SUPPORTING INFORMATION

Post-diagnosis body fatness, weight change and breast cancer prognosis: Global Cancer Update Programme (CUP Global) systematic literature review and meta-analysis

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Supplementary Text 1 Materials and Methods

This systematic literature review and meta-analysis was conducted as part of the on-going Global Cancer Update Programme (CUP Global), formally known as the WCRF/AICR Continuous Update Project (CUP)[18], which aims to update the evidence for cancer prevention recommendations[5]. The peer-reviewed protocol is available online[19]. The complete search strategies are shown below*. The PRISMA checklist is available in Supplementary Table S1.

Literature search

PubMed and Embase databases were searched for relevant peer-reviewed publications of any languages through 31st October 2021, using a search strategy that comprises the index terms and text words for the anthropometric factors and breast cancer outcomes. Relevant systematic literature reviews were searched in the Cochrane Database of Systematic Reviews. The reference lists of published meta-analyses, reviews and pooled projects were screened for any additional publications.

Study selection

Inclusion criteria were 1) Randomised controlled trials (RCTs) with at least six months of follow-up and/or intervention duration, longitudinal observational studies, and pooled analyses of individual data of these studies; 2) With at least 100 women diagnosed with first primary breast cancer during adulthood; 3) Reported results on post-diagnosis body mass index (BMI) (measure of general obesity), waist circumference or waist-hip-ratio (measures of abdominal obesity), and changes in weight or BMI in relation to breast cancer outcomes (all-cause mortality, breast cancer-specific mortality; breast cancer recurrence, any second primary cancers, non-breast cancer-related mortality, cardiovascular mortality).

Exclusion criteria were 1) Case report and ecologic, cross-sectional and case-control studies; 2) Articles published as comments, reviews, news or conference abstracts; 3) Articles from non-peer reviewed journals.

In the case of multiple publications from the same study or from studies of overlapping populations, the publication with the largest number of deaths or recurrent events was selected for meta-analysis. Pre-diagnosis or combined pre- and post-diagnosis associations were not meta-analysed in the current review. The studies were not excluded based on study quality.

Data extraction

The following variables were extracted into the CUP Global database: first author and publication year; study name, location, design, size, length of follow-up and those lost to follow-up; age,

menopausal status, year of diagnosis or treatment, disease characteristics, and cancer treatment of the participants; assessment method and definition of post-diagnosis exposure factors and breast cancer outcomes; exposure categories; numbers of outcome events and total participants per exposure category; estimates of relative risk (RR) or hazard ratios (HR) with their 95% confidence intervals (CI) or P-values; and covariate adjustment in the analysis.

Authors of the publications were not contacted for any missing information. Study selection and data extraction was conducted by the CUP Global team and at least 10% of the work was checked by a second reviewer. Any disagreements were resolved by consensus.

The quality of individual studies was not graded using a specific tool. Instead, relevant study characteristics that could be used to explore potential sources of bias were included into the CUP Global database. For all the included studies, information on potential for selection bias, information bias of exposure and outcome assessment, and residual confounding by cancer stage and treatment was retrieved after identifying the most likely influential sources of bias in cancer survival studies[20, 21]. The potential impact of measurement error, length of follow-up and loss to follow-up, and adjustment for confounding factors was tested in subgroup meta-analyses and meta-regression analyses. Details on how the study authors addressed the potential biases were also included. In the Expert Panel meeting, whether the studies had serious quality issues were discussed when judging the evidence for each exposure-outcome association.

Evidence synthesis

When at least three (additional) studies were identified in the updated search, a linear dose-response meta-analysis was conducted (or updated if reviewed previously with evidence up to 30th June 2012[5]) if the studies reported sufficient information for analysis, otherwise the studies were descriptively synthesised. Forest plots for the RR estimates comparing the highest with lowest exposure category were presented to aid results interpretation.

The definitions for “recurrence/relapse-free survival”, “breast cancer recurrence”, “disease-free survival”, “event-free survival”, “progression-free survival”, or “additional breast cancer events” varied between the studies, which could include local, regional and/or distant recurrence (metastasis), second primary breast cancer, any primary cancers, breast cancer-related death, and/or any causes of death. All such studies were reviewed under “recurrence”. When more than one “recurrence” outcomes were reported in a study, the outcome with the highest number of events, most often including any death (disease-free survival) was selected. For BMI, the number of studies allowed additional analysis by recurrence type (locoregional or distant recurrence), and whether non breast cancer-related deaths or any causes of death were included in the definition.

Statistical methods for meta-analysis

The summary relative risk (RR) estimates and their 95% confidence intervals (CIs) were calculated using inverse variance DerSimonian-Laird random-effects model that account for both within-study and between-study variation[22].

The RR estimates per exposure increment unit were pooled in a dose-response meta-analysis either with estimates provided in the original publications or estimated by us from category-specific risk estimates in the study using the generalised weighted least-squares regression model[23, 24].

Dose-response meta-analysis was conducted as it accounts for the different exposure levels in the included studies, and the presence of a plausible biological gradient in the association provides confidence on a causal relationship.

The required information for the estimation included RR estimates, and the 95% CIs of the estimates, numbers of events and total participants (missing in 0%-57% of the included studies across the present analyses), for at least three exposure categories with known mean or median values (not reported in the majority of the included studies). Standard imputations were conducted to calculate the required information when missing[25, 26]. Mid-point was assigned to each closed-ended exposure range and the width of the adjacent range was used to estimate the mid-point for an open-ended exposure category. The study was excluded from the analysis if imputation could not be done. When only RR estimates by subgroup of participants were reported, these were pooled in a fixed-effect model to calculate an overall study estimate before pooling with other studies. Post-hoc analyses showed that the summary RR estimates did not materially changed after the studies requiring imputations were excluded from the analyses of associations that received a strong-probable grade in the present review.

In the linear dose-response meta-analysis of BMI, underweight breast cancer survivors (BMI <18.5 kg/m^2 or as defined by studies) were excluded to avoid possible impact on the risk estimation. Pre- to post-diagnosis (≥1 year) weight change was grouped into moderate (5-10%), or high (>10%) weight loss or gain, following previous analyses[27, 28]. The RR estimates for the weight change groups were pooled in categorical meta-analyses comparing with the stable weight group (±5% weight or as defined by studies).

Multivariable adjusted estimates were selected for the meta-analyses. Between-study heterogeneity was assessed by the Cochran's Q test and I^2 statistic[29], with 30% and 50% as cut-points for low, moderate and high proportion of heterogeneity. In addition, forest plots were visually inspected for consistency of associations, noting the direction and size of the RR estimates, and overlapping of the CIs across included studies, as part of evidence grading. Pre-defined subgroup meta-analyses and random-effects meta-regression analyses were conducted to explore potential heterogeneity sources[30]. The factors investigated were: disease characteristics (menopausal status, hormone

receptor or molecular subtype, invasiveness, nodal status, cancer stage); study type and geographic location; exposure timing respective to cancer treatment; length and loss of follow-up; outcome definition (breast cancer recurrence) and number of events; and aspects of risk of bias (see above). Potential influence from changes of cancer regimens over time on the associations was examined by grouping the studies according to the period when women were diagnosed or treated for breast cancer before 2000 or after 2000 (when doxorubicin or cyclophosphamide use became more common[31], and before 2005 or after 2005 (when anthracycline use started to decline and taxane[32], and human epidermal growth factor receptor 2 (HER2) targeted therapy - trastuzumab[33] use concurrently increased).

The Egger's test and visual inspection of the funnel plots were conducted to examine publication bias such as small study bias, when there were more than ten studies[34]. Influence of single studies on the summary RR estimate was examined by leave-one-out analysis, where each study was omitted in turn from the meta-analysis[35].

Restricted cubic spline regression analysis, with three knots placed at the 10th, 50th, and 90th percentiles of the distribution of the exposure, was conducted and pooled in random-effects meta-analysis to explore the shape of the association when five or more studies with data from at least three exposure categories, including the underweight group if presented, were available[36, 37]. The difference between the linear and non-linear models was tested using a likelihood ratio test[38].

Stata 13.1 (StataCorp, College Station, TX, USA) was used for all statistical analysis.

Evidence grading

An independent Expert Panel (EG, MG, AJ, EK, VL, SC, AMcT) graded the quality of the evidence into strong (subgrades evaluating likelihood of causality: convincing, probable, or substantial effect on risk unlikely) or limited (subgrades evaluating likelihood of causality: limited-suggestive or limited-no conclusion) level, using pre-defined grading criteria to assess the quantity, consistency, magnitude and precision of the summary estimates, existence of a dose-response, study design and risk of bias, generalisability and mechanistic plausibility of the results (Supplementary Table S1).

***Search terms used for PubMed**

a. Searching for mortality, survival, recurrence, second cancer

1. Recurrence [MeSH Terms] OR "Neoplasm Recurrence, Local" [MeSH Terms] OR "Disease Progression"[MeSH Terms] OR "Disease-Free Survival"[MeSH Terms] OR Mortality[MeSH Terms] OR Mortality [Subheading] OR "Survival Analysis" [MeSH Terms] OR recurrence [tiab] OR recurrences [tiab] OR relapse [tiab] OR relapses [tiab] OR survivor [tiab] OR survivors [tiab] OR progression [tiab] OR survival [tiab] OR mortality [tiab] OR death [tiab] OR second cancer [tiab]

b. Searching for studies on breast cancer

(Search terms are those tested in the SLR for the WCRF/AICR Second Expert Report and the CUP)

2. Breast Neoplasms [MeSH Terms]

3. Breast AND (cancer* OR neoplasm* OR tumor* OR tumor* OR carcinoma* OR adenocarcinoma*)

4. mammary AND (cancer* OR neoplasm* OR tumor* OR tumor* OR carcinoma* OR adenocarcinoma*)

5. #2 OR #3 OR #4

c. Search for all studies relating to diet, body fatness and physical activity

6. diet therapy[MeSH Terms] OR nutrition[MeSH Terms]

7. diet[tiab] OR diets[tiab] OR dietetic[tiab] OR dietary[tiab] OR eating[tiab] OR intake[tiab] OR nutrient*[tiab] OR nutrition[tiab] OR vegetarian*[tiab] OR vegan*[tiab] OR "seventh day adventist"[tiab] OR macrobiotic[tiab]

8. “food and beverages” [MeSH Terms]

9. food*[tiab] OR cereal*[tiab] OR grain*[tiab] OR granary[tiab] OR wholegrain[tiab] OR wholewheat[tiab] OR roots[tiab] OR plantain*[tiab] OR tuber[tiab] OR tubers[tiab] OR vegetable*[tiab] OR fruit*[tiab] OR pulses[tiab] OR beans[tiab] OR

lentils[tiab] OR chickpeas[tiab] OR legume*[tiab] OR soy[tiab] OR soya[tiab] OR nut[tiab] OR nuts[tiab] OR peanut*[tiab] OR groundnut*[tiab] OR (seeds[tiab] AND (diet*[tiab] OR food*[tiab])) OR meat[tiab] OR beef[tiab] OR pork[tiab] OR lamb[tiab] OR poultry[tiab] OR chicken[tiab] OR turkey[tiab] OR duck[tiab] OR (fish[tiab] AND (diet*[tiab] OR food*[tiab])) OR ((fat[tiab] OR fats[tiab] OR fatty[tiab]) AND (diet*[tiab] OR food*[tiab] OR adipose[tiab] OR blood[tiab] OR serum[tiab] OR plasma[tiab])) OR egg[tiab] OR eggs[tiab] OR bread[tiab] OR (oils[tiab] AND (diet*[tiab] OR food*[tiab] OR adipose[tiab] OR blood[tiab] OR serum[tiab] OR plasma[tiab])) OR shellfish[tiab] OR seafood[tiab] OR sugar[tiab] OR syrup[tiab] OR dairy[tiab] OR milk[tiab] OR herbs[tiab] OR spices[tiab] OR chilli[tiab] OR chillis[tiab] OR pepper*[tiab] OR condiments[tiab] OR tomato*[tiab]

10. fluid intake[tiab] OR water[tiab] OR drinks[tiab] OR drinking[tiab] OR tea[tiab] OR coffee[tiab] OR caffeine[tiab] OR juice[tiab] OR beer[tiab] OR spirits[tiab] OR liquor[tiab] OR wine[tiab] OR alcohol[tiab] OR alcoholic[tiab] OR beverage*[tiab] OR (ethanol[tiab] AND (drink*[tiab] OR intake[tiab] OR consumption[tiab])) OR yerba mate[tiab] OR ilex paraguariensis[tiab]

11. pesticides[MeSH Terms] OR fertilizers[MeSH Terms] OR "veterinary drugs"[MeSH Terms]

12. pesticide*[tiab] OR herbicide*[tiab] OR DDT[tiab] OR fertiliser*[tiab] OR fertilizer*[tiab] OR organic[tiab] OR contaminants[tiab] OR contaminate*[tiab] OR veterinary drug*[tiab] OR polychlorinated dibenzofuran*[tiab] OR PCDF*[tiab] OR polychlorinated dibenzodioxin*[tiab] OR PCDD*[tiab] OR polychlorinated biphenyl*[tiab] OR PCB*[tiab] OR cadmium[tiab] OR arsenic[tiab] OR chlorinated hydrocarbon*[tiab] OR microbial contamination*[tiab]

13. food preservation[MeSH Terms]

14. (mycotoxin*[tiab] OR aflatoxin*[tiab] OR pickled[tiab] OR bottled[tiab] OR bottling[tiab] OR canned[tiab] OR canning[tiab] OR vacuum pack*[tiab] OR refrigerate*[tiab] OR refrigeration[tiab] OR cured[tiab] OR smoked[tiab] OR preserved[tiab] OR preservatives[tiab] OR nitrosamine[tiab] OR hydrogenation[tiab] OR fortified[tiab] OR additive*[tiab] OR colouring*[tiab] OR coloring*[tiab] OR flavouring*[tiab] OR flavoring*[tiab] OR nitrates[tiab] OR nitrites[tiab] OR solvent[tiab] OR solvents[tiab] OR ferment*[tiab] OR processed[tiab] OR antioxidant*[tiab] OR genetic modif*[tiab] OR genetically modif*[tiab] OR vinyl chloride[tiab] OR packaging[tiab] OR labelling[tiab] OR phthalates[tiab]) AND (diet*[tiab] OR food*[tiab] OR adipose[tiab] OR blood[tiab] OR serum[tiab] OR plasma[tiab])

15. cookery[MeSH Terms]

16. cooking[tiab] OR cooked[tiab] OR grill[tiab] OR grilled[tiab] OR fried[tiab] OR fry[tiab] OR roast[tiab] OR bake[tiab] OR baked[tiab] OR stewing[tiab] OR stewed[tiab] OR casserol*[tiab] OR broil[tiab] OR broiled[tiab] OR boiled[tiab] OR ((microwave[tiab] OR microwaved[tiab] OR re-heating[tiab] OR reheating[tiab] OR heating[tiab] OR re-heated[tiab] OR heated[tiab]) AND (diet*[tiab] OR food*[tiab])) OR poach[tiab] OR poached[tiab] OR steamed[tiab] OR barbecue*[tiab] OR chargrill*[tiab] OR heterocyclic amines[tiab] OR polycyclic aromatic hydrocarbons[tiab]

17. ((carbohydrates[MeSH Terms] OR proteins[MeSH Terms]) AND (diet*[tiab] OR food*[tiab])) OR sweetening agents[MeSH Terms]

18. (salt[tiab] OR salting[tiab] OR salted[tiab] OR fiber[tiab] OR fibre[tiab] OR polysaccharide*[tiab] OR starch[tiab] OR starchy[tiab] OR carbohydrate*[tiab] OR lipid*[tiab] OR linoleic acid*[tiab] OR sterols[tiab] OR stanols[tiab] OR sugar*[tiab] OR sweetener*[tiab] OR saccharin*[tiab] OR aspartame[tiab] OR acesulfame[tiab] OR cyclamates[tiab] OR maltose[tiab] OR mannitol[tiab] OR sorbitol[tiab] OR sucrose[tiab] OR xylitol[tiab] OR cholesterol[tiab] OR protein[tiab] OR proteins[tiab] OR hydrogenated dietary oils[tiab] OR hydrogenated lard[tiab] OR hydrogenated oils[tiab]) AND (diet*[tiab] OR food*[tiab] OR adipose[tiab] OR blood[tiab] OR serum[tiab] OR plasma[tiab])

19. vitamins[MeSH Terms]

20. supplements[tiab] OR supplement[tiab] OR vitamin*[tiab] OR retinol[tiab] OR carotenoid*[tiab] OR tocopherol[tiab] OR folate*[tiab] OR folic acid[tiab] OR methionine[tiab] OR riboflavin[tiab] OR thiamine[tiab] OR niacin[tiab] OR pyridoxine[tiab] OR cobalamin[tiab] OR mineral*[tiab] OR (sodium[tiab] AND (diet*[tiab] OR food*[tiab])) OR iron[tiab] OR ((calcium[tiab] AND (diet*[tiab] OR food*[tiab] OR supplement*[tiab])) OR selenium[tiab] OR (iodine[tiab] AND (diet*[tiab] OR food*[tiab] OR supplement*[tiab] OR deficiency)) OR magnesium[tiab] OR potassium[tiab] OR zinc[tiab] OR copper[tiab] OR phosphorus[tiab] OR manganese[tiab] OR chromium[tiab] OR phytochemical[tiab] OR allium[tiab] OR isothiocyanate*[tiab] OR glucosinolate*[tiab] OR indoles[tiab] OR polyphenol*[tiab] OR phytestrogen*[tiab] OR genistein[tiab] OR saponin*[tiab] OR coumarin*[tiab] OR lycopene[tiab]

21. physical fitness[MeSH Terms] OR physical exertion[MeSH Terms] OR physical endurance[MeSH Terms] OR walking[MeSH Terms] OR exercise[MeSH Terms] OR muscle stretching exercises[MeSH Terms] OR tai ji[MeSH Terms] OR yoga[MeSH Terms] OR sedentary lifestyle[MeSH Terms]

22. recreational activit*[tiab] OR household activit*[tiab] OR occupational activit*[tiab] OR physical activit*[tiab] OR physical inactivit*[tiab] OR exercise[tiab] OR exercising[tiab] OR energy intake[tiab] OR energy expenditure[tiab] OR energy

balance[tiab] OR energy density[tiab] OR sedentar*[tiab] OR standing[tiab] OR sitting[tiab] OR television[tiab] OR aerobic activities[tiab] OR aerobic activity[tiab] OR cardiovascular activities[tiab] OR cardiovascular activity[tiab] OR endurance activities[tiab] OR endurance activity[tiab] OR resistance training[tiab] OR strength training[tiab] OR physical conditioning[tiab] OR functional training[tiab] OR leisure-time physical activity[tiab] OR lifestyle activities[tiab] OR lifestyle activity[tiab] OR qi gong[tiab] OR tai chi[tiab] OR tai ji[tiab] OR yoga[tiab] OR free living activities[tiab] OR free living activity[tiab] OR walk[tiab] OR walking[tiab]

23. body weight[MeSH Terms] OR anthropometry[MeSH Terms] OR body composition[MeSH Terms] OR body constitution[MeSH Terms] OR body size[MeSH Terms] OR body size[tiab]

24. weight loss[tiab] OR weight gain[tiab] OR anthropometry[tiab] OR birth weight[tiab] OR birthweight[tiab] OR birth-weight[tiab] OR child development[tiab] OR height[tiab] OR body composition[tiab] OR body mass index[tiab] OR BMI[tiab] OR obesity[tiab] OR obese[tiab] OR overweight[tiab] OR over-weight[tiab] OR over weight[tiab] OR skinfold measurement*[tiab] OR skinfold thickness[tiab] OR DEXA[tiab] OR bio-impedence[tiab] OR waist circumference[tiab] OR hip circumference[tiab] OR waist hip ratio*[tiab]

25. #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24

d. Limiting to human studies:

26. animal [MeSH Terms] NOT human [MeSH Terms]

27. #25 NOT #26

e. Combining the searches for each cancer

(a) AND (b) AND (c) AND (d)

i.e. #1 AND #5 AND #27

*Search terms used for OVID Embase

a. Searching for mortality, survival, recurrence, second cancer

1 *Recurrent disease/
2 *Disease exacerbation/
3 Disease free survival/
4 mortality/ or all-cause mortality/ or cancer mortality/ or cardiovascular mortality/ or mortality rate/ or premature mortality/
5 Survival analysis/
6 Relapse/
7 Survivor/
8 Second cancer/
9 (recur$ or local recurrence or progression or relap$ or prognos$ or surviv$ or mortality or death or (second$ adj5 primar$)).ab,ti.
10 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9

b. Searching for studies on breast cancer

11 breast tumor/
12 (breast and (cancer$ or neoplasm$ or tumour$ or tumor$ or carcinoma$ or adenocarcinoma$)).tw,kw.
13 (mammary and (cancer$ or neoplasm$ or tumour$ or tumor$ or carcinoma$ or adenocarcinoma$)).tw,kw.
14 11 or 12 or 13

c. Search for all studies relating to diet, body fatness and physical activity

15 Diet therapy/
16 Nutrition/
17 (diet or diets or dietetic$ or dietary or eating or intake or nutrient$ or nutrition or vegetarian$ or vegan$ or (seventh adj1 day adj1 adventist) or macrobiotic).ab,ti.
18 15 or 16 or 17
19 Food/
20 (food$ or cereal$ or grain$ or granary or wholegrain or wholewheat or roots or plantain$ or tuber or tubers or vegetable$ or fruit$ or pulses or beans or lentils or chickpeas or legume$ or soy or soya or nut or nuts or peanut$ or groundnut$ or (seeds and (diet$ or food$))).ab,ti.
21 (meat or beef or pork or lamb or poultry or chicken or turkey or duck or (fish and (diet$ or food$)) or ((fat or fats or fatty) and (diet$ or food$ or adipose or blood or serum or plasma)) or egg or eggs or bread or (oils and (diet$ or food$ or adipose or blood or serum or plasma)) or shellfish or seafood or sugar or syrup or dairy or milk or herbs or spices or chilli or chillis or pepper$ or condiments or tomato$).ab,ti.
22 19 or 20 or 21

23 Beverage/

24 (fluid intake or water or drinks or drinking or tea or coffee or caffeine or juice or beer or spirits or liquor or wine or alcohol or alcoholic or beverage$ or (ethanol and (drink$ or intake or consumption)) or yerba mate or ilex or paraguariensis).ab,ti.

25 23 or 24

26 *Pesticide/

27 *Fertilizer/

28 *Veterinary drug/

29 (pesticide$ or herbicide$ or DDT or fertiliser$ or fertilizer$ or organic or contaminents or contaminate$ or veterinary drug$ or polychlorinated dibenzofuran$ or PCDF$ or polychlorinated dibenzodioxin$ or PCDD$ or polychlorinated biphenyl$ or PCB$ or cadmium or arsenic or chlorinated hydrocarbon$ or microbial contamination$).ab,ti.

30 26 or 27 or 28 or 29

31 Food Preservation/

32 ((mycotoxin$ or aflatoxin$ or pickled or bottled or bottling or canned or canning or vacuum pack$ or refrigerate$ or refrigeration or cured or smoked or preserved or preservatives or nitrosamine or hydrogenation or fortified or additive$ or colouring$ or coloring$ or flavouring$ or flavoring$ or nitrates or nitrites or solvent or solvents or ferment$ or processed or antioxidant$ or genetic modif$ or genetically modif$ or vinyl chloride or packaging or labelling or phthalates) and (diet$ or food$ or adipose or blood or serum or plasma)).ab,ti.

33 31 or 32

34 Cooking/

35 (cooking or cooked or grill or grilled or fried or fry or roast or bake or baked or stewing or stewed or casserol$ or broil or broiled or boiled or (microwave or microwaved or re-heating or reheating or heating or re-heated or heated and (diet$ or food$)) or poach or poached or steamed or barbecue$ or chargrill$ or heterocyclic amines or polycyclic aromatic hydrocarbons).ab,ti.

36 34 or 35

37 Carbohydrate/ and ((diet$ or food$).ab,ti.)

38 Protein/ and ((diet$ or food$).ab,ti.)

39 Sweetening agent/

40 ((salt or salting or salted or fiber or fibre or polysaccharide$ or starch or starchy or carbohydrate$ or lipid$ or linoleic acid$ or sterols or stanols or sugar$ or sweetener$ or saccharin$ or aspartame or acesulfame or cyclamates or maltose or mannitol or sorbitol or sucrose or xylitol or cholesterol or hydrogenated dietary oils or hydrogenated lard or hydrogenated oils or protein$) and (diet$ or food$ or adipose or blood or serum or plasma)).ab,ti.

41 37 or 38 or 39 or 40

42 Vitamins/

43 Vitamin D/ or (supplements or supplement or vitamin$ or retinol or carotenoid$ or tocopherol or folate$ or folic acid or methionine or riboflavin or thiamine or niacin or pyridoxine or cobalamin or mineral$ or (sodium and (diet$ or food$)) or iron or (calcium and (diet$ or food$ or supplement$)) or selenium or (iodine and (diet$ or food$ or supplement$ or deficiency)) or magnesium or potassium or zinc or copper or phosphorus or manganese or chromium or phytochemical or allium or isothiocyanate$ or glucosinolate$ or indoles or polyphenol$ or phytoestrogen$ or genistein or saponin$ or coumarin$ or lycopene).ab,ti.

44 42 or 43

45 *Fitness/

46 Exercise/

47 *Endurance/

48 Walking/

49 Stretching exercise/

50 Tai Chi/

51 Qigong/

52 Yoga/

53 Sedentary lifestyle/

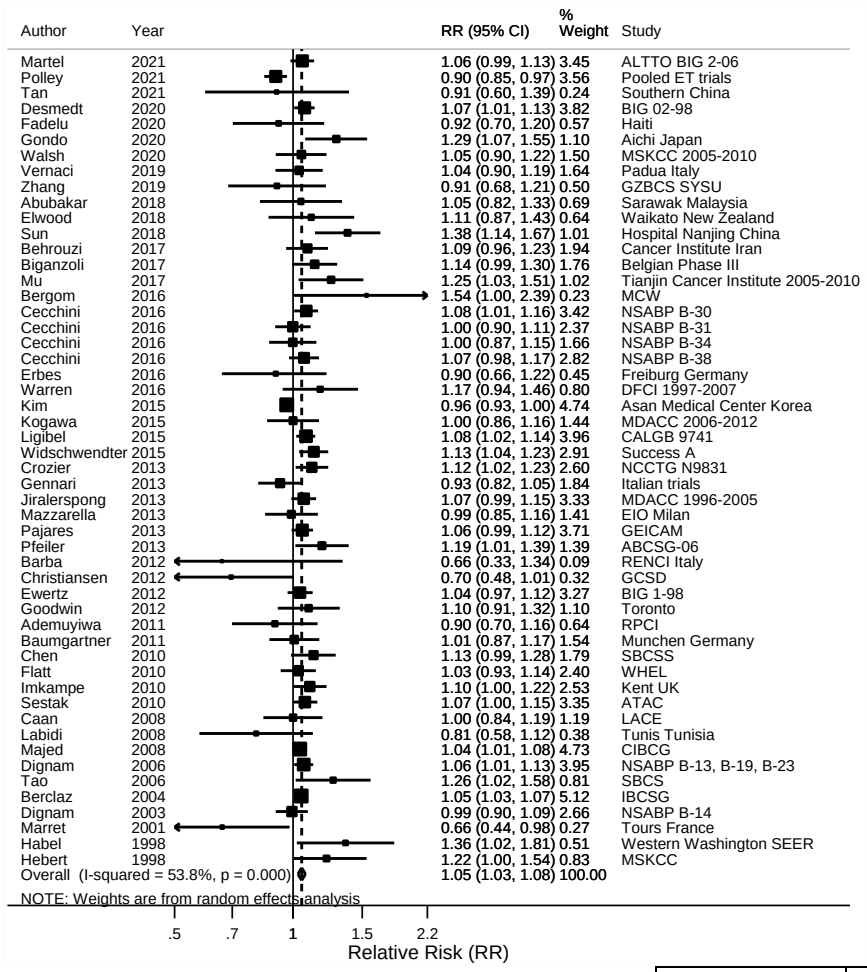
54 (physical fitness or physical exertion or physical endurance or muscle stretching exercise$ or recreational activit$ or household activit$ or occupational activit$ or physical activit$ or physical inactivit$ or exercise$ or exercising or energy intake or energy expenditure or energy balance or energy density or sedentar$ or standing or sitting or television viewing or aerobic activit$ or cardiovascular activit$ or endurance activit$ or resistance training or strength training or physical conditioning or functional training or leisure time physical activit$ or lifestyle activit$ or qigong or tai chi or tai ji or yoga or free living activit$ or walk or walking).ab,ti.

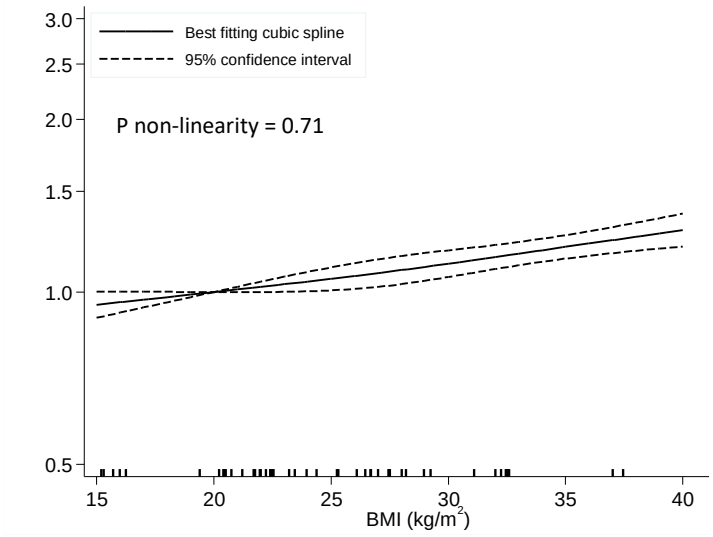
55 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54
56 Body weight/
57 Anthropometry/
58 Body Composition/
59 Body Constitution/
60 Body size/
61 (weight or weight loss or weight gain or anthropometry or birth weight or birthweight or birth weight or child development or height or body composition or fat distribution or body mass or BMI or obesity or obese or overweight or over weight or skinfold measurement$ or skinfold thickness or DEXA or bio-impedence or waist circumference or hip circumference or waist hip ratio$ or body size).ab,ti.
62 56 or 57 or 58 or 59 or 60 or 61
63 18 or 22 or 25 or 30 or 33 or 36 or 41 or 44 or 55 or 62
64 exp animal/
65 exp human/
66 64 not 65
67 63 not 66

d. Combined

68 10 and 14 and 67

Supplementary Figure S1 Linear and non-linear dose-response meta-analyses of post-diagnosis body mass index and breast cancer recurrence

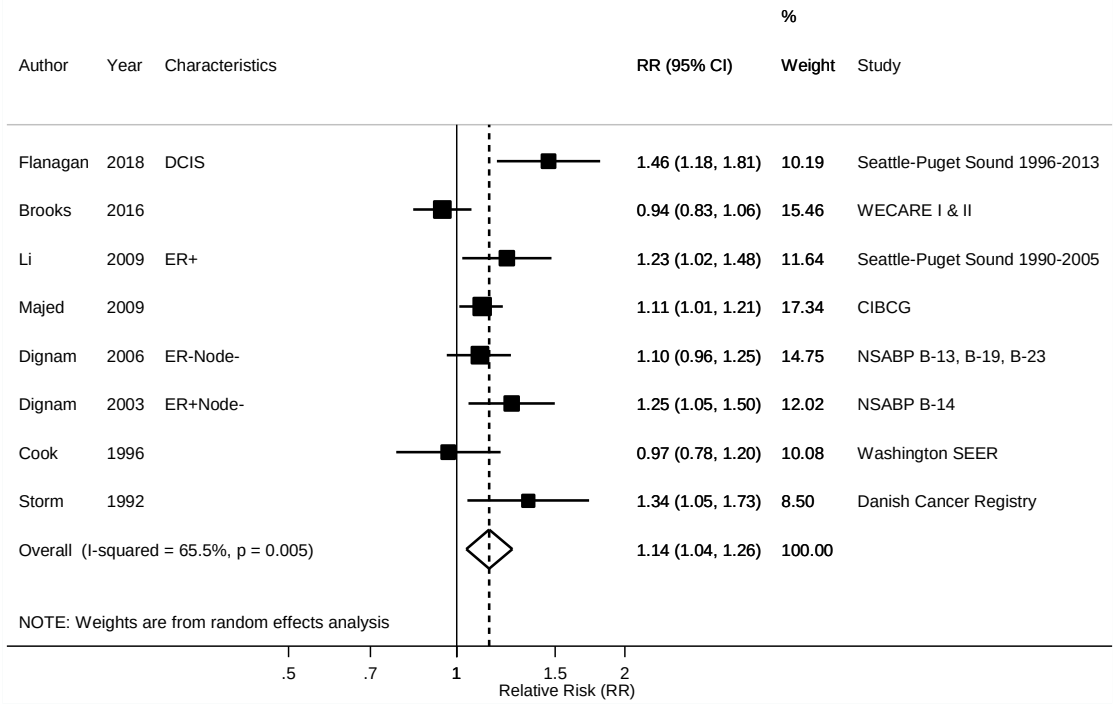


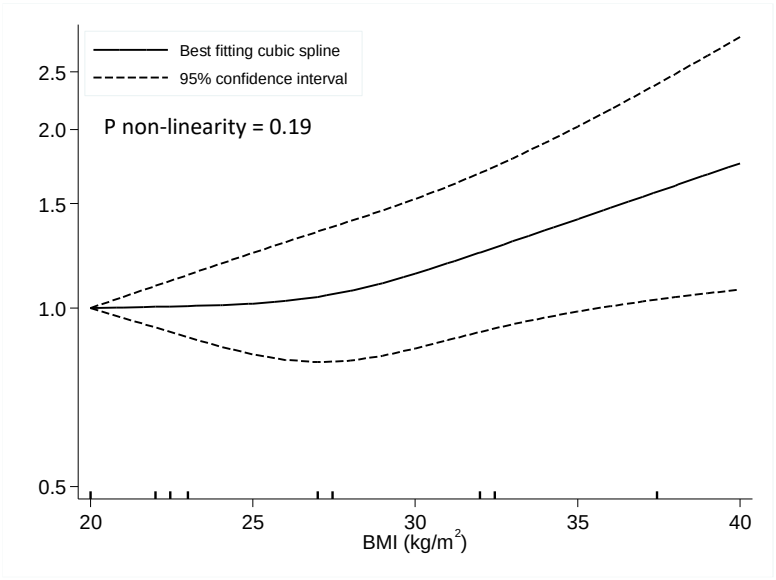


BMI (kg/m^2)	RR estimates (95% CI)
16	0.96 (0.92-1.00)
18	0.98 (0.96-1.00)
20	1.00
22	1.02 (1.00-1.04)
25	1.05 (1.01-1.10)
27	1.08 (1.02-1.14)
30	1.12 (1.06-1.18)
32	1.15 (1.10-1.21)
35	1.20 (1.14-1.26)
37	1.23 (1.17-1.30)

Figure legend: Forest plot shows the linear dose-response results (per 5 kg/m^2) from the inverse variance DerSimonian-Laird random-effects model. Diamond represents the summary relative risk (RR) estimate and its width as the 95% confidence interval (CI). Each square and the horizontal line across the square represents the RR estimate and its 95% CI of the individual study. Non-linear curve was estimated using restricted cubic spline regression with three knots at 10th, 50th and 90th percentiles of distribution of the exposure and pooled in random-effects meta-analysis. The table shows the estimated RRs and 95% CIs for selected BMI values comparing to BMI at 20 kg/m^2 as reference.

Supplementary Figure S2 Linear and nonlinear dose-response meta-analyses of post-diagnosis body mass index and second primary breast cancer

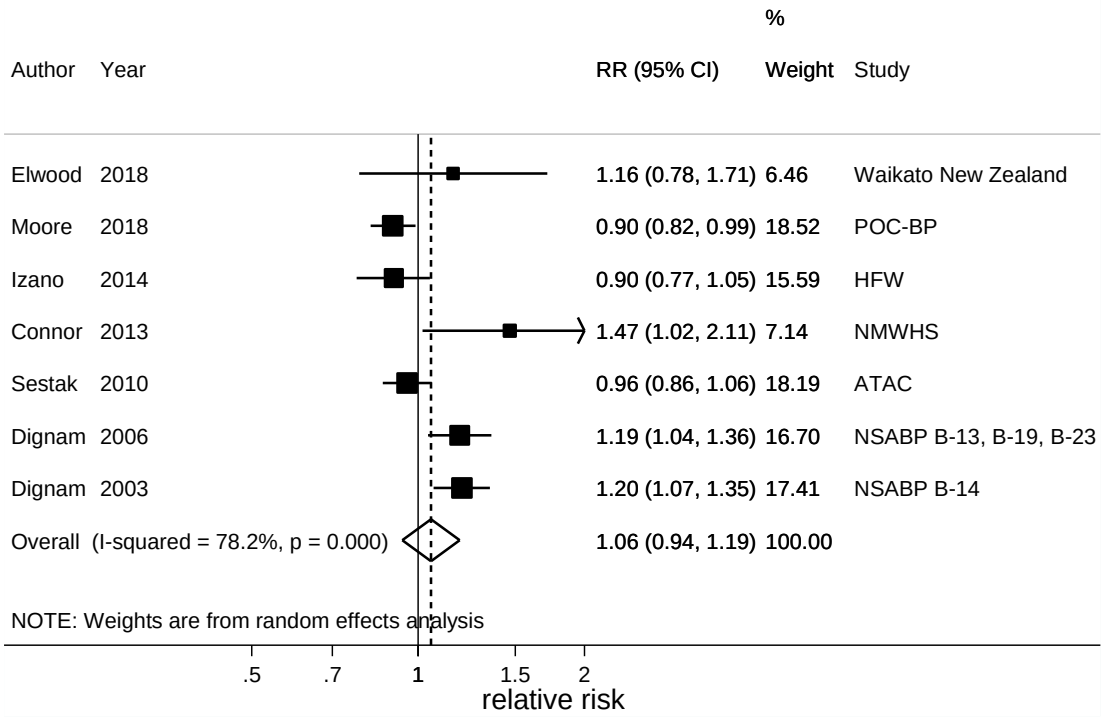




BMI (kg/m^2)	RR estimates (95% CI)
20	1.00
22	1.01 (0.93-1.09)
25	1.02 (0.84-1.24)
27	1.04 (0.81-1.35)
30	1.14 (0.85-1.53)

Figure legend: Forest plot shows the linear dose-response results (per 5 kg/m^2) from the inverse variance DerSimonian-Laird random-effects model. Diamond represents the summary relative risk (RR) estimate and its width as the 95% confidence interval (CI). Each square and the horizontal line across the square represents the RR estimate and its 95% CI of the individual study. Non-linear curve was estimated using restricted cubic spline regression with three knots at 10th, 50th and 90th percentiles of distribution of the exposure and pooled in random-effects meta-analysis. The table shows the estimated RRs and 95% CIs for selected BMI values comparing to BMI at 20 kg/m^2 as reference. DCIS, ductal carcinoma in situ; ER, oestrogen receptor.

Supplementary Figure S3 Linear dose-response meta-analyses of post-diagnosis body mass index and non-breast cancer related mortality



Supplementary Figure S4 Linear dose-response meta-analyses of post-diagnosis body mass index and cardiovascular mortality

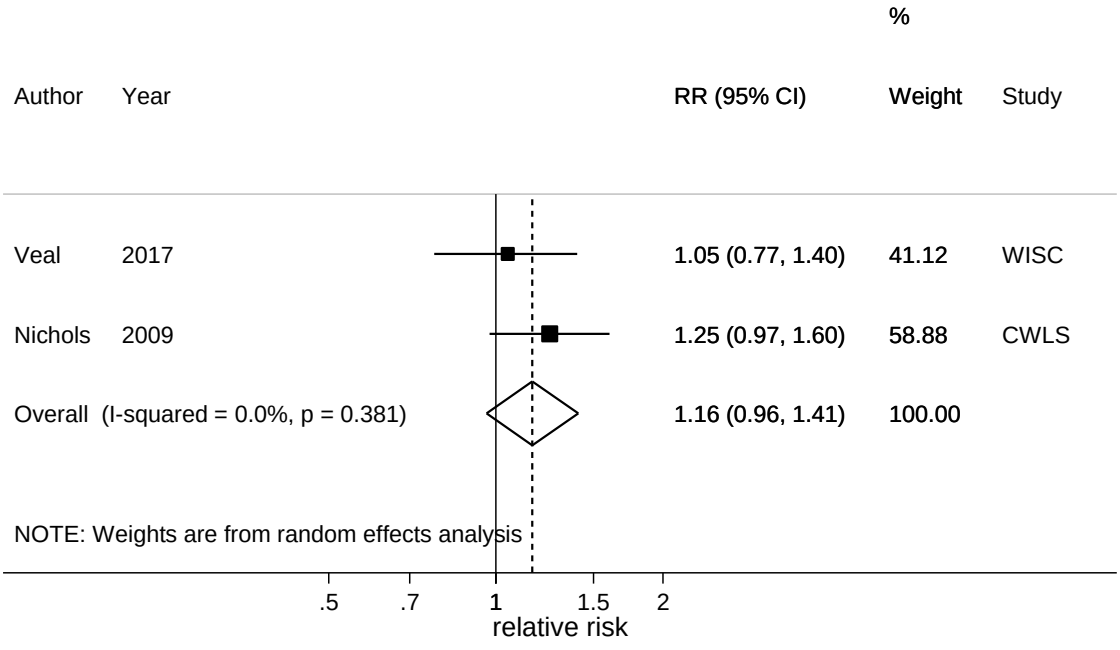


Figure legend: Forest plot shows the linear dose-response results (per 5 kg/m^2) from the inverse variance DerSimonian-Laird random-effects model. Diamond represents the summary relative risk (RR) estimate and its width as the 95% confidence interval (CI). Each square and the horizontal line across the square represents the RR estimate and its 95% CI of the individual study.

Supplementary Figure S5 Forest plot for the comparison of the highest versus lowest category of post-diagnosis BMI and all-cause mortality

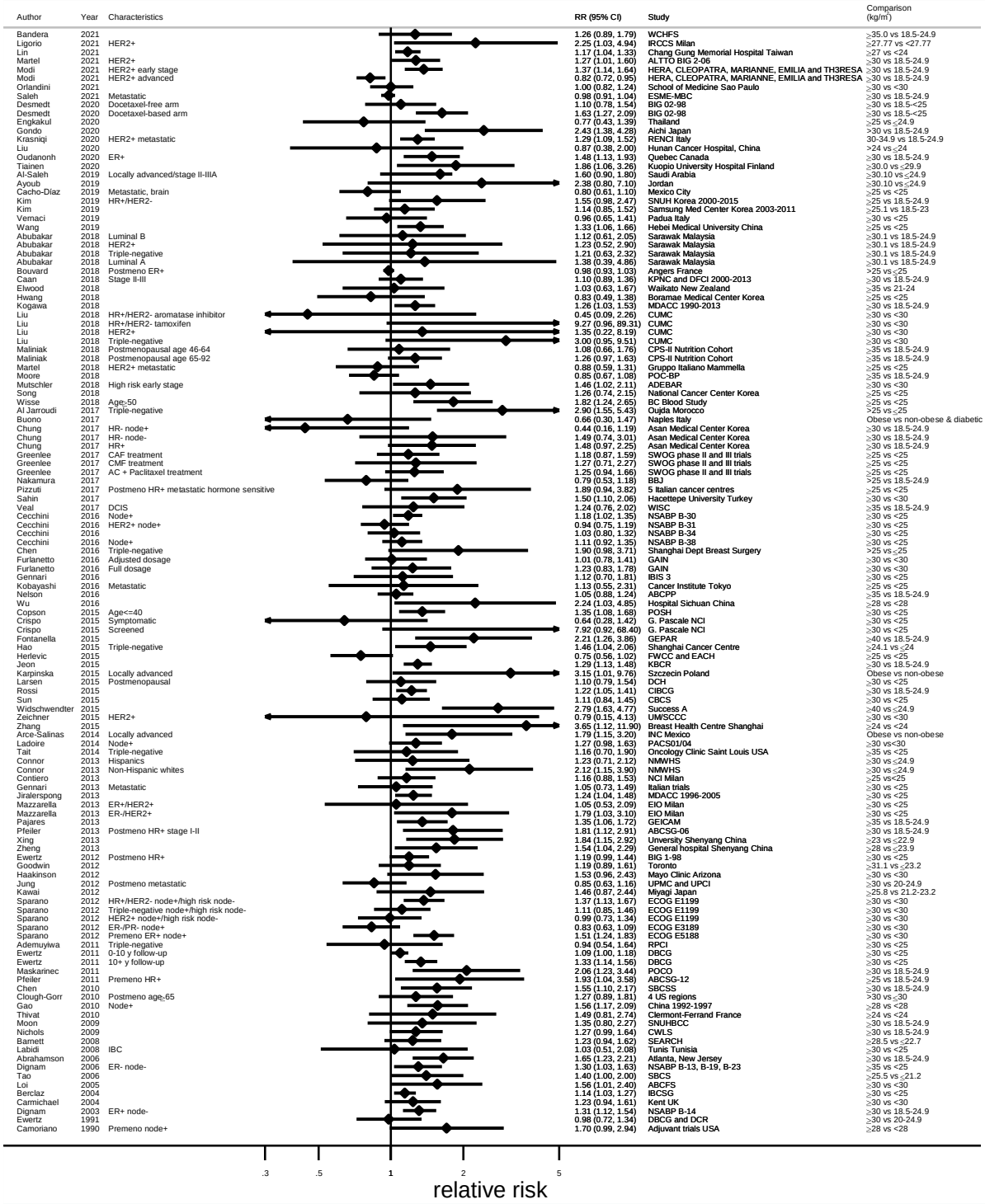


Figure legend: Forest plot shows the results for the highest versus lowest BMI categories. Each diamond and the horizontal line across the diamond represents the relative risk (RR) estimate and its 95% confidence interval (CI) of the individual study. A total of 101 publications were included. 60 publications (54% of the reviewed publications) were not available in the dose-response meta-analysis[139, 140, 142, 145, 147, 148, 151, 153, 155-157, 159, 161-164, 166, 167, 170, 173, 176, 177, 181, 182, 184, 185, 187, 189, 191, 193, 194, 197, 202-204, 207, 209, 213, 219-221, 223, 224, 228-235, 239, 242-244, 248, 250-252, 327]. AC, doxorubicin, cyclophosphamide; CAF, cyclophosphamide, doxorubicin, and 5-fluorouracil; CMF, cyclophosphamide, methotrexate, and 5-fluorouracil; DCIS, ductal carcinoma in situ; ER, oestrogen receptor; HER2, human epidermal growth factor receptor 2; HR, hormone receptor; IBC, inflammatory breast cancer; Premeno, premenopausal women; Postmeno, postmenopausal women.

Supplementary Figure S6 Forest plot for the comparison of the highest versus lowest category of post-diagnosis BMI and breast cancer-specific mortality

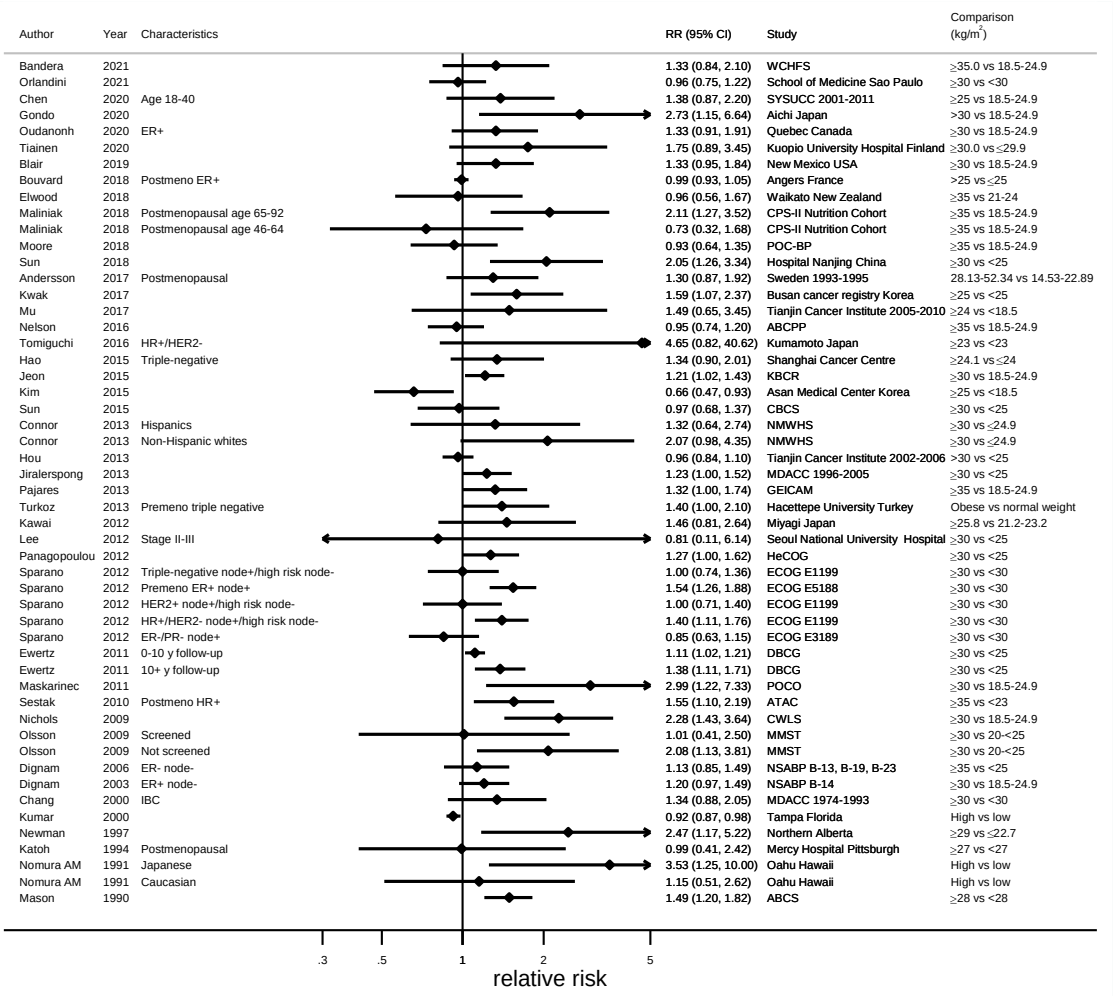


Figure legend: Forest plot shows the results for the highest versus lowest BMI categories. Each diamond and the horizontal line across the diamond represents the relative risk (RR) estimate and its 95% confidence interval (CI) of the individual study. A total of 43 publications were included. 16 publications (34% of the reviewed publications) were not available in the dose-response meta-analysis[83, 150, 159, 167, 174, 179, 180, 188, 192, 203, 205, 206, 223, 227, 232, 243]. ER, oestrogen receptor; HER2, human epidermal growth factor receptor 2; HR, hormone receptor; IBC, inflammatory breast cancer; Premeno, premenopausal women; Postmeno, postmenopausal women.

Supplementary Figure S7 Forest plot for the comparison of the highest versus lowest category of post-diagnosis BMI and breast cancer recurrence

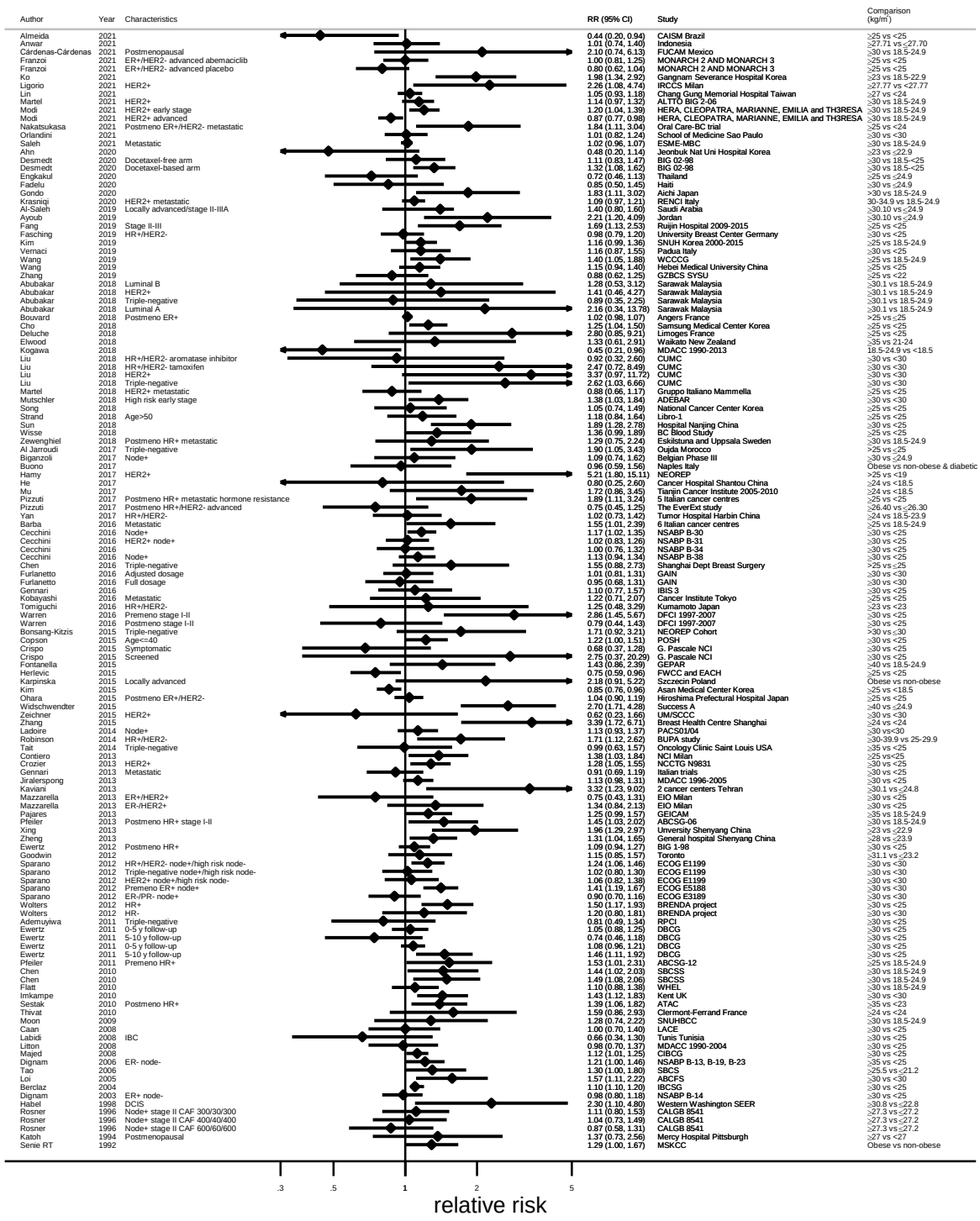
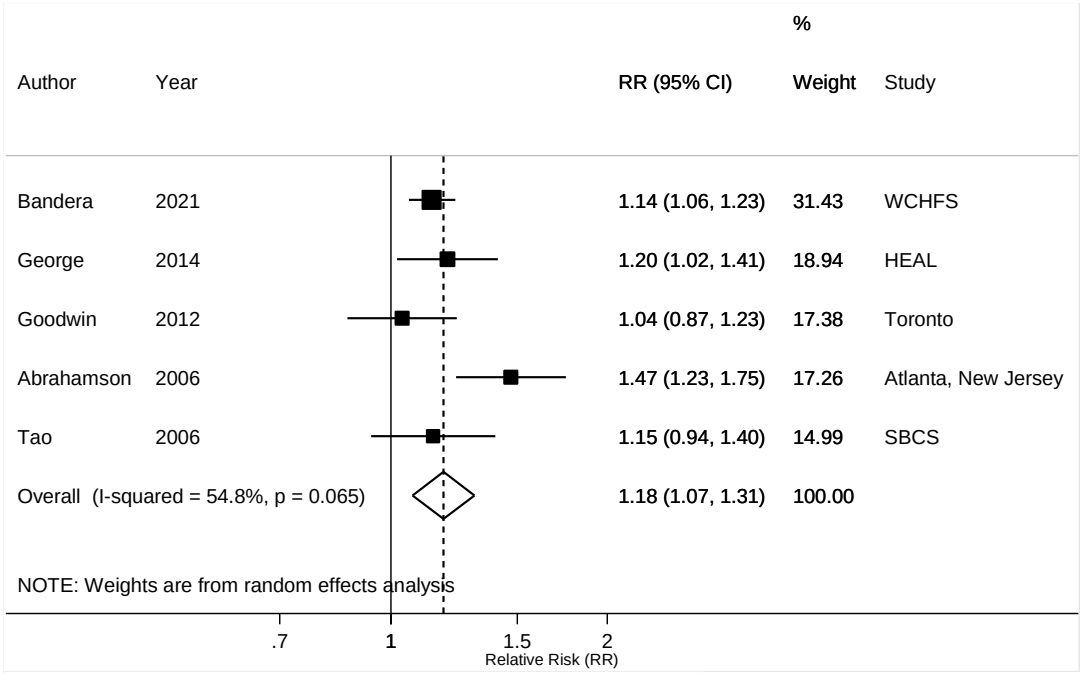
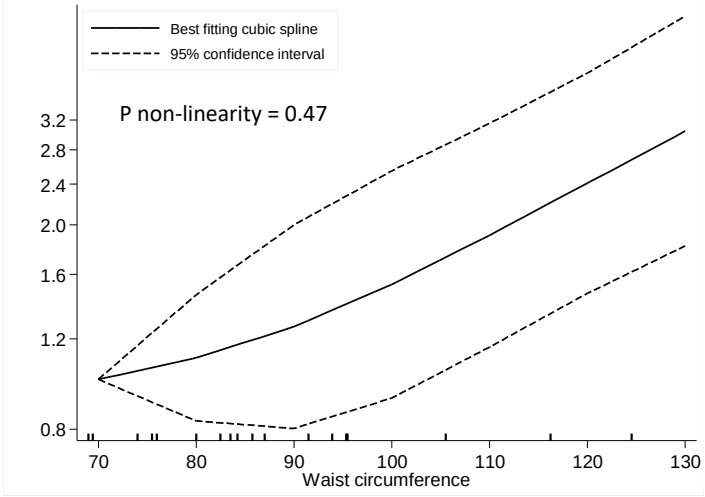


Figure legend: Forest plot shows the results for the highest versus lowest BMI categories. Each diamond and the horizontal line across the diamond represents the relative risk (RR) estimate and its 95% confidence interval (CI) of the individual study. A total of 108 publications were included. 70 publications (59% of the reviewed publications) were not available in the dose-response meta-analysis[111, 139, 141, 144, 145, 151, 152, 155-159, 161, 162, 164, 169, 170, 173, 174, 176, 177, 181, 183-185, 187, 189, 191, 193, 194, 196, 201-205, 207, 208, 210, 212, 213, 215-217, 219-224, 226, 228, 230, 233, 234, 236-239, 241-243, 245-251, 253]. CAF, cyclophosphamide, doxorubicin, and 5-fluorouracil; ER, oestrogen receptor; HER2, human epidermal growth factor receptor 2; HR, hormone receptor; IBC, inflammatory breast cancer; Premeno, premenopausal women; Postmeno, postmenopausal women.

Supplementary Figure S8 Linear and non-linear dose-response meta-analyses of post-diagnosis waist circumference and all-cause mortality





Waist (cm)	RR estimates (95% CI)
70	1
80	1.10 (0.83-1.46)
90	1.27 (0.80-2.00)
100	1.53 (0.92-2.55)
110	1.91 (1.16-3.15)

Figure legend: Forest plot shows the linear dose-response results (per 10 cm) from the inverse variance DerSimonian-Laird random-effects model. Diamond represents the summary relative risk (RR) estimate and its width as the 95% confidence interval (CI). Each square and the horizontal line across the square represents the RR estimate and its 95% CI of the individual study. Non-linear curve was estimated using restricted cubic spline regression with three knots at 10th, 50th and 90th percentiles of distribution of the exposure and pooled in random-effects meta-analysis. The estimated RRs and 95% CIs for selected waist circumference values comparing to 70 cm as reference are presented in the table.

Supplementary Figure S9 Linear dose-response meta-analysis of post-diagnosis waist circumference and breast cancer-specific mortality

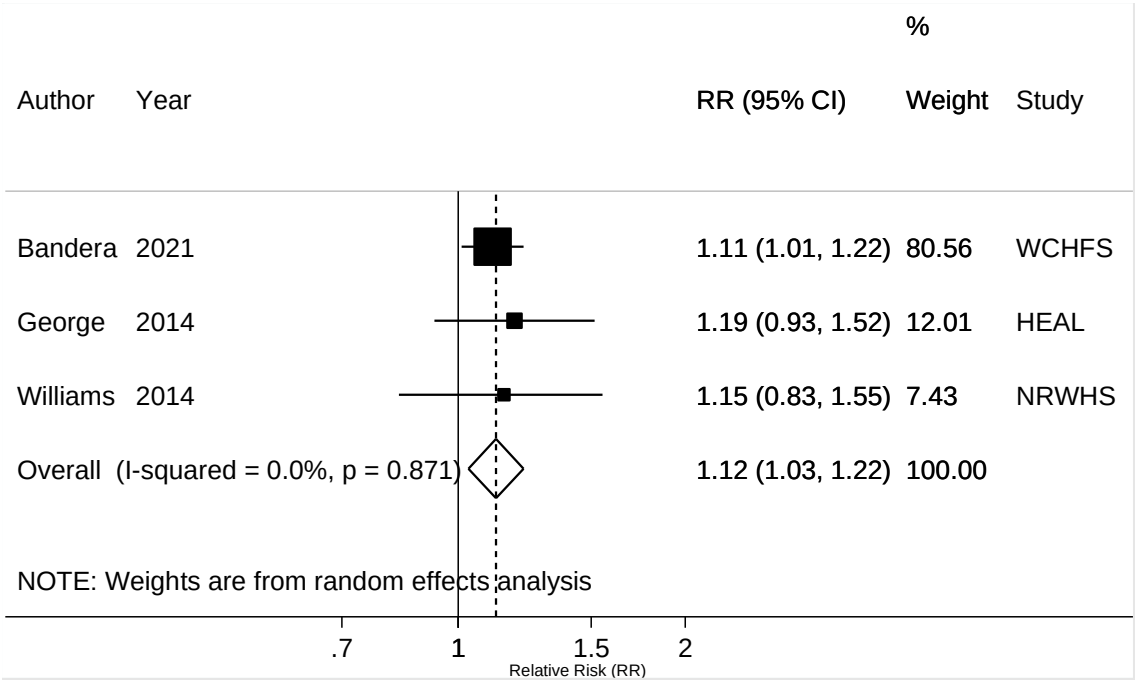
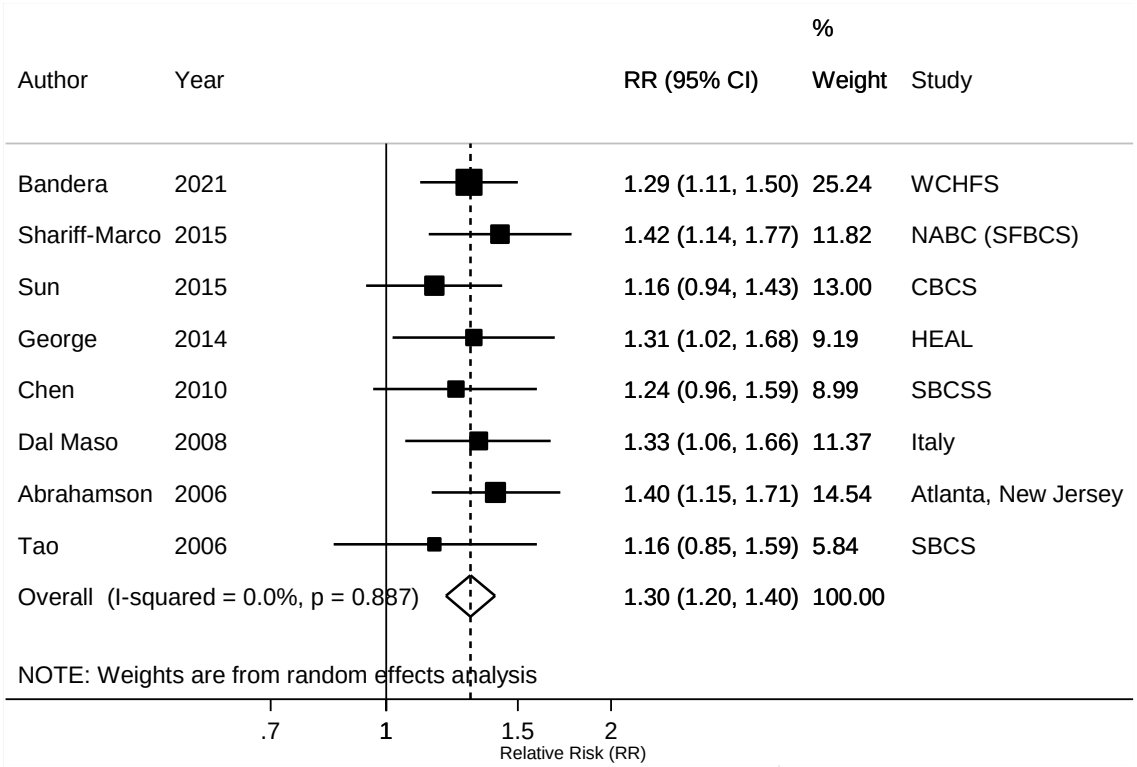
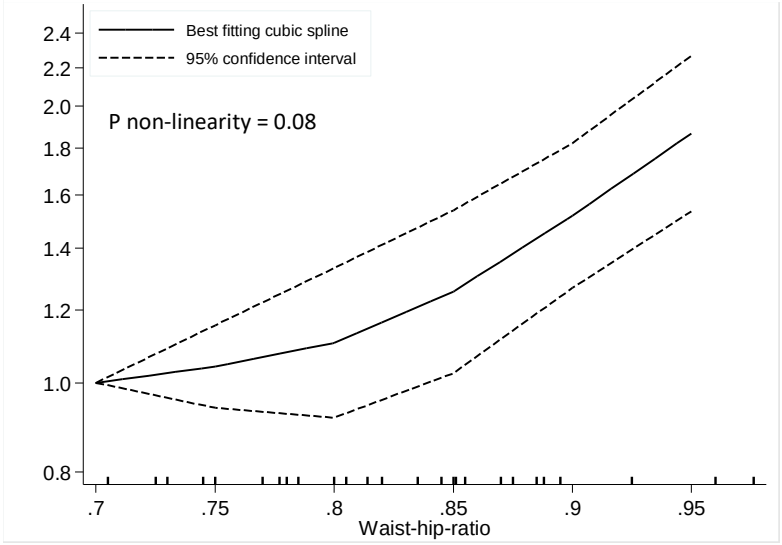


Figure legend: Forest plot shows the linear dose-response results (per 10 cm) from the inverse variance DerSimonian-Laird random-effects model. Diamond represents the summary relative risk (RR) estimate and its width as the 95% confidence interval (CI). Each square and the horizontal line across the square represents the RR estimate and its 95% CI of the individual study. Bandera, 2021[118] and Williams, 2014[117] did not adjust for BMI. George, 2014[71] was adjusted for BMI.

Supplementary Figure S10 Linear and non-linear dose-response meta-analyses of post-diagnosis waist-hip-ratio and all-cause mortality

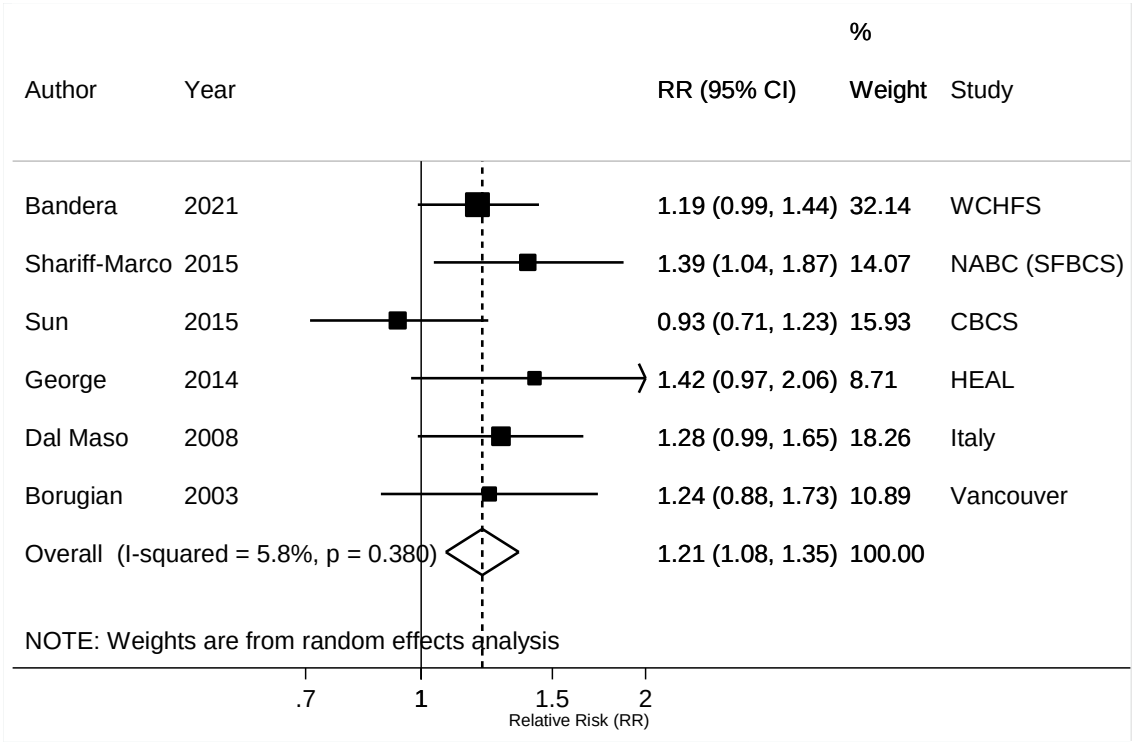


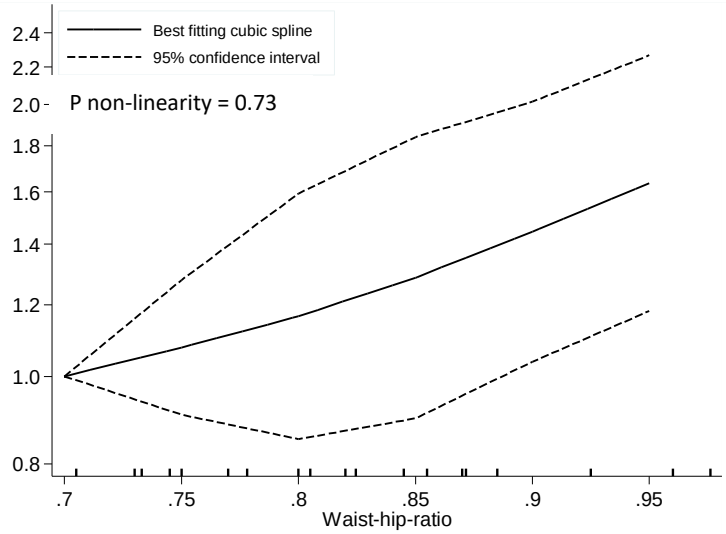


WHR	RR estimates (95% CI)
0.70	1.00
0.75	1.04 (0.94-1.15)
0.80	1.11 (0.92-1.33)
0.85	1.26 (1.02-1.54)
0.90	1.52 (1.27-1.82)
0.95	1.87 (1.54-2.27)

Figure legend: Forest plot shows the linear dose-response results (per 0.1 unit) from the inverse variance DerSimonian-Laird random-effects model. Diamond represents the summary relative risk (RR) estimate and its width as the 95% confidence interval (CI). Each square and the horizontal line across the square represents the RR estimate and its 95% CI of the individual study. Non-linear curve was estimated using restricted cubic spline regression with three knots at 10th, 50th and 90th percentiles of distribution of the exposure and pooled in random-effects meta-analysis. The table shows the estimated RRs and 95% CIs for selected waist-to-hip ratio values comparing to 0.7 unit as reference.

Supplementary Figure S11 Linear and non-linear dose-response meta-analyses of post-diagnosis waist-hip-ratio and breast cancer-specific mortality





WHR	RR estimates (95% CI)
0.70	1.00
0.75	1.08 (0.91-1.28)
0.80	1.17 (0.85-1.59)
0.85	1.29 (0.90-1.84)
0.90	1.45 (1.04-2.01)
0.95	1.64 (1.18-2.27)

Figure legend: Forest plot shows the linear dose-response results (per 0.1 unit) from the inverse variance DerSimonian-Laird random-effects model. Diamond represents the summary relative risk (RR) estimate and its width as the 95% confidence interval (CI). Each square and the horizontal line across the square represents the RR estimate and its 95% CI of the individual study. Non-linear curve was estimated using restricted cubic spline regression with three knots at 10th, 50th and 90th percentiles of distribution of the exposure and pooled in random-effects meta-analysis. The table shows the estimated RRs and 95% CIs for selected waist-to-hip ratio values comparing to 0.7 unit as reference.

Supplementary Figure S12 Relative risk of all-cause mortality per 10 cm increase of post-diagnosis waist circumference by BMI adjustment

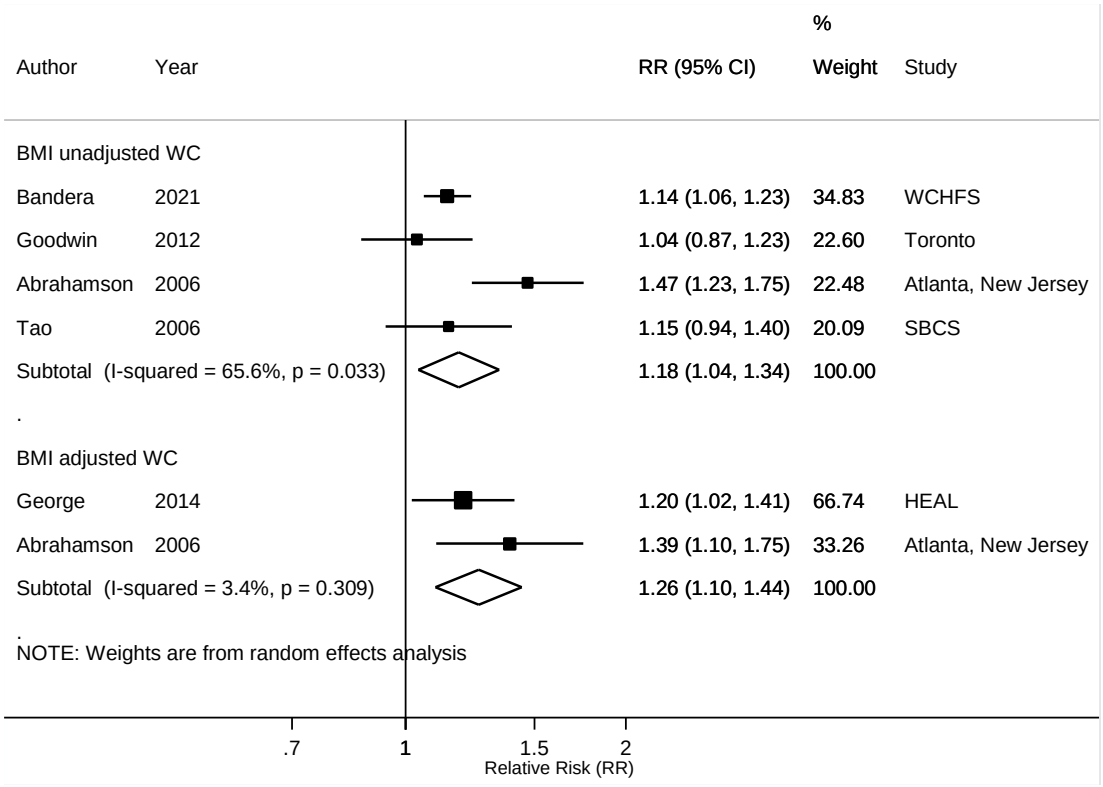
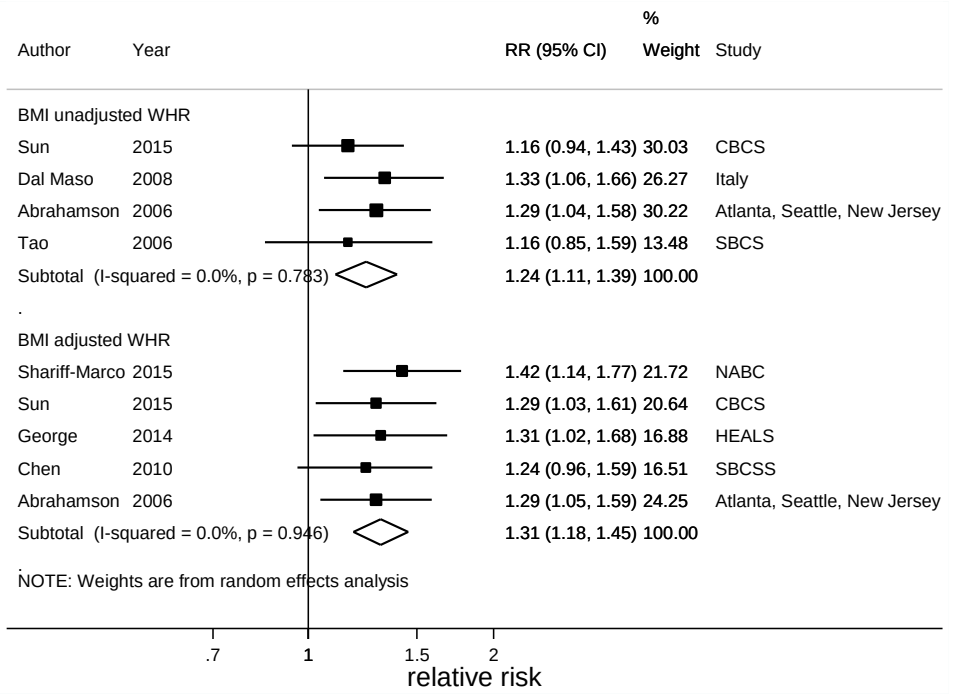


Figure legend: Forest plot shows the linear dose-response results (per 10 cm) by BMI adjustment from the inverse variance DerSimonian-Laird random-effects model. Diamond represents the summary relative risk (RR) estimate and its width as the 95% confidence interval (CI). Each square and the horizontal line across the square represents the RR estimate and its 95% CI of the individual study.

Supplementary Figure S13 Relative risk of all-cause mortality per 0.1 increase of post-diagnosis waist-hip-ratio by BMI adjustment



Supplementary Figure S14 Relative risk of breast cancer-specific mortality per 0.1 increase of post-diagnosis waist-hip-ratio by BMI adjustment

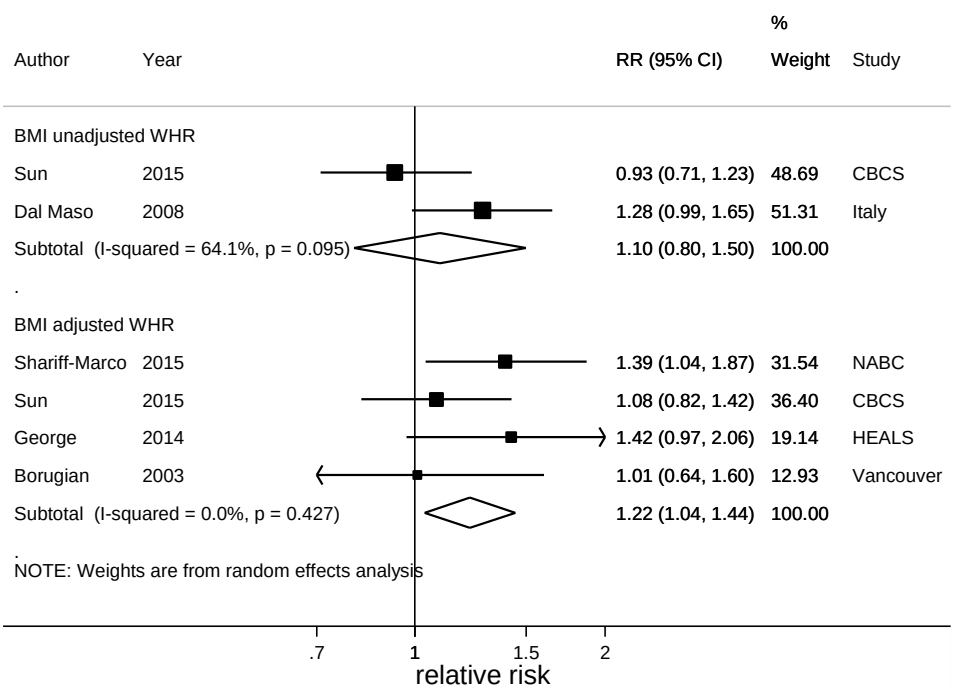


Figure legend: Forest plot shows the linear dose-response results (per 0.1 unit) by BMI adjustment from the inverse variance DerSimonian-Laird random-effects model. Diamond represents the summary relative risk (RR) estimate and its width as the 95% confidence interval (CI). Each square and the horizontal line across the square represents the RR estimate and its 95% CI of the individual study.

Supplementary Figure S15 Forest plot for the comparison of the highest versus lowest category of post-diagnosis waist circumference and breast cancer outcomes

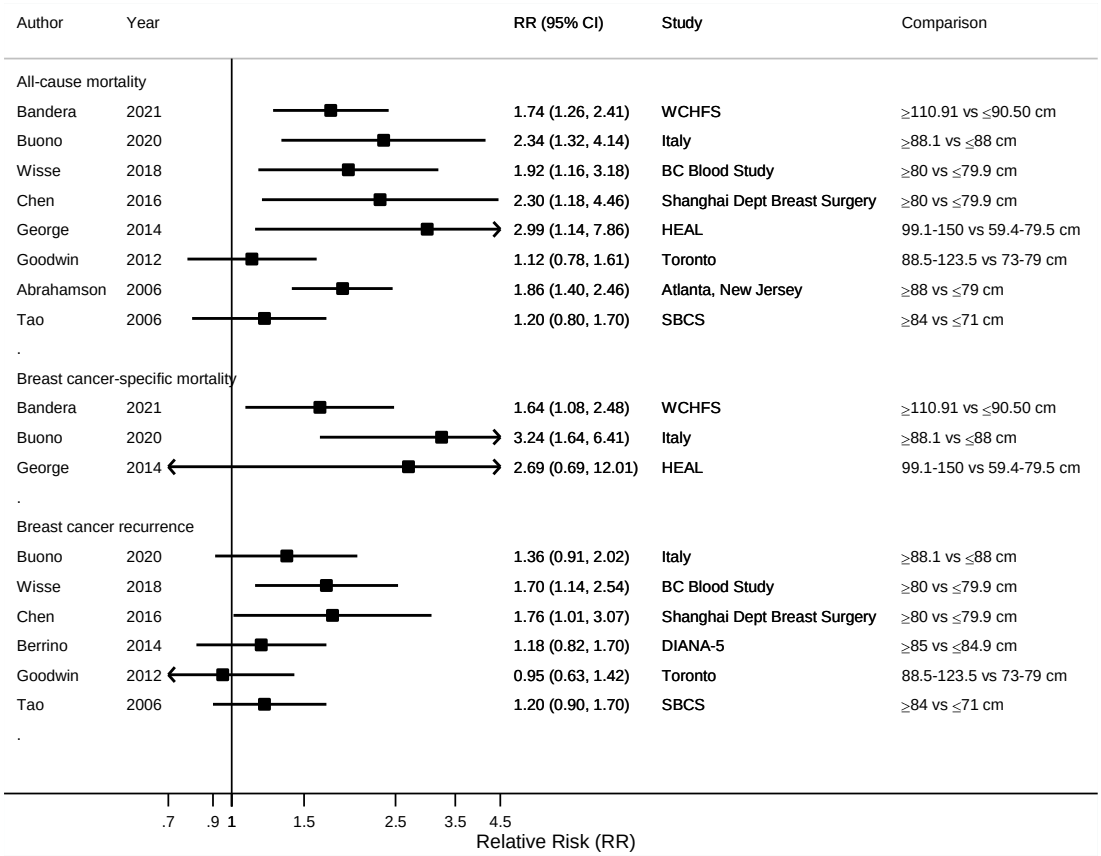


Figure legend: Forest plot shows the results for the highest versus lowest waist circumference categories. Each square and the horizontal line across the square represents the relative risk (RR) estimate and its 95% confidence interval (CI) for the breast cancer outcome investigated in the individual study.

The results were not adjusted for BMI in Bandera, 2021[118], Buono, 2020[255], Wisse, 2018[207], Chen, 2016[151], Berino, 2014[143], Goodwin, 2012[72], Abrahamson, 2006[39], and Tao, 2006[112]. The results were adjusted for BMI in George, 2014[71].

Wisse, 2018[207] (RR ≥80 vs < 80 cm 1.34, 95% CI: 0.70-2.54 for all-cause mortality and 1.45, 95% CI: 0.89-2.38 for breast cancer recurrence) and Abrahamson, 2006[39] (RR ≥88 vs < 80 cm 1.75, 95% CI: 1.20-2.55 for all-cause mortality) further reported BMI adjusted results. In addition, Williams, 2014 [117] reported BMI unadjusted dose-response results for breast cancer-specific mortality (RR 1.01, 95% CI: 0.98 - 1.05 per 1 cm).

Supplementary Figure S16 Relative risk (95% CI) of all-cause mortality by categorical comparison of pre- to post-diagnosis weight change

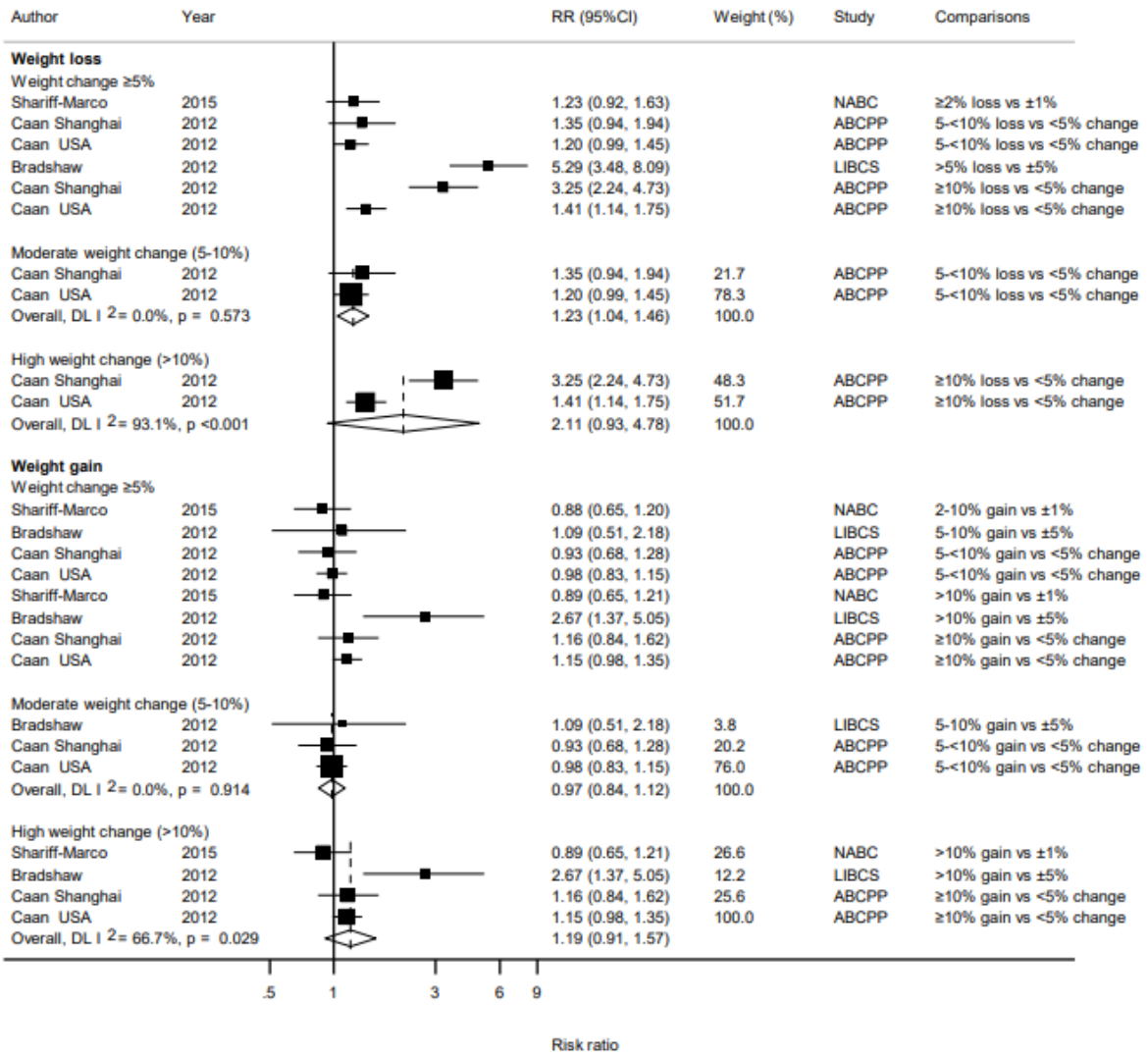


Figure legend: Forest plot shows the results for relative weight change (%) comparing to stable weight, with each square and the horizontal line across the square representing the relative risk (RR) estimate and its 95% confidence interval (CI) of the individual study. The upper panel shows all the results for weight loss. The middle panel shows all the results for weight gain. The results for comparable weight change categories were then pooled in inverse variance DerSimonian-Laird random-effects meta-analyses, with the diamonds representing the summary RR estimates and their width as the 95% CIs.

Supplementary Figure S17 Relative risk (95% CI) of breast cancer-specific mortality by categorical comparison of pre- to post-diagnosis weight change

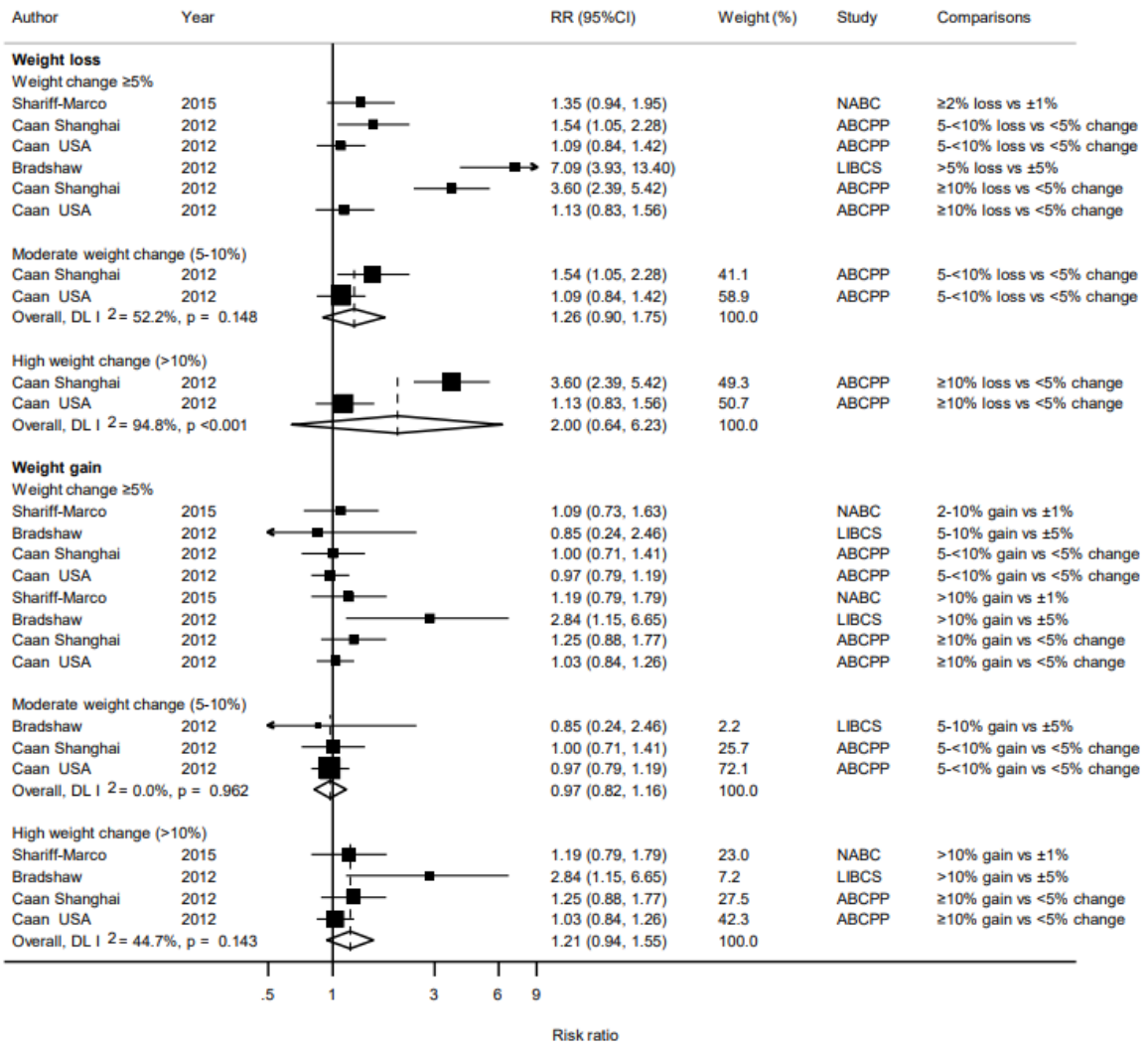


Figure legend: Forest plot shows the results for relative weight change (%) comparing to stable weight, with each square and its horizontal line across the square representing the relative risk (RR) estimate and its 95% confidence interval (CI) of the individual study. The upper panel shows all the results for weight loss. The middle panel shows all the results for weight gain. The results for comparable weight change categories were then pooled in inverse variance DerSimonian-Laird random-effects meta-analyses, with the diamonds representing the summary RR estimates and their width as the 95% CIs.

Supplementary Figure S18 Forest plot for post-diagnosis weight change and breast cancer outcomes

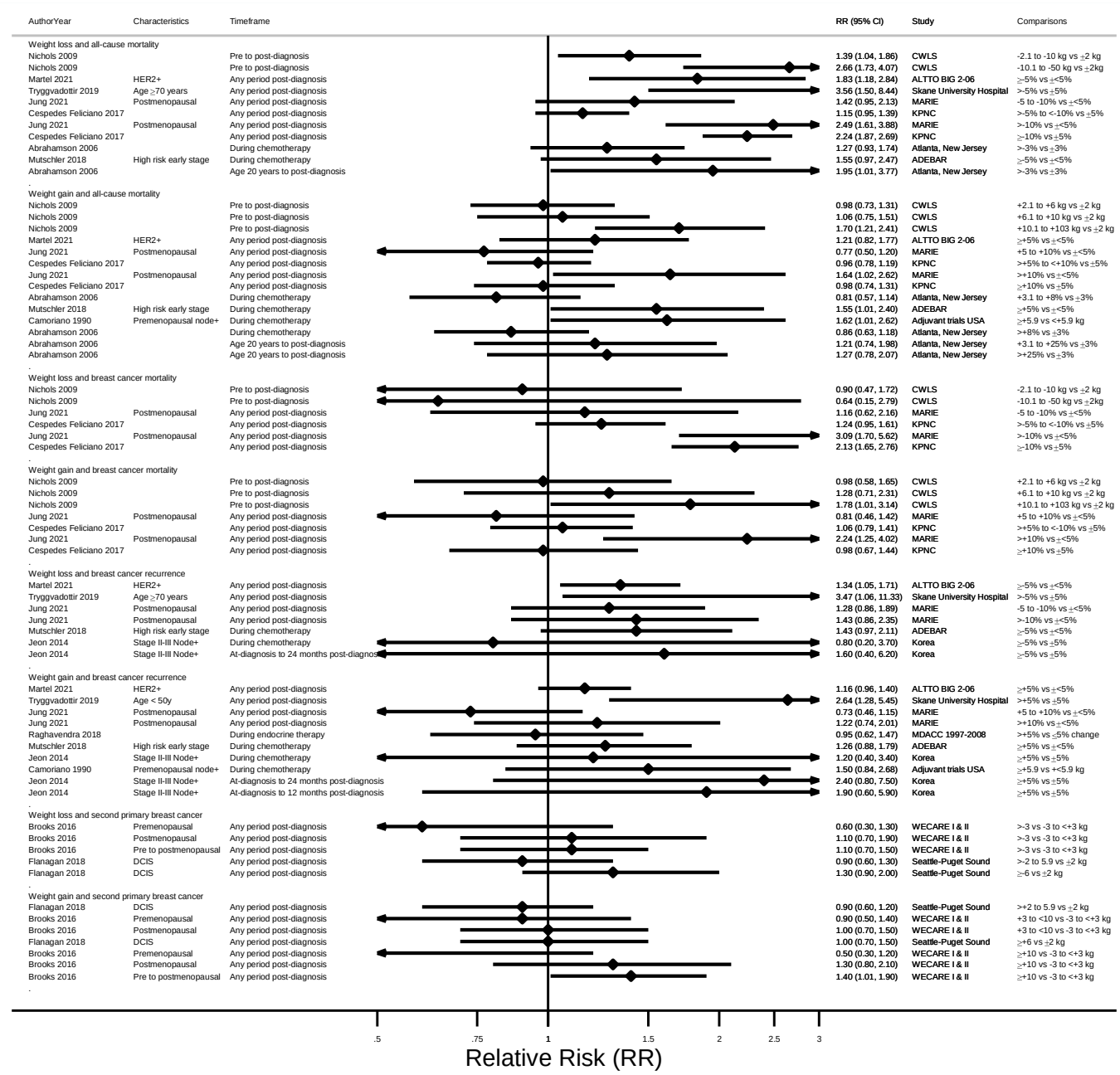


Figure legend: Forest plot shows the results for absolute (kg) or relative weight change (%) comparing to stable weight during any period post-diagnosis or specifically during cancer treatment, with each diamond and the horizontal line across the diamond representing the relative risk (RR) estimate and its 95% confidence interval (CI) of the individual study.

Two studies reporting results on pre- to post-diagnosis weight change but were not compatible with the other studies on the topic (Supplementary figures 16 and 17)[39, 100] are also presented. One additional study reported results on weight variation (>5 vs <5% change) from before to after chemotherapy (HRs = 2.11, 95% CI 1.21-3.66 for all-cause mortality and 2.28, 1.29-4.03 for disease-free survival)[204]. DCIS, ductal carcinoma in situ; HER2, human epidermal growth factor receptor 2.

Supplementary Figure S19 Forest plot for post-diagnosis BMI change and breast cancer outcomes

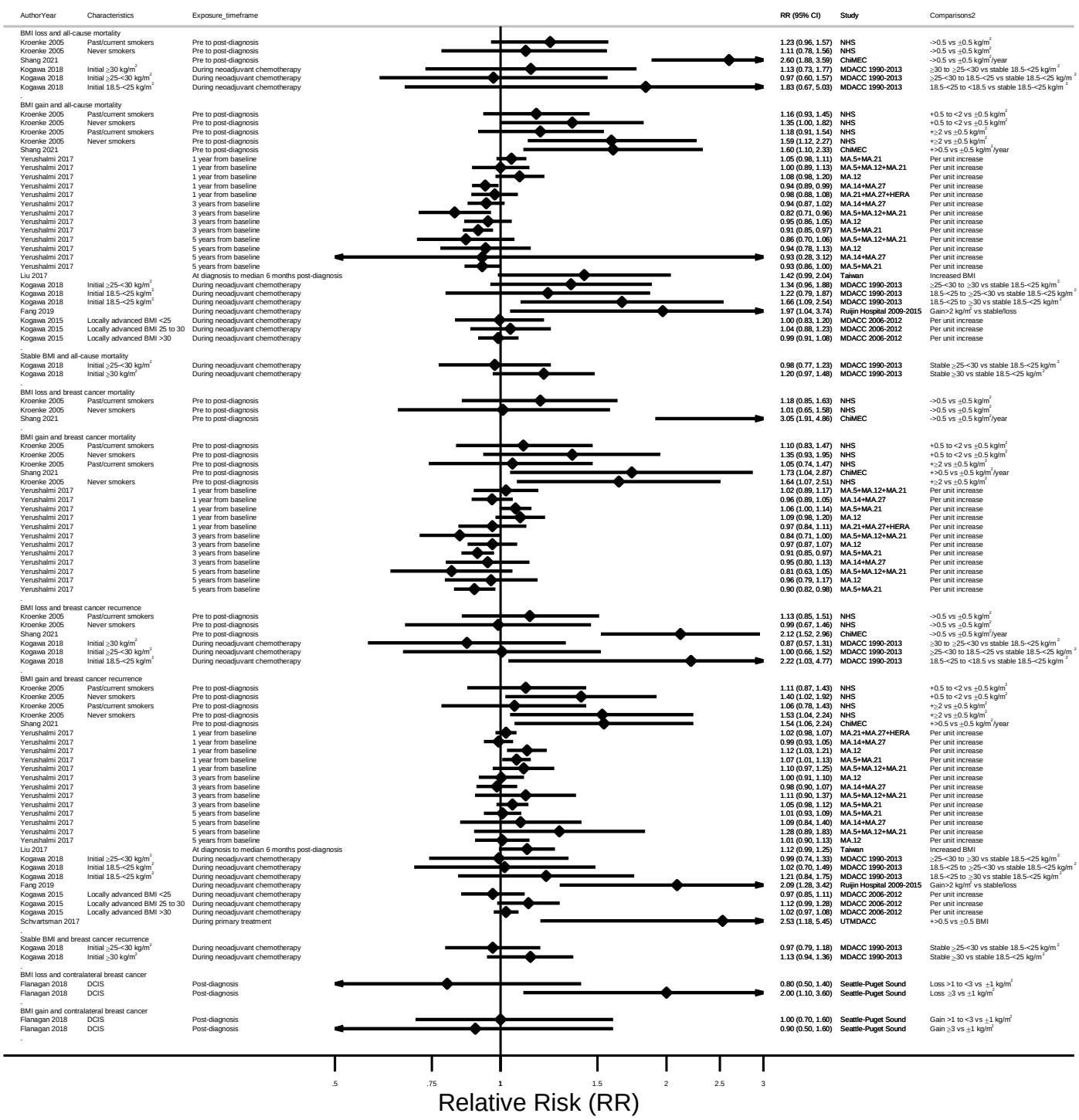


Figure legend: Forest plot shows the results for BMI change from before diagnosis to one or more years after diagnosis (pre- to post-diagnosis), during any period post-diagnosis, or specifically during cancer treatment, with each diamond and the horizontal line across the diamond representing the relative risk (RR) estimate and its 95% confidence interval (CI) of the individual study.

All results, including the results for categorical comparison for different BMI change (kg/m^2) versus stable BMI reported in seven studies[132, 177, 178, 200, 225, 236, 254] and the dose-response results (per unit increase) for BMI change at 1, 3, or 5 years[211] or by initial BMI status[84] reported in two studies without categorical comparison are displayed. One additional study reported results on BMI variation (>5.71 vs ≤5.71% change) after cancer treatment (HR 1.018, 95% CI: 1.002-1.034 for risk of recurrence)[160]. DCIS, ductal carcinoma in situ.

Supplementary Figure S20 Forest plot for breast cancer recurrence by categorical comparison of pre- to post-diagnosis weight change

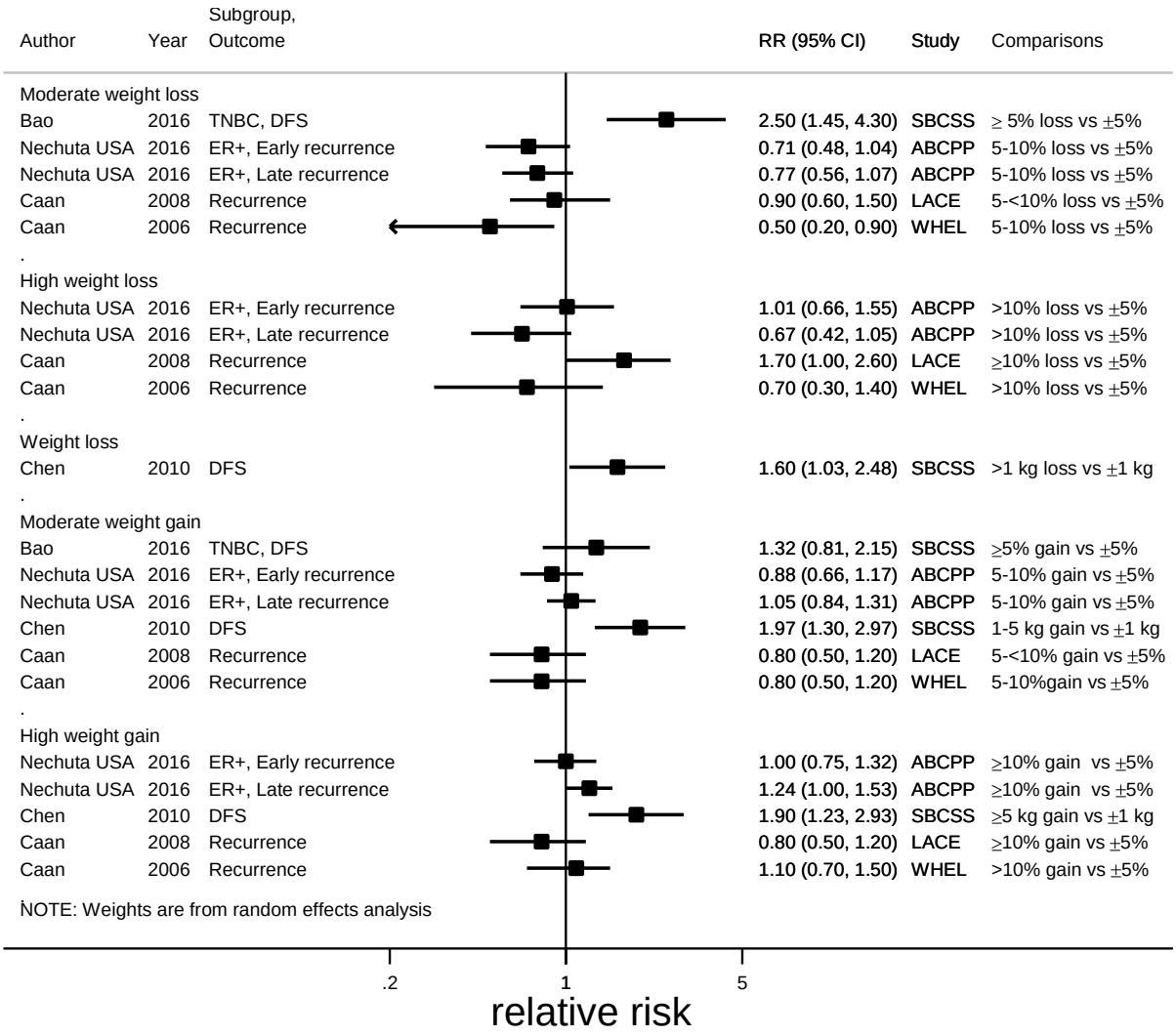
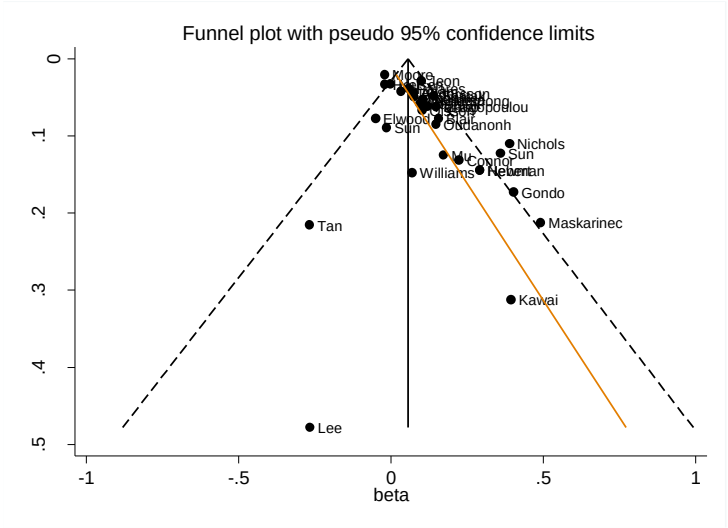


Figure legend: Forest plot shows the results for pre- to post-diagnosis absolute (kg) or relative weight change (%) comparing to stable weight, with each square and the horizontal line across the square representing the relative risk (RR) estimate and its 95% confidence interval (CI) of the individual study. DFS, disease-free survival; ER, oestrogen receptor; TNBC, triple-negative breast cancer.

Supplementary Figure S21 Funnel plot of A. all studies B. all but three small studies included in the dose response meta-analysis of post-diagnosis body mass index and risk of breast cancer-specific mortality

A. All studies



P Egger's test = 0.001

B. Excluded three small studies (Lee, 2012[86], Kawai, 2012[82], and Maskarinec, 2011[93]) from the funnel plot for clarity.

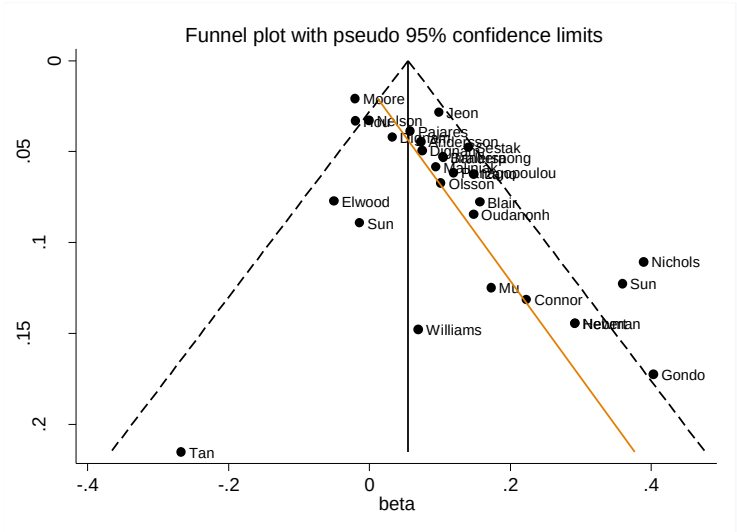


Figure legend: Each point represents the logarithm of relative risk estimate (RR) (x-axis) against its standard error as measure of study size (y-axis). Solid vertical line is the summary estimate of ln(RR) from the fixed effect meta-analysis. Dashed lines are the 95% confidence limits around ln(RR). Orange line shows the regression test for funnel-plot asymmetry proposed by Egger et al.

Supplementary Table S1 PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	4
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	4
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	4 Protocol is online
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	5, supplementary text
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	5, supplementary text
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Supplementary text

Section/topic	#	Checklist item	Reported on page #
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	5, supplementary text
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	5, supplementary text
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	Supplementary text
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	5, supplementary text
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	5-6, supplementary text
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	6, supplementary text
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	6, supplementary text
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	6, supplementary text
RESULTS			

Section/topic	#	Checklist item	Reported on page #
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	7, figure 1
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	Supplementary tables 4-8
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	Overall quality discussed 13-14
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	Figures 2-3, supplementary figures 1-20
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	7-11
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	11
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	8-9, table 2,3
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	11-14, table 1
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	12-14
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	15
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	16-17

Supplementary Table S2 Grading criteria for evidence on diet, nutrition, physical activity and survival in women with breast cancer

Evidence grades		GRADING CRITERIA FOR EVIDENCE ON DIET, NUTRITION, PHYSICAL ACTIVITY AND SURVIVAL IN WOMEN WITH BREAST CANCER	Het	PB	Mec
Strong evidence	**Convincing**	Evidence of an effect from a meta-analysis of RCTs or at least two well-designed independent RCTs	No	No	Desirable
	Probable	Evidence of an effect from a meta-analysis of RCTs or two well-designed RCTs	Some	No	Desirable
		OR Evidence of an effect from one well-designed RCT and one well-designed cohort study	No	No	Required
		OR Evidence from at least one well-designed pooled analysis of follow-up studies	No	No	Required
		OR Evidence from at least two independent well-designed follow-up studies	No	No	Required
Limited evidence	**Limited suggestive**	Evidence from a meta-analysis of RCTs or at least two well-designed RCTs but the confidence interval may include the null	Some	No	Not required
		OR Evidence from one well-designed RCT but the confidence interval may include the null	No	No	Required
		OR Evidence of an effect from a pooled analysis of follow-up studies	Some	No	Not required
		OR Evidence from a pooled analysis of follow-up studies but the confidence interval may include the null	Some	No	Required
		OR Evidence of an effect from at least one follow-up study	No	No	Required
		OR Evidence of an effect from at least two follow-up studies	No	No	Not required
		OR Evidence from at least two follow-up studies but the confidence interval may include the null	Some	No	Required
	Limited – no conclusion	Any of the following reasons: - Too few studies available - Inconsistency of direction of effect - Poor quality of studies	-	-	-
Strong evidence	**Substantial effect on risk unlikely**	Evidence of the absence of an effect (a summary estimate close to 1.0) from any of the following: a) A meta-analysis of RCTs b) At least two well-designed independent RCTs c) A well-designed pooled analysis of follow-up studies d) At least two well-designed follow-up studies - Absence of a dose response relationship (in follow-up studies)	No	-	Absence

Het: Substantial unexplained heterogeneity or some unexplained heterogeneity
PB: Publication bias
Mec: Strong and plausible mechanistic evidence is required, desirable but not required, not required, or absent
Special upgrading factors:
- Presence of a plausible biological gradient ('dose response') in the association. Such a gradient need not be linear or even in the same direction across the different levels of exposure, so long as this can be explained plausibly.
- A particularly large summary effect size (a relative risk of 2.0 or more, or 0.5 or less, depending on the unit of exposure), after appropriate control for confounders.
- Evidence from appropriately controlled experiments demonstrating one or more plausible and specific mechanisms.
- All plausible known residual confounders or biases including reverse causation would reduce a demonstrated effect, or suggest a spurious effect when results show no effect. Special considerations important for evidence for breast cancer survivors including the following potential confounding variables – the type of tumour, type of treatment, amount of treatment received, and the dissemination of the disease.

Supplementary Table S3 Publications included in or excluded from the specific systematic reviews and meta-analyses and reasons of exclusion

Publications identified	Publications descriptively reviewed or included in the meta-analyses	Publications excluded from the systematic reviews and meta-analyses and reasons of exclusion
Post-diagnosis BMI and all-cause mortality		
219 publications	121 publications were reviewed: - 57 publications were included in the dose-response meta-analyses[27, 39-46, 53-55, 57, 62-68, 70, 72, 78-82, 84, 85, 88, 89, 91, 93-95, 97, 98, 100, 102, 104, 105, 109, 111-114, 116, 118, 120, 123, 125-127, 129, 130, 135], including 1 publication [80] in non-linear and 4 publications[27, 42, 61, 62] in subgroup analyses only. - 64 publications did not have enough data to be included in the dose-response meta-analyses[139, 140, 142, 145, 147, 148, 151, 153-157, 159, 161-168, 170, 173, 176, 177, 181, 182, 184, 185, 187, 189-191, 193, 194, 197, 199, 202-204, 207, 209, 213, 219-221, 223, 224, 228-235, 239, 242-244, 248, 250-252], including 4 publications [165, 168, 190, 199] suitable for subgroup analyses only.	98 publications: - 22 publications superseded by publications from the same or overlapping studies[51, 69, 90, 152, 214, 262, 266, 283, 288, 291, 292, 299, 320, 327, 335, 339, 350, 354, 377, 392, 393, 396] -28 publications reported unadjusted relative risk (RR) estimates only[119, 158, 183, 200, 206, 226, 236, 261, 290, 293, 297, 314, 316, 317, 329, 330, 348, 352, 355-357, 366, 368, 376, 379, 381, 382, 391] -38 publications did not report a RR estimate or 95% confidence interval[141, 246, 258, 260, 267, 270, 276, 277, 285, 286, 289, 300, 302, 305, 306, 308, 310, 315, 319, 321, 325, 331, 332, 336, 345, 353, 359, 361-363, 369, 370, 375, 380, 389, 394, 395, 400] -In 1 new publication, the results appeared erroneous and could not be used in the meta-analyses[372]. -1 publication reported incompatible increment unit[211] -2 publications with <100 study participants[341, 349] -4 publications examined interaction effect or joint exposures[218, 269, 340, 371] -2 publication examined combined pre- and post-diagnosis exposures[225, 301]
Post-diagnosis BMI and breast cancer-specific mortality		
71 publications	51 publications were reviewed: - 33 publications were included in the dose-response meta-analyses[51, 57, 63-65, 74, 75, 77-79, 82, 86, 91, 93, 95, 96, 98-103, 106, 109, 110, 117, 118, 122, 125, 126, 128, 134, 137], including 2 publications in subgroup analysis only [51, 134]. -18 publications did not have enough data to be included in the dose-response meta-analyses[83, 150, 153, 159, 167, 168, 174, 179, 180, 188, 192, 203, 205, 206, 223, 227, 232, 243]; including 2 publications suitable for subgroup analyses only[153, 168].	20 publications: - 2 publications superseded by publications from the same or overlapping studies[189, 339] - 6 publications reported unadjusted relative risk (RR) estimates only[89, 261, 326, 348, 356, 383] - 5 publications did not report a RR estimate or 95% confidence interval[183, 281, 282, 306, 369] - 1 publication reported incompatible increment unit[211] - 1 new publication examined joint exposure [218] - 5 publications examined combined pre- and post-diagnosis exposures[225, 278, 294, 301, 413]
Post-diagnosis BMI and breast cancer recurrence		
244 publications	130 publications were reviewed: - 55 publications were included in the dose-response meta-analyses[27, 40-46, 48, 51, 54-56, 59, 62-66, 68-70, 72-74, 76, 79, 83-85, 88, 89, 92, 94, 96, 102, 104, 106, 110, 112, 115, 116, 119-125, 127, 130, 131, 133, 136], including 3 publications[27, 119, 133] in non-linear and 3 publications[42, 61, 62] in subgroup analyses only. - 75 publications did not have enough data to be included in the dose-response meta-analyses[111, 129, 139, 141, 144, 145, 151, 152, 155-159, 161, 162, 164, 165, 169, 170,	114 publications: -30 publications superseded by publications from the same or overlapping studies[90, 146, 148, 214, 227, 240, 266, 274, 280, 283, 291, 292, 296, 298, 299, 303, 307, 327, 333, 339, 350, 354, 377, 386-388, 390, 392, 393, 396] -32 publications reported unadjusted relative risk (RR) estimates only[86, 160, 172, 200, 206, 232, 261, 290, 293, 295, 297, 314, 316, 317, 323, 329, 337, 348, 352, 357, 359, 364, 366, 373, 374, 376, 379, 381-384, 398]

Publications identified	Publications descriptively reviewed or included in the meta-analyses	Publications excluded from the systematic reviews and meta-analyses and reasons of exclusion
	[173, 174, 176, 177, 181, 183-185, 187, 189-191, 193, 194, 196, 199, 201-205, 207, 208, 210, 212, 213, 215-217, 219-224, 226, 228-230, 233, 234, 236-239, 241-243, 245-251, 253], including 5 publications suitable for subgroup analysis only[129, 165, 190, 199, 229].	-38 publications did not report a RR estimate or 95% confidence interval[260, 265, 268, 272, 277, 284, 286, 289, 300, 311, 313, 318, 319, 321, 328, 331, 332, 336, 338, 343, 344, 346, 351, 353, 358, 361, 362, 365, 367, 369, 370, 375, 380, 385, 389, 394, 395, 400] -1 publication reported incompatible increment unit[211] - 6 publications examined interaction effect[218, 269, 271, 371, 378, 397] -4 publications examined combined pre- and post-diagnosis exposures[225, 278, 301, 360] -Results in 2 publications appeared erroneous [113, 372] -1 publication included male and female breast cancer patients[259]
Post-diagnosis BMI and second primary breast cancer		
16 publications	10 publications were reviewed: - 8 publications were included in the dose-response meta-analysis[58, 63, 64, 87, 90, 108, 132, 138]. - 2 publications did not have enough data to be included in the dose-response meta-analysis[171, 186].	6 publications: -2 publications superseded by another publication from the same study[89, 275] -2 publications reported insufficient results [343, 399] -1 publication on DCIS survivors, investigating BMI and any second breast cancer (secondary breast and second primary breast cancers) as outcome[312] - 1 publication examined combined pre- and post-diagnosis exposures [412]
Post-diagnosis BMI and non-breast cancer-related mortality		
10 publications	8 publications were reviewed: - 7 publications were included in the dose-response meta-analysis[57, 63-65, 77, 95, 106]. - 1 publication did not have enough data to be included in the dose-response meta-analysis[159].	2 publications: -1 publication reported unadjusted relative risk (RR) estimates only [342] -1 publication reported insufficient results [279]
Post-diagnosis BMI and cardiovascular mortality		
2 publications	2 publications were included in the dose-response meta-analysis[100, 114]	-
Post-diagnosis waist circumference (WC) and all-cause mortality		
9 publications	8 publications were reviewed: -5 publications were included in the dose-response meta-analyses[39, 71, 72, 112, 118] -3 publications (1 new) did not have enough data to be included in the dose-response meta-analyses[151, 207, 255]	-1 publication examined combined pre- and post-diagnosis exposures[304]
Post-diagnosis WC and breast cancer-specific mortality		
5 publications	4 publications were reviewed: -3 publications were included in the dose-response meta-analysis[71, 117, 118] -1 publication did not have enough data to be included in the dose-response meta-analysis[255]	-1 publication examined combined pre- and post-diagnosis exposures[304]
Post-diagnosis WC and breast cancer recurrence		
7 publications	6 publications were reviewed [72, 112, 143, 151, 207, 255].	-1 publication conducted log-rank test only [311]

Publications identified	Publications descriptively reviewed or included in the meta-analyses	Publications excluded from the systematic reviews and meta-analyses and reasons of exclusion
	Dose-response meta-analysis was not conducted as only two studies have sufficient data to allow the analysis [72, 112].	
Post-diagnosis waist-to-hip ratio (WHR) and all-cause mortality		
14 publications	9 publications were reviewed: 8 publications were included in the dose-response meta-analyses [39, 55, 60, 71, 107, 109, 112, 118]. 1 publication did not have enough data to be included in the dose-response meta-analyses [240]	5 publications: -2 publications[42, 214] were from the same study that was already included in the meta-analysis [55] -2 publications < 100 study participants[263, 264] -1 publication examined combined pre- and post-diagnosis exposures[304]
Post-diagnosis WHR and breast cancer-specific mortality		
7 publications	6 publications were included in the dose-response meta-analyses [49, 60, 71, 107, 109, 118].	1 publication examined combined pre- and post-diagnosis exposures[304]
Post-diagnosis WHR and breast cancer recurrence		
9 publications	5 publications: - 4 publications (2 studies) on waist-hip-ratio[42, 55, 112, 214] and 1 publication on change in waist-hip-ratio[240] were reviewed.	4 publications - 1 publication conducted log-rank test only[311] -2 publications < 100 study participants[263, 264] -1 publication examined interaction effect[397]
Post-diagnosis weight change and all-cause mortality		
24 publications 27, 39, 42, 50-52, 55, 100, 107, 120, 147, 149, 181, 191, 204, 218, 240, 256, 273, 395, 406, 407, 409, 411	11 publications were reviewed*: Overall, 16 publications were reviewed: *8 pre- to post-diagnosis weight change:* - 3 publications were meta-analysed[50, 52, 107] - 2 publications, one investigated weight change from aged 20 years to study baseline [39] and one assessed absolute pre- to post-diagnosis weight change instead of percentage weight change[100] were reviewed - 1 publication examined late outcomes was reviewed[27]. -2 publications included women with specific breast cancer subtypes were reviewed[42, 51] *5 any period post-diagnosis weight change publications:* -1 RCT[256] - 4 publications (from observational studies) [120, 149, 218, 240] *4 publications on weight change/variation during or from before to after cancer treatment*[39, 147, 191, 204] *One study reported on two time periods[39]	Overall, 8 publications were excluded*: *3 pre- to post-diagnosis weight change* - 2 publications superseded by other publications of the same or overlapping studies[55, 273] - 1 publication did not report a RR estimate or 95% confidence interval[411] *2 any period post-diagnosis weight change* publications did not report a RR estimate or 95% confidence interval[406, 409] *4 weight change during or from before to after cancer treatment* publications did not report a RR estimate or 95% confidence interval[181, 395, 407, 409] *One study reported on two time periods[409]
Post-diagnosis weight change and breast cancer-specific mortality		
8 publications	Overall, 6 publications were reviewed:	Overall, 2 publications were excluded:

Publications identified	Publications descriptively reviewed or included in the meta-analyses	Publications excluded from the systematic reviews and meta-analyses and reasons of exclusion
50, 52, 100, 107, 149, 218, 273, 410	*4 pre- to post-diagnosis weight change:* - 3 publications were meta-analysed [50, 52, 107] - 1 publication assessed absolute pre- to post-diagnosis weight change instead of percentage weight change was reviewed [100] 2 publications on any period post-diagnosis weight change were reviewed[149, 218] *0 publication on weight change during or from before to after cancer treatment*	*1 pre- to post-diagnosis weight change* publication was superseded by another publication of the same study[273]. *1 any period post-diagnosis weight change* publication did not report a RR estimate or 95% confidence interval[410] *0 publication on weight change during or from before to after cancer treatment*
Post-diagnosis weight change and breast cancer recurrence		
24 publications 27, 42, 51, 55, 120, 124, 146, 147, 172, 181, 191, 204, 218, 238, 240, 256, 257, 309, 365, 395, 407-410	Overall, 14 publications were reviewed: *5 pre- to post-diagnosis weight change* publications [27, 42, 51, 55, 146] *5 any period post-diagnosis weight change:* -1 RCT[256] -4 publications (from observational studies)[120, 172, 218, 240] *4 publications on weight change during or from before to after cancer treatment*[147, 191, 204, 257]	Overall, 10 publications were excluded: *0 pre- to post-diagnosis weight change publication* *3 any period post-diagnosis weight change* publications did not report a RR estimate or 95% confidence interval[408-410] *8 weight change during or from before to after cancer treatment:* -1 publication on weight gain during chemotherapy and breast cancer recurrence <100 study participants[309] - 1 publication reported unadjusted relative risk (RR) estimates only[365] - 6 publications did not report a RR estimate or 95% confidence interval[124, 181, 238, 395, 407, 409] *One study reported on two time periods[409]
Post-diagnosis weight change and second primary breast cancer		
3 publications 132, 138, 275	Overall, 2 publications were reviewed: 0 pre- to post-diagnosis weight change publication 2 any period post-diagnosis weight change publications were reviewed[132, 138] 0 weight change during or from before to after cancer treatment publication	1 post-diagnosis weight change publication was superseded by another publication of the same study [275]
Post-diagnosis BMI change and all-cause mortality		
8 publications 84, 177, 178, 200, 211, 225, 236, 254	Overall, 7 publications were reviewed: *2 pre- to post-diagnosis BMI change publications*[178, 225]. 1 publication on any period post-diagnosis BMI gain[211]. *4 publications on BMI change during or from before to after cancer treatmen*t[84, 177, 236, 254].	1 publication reported unadjusted relative risk (RR) estimates with BMI change during treatment [200]
Post-diagnosis BMI change and breast cancer-specific mortality		

Publications identified	**Publications descriptively reviewed or included in the meta-analyses**	**Publications excluded from the systematic reviews and meta-analyses and reasons of exclusion**
3 publications [178, 211, 225]	Overall, 3 publications were reviewed: *2 pre- to post-diagnosis BMI change* publications[178, 225] 1 publication on any period post-diagnosis BMI gain[211] *0 publication on BMI change during or from before to after cancer treatment*	-
Post-diagnosis BMI change and breast cancer recurrence		
9 publications [84, 160, 177, 178, 200, 211, 225, 236, 254]	Overall, 9 publications were reviewed: *2 pre- to post-diagnosis BMI change* publications[178, 225] 1 publication on any period post-diagnosis BMI gain[211] *6 publications on BMI change/variation during or from before to after cancer treatment*[84, 160, 177, 200, 236, 254]	
Post-diagnosis BMI change and second primary cancers		
2 publications [132, 312]	1 publication on any period post-diagnosis BMI change was reviewed[132]	1 publication on DCIS survivors, investigating pre- to post-diagnosis BMI change and any second breast cancer (secondary breast and second primary breast cancers) as outcome was excluded[312]

Supplementary Table S4 Description of studies included in or excluded from the descriptive review or meta-analysis of body mass index

Author, year, study name, country, WCRF Code	Study description	Time of diagnosis and follow-up	Disease characteristics treatment	Exposure assessment	Outcome (events)	Contrast	RR (95% CI)	Covariates
Almeida NR, 2021[215], Brazil BMI – Included, review	Female, Retrospective Cohort of Cancer Survivors (n=866) Menopause 63.7%	Diagnosed:2011-2015 (surgery) follow Up: Median 50.4 months	Luminal 69.2%, her/lumina HER 18%, triple-negative 12.6%. Nononcoplastic breast-conserving surgery 88.7%, oncoplastic breast-conerving surgery 11.3%. Mammaplasty 89.8%. Neoadjuvant chemotherapy 88.8%	Medical records	Local recurrence	>=25 vs <25 kg/m^2	0.44(0.20-0.94) P=0.035	Age at surgery, surgery, tumor subtype
Anwar SL, 2021[216], Indonesia BMI – Included, review	Female, Retrospective Cohort of Cancer Survivors (n=1081) mean age:50.9 Premenopausal 28.3%, post-menopausal 71.7%	Diagnosed:2014-2018 (surgery)	Nonmetastatic breast cancer patients. Stage I 1.2%, II 32.9%, III 65.9%. Neo-/Adjuvant chemotherapy 91.5%. Adjuvant endocrine therapy with tamoxifen 29.5%. Adjuvant radiotherapy 73.6%. Mastectomy 90.2%, BCT 9.2%, Biopsy 0.6%.	Measured	Recurrence (n=66)	>27.7 vs <=27.7 kg/m^2	1.01(0.74-1.40)	Multivariable adjusted
					Locoregional progression		0.89 (0.68-1.20)	
					Premenopausal Recurrence		0.63(0.31-1.26)	
					Postmenopausal Recurrence		1.23(0.85-1.78	
					Luminal a Recurrence		1.15(0.73-1.80)	
					Luminal b Recurrence		1.41(0.54-3.65)	
					HER2-enriched Recurrence		0.73(0.29-1.82)	
					Triple-negative Recurrence		0.80(0.42-1.52)	
					Luminal Recurrence		1.19(0.79-1.79	
					Non-luminal Recurrence		0.77(0.46-1.31)	
Ballinger TJ, 2021[353], BRE12-158 trial BMI - Excluded	Female, Secondary analysis of clinical trials (n=172)	Diagnosed:2014-2018 follow Up: Median 17.2 months	Triple-negative breast cancer	Measured	Overall survival (n=41)	Per 1 kg/m^2	0.77(0.46-1.31) Ptrend=0.343	Stage, ctDna, nodal status

					Overall survival (n=41)	≥30 vs <30 kg/m^2	0.94; Ptrend=0.86	Stage, ctDna, nodal status
					Disease free survival (n=61)		0.98; Ptrend=0.93	
					Distant disease-free survival (n=55)		0.87; Ptrend=0.62	
Bandera EV, 2021[118], Women's Circle of Health Study and the Women's Circle of Health Follow-Up Study (WCHFS), USA BMI – Included, meta-analysis	Female, Population-based cohort Study (n=1891) mean age:54.5 Pre-menopausal 39%, post-menopausal 61% African-American	Diagnosed:2005 - February 2020 follow Up: Median 5.9 years	Ductal carcinoma in situ or invasive breast cancer. Stage 0 18%, I 36%, II 32%, III 10%, IV 2%. ER positive 70%, negative 27%, missing 3%. No surgery 3%, lumpectomy 51%, mastectomy 46%. Chemotherapy 55%. Radiotherapy 68%. Endocrine therapy 64%.	Measured	All-cause mortality (n=286)	≥35.0 vs 18.5-24.9 kg/m^2	1.26(0.89-1.79) P trend=0.12	Age, income, smoking, tumor stage, tumor subtype, type of surgery
					Premenopausal All-cause mortality (n=105)		1.33(0.75-2.37) P trend=0.11	
					Postmenopausal All-cause mortality (n=181)		1.26(0.80-1.99) P trend=0.11	
					ER positive All-cause mortality (n=176)		1.20(0.76-1.90) P trend=0.12	
					ER negative All-cause mortality (n=106)		1.34(0.75-2.42) P trend=0.11	
					Breast cancer-specific mortality (n=175)		1.33(0.84-2.10) P trend=0.12	
					ER positive Breast cancer-specific mortality (n=96)		1.12(0.60-2.08) P trend=0.12	
					ER negative Breast cancer-specific mortality (n=76)		1.51(0.73-3.09) P trend=0.11	
Behrouzi B, 2021[354], Iran BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=217) Mean age:53.32.	Diagnosed:2003-2014(treatment) follow Up: Median 60 months	Breast cancer. TNM stage (n): I 35, IIA 55, IIB 46, IIIA 44, IIIB 14, IIIC 17. ER (n): Negative 65, Positive 151. PR (n): Negative 79, Positive 137. HER2 (n): Negative	Medical records	Overall survival (n=37)	Per 1 kg/m^2	1.08(1.03-1.14) P trend=0.002	Age, anti-diabetic medication use, TNM stage

			170, Positive 45. Subtype (n): Luminal-A 131, Luminal-B 19, Triple-Negative 39, HER2type 26. (n): 148 Metformin, 69 Other antidiabetic drugs. All received chemotherapy and/or hormonal therapy. Chemotherapy (n): 196 Adjuvant, 21 Neo-adjuvant.		5-year recurrence-free survival (n=63)		1.05(1.01-1.10) P trend=0.02	
Cárdenas-Cárdenas E, 2021[217], Mexico BMI – Included, review	Female, Retrospective Cohort of Cancer Survivors (n=220) age range: 49-70 years	Diagnosed:2013-2017 follow Up: Median 30.7 months	Breast cancer. Stages I-III	Measured	Recurrence free survival (n=8)	≥30.0 vs 18.5-24.9 kg/m^2	2.10(0.74-6.13) P=0.160	Age, histological grade, hormone receptor status, number of lymph nodes, treatment, tumor size
Feigelson, 2021[412], Kaiser Permanente Breast Cancer Survivors Cohort (KPBCSC) BMI – Excluded	Retrospective Cohort of Cancer Survivors (n=6,481) Mean age 61.2 years White 82.2%, Black 3.4% Other/unknown 14.3%	Diagnosed: 2000-2014 (Colorado); 1990-2008 (Washington) Follow-up 88 months Study entry from 1 year post-diagnosis (47,691 PY)	Invasive primary breast cancer Stage I 62%, II 32.6%, III 5.4% ER+ 80%, ER- 16.85, PR+ 69.3% PR- 26.4% Radiation 70.8%, chemotherapy 38.2% Hormonal therapy 68.4%	Registry and medical records BMI within 2 years prior through 1 year after initial diagnosis	Second primary breast cancer (n=333)	Per 5 kg/m^2	1.11 (1.02-1.21)	Study site, race and ethnicity, age, comorbidity index, receipt of radiation, receipt of chemotherapy, receipt of hormonal therapy, ER and PR status, stage, and year of initial breast cancer diagnosis
Franzoi MA, 2021[238], MONARCH 2 AND MONARCH 3 trials, Multi-country BMI – Included, review	Female, Secondary analysis of clinical trials (n=1138)		Advanced ER-positive, HER2-negative breast cancer 757 patients received abemaciclib + endocrine therapy and 381 only endocrine therapy	Measured	Abemaciclib + endocrine therapy Progression-free survival	>=25 vs <25 kg/m^2	1.00(0.81-1.25) P=0.98	Age, ECOG performance, endocrine therapy, menopausal status, number of metastatic sites, other factors
					Placebo + endocrine therapy Progression-free survival		0.80(0.62-1.04) P=0.09	

Iwase T, 2021[355], USA BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=198) mean age:49 Pre-menopausal 57% Multi-ethnic	Diagnosed:2007-2015 (treatment) follow Up: Median 4.7 years	Breast cancer stage III; ER+/HER2- 58%, ER+/HER2+ 17%, ER-/HER2+ 8%, triple-negative 17%; T3/T4 68%, N3 48% Neoadjuvant chemotherapy	Measured	Overall survival	≥30.0 vs 18.5-24.9 kg/m^2	1.19(0.55-2.59) P=0.66	Unadjusted
Jeon YW, 2021[356], Korea BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=479) mean age:51	Diagnosed:2005-2015 (treatment) follow Up: Median 79 months	Breast cancer stage I 30.5%, II 49.5%, III 20.0%; luminal cancer 49.5%, HER2-expressive 31.1%, triple-negative 19.4% Surgery and adjuvant chemotherapy 100%; breast conservation 71%, mastectomy 28%; adriamycin-based chemotherapy 86.4%	Measured	Overall survival	Obese vs Underweight	0.99(0.34-2.93) P trend=0.877	Unadjusted
					Breast cancer survival		1.21(0.27-5.46) P trend=0.96	
Jung AY, 2021[218], Mammary Carcinoma Risk Factor Investigation (MARIE) study, Germany BMI - Excluded	Female, Population-based Cohort Study (n=2216) mean age:62.9	Diagnosed:2002-2005	Invasive breast cancer. Grade low/moderate 69.1%, high 21.7%. HER2 positive 16.5%, negative 69.9%. Mastectomy 2.6%, mastectomy + axilla 23.5%, breast conserving 8.6%, breast conserving + axilla 65.3%. Chemotherapy 45.6%. Radiotherapy 80%. Tamoxifen/aromatase inhibitor use 80.9%.	Self-reported	All-cause mortality		"There was no evidence for associations between follow-up weight and subsequent prognosis according to baseline BMI"	
					Cancer specific mortality			
					Recurrence-free survival			
Kennard K, 2021[357], USA BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=177) mean age:59.9	Diagnosed:2007-2013 follow Up: Minimum 5 years	Triple negative breast cancer. Pathological stage 1 46.9%, 2 45.8%, 3 7.3%. Neoadjuvant therapy 7.3%.	Medical records	Overall survival (n=33)	>=30 vs <25 kg/m^2	0.45(0.18-1.12) P=0.088	Unadjusted

	Multi-ethnic		Neoadjuvant and adjuvant chemotherapy 7.3%, neoadjuvant chemotherapy only 0%, adjuvant chemotherapy only 67.2%, unknown 4%.		Disease free survival (n=33)		0.46(0.20-1.07) P=0.071	
Kim SW, 2021[358], Korea BMI - Excluded	Female, Secondary analysis of clinical trials (n=907)	Diagnosed:2007-2012 (surgery) follow Up: Median 72 months	Pathologically stage T1-2 and N0-1 Breast-conserving surgery 721 participants, total mastectomy 186 participants. 878 participants received systemic treatment, 196 participants adjuvant chemotherapy alone , 234 participants adjuvant hormone therapy alone and 448 participants both treatments. Radiotherapy 701 participants.	Medical records	Local recurrence (n=29)	>=30 vs <25 kg/m^2	Log-rank test P=0.756	
Ko SM, 2021[119], Korea BMI – Excluded (mortality) Included, meta-analysis (recurrence)	Female, Retrospective Cohort of Cancer Survivors (n=1225) mean age:51.4	Diagnosed:2009-2015 follow Up: Median 70 months	Histologic grade low 20.7%, intermediate 50.4%, high 28.5%. ER negative 29%, positive 71%. PR negative 38.6%, positive 61.3%. HER2 negative 71.2%, positive 25% Total mastectomy 45.4%, breast conserving surgery 54.6%. Anxillary surgery SLNB 82.2%, ALND 17.8%. Endocrine therapy 68.7%, not performed 30.9%, unknown 0.4%. Chemotherapy 60.2%. Radiotherapy 59.3%.	Measured	Overall survival (n=14)	≥23 vs 18.5-22.9 kg/m^2	0.55(0.18-1.68)	Unadjusted
					Disease free survival (n=138)		1.98(1.34-2.92)	Age, WBC count, Histological grade,Estrogen receptor status,Progesterone receptor status,HER2 status ,Ki-67,Tumor size,Positive lymph node involvement

			Anti-HER2 therapy 19.2%.					
Kreklau A, 2021[359], Germany BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=635) mean age:60.8, Premenopausal (n=92), perimenopausal (n=73), postmenopausal (n=470).	Diagnosed:2004=2010	Non-metastatic breast cancer. Grade (n): 112 G1, 341 G2, 180 G3. Estrogen receptor (n): 520 Positive, 113 Negative. Progesterone receptor (n): 463 Positive, 170 Negative. HER2 status (n): 99 Positive, 532 Negative. Triple negative (n): 75. (n): 92 hormone replacement therapy. Adjuvant Chemotherapy (n): 324 Yes, 204 No. Adjuvant radiation (n): 455 Yes, 83 No. Adjuvant endocrine therapy (n): 511 Yes, 117 No.	Measured	Overall survival		OS was increased in patients with intermediate BMI (25-30 kg/m2) as compared to patients with low (<25 kg/m2) and high BMI (>30 kg/m2), respectively	
					Progression-free survival	<30 vs >30 kg/m^2	1.90(0.97-3.69) P=0.06	
Ligorio F, 2021[219], Fondazione IRCCS Istituto Nazionale dei Tumori, Italy BMI – Included, review	Female, Retrospective Cohort of Cancer Survivors (n=505) mean age:55.38	Follow Up: Average 76.7 months	Surgically resected, stage I–III HER2+ BC treated with standard-of-care, trastuzumab-containing 34.7 % HR neg 65.3% HR posit 71.7% anthracycline–taxane	Medical records	Overall survival (n=35)	BMI ≥27.77 vs <27.77 kg/m^2	2.25(1.03-4.94) P=0.043	Lymph node involvement, peritumoral vascular invasion
					Recurrence free survival (n=55)		2.26(1.08-4.74) P=0.031	Grade, hormonal receptor status, lymph node involvement, glycemia
					Distant disease-free survival (n=48)		Survival rate: 85.7% (79.2–92.7%) vs 90.9% (87.8-94.1%) P=0.056	Unadjusted
					Recurrence free survival		1.36 (0.61-3.07) P=0.452	Unadjusted

					Hormone receptor+			
					Recurrence free survival Hormone receptor-		2.29(1.01-5.20) P=0.047	Lymph node involvement
Lin YC, 2021[220], Taiwan BMI – Included, review	Female, Retrospective Cohort of Cancer Survivors (n=5000)	Diagnosed:1990-2005 follow Up: Maximum 10 years	Stage i-III	Medical records	All-cause mortality	≥27 vs <24 kg/m^2	1.17(1.04-1.33) P=0.010	ER status, HER2 status , nodal status, nuclear grade, tumour size
					Disease free survival		1.05(0.93-1.18) P=0.454	
					Age < 50y All-cause mortality		1.21(1.00-1.45) P=0.045	
					Age < 50y Disease free survival		1.24(1.05-1.46) P=0.011	
Liu YS, 2021[360] BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=6642) mean age:48.3	Follow Up: Maximum 10 years	Stage I 40.72%, II 38.56%, III 10.86%, IV 1.16%. ER positive 61.66%, negative 32.11%.	Medical records	ER positive Disease free survival	Overweight/obese vs Underweight/normal weight	1.42(1.05-1.92)	Multivariable adjusted
					ER negative Disease free survival		0.96(0.70-1.31)	
Martel S, 2021[120], ALTO BIG 2-06 trial, Multi-country BMI – Included, meta-analysis	Female, Secondary analysis of clinical trials (n=8381) Mostly White	Follow Up: Median 4.5 years	HER2-positive early breast cancer	Measured	Overall survival (n=528)	≥30 vs 18.5-24.9 kg/m^2	1.27(1.01-1.60)	Ethnicity, age, menopausal status, nodal status, size, local, grade, surgery, treatment type
					Disease free survival (n=854)		1.14(0.97-1.32)	
					Distant disease-free survival (n=839)		1.25(1.04-1.50)	
					Premenopausal Overall survival (n=209)		0.96(0.65-1.43)	
					Postmenopausal Overall survival (n=319)		1.41(1.06-1.88)	
					Premenopausal Disease free survival (n=538)		0.95(0.74-1.22)	
					Postmenopausal Disease free survival (n=667)		1.26(1.03-1.53)	
					Premenopausal Distant disease-free survival (n=394)		1.09(0.82-1.45)	

					Postmenopausal Distant disease-free survival (n=445)		1.35(1.06-1.71)	
					Hormone receptor +ve Overall survival (n=227)		1.23(0.87-1.74)	
					Hormone receptor -ve Overall survival (n=301)		1.26(0.92-1.71)	
					Hormone receptor +ve Disease free survival (n=596)		1.05(0.84-1.30)	
					Hormone receptor -ve Disease free survival (n=609)		1.22(0.98-1.51)	
					Hormone receptor +ve Distant disease-free survival (n=397)		1.15(0.88-1.49)	
					Hormone receptor -ve Distant disease-free survival (n=442)		1.34(1.05-1.73)	
					Treated with trastuzumab alone Overall survival (n=135)		1.14(0.72-1.80)	
					Treated with lapatinib alone Overall survival (n=168)		1.00(0.65-1.55)	
					Treated with trastuzumab followed by lapatinib Overall survival (n=119)		1.54(0.94-2.52)	

					Treated with trastuzumab + lapatinib Overall survival (n=106)		1.59(0.98-2.57)	
					Treated with trastuzumab alone Disease free survival (n=301)		1.21(0.89-1.63)	
					Treated with lapatinib alone Disease free survival (n=366)		1.02(0.76-1.35)	
					Treated with trastuzumab followed by lapatinib Disease free survival (n=284)		1.06(0.77-1.46)	
					Treated with trastuzumab + lapatinib Disease free survival (n=254)		1.30(0.93-1.81)	
					Treated with trastuzumab alone Distant disease-free survival (n=204)		1.29(0.89-1.86)	
					Treated with lapatinib alone Distant disease-free survival (n=277)		1.03(0.74-1.43)	
					Treated with trastuzumab followed by lapatinib Distant disease-free survival (n=196)		1.43(0.98-2.08)	
					Treated with trastuzumab + lapatinib Distant disease-free survival (n=162)		1.43(0.95-2.13)	

Modi ND, 2021[221], HERA, CLEOPATRA. MARIANNE, EMILIA and TH3RESA, Multi-country BMI – Included, review	Female, Secondary analysis of clinical trials (n=8595)	Follow Up: Median 132 months	HER2 positive early and advanced breast cancer	Measured	Early Breast Cancer Overall survival	≥30 vs 18.5-24.9 kg/m^2	1.37(1.14-1.64)	Age, cardiovascular disease, diabetes, ECOG performance, ER/PR status, histological grade, race
					Early Breast Cancer Disease free survival		1.20(1.04-1.39)	
					Advanced Breast Cancer Overall survival		0.82(0.72-0.95)	Age, albumin, cardiovascular disease, diabetes, ECOG performance, ER/PR status, histological grade, race, visceral involvement
					Advanced Breast Cancer Progression-free survival		0.87(0.77-0.98)	
					Early breast cancer - trastuzumab 1-year arm Overall survival		1.55(1.12-2.15)	Age, cardiovascular disease, diabetes, ECOG performance, ER/PR status, histological grade, race
					Early breast cancer - trastuzumab 2-years arm Overall survival		1.13(0.81-1.57)	
					Early breast cancer - placebo arm Overall survival		1.46(1.08-1.95)	
					Early breast cancer - trastuzumab 1-year arm Disease free survival		1.33(1.03-1.73)	
					Early breast cancer - trastuzumab 2-years arm Disease free survival		1.03(0.79-1.33)	
					Early breast cancer - placebo arm Disease free survival		1.28(1.01-1.63)	

					CLEOPATRA Overall survival		0.86(0.63-1.17)	Age, albumin, cardiovascular disease, diabetes, ECOG performance, ER/PR status, histological grade, race, visceral involvement
					MARIANNE Overall survival		0.63(0.43-0.87)	
					TH3RESA Overall survival		0.70(0.50-0.98)	
					EMILIA Overall survival		1.01(0.82-1.26)	
					CLEOPATRA Progression-free survival		0.92(0.72-1.17)	
					MARIANNE Progression-free survival		0.74(0.59-0.92)	
					TH3RESA Progression-free survival		0.69(0.52-0.94)	
					EMILIA Progression-free survival		1.07(0.87-1.31)	
					Early breast cancer - ER or PR positive Overall survival		1.55(1.18-2.02)	Age, albumin, cardiovascular disease, diabetes, ECOG performance, ER/PR status, histological grade
					Early breast cancer - ER and PR negative Overall survival		1.25(0.98-1.59)	
					Early breast cancer - ER or PR positive Disease free survival		1.28(1.04-1.58)	
					Early breast cancer - ER and PR negative Disease free survival		1.14(0.94-1.39)	
					Advanced breast cancer - ER or PR positive Overall survival		0.86(0.71-1.04)	Age, albumin, cardiovascular disease, diabetes, ECOG performance, ER/PR status, histological
					Advanced breast cancer - ER and		0.80(0.66-0.98)	

					PR negative Overall survival			grade, race, visceral involvement
					Advanced breast cancer - ER or PR positive Progression-free survival		0.87(0.74-1.02)	
					Advanced breast cancer - ER and PR negative Progression-free survival		0.87(0.73-1.03)	
Nakatsukasa K, 2021[222], Oral Care-BC trial, Japan BMI – Included, meta-analysis	Female, Secondary analysis of clinical trials (n=169) Post-menopausal 100%	Follow Up: Maximum 13.9 months	Metastatic hormone-receptor-positive HER2-negative breast cancer Chemotherapy 12%,	Measured	Progression-free survival	>=25 vs <25 kg/m^2	1.84(1.11-3.04) P trend=0.018	Age, chemotherapy, endocrine therapy, metastasis, other factors, progesterone receptor status, study group
Orlandini LF, 2021[223], Brazil BMI – Included, review	Female, Retrospective Cohort of Cancer Survivors (n=1664)	Diagnosed:1999-2013	Early breast cancer. Stage I-III	Medical records	All-cause mortality (n=531)	>=30 vs <30 kg/m^2	1.00(0.82-1.24)	Age, grade, stage, tumor subtype
					Cancer specific mortality (n=409)		0.96(0.75-1.22)	
					Relapse (n=482)		1.01(0.82-1.24)	
					Postmenopausal All-cause mortality (n=531)		1.06(0.82-1.37)	
					Postmenopausal Cancer specific mortality (n=409)		0.96(0.70-1.32)	
					Postmenopausal Relapse (n=482)		1.08(0.82-1.41)	
Polley MC, 2021[121], Pooled endocrine therapy (ET) trials, Multi-countrys BMI – Included, meta-analysis	Female, Secondary analysis of clinical trials (n=891) mean age:62 Mostly White	Follow Up: Median 30.6 months	Receptor-positive advanced breast cancer. ER positive 98.8%, negative 0.8%. PR positive 76.9%, negative 20.7%. HER2 positive 1.5%, negative 76.1%.	Measured	Progression-free survival (n=672)	Per 1 kg/m^2	0.98(0.96-0.99) P trend=0.003	Age, chemotherapy, ECOG performance, endocrine therapy, metastasis location, number of metastatic sites, other factors, pr status, radiotherapy, tumor size
Saleh K, 2021[224], Medical-Economical	Female, Retrospective analysis,	Diagnosed:2008-2016 (diagnosed with metastatic	Metastatic breast cancer. Chemotherapy during 1st line (n): 8729	Medical records	Overall survival	≥30 vs 18.5-24.9 kg/m^2	0.98(0.91-1.04)	Age, chemotherapy, endocrine therapy, metastasis location,

(ESME)-Metastatic Breast Cancer (MBC), France BMI – Included, review	prospectively collected data (n=12999) mean age:60, Premenopausal n=2307, Post-menopausal n=6190, Missing 4502.	breast cancer) follow Up: Median 48.6 months	Yes, 4270 No. Endocrine therapy during 1st line (n): 6078 Yes, 6921 No.					other covariates, performance status, subtype, targeted therapy
					First-line progression free survival		1.02(0.96-1.07)	Age, metastasis location, other covariates, performance status, subtype
					HR+/HER2- Overall survival		0.99(0.90-1.08)	Age, metastasis location, other covariates, performance status
					HER2 positive Overall survival		0.97(0.82-1.14)	Age, other covariates, performance status, type of metastasis
					Triple-negative Overall survival		0.94(0.81-1.09)	Age, metastasis location, other covariates, performance status, subtype
Shang, 2021[225], Chicago Multiethnic Epidemiologic Breast Cancer Cohort (ChiMEC) USA BMI - Excluded	Follow-up of Case-control Study (n=2888), multi-ethnic	Diagnosed: 2000-2017 follow Up: Median 6.4 years	Non-metastatic breast cancer. Stages 0-III	Measured	Overall survival	Per 5 kg/m^2	1.09 (0.99–1.20)	Age, race, Carlson comorbidity index, tumor stage, histologic grade, estrogen receptor, progesterone receptor, HER2, radiotherapy, hormonal therapy, and chemotherapy
					Breast cancer survival		1.01 (0.87–1.16)	
					Disease free survival		1.04 (0.96–1.13)	
Tan X, 2021[122], China BMI – Included, meta-analysis	Female, Retrospective analysis, prospective collected data (n=315)	Diagnosed:2003-2010 follow Up: Median 70.7 months , Loss to Follow-up: 73 participants	Invasive breast cancer. ER positive 202, negative 113 participants. PR positive 204, negative 111 participants. HER2 positive 147, negative 168 participants.	Medical records	All-cause mortality	Per 1 kg/m^2	0.95(0.87-1.03)	Age, ER status, HER2 status , lymph node metastasis , PR status, tumor size
					Disease free survival		0.98(0.90-1.07)	
					Recurrence (n=91)	≥30.00 vs ≤23.90	1.29(0.26-6.38)	
Tong Y, 2021[361], China BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors	Diagnosed:2009-2018 (treatment) follow Up: Median 39.4	Invasive HR-positive, HER2-negative breast cancer grade I 9%, II 60%, III 20%; PR-positive	Measured	Overall survival (n=109)	Non-overweight, overweight and obese patients	Similar 5-year OS P=0.178	

	(n=1876) mean age:57 Pre-menopausal 35%, post-menopausal 65%	months	88%, ALN-positive 17% Breast conserving surgery 44%, mastectomy 56%		Disease free survival (n=109)		Similar 5-year DFS P=0.227	
Ahn HR, 2020[226], Korea BMI – Excluded (mortality) Included, review (recurrence)	Female, Retrospective Cohort of Cancer Survivors (n=423) mean age:47.7	Diagnosed:2010-2015 (surgery) follow Up: Median 70.1 months	Invasive ductal carcinoma 92.4%, lobular carcinoma 3.1%, medullary carcinoma 1.2%. ER positive 75.4%, negative 24.6%. PR positive 70.9%, negative 29.1%. Radiotherapy 85.8%, hormone therapy 761%, target therapy 34.5%.	Medical records	Overall survival	>=23 vs <23kg/m2	0.71(0.23-2.18)	Unadjusted
					Relapse-free survival		0.48(0.20-1.15)	Age, ER status, HER2 status , lymph node metastasis , PR status, tumor size, Ki-67 expression, other factors, stage, surgery, vascular invasion
Bayraktar S, 2020[362], USA BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=719)	Diagnosed:1997-208 follow Up: Median 4.2 years	Clinical stage I-IV	Medical records	Overall survival	Normal/underweight Overweight Obese	5-year rates 89.8(86.4-93.5) 88.0(83.8-92.4) (P=0.26) 82.6(77.7-87.8) (P=0.01)	
					Disease recurrence		80.9 (76.4- 85.6) 79.9 (74.7-85.4) (P=0.72) 75.6 (70.1-81.6) (P=0.11)	
Caleffi M, 2020[363], Brazil BMI - Excluded	Retrospective Cohort of Cancer Survivors (n=1113) mean age:52 Postmenopausal 64%	Diagnosed:1995-2017 follow Up: Median 84 months	Clinical stage 0 12.1%, I 50.6%, II 28.3%, III 7.4%, IV 1.3%. ER positive 76.7%, PR positive 76.7%, HER2 positive 19.5% Mastectomy 47%, breast conservative surgery 51.1%, adjuvant chemotherapy 41.7%, neoadjuvant chemotherapy 12.4%, radiotherapy 64.5%	Registry database	All-cause mortality (n=168)		"None of the other variables were associated with mortality, including BMI"	Age at diagnosis, clinical stage, education, ki-67 expression, recurrence
Cantini L, 2020[364], Italy	Female, Retrospective Cohort of Cancer	Diagnosed:2006-2016 (treatment) follow Up:	HER2-Positive Early Breast Cancer Patients. Stage I 38.66%, II	Registry database	Distant disease-free survival (n=22)	<25 vs >=25	1.05(0.44-2.49)	Unadjusted

BMI - Excluded	Survivors (n=238) mean age:54 Premenopausal 41.60%, postmenopausal 58.40%	Median 66.2 months	44.96%, III 15.97%, undefined 0.42%. Adjuvant chemotherapy with anthracyclines and taxanes 56.72%, taxanes only 10.50%, anthracyclines only 32.77%					
		Diagnosed:2006-2016 (treatment) follow Up: Maximum 3 years			Distant disease-free survival (n=10)		0.33(0.09-1.20)	
		Diagnosed:2006-2016 (treatment) follow Up: Median 66.2 months			Distant disease-free survival (n=22)	HR-/BMI >=25 vs others	1.11(0.76-1.63)	Chemotherapy, nodal status, stage, tumor size
		Diagnosed:2006-2016 (treatment) follow Up: Maximum 3 years			3-year distant disease-free survival (n=10)		1.79(1.04-3.07)	
Chen B, 2020[227], Sun Yat-sen University Cancer Center (SYSUCC), China BMI – Included, review (mortality) Excluded (recurrence)	Female, Retrospective Cohort of Cancer Survivors (n=3891) age range: 18-92 years	Diagnosed:2001-2011	Primary breast cancer (I-IV stages) I/II 2806 III/IV 1085	Medical records	Age 18-<40 years Breast cancer-specific mortality	≥25 vs 18.5-24.9 kg/m^2	1.38(0.87-2.20)	ER status, grade, HER2 status , PR status, stage
					Age 18-<40 years Disease free survival		1.46(0.93-2.28)	
Corona SP, 2020[365], BALLET study, Europe BMI - Excluded	Female, Secondary analysis of clinical trials (n=687)		Advanced or metastatic hormone receptor-positive breast cancer	Measured	Progression-free survival	>=25 vs <25 kg/m^2	Log-rank test P<0.001	
						30 vs <18.5 kg/m^2	85.00(56.00-177.00) 61.00(56.00-78.00) 56.00(43.00-63.00) 58.00(36.00-72.00)	
Da Silva JL, 2020[366], Brazil BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=235) mean age:50.1	Diagnosed:2010-2014 follow Up: Median 64.3 months	Triple-negative breast cancer. Stage (n): II 35, III 200. Complete standard Neo-adjuvant chemotherapy (n): 196. Post-NACT complementary treatment (n): Cisplatin 10, Capecitabine 6, Radiotherapy 11. Type	Medical records	Overall survival (n=101)	≥30 vs <30 kg/m^2	1.12(0.72-1.74) P trend=0.620	Unadjusted
					Event free survival (n=114)		1.09(0.72-1.66) P trend=0.683	

			of surgery (n): Breast-conserving surgery 6, Mastectomy 229.					
Desmedt C, 2020[123], BIG 2-98 phase III trial, Multi-country BMI – Included, meta-analysis	Female, Secondary analysis of clinical trials (n=2839)	Diagnosed:1998-2001 follow Up: Median 10.1 years	Early invasive breast cancer stage I-III	Measured	Docetaxel-free arm Overall survival (n=237)	≥30 vs 18.5-24.9 kg/m^2	1.10(0.78-1.54) P=0.59	Age, ER status, number of positive nodes, tumour size
						Per 5 kg/m^2	1.05(0.91-1.20) P=0.50	
					Docetaxel-based arm Overall survival (n=421)	≥30 vs 18.5-24.9 kg/m^2	1.63(1.27-2.09) P=0.0001	
						Per 5 kg/m^2	1.18(1.08-1.29) P=0.0002	
					Docetaxel-based arm >=85% Overall survival (n=349)	≥30 vs 18.5-24.9 kg/m^2	1.53(1.17-2.00) P=0.002	
					Docetaxel-free arm Disease free survival (n=349)	≥30 vs 18.5-24.9 kg/m^2	1.11(0.83-1.47) P=0.49	
						Per 5 kg/m^2	1.07(0.96-1.20) P=0.22	
					Docetaxel-based arm Disease free survival (n=663)	≥30 vs 18.5-24.9 kg/m^2	1.32(1.08-1.62) P=0.07	
						Per 5 kg/m^2	1.07(1.00-1.15) P=0.6	
					Docetaxel-based arm >=85% Disease free survival	≥30 vs 18.5-24.9 kg/m^2	1.28(1.02-1.59) P=0.03	
					Docetaxel-free arm Distant metastases	≥30 vs 18.5-24.9 kg/m^2	1.05(0.73-1.52) P=0.79	
					Docetaxel-based arm Distant metastases	≥30 vs 18.5-24.9 kg/m^2	1.19(0.91-1.55) P=0.20	
					Docetaxel-free arm and ER+ Overall survival (n=148)	≥30 vs 18.5-24.9 kg/m^2	1.02(0.65-1.59) P=0.94	
						Per 5 kg/m^2	1.00(0.84-1.19) P=0.98	
					Docetaxel-based arm and ER+	≥30 vs 18.5-24.9 kg/m^2	1.67(1.21-2.32) P=0.002	
						Per 5 kg/m^2	1.16(1.03-1.31)	

					Overall survival (n=242)		P=0.01	
					Docetaxel-free arm and ER- Overall survival (n=89)	≥30 vs 18.5-24.9 kg/m^2	1.20(0.71-2.02) P=0.59	
						Per 5 kg/m^2	1.13(0.91-1.39) P=0.28	
					Docetaxel-based arm and ER- Overall survival (n=179)	≥30 vs 18.5-24.9 kg/m^2	1.59(1.08-2.35) P=0.02	
						Per 5 kg/m^2	1.20(1.05-1.36) P=0.006	
					Docetaxel-free arm and ER+ Disease free survival (n=225)	≥30 vs 18.5-24.9 kg/m^2	1.14(0.79-1.63) P=0.49	
						Per 5 kg/m^2	1.09(0.95-1.25) P=0.23	
					Docetaxel-based arm and ER+ Disease free survival (n=434)	≥30 vs 18.5-24.9 kg/m^2	1.27(1.01-1.60) P=0.04	
						Per 5 kg/m^2	1.04(0.95-1.14) P=0.43	
					Docetaxel-free arm and ER- Disease free survival (n=124)	≥30 vs 18.5-24.9 kg/m^2	1.07(0.67-1.70) P=0.77	
						Per 5 kg/m^2	1.05(0.87-1.26) P=0.62	
					Docetaxel-based arm and ER- Disease free survival (n=529)	≥30 vs 18.5-24.9 kg/m^2	1.35(0.95-1.91) P=0.09	
						Per 5 kg/m^2	1.11(0.99-1.25) P=0.07	
Di Cosimo S, 2020[367], neoaltto trial, Multi-country BMI - Excluded	Female, Secondary analysis of clinical trials (n=455) mean age:50 Premenopausal 48%, postmenopausal 42%	Diagnosed:2008-2010 (treatment) follow Up: Median 6.7 years	HER2-positive breast cancer. HR negative 49%, positive 51%. Conservative surgery 29%, mastectomy 71%.	Measured	Event free survival (n=127)	≥30 vs <18.49 kg/m^2	Log-rank P=0.763 "Baseline BMI, either as a continuous or a categorical variable, was not significantly associated with EFS (overall or in the HR-positive cohort)"	
Engkakul T, 2020[228], Thailand BMI – Included, review	Female, Retrospective Cohort of Cancer Survivors (n=400) mean age:52,	Diagnosed:2004-2011 , Loss to Follow-up: 1	Breast cancer. Stage (n): IA 6, IIA 163, IIB 80, IIIA 66, IIIB 33, IIIC 52. Hormone receptor status (n): Negative 91,	Measured	Overall survival (n=52)	≥25 vs <24.9 kg/m^2	0.77(0.43-1.39)	Age, chemotherapy, comorbidity, HER2 status , hormonal receptor status, lymph

	Premenopausal n=211, Postmenopausal n=199	Diagnosed:2004-2011 follow Up: Median 65 months , Loss to Follow-up: 84	Positive 309. HER2 status (n): Negative 270, Positive 100, Unknown 30. Types of surgery (n): BCS 90, Mastectomy 308. Chemotherapy (n): No 48, Yes 352. Hormonal treatment (n): No 95, Yes 305.		Disease free survival (n=52)		0.72(0.46-1.13) P trend=0.159	node status, tumor stage
Fadelu T, 2020[124], Haiti BMI – Included, meta-analysis	Female, Retrospective Cohort of Cancer Survivors (n=224) mean age:49.1, Postmenopausal 36.2%.	Diagnosed:2012-2016 Follow Up: Median 21.7 months	Nonmetastatic breast cancer. Locally advance disease 58.5%. ER positive 61.8%. Neoadjuvant chemotherapy 45.1%. Adjuvant chemotherapy 82.6%.	Medical records	Disease free survival (n=80.0)	>30kg/m2 vs <25 kg/m2	0.85(0.50-1.45)	Clinical stage, ER status, menopausal status, time to definitive treatment, residence
					Receiving adjuvant chemotherapy Disease free survival		1.61(0.76-3.42)	Clinical stage, ER status, menopausal status, time to definitive treatment, residence, weight change
Godina C, 2020[229], BCBlood, Sweden BMI – Included, review	Female, Prospective Cohort of Cancer Survivors (n=814) mean age:63.9, Other Characteristics: Elderly	Diagnosed:2002-2012 Follow Up: Median 7 years	Breast cancer histological grade I 26.0%, II 51.2%, III 22.7%; ER+ 88.8%, PR+ 70.0% Surgery	Medical records	Death from any cause (n=111)	>=25 vs <25 kg/m^2	2.00(1.32-3.04)	Age, ER status, hormonal therapy, nodal status, tumor grade, tumor size
					Recurrence risk (n=119)		1.54(1.06-2.25)	
					ER positive Death from any cause (n=119)		1.99(1.25-3.17)	
					ER negative Death from any cause (n=119)		2.07(0.78-5.47)	
					ER positive Recurrence risk (n=119)		1.58(1.05-2.39)	
					ER negative Recurrence risk (n=119)		1.68(0.63-4.51)	
					ER+, aromatase inhibitor Death from any cause (n=119)		2.16(1.07-4.37)	
					ER+, no aromatase inhibitor Death from any cause (n=119)		2.00(1.05-3.80)	

					ER+, aromatase inhibitor Recurrence risk (n=119)		1.66(0.88-3.13)	
					ER+, no aromatase inhibitor Recurrence risk (n=119)		1.72(0.98-3.02)	
Gondo N, 2020[125] Aichi, Japan BMI – Included, meta-analysis	Female, Retrospective Cohort of Cancer Survivors (n=3223) mean age:54	Diagnosed:2003-2014 Median follow-up 57 months	Stage I-IIIC invasive carcinoma. 414 participants received neoadjuvant. 327 participants received preoperative chemotherapy and 87 participants preoperative hormone therapy.	Medical records	Overall survival (n=189)	≥30 vs 18.5-24.9 kg/m^2	2.43(1.38-4.28)	Age, chemotherapy, histological grade, hormonal therapy, menopausal status, number of positive lymph nodes, tumor size
					Cancer specific mortality (n=137)		2.73 (1.15-6.64)	
					Disease free survival (n=329)		1.83(1.11-3.02)	
					Premenopausal Overall survival		2.00(0.78-5.12)	
					Postmenopausal Overall survival		3.59(1.76-7.30)	
					Premenopausal Cancer specific mortality		2.47(0.95-6.42)	
					Postmenopausal Cancer specific mortality		3.06(1.18-7.87)	
					Premenopausal Disease- free survival		2.45(1.27-4.73)	
					Postmenopausal Disease free survival		1.85(0.92-3.66)	
					Premenopausal ER+ Overall survival		1.27(0.30-5.43)	
					Premenopausal ER- Overall survival		2.26(0.56-9.18)	
					Postmenopausal ER+ Overall survival		4.87(2.15-11.04)	
					Postmenopausal ER- Overall survival		1.84(0.42-8.10)	

					Premenopausal ER+ Cancer specific mortality		1.66(0.39-7.22)	
					Premenopausal ER- Cancer specific mortality		2.14(0.36-9.63)	
					Postmenopausal ER+ Cancer specific mortality		4.51(1.52-13.34)	
					Postmenopausal ER- Cancer specific mortality		1.37(0.17-10.00)	
					Premenopausal ER+ Disease free survival		2.04(0.88-4.74)	
					Premenopausal ER- Disease free survival		2.02(0.60-6.85)	
					Postmenopausal ER+ Disease free survival		4.87(1.02-4.89)	
					Postmenopausal ER- Disease free survival		1.18(0.27-5.10)	
Huh J, 2020[368], Korea BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=577) mean age:48.9	Diagnosed:2012-2014 follow Up: Median 74 months	Non-metastatic invasive breast cancer. ER negative 26.3%, positive 73.3%, unknown 0.4%. PR negative 34.8%, positive 64.8%, unknown 0.4%. HER2 negative 81.5%, positive 17.5%, unknown 1.0%. Neoadjuvant chemotherapy 22.5%. Adjuvant chemotherapy 57.7%. Adjuvant radiotherapy 19.2%.	Medical records	Overall survival (n=49)	>23.01 vs <=23.01 kg/m^2	0.68(0.39-1.19)	Unadjusted
					Age >50y Overall survival	>23.6 vs <=23.6 kg/m^2	0.63(0.29-1.38)	
Krasniqi E, 2020[230], Italy	Female, Retrospective			Measured	Overall survival	>23.6 vs <=23.6 kg/m^2	1.29(1.09-1.52)	Age, chemotherapy, histological grade,

BMI – Included, review	analysis, prospectively collected data (n=709) mean age:54		HER2-positive metastatic breast cancer		Progression-free survival (n=575)		1.09(0.97-1.21)	hormonal therapy, menopausal status, number of positive lymph nodes, tumor size
Liu G, 2020[231], China BMI – Included, review	Female, Follow-up of Case-control Study (n=480) Mean age:49.6 Chinese	Follow Up: Maximum 80 months	Breast cancer stage I-II 54.2%, III-IV 45.8%; ER positive 42.7%, PR positive 48.5%, HER2 positive 67.5% Radiation 33.8%, chemotherapy 66.3%	Measured	Breast cancer survival	>24 vs <=24 kg/m^2	0.87(0.38-2.00)	Age, alcohol intake, smoking
Oudanonh T, 2020[126], Canada BMI – Included, meta-analysis	Female, Retrospective analysis, prospectively collected data (n=3747) Mean age:58.4 Post-menopausal 72%	Diagnosed:1995-2010 follow Up: Median 5.9 years	ER-positive non-metastatic breast cancer stage I 47.7%, II 41.1%, 11.2%; grade 1 34.7%, 2 46.8%, 3 18.5%; PR-negative 22.5%; HER2-negative 70.9% Radiotherapy 81.7%; hormone replacement therapy never 54.6%, ever 27.3%, current 18.1%	Self-reported	All-cause mortality (n=444)	≥30 vs 18.5-24.9 kg/m^2	1.48(1.13-1.93) P het=0.004	Age at diagnosis, endocrine therapy, family history, hormone replacement therapy use, menopausal status, other factors, pr status, radiotherapy, smoking, tumor grade, tumor stage
					Breast cancer survival (n=234)		1.33(0.91-1.91) P het =0.16	
					Pre-menopausal All-cause mortality (n=106)		1.08(0.56-2.08) P het =0.07	
					Post-menopausal All-cause mortality (n=338)		1.56(1.16-2.10) P het =0.01	
					Pre-menopausal Breast cancer-specific mortality (n=87)		0.66(0.29-1.48) P het =0.08	
					Post-menopausal Breast cancer-specific mortality (n=147)		1.67(1.08-2.57) P het =0.10	
					PR positive All-cause mortality (n=292)		1.15(0.82-1.62) P het =0.74	
					PR negative All-cause mortality (n=152)		2.33(1.51-3.60) P het =0.0001	
					PR positive Breast cancer-specific mortality (n=145)		1.24(0.78-1.97) P het =0.67	
					PR negative Breast cancer-specific mortality (n=89)		1.52(0.82-2.80) P het =0.01	

Patel V, 2020[369], New Zealand BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=2513) mean age:56 Premenopausal 35%, postmenopausal 65%	Diagnosed:1991-2014 (treatment) follow Up: Median 5.25 years , Loss to Follow-up: 83 participants	Early stage breast cancer. Tumor grade 1 22%, 2 44%, 3 1%. ER negative 21%, positive 77%, unknown 2%. CFRT radiation 45%, HFRT 55%. Adjuvant hormone therapy 66%, adjuvant chemotherapy 47%.	Registry database	All-cause mortality	High BMI vs Normal weight	1.01(0.74-1.38)	
					Cancer specific mortality		1.09(0.84-1.40)	
					Disease free survival		BMI was not significantly associated with the primary or secondary outcomes in the entire cohort or when analyzed separately as premenopausal or postmenopausal groups	
					Local recurrence-free survival			
					Locoregional recurrence-free survival			
Schmidt G, 2020[370], Germany BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=197) premenopausal 29.4%, postmenopausal 70.6%	Follow Up: Median 41.43 months	Triple-negative breast cancer. Grade G1 1%, G2 29.5%, G3 66.5%. Neoadjuvant chemotherapy 42.7%, pcr after neoadjuvant chemotherapy 40.5%, adjuvant chemotherapy 44.1%, no chemotherapy 13.2%	Registry database	Overall survival	Overweight/obese vs Underweight/normal	Log-rank P=0.4720	
					Disease free survival		Log-rank P=0.327	
Tiainen S, 2020[232], Finland BMI – Included, review	Female, Retrospective Cohort of Cancer Survivors (n=262) mean age:58.7	Diagnosed:2002-2008 (treatment) follow Up: Median 9.7 years	Breast cancer pt1 55%, pt2 36%, pt3 4%, pt4 5%; pn0 37%, pn1 44%, pn2 13%, pn3 6%; HER2-positive 49%, ER-positive 72%, PR-positive 62% Surgery	Measured	Overall survival (n=70)	>=30 vs <30 kg/m^2	1.86 (1.06-3.26)	Nodal status, very low density, tumour size, HER2, ER, CD163+ tumor associated macrophages, stromal hyaluronan, type 2 diabetes
					Breast cancer survival (n=52)		1.75(0.89-3.45)	Nodal status, very low density, tumour size, HER2, ER, CD163+ tumor associated macrophages, stromal hyaluronan, hyaluronan in breast cancer cells, type 2 diabetes, CD68+ tumor associated macrophages

Tong Y, 2020[371], China BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=679) mean age:53.04 Pre/peri-menopausal 42%, post-menopausal 58%	Diagnosed:2012-2017 (treatment) follow Up: Median 36 months	Breast cancer histological grade I-II 34%, III 66% ; invasive ductal carcinoma 94.55%; ER-positive 44%, PR-positive 27% Mastectomy 77.91%, sentinel lymph node biopsy 58.76%; adjuvant radiotherapy 89%, adjuvant targeted therapy 80%, adjuvant endocrine therapy 44%	Registry database	Overall survival (n=15)		"A modest but insignificant interaction of IGF-1 and BMI in predicting OS (P for interaction = 0.054"	
					Recurrence free survival (n=52)		"BMI and IGF-1 interacted in predicting RFS (P = 0.009)"	
Walsh SM, 2020[127], Memorial Sloan Kettering Cancer Center, New York (MSKCC), USA BMI – Included, meta-analysis	Female, Retrospective Cohort of Cancer Survivors (n=666) mean age:55	Diagnosed:2005-2010 (treatment) Median 6.1 years	Stage 0-I 46.7%, II 33.9%, III 15.8%, missing 3.6%. ER positive 66.4%, negative 32.9%. PR positive 51.8%, negative 47.1%. Breast-conservative surgery 51.1%, mastectomy 48.6%, no surgery 0.3%. Axilliary surgery SLNB 52.9%, ALND 44.6%, missing 2.1%. Chemotherapy 35.1%. Endocrine therapy 61.3%. Radiotherapy 63.4%.	Registry database	Overall survival (n=115)	Per 1 kg/m^2	1.01(0.98-1.04) P trend=0.579	Age, ER status, HER2 status , mastectomy, nodal status, tumor stage
					Disease free survival (n=118)		1.01(0.98-1.04) P trend=0.432	
Abdel-Rahman O, 2019[372], Breast Johnson 126 and Breast elieli 2008_168, Multi-national BMI - Excluded	Secondary analysis of clinical trials (n=604)			Registry database	Overall survival	Per 1 unit	0.09(0.01-0.65)	Age, chemotherapy, hormone receptor status, metastasis, other factors
					Time to progression		0.22(0.03-1.46)	

Al-Saleh K, 2019[233], Saudi Arabia BMI – Included, review	Female, Retrospective Cohort of Cancer Survivors (n=246) mean age:49.8	Diagnosed:2005-2010	Stage II 35%, IIIA 65%. Luminal A 23.2%, B 45.1%, triple-negative 16.7%, HER2-neu positive 15%. 63% treated with sequential dose dense AC-T chemotherapy consisting of 60mg/m2 doxorubicin i.v. On day 1 and 600mg/m2 cyclophophamine i.v. For 4 cycles followed by 4 cycles of 75mg/m2 docetaxel on day 1 every 2 weeks. 37% received FEC100-taxotere chemotherapy. Adjuvant trastuzumab was given to Her 2neu positive patients. Endocrine adjuvant was offered to women with ER positive and/or PR positive.	Medical records	Overall survival (n=59)	≥30.1 vs ≤24.99 kg/m^2	1.60(0.90-1.80)	Clinical stage, ER status, HER2 status , menopausal status, operation type, PR status, tumor grade, tumor histology, tumor site, vascular invasion
					Disease free survival (n=59)		1.40(0.80-1.60)	
Ayoub NM, 2019[234], Jordan BMI – Included, review	Female, Retrospective Cohort of Cancer Survivors (n=348) mean age:50.98, Premenopausal (n=153), Postmenopausal (n=195).	Diagnosed:2004-2014. Follow Up: Maximum 11 years	Breast cancer. Site (n): Right 159, Left 180, Bilateral 9. Tumor stage (n): I 18, II 170, III 101, IV 59. ER status (n): Positive 258, Negative 90. PR status (n): Positive 234, Negative 114. HER2 status (n): Positive 84, Negative 264. Surgery (n): None 6, Mastectomy 318, Breast conservation 18, Unknown 6. Adjuvant chemotherapy (n): Yes 282, No 26, Unknown 40.	Measured	Death from any cause (n=16)	≥30 vs <29.9 kg/m^2	2.38(0.80-7.10) P=0.1102	Stage
					Breast cancer recurrence (n=56)		2.22(1.20-4.09) P=0.0110	Grade, lymph vascular invasion

Blair CK, 2019[128], New Mexico, USA BMI – Included, meta-analysis	Female, Case-cohort Study (n=859) Non-Hispanic/ Hispanic White	Diagnosed:1997-2009 follow Up: Median 94 months	Stage I-IV	Medical records	Cancer specific mortality (n=697.0)	≥30 vs <29.9 kg/m^2	1.33(0.95-1.84)	Age, ethnicity, stage at diagnosis, tumor grade
					Luminal a Cancer specific mortality (n=408.0)		1.41(0.91-2.18)	
					Luminal b Cancer specific mortality (n=128.0)		1.62(0.49-5.33)	
					HER2-E Cancer specific mortality (n=48.0)		1.09(0.14-8.84)	Age, ethnicity
					Triple-negative Cancer specific mortality (n=113.0)		1.04(0.42-2.54)	Age, ethnicity, stage at diagnosis, tumor grade
					Premenopausal, luminal A Cancer specific mortality (n=99.0)		2.10(0.80-5.10)	
					Premenopausal, luminal B Cancer specific mortality (n=43.0)		1.50(0.30-7.50)	
					Premenopausal, HER-2 overexpressing Cancer specific mortality (n=21.0)		NA	
					Premenopausal, triple-negative Cancer specific mortality (n=44.0)		1.20(0.20-7.10)	Age, ethnicity
					Postmenopausal, luminal A Cancer specific mortality (n=21.0)		1.20(0.70-1.90)	Age, ethnicity, stage at diagnosis, tumor grade
					Postmenopausal, luminal B Cancer specific mortality (n=85.0)		1.10(0.10-8.10)	
					Postmenopausal, Her-2		NA	

					overexpressing Cancer specific mortality (n=27.0)			
					Postmenopausal, triple-negative Cancer specific mortality (n=69.0)		1.10(0.30-3.60)	
Burkheimer, 2019 [276] BMI - Excluded	Retrospective cohort study (n= 1566)	2009 - 2012 Follow up= 84 months	Grade I-III	From records, Pre-surgery BMI	5-year overall survival	Obese vs Normal weight	P = 0.297	Unadjusted
Cacho-Díaz B[235], 2019, Mexico BMI – Included, review	Female, Retrospective analysis, prospectively collected data (n=228) mean age:46	Diagnosed:2014-2018 follow Up: Median 68 months	Breast cancer with brain metastasis	Measured	Overall survival	>=25 vs <25 kg/m^2	0.80(0.61-1.10)	Age, other factors, tumor subtype
Fang Q, 2019[236], China BMI – Excluded (mortality) Included, review (recurrence)	Female, Retrospective Cohort of Cancer Survivors (n=409) Pre/peri-menopausal 53.1%. Post-menopausal 46.9%	Diagnosed:2009-2015 follow Up: Median 43.2 months	AJCC stage II 65.5%, III 34.5%. ER negative 44.5%, positive 55.5%. PR negative 63.1%, positive 36.9%.	Medical records	Overall survival (n=59.0)	>=25 vs <25 kg/m^2	1.23(0.70-2.17) P=0.012	
					Disease free survival (n=107.0)		1.69(1.13-2.53) P=0.011	Age, other factors, tumor subtype, BMI change, clinical stage, ER status, PCR status, PR status, stage, tumor subtype
Fasching PA, 2019[237], Germany BMI – Included, review	Female, Retrospective Cohort of Cancer Survivors (n=3140)		Early HER2-negative and hormone receptor-positive breast cancer; AJCC stage I 1083, II 1213, III 391 Chemotherapy yes 677, no 2730	Registry database	Disease free survival (n=586)	>=30 vs <25 kg/m^2	0.98(0.79-1.20)	Age, ki-67 expression, tumor stage
Kim JY, 2019[129], Korea	Female, Retrospective Cohort of Cancer Survivors	Diagnosed:2003-2011 (treatment) follow Up:	Breast cancer stage I 44.8%, II 42.4%, III 12.7%; ER positive 72.2%, PR positive	Medical records	All-cause mortality (n=256)	>=25.1 vs 18.5-23 kg/m^2	1.14(0.85-1.52)	Age, chemotherapy, radiotherapy, surgery, tumor stage, tumor type
					Recurrence (n=256)		1.08(0.85-1.37)	

BMI – Included, meta-analysis (mortality) Included, review (recurrence)	(n=6405) mean age:48.6 Post-menopausal 37.2%	Median 5.45 years	67.2%, HER2 positive 19.6% Curative surgery followed by adjuvant chemotherapy 72.3%, radiotherapy 75.5%, hormone therapy 98.8%, targeted therapy 46.7%		Age <40 All-cause mortality		1.25(0.65-2.43)	
					Age 40-49 All-cause mortality		1.23(0.70-2.15)	
					Age 50-59 years All-cause mortality		0.99(0.56-1.79)	
					Age >60 All-cause mortality		1.05(0.58-1.93)	
					Age <40 Recurrence		1.07(0.63-1.80)	
					Age 40-49 Recurrence		1.20(0.78-1.82)	
					Age 50-59 years Recurrence		0.76(0.46-1.27)	
					Age >=60 Recurrence		1.33(0.71-2.48)	
Kim JY, 2019[239], Korea BMI – Included, review	Female, Retrospective Cohort of Cancer Survivors (n=5919) Pre-menopause 56.9%, post-menopause 41.6%	Diagnosed:200-2015 (surgery) follow Up: Median 71 months	Stage I 28.3%, II 58.2%, III 13.1%, unknown 0.4%. ER negative 33.3%, positive 66.6%. PR negative 45.9%, positive 54.0%. Adjuvant chemotherapy 68.8%, post-operation radiation therapy 67.2%.	Measured	Overall survival (n=210)	>=25 vs 18.50-24.99 kg/m^2	2.77(1.09–7.04) P= 0.032	Menopausal status, tumor stage, tumor subtype
					Relapse-free survival (n=764)		1.16(0.99-1.36) P=0.074	
					Premenopausal Relapse-free survival		1.92(1.33-2.78) P=0.017	
					Postmenopausal Relapse-free survival		1.35(1.08-1.69) P=0.009	Tumor stage, tumor subtype
					HR+/HER2- Overall survival		1.55(0.98-2.47) P=0.063	
					HR+/HER2- Relapse-free survival		1.80(1.11-2.91) P=0.017	
					HR+/HER2+ Relapse-free survival		4.54(2.05-10.03) P=0.017	Menopausal status, tumor stage, tumor subtype
					Pre-menopausal, HR+/HER2- Overall survival		2.99(1.17-7.63) P=0.011	
					Post-menopausal HR+/HER- Overall survival		2.09(1.10-3.97) P=0.024	
					Pre-menopausal, HR+/HER2-		1.90(1.16-3.12) P=0.011	Tumor stage, tumor subtype

					Relapse-free survival			
					Post-menopausal HR+/HER- Relapse-free survival		1.53(1.10-2.12) P=0.012	
Kus T, 2019[373], Turkey BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=424) mean age:48.2	Diagnosed:2005-2016 follow Up: Median 6.7 years	Breast cancer stage I to III 36% Surgery completed, neoadjuvant or adjuvant chemotherapy	Medical records	Recurrence	>=30 vs <30 kg/m^2	0.86(0.60-1.40)	
					Recurrence rate after 5 y		1.65(0.70-4.10)	
Lee JW, 2019[374] , Korea BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=336) mean age:51,	Diagnosed:2012-2016 Follow Up: Median 53.3 months	Invasive breast cancer T stage T1 45.8%, T2 43.8%, T3 6.8%, T4 3.6%; N stage N0 54.3%, N1 20.5%, N2 8.6%, N3 6.5%; histologic grade 1 24.7%, 2 50.3%, 3 25.0%, triple-negative 12.2%, PR-positive 61.9%, HER2 positive 50.3%, Curative surgery completed; neoadjuvant chemotherapy 13.7%, adjuvant chemotherapy 97.8%	Medical records	Recurrence free survival (n=36)	>=23 vs <23 kg/m^2	1.13(0.58-2.18) P=0.717	
Omarini C, 2019[375], Italy BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=407) mean age:50, Pre-menopausal 52%	Diagnosed:2005-2017 (treatment)	Breast cancer stage I 1%, II 73%, III 26%; grade 1-2 11%, 3 89%; HR-positive 38%, HER2-positive 36%, TN 26% Mastectomy 51%, lumpectomy 49%; neoadjuvant chemotherapy 100%	Medical records	Mortality	Obesity	Neither BMI classes nor body composition parameters distribution significantly influenced overall survival and relapse-free survival	
					Recurrence free survival			
Tryggvadottir H, 2019[240], Sweden BMI - Excluded	Female, Prospective Cohort of Cancer Survivors (n=1178) mean age:61.5	Diagnosed:2002-2014 follow Up: Maximum 13 years	Breast cancer. Histological grade I 24.7%, II 47.7%, III 27.6%. ER + 88.5%. PR+ 71.8%. Chemotherapy 28.2%. Radiotherapy 61.2%	Measured	Recurrence (n=165)	>=25 vs <25 kg/m^2	P=0.013	

Vernaci G, 2019[130], Italy BMI – Included, meta-analysis	Female, Retrospective Cohort of Cancer Survivors (n=992)	Diagnosed:200-2007 follow Up: Median 152 months	Early breast cancer. Stage I-III	Measured	Overall survival (n=212)	>=30 vs <25 kg/m^2	0.96(0.65-1.41) P=0.820	Age, grade, menopausal status, stage
					Invasive disease free survival (n=358)		1.16(0.87-1.55) P=0.307	
					HR+ Invasive disease free survival		1.72(1.30-2.28) P=<0.001	
					HR- Invasive disease free survival (n=10)		P =0.662	
		Diagnosed:2000-2007 follow Up: Median 39 months			Late invasive disease free survival (n=86.0)		2.81(1.64-4.83) P=<0.001	
					HR+ Late invasive disease free survival		3.86(2.25-6.62) P=<0.001	
Wang K, 2019[241], Western China Clinical Cooperation Group (WCCCG), China BMI – Included, review	Female, Retrospective Cohort of Cancer Survivors (n=1288)	Diagnosed:2005-2015 follow Up: Maximum 5 years	Nonmetastatic invasive breast cancer	Medical records	Disease free survival	≥25 vs 18.5-24.9 kg/m^2	1.40(1.05-1.88) P=0.02	Age at diagnosis, axillary node dissection, chemotherapy, endocrine therapy, ER status, HER2 status , nuclear grade, PR status, radiotherapy, surgery, tumor size
					Premenopausal Disease free survival		1.34(0.87-2.06) P=0.18	
					Postmenopausal Disease free survival		1.63(1.06-2.50) P=0.03	
					Luminal-like Disease free survival		0.93(0.52-1.69) P=0.82	
					HER2/luminal-like Disease free survival		2.14(1.23-3.75) P=0.01	
					HER2-like Disease free survival		1.25(0.65-2.39) P=0.51	
					TNBC Disease free survival		2.33(1.06-5.12) P=0.04	
					Axillary lymph nodes metastasis no Disease free survival		2.15(1.21-3.79) P=0.01	
					Axillary lymph nodes metastasis		1.30(0.91-1.84) P=0.15	

					yes Disease free survival			
					Nuclear grade I/II Disease free survival		1.31(0.89-1.92) P=0.17	
					Nuclear grade III Disease free survival		1.48(0.90-2.42) P=0.12	
					Chemotherapy - no Disease free survival		1.48(1.09-2.02) P=0.01	
					Chemotherapy - yes Disease free survival		1.03(0.32-3.28) P=0.04	
Wang X, 2019[242], Hebei Medical University China BMI – Included, review	Female, Retrospective Cohort of Cancer Survivors (n=3380) mean age:50		44.5% lymphatic metastasis positive 55.5% lymphatic metastasis negative	Medical records	Overall survival	>=25 vs <25	1.33(1.06-1.66) P=0.012	ER status, grade, HER-2/neu, ki-67 expression, lymph node involvement, PR status, size of tumor
					Disease free survival		1.15(0.94-1.40) P=0.173	
					>= 50 years Overall survival		1.43(1.05-1.95) P=0.025	
					>= 50 years Disease free survival		1.17(0.88-1.56) P=0.283	
Yao D, 2019[376], China BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=825) mean age:52, Chinese	Diagnosed:2009-2014 follow Up: Median 47.6 months	Breast cancer. Stage (n): I 184, II 397, III 244. ER positive (n): 496 PR positive (n): 418. Her-2-positive (n): 185. Type of surgery (n): Radical 617, Conservative 208. Chemotherapy (n): 742.	Medical records	Overall survival	>=24 vs <24 kg/m^2	1.47(0.59-3.48) P=0.276	
					Disease free survival		1.34(0.67-3.16) P=0.165	
Zhang JY, 2019[131], Guangzhou Breast Cancer Study (GZBCS) Sun Yat-sen University (SYSU), China BMI – Included, meta-analysis	Female, Prospective Cohort of Cancer Survivors (n=1551) mean age:48.25 Premenopausal 60.8%, postmenopausal 39.2%	Diagnosed:2008-2012 follow Up: Median 58.58 months Loss to follow-up 8.3%	Stage I-II 79%, III-IV 21%. ER negative 28.5%, positive 71.5%. PR negative 35.2%, positive 64.8%. HER2 negative 68.3%, positive 31.7%	Questionnaire Self-reported	Progression-free survival (n=285.0)	>=25 vs <22 kg/m^2	0.88(0.62-1.25)	Age at diagnosis, education, ER status, HER2 status , menopausal status, stage

Zhang M, 2019[377], China BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=1536) Premenopausal (n=815) Postmenopausal (n=721) Chinese	Diagnosed:1971-2011 (treatment) follow Up: Maximum 5 years	Breast cancer. Type (n): 512 Bilateral, 1024 Unilateral. ER (n): 662 Negative, 874 Positive. PR (n): 665 Negative, 871 Positive. HER2 (n): 1216 Negative, 153 Positive. Not reported.	Medical records	Unilateral breast cancer	>=30.1 vs <25 kg/m^2	0.88(0.73-1.07) P=0.211	Age at diagnosis, education, er status, HER2 status , menopausal status, stage
					Progression-free survival		0.92(0.79-1.06) P=0.249	
					Bilateral breast cancer Overall survival	>=30.1 vs <25 kg/m^2	2.10(1.19-3.70) P trend=0.005	Age, diabetes, estrogen receptor status, grade, ki-67 expression, lymph node status, size of tumor
					Bilateral breast cancer Progression-free survival		1.44(0.96-2.18) P trend=0.007	Age, diabetes, estrogen receptor status, grade, lymph node status, size of tumor
Abubakar M, 2018 [40], Sarawak Malaysia BMI – Included, meta-analysis	Prospective cohort study (n= 3012) Premenopausal/≤ 50 years 29% Postmenopausal/ >50 years 71% Mean age: 52 years Chinese 48% Malay 24% Native 28% Response rate 97%	Diagnosis: 2003-2006 Follow up = 24 months 579 deaths in 10 years 314 recurrence events in 5 years 5% loss to follow-up	Invasive breast cancer Stage I 14%, II 42%, III 31%, IV 13% Surgery: 88% Chemotherapy: 76% Radiotherapy: 74% Tamoxifen: 47% Aromatase inhibitor: 13% No endocrine therapy: 40%	Measured 4 weeks after diagnosis	Self-reported 10-year all-cause mortality (n=71) Luminal A	≥30.1 vs 18.5-24.9 kg/m^2	1.38 (0.39 - 4.86)	Age, ethnicity, Tumour stage, histological grade, Surgery, Systemic therapy, chemotherapy, radiotherapy, age at menarche, parity, breastfeeding, family history, age at first full-term birth
					10-year all-cause mortality (n=140) Luminal B	≥30.1 vs 18.5-24.9 kg/m^2	1.12 (0.61 - 2.05)	Age, ethnicity, BMI, Tumour stage, histological grade, Surgery, Systemic

								therapy, chemotherapy, radiotherapy,
					10-year all-cause mortality (n=81) HER2+	≥30.1 vs 18.5-24.9 kg/m^2	1.23 (0.52 - 2.9)	
					10-year all-cause mortality (n=146) ER-/PR-/HER2-	≥30.1 vs 18.5-24.9 kg/m^2	1.21 (0.63 - 2.32)	
					Assessed at clinic 5-year breast cancer recurrence (n=39) Luminal A	≥30.1 vs 18.5-24.9 kg/m^2	2.16 (0.34 - 13.78)	Age, ethnicity, Tumour stage, histological grade, Surgery, Systemic therapy, chemotherapy, radiotherapy, age at menarche, parity, breastfeeding, age at first full-term birth, family history
					5-year breast cancer recurrence (n=95) Luminal B	≥30.1 vs 18.5-24.9 kg/m^2	1.28 (0.53 - 3.12)	Age, ethnicity, BMI, Tumour stage, histological grade, Surgery, Systemic therapy, chemotherapy, radiotherapy,
					5-year breast cancer recurrence (n=54) HER2+	≥30.1 vs 18.5-24.9 kg/m^2	1.41 (0.46 - 4.27)	
					5-year breast cancer recurrence (n=83) ER-/PR-/HER2-	≥30.1 vs 18.5-24.9 kg/m^2	0.89 (0.35 - 2.25)	

Bouvard B, 2018[243], France BMI – Included, review	Female, Prospective Cohort of Cancer Survivors (n=450) mean age:60.7	Diagnosed:2004-2006 follow Up: Median 5.2 years	ER+ breast cancer. Stage I 23.1%, II 50.2%, III 22.0%, missing 4.7%. PR positive 81.8%, negative 16.9% missing 1.3%. Previous chemotherapy 55.8%, anthracyclines 85.7%, docetaxel 32.7%, other type 15.9%, no 44.2%. Previous radiotherapy yes 93.1%. Previous tamoxifen therapy 40.4%.	Measured	All-cause mortality (n=67)	>25 vs <=25kg/m2	0.98(0.93-1.03) P=0.37	Age, bisphosphonate, nodal involvement, PR status, tumor size, vitamin d
				Cancer specific mortality (n=41)		0.99(0.93-1.05) P=0.69	
				Breast cancer relapse (n=65)		1.02(0.98-1.07) P=0.34	
Caan, 2018 [53], Kaiser Permanente of Northern California (KPNC) and Dana Farber Cancer Institute (DFCI), USA BMI – Included, meta-analysis	Retrospective cohort study (n= 324) mean age: 54 Pre- and postmenopausal	KPNC:2005-2013 DFCI: 2000-2012 Follow up= 6 years	Invasive breast cancer Stage II 60.2%; III 39.8% ER- 27.0%, ER+ 73.0% HER2- 73.3%, HER2+ 20.9% Chemotherapy: 86.7%	Measured	Total mortality (n=619)	≥ 30 vs 18.5-24.9 kg/m^2	1.10 (0.89 - 1.36)	Age at diagnosis, race, stage, grade, surgery type, chemotherapy, smoking, estrogen receptor level, human epidermal growth factor receptor 2
						Per 6.3 kg/m^2	1.03 (0.94 - 1.13)	
					Total mortality (n=619)	≥ 30 vs 18.5-24.9 kg/m^2	1.22 (0.96 - 1.55)	Above factors + muscle area
					Total mortality (n=619)	Per 6.3 kg/m^2	1.10 (0.98-1.22)	
Cho, 2018 [152], Korea, BMI – Excluded (mortality)	Retrospective cohort study (n= 5668) age range: 22-90 patients	Treatment: 1996-2013 Follow up= 168 months	Invasive breast cancer HR+/HER2- 59.8% HR+/HER2+ 899 cases Triple Negative 793 cases	From records At admission for surgery	Overall survival	≥25 vs <25 kg/m^2	1.356 (1.038 - 1.773)	Age, subtype, pT, pN, Hyperlipidemia, Surgery, Diabetes, Hypertension, Surgery

Included, review (recurrence)	underwent curative surgery for breast cancer (C50) from 1996 to 2013. Pre- and postmenopausal		HR-/HER+ 653 cases, Unknown 372 cases Surgery (BCS+RT) 3687 cases Mastectomy 1981 cases Chemotherapy: 69.2%					
					Overall survival HR+/HER2-	≥25 vs <25 kg/m^2	1.836 (1.205 - 2.8)	
					Overall survival HR+/HER2+	≥25 vs <25 kg/m^2	0.882 (0.326 - 2.39)	
					Overall survival Triple-negative	≥25 vs <25 kg/m^2	1.408 (0.902 - 2.197)	
					Overall survival HR-/HER2+	≥25 vs <25 kg/m^2	0.83 (0.418 - 1.647)	
					Disease-free survival	≥25 vs <25 kg/m^2	1.248 (1.038 - 1.502)	
					Disease-free survival HR+/HER2-	≥25 vs <25 kg/m^2	1.416 (1.08 - 1.856)	
					Disease-free survival HR+/HER2+	≥25 vs <25 kg/m^2	1.11 (0.593 - 2.041)	
					Disease-free survival Triple-negative	≥25 vs <25 kg/m^2	1.149 (0.811 - 1.627)	
					Disease-free survival HR-/HER2+	≥25 vs <25 kg/m^2	0.833 (0.494 - 1.404)	
					Overall survival With Chemotherapy	≥25 vs <25 kg/m^2	1.285 (0.959-1.723)	
					Overall survival Without Chemotherapy	≥25 vs <25 kg/m^2	1.507 (0.846-2.685)	

					Disease-free survival With Chemotherapy	≥25 vs <25 kg/m^2	1.212 (0.990-1.485	
					Disease-free survival Without Chemotherapy	≥25 vs <25 kg/m^2	1.036 (0.680-1.579)	
Deluche, 2018 [158], France, BMI - Excluded	Retrospective cohort study (n= 119) mean age:56 Pre- and postmenopausal	Diagnosis year: March 2007 to June 2016 Follow up= 52.4 months	Early stage breast cancer Tumor size < 2 cm 19.0% Tumor size ≥ 2 cm 81.0% Neoadjuvant chemotherapy 55% Adjuvant chemotherapy alone 54% Adjuvant radiotherapy 90.0%	Measured at 1st clinical appointment	Overall survival(n=22)	≥25 vs <25 kg/m^2	0.7 (0.3 - 1.7) P =0.4	Unadjusted
					Disease-free survival(n=25)	≥25 vs <25 kg/m^2	2.8 (0.1 - 1.1) P =0.09	sarcopenia, subcutaneous adipose tissue, visceral adipose tissue index, muscle fat infiltration index, VAT/SAT ratio
Desmedt C, 2018[378], Brussels BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=1834)	Diagnosed: between January 2008 and December 2010 follow Up: Median 7 years	Tumor size, cm all no. (%): Ketorolac series: <2cm= 466 (56.4); >=2cm=360 (43.6%); Diclofenac series: <2cm: 634 (63.5),	At the time of primary surgery	Distant metastases (n=73)		Ketorolac/Diclofenac use or not was not associated with distant metastases within BMI subgroups	Age, tumor size, nodal status, grade, estrogen receptor status, human epidermal growth factor receptor 2 status, adjuvant

		,>In the ketorolac cohort, 73 distant metastases occurred as the first event, of which 48 were in the high-BMI group >In the diclofenac cohort, 79 distant metastases occurred as the first event, of which 41 were in the high-BMI group **ketorolac (n=529 with, n=298 without) or diclofenac (n=787 with, n=220 without).	>=2cm: 364 (36.5) Ketorolac series: Grade 1=129 (16.9); Grade 2=281 (36.8); Grade 3= 354(46.3) Diclofenac series: Grade 1=192 (19.1); Grade 2=518(51.5); Grade 3 295 (29.4)					chemotherapy, adjuvant endocrine therapy
Elwood JM, 2018 [65], New Zealand cohort, New Zealand, BMI – Included, meta-analysis ((non)-breast cancer mortality)	Prospective cohort of cancer survivors (n= 1049) Pre-and post-menopausal	2000-2014 Follow up= 4.1 years	Invasive breast cancer Stage I 14%, II 51.2%, III 29.5%, IV 5.3% ER+/PR+ 49.1%, ER+/PR- 20.6%, ER-/PR+ 2.1%, ER-/PR- 25.7%, missing/unknown 2.5% HER-2 + 26.1%, equivocal 2.6%, negative 52.8%,	From records at first clinic after diagnosis and before primary treatment or after primary surgery but before systemic treatment	Overall mortality (n=463) whole study period	≥ 35 vs 21-25 kg/m^2	1.03 (0.63 - 1.67)	BMI, ethnicity, menopausal status, age, social class, social deprivation, urban-rural status, mode of diagnosis (screening vs symptomatic), year of diagnosis, stage, grade, histology , hormone receptor status, local treatment, systemic treatment (chemotherapy, hormonal therapy and biological treatment), treatment facility

			missing/unknown 18.5% Chemotherapy alone 32.2%, chemotherapy and hormonal therapy 67.8% Breast cancer conserving surgery with radiotherapy 43%, with no radiotherapy 4.3%, mastectomy with radiotherapy 36.1%, with no radiotherapy 12.4%, no primary surgery 4.2% Total mastectomy 48.5%, total with radiotherapy 79.1%, total without radiotherapy 16.7%					(public vs private), comorbidity index
					Total mortality (n=462) whole study period	Per 1 kg/m^2	1.00 (0.97 - 1.03)	
					Breast cancer-specific mortality(n=361) whole study period	≥ 35 vs 21-25 kg/m^2	0.96 (0.56 - 1.67)	
					Breast cancer-specific mortality(n=317) normal axillary nodes	Per 1 kg/m^2	0.99 (0.96 - 1.02)	

					Non-breast-cancer-related death(n=171) whole study period	≥ 35 vs 21-25 kg/m^2	1.42 (0.4 - 5.01)	
					Breast cancer recurrence(n=107) whole study period	≥ 35 vs 21-25 kg/m^2	1.17 (0.19 - 7.21)	
					Distant metastases (n=433) whole study period	≥ 35 vs 21-25 kg/m^2	1.33 (0.61 - 2.91)	
						Per 1 kg/m^2	0.98 (0.94 - 1.02)	
Espelund U, 2018[379], Denmark BMI - Excluded	Female, Prospective Cohort of Cancer Survivors (n=301) mean age:55 Premenopausal 29%, postmenopausal 71%	Diagnosed:1993-1998 (surgery) follow Up: Median 68 months	ER positive 76%, negative 24%. PR positive 38%, negative 62%. Lumpectomy 52%, mastectomy 48%. No adjuvant therapy 53%, ovarian ablation 12%, tamoxifen 20%, chemotherapy 16%.	Measured	Overall survival (n=107)	Per 5 kg/m^2	0.93(0.76-1.14) P trend=0.477	
					Recurrence-free survival (n=105)		0.87(0.72-1.04) P trend=0.129	
Flanagan MR, 2018[132], USA BMI – Included, meta-analysis	Female, Nested Case-control Study (n=1310) , (n): 520 Pre or perimenopausal, 749 Postmenopausal, 41 Unknown. Mostly white	Diagnosed:1995-2013 (diagnosed with DCIS)	Breast cancer: Ductal carcinoma In situ. Histology of DCIS (n): 494 Mixed, 298 NOS, 171 Comedo, 158 Cribriform, 128 Solid, 61 other. Treatment for initial DCIS (n): 13 Biopsy only, 707 BCS with radiation, 308 without radiation, 282 Mastectomy. Adjuvant endocrine therapy (n): 863 No, 445 Yes, 2 Unknown.	Interview Medical records	Risk of second breast cancer event	Per 1 kg m^2	1.03(1.01-1.10) P trend=0.007	Adjuvant endocrine therapy, age, diagnosis year, grade, histology , menopausal status, other covariates, survival time, treatment
					Invasive secondary breast cancer		1.04(1.01-1.10) P trend=0.005	
					In situ secondary breast cancer		1.01(0.90-1.05) P trend=0.491	
					Risk of second breast cancer event	>=30 vs <25 kg/m^2	1.60(1.20-2.20)	
					Invasive secondary breast cancer		1.80(1.20-2.60)	Adjuvant endocrine therapy, age, grade, histology , menopausal status, other covariates, radiation therapy,
					In situ secondary breast cancer		1.30(0.80-2.30)	

					Without unilateral mastectomy Ipsilateral secondary breast cancer (n=173)	>=30 vs <25 kg/m^2	1.10(0.70-1.80)	surgery, survival time, year of diagnosis Adjuvant endocrine therapy, age, diagnosis year, grade, histology , menopausal status, other covariates, survival time, treatment
					Contralateral secondary breast cancer (n=270)	>=30 vs <25 kg/m^2	2.20(1.40-3.30)	
					Risk of second breast cancer event	Per 1 kg/m^2	1.03(1.00-1.04) P trend=0.028	
					In situ secondary breast cancer		1.01(0.97-1.05) P trend=0.698	
					Invasive secondary breast cancer		1.03(1.01-1.06) P trend=0.017	
					Risk of second breast cancer event	>=30 vs <25 kg/m^2	1.50(1.10-2.10)	
					Invasive secondary breast cancer		1.60(1.10-2.30)	Adjuvant endocrine therapy, age, grade, histology , menopausal status, other covariates, radiation therapy, surgery, survival time, year of diagnosis
					In situ secondary breast cancer		1.30(0.80-2.30)	
					Without unilateral mastectomy Ipsilateral secondary breast cancer (n=173)	>=30 vs <25 kg/m^2	1.10(0.60-2.10)	
					Contralateral breast cancer (n=270)	>=30 vs <25 kg/m^2	1.90(1.30-2.80)	
Hwang KT, 2018[244], Korea BMI – Included, review	Female, Retrospective Cohort of Cancer Survivors (n=967) mean age:54.3	Diagnosed:1992-2016 (surgery) follow Up: Median 70.8 months	Operable primary invasive breast cancer. Stages I-III	Registry database	Overall survival (n=94)	>25 vs <=25 kg/m^2	0.83(0.49-1.38)	Age, chemotherapy, endocrine therapy, estrogen receptor status, HER2 status , herceptin use, histological grade, lymphovascular invasion, nodal status, operation type, other factors, progesterone receptor status,
					Age >50y Overall survival		0.98(0.54-1.79)	

								radiotherapy, tumor size
Kogawa, 2018 [177], MD Anderson Cancer Centre (MDACC), USA BMI – Included, review	Retrospective cohort study (n= 4029) age range:19-83 Pre- and postmenopausal	Diagnosis year: May 1, 1990, and April 30, 2013 Follow up= 3.95 years	Clinical stage: I 2.1%, II 56.2%, III 41.7%	Baseline BMI before neoadjuvant chemotherapy BMI after neoadjuvant chemotherapy	Total mortality(n=694)	≥30 vs 18.5-24.9 kg/m^2	1.260 (1.032-1.527)	Age, race, tumor stage, nuclear grade, lymph vascular invasion, positive lymph nodes, pCR status
					Recurrence free survival(n=936)	<18.5 vs 18.5-24.9 kg/m^2	2.23 (1.038-4.788)	
Liu, 2018 [184], BMI – Included, review	Retrospective cohort study (n= 273) Pre- and postmenopausal	Diagnosis year: January 2004 and February 2016 Follow up= 32.6 months Loss to follow up 1 patient Overall 33 deaths 60 event-free survival events	Invasive breast cancer	From records, average 2.7 months after diagnosis	Overall survival(n=8) HR+/HER2- with aromatase inhibitor	≥30 vs < 30 kg/m^2	0.45 (0.09 - 2.26) P =0.34	Hormonal therapy
					Overall survival(n=4) HR+/HER2- with tamoxifen	≥30 vs < 30 kg/m^2	9.27 (0.96 - 89.31) P =0.05	
					Overall survival(n=4) HER2 positive	≥30 vs < 30 kg/m^2	1.35 (0.22 - 8.19) P =0.75	
					Overall survival(n=12) Triple-negative	≥30 vs < 30 kg/m^2	3 (0.95 - 9.51) P =0.06	

					Event free(n=15) HR+/HER2- with aromatase inhibitor	≥30 vs < 30 kg/m^2	0.92 (0.32 - 2.6) P =0.87	
					Event free(n=11) HR+/HER2- with tamoxifen	≥30 vs < 30 kg/m^2	2.47 (0.72 - 8.49) P =0.15	
					Event free(n=11) HER2 positive	≥30 vs < 30 kg/m^2	3.37 (0.97 - 11.72) P =0.06	
					Event free(n=18) Triple-negative	≥30 vs < 30 kg/m^2	2.62 (1.03 - 6.66) P =0.04	
Maliniak ML, 2018 [91], Cancer Prevention Study (CPS)-II Nutrition Cohort, United States, BMI – Included, meta-analysis	Population-based study (n= 5254) Postmenopausal Age ≥65 years 3% non-white/unknown	Diagnosis: 1992-2013 Follow-up= 13.3 years for cases diagnosed at 46-64 years; 7.5 years for age 65-92 years 1771 deaths, 505 breast cancer deaths 100 patients loss to follow-up	Invasive breast cancer, stage I-III, local or regional	Self-reported, questionnaire, median 3.1 years after diagnosis	All-cause mortality (n=222) Diagnosed at age 46-64 years	≥35 vs 18.5-24.9 kg/m^2	1.08 (0.66 - 1.76) P trend=0.45	Age at diagnosis, race, calendar year, SEER summary stage at diagnosis, post-diagnosis physical activity, post-diagnosis number of comorbidities, post-diagnosis use of hormone replacement therapy, post-diagnosis alcohol intake, pre-diagnosis other cancer diagnosis, smoking status (Other covariates were tested but not included in the final models)
						Per 5 kg/m^2	0.95 (0.82 - 1.09)	
					All-cause mortality (n=1114) Diagnosed at age 65–92 years	≥35 vs 18.5-24.9 kg/m^2	1.26 (0.97 - 1.63) P trend=0.57	
						Per 5 kg/m^2	0.98 (0.92 - 1.05)	

							P interaction=0.66	
					Breast cancer-specific mortality (n=95) Diagnosed at age 46-64 years	≥35 vs 18.5-24.9 kg/m^2	0.73 (0.32 - 1.68) P trend=0.28	Above factors without smoking habits
						Per 5 kg/m^2	0.89 (0.71 - 1.1)	
					Breast cancer-specific mortality (n=231) Diagnosed at age 65–92 years	≥35 vs 18.5-24.9 kg/m^2	2.11 (1.27 - 3.52) P trend=0.01	
						Per 5 kg/m^2	1.19 (1.04 - 1.36) P interaction=0.02	
					Breast cancer-specific mortality Received chemotherapy	Per 5 kg/m^2	1.29 (1.03-1.61)	
					Breast cancer-specific mortality Not received chemotherapy	Per 5 kg/m^2	1.32 (1.08-1.61) P-interaction= 0.88	
					Breast cancer-specific mortality Comorbidities 0	Per 5 kg/m^2	1.25 (0.90-1.76)	
					Breast cancer-specific mortality Comorbidities 1+	Per 5 kg/m^2	1.21 (1.05-1.40) P-interaction= 0.84	
Martel , 2018 [187], Italy, BMI – Included, review	Retrospective cohort study (n= 329) Pre- and postmenopausal	2000-2013 Follow up= 3 years Loss to follow up: 1 patient	HER2-positive metastatic breast cancer, treated with trastuzumab-based therapy	BMI collected at time of diagnosis	Overall survival(n=154)	≥25 vs < 25 kg/m^2	0.88 (0.59 - 1.31) P =0.525	BMI, age, histological grade, number of metastatic sites, visceral involvement, disease-free interval

			Liver metastasis 31.6%					
					Progression-free(n=279)	≥25 vs < 25 kg/m^2	0.95 (0.75 - 1.2) P =0.691	
Moore, 2018 [95], Patterns of Care Study for Breast and Prostate Cancers (POC-BC), United States, BMI – Included, meta-analysis	Retrospective cohort study (n= 5394) Age range:20-98 years Pre- and postmenopausal	Diagnosis year: 2004-2012 Follow up= 8 years Loss to follow: 6 patients	Invasive breast cancer. Stage I 48.4%, II 37.6%, III 14% ER+ and/or PR+ 73%. ER- and PR- 22.5%, unknown 4.5% HER2+ 34.4%, HER2- 49.7%, unknown 15.9%	Measured at diagnosis.	All-cause mortality	≥35 vs 18.5-24.9 kg/m^2	0.85 (0.67 - 1.08)	Age, American joint committee on cancer stage, insurance type, poverty in census tract of residence, education, urbanicity of residence area, tumor grade, hormone receptor status, comorbidity
					All-cause mortality	Per 5 kg/m^2	0.93 (0.87 - 0.95)	
					All-cause mortality ER positive	≥35 vs 18.5-24.9 kg/m^2	0.86 (0.64 - 1.16) P trend=0.03	
					All-cause mortality ER negative	≥35 vs 18.5-24.9 kg/m^2	0.86 (0.55 - 1.34) P trend=0.22	
					All-cause mortality <50 years	≥35 vs 18.5-24.9 kg/m^2	1.04 (0.63-1.73)	
						Per 5 kg/m^2	1.01 (0.91-1.13)	

					All-cause mortality 50-69 years	≥35 vs 18.5-24.9 kg/m^2	0.84 (0.56-1.28)	
						Per 5 kg/m^2	0.95 (0.86-1.05)	
					All-cause mortality ≥70 years	≥35 vs 18.5-24.9 kg/m^2	0.78 (0.52-1.17)	
						Per 5 kg/m^2	0.85 (0.75-0.95) P interaction = 0.01	
					Breast cancer-specific mortality	≥35 vs 18.5 kg/m^2	0.93 (0.64 - 1.35)	
					Breast cancer-specific mortality	Per 5 kg/m^2	0.98 (0.94 - 1.02)	
					Breast cancer-specific mortality ER positive	≥35 vs 18.5-24.9 kg/m^2	0.95 (0.57 - 1.57) P trend=0.75	
					Breast cancer-specific mortality ER negative	≥35 vs 18.5-24.9 kg/m^2	0.87 (0.51 - 1.49) P trend=0.58	
					Non-breast-cancer-related death	≥35 vs 18.5-24.9 kg/m^2	0.88 (0.64 - 1.21)	
					Non-breast-cancer-related death	Per 5 kg/m^2	0.9 (0.82 - 0.99)	
					Non-breast-cancer-related death ER positive	≥35 vs 18.5-24.9 kg/m^2	0.95 (0.67 - 1.36) P trend=0.07	
					Non-breast-cancer-related death	≥35 vs 18.5-24.9 kg/m^2	0.77 (0.31 - 1.88) P trend=0.58	

					ER negative			
Morrison VA, 2018 [316], CALGB, BMI - Excluded	Secondary analysis of clinical trial (n= 615) Age ≥65 years Postmenopausal	From September 2001 through December 2006 Follow-up: median 2.4 years	Stage I-IIIB	BSA and BMI were measured prior to chemotherapy	Overall survival	>30 vs 23-25 kg/m^2	0.99 (0.63 - 1.56) P trend=0.087	Unadjusted
					Relapse-free survival	>30 vs 23-25 kg/m^2	1.02 (0.68 - 1.55) P trend=0.25	Unadjusted
Mutschler NS, 2018 [191], ADEBAR, Germany, BMI – Included, review	Secondary analysis of clinical trial (n= 1080) Pre- and postmenopausal Mean age: 53 years	2001-2005 Follow up= 62.9 months	Lymph node+ early breast cancer, no metastasis	Measured Prior to adjuvant therapy	Overall survival(n=186)	≥ 30 vs <30 kg/m^2	1.46 (1.02 - 2.11) P =0.041	Age, menopausal status, tumor stage, nodal status, grade, histological type, hormone receptor status, HER2 status , chemotherapy
					Disease-free survival(n=303)	≥ 30 vs <30 kg/m^2	1.38 (1.03 - 1.84) P =0.032	
Pizzuti L, 2018 [321], Italy, BMI - Excluded	Retrospective cohort of cancer survivors (n= 196) Pre- and postmenopausal, age range 31-82 years, median age 56 years	Diagnosed and treated from 2008 through 2015	HER2-negative metastatic breast cancer ER+ and/or PgR positive 74.5%, Triple negative 22%, unknown 3.5% Metastatic spread 34.2% 1 site, 31.6% 2 sites, 34.2% 3 sites metastatic at diagnosis 18.4%, metastatic pattern viscera 60.7%, bones 11.7%, other sites 27.6 % Neo/adjuvant chemotherapy 70.4%, adjuvant endocrine agents 61.2%, adjuvant radiotherapy 55.6%	Weight, height from records and BMI calculated at study baseline	Overall survival	≥ 25 vs < 25 kg/m^2	P log-rank test = 0.67	Unadjusted
					Overall survival ER and/or PgR positive	≥ 25 vs < 25 kg/m^2	P log-rank test = 0.41	Unadjusted

					Overall survival Triple-negative	≥ 25 vs < 25 kg/m^2	P log-rank test = 0.02	Unadjusted
					Progression-free survival	≥ 25 vs < 25 kg/m^2	P log-rank test = 0.33	
					Progression-free survival ER and/or PgR positive	≥ 25 vs < 25 kg/m^2	P log-rank test = 0.85	Unadjusted
					Progression-free survival Triple-negative	≥ 25 vs < 25 kg/m^2	P log-rank test = 0.04	Unadjusted
Song, 2018 [202], Korea, BMI – Included, review	Retrospective cohort study (n=1460) Mean age: 46 years	2001-2009 Follow up= 8.07 years 185 patients (12.7%) experienced disease recurrence, and 93 patients (6.4%) died.	Invasive, stage I, 38.2%; stage II, 46.5%; and stage III, 15.3% ER+ 70.3% PR+ 65.3% HER2+ 14.8% Chemotherapy 81.8% Unknown 6.8% Radiotherapy 79.9% Unknown: 8.2% Anti-hormonal therapy 71.5% Unknown: 6.5% Operation: MRM: 19.7% PM: 80.3%	From records at diagnosis; within 2 years	Overall survival(n=93)	≥25 vs <25 kg/m^2	1.26 (0.74 - 2.15)	Age at diagnosis, stage including T stage and N stage, tumor grade, ER, PR, Ki-67, type of operation, anti-hormone therapy, and muscle volume
					Overall survival(n=93)	Per unit increase	1.02 (0.96 - 1.08)	
					Recurrence-free survival (n=185)	≥25 vs <25 kg/m^2	1.05 (0.74 - 1.49)	Stage, PR, type of operation, radiotherapy, anti-hormone therapy, and muscle volume
					Recurrence-free survival (n=185)	Per unit increase	1.03 (0.98-1.07)	

Strand F, 2018[245], Libro-1, Sweden BMI – Included, review	Female, Population-based Cohort Study (n=2012) mean age:60.3, Cancer Diagnosis: 2011-2008	Diagnosed:2011-2008	Invasive breast cancer.	Self-reported	Disease progression (n=153)	>=25 vs <25 kg/m^2	1.18(0.84-1.64)	Age, mammogram
					Screen-detected cancers Disease progression (n=81)		0.97(0.62-1.52)	
					Interval cancer Disease progression (n=72)		1.70(1.04-2.77)	
Sun, 2018 [110], China, BMI – Included, meta-analysis	Retrospective cohort study (n= 1017) Pre- and post-menopausal	2004-2012 Follow up= 80 months 115 breast cancer deaths 180 disease-free survival events 76 patients lost to follow-up	Grade I-III breast cancer	At/during diagnosis weight and height were recorded before surgery	Breast cancer mortality (n=115)	≥30 vs <25 kg/m^2	2.052 (1.262 - 3.336)	Age at diagnosis, lymph node status, tumor size, histological grade, ER status, PR status, radiotherapy, hormone therapy
					Breast cancer mortality Pre-menopausal	≥30 vs <25 kg/m^2	1.948 (1.029 - 3.687)	
					Breast cancer mortality Post-menopausal	≥30 vs <25 kg/m^2	2.493 (1.117 - 5.564)	
					Breast cancer recurrence (n=180)	≥30 vs <25 kg/m^2	1.888 (1.281 - 2.783)	
					Breast cancer recurrence Pre-menopausal	≥30 vs <25 kg/m^2	1.824 (1.096 - 3.037)	

					Breast cancer recurrence Post-menopausal	≥30 vs <25 kg/m^2	2.031 (1.091 - 3.782)	
Venturelli, 2018 [346], TPM, Italy, BMI - Excluded	Retrospective cohort study (n= 460) Postmenopausal	Diagnosis year: 2003-2006 Follow up= 6.3 years 45 breast cancer recurrence, 31 deaths (8 progressive disease, 23 other than cancer)	ER-positive postmenopausal breast cancer 22.4% PR-, 77.6% PR+; 8.5% AR-, 37.1% AR+<60%; 54.5%AR+≥60%; 55.5% HER2-, 28.4% HER2+2+, 16.1% HER2+3+ Endocrine therapy: 93.5%	Self-reported At first clinical visit	Disease-free survival(n=45)	Obese vs Normal weight	P = 0.021	Unadjusted
Wisse, 2018 [207], BC Blood Study, Sweden, BMI – Included, review	Prospective cohort study (n= 1640) Mean age: 60.9 years	2002- 2016 Follow up= 3.05 years 166 breast cancer events 139 died due to any cause, 78 of whom had a prior breast cancer event	Invasive breast cancer, no metastasis ER+ 88.5%, PgR+ 71.1%, HER2+ 11.1% Tumor grade: 27.8% III Chemotherapy: 27.6%; Radiotherapy: 61.7%; Trastuzumab: 8.1%	Measured/self-reported Prior to surgery	Overall survival(n=136)	≥25 vs <25 kg/m^2	1.82 (1.24 - 2.65)	Age, tumor size, lymph node involvement, histological grade, ER status, alcohol intake, smoking, treatment
					Overall survival (n=111)	≥25 vs <25	1.63 (1.00 - 2.64)	Above factors +waist circumference, breast volume
					Overall survival (n=133)	BMI≥25 and WC≥80 vs BMI <25 kg/m^2 and WC<80 cm	2.28 (1.32 - 3.92)	Above factors
					Overall survival (n=111)	BMI≥25 and WC≥80 vs BMI <25 kg/m^2 and WC<80 cm	2.17 (1.11 - 4.23)	Above factors +waist circumference, breast volume
					Overall survival ER positive	≥25 vs <25 kg/m^2	1.91 (1.26 - 2.91)	Above factors
					Overall survival ER negative	≥25 vs <25 kg/m^2	(-)	Above factors
					Breast cancer recurrence(n=165)	≥25 vs <25 kg/m^2	1.36 (0.99 - 1.89)	Above factors

					Breast cancer recurrence(n=144)	≥25 vs <25 kg/m^2	0.94 (0.62 - 1.41)	Above factors +waist circumference, breast volume
					Breast cancer recurrence(n=162)	BMI≥25 and WC≥80 vs BMI <25 kg/m^2 and WC<80 cm	1.72 (1.12 - 2.65)	Above factors
					Breast cancer recurrence(n=144)	BMI≥25 and WC≥80 vs BMI <25 kg/m^2 and WC<80 cm	1.31 (0.78 - 2.2)	Above factors +waist circumference, breast volume
					Breast cancer recurrence ER positive	≥25 vs <25 kg/m^2	1.45 (1.02 - 2.08)	Above factors
					Breast cancer recurrence ER negative	≥25 vs <25 kg/m^2	0.93 (0.47 - 1.85)	Above factors
					Overall survival ≥50 years ER+ Tamoxifen	≥25 vs <25 kg/m^2	2.28 (1.29-4.03)	Above factors
					Overall survival ≥50 years ER+ AI	≥25 vs <25 kg/m^2	1.75 (0.92-2.30)	Above factors
					Overall survival Chemonaive	≥25 vs <25 kg/m^2	1.91 (1.26-2.91)	Above factors
					Breast cancer recurrence ≥50 years ER+ Tamoxifen	≥25 vs <25 kg/m^2	1.72 (1.00-2.95)	Above factors
					Breast cancer recurrence ≥50 years ER+ AI	≥25 vs <25 kg/m^2	1.71 (0.91-3.20)	Above factors
Zekri J, 2018 [351], Saudi Arabia, BMI - Excluded	Retrospective cohort of cancer survivors (n= 320) Postmenopausal Age range: 45-95 years, mean age: 60.3 years	Treatment: 2005-2014 Follow up= 49 months	ER+ breast cancer; HER2+ 10.9%, HER2- 89.1% Invasive ductal carcinoma 90.6%, invasive lobular carcinoma 7.2%, mixed 2.2%; Grade I 8.1%, II 60%, III 32% Surgery: conservative: 50.9%, mastectomy 49.1%; All on adjuvant letrozole	From records at the time of treatment initiation	Recurrence-free survival	≥ 30 vs <30 kg/m^2	P log-rank test = 0.097	Unadjusted

					Recurrence-free survival Received Letrozole	≥ 30 vs <30 kg/m^2	No significant association	
Zewenghiel, 2018 [212], Sweden, BMI – Included, review	Retrospective cohort study (n= 173) Post-menopausal mean age: 67 years	2008-2016 Follow up= 38 months	HR+ metastatic breast cancer (non-visceral, visceral, bone only)	From records at diagnosis	Time to progression	≥30 vs 18.5-24.9 kg/m^2	1.29 (0.75 - 2.24)	Charlson Comorbidity Index, Age to metastasis, Resistance to endocrine therapy, Type of metastasis, Molecular subtype, Tumor grade, Performance status, Metastasis location
Al Jarroudi, 2017 [139], Morocco, BMI – Included, review	Retrospective cohort study (n= 115) Pre- and postmenopausal	2009-2011 Follow up= 5 years Rates of overall mortality and disease progression at 5 years were 37.4% and 69.6%, respectively.	Triple-negative breast cancer	At diagnosis	Overall survival post-menopausal	>25 vs ≤25 kg/m^2	2.903 (1.551 - 5.432)	Age at diagnosis, menopausal status, Tumor size, Nodal status, grade, Systemic adjuvant therapy
					Overall survival pre-menopausal	>25 vs ≤25 kg/m^2	2.752 (1.267 - 5.978)	
					Overall survival post-menopausal	>25 vs ≤25 kg/m^2	1.345 (0.375 - 4.831)	
					Disease-free survival	>25 vs ≤25 kg/m^2	1.899 (1.05 - 3.433)	
					Disease-free survival pre-menopausal	>25 vs ≤25 kg/m^2	3.242 (1.249 - 8.412)	
					Disease-free survival post-menopausal	>25 vs ≤25 kg/m^2	1.035 (0.276 - 6.172)	
Andersson TM, 2017[137], Sweden BMI – Included, meta-analysis	Female, Follow-up of Case-control Study (n=1740) age range: 50-74 years Postmenopausal	Diagnosed:1993-1995 follow Up: Maximum 15 years , Loss to Follow-up: Not reported	Grade (n) Well- 186, moderately- 509, poorly- 497 differentiated, unknown 548. ER+1,003, ER- 242, unknown 495. Chemothreapy (n) yes	Self-reported	Breast cancer-specific mortality (n=269.0)	28.13 vs 14.53 kg/m^2	1.30(0.87-1.92)	Age at diagnosis, chemotherapy, ER status, mammogram, number of lymph nodes, radiotherapy, tamoxifen use, tumor grade, tumor size

			127, no 1613. Radiotherapy (n) yes 767, no 973.					
Behrouzi, 2017 [44], Iran, BMI – Included, meta-analysis	Retrospective cohort study (n=1021) Pre- and postmenopausal	Diagnosis year: from July 2003 until December 2016. Follow up= 61 months were 48	Invasive breast cancer Stages I 14.4%, IIA 29.1%, IIB 21.7%, IIIA 19.0%, IIIB 7.5%, IIIC 8.3% Luminal-A 53.2%, Luminal-B 15.4%, Triple-Negative 17.2%, HER2type 14.3% Chemotherapy: Adjuvant: 89.1% Neoadjuvant: 10.9%	At diagnosis	Overall survival	Per 1 kg/m^2	1.058 (1.027 - 1.09)	TNM stage, subtype, Age, BMI
					Recurrence-free survival	Per 1 kg/m^2	1.017 (0.992 - 1.042)	
Biganzoli E, 2017 [48], Belgian Phase III, Belgium, BMI – Included, meta-analysis	Secondary analysis of clinical trial (n= 734) Pre- (58%) and postmenopausal (42%)	Follow up= 15.4 years 368 outcome events, including 250 distant recurrence	Node+ invasive breast cancer, no metastasis Grade I 23%, II 53%, III 24% ER+ 74%, ER-26% PR+ 68%, PR- 32% Chemotherapy regimens: HDE vs SDE and CMF Doses were calculated by actual BSA without any cap Postmenopausal ER+ cases received endocrine therapy	At diagnosis, no further info	Breast cancer recurrence (n=368)	≥30 vs ≤24.9 kg/m^2	1.09 (0.74 - 1.62) P trend=0.65	Age, menopausal status, tumor size, number of positive lymph nodes, grade, treatment arm
						Per 10 kg/m^2	1.29 (0.99 - 1.68)	

					Distant recurrence (n=250)	≥30 vs ≤24.9 kg/m^2	1.03 (0.63 - 1.67) P trend=0.38	
						Per 10 kg/m^2	1.17 (0.85 - 1.62)	
Björner, 2017 [269], BC Blood Study, Sweden, BMI - Excluded	Prospective cohort study (n= 1018) mean age: 61.1 years Pre- and postmenopausal	2002-2012 Follow up= 11 years	Invasive breast cancer, no metastasis ER+ (>10%): 87.9%; PR+ (>10%): 71.0%; HER2 amplification: 12.2% Ever chemotherapy: 25.4% Ever radiotherapy: 63.0 % Ever trastuzumab: 8.9% ER+ only: ever endocrine therapy: 77.7% Ever tamoxifen: 59.1% Ever aromatase inhibitor: 38.7%	Measured prior to surgery	all-cause mortality Insulinogenic load ≥median	overweight/obese vs normal weight	0.35 (0.17 - 0.72)	Age, Tumor size, lymph node involvement, histological grade, ER status, BMI, Treatment, Time between cancer diagnosis and exposure assessment
					Event free Insulinogenic load ≥median		0.48 (0.25 - 0.92)	
Boivin, 2017 [270], France, BMI - Excluded	Retrospective cohort study (n= 1599) Pre- and postmenopausal	Diagnosed 2009 Follow up= 36.4 months		Measured/self-reported	Overall survival	obese vs underweight	P =0.30	Unadjusted
Buono, 2017 [145], Italy, BMI – Included, review	Prospective cohort study (n= 841) Pre and post-menopausal	2009-2013 Follow up= 58.9 months	Stage I-IIIC	At diagnosis	Overall survival	Obesity vs no obesity and diabetes	0.66 (0.3 - 1.47) P =0.3	Age, stage, Molecular subtype, Treatment
					Disease-free survival		0.96 (0.59 - 1.56) P =0.8	
Cespedes Feliciano, 2017 [278], KPNC and UTMDACC, BMI - Excluded	Prospective cohort study (n= 1559) Age range:18-79 years	1996-2013 Follow up= 9 years 312 breast cancer deaths	Stage I-III Stage I 50%, II 43%, Luminal A 54% Luminal B 20% HER2+ 15% Basal-like 11%	self-reported, 1 year prior and <7 months post-diagnosis	Breast cancer-specific mortality(n=312)	≥35 vs 18.5-<25 kg/m^2	1.06 (0.74 - 1.52)	PAM50 subtype, Age, menopausal status, race/ethnicity, study, stage, chemotherapy

		378 recurrent disease						
						Per 5 kg/m^2	1.05 (0.95 - 1.15)	
					Breast cancer-specific mortality(n=110) Luminal A	≥35 vs 18.5-<25 kg/m^2	2.24 (1.22 - 4.11)	
						Per 5 kg/m^2	1.31 (1.11 - 1.54)	
					Breast cancer-specific mortality(n=94) Luminal B	≥35 vs 18.5-<25 kg/m^2	0.61 (0.29 - 1.29)	
						Per 5 kg/m^2	0.99 (0.83 - 1.18)	
					Breast cancer-specific mortality(n=52) Basal	≥35 vs 18.5-<25 kg/m^2	0.67 (0.28 - 1.59)	
						Per 5 kg/m^2	0.9 (0.73 - 1.11)	
					Breast cancer-specific mortality(n=56) Her2-overexpressing	≥35 vs 18.5-<25 kg/m^2	0.89 (0.37 - 2.15)	
						Per 5 kg/m^2	0.92 (0.71 - 1.2)	
					Breast cancer-specific mortality(n=204) Luminal A and B	≥35 vs 18.5-<25 kg/m^2	1.61 (0.85 - 3.06)	
						Per 5 kg/m^2	1.21 (1.04 - 1.42)	
					Breast cancer-specific	≥35 vs 18.5-<25 kg/m^2	0.71 (0.28 - 1.79)	

					mortality(n=108) Non-luminal			
						Per 5 kg/m^2	0.9 (0.71 - 1.14)	
					Breast cancer recurrence(n=378)	≥35 vs 18.5-<25 kg/m^2	1.02 (0.67 - 1.54)	
						Per 5 kg/m^2	1.03 (0.92 - 1.14)	
					Breast cancer recurrence(n=130) Luminal A	≥35 vs 18.5-<25 kg/m^2	2.17 (0.92 - 5.11)	
						Per 5 kg/m^2	1.24 (1 - 1.54)	
					Breast cancer recurrence(n=115) Luminal B	≥35 vs 18.5-<25 kg/m^2	0.58 (0.15 - 2.21)	
						Per 5 kg/m^2	0.98 (0.71 - 1.35)	
					Breast cancer recurrence(n=59) Basal	≥35 vs 18.5-<25 kg/m^2	0.75 (0.25 - 2.25)	
						Per 5 kg/m^2	0.93 (0.74 - 1.17)	
					Breast cancer recurrence(n=74) Her2-overexpressing	≥35 vs 18.5-<25 kg/m^2	0.79 (0.21 - 2.99)	
						Per 5 kg/m^2	0.87 (0.53 - 1.41)	
					Breast cancer recurrence(n=245) Luminal A and B	≥35 vs 18.5-<25 kg/m^2	1.37 (0.79 - 2.39)	
						Per 5 kg/m^2	1.16 (1.01 - 1.33)	

					Breast cancer recurrence(n=133 .0) Non-luminal	≥35 vs 18.5-<25 kg/m^2	0.88 (0.37 - 2.14)	
						Per 5 kg/m^2	0.96 (0.76 - 1.2)	
Chung, 2017 [153], South Korea, BMI – Included, review	Retrospective cohort study (n= 8742) mean age:47.7	1997-2008 Follow up= 92 months 1178 deaths 957 breast cancer deaths 98 other deaths 123 unknown causes	Non-metastatic invasive breast cancer T1: 4717; >T1: 3997 Hormone-receptor status: Negative: 3008; Positive: 5646 Radiation therapy No: 3675; Yes: 5032 Hormonal therapy No: 2648; Yes: 5985 Chemotherapy No: 2544; Yes: 6039 cases	Measured prior to surgery	all-cause mortality Premenopausal	≥30 vs 18.5-24.9kg/m^2	1.87 (1.2 - 2.91)	Age, Tumor size, number of lymph nodes, histological grade, Treatment, menopausal status
					all-cause mortality Postmenopausal Node+	≥30 vs 18.5-24.9kg/m^2	0.57 (0.26 - 1.24)	
					all-cause mortality Postmenopausal Node-	≥30 vs 18.5-24.9kg/m^2	1.24 (0.63 - 2.44)	
					all-cause mortality Hormone Receptor+	≥30 vs 18.5-24.9kg/m^2	1.48 (0.97 - 2.25)	
					all-cause mortality Hormone Receptor- Node+	≥30 vs 18.5-24.9kg/m^2	0.44 (0.16 - 1.19)	
					all-cause mortality Hormone Receptor- Node-	≥30 vs 18.5-24.9kg/m^2	1.49 (0.74 - 3.01)	
					Breast cancer-specific mortality Premenopausal	≥30 vs 18.5-24.9kg/m^2	2.04 (1.27 - 3.26)	

					Breast cancer-specific mortality Postmenopausal Node+	≥30 vs 18.5-24.9kg/m^2	0.65 (0.28 - 1.49)	
					Breast cancer-specific mortality Postmenopausal Node-	≥30 vs 18.5-24.9kg/m^2	1.13 (0.44 - 2.91)	
					Breast cancer-specific mortality Hormone Receptor+	≥30 vs 18.5-24.9kg/m^2	1.65 (1.02 - 2.66)	
					Breast cancer-specific mortality Hormone Receptor- Node+	≥30 vs 18.5-24.9kg/m^2	0.53 (0.19 - 1.44)	
					Breast cancer-specific mortality Hormone Receptor- Node-	≥30 vs 18.5-24.9kg/m^2	1.55 (0.7 - 3.43)	
Farr, 2017 [290], Department of Obstetrics and Gynecology, Medical University of Vienna, Austria, BMI - Excluded	Retrospective cohort study (n= 120) Pre- and postmenopausal Mean age: 52.6 years	2005-2015 Follow up= 30.1 months	65.8% HR positive 34.2% HR negative neoadjuvant chemotherapy	Measured at baseline	Overall survival	obese vs non obese	0.29 (0.002 - 2.65)	Unadjusted
					Disease-free survival	obese vs non obese	0.38 (0.04 - 1.59)	Unadjusted
					Progression-free	obese vs non obese	0.1 (0.00084 - 0.81)	Unadjusted
Guo Q, 2017 [294], Six case-cohort studies (COGS,	Mendelian randomization study	Follow up= 170,504 person-years	ER+ (n=22,567) ER- (n=5683)	BMI genetic risk score (GRS)	Breast cancer mortality (n=1,161)	Individual-level data MR analysis Per 1 unit	1.11 (1.01-1.22) P=0.03	Nodes, size and grade

CGEMS, METABRIC, PG-SNPs, SASBAC and UK2), BMI - Excluded	(n=36,210)				ER positive			
				Self-reported at date closest to diagnosis for the cases or study entry for the controls	Breast cancer mortality (n=1,161) ER positive	Observational estimates Per 1 kg/m^2	1.02 (1.00 - 1.05) P=0.05	
				BMI genetic risk score (GRS)	Breast cancer mortality (n=679) ER negative	Individual-level data MR analysis Per 1 unit	1.00 (0.89-1.13) P=0.95	
				Self-reported at date closest to diagnosis for the cases or study entry for the controls	Breast cancer mortality (n=679) ER negative	Observational estimates Per 1 kg/m^2	1.00 (0.97 - 1.02) P=0.77	
Greenlee H, 2017[252], SWOG phase II and III trials, Multi-country BMI – Included, review	Female, Pooled Analysis (Any) (n=3145)	Follow Up: Minimum 5 years	CAF, CMF, or AC + Paclitaxel	Measured	CAF treatment Overall survival AC + Paclitaxel treatment Overall survival CMF treatment Overall survival	BMI >=25 vs BMI <25 kg/m^2	1.18 (0.87-1.59) 1.25 (0.94-1.66) 1.27 (0.71-2.27)	Age, disease specific prognostic factors, race
Hamy AS, 2017[133], NEOREP Cohort, France	Female, Prospective Cohort of Cancer Survivors (n=175) mean age:47	Diagnosed:2002-2012 (treatment) follow Up: Median 38.8	HER2-positive invasive breast cancer. Grade I-II 24.16%, III 27.62%. ER negative 28.99%, positive 24.79%. PR	Measured	Disease free survival (n=17.0)	>25 vs 19-25 kg/m^2	5.21(1.80-15.11) P trend=0.002	ER status, grade, other factors

BMI – Included, meta-analysis	Premenopausal 25.95%, postmenopausal 27.49%	months	negative 27.51%, positive 23.98%. All patients received neoadjuvant chemotherapy followed by surgery and radiotherapy. Neoadjuvant trastuzumab 27.26%		Treated with both neoadjuvant and adjuvant trastuzumab Disease free survival (n=11.0)		3.76(1.10-12.85) P trend=0.035	
He, 2017 [169], China BMI – Included, meta-analysis	Retrospective cohort study (n= 209), Pre and post-menopausal Mean age: 49.05 years Non-smokers	2006-2009 Follow-up: 67 months	Invasive breast cancer Clinical stage I-IV	From records at diagnosis before surgery	Distant disease free(n=55)	≥24 vs <18.5 kg/m^2	0.804 (0.249 - 2.599)	Age at diagnosis, family history of breast cancer, high N classification, blood cadmium levels
Karatas, 2017 [300], Turkey, BMI - Excluded	Retrospective cohort study (n= 295) Pre and post-menopausal Mean age:46.4 years	1994-2015 Follow up= 45.8 months	Invasive breast cancer AJCC staging 7 ed: II 51.5%, III 47.4% ER+ 61% ER- 39% PR+ 55.9% PR- 42.4%; HRE2+ 30.2% HER2- 69.8% Neoadjuvant chemotherapy and surgery: 99%; Chemotherapy: 99% 86.1% taxane, 13.9% no taxane; Hormonotherapy: 64.7% Radiotherapy: 91.5%		Overall survival(n=63)	Obese vs Normal/underweight	P log-rank test=0.02	Unadjusted
					recurrence free survival(n=92)	Obese vs Normal/underweight	P log-rank test=0.03	Unadjusted
Kwak, 2017 [180], Korea, BMI – Included, review	Retrospective cohort study (n= 947) mean age:51.9	2010-2011 109 deaths	Tumor stage: localised, regional, distant, missing.	at diagnosis from records	Breast cancer-specific mortality	≥24 vs <25 kg/m^2	1.59 (1.07 - 2.37)	Age, area-level deprivation index, tumour stage, smoking, drinking, diagnosis path

Mu, 2017 [96], China, BMI – Included, meta-analysis	Retrospective cohort study (n= 2106) Pre and post-menopausal	Follow up= 71 months Loss of follow up: 23 patients		From records	Breast cancer-specific mortality (n=190)	<18.5 vs ≥24 kg/m^2	0.67 (0.29 - 1.55) P =0.347	Age, tumour size, lymph node status, histological grade, oestrogen receptor level, progesterone receptor level, HER2 status, hormone therapy
					Breast cancer relapse(n=300)	<18.5 vs ≥24 kg/m^2	0.58 (0.29 - 1.16) P =0.122	
Nakamura K, 2017 [97], Biobank Japan (BBJ), Japan, BMI – Included, meta-analysis	Prospective cohort study of cancer survivors (n= 1860) Pre- and postmenopausal Mean age: 55.3 years Registered within 90 days post-diagnosis	2003-2008 Follow up= 7.8 person-years 218 deaths 1 patient loss to follow-up	In situ:226, invasive:1414 cases Stage 0 10.9% I 47.9%, IIA 31.3%, IIB 5.8%, IIIA 1.4%, IIIB 1.1%, IIIC 0.3%, IV 0.8%, Unclassified 0.5% Unknown 51.9% ER+ 75.8% ER- 24.2% PR+ 62.1% PR- 37.9%	Interview with questionnaire at study entry, within 90 days post-diagnosis	All-cause mortality (n=206)	>25 vs 18.5-24.9 kg/m^2	0.79 (0.53 - 1.18)	Age at study entry, entry year
						Per 1 kg/m^2	0.98 (0.94 - 1.02)	
Pizzuti L, 2017[246], The everext study, Italy BMI – Excluded (mortality) Included, review (recurrence)	Female, Retrospective Cohort of Cancer Survivors (n=102) mean age:60.9Post-menopausal 100%	Follow Up: Maximum 18 months	HR+HER2-advanced breast cancer Mean number of cycles of everolimus and exemestane received was 9±7, which in 30 (29.4%) patients were administered in first line	Self-reported	Overall survival	Highest BMI category vs Lowest BMI category	P trend=0.17	ER status, grade, other factors

					Progression-free survival		0.75(0.45-1.25) P trend=0.269	Chemotherapy, fasting glucose
Pizzuti L, 2017 [194], Italy, BMI – Included, review	Retrospective cohort study (n= 161) Postmenopausal Age range: 35-87 years, mean age: 68.9 years		Hormone-receptor positive metastatic breast cancer HER-2+ 8.1%, HER-2- 88.8% metastatic sites 1 48.4%, 2 40.4%, ≥ 3 11.2%, patterns: bones 31.1%, viscera 10.6%, miscellanea 58.4% ECOG PS 0 68.9%, 1 23%, 2 4.3% Grade 1-2 endocrine-resistant patients 62.5%, endocrine-responsive patients 56.7% Grade 3 endocrine-resistant patients 28.1%, endocrine-responsive patients 22.7%	From records prior exposure to endocrine therapy	Progression-free Endocrine sensitive	≥ 25 vs < 25 kg/m^2	1.89 (0.94 - 3.82) P=0.08	BMI, HER2 status, age, fulvestrant in subsequent line vs 1st, number of metastatic sites, visceral involvement
					Overall survival Endocrine resistant	≥ 25 vs < 25 kg/m^2	1.89 (1.11 - 3.24) P=0.02	
Rier 2017[105], Netherlands BMI – Included, meta-analysis	Female, Retrospective Cohort of Cancer Survivors (n=166)	Follow Up: Average 22 months No loss to follow-up	Distant metastatic breast cancer	Medical records	All-cause mortality (n=140)	Highest BMI category vs Lowest BMI category	0.99 (0.96-1.02) Ptrend =0.41	Age, HR status, year of diagnosis, metastatic location, HER2Neu status
Robinson, 2017 [325], New Zealand cohort, New Zealand, BMI - Excluded	Prospective cohort study (n= 5458) Pre- and postmenopausal Mean age:55 years	First breast cancer prior to 31 Dec 2014 Follow up= 3.2 years	Invasive breast cancer ER+ 4163 cases, ER- 1189 cases, PgR+ 3392 cases, PfR- 1919 cases, HER2+ 1038 cases, HER2- 3397 cases Grade: low 834 cases, Intermediate 2424 cases, high 1959 cases	Weight and height recorded at the time of first diagnosis	Total mortality pre-menopausal	35-39.9 vs 18.5-24.9 kg/m^2	P log-rank test = 0.045	Unadjusted

			Metastases at diagnosis 285 cases					
					Total mortality ≥55 years	≥35 vs vs 18.5-24.9 kg/m^2	0.72 (-)	Unadjusted
					Total mortality <55 years	≥35 vs 18.5-24.9 kg/m^2	1.4 (-)	Unadjusted
Sahin, 2017 [197], Turkey, BMI – Included, review	Retrospective cohort study (n= 3767) Pre and Post-menopausal Mean age:48.6 years	1994-2015 Follow up= 48.6 months	Invasive breast cancer Clinical stage I: 21.8% II: 41.7% III: 25.7% IV: 8.9% Missing: 1.8% Luminal-like: 65.9% HER2/Luminal-like: 13.6% HER2-like: 8.8% Triple negative: 11.7% Adjuvant chemotherapy Pre: 84.8% Post: 63.7% Adjuvant radiotherapy Pre: 76.5% Post: 68.8% Adjuvant endocrine therapy Pre: 78.3% Post: 80.0% Surgery MRM: 33.2% BCS: 60.8% Not operated: 6.0%	At diagnosis from records	Overall survival	≥30 vs <30 kg/m^2	1.505 (1.101 - 2.059) P =0.009	Molecular subtypes, lymphovascular invasion, tumour stage, nodal stage, metastasis
Schvartsman, 2017 [200], UTMDACC, United States	Retrospective cohort study (n= 1998)	Treatment: 2004-2015 Follow up= 7.1 years	Invasive breast cancer Stage I-III	BMI was calculated at diagnosis, first chemotherapy	Overall survival	>40 vs 18-25 kg/m^2	1.36 (0.67 - 2.78) P trend=0.353	Unadjusted

BMI - Excluded	Pre and postmenopausal		Majority hormone receptor-positive and HER-2- negative	date, last chemotherapy date, and 1 year after last chemotherapy date from records				
					Locoregional recurrence(n=46)	>40 vs 18-25 kg/m^2	0.99 (0.22 - 4.35) P trend=0.184	Unadjusted
Veal CT, 2017 [114], Wisconsin In Situ Cohort (WISC), United States, BMI – Included, meta-analysis	Prospective cohort study of cancer survivors (n= 1925) Pre- and postmenopausal Age range: 20-74 years Response rate 76%	1997-2006 Follow up= 6.7 years 196 deaths 87 cancer deaths, 34 CVD deaths, 75 other deaths	DCIS Mastectomy ipsilateral 33.4%, bilateral 7% Breast conserving surgery no radiation 12.1%, with radiation 44.6% Biopsy only 3% Endocrine therapy 39.2%	Self-reported in baseline telephone interview, median 1.3 years after diagnosis, then in 3 follow-up questionnaires; treated as time-varying variable	All-cause mortality (n=196)	≥35 vs 18.5-24.9 kg/m^2	1.24 (0.76 - 2.02)	Age at diagnosis, family history of breast cancer, education, surgical treatment type, year of diagnosis, post-treatment endocrine therapy use, comorbidity, post-menopausal hormone use, physical activity, alcohol consumption, smoking habits
						Per 1 kg/m^2	1.00 (0.98 - 1.03)	
					All-cause mortality (n=196)	≥35 vs 18.5-24.9 kg/m^2	1.48 (0.69 - 3.19)	Above factors + pre-diagnosis BMI
						Per 1 kg/m^2	1.02 (0.98 - 1.07)	
					Cancer mortality (n=87)	≥35 vs 18.5-24.9 kg/m^2	1.34 (0.66 - 2.73)	
						Per 1 kg/m^2	1.00 (0.96 - 1.04)	
					Cancer mortality (n=87)	≥35 vs 18.5-24.9 kg/m^2	1.68 (0.56 - 5.01)	Above factors + pre-diagnosis BMI
						Per 1 kg/m^2	1.01 (0.94 - 1.08)	
					Cardiovascular disease mortality (n=34)	≥35 vs 18.5-24.9 kg/m^2	1.18 (0.3 - 4.68)	
						Per 1 kg/m^2	1.01 (0.95 - 1.07)	
					Cardiovascular disease mortality (n=34)	≥35 vs 18.5-24.9 kg/m^2	0.36 (0.05 - 2.74)	Above factors + pre-diagnosis BMI
						Per 1 kg/m^2	0.96 (0.85 - 1.08)	
Wu R, 2017[380], China	Female, Retrospective		Modified radical mastectomy or breast	Registry database	Overall survival	Obese vs Normal weight kg/m^2	Log rank P=0.04	

BMI - Excluded	Cohort of Cancer Survivors (n=219)		conserving surgery, completed adjuvant or neoadjuvant chemotherapy		Recurrence free survival		Log rank P=0.018	
Wu, 2017 [350], UTMDACC , United States, BMI - Excluded	Retrospective cohort study (n= 15314) Pre and post-menopausal Age:54.5 years	Treatment: 1997-2012 Follow up= 6.09-7.95 years Discovery cohort: 1627 deaths, 1144 recurrence Validation cohort: 1095 deaths, 684 recurrence	Invasive breast cancer AJCC stage I-III	Self-reported within a year of diagnosis	all-cause mortality(n=869)	≥30 vs <25 kg/m^2	1.55 (1.32 - 1.83)	
					recurrence(n=900)	≥30 vs <25 kg/m^2	1.28 (1.09 - 1.49)	
Yan M, 2017 [210], China, BMI – Included, review	Retrospective cohort of cancer survivors (n= 646) Pre and postmenopausal Age range:21-83 years	Treatment: 2009-2011 Follow up= 67 months	Hormone receptor + and HER2- breast cancer Early stage I-III ER+ and PR+ 76% ER+/PR- 17% ER-/PR+ 7% Neoadjuvant 91% Chemotherapy 7% Adjuvant radiotherapy 27%	From records At 6 months of treatment with tamoxifen	Disease-free survival (n=274)	≥24 vs 18.5-23.9 kg/m^2	1.02 (0.73 - 1.42)	Tumor size, lymphatic metastasis, p53 mutation, Ki-67 expression, neighbourhood socioeconomic status
Yerushalmi R, 2017[211], CCTG trials, BMI – Excluded	Pre-, peri-, and early post-menopausal Adjuvant chemotherapy trials: MA.5 (n=710) Premenopausal (100%) MA.21 (n=2083)	MA.5 10-year follow-up MA.21 8-year follow-up	MA.5 Node+ 100% T1/in situ 37% HR+ 68% Chemotherapy 100% Anthracyclines 49% Randomised to CEF or CMF	Weight and height measured at baseline, 1, 3 and 5 years after accrual	Overall survival	Baseline BMI 1 y post diagnosis Per 1 log unit	1.007 (0.986- 1.029)	Baseline risk factors

	Premenopausal (68%) Total n=2793		MA.21 Node+ 72% High risk node- 28% T1/in situ 35% HR+ 61% Chemotherapy 100% Anthracyclines 100% Randomised to CEF or dose dense EC/T or AC/T					
					Overall survival	Baseline BMI 3 y post diagnosis Per 1 log unit	1.007 (0.979- 1.036)	
					Overall survival	Baseline BMI 5 y post diagnosis Per 1 log unit	1.011 (0.975- 1.049)	
					Breast cancer-specific mortality	Baseline BMI 1 y post diagnosis Per 1 log unit	1.015 (0.992-1.038)	
					Breast cancer-specific mortality	Baseline BMI 3 y post diagnosis Per 1 log unit	1.015 (0.985-1.046)	
					Breast cancer-specific mortality	Baseline BMI 5 y post diagnosis Per 1 log unit	1.020 (0.979-1.062)	
					Breast cancer-free interval	Baseline BMI 1 y post diagnosis Per 1 log unit	1.004 (0.983-1.025)	
					Breast cancer-free interval	Baseline BMI 3 y post diagnosis	1.004 (0.977-1.033)	

						Per 1 log unit		
					Breast cancer-free interval	Baseline BMI 5 y post diagnosis Per 1 log unit	0.983 (0.946-1.022)	
	Pre-, peri-, and early post-menopausal Adjuvant endocrine therapy trial MA.12 (n=672) Premenopausal (100%)		MA.12 Node+ 75% T1/in situ 43% HR+ 75% Chemotherapy 100% Anthracyclines 55% Women completed CMF, CEF, or AC received tamoxifen or placebo	Weight and height measured at baseline, 1, 3 and 5 years after accrual	Overall survival	Baseline BMI 1 y post diagnosis Per 1 log unit	1.024 (0.993-1.057)	
					Overall survival	Baseline BMI 3 y post diagnosis Per 1 log unit	1.032 (0.991-1.076)	
					Overall survival	Baseline BMI 5 y post diagnosis Per 1 log unit	1.128 (1.036-1.228)	
					Breast cancer-specific mortality	Baseline BMI 1 y post diagnosis Per 1 log unit	1.033 (1.000-1.066)	
					Breast cancer-specific mortality	Baseline BMI 3 y post diagnosis Per 1 log unit	1.034 (0.992-1.079)	
					Breast cancer-specific mortality	Baseline BMI 5 y post diagnosis Per 1 log unit	1.135 (1.041-1.238)	
					Breast cancer-free interval	Baseline BMI 1 y post diagnosis	1.033 (1.006-1.061)	

						Per 1 log unit		
					Breast cancer-free interval	Baseline BMI 3 y post diagnosis Per 1 log unit	1.014 (0.973-1.057)	
					Breast cancer-free interval	Baseline BMI 5 y post diagnosis Per 1 log unit	1.036 (0.979-1.100)	
	Pre-, peri-, and early post-menopausal trials: MA.5 Premenopausal (100%) MA.12 Premenopausal (100%) MA.21 Premenopausal (68%)		Triple-negative breast cancer	Weight and height measured at baseline, 1, 3 and 5 years after accrual	Overall survival	Baseline BMI 1 y post diagnosis Per 1 log unit	1.016 (0.972-1.063)	
					Overall survival	Baseline BMI 3 y post diagnosis Per 1 log unit	1.001 (0.934-1.072)	
					Overall survival	Baseline BMI 5 y post diagnosis Per 1 log unit	0.989 (0.892-1.096)	
					Breast cancer-specific mortality	Baseline BMI 1 y post diagnosis Per 1 log unit	1.028 (0.980-1.079)	
					Breast cancer-specific mortality	Baseline BMI 3 y post diagnosis	1.021 (0.950-1.098)	

						Per 1 log unit		
					Breast cancer-specific mortality	Baseline BMI 5 y post diagnosis Per 1 log unit	0.994 (0.876-1.127)	
					Breast cancer-free interval	Baseline BMI 1 y post diagnosis Per 1 log unit	1.016 (0.972-1.062)	
					Breast cancer-free interval	Baseline BMI 3 y post diagnosis Per 1 log unit	0.992 (0.925-1.064)	
					Breast cancer-free interval	Baseline BMI 5 y post diagnosis Per 1 log unit	0.877 (0.764-1.006)	
	Postmenopausal endocrine therapy trials MA.14 (n=665) MA.27 (n=7571) Postmenopausal		MA.14 Node+ 47% T1/in situ 58% HR+ 91% Chemotherapy 31% Anthracyclines 25% Received tamoxifen +/- octreotide LAR MA.27 Node+ 28% T1/in situ 72% HR+ 100% Chemotherapy 31% Anthracyclines 28%	Weight and height measured at baseline, 1, 3 and 5 years after accrual	Overall survival	Baseline BMI 1 y post diagnosis Per 1 log unit	1.004 (0.998-1.009)	
					Overall survival	Baseline BMI 3 y post diagnosis	1.028 (0.996-1.062)	

						Per 1 log unit		
					Overall survival	Baseline BMI 5 y post diagnosis Per 1 log unit	0.843 (0.387-1.838)	
					Breast cancer-specific mortality	Baseline BMI 1 y post diagnosis Per 1 log unit	1.001 (0.992-1.011)	
					Breast cancer-specific mortality	Baseline BMI 3 y post diagnosis Per 1 log unit	0.995 (0.934-1.060)	
					Breast cancer-specific mortality	Baseline BMI 5 y post diagnosis Per 1 log unit	Low events	
					Breast cancer-free interval	Baseline BMI 1 y post diagnosis Per 1 log unit	0.994 (0.977-1.011)	
					Breast cancer-free interval	Baseline BMI 3 y post diagnosis Per 1 log unit	0.978 (0.946-1.011)	
					Breast cancer-free interval	Baseline BMI 5 y post diagnosis Per 1 log unit	1.104 (0.970-1.258)	
	Pre- and postmenopausal adjuvant herceptin trials MA.21 MA.27 HERA (n=1249)		Trastuzumab patients	Weight and height measured at baseline, 1, 3 and 5 years after accrual	Overall survival	Baseline BMI 1 y post diagnosis Per 1 log unit	0.992 (0.978-1.007)	

					Breast cancer-specific mortality	Baseline BMI 1 y post diagnosis Per 1 log unit	1.009 (0.963-1.057)	
					Breast cancer-free interval	Baseline BMI 1 y post diagnosis Per 1 log unit	0.988 (0.959-1.018)	
Yue CF, 2017[381], Cancer Center of Sun Yat-Sen University (SYSUCC), China BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=443) mean age:49.5, Chinese	Diagnosed:2002-2008 follow Up: Average 56 months	Breast cancer. Clinical stage (n): I 93, II 210, III 136, Undetermined 4. ER (n): Negative 55, Positive 385, Unknown 3. PR (n): Negative 72, Positive 368, Unknown 3. HER2 (n): Negative 333, Positive 107, Unknown 3. Triple negative (n): Yes 48, No 392, Unknown 3. Endocrine therapy (n): Yes 338, No 89, Unknown 16. Adjuvant chemotherapy (n): Yes 382, No 50, Unknown 11. Adjuvant radiotherapy (n): Yes 106, No 318, Unknown 19.	Medical records	Overall survival (n=41)	≥24 vs <24 kg/m^2	1.01(0.54-1.88)	Unadjusted
					Local relapse-free survival (n=30)		1.28(0.62-2.62)	
					Distant metastasis-free survival (n=34)		0.88 (0.44-1.75)	
Zhang S, 2017[382], China BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=583)	Diagnosed:2001-2010 (treatment)	Breast cancer AJCC stage I 21%, II 53%, III 26%; ER positive 63%, negative 37%; PR positive 53%, negative 47%; HER2 positive 28%, negative 72% Surgery	Medical records	Overall survival (n=158)	High BMI vs Low BMI kg/m^2	2.23(1.09-4.56) P trend=<0.05	Unadjusted
					Disease free survival (n=158)		1.32(0.70-2.50)	
Zhang M, 2017 [214], Shanghai Breast Cancer	Prospective cohort study of cancer survivors	2002-2006 Follow up= 10.54 years for	5-year disease-free invasive breast cancer survivors	Measured approximately	Late all-cause mortality (n=326)	≥26.3 vs 21.88 kg/m^2	1.10 (0.81 - 1.49)	Age at diagnosis, ER status, TNM stage, mastectomy, chemotherapy,

Survival Study (SBCSS), China, BMI - Excluded	(n= 4062) Pre- and postmenopausal (50.1%) Mean age: 53.2 years	mortality, 8.4 years for breast cancer recurrence 326 deaths 264 breast cancer recurrence	Stage I 38.1%, IIA 35.3%, IIIB 15.5%, III-IV 6.5% ER+ 65.5%, ER- 33.4% PR+ 59.3%, PR- 39.3% Mastectomy 94.5% Chemotherapy 92.3% Radiotherapy 30.4% Comorbidity 19.2%	6, 18, 36 and 60 months after diagnosis; treated as time-varying variable				radiotherapy, comorbidity, menopausal status, soy protein, exercise, education
					Late breast cancer recurrence (n=264)	≥26.3 vs 21.88 kg/m^2	1.02 (0.73 - 1.42)	
Bao, 2016 [42], SBCSS, China, BMI – Included breast cancer molecular subtypes meta-analysis	Prospective cohort study of cancer survivors (n= 518) Pre- and postmenopausal (53.09%) Mean age: 53.4 years Recruited approximately 6.5 months after diagnosis Response rate 80%	2002-2006 Follow up= 9.1 years 128 deaths 112 recurrence and disease-specific mortality	Invasive TNBC stage I 30.9%, II 55.6%, III 10.2%, no metastasis Mastectomy: 95.6% Chemotherapy: 94.4 % Radiotherapy: 27.4 % Immunotherapy: 17.8 % Tamoxifen: 21.6%	Self-reported weight 1 year prior and at diagnosis; measured approximately 6, 18, 36 and 60 months after diagnosis BMI at-diagnosis	Interviewed, verified by record linkage with regional vital statistics databases All-cause mortality(n=128)	≥28 vs 18.5-23.9 kg/m^2	1.36 (0.78-2.40)	Age at diagnosis; education; menopausal status; exercise; type of surgery; chemotherapy; radiotherapy; TNM stage
				BMI at-diagnosis	Relapse/disease-specific mortality(n=112)	≥28 vs 18.5-23.9 kg/m^2	1.53 (0.84-2.77)	
Barba M, 2016 [141], Italy, BMI - Excluded	Retrospective cohort of cancer survivors (n= 101)	2012-2015 Follow up= 12 months	Metastatic Breast Cancer 73 ER+ cases 19 ER- cases	From records BMI measurements prior to eribulin administration	Total mortality	≥25 vs 18.5-24.9 kg/m^2	P log-rank test = 0.96	Unadjusted

	Pre- and postmenopausal Age range: 31-79 years Mean age: 61 years		58 PgR+ cases 34 PgR- cases		Progression-free survival		1.55 (1.01-2.39)	ER status
Bergom, 2016 [46], Medical College of Wisconsin (MCW) United States, BMI – Included, meta-analysis	Retrospective cohort study (n= 193) Mean age: 60 Pre and post-menopausal	Follow up= 73 months calendar year:1998-2010	In situ:39 cases Invasive:154 cases T0=20%; T1=60%; T2=17%; T3=2% Of the ER+ and/or PR+ 79% HER2/Neu+ or HER2/Neu-amplified tumours 17% Chemotherapy:33%; Anti-endocrine therapy: 70%	From records at diagnosis	Overall survival invasive breast cancer	Per 1 kg/m2	1.12 (1.05 - 1.2)	BMI, Age
					Distant disease free invasive breast cancer	Per 1 kg/m2	1.09 (1 - 1.19)	Tumour size
Brooks JD, 2016[138], The Women's Environmental Cancer and Radiation Epidemiology Study (WECARE I & II), Canada, Denmark, USA BMI – Included, meta-analysis	Female, Nested Case-control Study (n=3431) mean age:46, Cancer Diagnosis: 1985-2008 Mostly White	Diagnosed:1985-2008	Invasive breast cancer stage I-III	Self-reported	Pre-menopausal Contralateral breast cancer	>=30 vs <25 kg/m^2	0.70(0.30-1.40)	Age at diagnosis, age at menarche, chemotherapy, er status, family history, histology , hormonal therapy, number of full-term pregnancies, radiotherapy, tumor stage
					Post-menopausal Contralateral breast cancer		1.00(0.60-1.70)	
					Pre- to post-menopausal Contralateral breast cancer		1.00(0.70-1.50)	
					Pre-menopausal, ER+ Contralateral breast cancer		0.30(0.06-1.50)	
					Pre-menopausal, ER- Contralateral breast cancer		1.60(0.50-5.50)	

					Post-menopausal, ER+ Contralateral breast cancer		0.90(0.50-1.90)	
					Post-menopausal, ER- Contralateral breast cancer		0.80(0.30-2.30)	
					Pre- to post-menopausal, ER+ Contralateral breast cancer		0.60(0.40-1.00)	
					Pre- to post-menopausal, ER- Contralateral breast cancer		1.90(1.02-3.40)	
Cecchini RS, 2016 [54], National Surgical Adjuvant Breast and Bowel Project (NSABP) B-30, -31, -34, -38, United States, BMI – Included, meta-analysis	Secondary analysis of clinical trials (n= 15538) (B-30 = 5351, B-31 = 2119; B-34 = 3323; B-38 = 4892) Pre- and postmenopausal (status unknown in 80% of B-31 patients) Mean age: 49.6 (B-31) to 54.1 (B-34) years 83%-86% white	1999-2004 Follow up= B-30: 9.0 years B-31: 8.3 years B-34: 8.4 years B-38: 5.9 years 2581 deaths 2767 breast cancer recurrence 146 patients loss to follow-up	Invasive breast cancer B-30: Node+; Treatment: AC T, AT, or TAC B-31: Node+/HER2+; Treatment: AC P or AC PH B-34: Early stage, mostly node- and small tumours; Treatment: clodronate or placebo B-38: Node+; Treatment: TAC, AC → P, or AC → PG	Measured upon entry to adjuvant treatment trial	Overall survival(n=1172) B-30	≥30 vs <25 kg/m^2	1.18 (1.02 - 1.35) P trend=0.02	
					Overall survival(n=419) B-31	≥30 vs <25 kg/m^2	0.94 (0.75 - 1.19) P trend=0.58	
					Overall survival(n=375)	≥30 vs <25 kg/m^2	1.03 (0.80 - 1.32) P trend=0.76	

					B-34			
					Overall survival(n=615) B-38	≥30 vs <25 kg/m^2	1.11 (0.92 - 1.35) P trend=0.26	
					Overall survival B-30 AC□T	≥30 vs <25 kg/m^2	1.15 (0.90-1.48) P trend=0.25	
					Overall survival B-30 AT	≥30 vs <25 kg/m^2	1.44 (1.12-1.85) P trend=0.005	
					Overall survival B-30 ATC	≥30 vs <25 kg/m^2	1.02 (0.81-1.29) P trend=0.87	
					Breast cancer recurrence(n=1201) B-30	≥30 vs <25 kg/m^2	1.17 (1.02 - 1.35) P trend=0.03	
					Breast cancer recurrence(n=501) B-31	≥30 vs <25 kg/m^2	1.02 (0.83 - 1.26) P trend=0.91	
					Breast cancer recurrence(n=324) B-34	≥30 vs <25 kg/m^2	1.00 (0.76 - 1.32) P trend=0.97	
					Breast cancer recurrence(n=741) B-38	≥30 vs <25 kg/m^2	1.13 (0.94 - 1.34) P trend=0.16	
					Breast cancer recurrence	≥30 vs <25 kg/m^2	1.17 (0.91-1.50)	

					B-30 AC?T		P trend = 0.21	
					Breast cancer recurrence B-30 AT	≥30 vs <25 kg/m^2	1.25 (0.98-1.58) P trend = 0.07	
					Breast cancer recurrence B-30 ATC	≥30 vs <25 kg/m^2	1.10 (0.87-1.40) P trend = 0.43	
Chen, 2016 [151], A China, BMI – Included, review	Retrospective cohort study (n= 206) mean age:48.5	Treatment: 2006-2015 Follow up= 59 months Loss to follow up: 1.5%	Invasive TNBC AJCC stage I to III 96.1% received an anthracycline- based regimen	From records at baseline	Disease-free survival(n=52)	>25 vs ≤25 kg/m^2	1.554 (0.885 - 2.728)	Nodal status, Tumor stage, Lymphovascular invasion
					Overall survival(n=38)	>25 vs ≤25 kg/m^2	1.904 (0.976 - 3.713)	
Erbes T, 2016 [66], Germany, BMI – Included, meta-analysis	Retrospective cohort of cancer survivors (n= 324) Pre and postmenopausal, age range: 24-85 years mean age: 50.6 years		Primary nonmetastatic breast cancer Invasive ductal 85.2%, invasive lobular 10.5%, ER+: 62.7%; PR+: 56.8% primary non-metastatic BC g1 3.4%, g2 53.7%, g3 42.9%, HER2/neu + 28.1%, luminal-like 51.5%, HER2/luminal 13.6%, HER2-like 13.0%, Triple-negative 21.9%	Measured prior to chemotherapy	Overall survival	Per 1 unit increase	0.99 (0.92-1.07)	Age, histological grade, tumour stage, nodal status, grade, lymph vascular invasion, hormone receptor status, menopausal status, HER-2/neu, triple-negative status
					Progression-free	Per 1 unit increase	0.98 (0.92-1.04)	
Furlanetto J, 2016 [162], GAIN,	Secondary analysis of clinical trial (n= 2990)	2004-2008	Invasive breast cancer	From records prior to adjuvant therapy	Overall survival Adjusted chemotherapy dose	≥ 30 vs <30 kg/m^2	1.01 (0.78 - 1.41)	Age, pT, pN, treatment arm, cyclophosphamide dose

BMI – Included, review	Pre- and postmenopausal 2435 non-obese 382 adjusted BSA 173 unadjusted BSA							
					Overall survival Full chemotherapy dose	≥ 30 vs <30 kg/m^2	1.23 (0.83 - 1.78)	
					Disease-free survival Adjusted chemotherapy dose	≥ 30 vs <30 kg/m^2	1.01 (0.81 - 1.31)	
					Disease-free survival Full chemotherapy dose	≥ 30 vs <30 kg/m^2	0.95 (0.68 - 1.31)	
Gennari A, 2016 [164], IBIS 3, Italy, BMI – Included, review	Secondary analysis of clinical trial (n= 959) Pre- and postmenopausal Age range: 26-70 years Mean age:52 years High risk	1997-2004 Follow-up: 103 months 139 deaths, 267 disease-free events	Invasive breast cancer ER+/HER2- 405 cases, ER+/HER2+ 117 cases, ER-/HER2- 215 cases, ER-/HER2+ 77cases Tumor size ≥ 2cm 415 cases Hormonal therapy 415 cases	From records, prior to chemotherapy	Overall survival	≥ 30 vs < 25 kg/m^2	1.12 (0.7 - 1.81)	Tumor size, hormonal receptor status, HER2 status , Nodal status, chemotherapy, ,
					Overall survival pre-menopausal	≥ 30 vs < 25 kg/m^2	1.33 (0.64 - 2.78)	
					Overall survival post-menopausal	≥ 30 vs < 25 kg/m^2	1.02 (0.59 - 1.78)	
					Disease-free survival	≥ 30 vs < 25 kg/m^2	1.1 (0.77 - 1.57)	
					Disease-free survival pre-menopausal	≥ 30 vs < 25 kg/m^2	1.02 (0.57 - 1.81)	
					Disease-free survival post-menopausal	≥ 30 vs < 25 kg/m^2	1.18 (0.78 - 1.77)	

Hyun, 2016 [296], Korea, BMI - Excluded	Retrospective cohort study (n= 332) Pre and post-menopausal Mean age:46.1 years	Treatment: 2006-2012 Follow up= 39 months 15 breast cancer deaths 76 recurrence	Invasive breast cancer Clinical stage I 8.1%, II 33.4%, III 58.4% ER+ 62.7%, ER- 37.3% PR+ 56.6%, PR- 43.4% HER2+ 25%, HER2- 75% Neoadjuvant therapy: 60.2%	measured at the time of PET/CT.	Recurrence-free (n= 76)	Overweight vs Normal weight	1.84 (1.17 - 2.89)	clinical stage, Tumor stage,
Jeon SJ, 2016 [298], South Korea, BMI - Excluded	Retrospective cohort of cancer survivors (n= 249) Premenopausal Age range: 26-55 years, Mean age:44 years	Treatment: 2007-2013 Follow up= 64 months	Invasive breast cancer Stage 1 39%, 2 49.8%, 3 11.2% ER+ 83.5%, PR+ 67.5%, Tumour size: ≥2cm 61.8% Adjuvant/neoadjuvant chemo: anthracycline-based 86.7%, taxane-containing 6.8%, CMF 6.4%, adjuvant hormonal therapy 88%	From records	Disease-free survival	≥23 vs <23 kg/m^2	0.2 (0.021 - 1.174)	
Kawai, 2016 [301], Japan, BMI - Excluded	Prospective cohort study (n= 20,090) Pre and post-menopausal Mean age:57.3 years	2004-2006 Follow up= 6.7 years	Invasive breast cancer Tumor stage I:8304 cases, IIA-B 9841 cases, IIIA-C 1945 cases Luminal A: 9850 cases, Luminal B: 3988 cases, HER2: 1485 cases, TNBC:2993 cases	From records, timing not specified	all-cause mortality(n=1418)	≥30 vs 18.5-21.8 kg/m^2	1.46 (1.16 - 1.83) P trend=0.026	Age, residence, Detection type, family history of breast cancer, Tumor stage, radiation therapy, chemotherapy, endocrine therapy, Tumor subtype, menopausal status, year of recruitment
					all-cause mortality(n=332) pre-menopausal	≥30 vs 18.5-21.8 kg/m^2	1.46 (0.91 - 2.35) P trend=0.21	
					all-cause mortality(n=1013) post-menopausal	≥30 vs 18.5-21.8 kg/m^2	1.47 (1.13 - 1.92) P trend=0.11	
					Breast cancer-specific mortality(n=937)	≥30 vs 18.5-21.8 kg/m^2	1.47 (1.11 - 1.93) P trend=0.067	

					Breast cancer-specific mortality(n=296) pre-menopausal	≥30 vs 18.5-21.8 kg/m^2	1.34 (0.79 - 2.27) P trend=0.39	
					Breast cancer-specific mortality(n=607) post-menopausal	≥30 vs 18.5-21.8 kg/m^2	1.58 (1.13 - 2.2) P trend=0.11	
					Breast cancer-specific mortality(n=183) Luminal A	≥30 vs 18.5-21.8 kg/m^2	1.64 (0.93 - 2.9) P trend=0.075	
					Breast cancer-specific mortality(n=186) Luminal B	≥30 vs 18.5-21.8 kg/m^2	2.59 (1.51 - 4.43) P trend=0.017	
					Breast cancer-specific mortality(n=371) Triple-negative	≥30 vs 18.5-21.8 kg/m^2	1.11 (0.67 - 1.84) P trend=0.65	
					Breast cancer-specific mortality(n=125) HER2	≥30 vs 18.5-21.8 kg/m^2	1.53 (0.68 - 3.42) P trend=0.097	
					recurrence(n=2433)	≥30 vs 18.5-21.8 kg/m^2	1.15 (0.95 - 1.39) P trend=0.6	
					recurrence(n=817) pre-menopausal	≥30 vs 18.5-21.8 kg/m^2	1.21 (0.85 - 1.71) P trend=0.71	
					recurrence(n=1520) post-menopausal	≥30 vs 18.5-21.8 kg/m^2	1.15 (0.92 - 1.46) P trend=0.82	
					recurrence(n=765) Luminal A	≥30 vs 18.5-21.8 kg/m^2	1.23 (0.9 - 1.68) P trend=0.25	
					recurrence(n=555) Luminal B	≥30 vs 18.5-21.8 kg/m^2	1.16 (0.77 - 1.75) P trend=0.68	
					recurrence(n=623) Triple-negative	≥30 vs 18.5-21.8 kg/m^2	1.09 (0.74 - 1.62) P trend=0.97	

					recurrence(n=309) HER2	≥30 vs 18.5-21.8 kg/m^2	1.24 (0.68 - 2.26) P trend=0.32	
Kobayashi, 2016 [176], Japan, BMI – Included, review	Retrospective cohort study (n= 157) Pre and post-menopausal Mean age:56 years	Treatment: 2011-2013 Follow up= 43.4 weeks	Metastatic breast cancer Total mastectomy 101/157 (64%); breast-conserving surgery 35/157 (22%); bilateral surgery 6/157 (4%); No surgery: 15/157 (9%)	From records	all-cause mortality without liver metastasis	>25 vs ≤25 kg/m^2	1.22 (0.71 - 2.07) P =0.47	Multivariable adjusted
					all-cause mortality without liver metastasis	>25 vs ≤25 kg/m^2	0.86 (0.38 - 1.93) P =0.71	
Nechuta S, 2016 [27], After Breast Cancer Pooling Project (ABCPP) (Women's Healthy Eating and Living (WHEL), Life After Cancer Epidemiology (LACE), Nurses' Health Study (NHS), United States BMI - Included in molecular breast cancer subtype and non-linear DFS meta-analyses	Pooled analysis (prospective studies) (final n= 5675 in recurrence analysis; 6596 in mortality analysis) Pre- and postmenopausal (72.9%) Mean age: 59.4 years Excluded 921 and 599 women due to event/loss to follow-up prior to 5 years after diagnosis in respective analysis	1976–2004 Follow up= 12 years for mortality, 10.6 years for reucrrence 1427 deaths 49% of breast cancer deaths, 17% other cancers deaths, 13% CVD deaths, 21% from other causes 1309 recurrence	5-year disease free (survived average 2 years) invasive ER+ breast cancer Stage I 53.2%, II 35.7%, III 11.1% PR+ 81.9% Mastectomy 48.6% Chemotherapy 46.2% Radiotherapy 61.6% Hormonal therapy 86.3%	Measured/self-reported, average 2.1 years after diagnosis for 1st assessment and 4.6 years for 2nd weight assessment BMI at 2 years post-diagnosis	Mortality information via medical and death records linkages. Self-reported breast cancer outcomes, confirmed by medical records (WHEL, LACE) Early all-cause mortality (<5 years)	≥35 vs 21.5-24.99 kg/m^2	1.22 (0.74 - 2.03)	Age at diagnosis, TNM stage, PR status, chemotherapy, radiotherapy, surgery, hormonal therapy, race/ethnicity, menopausal status, comorbidity, time between exposure measurement and 5-year post-diagnosis date, stratified by study, weight change, exercise, alcohol intake, smoking as appropriate
				BMI at 2 years post-diagnosis	Late all-cause mortality (≥5 years) (n=1209)	≥35 vs 21.5-24.99 kg/m^2	1.37 (0.93 - 2.01) P trend=0.19	
				BMI at 4.6 years post-diagnosis	Late all-cause mortality (≥5 years) (n=962)	≥35 vs 21.5-24.99 kg/m^2	1.40 (1.09 - 1.81) P trend=0.013	

				BMI at 2 years post-diagnosis	Early recurrence (<5 years)	≥35 vs 21.5-24.99 kg/m^2	1.06 (0.50 - 2.25)	
				BMI at 2 years post-diagnosis	Late recurrence (≥5 years) (n=604)	≥35 vs 21.5-24.99 kg/m^2	1.41 (1.02 - 1.93) P trend=0.007	
				BMI at 4.6 years post-diagnosis	Late recurrence (≥5 years) (n=510)	≥35 vs 21.5-24.99 kg/m^2	1.65 (1.16 - 2.32) P trend=0.0003	
Nelson SH, 2016 [98], After Breast Cancer Pooling Project (ABCPP) (Women's Healthy Eating and Living (WHEL), Life After Cancer Epidemiology (LACE), Nurses' Health Study (NHS), United States BMI – Included, meta-analysis	Pooled analysis (prospective studies) (n= 9513) Pre- and postmenopausal (72.6%) Mean age: 59 years Non-Hispanic white: 88.6 %	1976-2006 Follow up= 11.8 years 2212 deaths 1131 breast cancer deaths	Invasive breast cancer Stage I (51.4%), II, III	Measured/self reported mean 1.4 years post-diagnosis	Medical records, or self-reported and verified by medical records All-cause mortality (n=2212)	≥35 vs 18.5-24.9 kg/m^2	1.05 (0.88 - 1.24)	Age at diagnosis, race, stage, grade, ER status, chemotherapy, smoking, comorbidity, physical activity
					Breast cancer-specific mortality (n=1131)	≥35 vs 18.5-24.9 kg/m^2	0.95 (0.74 - 1.20)	
Sendur, 2016 [332], Turkey BMI - Excluded	Retrospectve cohort study (n= 826) Premenopausal Mean age 57 years	1998-2014 Follow up= 37.5 months	Non-metastatic HR+ breast cancer using tamoxifen	Medical records	Overall survival	≥25 vs <25 kg/m^2	Log-rank P = 0.028	Unadjusted
					Disease-free survival		Log-rank P = 0.39	
Sestak, 2016 [333], Arimidex, Tamoxifen Alone or in Combination (ATAC), International BMI - Excluded	Secondary analysis of clinical trial (n= 940) Postmenopausal Mean age:63.6 years	Follow up= 10 years 142 recurrences	Invasive HR+ breast cancer Hysterectomy 22.1 %; Radiotherapy 68.0 %; Mastectomy 41.5 %	No description	Distant recurrence(n=142)	Per 1 SD	1.12 (0.9 - 1.38)	

Slaoui, 2016 [337], National Institute of Oncology Rabat, BMI - Excluded	Retrospective cohort study (n= 716) Pre and post-menopausal	2009-2014 Follow up= 31 months	TNBC 16.8% N0 40%	From records	Event free survival age	yes vs no	1.11 (0.32 - 3.81)	Unadjusted
					Event free survival age > 40y	yes vs no	1.15 (0.58 - 2.3)	Unadjusted
Su Y, 2016 [340], SBCS, China, BMI - Excluded	Follow-up of cases in case-control study (n= 535) Pre and postmenopausal Age range: 20-70 years, Mean age: 51.4 years	2002-2005 Follow up=	Invasive breast cancer TNM stage 0 2.4%, stage 1 31.9%, 2a 32.9%, 2b 21.6%, 3 10.5%, 4 0.7% ER+ 62.7% PR+ 61.4% HER2+ 30.4% Chemotherapy 94.4% Radiotherapy 32.1% Tamoxifen 54.2%	Measured, 6 months after diagnosis	Overall survival	pSmad2 intensity x BMI TGFβ-RII intensity x BMI TGFβ-RII pattern x BMI	P interaction <0.001 P interaction = 0.24 P interaction = 0.88	Age at diagnosis, tumor size, grade, tumor-node-metastasis stage, estrogen receptor α, progesterone receptor, human epidermal growth factor receptor 2, radiotherapy, chemotherapy, immunotherapy, and tamoxifen
					Disease-free survival	pSmad2 intensity x BMI TGFβ-RII intensity x BMI TGFβ-RII pattern x BMI	P interaction <0.02 P interaction = 0.64 P interaction = 0.92	
Tamura, 2016 [343], Japan, BMI - Excluded	Retrospective cohort study (n= 301) Pre and post-menopausal Mean age:50 years	1993-2008 Follow up= 5.77 years	DCIS HR+ 79% HR- 21% HER2 0/1+ 81% HER2 2/3+ 19% Total mastectomy 59% Lumpectomy 41%	From records	Ipsilateral breast tumor recurrence (IBTR)	≥22 vs <22 kg/m^2	P = 0.26	Unadjusted
					Contralateral breast tumor recurrence (CBTR)	≥22 vs <22 kg/m^2	P = 0.14	Unadjusted

Tomiguchi, 2016 [205], Japan, BMI – Included, review	Retrospective cohort study (n=307) Pre- and post-menopausal	Treatment: 2000-2011 Follow up= 65 months	Invasive HR+/HER2- breast cancer Chemotherapy 25.4% Endocrine therapy 93.5%	No description	Breast cancer-specific mortality(n=8) ER+ and HER2-	≥23 vs <23 kg/m^2	4.56 (0.82 - 40.62)	Age, menopausal status, Tumor size, Ki-67 expression, Nodal status, FGFR1 amplification, FGFR1 mRNA expression, Nuclear grade, FGFR1 protein expression
					Relapse-free(n=21) ER+ and HER2-	≥23 vs <23 kg/m^2	1.25 (0.48 - 3.29)	
Warren LE, 2016 [115], Dana-Farber Cancer Institute (DFCI), USA BMI – Included, meta-analysis	Retrospective cohort of cancer survivors (n= 878) Pre- and postmenopausal Age range: 23-87 years mean age: 55 years	Treatment between 1997 and 2007 Follow up= 10.8 years 45 locoregional recurrence 103 CBC, DM, or deaths	Invasive breast cancer Adjuvant hormonal therapy 76% Adjuvant chemotherapy 44.3%	From records Adult height and weight within a year after diagnosis	Disease-free survival	≥ 30 vs < 25 kg/m^2	1.44 (0.97 - 2.14)	Unadjusted
					Disease-free survival pre-menopausal	≥ 30 vs < 25 kg/m^2	2.86 (1.45 - 5.67)	Age, year of diagnosis from 1997, tumour grade, margin status, subtype, pT stage, no. of positive nodes, adjuvant hormone therapy, adjuvant chemotherapy
					Disease-free survival post-menopausal	≥ 30 vs < 25 kg/m^2	0.79 (0.44 - 1.43)	
					Locoregional recurrence	≥ 30 vs < 25 kg/m^2	1.1 (0.48 - 2.11)	Unadjusted

					Locoregional recurrence(n=23) pre-menopausal	≥ 30 vs < 25 kg/m^2	3.36 (1.07 - 10.63)	Age, year of diagnosis from 1997, tumour grade, subtype, pT stage, lymphovascular invasion, no. of positive nodes, adjuvant hormone therapy, adjuvant chemotherapy
					Locoregional recurrence (n=32) post-menopausal	≥ 30 vs < 25 kg/m^2	0.52 (0.15 - 1.83)	
Wu, 2016 [209], China, BMI – Included, review	Retrospective cohort study (n= 122) Mean age:50.5 years	2009-2014 Follow up= 31 months calendar year:2009-2014	Invasive breast cancer with first-episode liver metastasis AJCC v.7 I: 3, II: 29, III:56; IV 34 cases Luminal A 12, B 61, HER2+ 30, TNBC 19 cases Surgery:106 Chemotherapy: 95 Radiotherapy: 57 Hormonal therapy: 58 Targeted therapy: 21 cases	Medical records	Total mortality(n=84)	≥28 vs <28	2.239 (1.034 - 4.847)	Tumour subtype (luminal, HER2, TNBC), cTNM stage, lactate dehydrogenase level at relapse, radiotherapy, targeted therapy, chemotherapy
Zhou, 2016 [352], China, BMI - Excluded	Retrospective cohort study (n= 732) mean age:51 years	Treatment: 2007-2011 Follow up= 41 months	Invasive and in situ HER2+ breast cancer HR+ 55.5% HR- 44.5% DCIS 2.9% Stage I 24.5%, II 58.3%, III 14.2% Neoadjuvant chemotherapy treatment: 19.4% Chemotherapy: 12.8% Radiotherapy: 41.7% Endocrine therapy: 51.6%	At diagnosis	Overall survival	≥18.49 vs ≤24 kg/m^2	0.851 (0.112 - 6.473)	Unadjusted

					Disease-free survival	≥18.49 vs ≤24 kg/m^2	1.18 (0.422 - 3.298)	Unadjusted
Al Saeed, 2015 [259], Saudi Arabia BMI - Excluded	Retrospective cohort study (n= 112) Pre and post-menopausal Mean age: 47 years Included 2 male breast cancer cases	Treatment: 1988-2008 Follow up= 9 years	Invasive breast cancer	Measured at time of surgery	Locoregional recurrence(n=10)	26-30 vs 18.5 -25 kg/m^2	3.4 (3.0-3.8)	
Bonsang-Kitzis , 2015 [144], BMI – Included, review	(n= 326) mean age:47	Follow up= 52 months	T1:9% T2: 65% T3: 26% All patients received NAC followed by surgery with or without radiotherapy.		Metastasis	>30 vs ≤30 kg/m^2	1.71 (0.92 - 3.21) P =0.09	Tumour size, pre and post-treatment lymph node, post-treatment tumour
Bao PP, 2015[396], Shanghai Breast Cancer Study (SBCS), Shanghai Breast Cancer Survival Study (SBCSS), Shanghai Womens' Health Study (SWHS), China BMI - Excluded	Female, Pooled Analysis Cohorts (n=6346) Chinese	Follow Up: Median 8.08 years , Loss to Follow-up: Not reported	Breast cancer. TNM stage (n) 0-I 2,111, II 3,088, III-IV 633, unknown 514. ER+ 3,745, ER- 2,035, unknown 566. PR+ 3,431, PR- 2,334, unknown 581. ER+/PR+ 2,978, ER-/PR- 1,581, ER+/PR- or ER-PR+ 1,195, unknown 592. Radical mastectomy (n) yes 6,276, no 30, unknown 40. Chemotherapy yes 5,761, no 540, unknown 45. Radiotherapy yes 1,943, no 4,212, unknown 191. Tamoxifen use yes	Self-reported	5-year overall survival (n=1207.0) 5y disease free survival (n=1160)	Q2 vs Q1	85.98 vs 89.39 P<0.01 80.63 vs 84.84 P=0.01	Age at diagnosis, age at menarche, chemotherapy, ER status, family history, histology , hormonal therapy, number of full-term pregnancies, radiotherapy, tumor stage

			3,009, no 2,387, unknown 950.					
Cakar, 2015 [277], Ege University Medical Oncology Clinic, Turkey, BMI - Excluded	Prospective cohort study (n= 112) Pre and Post-menopausal Mean age:50.4 years	Diagnosis year: 2004-2009 Follow up= 23.2 months	Triple negative breast cancer IDC 63.4%, ILC 0.9%, IDC+ILC 8%, inflammatory 2.7%, other 25% Anthracycline 43.8% Taxane 3.6% Anthracycline + taxane 43.8%, Neoadjuvant chemotherapy 7.1%	Assessed at time of diagnosis	Overall survival(n=6)	Obese vs Normal/underweight	P log-rank test = 0.304	Unadjusted
					Disease-free survival(n=12)	Obese vs Normal/underweight	P log-rank test = 0.16	Unadjusted
Copson, 2015 [156], Prospective Study of Outcomes in Sporadic and Hereditary Breast Cancer (POSH), United Kingdom, BMI – Included, review	Prospective cohort study (n= 2843) Premenopausal Mean age:36 years	2000-2008 Follow up= 5.87 years 3.1% lost to follow-up	Invasive breast cancer	Height and weight were measured at registration.	Overall survival	≥30 vs <25 kg/m^2	1.35 (1.08 - 1.68)	Tumor grade, Tumor size, Nodal status, HER2 status , Age at diagnosis, Race
					Overall survival ER positive	≥30 vs <25 kg/m^2	1.47 (1.12 - 1.95)	
					Overall survival ER negative	≥30 vs <25 kg/m^2	1.16 (0.81 - 1.66)	
					Distant disease free	≥30 vs <25 kg/m^2	1.22 (1.00 - 1.51)	
					Distant disease free ER positive	≥30 vs <25 kg/m^2	1.37 (1.06 - 1.76)	

					Distant disease free ER negative	≥30 vs <25 kg/m^2	1.00 (0.70 - 1.41)	
Crispo, 2015 [157], G. Pascale National Cancer Institute, Italy, BMI – Included, review	Retrospective cohort study (n= 448) Pre-, peri-, postmenopausal	2004-2006 Follow up= 61.8 months		Interviewed	Overall survival(n=319) Symptomatic	≥30 vs <25 kg/m^2	0.64 (0.28 - 1.42)	Age, education, menopausal status, Tumor size, Nodal status, Receptor status
					Overall survival(n=107) Screened	≥30 vs <25 kg/m^2	7.92 (0.92 - 68.4)	
					Disease-free survival(n=319) Symptomatic	≥30 vs <25 kg/m^2	0.68 (0.37 - 1.28)	
					Disease-free survival(n=107) Screened	≥30 vs <25 kg/m^2	2.75 (0.37 - 20.29)	
Fan, 2015 [289], China, BMI - Excluded	Retrospective cohort study (n= 3966) Pre and post-menopausal	2005-2008 Follow up= 66 months The 5-year RFS rate and OS rate for the entire cohort were 79.1% and 86.4%, respectively	Invasive breast cancer ER-/ PgR+/HER2- 6% TNBC 8.8%	No description	all-cause mortality ER-/PgR+/HER2-	≥25 vs <25 kg/m^2	P = 0.803	Unadjusted
					all-cause mortality Triple-negative	≥25 vs <25 kg/m^2	P = 0.903	Unadjusted
					Relapse-free ER-/PgR+/HER2-	≥25 vs <25 kg/m^2	P = 0.34	Unadjusted
					Relapse-free Triple-negative	≥25 vs <25 kg/m^2	P = 0.404	Unadjusted

Fei F, 2015[384], EORTC 10994/BIG 1- 00 phase III trial, Multi-country BMI - Excluded	Female, Secondary analysis of clinical trials (n=283) , (n): Premenopausal 178, Postmenopausal 104, Missing 1.	Diagnosed:2001-2006 (randomised) follow Up: Median 57 months	Breast cancer. Histological grade (n): I 9, II 96, III 137, Unknown 41. Subtype (n): Luminal A 37, Luminal B HER2-negative 22, Luminal B HER2-positive 51, HER2-positive (non-luminal) 42, Triple negative 70, Unknown 61. P53 status (n): Wild type 90, Mutated 130, Unknown 63. Randomised treatment (n): anthracycline based chemotherapy 135, docetaxel and epirubicin+docetaxel 148. Type of surgery (Primary) (n): Lumpectomy/quadrantectomy 181, Mastectomy 102. After surgery, treatment was completed with radiotherapy and/or hormonal therapy.	Measured	Recurrence free interval (n=40) Distant recurrence free interval (n=28)	BMI>/=30 vs BMI <25 kg/m^2	0.81(0.31-2.10) 0.91(0.31-2.66) P trend=0.4747	Unadjusted
Fontanella, 2015 [161], Germany, BMI – Included, review	Pooled analysis of 8 neoadjuvant trials (n= 4061) Mean age:49.7 years Trials GeparQuattro and GeparQuinto	1999-2011 Follow up= 42.7 months	Invasive breast cancer T1–2 71.0% T3 16.5% T4 a-c: 6.9% T4 d: 5.6% ER+ 38.1% ER- 61.9% PgR+ 46.6% PgR- 53.4% HER2+ 72.1% HER2- 31.2%	BMI before treatment	overall survival	≥40 vs 18.5-24.9 kg/m^2	2.21 (1.26 - 3.86)	study, number of comorbidities

					Disease-free survival	≥40 vs 18.5-24.9 kg/m^2	1.43 (0.86 - 2.39)	
Hao, 2015 [167], China, BMI – Included, review	Retrospective cohort study (n= 1106) Pre and post-menopausal	Treatment 2002-2012 Follow up= 44.8 months	Triple negative breast cancers Stage I – II 43.3% III 56.6% Chemotherapy 94.2%	BMI at diagnosis	Overall survival (n=154)	>24 vs ≤24 kg/m^2	1.46 (1.04 - 2.06)	Age at diagnosis, menopausal status, Tumor size, Nodal status, grade, Systemic adjuvant therapy
					Overall survival(n=58) pre-menopausal	>24 vs ≤24 kg/m^2	2.16 (1.21 - 3.87)	
					Overall survival(n=96) post-menopausal	>24 vs ≤24 kg/m^2	1.07 (0.7 - 1.64)	
					Breast cancer-specific mortality(n=106)	>24 vs ≤24 kg/m^2	1.34 (0.9 - 2.01)	
					Breast cancer-specific mortality(n=40) pre-menopausal	>24 vs ≤24 kg/m^2	2.27 (1.11 - 4.63)	
					Breast cancer-specific mortality(n=66) post-menopausal	>24 vs ≤24 kg/m^2	0.96 (0.58 - 1.58)	
Herlevic, 2015 [170], Feist-Weiller Cancer Center, United States, BMI – Included, review	Retrospective cohort study (n= 523) Mean age:61.2 years	Treatment: 1997-2013 Follow up= 49 months	Invasive breast cancer Excluded stage IV	BMI at diagnosis	Overall survival(n=86)	≥25 vs <25 kg/m^2	0.75 (0.56 - 1.02)	Age at diagnosis, T stage, N stage, tumor grade, ethnicity, ER positivity, progesterone receptor positivity, Her-2 overexpression, and receipt of chemotherapy
					Disease-free survival	≥25 vs <25 kg/m^2	0.75 (0.59 - 0.96)	
Jeon YW, 2015 [78], Korean Breast	Prospective cohort study of	1988-2008 Follow up= 92 months	Invasive breast cancer, no metastasis	From records	Overall survival(n=4468)	≥30 vs 18.5-24.9kg/m^2	1.29 (1.13 - 1.48)	Age, tumour size, histological grade,

Cancer Registry (KBCR), Korea, BMI – Included, meta-analysis	cancer survivors (n= 41021) Pre- and postmeonpausal Mean age: 48 years Excluded patients treated with neoadjuvant therapy	4468 deaths 2824 breast cancer deaths	Grade 1-2: 48.86%, 3: 38.74% ER and/or PR+/HER2- 51.42% ER and/or PR+/HER2+ 10.04% ER and PR-/HER2+ 9.48% ER and PR-/HER2- - 18.13% Unknown: 10.94% Mastectomy: 56.95% Conserving surgery: 43.05% Chemotherapy: 70.24% Hormone therapy: 64.03%	at diagnosis				lymph node status, operation type, Adjuvant therapy, ER/PR status, HER2 status
					Breast cancer-specific mortality (n=2824)	≥30 vs 18.5-24.9kg/m^2	1.21 (1.02 - 1.43)	Age, tumour size, histological grade, lymph node status, operation type, Adjuvant therapy, ER/PR status, HER2 status
Karpińska, 2015 [173], BMI – Included, review	Retrospective cohort study (n= 105) mean age:49.9	2001-2006. Follow up= 5 years 24 deaths 20 cancer deaths 4 non-cancer deaths 29 recurrences	Oestrogen receptors positive: 61 (58,1%) neg: 44 (41,9%) stages IIIA, IIIB, IIIC)	at diagnosis/at enrolment	Overall survival	Obese vs non-obese	3.146 (1.015 - 9.756) P =0.047	Age, hormone dependency, menopause, tumour stage,

					Disease-free survival	Obese vs non-obese	2.177 (0.909 - 5.216) P =0.08	
Kim, 2015 [83], BMI – Included, meta-analysis	Retrospective cohort study (n= 6967)	Data from the Asan Medical Center Breast Cancer Database (AMCBCD) from 1997 to 2007 were analysed. Follow up= 100.3 months	Tumor size: =2cm Chemotherapy; endocrine therapy.	at diagnosis	Breast cancer-specific mortality	<18.5 vs ≥25 kg/m^2	1.52 (1.08 - 2.14)	Tumour size, lymph node metastasis, ER status, PR status, Her-2/neu, systemic treatment (chemotherapy, hormonal therapy and biological treatment)
					Breast cancer-specific mortality hormone receptor +, HER2 -	<18.5 vs ≥25 kg/m^2	2.11 (1.2 - 3.68)	
					Breast cancer-specific mortality hormone receptor +, HER2 +	<18.5 vs ≥25 kg/m^2	1.50 (0.53 - 4.3)	
					Breast cancer-specific mortality hormone receptor -, HER2 +	<18.5 vs ≥25 kg/m^2	1.63 (0.79 - 3.38)	
					Breast cancer-specific mortality hormone receptor -, HER2 -	<18.5 vs ≥25 kg/m^2	1.17 (0.62 - 2.23)	
					Disease-free survival	<18.5 vs ≥25 kg/m^2	1.17 (1.1 - 1.17)	
					Disease-free survival hormone receptor +, HER2-	<18.5 vs ≥25 kg/m^2	1.62 (1.04 - 2.54)	
					Disease-free survival hormone	<18.5 vs ≥25 kg/m^2	2.15 (1.00 - 4.63)	

					receptor +, HER2 +			
					Disease-free survival hormone receptor-, HER2 +	<18.5 vs ≥25 kg/m^2	1.81 (0.98 - 3.35)	
					Disease-free survival hormone receptor -, HER2 -	<18.5 vs ≥25 kg/m^2	1.00 (0.54 - 1.83)	
Kogawa, 2015 [84], MD Anderson Cancer Centre (MDACC), USA BMI – Included, meta-analysis	Retrospective cohort study (n= 1002)	Follow up= 19.6 months	Invasive breast cancer Clinical stage: III/IIIA: 29.7%; IIIB: 25.8%; IIIC:44.4% cT stage: T1: 4.1%; T2: 22.5%; T3:32.8%; T4: 40.6% ER-:36.3%, ER+:63.7%; PR-: 54.4%, PR+: 45.6%	BMI was measured at diagnosis before chemotherapy and again at the last cycle of NST, and the change in BMI was calculated as the difference between the two.	Overall survival BMI <25	Per 1 kg/m^2	0.996 (0.84 - 1.181)	Inflammatory breast cancer, hormonal receptor status, HER2 status, clinical stage, lymph vascular invasion
					Overall survival 25≤BMI<30	Per 1 kg/m^2	0.833 (0.652 - 1.065)	
					Overall survival BMI>30kg/m2	Per 1 kg/m^2	0.995 (0.952 - 1.041)	
					Recurrence free survival BMI <25	Per 1 kg/m^2	0.953 (0.84 - 1.082)	
					Recurrence free survival 25≤BMI<30	Per 1 kg/m^2	0.97 (0.807 - 1.166)	
					Recurrence free survival BMI >30	Per 1 kg/m^2	1.004 (0.973 - 1.037)	

Larsen, 2015 [182], DCHS, Denmark, BMI – Included, review	Prospective cohort study (n= 1229) Postmenopausal Age range: 50-64 years	1993-1997 Follow up= 9.6 years	Invasive breast cancer Stage 1 40%, 2 50%, 3 2%, unknown 8% ER+ 76%, ER- 16% Unknown 9%	From hospital records or questionnaire, BMI, WC at-diagnosis	all-cause mortality	≥30 vs <25 kg/m^2	1.10 (0.79 - 1.54)	Age, Tumor size, lymph node status, number of positive lymph nodes, malignancy grade, estrogen receptor status
					all-cause mortality	≥30 vs <25 kg/m^2	1.09 (0.78 - 1.51)	Age, Charlson Comorbidity Index
Ligibel JA, 2015 [88], Cancer and Leukemia Group B (CALGB) 9741, USA BMI – Included, meta-analysis	Secondary analysis of clinical trial (n= 1909) Pre- (49.8%) and postmenopausal (50.2%) Mean age: 50 years White 82.3% Recuited women diagnosed within the past 84 days	1997-1999 Follow up= 11 years 543 deaths 619 recurrence-free survival events	Node+ invasive breast cancer, no metastasis Tumour size: 2-≤5 57.9% ER+ 64.7% ER- 33.5%, PgR+ 56.6% PgR- 41.2% PAM50 subset: 403 luminal A 334 luminal B 251 HER2-enriched 284 basal-like cases Tamoxifen use 70.6%	From record, at diagnosis, after surgery before systemic therapy	Overall(n=543)	Per 5 kg/m^2	1.08 (1.01 - 1.14)	Nodal involvement, ER status, Tumour size, menopausal status, drug sequence, dose density

			Received doxorubicin, cyclophosphamide, paclitaxel 1.9% patients received reduced doses of doxorubicin. Proportion not different by BMI category					
					Recurrence-free survival(n=619)	Per 5 kg/m^2	1.08 (1.02 - 1.14)	
					Recurrence-free survival Luminal A	Per 5 kg/m^2	1.23 (1.08 - 1.40)	
					Recurrence-free survival Luminal B	Per 5 kg/m^2	1.00 (0.87 - 1.16)	
					Recurrence-free survival HER2+	Per 5 kg/m^2	1.10 (0.97 - 1.26)	
					Recurrence-free survival Basal-like	Per 5 kg/m^2	1.11 (0.97 - 1.28)	
Ohara M, 2015[247], Japan BMI – Included, review	Female, Retrospective Cohort of Cancer Survivors (n=184) mean age:64, All postmenopausal	Diagnosed:2002-2012	ER+/HER2- breast cancer. Pt stage T1 70.7%, T2 26.6%, T3 0.5%. T4 2.2%. Endocrine therapy with anastrozole 52.2%, letrozole 45.7%, exemestane 2.1%. Chemotherapy 28.8%.	Medical records	Recurrence-free survival (n=16)	>=25 vs <25 kg/m^2	1.04(0.90-1.19)	Ki-67 expression, nodal status, pr status
Osman MA, 2015[385], UK BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=118)	Diagnosed: Not reported.	Metastatic breast cancer. Stage (n): I-II 39, III 38, IV 41.Receptor status (n): ER+ve PR+ve	Medical records	Progression free survival	>=25 vs <25 kg/m^2	Log rank P= 0.06	Ki-67 expression, nodal status, pr status

			45, ER +ve PR-ve 66, ER-ve PR+ve 7. HER 2 neu (n): Positive 42, Negative 76. Chemotherapy treatment for patients eligible for 2nd part of the study.		Overall survival		Log rank P= 0.06	
Rossi, 2015 [327], Curie Institute Breast Cancer Study (CIBCS), France BMI - Excluded	Prospective cohort study (n= 32,502)	Treatment: 1981-2008 Follow up= 28 years (max)	Invasive breast cancer without metastasis 73.6% HR+ /13.9% HR-	No description	overall survival(n=8,119)	≥30 vs 18.5-24.9 kg/m^2	1.22 (1.05 - 1.41)	Age, menopausal status, histological type, Tumor size, Nodal status, Hormone receptor status, SBR grade of the tumor, Time period
					Distant disease free(n=5,946)	≥30 vs 18.5-24.9 kg/m^2	1.22 (1.04 - 1.43)	
Scholz C, 2015 [199], ADEBAR BMI – Included, review	Secondary analysis of clinical trial (n= 1310) Pre- and postmenopausal Age range: 18-70 years High risk	2001-2005	Lymph-node positive primary breast cancer pT1 28.4% pT2 55.3% pT3 11.9% pT4 4.3% Unknown 0.1% Hormone receptor status: Negative 21.6% Positive 76.4% Unknown 2.0% HER2 negative 68.9% Positive 23.1% Unknown 8.1% Chemotherapy: EC-Doc 50.2%, FEC120 49.8%	Measured at randomisation trial, prior to adjuvant therapy	Total mortality (n=225)	≥ 30 vs < 30 kg/m^2	1.56 (1.14 - 2.14)	Age, menopausal status, tumor stage,nodal status, histological grade, type, hormone receptor status, HER2 status , chemotherapy

					Total mortality(n=71.0) pre-menopausal	≥ 30 vs < 30 kg/m^2	0.94 (0.46 - 1.89)	
					Total mortality(n=151.0) post-menopausal	≥ 30 vs < 30 kg/m^2	1.79 (1.25 - 2.58)	
					Total mortality(n=139.0) HR+	≥ 30 vs < 30 kg/m^2	1.48 (0.99 - 2.21)	
					Total mortality(n=78.0) HR-	≥ 30 vs < 30 kg/m^2	1.23 (0.7 - 2.16)	
					Disease-free survival(n=362.0)	≥ 30 vs < 30 kg/m^2	1.43 (1.11 - 1.86)	
					Disease-free survival(n=125.0) pre-menopausal	≥ 30 vs < 30 kg/m^2	1.06 (0.63 - 1.76)	
					Disease-free survival(n=234.0) post-menopausal	≥ 30 vs < 30 kg/m^2	1.56 (1.15 - 2.12)	
					Disease-free survival(n=242.0) HR+	≥ 30 vs < 30 kg/m^2	1.53 (1.12 - 2.09)	
					Disease-free survival(n=109.0) HR-	≥ 30 vs < 30 kg/m^2	0.87 (0.53 - 1.44)	
Sun X, 2015 [109], Carolina Breast Cancer Study	Follow-up of cases in case-control study (n= 1109)	1993-2001 Follow up= 13.5 years	Invasive breast cancer Stage I 37%, II 50%, III-IV 12%	Measured at interview, average 145 days post-diagnosis	Overall mortality (n=438)	≥30 vs <25 kg/m^2	1.11 (0.84 - 1.45)	Age, physical activity, alcohol intake, smoking, parity, WHR, tumour stage and size,

(CBCS), United States BMI – Included, meta-analysis	Pre- (49%) and postmenopausal (51%) Mean age: 50.60 years White 55% African-American 45%	435 deaths 268 breast cancer deaths	Luminal 64% Basal-like 18% HER2+ 6% Normal-like 11% No treatment information					lymph node status, histological type, race, study phase, Income, education,
					Breast cancer-specific mortality(n=269)	≥30 vs <25 kg/m^2	0.97 (0.68 - 1.37)	
Tichy, 2015 [113], Lineberger Comprehensive Cancer Center (LCCC), United States, BMI – Included, meta-analysis (mortality) Excluded (recurrence)	Prospective cohort study (n= 349) Mean age:48 years	Follow up= 6.5 years 107 breast cancer recurrences 98 deaths	HR-/HER2- 30%, HR-/HER2+ 13.2%, HR+/HER2- 42.1%, HR+/HER2+ 14.6% Grade III at diagnosis: 65% in non-AA, 69% in AA Stage II at diagnosis: 45.6% overall Stage III at diagnosis: 54.4% overall Neoadjuvant regimen: A+T 83.5%, A no T 8.5%, T no A 8% Endocrine therapy receipt (HR+ only) 97% Post-mastectomy radiation 52.7%		Overall survival	Per 1 unit	1.02 (0.99-1.04)	Age, race, subtype, tumour stage, pCR
					Overall survival HR+	Per 1 unit	1.02 (0.99-1.05)	
					Overall survival HR-	Per 1 unit	1.02 (0.98-1.05)	
					Breast cancer recurrence	Per 1 unit	1.01 (0.98-1.01)	
					Breast cancer recurrence HR+	Per 1 unit	1.00 (0.97-1.03)	

					Breast cancer recurrence HR-	Per 1 unit	1.03 (0.99-1.07)	
Widschwendter P, 2015 [116], Success A, Germany, BMI – Included, meta-analysis	Secondary analysis of clinical trial (n= 3754) Pre- (41.7%) and postmenopausal (58.3%) Mean age: 53 years High-risk breast cancer patients (pN1–3, tumour size ≥ pT2, histological grade 3, negative HR status or age ≤ 35 years)	2005-2007 Follow up= 65 months 302 deaths 502 recurrence	Early invasive breast cancer Luminal A 38%, luminal B 16.5%, HER2+ 23.5%, TNBC 19.8% Mastectomy 29.2%, breast conserving 70.3% Chemotherapy, FEC-DocG: 49.4%, FEC-Doc: 50.6 % Undertreatment (<6 cycles CT), no: 90.4%, yes: 9.6% Hormone therapy 71.3%	Measured prior to adjuvant treatment	Overall survival (n=302)	≥40 vs ≤24.9 kg/m^2	2.79 (1.63 - 4.77)	Age, tumour size, nodal status, tumour grade, histological type, hormone receptor status, HER2 status , menopausal status, type of surgery, chemotherapy, antihormone treatment, undertreatment (<6 cycle CT)
					Disease-free survival (n=502)	≥40 vs ≤24.9 kg/m^2	2.70 (1.71 - 4.28)	
Zeichner SB, 2015[248], University of Miami/Sylvester Comprehensive Cancer Center (UM/SCCC), USA BMI – Included, review	Female, Retrospective Cohort of Cancer Survivors (n=246) mean age:54, Non-hispanic/hispanic White	Diagnosed:2006-2012 (treatment) follow Up: Median 29.5 months	Nonmetastatic, histologic grade low/intermediate 39.7%, high 60.3%, HER2+ 100%, ER+ 63.6%, ER- 36.4%, PR+ 53%, PR- 47.% Taxane + trastuzumab 57.3%, Taxane + trastuzumab + anthracycline 13%. Adjuvant radiation 88%. Hormone therapy 58.1%. Lumpectomy 34.9%, mastectomy 60.6%, no surgery 4.6%.	Medical Records	Overall survival (n=21)	>=30 vs <30 kg/m^2	0.79(0.15-4.13) P=0.780	Age at diagnosis, ER status, histological grade, lymph node metastasis , tumor size, vitamin d
					Disease free survival (n=89)		0.62(0.23-1.66) P=0.344	

Zhang, 2015 [213], BMI – Included, review	Retrospective cohort study (n= 1699) mean age:54	Diagnosis year: 2009-2012 Follow up= 16 months	Early breast cancer, stage: 795 I-II, 585 III, 319 unknown; T status: 183 Tis, 809 T1, 663 T2-4, 44 unknown; ER status: 504 positive, 1111 negative, 84 unknown; PR status: 886 positive, 731 negative, 82 unknown Surgery: 1244 mastectomy, 368 breast-conserving	Measured	Total mortality	≥24 vs <24 kg/m^2	3.65 (1.12 - 11.90)	Age, lymph node involvement, ER status
					Disease-free survival	≥24 vs <24 kg/m^2	3.389 (1.715 - 6.711)	Age, lymph node involvement, ER status, PR status
Arce-Salinas, 2014 [140], Mexico, BMI – Included, review	Retrospective cohort study (n= 819) Pre and post-menopausal Mean age:49 years	Follow up= 29 months	AJCC stage IIB-IIIB ER+ 44.3% PR+ 55.3% HER2+ 17.7% TNBC 25.4%	From records	all-cause mortality(n=184)	Obesity vs non-obese	1.79 (1.15 - 3.2) P =0.012	Menopausal status, presence of diabetes, HER2 positivity, triple negative subtype, clinical stage, nuclear grade
Chapman, 2014 [279] NCIC CTG MA.14, Canada BMI - Excluded	RCT (n= 667) Postmenopausal mean age:60.1	Follow up= 9.8 years breast cancer deaths = 106 other cause mortality = 55	Tumor size: T1 n=382, >=T2 n=276 Tamoxifen n=329, tamoxifen + octreotide LAR n=329		non-breast-cancer-related death(n=55)	Per 1 kg / m^2	0.9613 (0.9418 - 0.9802)	Treatment, chemotherapy, Nodal status, Hormone receptor status, Age
Fedele, 2014 [160], Brindisi study, Italy, BMI - Excluded	Retrospective cohort study (n= 520) Mean age:55 years	Treatment 1990-2013 Follow up= 66 months	Stage I 38%, II 51%, IIIA 11% Luminal A 71%, Luminal B 9%, HER2 type 5%, TNBC 15% Adjuvant chemotherapy 65% Adjuvant radiation 72% Mastectomy 29% Breast conserving 71%	BMI measured <1 month after surgery	Disease-free survival(n=194)	High vs low	0.97 (0.943 - 0.998)	Unadjusted

Huober J, 2014[386], BIG 1-98 study, Mono-therapy arms, Multi-country BMI - Excluded	Female, Secondary analysis of clinical trials (n=4682) mean age:61, Post-menopausal	Diagnosed:1998-2000 (treatment) follow Up: Median 8.7 years	Breast cancer stage I 25.8%, II 47%, III 13% Monotherapy with 5 years tamoxifen, or 5 years letrozole, or to sequential treatment with tamoxifen for 2 years followed by 3 years of letrozole or the reverse	Measured	Disease free survival	>=29.7 vs <=23.2 kg/m^2	0.93(0.77-1.13)	Stratified by randomization option (2-arm vs. 4-arm) and chemotherapy use. Adjusted for treatment group, age quartile, prior HRT use (yes or no), nodal status (node-negative, 1–3 involved nodes, and C4 involved nodes), tumor grade (I, II, III, and unknown), tumor size (B2 cm, [2 cm, and unknown), and cooperative clinical trial group
Iwase, 2014 [297], Japan, BMI - Excluded	Retrospective cohort study (n= 249) Pre and Post-menopausal Mean age: 50.3 years	Treatment 2000-2010 Follow up= 1,292 days	Stage 1: 10%, 2: 56%, 3: 13%, 4: 22% Mastectomy 57%, Lumpectomy 43% Chemo taxane 89%, Chemo not taxane 11%	BMI before neoadjuvant chemotherapy	Overall survival	≥30 vs <18.5 kg/m^2	1.69 (0.25 - 11.45) P trend=0.25	Unadjusted
					Disease-free survival	≥30 vs <18.5 kg/m^2	2.72 (0.63 - 11.82) P trend=0.06	Unadjusted
Izano M, 2014 [77], Health and Functioning in Women (HFW) (2 cohorts), United States, (also reported results by race) BMI – Included, meta-analysis	Prospective cohort study of cancer survivors (n= 975) Pre- and post-menopausal Mean age: 63.1 years white 83% African American 17% Response rate 81.1%-88.4%	1984-1985 1987-1988 Follow up= 11.3 years 774 deaths 323 breast cancer deaths 451 other deaths	Invasive breast cancer Stage I-IV Local 53.6% Regional 40.7% Remote 5.6% No surgery 2.2% Partial mastectomy 20.2% Modified radical mastectomy 77.6% Charlson Comorbidity Score:	Self-reported interviewed between 2-4 months of diagnosis	20-year breast cancer-specific mortality (n=323)	Per 1 kg/m^2	1.03 (1.00 - 1.05)	Age, comorbidities, hypertension, functional limitation, positive lymph nodes, tumour size, surgery, period of study entry, stage, race, financial adequacy, education, current smoking

			0: 44.7%, 1: 24.7%, 2: 15.5%, 3: 8.2%, 4: 4.6%					
					20-year non-breast-cancer-related mortality (n=451)	Per 1 kg/m^2	0.98 (0.95 - 1.01)	
Jeon, 2014 [172], Catholic University of Korea, Korea, BMI - Excluded	Retrospective cohort study (n= 108)	Treatment 2005-2010 Follow up= 60.2 months	Invasive breast cancer, node-positive, no metastasis Mastectomy 38% Breast-conserving surgery 62% Any hormonal therapy 59.3%	BMI measured prior to surgery 12 and 24 months post-diagnosis weight change	Relapse-free survival (n=16)	≥25 vs 18.5-22.9 kg/m^2	1.0 (0.3 - 3.3)	Unadjusted
Ladoire S, 2014[181], PACS01 and PAC04 phase III BMI – Included, review	Secondary analysis of clinical trials (n=4996) Pre and Post-menopausal mean age:50.556.4% pre, 43.6% post	Follow Up: Median 5.9 years	Tumour grade Unknown: 3% 1: 12.3% 2: 45.1% 3: 39.7% Tumour size (mm): =50 mm: 6% Breast cancer subtypes: HER2+++:18% Triple negative: 12% RE or RP+ and HER2-: 70.1%. Treatment arm: Six FEC: 50.1% Three FEC+ three docetaxel: 20.2% Six (epirubicin + docetaxel): 29.8%	At baseline before initiation of chemotherapy treatment.	Disease free survival	>=30 vs <30kg/m^2	1.13 (0.93 -1.37) Ptrend=0.22	Age, trial, treatment arm, nodal status, size, grade, ER status, PR status, HER status
					Overall survival		1.27 (0.98- 1.63) Ptrend=0.069	
					Overall survival 6 FEC	≥ 30 vs < 30 kg/m^2	1.35 (1.02-1.78)	
					Overall survival 3 FEC + 3 docetaxel ou 6 (epirubicin + docetaxel)	≥ 30 vs < 30 kg/m^2	1.42 (1.06-1.31)	
					Disease-free survival 6 FEC	≥ 30 vs < 30 kg/m^2	1.17 (0.94-1.46)	
					Disease-free survival	≥ 30 vs < 30 kg/m^2	1.19 (0.95-1.50)	

					3 FEC + 3 docetaxel ou 6 (epirubicin + docetaxel)			
Lee SA, 2014[387], Korea BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=370), Pre-menopausal 64%, post-menopausal 36%	Diagnosed:2004-2007 follow Up: Median 4.2 years	Breast cancer TNM stage 0-I 44.7%, II 36.2%, III-IV 19.0%; ER positive 60.8%, PR positive 56.6%; histologic grade I-II 56.7%, III 43.3%; nuclear grade I-II 57.1%, III 42.9% Adjuvant chemotherapy 67.9%, radiotherapy 59.9%, hormone chemotherapy 66.1%	Medical records	Disease free survival (n=109.0)	>=25 vs <25 kg/m^2	1.03(0.63-1.70)	Age, ER status, histological grade, nuclear grade, PR status, TNM stage
McLaughlin VH, 2014 [312], Wisconsin In Situ Cohort (WISC), United States, BMI – Excluded	Prospective cohort study of cancer survivors (n= 162) Pre and Post-menopausal Age range: 20-74 years	Diagnosed 1997-2006 Follow up= 6.7 years 162 second breast cancer events of the 117 events confirmed via pathology report: 57 (49%) invasive and 60 (51%) were in situ	DCIS patients Ipsilateral mastectomy 30.8% Bilateral mastectomy 4.2%, BSC without radiation 9.1% BCS with radiation 42.9% Biopsy only 2.6%	Questionnaire, recalled information 1 year pre-diagnosis	Self-reported, 72% confirmed by pathology reports Second breast cancer (n=162)	Q3 vs Q1 kg/m^2	1.15 (0.52 - 2.13) P trend=0.21	Age at diagnosis, menopausal status, mode of detection, Treatment, postmenopausal hormone use, tamoxifen use, year of diagnosis, tumour size and grade, lifetime alcohol intake, remaining lifestyle factors
					Second breast cancer (n=162)	Per 1 kg /m^2	1.03 (0.97 - 1.1)	
					Second breast cancer (n=74) Pre-menopausal	Q3 vs Q1 kg/m^2	1.14 (0.33 - 3.92) P trend=0.44	
					Second breast cancer(n=74) Pre-menopausal	Per 1 kg /m^2	1.04 (0.95 - 1.13)	

					Second breast cancer (n=88) Post-menopausal	Q3 vs Q1 kg/m^2	1.21 (0.42 - 2.45) P trend=0.22	
					Second breast cancer (n=88) Post-menopausal	Per 1 kg/m^2	1.03 (0.94 - 1.12)	
					invasive breast cancer(n=57)	Q3 vs Q1 kg/m^2	1.34 (0.44 - 4.07) P trend=0.64	
					Second invasive breast cancer(n=57)	Per 1 kg /m^2	1 (0.9 - 1.11)	
					Second invasive breast cancer (n=24) Pre-menopausal	Q3 vs Q1 kg/m^2	0.5 (0.05 - 5.42) P trend=0.43	
					Second invasive breast cancer (n=24) pre-menopausal	Per 1 kg / m^2	0.95 (0.82 - 1.13)	
					Second invasive breast cancer (n=33) Post-menopausal	Q3 vs Q1 kg/m^2	2.39 (0.57 - 10.1) P trend=0.22	
					Second invasive breast cancer (n=33) Post-menopausal	Per 1 kg /m^2	1.03 (0.9 -1.18)	
Robinson PJ, 2014 [196], Bupa Health Foundation Health and Wellbeing after Breast Cancer Study (BUPA study), Australia,	Prospective cohort of cancer survivors (n= 1199, 1155 in analysis) Pre- and postmenopausal Mean age 58.4 years	2004-2006 Follow up= 5.6 years 98 events (78 recurrence or second primary breast cancer 20 breast cancer mortality)	HR+, HER2- invasive breast cancer	Self-reported, about BMI 9.4 months after diagnosis	Additional breast cancer events(n=98)	≥ 30-39.9 vs 25-29.9 kg/ m^2	1.71 (1.12 - 2.62)	Age, HRT use at diagnosis, type of surgery, stage, cancer type (Lobular/Ductal), radiotherapy, chemotherapy, oral adjuvant endocrine therapy.

BMI – Included, review	Recruited within 12 m of diagnosis							
Tait, 2014 [111], United States, BMI – Included, meta-analysis (mortality) Included, review (recurrence)	Retrospective cohort study (n= 448) Age range: 23-98 years Pre- and post-menopausal	Diagnosed: 2006 - 2010 Follow up= 40.1 months 154 deaths 136 recurrences	Triple-negative breast cancer	From records at diagnosis	All-cause mortality(n=154)	≥35 vs <25 kg/m^2	1.16 (0.70 - 1.90)	Tumour stage, chemotherapy
					Disease-free survival stage IV breast cancer	≥35 vs <25 kg/m^2	0.99 (0.63 - 1.57)	
Vici P, 2014[388], USA BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=106)	Follow Up: Median 28.8 months , Loss to Follow-up: 12.2%	HER2-positive breast cancer Trastuzumab	Other	Progression-free survival	Per kg m^2	1.02(0.89-1.18) P trend=0.743	Age at diagnosis, other factors, p53 mutation
Williams PT, 2014 [117], National Runners' and Walkers' Health Surveys (NRWHS), United States BMI – Included, meta-analysis	Population-based study (n= 986) Pre- and postmenopausal runners (n= 272) or walkers (n= 714) Caucasian 90.35%-100%	Recruited: 1998-2001 Follow up= 9.1 years 46 breast cancer deaths	Self-reported breast cancer, no other clinical and pathological information	Self-reported in questionnaire, average 7.9 years post-diagnosis	Breast cancer-specific mortality(n=46)	Per 1 kg/m^2	1.014 (0.953 - 1.070)	Age, race, exercise (runner vs walker)
Xiao Y, 2014[134], China	Female, Retrospective Cohort of Cancer Survivors	Diagnosed:2002-2006 follow Up: Median 70	Luminal-type breast cancer	Medical records	Luminal a Cancer specific mortality (n=127.0)	>=30 vs <25 kg/m^2	0.76(0.52-1.11) P=0.155	Age, cardiovascular comorbidity, chemotherapy, endocrine therapy,

BMI – Included, meta-analysis	(n=5785) , Cancer Diagnosis: 2002-2006	months						menopausal status, number of lymph nodes, other factors, stage
					Luminal b and high ki67 Cancer specific mortality (n=371.0)		1.04(0.85-1.29) P=0.695	Age, cardiometabolic abnormalities, chemotherapy, endocrine therapy, menopausal status, number of lymph nodes, other factors, stage
					Luminal b and her-2/neu+ Cancer specific mortality (n=172.0)		1.23(0.89-1.69) P=0.212	
Ampil F, 2013[389] USA BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=100) mean age:58.5	Follow Up: Median 96 months	Early stage breast cancer with tumor-free surgical margins; estrogen-positive 44%, progesterone-positive 42%, HER-2 neu-positive 19% Breast-conserving surgery and irradiation; adjuvant chemotherapy 53%	Medical records	Overall survival	≥35 vs <35 kg/m^2	Log rank P=0.02	
					Disease free survival		Log rank P=0.66	
					Recurrence		Log rank P=0.29	
					Local recurrence		Log rank P=0.99	
Asaga S, 2013[383], Japan BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=135) mean age:54 Premenopausal 57, postmenopausal 78 patients	Diagnosed:200-2009 (treatment)	Triple-negative breast cancer. 123 underwent both anthracycline (A) and taxane (T) containing (A+T) regimens, 5 patients had an A regimen only, and 7 patients had a T. 94 out of 123 patients (76%) receiving A+T regimens completed the scheduled treatment, 4 out of 5 patients (80%) given the A regimen and 6 out of 7 patients (86%) given the T regimen completed the treatment regimen regimen only.	Medical records	Cancer specific mortality (n=37)	>=25 vs <18.5 kg/m^2	0.70(0.20-3.27)	Unadjusted
					Disease free survival (n=41)		0.76(0.21-3.54)	

Biglia, 2013 [268], Italy, BMI - Excluded	Retrospective cohort study (n= 2148) Pre- and post-menopausal	Treatment: 1999-2009 Follow up= 60 months	Invasive breast cancer, no metastasis All underwent breast cancer surgery	BMI before surgery	Distant recurrence post-menopausal	Over/obese vs under/normal weight	Log rank P = 0.017	
Borgquist, 2013 [271], Breast Cancer and Blood cohort (BC Blood Study), Sweden, BMI - Excluded	Prospective cohort study (n= 634) Pre and post-menopausal Mean age:59.6 years	2002-2008 Follow up= 4.92 years	In situ 14 cases Invasive 620 cases ER+ 86.7% ER- 13.3% PR+ 69.4% PR- 30.6% Histological grade: I 157, II 308, III 126 cases	Measured at prior to surgery	Breast cancer haplotype TCAC		A significant interaction was observed between htSNP1 and BMI on disease-free survival (P interaction = 0.015).	
Chen Y, 2013[397], Shanghai Breast Cancer Survival Study (SBCSS), China BMI - Excluded	Female, Prospective Cohort of Cancer Survivors (n=4842) mean age:53.3 Pre and postmenopausal Chinese	Diagnosed:2002-2006 follow Up: Median 5.3 years , Loss to Follow-up: Not reported	Primary breast cancer. Stage 0-III.	FFQ Measured	Breast cancer recurrence (n=720)	Obese vs Non-morbidly obese kg/m^2	Being overweight/obese or not did not significantly modify the associations between menopausal symptoms experience and breast cancer recurrence P interaction=0.18-0.97	Age at diagnosis, comorbidity, education, er/pr status, marital status, number of parity, quality of life, tnm stage, treatment
Connor AE, 2013 [57], New Mexico Women's Health Study (NMWHS), New Mexico, United States, BMI – Included, meta-analysis	Follow-up of cases in case-control study (n= 577) Pre- and postmenopausal Mean age: 53.2 years Hispanic and non-Hispanic white Response rate in original study 73%	1992-1994 Follow up= 13 years 215 deaths 129 breast cancer deaths 87 non-breast cancer deaths	Invasive breast cancer	Self-reported in interview, median 193 days post-diagnosis (Gilliland, 2001, PMID11532786)	All-cause mortality (n=100) Hispanic	≥30 vs ≤24.9 kg/m^2	1.23 (0.71 - 2.12) P trend=0.47	Age, history of high blood pressure, history of stroke, smoking status, total METs, and total daily energy intake

					All-cause mortality (n=101) Non-Hispanic white	≥30 vs ≤24.9 kg/m^2	2.12 (1.15 - 3.90) P trend=0.03	
					Breast cancer-specific mortality (n=61) Hispanic	≥30 vs ≤24.9 kg/m^2	1.32 (0.64 - 2.74) P trend=0.50	BMI at age 18, total METs, duration of oestrogen use, breast cancer stage, total daily energy intake, and post–breast cancer diagnosis
					Breast cancer-specific mortality (n=59) Non-Hispanic white	≥30 vs ≤24.9 kg/m^2	2.07 (0.98 - 4.35) P trend=0.09	
					Non-breast-cancer deaths (n=37) Hispanic	≥30 vs ≤24.9 kg/m^2	2.18 (0.77 - 6.10) P trend=0.15	Age, history of high blood pressure, history of stroke, smoking status, total METs, and total daily energy intake
					Non-breast-cancer-deaths (n=41) Non-Hispanic white	≥30 vs ≤24.9 kg/m^2	2.65 (0.9 - 7.81) P trend=0.15	
Contiero, 2013 [155], Italy, BMI – Included, review	Retrospective cohort study (n= 1261) Pre- and post-menopausal	1996, 1999-2000 Follow up= 9.5 years 317 deaths 400 recurrences 107 loco-regional recurrences 293 distant metastases	Invasive breast cancer, no metastasis all 481 Stage I 564 stage II 216 stage III 836 PR+ 383 PR- 42 Unknown 965 ER+ 253 ER- 43 Unknown	From records	all-cause mortality(n=317)	≥25 vs <25 kg/m^2	1.16 (0.88 - 1.53)	menopausal status, estrogen receptor level, progesterone receptor level, stage, Age, fasting glucose

					Breast cancer recurrence(n=400)	≥25 vs <25 kg/m^2	1.38 (1.03 - 1.84)	
					Distant metastases(n=293)	≥25 vs <25 kg/m^2	1.49 (1.1 – 2.00)	
Crozier JA, 2013 [59], North Central Cancer Treatment Group trial (NCCTG) N9831, International BMI – Included, meta-analysis	Secondary analysis of clinical trial (n= 3017) Pre- and postmenopausal Age range: 18-82 116 patients loss to follow-up	Follow up= 5.3 years in disease-free women 360 deaths 292 breast cancer deaths 647 disease-related events	HER2+, early stage, lymph node-positive or high-risk lymph node-negative AC?P and either no trastuzumab, sequential trastuzumab, or concurrent trastuzumab	BMI prior to treatment calculated from body surface area (BSA) and weight obtained from records	Disease-free survival (n=647)	≥30 vs <25kg/m^2	1.28 (1.05 - 1.55) P trend=0.025	Stratified by HR status and lymph node status; adjusted for age and race
					Disease-free survival No trastuzumab	≥30 vs <25kg/m^2	1.11 (0.83-1.50) P trend = 0.54	
					Disease-free survival Sequential trastuzumab	≥30 vs <25kg/m^2	1.42 (1.00-2.01) P trend = 0.10 P interaction=0.24	
					Disease-free survival Concurrent trastuzumab	≥30 vs <25kg/m^2	1.23 (0.84-1.81) P trend = 0.54 P interaction not significant=0.69	
					Distant disease-free survival (n=136)	≥31.1 vs ≤23.2 kg/m^2	1.15 (0.85 - 1.57) P trend=0.66	Age, tumour stage, tumour grade, hormone receptor status, adjuvant

								chemotherapy, hormonal therapy
Gennari A, 2013 [70], Eastern Cooperative Oncology Group Performance Status (ECOG-PS) Italian trials, Italy, BMI – Included, meta-analysis	Secondary analysis of three clinical trials (n= 489) Pre- and postmenopausal Mean age: 57 years	2000-2005 Follow up= 18 months 218 deaths 385 progressions	Metastatic breast cancer Metastatic site: Viscera 57% Non-viscera 43% HR+ 52% HR- 23% HR status unknown 26%	From record, height and weight prior to treatment	Overall survival(n=218)	≥30 vs <25 kg/m^2	1.05 (0.73 - 1.49) P trend=0.8	Age, menopausal status, WHO performance status, hormonal status, site, and number of metastases and trial
					Progression-free survival (n=385)	≥30 vs <25 kg/m^2	0.91 (0.69 - 1.19) P trend=0.3	
Gnant, 2013 [291], ABCSG-06a, United States, BMI - Excluded	Retrospective cohort study (n= 634) Post-menopausal mean age:66.4	Follow up= 73.2 months	Hormone-receptor positive breast cancer	From records, prior to extended hormone therapy	Overall survival	≥ 25 vs 18.4-24.9 kg/ m^2	0.77 (0.49 - 1.28)	Age, Nodal status, Tumor grade, Tumor stage, ER/PR status,
					Disease-free survival	≥ 25 vs 18.4-24.9 kg/ m^2	0.89 (0.55 - 1.12)	
					Distant recurrence-free survival	≥ 25 vs 18.4-24.9 kg/ m^2	1.29 (0.61 - 2.76)	
					Overall survival 3-year Anastrozole	≥ 25 vs 18.4-24.9 kg/ m^2	0.71 (0.27-1.86)	
					Overall survival No treatment	≥ 25 vs 18.4-24.9 kg/ m^2	0.67 (0.34-1.35)	
					Disease-free survival 3-year Anastrozole	≥ 25 vs 18.4-24.9 kg/ m^2	1.27 (0.65-2.46)	

					Disease-free survival No treatment	≥ 25 vs 18.4-24.9 kg/ m^2	0.68 (0.42-1.10)	
					Distant recurrence-free survival 3-year Anastrozole	≥ 25 vs 18.4-24.9 kg/ m^2	3.41 (0.74-15.75)	
					Distant recurrence-free survival No treatment	≥ 25 vs 18.4-24.9 kg/ m^2	0.79 (0.33-1.97)	
					Overall survival; treated or not treated		P interaction= 0.17	
Hartog H, 2013[135], Netherlands BMI – Included, meta-analysis	Female, Prospective Cohort of Cancer Survivors (n=582) mean age:56.8Pre-menopausal 29%, post-menopausal 71%	Average follow up=5.5 years	Breast cancer pathological T stage T1 61%, T2 31%, T3 3%, T4 2%; grade I 25%, II 48%, III 27%; distant metastasis 1% Radiotherapy 83%, chemotherapy 27%, hormonal therapy 27%	Self-reported	Overall survival (n=36)	Per 1 kg m^2	1.03(0.95-1.10) P trend=0.5	Age, distant metastasis, hormonal therapy, igfbp3, oc use, radiotherapy, tumor grade, tumor size
Hou, 2013 [75], Tianjin Medical University Study, China, BMI – Included, meta-analysis	Retrospective cohort study (n= 5634) age range: 35-65 years Pre and post-menopausal	Median follow up= 68 months (10-120 months) 1,424 patients died of breast cancer	Invasive breast cancer	From records	Breast cancer survival (n=5634) 5-year survival estimate	>30 vs <25 kg/m^2	0.96 (0.84-1.10)	Age, menopausal status, pT stage, lymph nodes, vessel carcinoma embolus, ER status, PR status, HER2 status, cardio-cerebrovascular complications, (non)metformin-treated, chemotherapy regimen
Jiralerspong, 2013 [79], MD	Retrospective cohort study (n=	Treatment 1996-2005 Follow up=	Invasive breast cancer, Stage I/II 93%, III 7%	No description	Overall survival	≥30 vs <25 kg/m^2	1.24 (1.04 - 1.48)	Age, race, diabetes status, comorbidity,

Anderson Cancer Center (MDACC), Texas Review Study, United States, BMI – Included, meta-analysis	6342) mean age:53 years Pre- and post-menopausal	5.4 years 1175 recurrences, 951 deaths, with 673 deaths due to breast cancer	ER+/PR+ 77% ER and PR- 23% HER2+ 21% HER2-79% Chemotherapy: 56% (41% anthracycline-based, 50% taxane-based) Endocrine therapy: 63% (46% tamoxifen, 29% AI, 25% both)					stage, nuclear grade, ER or PR status, adjuvant chemotherapy, adjuvant endocrine therapy
					Breast cancer-specific mortality	≥30 vs <25 kg/m^2	1.23 (1.00 - 1.52)	
					Recurrence-free survival	≥30 vs <25 kg/m^2	1.13 (0.98 - 1.31)	
Kaviani A, 2013[249], Iran BMI – Included, review	Female, Retrospective Cohort of Cancer Survivors (n=646) mean age:49.62 (n): Per-menopause 324, Post-menopause 322.	Diagnosed:2003-2011. Follow Up: Median 1.92 years	Breast cancer. Estrogen receptor (n): Negative 99, Positive 210, Unknown 15. Progesterone receptor (n): Negative 104, Positive 187, Unknown 33. HER2 (n): Negative 121, Positive 108, Unknown 95. Not reported.	Medical records	Disease free survival	>=30 vs <25 kg/m^2	3.32(1.23-9.02)	Estrogen receptor status, tumor size
Kim JY, 2013[398], South Korea BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=313) Postmenopausal	Diagnosed:Treatment: 2006-2008 follow Up: Median 52 months , Loss to Follow-up: Not	Invasive breast cancer. Histologic grade 1 or 2 131, grade 3 153, unknown 29. ER+ 190, ER- 123. PR+ 133, PR-180. HER2/neu status+	Medical records	Estrogen receptor positive Metastasis-free survival (n=7)	≥23 vs <23 kg/m^2	1.22(0.52-2.86) P=0.64	Unadjusted

		reported	45, - 246, unknown 22. Surgery (n): Conservation 175, mastectomy 138. (Adjuvant) Chemotherapy yes 182, no 131. Radiotherapy (n) yes 180, no 133. Hormonal therapy (n) SERM 36, AI 137, switch 14, no 3.		Estrogen receptor negative Metastasis-free survival (n=15)		1.02(0.37-2.82) P=0.97	
Kneubil, 2013 [303], Italy, BMI - Excluded	Retrospective cohort study (n=1742) mean age:46 years	Treatment: 1997-2006 Follow up= 74 months	Invasive breast cancer ER+ 80.2% ER- 19.8% PR+ 67.9% PR- 32.1% All underwent mastectomy No radiotherapy 61.4% IORT radiotherapy 25.1% Standard radiotherapy 13.5%	From records	Locoregional recurrence(n=121)	≥25 vs <25 kg/m^2	1.66 (1.06 - 2.59)	Age, subsite, hormonal receptor or status, radiotherapy
Loehberg, 2013 [310], Germany, BMI - Excluded	Retrospective Study (n= 467) Mean age:58.7 years	1995-2010 Follow up= 1.5 years	Invasive metastatic breast cancer, diagnosed at any time after the primary diagnosis (liver 14.6%, lung 6.2%, bone 24.1%, multiple sites 26.3 %, other sites 25.0 %) Adjuvant chemotherapy 59.5 % Adjuvant endocrine therapy 54.5%	No description	Overall survival(n=373)	≥28 vs <23 kg/m^2	P log-rank test =0.02	Unadjusted
Mazzarella, 2013 [94], European Institute of Oncology (EIO),	Retrospective cohort study (n= 1250) Pre and post-menopausal	Clinical data from 1995 to 2005 Follow up= 8.2 years	Invasive breast cancer Grade 1-2: 29.3% Grade 3: 67.7% Conservative surgery 69.7%, mastectomy 30.3% Radiotherapy 74.1%, chemo 41.4%,	Measured during operation period	Overall survival ER positive	≥30 vs< 25 kg/m^2	1.05 (0.53 - 2.09)	Age, pT, grade, ER, pN, menopause, PVI, surgery

BMI – Included, meta-analysis			hormonotherapy 16.1%, chemo and hormo 33.3% Anthracycline-containing regimen 75.4%					
					Overall survival ER negative	≥30 vs< 25 kg/m^2	1.79 (1.03 - 3.1)	
					Disease-free survival ER positive	≥30 vs< 25 kg/m^2	0.75 (0.43 - 1.31)	
					Disease-free survival ER negative	≥30 vs< 25 kg/m^2	1.34 (0.84 - 2.13)	
					Locoregional recurrence ER positive	≥30 vs< 25 kg/m^2	0.38 (0.09 - 1.57)	
					Locoregional recurrence ER negative	≥30 vs< 25 kg/m^2	0.37 (0.09 - 1.55)	
					Distant metastases ER positive	≥30 vs< 25 kg/m^2	0.81 (0.36 - 1.84)	
					Distant metastases ER negative	≥30 vs< 25 kg/m^2	2.03 (1.13 - 3.63)	
Minicozzi, 2013 [413], Italy BMI - Excluded	Retrospective cohort study (n=1,607) Age 15-99 years	Diagnosed: 2003-2005 Followed until 2008	Stage T1-3N0M0 45% to M1 6% Chemotherapy 55% Endocrine therapy 66%	BMI from records, 3 months before diagnosis up to hospital admission for surgery	5-year breast cancer-specific mortality ER+PR+ ER-PR-	>27.3 vs 23.5-27.3 kg/m^2 >27.3 vs 23.5-27.3 kg/m^2 >27.3 vs 23.5-27.3 kg/m^2	1.30 (0.79-2.12) 2.90 (1.22-6.91) 0.77 (0.34-1.75)	Age, fasting blood glucose, stage, hormone receptor status, chemotherapy and endocrine therapy

Mowad, 2013 [190], United States, BMI – Included, review	Retrospective cohort study (n= 183) Mean age:49.8 years	Treatment: 1998-2011 Follow up= 42.5	Invasive TNBC Excluded stage 4	From records at diagnosis	all-cause mortality(n=37)	≥30 vs< 25 kg/m^2	1.36 (0.77 - 2.42)	Age at diagnosis, race, tumor grade, T stage, N stage, postmastectomy radiotherapy
					Disease-free survival(n=61)	≥30 vs< 25 kg/m^2	1.01 (0.67 - 1.52)	Unadjusted
Natori A, 2013[391], USA, Japan BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=406) Post-menopausal 52% Mostly White	Diagnosed:2003-2009 follow Up: Median 3.1 years	Inflammatory breast cancer; nuclear grade 1 1%, 2 22%, 3 68%; ER negative 51%, PR negative 65%, HER2 positive 31% SLIH: chemotherapy 77.3%, surgery 90.9%, radiotherapy 59.1% MDA: chemotherapy 72.4%, surgery 92.4%, radiotherapy 76.6%	Medical records	Overall survival	>=30 vs <25 kg/m^2	0.60(0.40-0.90)	Unadjusted
Pajares B, 2013 [102], GEICAM/9906, 9805, 2003-02, and BCIRG 001, International, Spain, BMI – Included, meta-analysis	Pooled analysis of 4 clinical trials (n= 5683) Pre- and postmenopausal Age range: 20-76 years 98% Caucasian	1996-2008 Follow up of patients alive at time of analysis = 93.4 months 818 deaths 664 breast cancer deaths 1047 recurrence	Invasive breast cancer Chemotherapy: anthracyclines and taxane 2% of obese patients received adjusted dosage Overall under-treatment: Non-obese 9.4% Obese 13.2% Severely obese 16.5%	Measured prior to adjuvant treatment	10-year overall mortality (n=818)	35 vs 18.5-24.9 kg/m^2	1.35 (1.06 - 1.72)	Age, clinical trial, treatment regimen, menopausal status, pathologic primary tumour size, histological grade, type of surgery, HER2 status, overall under-treatment (received a dose lower than 85% of the standard dose)

					10-year overall mortality No undertreated	35 vs 18.5-24.9 kg/m^2	1.3 (1.0-1.7)	
					10-year overall mortality Undertreated	35 vs 18.5-24.9 kg/m^2	1.7 (0.9-3.1)	
					10-year overall mortality Hormone therapy	35 vs 18.5-24.9 kg/m^2	1.3 (1.0, 1.8)	
					10-year overall mortality No hormone therapy	35 vs 18.5-24.9 kg/m^2	1.5 (1.1, 2.2)	
					10-year breast cancer mortality(n=664)	35 vs 18.5-24.9 kg/m^2	1.32 (1.00 - 1.74)	
					10-year breast cancer mortality No undertreated	35 vs 18.5-24.9 kg/m^2	1.4 (1.0-1.8)	
					10-year breast cancer mortality Undertreated	35 vs 18.5-24.9 kg/m^2	1.3 (0.6-2.8)	
					10-year breast cancer mortality Hormone therapy	35 vs 18.5-24.9 kg/m^2	1.4 (0.9-2.0)	
					10-year breast cancer mortality No hormone therapy	35 vs 18.5-24.9 kg/m^2	1.4 (0.9-2.2)	
					10-year breast cancer recurrence (n=1047)	35 vs 18.5-24.9 kg/m^2	1.25 (0.99 - 1.57)	

					10-year breast cancer recurrence No undertreated	35 vs 18.5-24.9 kg/m^2	1.3 (1.0-1.6)	
					10-year breast cancer recurrence Undertreated	35 vs 18.5-24.9 kg/m^2	1.4 (0.7-2.5)	
					10-year breast cancer recurrence Hormone therapy	35 vs 18.5-24.9 kg/m^2	1.2 (0.9-1.7)	
					10-year breast cancer recurrence No hormone therapy		1.7 (1.1-2.4)	
Pande Mala, 2013[390], Early Stage Breast Cancer Repository cohort, USA BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=1029) , Cancer (n): Premenopausal 380, Postmenopausal 640, Missing 9. Mostly white	Diagnosed:1985-2000 (treated) follow Up: Median 9.5 years	Unilateral Breast cancer. Stage (n): I 308, II 721. ER/PR (n): Positive 744, Negative 251, Missing 34. Surgery (n): Excision 370, Mastectomy 659. Radiation (n): Yes 435, No 590, Missing 4. Chemotherapy (n): Yes 541, No 483, Missing 5. Hormone therapy (n): Yes 460, No 564, Missing 5.	Measured	Disease free survival (n=266)	Obese vs Normal	0.91(0.67-1.24) P=0.54	Estrogen receptor status, tumor size
Perez, 2013 [319], United States BMI - Excluded	Retrospective cohort study (n= 704) Post-menopausal Mean age:55 years	1999-2007 Follow up= 51 months	TNBC Stage I-III T1mic/T1: 68% T2/T3: 32% N0:71%; N1mic: 8%; N1:15%; N2/N3: 6%. Chemotherapy: 79% Adjuvant radiation: 85% Lumpectomy boost: 92% Axillary radiation: 3% SCV radiation: 11%	From records	Overall survival(n=111)	≥25 vs 18.5-<24.9 kg/m^2	P = 0.963	Unadjusted

					Locoregional recurrence(n=55)	≥25 vs 18.5-<24.9 kg/m^2	P = 0.740	Unadjusted
					Distant recurrence(n=61)	≥25 vs 18.5-<24.9 kg/m^2	P = 0.840	Unadjusted
Pfeiler G, 2013 [104], ABCSG-06, Austria, BMI – Included, meta-analysis	Secondary analysis of clinical trial (n= 1509) Age range: 41-80 years Postmenopausal	Recruitment:1990 -1995 Follow up= censored at 60 months 162 deaths 101 breast cancer deaths 61 non-breast cancer deaths 431 disease-free survival events 162 distant recurrence 22 patients loss to follow-up	Stage I or II invasive ER+ and/or PR+ breast cancer Tamoxifen with or without aminoglutethimide	From records, prior to hormone therapy	Overall survival(n=162)	≥30 vs 18.5-24.9 kg/m^2	1.81 (1.12 - 2.91)	Age, stage, treatment, nodal status, grade, ER and PR status
					Overall survival Tamoxifen	≥30 vs 18.5-24.9 kg/m^2	1.41 (0.71 - 2.77)	
					Overall survival Tamoxifen + aminogluthtetimide	≥30 vs 18.5-24.9 kg/m^2	2.28 (1.16 - 4.51)	
					Disease-free survival(n=431)	≥30 vs 18.5-24.9 kg/m^2	1.45 (1.03-2.02)	

					Disease-free survival Tamoxifen	≥30 vs 18.5-24.9 kg/m^2	1.15 (0.70 - 1.87)	
					Disease-free survival Tamoxifen + aminogluthtetimide	≥30 vs 18.5-24.9 kg/m^2	1.78 (1.12 - 2.83)	
					Distant recurrence-free survival(n=162)	≥30 vs 18.5-24.9 kg/m^2	1.79 (1.11 - 2.87)	
					Distant recurrence-free survival Tamoxifen	≥30 vs 18.5-24.9 kg/m^2	1.31 (0.66 - 2.60)	
					Distant recurrence-free survival Tamoxifen + aminogluthtetimide	≥30 vs 18.5-24.9 kg/m^2	2.43 (1.25 - 4.70)	
Turkoz FP, 2013 [206], Turkey, BMI - Excluded	Retrospective cohort of cancer survivors (n= 733) Premenopausal	2001-2011 Follow up= 29 months	Nonmetastatic invasive breast cancer Chemotherapy: 89.6%	BMI at admission	Breast cancer-specific mortality(n=157)	≥ 30 vs 18.5-25 kg/ m^2	1.8 (1.2 - 2.7) P =0.006	Unadjusted
					Breast cancer-specific mortality Luminal	≥ 30 vs 18.5-25 kg/ m^2	1.5 (1 - 2.2) P =0.27	Unadjusted
					Breast cancer-specific mortality Triple-negative	≥ 30 vs 18.5-25 kg/ m^2	1.4 (1.0-2.1) P =0.04	Age, tumor size, nodal involvement, grade, lymphovascular invasion, hormone receptor status, extracapsular extension

					Breast cancer-specific mortality Her2-overexpressing	≥ 30 vs 18.5-25 kg/ m^2	1.4 (1.1 - 2.1) P =0.07	Unadjusted
					Breast cancer recurrence(n=236)	≥ 30 vs 18.5-25 kg/ m^2	1.5 (1.1 - 2.1) P =0.02	Unadjusted
					Breast cancer recurrence Triple-negative	≥ 30 vs 18.5-25 kg/ m^2	1.4 (1 - 2) P =0.04	Unadjusted
					Breast cancer recurrence Her2-overexpressing	≥ 30 vs 18.5-25 kg/ m^2	1.5 (1 - 2.1) P =0.03	Unadjusted
Xing P, 2013[250], China BMI – Included, review	Female, Retrospective Cohort of Cancer Survivors (n=1192) mean age:51Pre-menopausal 61.2%, post-menopausal 38.8% Chinese	Follow Up: Median 36 months , Loss to Follow-up: 4.3%	Breast cancer pathologic T stage T1 36.6%, T2 56.0%, T3 5.9%, T4 1.5%; nodal stage N0 54.4%, N1 24.0%, N2 12.0%, N3 9.6%; ER status positive 54.7%, negative 45.3%; PR status positive 58.4%, negative 41.6%; HER2 status positive 21.8%, negative 78.2% Curative resection; breast-conserving surgery 3.6%, mastectomy 96.4%; chemotherapy 88.4%, radiotherapy 21.4%, hormone therapy 43.0%	Measured	Overall survival (n=122)	>=23 vs <23 kg/m^2	1.84(1.16-2.93) P=0.010	Age, chemotherapy, er status, hormone therapy, menopausal status, nodal status, other factors, pr status, radiotherapy, smoking, tumor stage
					Disease free survival (n=120)		1.96(1.29-2.97) P=0.002	
					Hormone receptor +ve Overall survival		2.37(1.28-4.09) P=0.004	
					Hormone receptor +ve Disease free survival		4.61(1.88-11.53) P=0.001	
Zheng Z, 2013[251], China BMI – Included, review	Female, Retrospective Cohort of Cancer Survivors (n=317) mean age:53	Diagnosed:2004-2006 follow Up: Median 55.4 months	Breast cancer. ER/PR status (n): 195 Positive, 122 Negative. Adjuvant radiotherapy (n): 142 Yes, 175 No. Adjuvant	Medical records	Overall survival	≥28 vs ≤23.9 kg/m^2	1.54(1.04-2.29)	Adjuvant endocrine therapy, ER/PR status, lymph node metastasis , radiotherapy, tumor size
					Disease free survival		1.31(1.04-1.65)	

	(n): 165 Menopause Chinese	Diagnosed:2004-2006 follow Up: Maximum 7 years	endocrine therapy (n): 168 Yes, 149 No.		ER/PR positive Overall survival ER/PR negative Overall survival		1.18(0.60-2.33) 2.20(1.34-3.61)	
Barba M, 2012[136], Regina Elena National Cancer Institute (RENCI), Italy BMI – Included, meta-analysis	Mixed, Retrospective Cohort of Cancer Survivors (n=202) Mean age:53.4, Premenopausal 137, Postmenopausal 160.	Diagnosed:1998-2009	Colorectal cancer (n): 218. Breast cancer (n): 202. Stage at cancer diagnosis (n): I 86, II 4, III 12, IV 169. Targeted agents: Trastuzumab for breast cancer patients. Bevacizumab and/or cetuximab for colorectal cancer patients.	Medical records	Breast cancer Time to progression	Per 1 kg/m^2	0.92(0.80-1.06) P trend=0.276	Age at diagnosis, fasting glucose
Bayraktar S, 2012 [266], UTMDACC, United States, BMI - Excluded	Retrospective cohort of cancer survivors (n= 1448) Pre- and postmenopausal Age range:21-87 years	Treatment: 1995-2007 Follow up= 62 months 535 deaths 559 distant metastasis-free survival events 647 recurrence-free survival events	Invasive TNBC T1: 49.4% T2: 44.5% T3/4: 6.1% Breast-conserving surgery 51% Mastectomy 49% All received adjuvant chemotherapy None received adjuvant endocrine therapy	Unclear, possibly at or around treatment	5-year survival (n=492)	Obese vs Normal/ underweight	P log-rank test = 0.33	Unadjusted
				Unclear, possibly at or around treatment	Recurrence free survival (n=601)	Obese vs Normal/ underweight	P log-rank test = 0.65	Unadjusted
				Unclear, possibly at or around treatment	Distant metastasis-free survival (n=520)	Obese vs Normal/underweight	P log-rank test = 0.73	Unadjusted
Brooks JD, 2012 [275], Women's Environmental Cancer and Radiation Epidemiology	Nested case-control study (n= 1510) Pre- and postmenopausal	1985-2000 Follow up= 4 years	49.8% ER+ve, 25.9% ER-ve, 24.2% other, 42% PR+ve, 23.3% PR-ve, 34.7% other In situ or invasive breast cancer; 65.3% localized, 34.7%	Self-reported	Second primary breast cancer (n=247) Pre-menopausal	≥30 vs <25 kg/m^2	1.12 (0.56 - 2.23)	Age at diagnosis, age of menarche, number of full-term pregnancies, family history, histology, tumour stage, chemotherapy,

Study (WECARE), United States and Denmark, BMI - Excluded	Mean age: 45 years		regional Chemotherapy: 44.3% yes, 55.7% no; Hormone treatment: 70.7% yes, 29.2% no; Radiation treatment: 70% ever, 30% never					hormonal therapy, radiation therapy
					Second primary breast cancer (n=264) Post-menopausal	≥30 vs <25 kg/m^2	1.59 (0.79 - 3.17)	
					Second primary breast cancer (n=108) Premenopausal ER+	≥30 vs <25 kg/m^2	0.86 (0.29 - 2.58) P trend=0.85	
					Second primary breast cancer (n=67) Premenopausal ER-	≥30 vs <25 kg/m^2	2.68 (0.79 - 9.11) P trend=0.26	
					Second primary breast cancer (n=136) Postmenopausal ER+	≥30 vs <25 kg/m^2	0.94 (0.39 - 2.3) P trend=0.40	
					Second primary breast cancer (n=72) Postmenopausal ER-	≥30 vs <25 kg/m^2	5.64 (1.76 - 18.13) P trend=0.30	
Christiansen, 2012 [56], Georgia Cancer Specialist Database (GCSD), United States, BMI – Included, meta-analysis	Retrospective cohort study (n= 209) Pre and Post-menopausal	Diagnosis year: 2003-2008 median follow up= 11.4 years	Invasive breast cancer non metastatic triple negative breast cancer stage I-III adjuvant chemotherapy	From records	Disease-free survival	Per 1 kg/m^2	0.93 (0.864-1.001) P=0.0517	Race, age, comorbidity, stage smoking

					Breast cancer recurrence	Per 1 kg/m^2	0.93 (0.860-1.005) P=0.068	
Crujeiras, 2012 [282], Spanish Oncology Department Review Study, Spain, BMI - Excluded	Retrospective cohort study (n= 159) Pre- and postmenopausal mean age:59.8	Diagnosis year: Jan2006-Dec2006 Follow up= 3 years	All invasive breast cancer	From records	Breast cancer-specific mortality(n=18)	≥30 vs <25 kg/m^2	P log-rank test = 0.77	Unadjusted
Dawood , 2012 [62], MD Anderson Cancer Center (MDACC), Texas Review Study, United States, BMI – Included, meta-analysis	Retrospective cohort study (n= 2311) Pre- and postmenopausal	Diagnosis year: 1990-2010 Follow up= 39 months	All invasive breast cancer	From records at diagnosis	Overall survival(n=753)	≥30 vs <25 kg/m2	0.97 (0.81 - 1.16)	Age, race, tumour stage, lymphovascular invasion, adjuvant radiation, taxane, anthracycline
					Recurrence-free(n=874)	≥30 vs <25 kg/m2	1.02 (0.86 - 1.2)	
					Distant disease free(n=771)	≥30 vs <25 kg/m2	0.99 (0.83 - 1.18)	
Del Fabbro E, 2012[392], USA BMI - Excluded	Female, Follow-up of Case-control Study (n=129)	Diagnosed:200-2004 (treated) follow Up: Median 7.74 years	Nonmetastatic, invasive ductal or lobular noninflammatory breast cancer. Stage I-III	Registry database	Overall survival (n=21) Progression-free survival (n=21)	Above normal vs normal weight	"Sarcopenia and BMI were not significantly associated with the OS time" 5-year rates P =0.0389	Age at diagnosis, fasting glucose
Ewertz , 2012 [68], Breast International Group (BIG) 1-98, International, BMI – Included, meta-analysis	Secondary analysis of clinical trial (n= 4760) Postmenopausal Age range: 38-90 years	1998-2003 Median 1.3 months from diagnosis to randomisation Follow up= 8.7 years	Early stage invasive ER+ and/or PR+ breast cancer 2382 patients received letrozole, 2378 patients received tamoxifen	BMI at randomisation, before start of adjuvant endocrine treatment	Overall survival (n=829)	≥30 vs <25kg/m^2	1.19 (0.99 - 1.44)	Age at randomization, region, nodal status, tumour grade, tumour size, radiotherapy, mastectomy, oestrogen and progesterone receptor status, HER-2/neu, hormonal therapy, diabetes,

		829 deaths 1272 disease-free-survival related events						smoking, hypertension, randomisation arm, chemotherapy
					Overall survival Letrozole	≥30 vs <25kg/m^2	1.22 (0.93 - 1.60)	
					Overall survival Tamoxifen	≥30 vs <25kg/m^2	1.18 (0.91 - 1.52) P interaction = 0.74	
					Disease-free survival (n=1272)	≥30 vs <25kg/m^2	1.09 (0.94 - 1.27)	
					Disease-free survival Letrozole	≥30 vs <25kg/m^2	1.09 (0.87 - 1.35)	
					Disease-free survival Tamoxifen	≥30 vs <25kg/m^2	1.10 (0.89 - 1.35) P interaction = 0.89	
					Breast cancer-free survival(n=815)	≥30 vs <25kg/m^2	1.01 (0.84 - 1.23)	
					Breast cancer-free survival Letrozole	≥30 vs <25kg/m^2	1.03 (0.78 - 1.36)	
					Breast cancer-free survival Tamoxifen	≥30 vs <25kg/m^2	0.99 (0.75 - 1.29) P interaction = 0.60	
					Distant recurrence-free survival(n=625)	≥30 vs <25kg/m^2	1.16 (0.94 - 1.44)	
					Distant recurrence-free survival Letrozole	≥30 vs <25kg/m^2	1.21 (0.88 - 1.66)	

					Distant recurrence-free survival Tamoxifen	≥30 vs <25kg/m^2	1.11 (0.82 - 1.50) P interaction = 0.92	
Goodwin PJ, 2012 [72], Toronto, Canada, BMI – Included, meta-analysis	Prospective cohort study of cancer survivors (n= 535) Pre- and postmenopausal Mean age: 50.3 yeares Multi-ethnic Excluded women with serious coexisting medical conditions including diabetes	1989-1996 Follow up= 12.1 years 134 deaths 113 breast cancer deaths 21 deaths from other causes 40 locoregional recurrences 136 distant recurrences 4.3% loss to follow-up	Invasive breast cancer T1 55.5%, T2 32.5%, T3 5%, Tx 6.9% N0 69.2%, N1 30.8% M0 ER+ 67.7% ER- 18.7% Unknown 13.6% PR+ 61.7% PR- 23.4% Unknown 15% Mastectomy: 22.8% Lumpectomy: 77.2% Chemotherapy: 39.8% Hormone therapy: 39.1%	Measured height and weight before chemotherapy	Overall survival (n=134)	27.8-54.8 vs 21.9-24.4 kg/m^2	1.19 (0.89 – 1.61)	Age, Tumour stage, Tumour grade, Hormone receptor status, Adjuvant chemotherapy, Hormonal therapy
					Distant disease free(n=134)	27.8-54.8 vs 21.9-24.4 kg/m^2	1.15 (0.85 – 1.57)	
Haakinson, 2012 [166], Mayo Clinic Arizona Review Study, United States, BMI – Included, review	Retrospective cohort study (n= 1352) Pre- and postmenopausal mean age:66	Diagnosis year: 2000-2008 Follow up= 2.5 years	All invasive breast cancer	From records	Overall survival	≥30 vs <30 kg/m^2	1.530 (0.965 - 2.431)	Node status, tumour size, tumour stage
He, 2012 [168], MD Anderson Cancer Center (MDACC), Texas Review	Retrospective cohort study (n= 1983)	Treatment: 1998-2010 Follow up= 47.6 months	Invasive breast cancer Stage II-IV HER2+ Diabetics	From records at first clinic visit	Overall survival	≥35 vs 20-24.9 kg/m^2	0.73 (0.55 - 0.97)	Age, Race, Diabetes, Tumor grade, Hormone receptor status, Tumor stage, Treatment

Study, United States, BMI – Included, review	Pre- and postmenopausal Age range:21-89 years Loss to follow up: 2%		with antidiabetic medications 154 women Non-diabetics 1,829 women					
					Overall survival Diabetic	≥30 vs 20-<30 kg/m^2	0.59 (0.32 - 1.09)	Age, Hormone receptor status, Tumor stage, Treatment
					Breast cancer-specific mortality Diabetic	≥30 vs 20-<30 kg/m^2	0.64 (0.33 - 1.23)	
Jung, 2012 [81], University of Pittsburgh Medical Center (UPMC) and the University of Pittsburgh Cancer Institute (UPCI) Breast Cancer Project, United States BMI – Included, meta-analysis	Retrospective cohort study, hospital clinic-based (n= 557) mean age: 55 years post-menopausal,	Diagnosis year: 1999-2008 Follow up= 9 years	Invasive breast cancer 73.2% ER/PR+, 26.8% ER/PR- Metastatic breast cancer; 34.5% HER2+, 65.5% HER2-, and metastatic at only one site (69.8%)	From records at study entry	Overall survival(n=403)	≥30 vs 20-24.9 kg/m^2	0.85 (0.63 - 1.16)	Age, menopausal status, hypertension, comorbidity, Heart failure, chronic pulmonary disease, mild liver disease, diabetes, receptor status, metastasis-free survival, metastasis location, race, education
Kawai, 2012 [82], Miyagi, Japan, BMI – Included, meta-analysis	Prospective cohort study of cancer survivors (n= 653) Pre- (42.4%) and postmenopausal (54.2%) Mean age: 57 years Response rate 92.5%	1997-2005 Follow up= 5.85 years 136 deaths 108 breast cancer deaths Complete follow-up	In situ or localised 39.2% Lymph node metastasis 35.7% Local invasion 8.7% Distant metastasis 3.1% Unknown 13.3% ER+ or PR+ 62.8% ER-/PR- 26.6% Unknown HR status 10.6%	Validated self-reported pre-treatment height and weight	All-cause mortality(n=136)	≥25.8 vs 21.2-23.2 kg/m^2	1.46 (0.87- 2.44) P trend=0.59	Age, tumour stage, hormone receptor status, radiation therapy, chemotherapy, hormonal therapy, smoking, physical activity, menopausal status, family history of breast cancer, comorbidities (hypertension, ischemic heart disease, stroke and diabetes mellitus)

			Radiation therapy 18.7% Chemotherapy 23.7% Endocrine therapy 24.5% Comorbidities 23.6%					
					Breast cancer-specific mortality(n=108)	≥25.8 vs 21.2-23.2 kg/m^2	1.46 (0.81 - 2.64) P trend=0.87	
Lee, 2012 [86], Seoul National University Hospital, Korea, BMI – Included, meta-analysis (breast cancer mortality) Excluded (recurrence)	Retrospective cohort study (n= 438) mean age:45.3 years Pre and Post-menopausal	Diagnosis year: 1994-2008 Follow up= 35.4 months, 112 (25.6%) recurrent patients, and 49 (11.2%) patients died.	Invasive breast cancer Clinical stage IIA 4.3% IIB 17.8%, IIIA 47.5%, IIIB 15.3%, IIIC 13.9%, Unknown 1.1% 47.9% ER+ 52.1% ER- 32.9% PR+ 67.1%PR- Neoadjuvant regimen DA 95% AC 7.5% PGH 3.4% Others 4.6% Radiation therapy 85.8% Hormonal therapy 45.2%	Measured	Breast cancer mortality	≥30 vs <25 kg/m^2	0.810 (0.107 - 6.137) P trend=0.172	Age, stage, hormonal receptor status
					Breast cancer mortality	Per 1 kg/m^2	1.002 (0.918 - 1.095)	Age
					Relapse-free survival	Per 1 kg/m^2	0.995 (0.938 - 1.05)	Unadjusted
Lee, 2012 [307], Korea, BMI - Excluded	Retrospective cohort study (n= 980)	2004-2007 Follow up= 5.3 years 141 disease-free survival events	Invasive ductal carcinoma TNM I 40.1% TNM II 42.5%	BMI interview at baseline	Disease-free survival (n=141)	>25 vs <25 kg/m^2	0.79 (0.52 - 1.20)	Age, TNM stage, hormonal receptor status, grade,

	Pre- and postmenopausal	including 77 deaths	TNM III 16.7% ER- 39.2% pPR- 44.2%					education, Recruitment site
Markkula, 2012 [311], Sweden, BMI – Excluded	Prospective cohort study (n= 772) Pre and post-menopausal Mean age:61.2 years	2002-2010 Follow up= 7 years 62 breast cancer events	In situ 28 cases Invasive 739 cases ER+ 86.8% PR+ 69.3% Grade I 191 cases II 382 cases III 191 cases	BMI measured prior to operation	Distant metastasis-free survival(n=40)	≥25 vs <24.9 kg/m^2	P log-rank test = 0.075	Unadjusted
Mousa, 2012 [317], Turkey, BMI - Excluded	Retrospective cohort study (n= 433) Pre- and postmenopausal Mean age:48.56 years	1988-2006 Follow up= 18 years 41 deaths 94 relapse	Early stage breast cancer Grade 1 22.2%, 2 39.7%, 3 17.3%, unknown 20.8% Breast conserving surgery 11.8% Modified radical mastectomy 88.2% Chemotherapy 90.1 % Radiotherapy: 40% Tamoxifen 56.4% Aromatase inhibitors 7.4% Trastuzumab 2.7%	BMI at diagnosis	Overall survival(n=41)	>30 vs 18.5-24.9 kg/m^2	P = 0.51	Unadjusted
					Disease-free survival	>30 vs 18.5-24.9 kg/m^2	P = 0.13	Unadjusted
Panagopoulou P, 2012 [103], Hellenic Cooperative Oncology Group (HeCOG) (10/97; 10/00; 10/04; 10/05), Greece	Secondary analysis of clinical trial (n= 2789) mean age:52 years Pre-, peri-, post-menoapausal	1997-2008 Follow up= 5.08 years 507 women (18.2 %) died on account of breast cancer	Node+ or high-risk node- invasive breast cancer Treatment: HE 10/97 and 10/00 E-T-CMF vs E-CMF HE 10/04: E-CMF vs docetaxel	Self-reported at diagnosis	Breast cancer mortality(n=507)	≥30 vs <25 kg/m^2	1.27 (1.00-1.62) P trend=0.003	Age, menopausal status, tumour size/grade, number of positive nodes, HR and HER2 status, surgery type/treatment protocol

BMI – Included, meta-analysis		34 patients loss to follow-up	HE 10/05: E-T-CMF vs E-CMF					
Sendur, 2012 [331], Turkey, BMI - Excluded	Retrospective cohort study (n= 501) Postmenopausal	2000-2012 Follow up= 25.1 months	HR+ breast cancer	From records	3-year survival	≥25 vs <25 kg/m^2	P log-rank test = 0.08	Unadjusted
					Disease-free survival	≥25 vs <25 kg/m^2	P log-rank test = 0.57	Unadjusted
Sparano JA, 2012 [339], Phase III Taxane-based Drug Trial E1199, United States, BMI - Excluded	Secondary analysis of clinical trial (n= 4817) pre- and postmenopausal age range: 22-84 years recruited between 1999-2002	Follow up= 95 months 904 deaths, 577 breast cancer mortality, 127 deaths after breast cancer recurrence, 119 deaths from other causes, 81 unknown causes of death	Axillary lymph node metastases breast cancer 71.4% ER/PR+, 27.1% ER/PR-, 1.5% unknown Triple-negative disease: 31.9% of black patients, 17.2% of non-blacks patients Stage I-III Surgery (among those with data): 99% breast-sparing surgery, 1% mastectomy; Radiation therapy: 56.1% given, 43.9% not-given; Endocrine therapy given (among those with data): 32.8% tamoxifen alone, 56.3% tamoxifen and then aromatase inhibitor	No info, possibly after diagnosis but before drug trial	Overall survival(n=904)	≥ 30 vs < 30 kg/m^2	1.35 (1.11 - 1.64)	
					Disease-free survival(n=127)	≥ 30 vs < 30 kg/m^2	1.22 (1.04 - 1.44)	
Sparano, 2012 [203], ECOG E1199, E5188, E3189, United States, BMI – Included, review	Secondary analysis of clinical trial (n= 4770) Pre- and postmenopausal age range:22-84 years Trial E5188	Treatment 1999-2002 Follow up= 7.9 years	Invasive breast cancer	Prior to adjuvant therapy	Overall survival premenopausal ER+	≥ 30 vs < 30 kg/m^2	1.51 (1.24 - 1.83)	Age, race, premenopausal status (E1199 and E3189), tumour size, axillary nodal status, surgery, use of radiation therapy (E5188 and E3189), systemic therapy (E5188 and E3189), chemotherapy treatment arm (E3189),

								treatment duration of endocrine therapy (E5188)
	Trial E3189				Overall survival ER-	≥ 30 vs < 30 kg/m^2	0.83 (0.63 - 1.09)	
	Trial E1199				Overall survival ER+&/PR+/HER2-ve/unknown	≥ 30 vs < 30 kg/m^2	1.37 (1.13 - 1.67)	
	Trial E1199				Overall survival Triple-negative disease	≥ 30 vs < 30 kg/m^2	1.11 (0.85 - 1.46)	
	Trial E1199				Overall survival HER2 positive	≥ 30 vs < 30 kg/m^2	0.99 (0.73 - 1.34)	
					Breast cancer-specific mortality(n=704)	≥ 30 vs < 30 kg/m^2	1.39 (1.11 - 1.75)	
	Trial E5188				Breast cancer-specific mortality premenopausal ER+	≥ 30 vs < 30 kg/m^2	1.54 (1.26 - 1.88)	
	Trial 3189				Breast cancer-specific mortality ER negative	≥ 30 vs < 30 kg/m^2	0.85 (0.63 - 1.15)	
	Trial E1199				Breast cancer-specific mortality ER+&/PR+/HER2-ve/unknown	≥ 30 vs < 30 kg/m^2	1.40 (1.11 - 1.76)	
	Trial E1199				Breast cancer-specific mortality Triple-negative disease	≥ 30 vs < 30 kg/m^2	1.00 (0.74 –1.36)	
	Trial E1199				Breast cancer-specific mortality HER2 positive	≥ 30 vs < 30 kg/m^2	1.00 (0.71 - 1.40)	
	Trial E5188				Disease-free premenopausal ER+	≥ 30 vs < 30 kg/m^2	1.41 (1.19 - 1.67)	
	Trial E3189				Disease-free survival ER-	≥ 30 vs < 30 kg/m^2	0.90 (0.70 - 1.16)	

	Trial E1199				Disease-free survival ER+&/PR+/HER2-ve/unknown	≥ 30 vs < 30 kg/m^2	1.24 (1.06 - 1.46)	
	Trial E1199				Disease-free survival Triple-negative disease	≥ 30 vs < 30 kg/m^2	1.02 (0.80 - 1.30)	
	Trial E1199				Disease-free survival HER2 positive	≥ 30 vs < 30 kg/m^2	1.06 (0.82 - 1.38)	
Wolters, 2012 [208], (Breast Cancer Care under Evidence-Based Guidelines (BRENDA) project, Germany, BMI – Included, review	Retrospective cohort study (n= 4636) Mean age:61.48 years	1992-2005	Invasive primary breast cancer Grading: 1: 6.4%, 2: 61.0%, 3: 32.4%, unknown: 0.4% HR- 15.7%, HR+ 84.0%, unknown 0.2% HER2/neu- 55.2%, HER2/neu+ 33.2%, unknown 11.6% No adjuvant drug therapy: 12.0% Chemotherapy:16.6%; Chemo- + hormone therapy: 26.7%; Hormone therapy: 44.7% AI: 14.5% Tamoxifen: 53.9% Others: 3.0%	No description	recurrence free survival premenopausal HR+ patients	≥30 vs <30 kg/m^2	1.44 (0.82 - 2.53)	Multivariable adjusted
					recurrence free survival postmenopausal HR+ patients	≥30 vs <30 kg/m^2	1.61 (1.24 - 2.09)	
					recurrence free survival HR+ breast cancer patients	≥30 vs <30 kg/m^2	1.3 (1.03 - 1.65)	
					recurrence free survival HR+ breast cancer patients	≥30 vs <25 kg/m^2	1.50 (1.17 - 1.93)	

					recurrence free survival HR-	≥30 vs <30 kg/m^2	1.2 (0.8 - 1.81)	
Ademuyiwa, 2011 [41], Roswell Park Cancer Institute (RPCI), Buffalo Review Study, United States, BMI – Included, meta-analysis	Retrospective cohort study (n= 418) mean age: 54 years	Diagnosis year: 1996-2010 Follow up= 37.2 months 87 deaths	Invasive TNBC AJCC stages: 36.8% I, 47.6% II, 15.6% III; Breast conserving surgery: 72% Chemotherapy: 80.6%	From records at diagnosis	Overall survival(n=87)	obese vs normal/underweight	0.94 (0.54 - 1.64)	Age at diagnosis, race, chemotherapy, year of diagnosis, grade, histology , stage, lymphovascular invasion
Allin, 2011 [261], Denmark, BMI - Excluded	Prospective cohort study (n= 2910) age range: 26-99	Diagnosis year: 2002-2009 Follow up=		self-administered questionnaire, Self-reported	overall survival(n=383)	≥30 vs 18.5-24.9 kg/m^2	1.45 (1.01 - 2.09)	Unadjusted
					Breast cancer mortality (n=225)	≥30 vs 18.5-24.9 kg/m^2	1.62 (1.05 - 2.52)	Unadjusted
					Disease-free survival	≥30 vs 18.5-24.9 kg/m^2	1.58 (1.13 - 2.21)	Unadjusted
					Breast cancer recurrence (n=118)	≥30 vs 18.5-24.9 kg/m^2	1.88 (1.08 - 3.25)	Unadjusted
Baumgartner, 2011 [43], Munchen University Breast Cancer Center Review Study, Germany, BMI – Included, meta-analysis	Retrospective cohort study (n= 1053) Age range:27-94 years	Diagnosis year: 1984-2006 Follow up= 88 months	Invasive primary invasive, nonmetastatic breast cancer Tumour stages: 55.1% T1, 33.1% T2, 5.4% T3, 6.5% T4 among peri-postmenopausal women with data Mastectomy: 37.1%; Breast conserving surgery: 62.9% Chemotherapy: 48.2% Radiotherapy: 74.5% Hormonal therapy: 87.6% among peri-	From records	Overall survival perimenopausal	Per 1 kg/m^2	1.31 (1.11 - 1.54)	Age, tumour stage and grade, nodal status, hormonal therapy, histology, surgery, adjuvant therapy, adjuvant chemotherapy

			postmenopausal women with data					
					Overall survival post-menopausal	Per 1 kg/m^2	0.98 (0.96 - 1.01)	
Bergmann, 2011 [267], Brazil, BMI - Excluded	Retrospective cohort study (n= 196) Pre- and postmenopausal mean age:55.9	Treatment 2006-2007 Follow up= 18.69 months	All invasive breast cancer	Prior to neoadjuvant or palliative treatment	Overall survival(n=62)	Obese vs non-obese	P log-rank test = 0.0294	Unadjusted
Ewertz, 2011 [159], Danish Breast Cancer Cooperative Group (DBCG), Denmark, BMI – Included, review	Secondary analysis of clinical trial (n= 18,967) Pre- and post-menopausal Age range:39-70 years Complete follow-up for first events (loco regional recurrences and distant metastases)	Treatment 1977-2008 Follow up= 7.1 years 15,197 breast cancer deaths, 5,967 deaths from unknown causes	Early stage breast cancer ER+ 32276 cases ER- 9780 cases, Unknown 11760 cases Ductal grade 1 14077 cases, grade 2 19456 cases, grade 3 9282 cases Lobular breast cancer 5532 cases No adjuvant treatment 22968 cases Chemotherapy 10230 cases, Endocrine therapy 16148 cases, Combined therapy 4470 cases	From records, prior to adjuvant therapy	Overall survival 0-10 years of follow up	≥ 30 vs < 25 kg/m^2	1.09 (1.00-1.18)	Age, menopausal status, tumor size, nodal status, tumor grade, histology , ER status, fascia invasion, protocol year, systemic therapy
					Overall survival 10+ years of follow-up	≥ 30 vs < 25 kg/m^2	1.33 (1.14 - 1.56)	
					Breast cancer-specific mortality 0-10 years of follow up	≥ 30 vs < 25 kg/m^2	1.11 (1.02 - 1.21)	
					Breast cancer-specific mortality 10+ years of follow-up	≥ 30 vs < 25 kg/m^2	1.38 (1.11 - 1.71)	
					Non-breast-cancer-related death 0-10 years of follow up	≥ 30 vs < 25 kg/m^2	0.97 (0.79 - 1.21)	

					Non-breast-cancer-related death 10+ years of follow-up	≥ 30 vs < 25 kg/m^2	1.31 (1.05 - 1.63)	
					Locoregional recurrence 0-5 years of follow up	≥ 30 vs < 25 kg/m^2	1.05 (0.88 - 1.25)	
					Locoregional recurrence 5-10 years of follow-up	≥ 30 vs < 25 kg/m^2	0.74 (0.46 - 1.18)	
					Distant metastases 0-5 years of follow up	≥ 30 vs < 25 kg/m^2	1.08 (0.96 - 1.21)	
					Distant metastases 5-10 years of follow-up	≥ 30 vs < 25 kg/m^2	1.46 (1.11 - 1.92)	
		10+ years since diagnosis			All-cause mortality 10+ years since diagnosis, No adjuvant therapy	≥ 30 vs < 25 kg/m^2	1.08 (0.84-1.39)	
					All-cause mortality 10+ years since diagnosis, Chemotherapy	≥ 30 vs < 25 kg/m^2	1.77 (1.37 – 2.29)	
					All-cause mortality 10+ years since diagnosis, Hormonal therapy	≥ 30 vs < 25 kg/m^2	1.57 (1.09 – 2.26)	
Jung, 2011 [80], University of Pittsburgh Medical Center (UPMC) and the University of	Retrospective cohort study (n= 553) mean age: 55 years Post-menopausal	Diagnosed: 1999-2008 Follow up= 9 year	Invasive breast cancer 73.1% ER/PR+ Metastatic breast cancer; 65.5% HER2-	From records at study entry	Overall survival(n=288)	≥30 vs <20 kg/m^2	1.46 (0.83 - 2.58)	Unadjusted

Pittsburgh Cancer Institute (UPCI) Breast Cancer Project, United States BMI – Included, non-linear meta-analysis								
Lara-Medina, 2011 [306], National Cancer Institute, Mexico Review Study, Mexico, BMI - Excluded	Retrospective cohort study (n= 2074) Age range:20-74	Diagnosis year: 1998-2008 Follow up= 17 months 209 deaths	Invasive breast cancer; AJCC stages: 9.7% I, 34.6% II, 44% III, 11.7% IV All patients underwent re-excision; Radiotherapy: 63%	From records	5-year survival patients with	≥30 vs <30 kg/m^2	P log-rank test = 0.121	Unadjusted
					5-year cancer-specific survival patients with Triple-Negative Breast Cancer	≥30 vs <30 kg/m^2	P log-rank test = 0.73	Unadjusted
Majed, 2011 [186], Curie Institute Breast Cancer Group (CIBCG), France BMI – Included, review	Prospective cohort study (n= 15116) Pre- and postmenopausal	Follow up= maximal 24 years Diagnosis year: 1981-1999	Invasive breast cancer Stages: 85% I and II 50.1% ER+, 17% ER-, 32.9% unknown; 49.4% PR+, 23.8% PR-, 26.8% unknown Mastectomy: 13.8% Lumpectomy: 52.6% Chemotherapy: 15.1% Radiotherapy: 18.5% Chemo and hormonotherapy 30.6% Hormonotherapy alone: 17.4%, 52% none; Final surgical treatment: 29.1%	Measured at diagnosis	Contralateral Breast Cancer 0-24 years of follow up	≥30 vs <30 kg/m^2	1.19 (0.97 - 1.47) P =0.05	initial delivered treatment, tumor histology, hormonal receptor status, number of axillary invaded nodes, family history of breast cancer, Age, menopausal status, period of recruitment
Maskarinec G, 2011 [93], Patterns of Care and Outcomes for	Prospective cohort study of cancer survivors	Diagnosed: 1995-1996 Follow up= 13.2 years 115 deaths	Invasive and in situ breast cancer Stages 0-IV, two thirds at stage 0 or I	From record, at-diagnosis	All-cause mortality(n=115)	≥30 vs 18.5-24.9 kg/m^2	2.06 (1.23 - 3.44)	Age at diagnosis, ethnicity, menopausal status, Adherence to treatment guidelines,

Patients with Breast Cancer (POCO), Hawai, United States, BMI – Included, meta-analysis	(n= 382) mean age: 59.3 years Pre- and postmenopausal Multi-ethnic Response rate 48.2%	43 breast cancer deaths 72 other causes of deaths	69.1% received recommended treatment, including 28.5% with additional treatment 30.9% did not receive recommended treatment About 30% had ≥1 concomitant chronic condition					Tumour stage, Hormone receptor status, Toxicity, Comorbidity, Health insurance
					Breast cancer mortality(n=43)	≥30 vs 18.5-24.9 kg/m^2	2.99 (1.22 - 7.33)	
Melhem-Bertrandt A, 2011[393], MD Anderson Cancer Center, (MDACC), USA BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=1413) Mostly White	Diagnosed:1995-2007 (treatment) follow Up: Median 55 and 63 months	Breast cancer stage I 4%, II 54%, III 41%; nuclear grade I 4%, II 32%, III 62%; HER2 negative 81% and positive 18%; triple-negative 27% Chemotherapy 100%, at the completion of chemotherapy, all patients underwent surgery and radiation therapy as indicated	Registry database	Overall survival Recurrence free survival Triple-negative Overall survival Triple-negative Recurrence free survival	≥30 vs <25 kg/m^2	1.25(0.95-1.64) P=0.11 1.16(0.90-1.50) P=0.26 0.96(0.61-1.50) P=0.85 0.97(0.63-1.50) P=0.89	Age, diabetes, HER2 status , hormone receptor status, hypertension, lymphovascular invasion , other factors, race, triple-negative status, tumor grade, tumor stage
Pfeiler, 2011 [193], ABCSG-12, Austria, Germany BMI – Included, review	Prospective cohort study (n= 1684) Premenopausal	Follow up= 62.6 months.	Invasive:1684 ER-, ER low expression (+), ER(++), ER (+++), PR-, PR (+), PR(++), PR (+++), PR unknown. Cancer stage: T1a, T1b, T1c, T2, T3 Tumor grade: G1, G2, G3, Gx, lobular Surgery breast retaining, radically modified; Preparative chemotherapy Complete axillary dissection	At study entry	Overall survival (n=66)	≥25 vs 18.5-24.9 kg/m^2	1.49 (0.92 - 2.43) P = 0.1	Tumor stage, Nodal status, grade, ER status, PR status, Age
					Overall survival (n=24) Tamoxifen	≥25 vs 18.5-24.9 kg/m^2	0.83 (0.35 - 1.93)	

					Overall survival (n=42) Anastrozole	≥25 vs 18.5-24.9 kg/m^2	2.14 (1.17-3.92)	
					Disease-free survival (n=179)	≥25 vs 18.5-24.9 kg/m^2	1.24 (0.92 - 1.68) P = 0.15	
					Disease-free survival (n=86) Tamoxifen	≥25 vs 18.5-24.9 kg/m^2	0.94 (0.60 - 1.46)	
					Disease-free survival (n=93) Anastrozole	≥25 vs 18.5-24.9 kg/m^2	1.60 (1.06 - 2.41)	
Pritchard, 2011 [323] The NCIC CTG MA.21 trial Canada BMI - Excluded	Retrospective cohort study (n=667) Mean age 60.1 years postmenopausal women Recruitment 1996-2000	Follow up 7.9 years	Breast Adenocarcinoma	From records	Event free survival (n=220)	Higher vs lower BMI	Beta coefficient -0.29, SE = 0.15 "Lower BMI was significantly associated with longer EFS p<0.001"	Unadjusted
Sarkissyan, 2011 [328], African-American and Hispanic Breast Cancer Survivors, Los Angeles, United States, BMI - Excluded	Retrospective cohort study (n= 471) Recruitment 1995-2007	Follow up= not reported	Invasive breast cancer Stages I-IV	From records	5y disease free survival	≥30 vs <30 kg/m^2	P log-rank test = 0.045	Unadjusted
					5y disease free survival	≥28 vs <28 kg/m^2	P log-rank test = 0.019	Unadjusted
Singh, 2011 [336], Breast Cancer Study, India BMI - Excluded	Prospective cohort study (n= 309) Pre- and postmenopausal mean age:47.54	Surgery 2005-2009 Follow up= 4 years	Invasive primary breast cancer 86.3%; Benign breast disease: 13.7%	Measured	Overall survival	Underwt Normal Overweight Obese I Obese II	Obesity is a significant risk factor for 3-year mortality in patients; normal and underweight may confer survival benefit	Unadjusted
					Metastasis	Underwt Normal Overweight Obese I Obese II		Unadjusted

von Drygalski A, 2011 [349], United States BMI - Excluded	Retrospective cohort of cancer survivors (n= 96) Pre- and postmenopausal mean age: 43 years	Treatment 1989-1999 Follow up= 65 months	Invasive breast cancer ER- 37.5%, ER+ 59.4%, unknown metastatic breast cancer 3.1%; Stage I 21.9%, II 44.8%, III 24.0%, IV 8.3%, 1.0% unknown Received high-dose chemotherapy with autologous stem cell support (HD-ASCT)	From records at the time of high-dose chemotherapy with autologous stem cell support	Overall survival	≥ 30 vs < 30 kg/m^2	1.82 (1.03 - 3.23)	Tumor stage, site of metastasis
Chen X, 2010 [55], Shanghai Breast Cancer Survival Study (SBCSS), China BMI – Included, meta-analysis	Prospective cohort study of cancer survivors (n= 5042) Pre- and postmenopausal (51.1%) Mean age: 53.5 years Response rate 80%	2002-2006 Average 6.5 months from diagnosis to study enrolment Follow up= 46 months 442 deaths 534 relapses or breast cancer deaths	Invasive and in situ breast cancer Stage 0-I 36.4% IIA 32.6%, IIB 16.6%, III-IV 9.8% ER+/PR+ 49.9% ER-/PR- 27.6% ER+/PR- or ER-/PR+ 20.4% Mastectomy: 93.9% Chemotherapy: 91.2% Radiotherapy: 32.1% tamoxifen: 52% Comorbidity 20%	Self-reported weight at 1 year prior to diagnosis and at diagnosis, weight measured approximately 6 and 18 months after diagnosis BMI at diagnosis	Self-reported and record linkage with vital statistics database Total mortality(n=442)	<18.5 vs 18.5-24.9 kg/m^2	1.45 (0.92 - 2.28)	Multivariable adjusted model: age at diagnosis, comorbidity, time from diagnosis to study enrolment, menopausal status, menopausal symptoms, chemotherapy, surgery type, radiotherapy, tamoxifen use, receptor status, TNM stage, immunotherapy, exercise, meat intake, cruciferous vegetables, soy protein, education, income, marital status
					Total mortality(n=442)	≥30 vs 18.5-24.9 kg/m^2	1.55 (1.10 - 2.17)	
					Total mortality(n=276) TNM 0-II stage	≥30 vs 18.5-24.9 kg/m^2	1.53 (0.98- 2.39)	As above multivariable adjusted model, without TNM stage
					Total mortality(n=145) TNM III-IV stage	≥30 vs 18.5-24.9 kg/m^2	1.99 (1.08-3.65) P interaction = 0.91	

					Total mortality Comorbidity index = 0 (n=337)	<18.5 vs 18.5-24.9 kg/m^2	1.19 (0.71 - 1.98)	As above multivariable adjusted model, without comorbidity
						≥30 vs 18.5-24.9 kg/m^2	1.28 (0.81 - 2.01)	
					Total mortality Comorbidity index = 1 (n=105)	<18.5 vs 18.5-24.9 kg/m^2	5.84 (2.11 - 16.10)	
						≥30 vs 18.5-24.9 kg/m^2	1.95 (1.10 - 3.48) P interaction = 0.15	
				BMI at diagnosis	Relapse/disease-specific mortality(n=481)	<18.5 vs 18.5-24.9 kg/m^2	1.21 (0.76 - 1.91)	As above multivariable adjusted model
						≥30 vs 18.5-24.9 kg/m^2	1.44 (1.02 - 2.03)	
					Relapse/disease-specific mortality(n=317) TNM 0-II stage	≥30 vs 18.5-24.9 kg/m^2	1.67 (1.09-2.55)	As above multivariable adjusted model, without TNM stage
					Relapse/disease-specific mortality(n=145) TNM III-IV stage	≥30 vs 18.5-24.9 kg/m^2	1.51 (0.78-2.94) P interaction = 0.91	
					Relapse/disease-specific mortality Comorbidity index = 0 (n=388)	<18.5 vs 18.5-24.9 kg/m^2	1.02 (0.61 - 1.69)	As above multivariable adjusted model, without comorbidity
						≥30 vs 18.5-24.9 kg/m^2	1.25 (0.80- 1.94)	
					Relapse/disease-specific mortality Comorbidity index = 1 (n=92)	<18.5 vs 18.5-24.9 kg/m^2	4.86 (1.62 - 14.60)	

						≥30 vs 18.5-24.9 kg/m^2	2.26 (1.21-4.25) P interaction = 0.122	
Clough-Gorr, 2010 [154], Follow-up of Older Breast Cancer Survivors, Four US Regions, United States, BMI – Included, review	Prospective cohort of study (n= 660) Post-menopausal Age ≥65 years	calendar year:1997-2006 Follow up= 7 years	Invasive breast cancer TNM stages: 51% I, 45% II, 3.8% III Mastectomy: 49%, breast-conserving surgery with radiation: 33%, without radiation: 16%, other: 2.6%; Chemotherapy: 22%; Tamoxifen: 75%	Self-reported 3 months after definitive surgery	Overall survival	≥30 vs <30 kg/m^2	1.27 (0.89-1.81)	Age, Tumor stage, social class, Comorbidity, Physical function, Mental Health Index
de Azambuja E, 2010 [283], BIG 02-98, International, BMI – Excluded	Secondary analysis of clinical trial (n= 2887) Pre- and postmenopausal Age range: 18-70 years	1998-2001 Follow up= 62.5 months 403 deaths 368 breast cancer deaths 35 other deaths 70 second primary tumour including 20 second primary breast tumour	Node+ invasive breast cancer Received Docetaxel and doxorubicin-containing adjuvant chemotherapy Dose capped at BSA of 2.0 m^2 since December 2000. No evidence of under-treatment in obese patients. 20.3% obese and 21.3% non-obese patients had dose reductions (P = 0.6)	At study baseline, before 1st cycle of chemotherapy, no further info	5-year overall survival(n=403)	≥35 vs 18.5-24.9 kg/m^2	1.56 (1.07 - 2.28)	Stratified for HR status, age, menopausal status and number of positive lymph nodes.
						≥30 vs <30 kg/m^2	1.36, P = 0.008	HR status, age, menopausal status, tumour size, number of positive lymph nodes

					5-year disease-free survival(n=732)	≥35 vs 18.5-24.9 kg/m^2	1.10 (0.80- 1.50)	HR status, age, menopausal status and number of positive lymph nodes.
						≥30 vs <30 kg/m^2	1.20, P = 0.04	HR status, age, menopausal status, tumour size, number of positive lymph nodes
Flatt S, 2010 [69], Women's Healthy Eating and Living (WHEL), United States BMI – Excluded (mortality) (superseded by Nelson, 2016) Included, meta-analysis (recurrence)	Secondary analysis of dietary intervention trial (n= 3088) Mean age: 52 years Pre- and postmenopausal Non-Hispanic white 85%	Diagnosed: 1991-2000 Follow up= 7.3 years 315 deaths (83% BC-related, 8% not from any cancer) 518 breast cancer events (69% distal recurrences)	Invasive breast cancer 1190 stage I 1407 stage II 491 stage III 2286 ER+ 756 ER- cases	Measured about 2 years after diagnosis	Self-reported and verified in medical records and death certificates All-cause mortality (n=310)	≥30 vs 18.5-24.9 kg/m^2	1.28 (0.97 - 1.70)	Tumour grade, tumour stage, years between diagnosis and study entry, alcohol intake, education, ethnicity, smoking, parity, physical activity
					Additional breast cancer events (n=511)	≥30 vs 18.5-24.9 kg/m^2	1.10 (0.88 - 1.38)	
Gao, 2010 [163], China, BMI – Included, review	Retrospective cohort study (n= 593) mean age:44 calendar year:1992-1997 until 2008	Diagnosis year: 1992-1997 Follow up= 125 months	Node-positive; 196 stage II, 397 stage III Neoadjuvant therapy (CMF or CAF); adjuvant therapy (CMF, CAF, or CEF), hormone therapy for ER+ or PR+ patients	Before surgery	Total mortality	≥28 vs <28 kg/m^2	1.565 (1.17 - 2.094)	Age, Tumor size, lymph node metastasis , chemotherapy, radiotherapy, LVI: lymphovascular invasion
					Total mortality pre-menopausal	≥28 vs <28 kg/m^2	1.872 (1.162 - 3.017)	Tumor size, lymph node metastasis , chemotherapy, LVI: lymphovascular invasion
					Total mortality post-menopausal	≥28 vs <28 kg/m^2	1.363 (0.923 - 2.011)	Age, Tumor size, lymph node metastasis , chemotherapy, LVI: lymphovascular invasion
Imkampe A, 2010 [76], Kent, United Kingdom,	Prospective cohort study of cancer survivors	1983-2007 Follow up= 85 months	Grade I-III 1218 ER+ cases	Self-reported on questionnaire at 1st clinic	7-year recurrence-free survival	≥30 vs <30 kg/m^2	1.43 (1.12 - 1.83) P trend<0.01	Age, tumour size, tumour grade, lymph node status, vascular

BMI – Included, meta-analysis	(n= 2298) Pre- and postmenopausal Mean age: 59.5 years		All received surgery and chemotherapy 1198 cases received radiotherapy					invasive, operation, adjuvant endocrine treatment, chemotherapy, radiotherapy, year of diagnosis
						Per 1 kg/m^2	1.02 (1.00 - 1.04)	
Sestak, 2010 [106], Arimidex, Tamoxifen Alone or in Combination (ATAC), International BMI – Included, meta-analysis	Secondary analysis of clinical trial (n= 4939) Postmenopausal	Follow up= 100 months 481 breast cancer deaths 504 non-breast cancer deaths 878 breast cancer recurrence	Early-stage ER+ and/or PR+ invasive breast cancer Tamoxifen or Anastrozole	Measured at trial baseline	Breast cancer deaths after recurrence (n=481)	≥35 vs <23 kg/m^2	1.55 (1.10 - 2.19) P trend≤0.001	Age, mastectomy, tumour size, tumour grade, nodal status, chemotherapy, radiotherapy, region
					Deaths without recurrence (n=504)	≥35 vs <23 kg/m^2	1.03 (0.71 - 1.50) P trend=0.18	
					Breast cancer recurrence(n=854)	≥35 vs <23 kg/m^2	1.39 (1.06 - 1.82) P trend=0.02	
					Distant recurrence(n=632)	≥35 vs <23 kg/m^2	1.46 (1.07 - 1.61) P trend=0.001	
					Breast cancer recurrence Tamoxifen	≥35 vs <23 kg/m^2	1.18 (0.90-1.84) P trend = 0.23	
					Breast cancer recurrence Anastrozole	≥35 vs <23 kg/m^2	1.53 (1.01-2.32) P trend = 0.001 P interaction = 0.04	

Thivat E, 2010 [204], Jean Perrin Center, Clermont-Ferrand Review Study, France, BMI – Included, review	Retrospective cohort of cancer survivors (n= 111) Pre- and postmenopausal, age range: 32-74 years mean age: 54 years Recruited until 2009	Treatment 1976-1989 Follow up= from 19.4-27.6 years 57 deaths	Early stage and locally advanced breast cancer; 42% ER+, 44% ER-, 35% PR+, 47% PR-, 19% T1, 44% T2, 15% T3, 22% T4; Scarff-Bloom-Richardson Grade I 8%, 55% II, 20% III Anthracycline-based chemotherapy: all patients, Tumourectomy: 66 cases, mastectomy: 44 cases, radiation 97% (after chemotherapy), hormonal therapy 44% (90% with tamoxifen)	Measured at the beginning of treatment	Overall survival (n=57)	≥ 24 vs <24 kg/m^2	1.49 (0.81 - 2.74)	Nodal status, tumor stage, menopausal status, hormonal therapy, weight
					Disease-free survival (n=55)	≥ 24 vs <24 kg/m^2	1.59 (0.86 - 2.93)	
Anderson, 2009 [262], NSABBP B-13,14,19,20,23, United States, BMI - Excluded	Secondary analysis of clinical trial (n= 3799) Pre- and postmenopausal	Calendar year:1981-1998 until 2007 Treatment1981-1991 Follow up= 16.1 years	All invasive breast cancer Node-negative breast cancer Underwent lumpectomy and whole breast irradiation; with or without adjuvant systemic therapy in RCT trials	No description	Overall survival recurrent invasive carcinoma	Q4 vs Q1	1.3 (1.05 - 1.6) P trend=0.089	Age, ER status, Race, Tumor size
					Overall survival regional recurrence	Q4 vs Q1	1.31 (1.06 - 1.61) P trend=0.0044	
Chen, 2009 [280], Chang Gung	Retrospective cohort study (n=	Follow up= 36 months	Invasive breast cancer	From records Undergoing	5y locoregional recurrence(n=27)	≤24 vs >24.1 kg/m^2	6.24 (1.33 - 29.27)	Unadjusted

Memorial Hospital Study, Taiwan, Taiwan, BMI - Excluded	858) Pre- and postmenopausal mean age:45 calendar year:1998-2005			breast conserving therapy				
Eralp, 2009 [286], MD Anderson Cancer Center (MDACC), Texas Review Study, BMI - Excluded	Retrospective cohort study of cancer survivors (n=110) Premenopausal, age range: 22-35 years, mean age: 32 years	Follow up= 43 months 17 deaths 50 recurrence	In situ breast cancer 59% +ve, 39% -ve 51% stage II, 49% stage III, 75% grade III Neoadjuvant chemotherapy treatment (anthracycline-based combinations, with or without taxanes)	From records, prior to chemotherapy	Overall survival (n=17)	29.2-48.7 vs 18.1-22.1 kg/ m^2	Not significant	Tumor grade, stage, ethnicity, hormone receptor status, nodal status
					Disease free survival (n=50)	29.2-48.7 vs 18.1-22.1 kg/ m^2	Not significant	
Li C, 2009 [87], Seattle-Puget Sound Region, United States, BMI – Included, meta-analysis	Nested case-control study (n= 1091) Pre- and postmenopausal Age range: 40-79 years	1990-2005 Follow up= 17 years 365 contralateral breast cancers	ER+ breast cancer Invasive:1091 AJCC stages: 67.4% I, 32.6% II or III; Tumour size (cm): 33.4% ≤ 1.0, 41.7% 1.1-2.0, 21.9% >2, 3% missing Chemotherapy: 26.1% yes, 73.9% no; Radiotherapy: 65.4% yes, 34.6% no, 0.1% missing; Adjuvant hormone therapy: 66.8% yes, 33.2% no	Interview	Contralateral Breast Cancer(n=355)	≥30 vs <25 kg/m^2	1.5 (1 - 2.1)	Age, year of diagnosis, tumour stage, survival time, hormonal therapy, chemotherapy, HRT, county, race
Majed B, 2009 [90], Curie Institute Breast Cancer Group (CIBCG), France BMI – Included, meta-analysis	Prospective cohort study of breast cancer survivors (n= 14709) Pre- and postmenopausal	1981-1999 Follow up= 8 years 1009 contralateral recurrences, 555 second primary cancers	First unilateral breast cancer without distant dissemination	Measured	Overall survival(n=2558) Training sample	stout vs non stout	1.11 (1.02 - 1.2)	Age, menopausal status, tumour size, receptor status, nodal status, surgery type, hormonal therapy, chemotherapy, radiotherapy

(Results superseded by Majed, 2008)								
(Results superseded by Majed, 2008)					Overall survival(n=1135) Validation sample	stout vs non stout	1.16 (1.02 - 1.32)	
(Results superseded by Majed, 2008)					Disease-free survival(n=3416) Training sample	stout vs non stout	1.1 (1.02 - 1.18)	
(Results superseded by Majed, 2008)					Disease-free survival(n=1460) Validation sample	stout vs non stout	1.05 (0.93 - 1.18)	
					Node recurrence(n=227) Training sample	stout vs non stout	0.78 (0.59 - 1.05)	
					Node recurrence(n=96) Validation sample	stout vs non stout	1.36 (0.83 - 2.25)	
(Results superseded by Majed, 2008)					Locoregional recurrence(n=144 2) Training sample	stout vs non stout	0.97 (0.86 - 1.09)	
(Results superseded by Majed, 2008)					Locoregional recurrence(n=627) Validation sample	stout vs non stout	0.98 (0.82 - 1.17)	
(Results superseded by Majed, 2008)					Distant metastases(n=26 34) Training sample	stout vs non stout	1.15 (1.07 - 1.25)	
(Results superseded by Majed, 2008)					Distant metastases(n=11 46) Validation sample	stout vs non stout	1.1 (0.97 - 1.24)	
(Results superseded by Majed, 2008)					Contralateral Breast	stout vs non stout	1.33 (1.14 - 1.56)	

					Cancer(n=690) Training sample			
(Results included in dose-response meta-analysis)					Contralateral Breast Cancer(n=319) Validation sample	stout vs non stout	1.04 (0.82 - 1.32)	
					Second primary cancers(n=380) Training sample	stout vs non stout	1.81 (1.37 - 2.38)	
					Second primary cancers(n=175) Validation sample	stout vs non stout	0.76 (0.44 - 1.31)	
Moon, 2009 [189], Korean Breast Cancer Registry (KBCR), Seoul National University Hospital Breast Care Center (SNUHBCC), Korea, Korea, BMI – Included, review	Retrospective cohort study (n= 29043) Pre- and post-menopausal mean age:48	Breast surgery: 1982-2006 Follow up=	Invasive breast cancer KBCR: 59% ER+, 41% ER-, 53.7% PR+, 46.3% PR-; SNUHBCC: 58% ER+, 42% ER-, 46.6% PR+, 53.4% PR- Nonmetastatic, invasive breast cancer; histologic grades of KBCR patients: 62.8% 1-2, 37.2% 3; histologic grades of SNUHBCC patients: 57.1% grade 1-2, 42.9% grade 3 Among those with data: Chemotherapy: 79.6% yes, 20.4% no KBCR patients, 73.4% yes, 26.6% no SNUHBCC; Hormonal treatment: 62.5% yes, 37.5% no KBCR patients, 50.7% yes, 49.3% no SNUHBCC	From records at the time of diagnosis	Overall survival KBCR	≥25 vs 18.5-24.9 kg/m^2	0.96 (0.87 - 1.02)	Age, Tumor size, Tumor stage, Nodal status, ER status, PR status, Tumor grade, Lymphovascular invasion
					Breast cancer-specific mortality KBCR	18.5-24.9 vs ≤18.4 kg/m^2	1.49 (1.15 - 1.93)	

					Overall survival SNUHBCC	≥30 vs 18.5-24.9 kg/m^2	1.35 (0.8 - 2.27)	Age, Tumor size, Tumor stage, Nodal status, ER status, PR status, Tumor grade, Lymphovascular invasion, chemotherapy, Hormonal therapy
					Disease-free survival SNUHBCC	≥30 vs 18.5-24.9 kg/m^2	1.28 (0.74 - 2.22)	
					Locoregional recurrence SNUHBCC	≥30 vs 18.5-24.9 kg/m^2	0.27 (0.03 - 1.97)	
					Distant metastases SNUHBCC	≥30 vs 18.5-24.9 kg/m^2	1.23 (0.64 - 2.36)	
Nichols HB, 2009 [100], Collaborative Women's Longevity Study (CWLS), United States BMI – Included, meta-analysis	Follow-up of cases of case-control studies (final n= 3993) Pre- and postmenopausal Mean age:58.4 years White >98% Recruited on average 5.8 years after diagnosis Response rate 40% Excluded women with breast cancer recurrence before enrolment (n= 553), or un-intentional	Diagnosed: 1988-1999, Follow up= 6.3 years 421 deaths 121 breast cancer deaths 95 deaths from cardiovascular disease	Invasive non-metastatic breast cancer Local 64.1% Regional 24.7% Distant 0.6% Unknown stage 10.6%	Self-reported at about 5.8 years post-diagnosis in follow-up questionnaire	Record linkage with National Death Index Total mortality (n=405)	≥30 vs 18.5-24.9 kg/m^2	1.27 (0.99 - 1.64)	Age, tumour stage, time between diagnosis and enrolment, family history of breast cancer, post-diagnosis smoking, recreational physical activity in follow-up, post-diagnosis menopausal status (breast cancer treatment modality and postmenopausal hormone use did not influence results and were not included in final model)

	weight loss (n= 262)							
					Breast cancer-specific mortality (n=117)	≥30 vs 18.5-24.9 kg/m^2	2.28 (1.43 - 3.64)	
					Cardiovascular disease mortality (n=90)	≥30 vs 18.5-24.9 kg/m^2	1.65 (0.97 - 2.83)	
Olsson A, 2009 [101], Malmo Mammographic Screening Trial (MMST), Sweden BMI – Included, meta-analysis	Randomised controlled trial of mammography screening (n= 2794) (pre-screening 1568, invited 656 control 570 women) Pre- and postmenopausal Age range: 45-69 years	1961-1991 Follow up= 10 years (max) 1318 deaths (pre-screening 862, invited 210 control 246 deaths) 817 breast cancer deaths (pre-screening 564, invited 111 control 142 deaths)	Invasive breast cancer, any stages including distant metastasis No non-surgical treatment information	Measured/self-reported at diagnosis	Death Registry 10-year breast cancer-specific mortality(n=564) Pre-screening/ historical	≥30 vs 20-<25 kg/m^2	1.04 (0.74 - 1.47)	Age at diagnosis, menopausal status, histology , tumour size, Date of diagnosis, nodal status, clinical site, metastasis
					10-year breast cancer-specific mortality(n=111) Screened	≥30 vs 20-<25 kg/m^2	1.01 (0.41 - 2.50)	
					10-year breast cancer-specific mortality(n=142) Not screened	≥30 vs 20-<25 kg/m^2	2.08 (1.13 - 3.81)	
Shu, 2009 [335], Shanghai Breast	Prospective cohort study (n=	Diagnosis year: 2002-2006 Follow	Invasive and in situ 63.2% ER+, 35.2% ER-,	6.5 months after diagnosis	5-year survival(n=442)	≥30 vs <25 kg/m^2	P = 0.01	Unadjusted

Cancer Survival Study (SBCSS), China, BMI - Excluded	5042) Pre- and postmenopausal age range:20-75	up= 3.9 years 444 deaths and 534 recurrences or breast cancer–related deaths	1.6% missing; 57.5% PR+, 40.6% PR-, 1.9% missing TNM stages: 85.8% 0-II, 9.8% III-IV, 4.4% Unknown Radical mastectomy: 92.6% yes, 7.4% no; Radiotherapy: 32.1% yes, 67.9% no; Chemotherapy: 91.2% yes, 8.8% no; Tamoxifen: 52.1% yes, 47.9% no among those with data					
Barnett, 2008 [142], Studies of Epidemiology and Risk Factors in Cancer Heredity (SEARCH), United Kingdom, BMI – Included, review	Prospective cohort study (n= 4560, 4346 in analysis) Pre- and postmenopausal Mean age:51.5 years	1991-2005 Follow up= range 0.47-10 years Total 620 deaths	Invasive breast cancer 73% incident and 27% prevalent Stage I 49.7% Stage II 45.8% Stage III 3.3% Stage IV 1.1% ER+ 81.2% ER- 18.7%	Self-administered questionnaire, at various time after diagnosis	Total mortality (n=586)	≥28.5 vs ≤ 22.7 kg/ m^2	1.23 (0.94 - 1.62)	Age at diagnosis, Tumor stage, Tumor grade
					Total mortality (n=586)	Per 1 kg/m^2	1.03 (1.01 - 1.04)	Unadjusted
					Total mortality (n=193) ER positive	≥28.5 vs ≤ 22.7 kg/ m^2	2.28 (1.45 - 3.58) P trend=0.0003	Unadjusted
					Total mortality (n=193) ER positive	Per 1 kg/m^2	1.05 (1.03 - 1.08)	Unadjusted
					Total mortality (n=120) ER negative	≥28.5 vs ≤ 22.7 kg/ m^2	0.94 (0.56 - 1.58) P trend=0.85	Unadjusted

					Total mortality (n=120) ER negative	Per 1 kg/m^2	0.99 (0.96 - 1.03)	Unadjusted
Caan BJ, 2008 [51], Life After Cancer Epidemiology (LACE), United States, BMI – Excluded (all-cause mortality) (superseded by Nelson, 2016) Included, subgroup meta-analysis (breast cancer mortality) Included, meta-analysis (recurrence)	Prospective cohort study of cancer survivors (n= 1692) Pre- and postmenopausal Mean age:58.3 years Entered study on average 1.9 years post-diagnosis Response rate 46%	1997-2000 Follow up= 83.9 months 162 deaths 99 breast cancer deaths (55%) 207 recurrences	Stage I-IIIA invasive breast cancer 1551 ER+/PR+ 348 ER-/PR- 343 others HR status 793 node+ 1363 node- cases 423 patients chemotherapy only 552 patients radiotherapy 855 patients chemo- and radiotherapy 1610 patients current tamoxifen use 153 patients past tamoxifen use	Self-reported pre-diagnosis weight and weight at study entry and height, 11-39 (average 22.7) months after diagnosis	Death from any cause(n=160) Breast cancer death (n=90) Breast cancer recurrence (n=207)	≥30 vs <25kg/m^2 ≥30 vs <25kg/m^2 ≥30 vs <25kg/m^2	1.3 (0.8 - 1.9) P trend=0.22 1.2 (0.7-2.1) P trend=0.53 1.0 (0.7-1.4) P trend=0.83	Age at diagnosis, tumour stage, tamoxifen use, treatment, nodal status, oestrogen receptor level, progesterone receptor level, smoking, non-sedentary activities
Dawood, 2008 [61], MD Anderson Cancer Center (MDACC), Texas Review Study, United States BMI – Included, subgroup meta-analysis	Retrospective cohort study Pre and post-menopausal		Invasive breast cancer	From records At diagnosis	Total mortality	≥30 vs <25 kg/m^2	1.40 (1.03-1.91)	
					Recurrence-free survival	≥30 vs <25 kg/m^2	1.42 (1.05-1.92)	
Labidi SI, 2008 [85], Salah Azaiz Institute Tunisia	Retrospective study (n= 100) Pre and postmenopausal	Treatment 1994-2000 Follow up= 6 years 70 deaths	Nonmetastatic inflammatory breast cancer,	From records, before treatment	3-year survival (n=70)	≥30 vs <25 kg/ m2	1.032 (0.511 - 2.084)	Chemotherapy, hormonal therapy

Review Study, Tunisia BMI – Included, meta-analysis	age range: 23-71 years, mean age: 44 years		40% ER-, 17 %ER +, 43% unknown, 27% PR-, 12 %PR+, 61% unknown tumor size <= 5cm 30% , size >5 cm 46%, 24% unknown, Scarf and Bloom grade1: 4%, grade 2 39%, grade 3 37%, 20% unknown 99% neo-adjuvant chemotherapy, 93% mastectomy, 83% radiotherapy, 84% adjuvant chemotherapy, 60% hormone therapy					
Litton, 2008 [183], MD Anderson Cancer Center (MDACC), Texas Review Study, United States, BMI – Included, review (recurrence)	Retrospective cohort study (n= 1169) Pre- and postmenopausal mean age:50	Diagnosis year: 1990-2004 Follow up= 14 years	All invasive breast cancer 60.1% ER+, 39.9% ER-; 51.2% PR+, 48.8% PR-; 22.8% HER-2+, 77.2% HER-2- Cancer stages: 4.1% I, 63% II, 32.9% III; Tumor stages: 0.2% T0, 11.5% T1, 56.5% T2, 17.7% T3; 14.1% T4; Histology: 92.9% ductal, 7.1% lobular Mastectomy: 61% yes; Breast-conserving surgery: 38% yes; No surgery: 1% yes; Anthracycline-based regimen: 91% yes	From records before surgery at start of neoadjuvant chemotherapy	Overall survival(n=194)	≥30 vs <24.9 kg/m^2	1.65 (1.18 - 2.3)	
					10y breast cancer-specific survival(n=167)	≥30 vs <24.9 kg/m^2	P log-rank test = 0.048	

					Disease-free survival	≥30 vs <24.9 kg/m^2	0.98 (0.7 - 1.37)	Race, Age, menopausal status, chemotherapy, Receptor status, Nodal status, Pathological complete response, Time from chemo to surgery, Nuclear grade
Majed B, 2008 [89], Curie Institute Breast Cancer Group (CIBCG), France BMI – Included, meta-analysis (all-cause mortality, recurrence) Excluded (breast cancer mortality, deaths from second cancers, second primary breast cancer)	Prospective cohort study of cancer survivors (n= 14709) Pre- and postmenopausal	1981-1999 Follow up= 8 years 3693 deaths, including 80.5% breast cancer deaths, 5.2% due to second cancers, 4.5% from other causes	Non-metastatic invasive breast cancer Stage I 36.2%, II 51.1%, III 12.6% ER+ 50.9% ER- 17.4% Unknown 31.7% PR+ 50.2% PR- 24.2% Unknown 25.6% Conservative surgery: 57.2% Non-conservative surgery: 29% Non surgical local treatment: 13.8% Hormonal therapy: 33.1% Chemotherapy: 30.8% Radiotherapy: 86.6%	Measured at diagnosis	Overall survival(n=3693)	≥30 vs <25 kg/m^2	1.15 (1.02 - 1.29) P trend= <0.05	Age, tumour dimension, clinical node development, menopausal status, year of diagnosis, tumour oestrogen, progesterone receptor level, clinical tumour extension, number of axillary invaded nodes, Scarf-Bloom-Richardson grade
					Overall survival(n=3693)	Per 1 kg/m^2	1.010 (1.002 - 1.019)	
					Breast cancer mortality	≥30 vs <25 kg/m^2	1.35 (1.19 - 1.54) P trend=<0.0001	Unadjusted
					Deaths from second cancers	≥30 vs <25 kg/m^2	2.14 (1.38 - 3.31) P trend=< 0.001	Unadjusted

					Disease-free survival (n=4876)	≥30 vs <25 kg/m^2	1.12 (1.01 - 1.25) P trend=<0.05	Above factors
					Disease-free survival (n=4876)	Per 1 kg/m^2	1.008 (1.001 - 1.015)	
					Locoregional recurrence(n=2069)	≥30 vs <25 kg/m^2	0.98 (0.82 - 1.16) P trend=0.78	Unadjusted
					Node recurrence(n=323)	≥30 vs <25 kg/m^2	1.03 (0.68 - 1.57) P trend=0.88	Unadjusted
					Distant metastases(n=3780)	≥30 vs <25 kg/m^2	1.17 (1.04 - 1.31) P trend=<0.01	Above factors
						Per 1 kg/m^2	1.013 (1.005 - 1.021)	
					Second cancer(n=555)	≥30 vs <25 kg/m^2	1.46 (1.10 - 1.94) P trend=<0.05	Age, menopausal status
					Second cancer postmenopausal	≥30 vs <25 kg/m^2	1.41 (1.02-1.94) P trend=<0.05	
					Second cancer(n=555)	Per 1 kg/m^2	1.021 (1.001 - 1.042)	
(Results superseded by Majed, 2009)					Contralateral Breast Cancer(n=1009)	≥30 vs <25 kg/m^2	1.17 (0.93 - 1.48) P trend=0.23	Unadjusted
					Any cancer(n=555)	≥30 vs <25 kg/m^2	1.46 (1.1 - 1.94) P trend=<0.05	Age, menopausal status
					Any cancer(n=555)	Per 1 kg/m^2	1.021 (1.001 - 1.042)	
Sánchez, 2008[198], Spain BMI – Excluded, second primary cancer	Nested case-control study (n=682) Pre- and postmenopausal	Diagnosed: 1975-2003 Follow-up= 89.17 months, 217 second primary cancers	Stage: 35.6% local, 41.9% regional, 4.7% advanced, 17.7% unknown 54.5% ER+, 45.5% ER-	From medical records or measured at baseline	Any cancer (n=270) Second primary cancers (n=217)	≥30 vs < 30 kg/m^2	7.48 (1.25-44.88) P< 0.05	Multivariate adjusted

	Mean age: 56 years		31.1% PR+, 58.9% PR- 96.2% surgery 28.2% chemotherapy 61.4% radiotherapy 32.3% hormone therapy					
Vitolins MZ, 2008[348], Phase II Doxorubicin-Based Drug Trial for Node-Positive Breast Cancer, United States, BMI - Excluded	Secondary analysis of clinical trial (n= 636) Pre- and postmenopausal age range: 25-73 years mean age: 52 years Recruited between 1980-1985 until 1999	Follow up= 13.7 years, 341 deaths, 303 breast cancer deaths, 38 deaths from other causes	Stages II-III, lymph-node positive breast cancer 62% ER+, 38% ER-, 49% PR+, 51% PR-, Participants of doxorubicin-based multidrug regimen as adjuvant therapy trial; had mastectomy	Measured prior to adjuvant therapy	Overall survival (n=341)	Per 1 kg/m^2	1.04 (-)	Unadjusted
					Breast cancer-specific mortality (n=303)	Per 1 kg/m^2	1.04 (-)	Unadjusted
					Breast cancer recurrence (n=345)	Per 1 kg/m^2	1.03 (1.01 - 1.05)	Unadjusted
Brewster, 2007[274], Early Stage Breast Cancer Repository (ESBCR) Study, BMI - Excluded	Retrospective cohort study (n= 2327) Mean age:55 calendar year:1985-2000 Loss to follow up : 6%	Follow up= 5 years	Early stage breast cancer Tumor size: ≤2 (n=1603)/ >2 (n=57) Node negative: n=1558 Node Positive: n=765 Missing: n=4 ER+/PR+ n=1099 ER+/PR- Or ER-/PR+ n=424 ER-/PR- n=436 Missing n=368 Surgery: Modified mastectomy n=1367/Segmental mastectomy: n=952/ Missing: n=8 Chemotherapy: Anthracycline 643/Anthracycline and taxane: n=335/Other: n=52/No chemo n=1263 Endocrine treatment:	Medical records,	(n=332)	Obese vs Under/normal weight	0.86 (0.65 - 1.12) P trend=0.27	Treatment, stage

			Yes n=1005/No n=1305/missing n=17 Radiation: Yes n=1017 No n=1295 Missing n=15					
Demirkan, 2007[284], Turkish Adjuvant Systemic Treatments Follow-up Study, Turkey BMI - Excluded	Retrospective cohort study (n= 266) Pre- and postmenopausal mean age:52 calendar year:2000-2004	Follow up= 60 months	Invasive breast cancer	Measured Post-surgery/treatment; at admission for adjuvant treatment	Distant disease free pre-menopausal	≥30 vs 18.5-29.9 kg/m^2	P log-rank test = 0.056	Unadjusted
					Distant disease free post-menopausal	≥30 vs 18.5-29.9 kg/m^2	P log-rank test = 0.026	Unadjusted
Pierce J, 2007[320], Women's Healthy Eating and Living (WHEL), United States BMI - Excluded	Secondary analysis of dietary intervention trial (n= 1490) Pre- and postmenopausal Mean age: 50 years	1991-2000 Follow up= 6.7 years 135 deaths, 118 breast cancer deaths, 10 deaths from other cancers, 7 deaths from non-cancer, 236 breast cancer events 7 patients lost to follow-up	Early stage breast cancer AJCC Stage I 40% Stage II 45% stage III 15% ER+/PR+ 63.1% ER+/PR- 10.8% ER-/PR+ 5.1% ER-/PR- 20.8% No chemotherapy 31.4% Nonanthracycline 25.7% Anthracycline 42.8% Adjuvant tamoxifen 42%	Measured about 2 years after diagnosis	Overall survival(n=135)	≥30 vs 20 kg/ m^2	1.42 (0.87 - 2.31)	Age, alcohol intake, receptor status, time from diagnosis to randomization
Schuetz, 2007[330], University Hospital of Heidelberg, Germany BMI - Excluded	Retrospective cohort study (n= 1072) Pre- and postmenopausal mean age:54	Breast surgery: 1990 -1999 Follow up= 73.2 months 163 deaths	Invasive:1072 67.2% ER +ve, 59.4% PR +ve Primary breast cancer, grades: 12.3% 1, 52.5% 2, 27.9% 3 Breast conserving surgery: 74.6% yes; Primary chemotherapy: 9.8% yes; Adjuvant radiation therapy: 80.5% yes; Adjuvant systemic	From records	Overall survival(n=124) post-menopausal	Per 1 kg/m^2	1.01 (0.96 - 1.05)	Unadjusted

			therapy 84.2% yes; Endocrine therapy 45.5% yes; Chemotherapy: 25.7% yes; Endocrine and chemotherapy: yes 13.1%					
Abrahamson, 2006[39], Atlanta, Seattle, New Jersey, United States BMI – Included, meta-analysis	Follow-up of cases in case-control study (n= 1254) Pre- (78%) and postmenopausal (22%) Age range: 20-54 years White 75% Non-white 25% 86% completed interviews at median 4.2 months post-diagnosis	1990-1992 Follow up= 9.8 years 290 deaths, including 85% breast cancer deaths <2% loss to follow-up	Invasive breast cancer Local 57% Regional 40% Distant 3% ER+ 56% ER- 35% Borderline 3% Unknown 6%	Measured at interview conducted 4.2months post-diagnosis; recalled weight at 20 years and in the year before diagnosis BMI at interview	Record linkage with National Death index All-cause mortality(n=281)	≥30 vs 18.5-24.9 kg/m^2	1.65 (1.23 - 2.21) P trend=0.001	Tumour stage, Income (Tested other covariates, no change to estimate by >10% and not included in final model No confounding or modifying effects of treatment status)
Caan B, 2006[146], Women's Healthy Eating and Living (WHEL) and Life After Cancer Epidemiology (LACE), United States BMI - Excluded	Pooled analysis of prospective studies (n= 3215) Pre- and postmenopausal Age range: 18-70 years, Mean age: 58.8 years	1995-2002 Follow up= 7 years	Stage I 43.7%, II 52.7%, III A 3.6% ER+ 78.2%, PR+ 69.3% Surgery type: mastectomy 50.7%, conserving 49.3% No radiation/no chemotherapy 15.1%, Chemotherapy only 22.5%, Radiation only 23%, Chemotherapy and radiation 39.4%	Measured/self-reported at study entry, about 2 years post-diagnosis	Recurrence	≥30 vs 18.5-25 kg/ m^2	1.1 (0.9 - 1.4)	BMI, age at diagnosis, smoking, tamoxifen use, treatment, tumor stage, nodal status, hormone receptor status, menopausal status, height, %weight gain

			Tamoxifen use at diagnosis: never 28.5%, past 6.6%, current 64.9%					
Dignam, 2006[64], National Surgical Adjuvant Breast and Bowel Project (NSABP) B-13, B-19, B-23, United States BMI – Included, meta-analysis (second primary breast cancer)	Secondary analysis of clinical trial (n= 4077) Pre- (54.5%) and postmenopausal (45.5%) White 81.7%, Black 12%	1981-1988 Max follow-up: 24 years 820 deaths 624 breast cancer deaths 196 other deaths	ER-, node- invasive breast cancer	At trial enrolment, no further info	Total mortality (n=820)	≥35 vs <25 kg/m^2	1.30 (1.03-1.63)	Age, treatment, tumour size, ethnicity
					Deaths following breast cancer events (n=624)	≥35 vs <25 kg/m^2	1.13 (0.85-1.49)	
					Other deaths (n=196)	≥35 vs <25 kg/m^2	1.86 (1.21-2.84	
					Disease-free survival (n=1326)	≥35 vs <25 kg/m^2	1.21 (1.00-1.46)	
					Breast cancer recurrence (n=772)	≥35 vs <25 kg/m^2	1.04 (0.80-1.35)	
					Second cancer (n=439)	≥35 vs <25 kg/m^2	1.32 (0.96-1.81)	
					Contralateral Breast Cancer(n=156) pre-menopausal	obese II vs normal Kg/m^2	0.98 (0.54 - 1.74) P trend=0.76	
					Contralateral Breast Cancer(n=86) post-menopausal	obese II vs normal Kg/m^2	2.13 (1.06 - 4.28) P trend=0.02	

Tao MH, 2006[112], Shanghai Breast Cancer Study (SBCS), China BMI – Included, meta-analysis	Follow-up of cases in case-control study (n= 1455) Pre- and postmenopausal Age range: 25-64 years Response rate: 91.1%	1996-1998 Follow up= 5.1 years 240 deaths, including 218 breast cancer deaths	Stage 0-I 24.6% IIA 34.9% IIB 21.9% III-IV 11.3% Unknown 7.1% ER+ 44% ER- 25.5% Unknown 30.0% PR+ 43.5% PR- 25.2% Unknown 31.1% Surgery: 99% Chemotherapy: 94% Chemotherapy and traditional Chinese medicine: 63% Radiotherapy: 38.9% Tamoxifen: 63.2%	Measured at or soon after diagnosis at interview	Self-reported, record linkage with death registry Overall survival(n=240)	≥25.53 vs <21.23 kg/m^2	1.4 (1.0 – 2.0) P trend=0.07	Age at diagnosis, education, menopausal status, Tumour stage, chemotherapy, Tamoxifen use, radiotherapy, oestrogen receptor level, progesterone receptor level
					Disease-free survival(n=298)	≥25.53 vs <21.23 kg/m^2	1.3 (1.0 - 1.8) P trend=0.08	
Gonzalez-Angulo, 2005[165], MD Anderson Cancer Center, Texas Review Study, United States, BMI – Included, meta-analysis (all-cause mortality) Included, review (recurrence)	Retrospective cohort study (n= 452) Postmenopausal due to surgery Mean age:<=35 years	1990-2002 Follow up= range 3 years	In situ 14 cases Invasive 389 cases AJCC Stage II-IIIA 63% ER+ 52.3% ER- 47.7% PR+ 47.5% PR- 52.4% Mastectomy 75.4% Node dissection 75% All received anthracycline-based chemotherapy Additional taxane 35%	From records at diagnosis	Overall survival(n=82)	≥30 vs <30 kg/m^2	1.42 (0.99 - 2.04)	Adjustment unclear

					Recurrence-free(n=171)	≥30 vs <30 kg/m^2	1.02 (0.59 - 1.77)	Adjustment unclear
Loi, 2005[185], Australia BMI – Included, review	Follow-up of case from a control study (n = 1101) Age range: 23-69 years	From 1992 Follow-up: 5 years	Non-metastatic breast cancer ER+ 671 cases ER- 379 cases PR+ 715 cases PR- 334 cases Chemotherapy 688 cases Tamoxifen 369 cases No treatment 233 cases	BMI self-reported on average 8 months after diagnosis	All-cause mortality (n = 184)	≥30 vs <30 kg/m^2	1.56 (1.01 - 2.40)	Age, tumor grade, nodal status, progesterone receptor level
						≥30 vs <30 kg/m^2 Premenopausal	1.71 (1.05 - 2.77)	
						≥30 vs <30 kg/m^2 Postmenopausal	0.84 (0.28 - 2.56)	
Tammemagi, 2005[342], United States BMI - Excluded	Retrospective cohort study (n= 906) Pre and Post-menopausal	1985-1990 Follow up= 10 years 476 deaths: 179 (37.6%) breast cancer deaths, 297 (62.4%) other deaths 20 patients lost to follow up	In situ 30 (3.6%) Invasive 805 cases Stage I 34.3% Stage II 45.4% Stage III 10.9% Stage IV 5.9% Surgery 90.8% Chemotherapy 27.2% Radiotherapy 28.5% Hormone therapy 4.4% Tamoxifen 38.5%	Pre, at, post-diagnosis BMI, from medical records	Non-breast-cancer-related death(n=297)	≥35 vs 18.5-24.9 kg/m^2	1.35 (0.91 - 2.00)	Unadjusted
Berclaz, 2004[45], International Breast Cancer Study Group (IBCSG), multi-national	Secondary analysis of clinical trial (n= 6370) Pre- and postmenopausal	1978-1993 Follow up= 14 years	Invasive breast cancer 3655 cases ER+ 1798 cases ER- 3030 cases PR+ 2143 cases PR-	From records, prior to treatment	All-cause mortality (10-year estimate n= 2627)	≥30 vs <25 kg/m^2	1.14 (1.03-1.27)	ER status, menopausal status, nodal status, tumour size, treatment, chemotherapy, hormone and chemotherapy

BMI – Included, meta-analysis	Age range: 21-84 years		5098 cases node+ 1272 cases node- 3702 chemotherapy 2019 hormone therapy with or without chemotherapy 649 patients no therapy 96% of obese patients received dosage that was calculated based on ideal surface area (ISA)					
					All-cause mortality Observation (no adjuvant treatment)	≥30 vs <25 kg/m^2	0.93 (0.68-1.29)	
					All-cause mortality Hormone ± chemotherapy	≥30 vs <25 kg/m^2	1.10 (0.93-1.29)	
					All-cause mortality Chemotherapy alone	≥30 vs <25 kg/m^2	1.24 (1.08-1.43)	
					Disease-free survival (10-year estimate n= 3555)	≥30 vs <25 kg/m^2	1.10 (1.10-1.20)	
					Disease-free survival Observation (no adjuvant treatment)	≥30 vs <25 kg/m^2	0.90 (0.68-1.20)	

					Disease-free survival Hormone ± chemotherapy	≥30 vs <25 kg/m^2	1.04 (0.89-1.21)	
					Disease-free survival Chemotherapy alone	≥30 vs <25 kg/m^2	1.23 (1.08-1.39)	
Carmichael, 2004[148], United Kingdom BMI – Included, review (mortality) Excluded (recurrence)	Prospective cohort study (n= 1579) Pre- and postmenopausal	Treatment 1963-1999 Follow up= 6 years	Tumor grades: I 23%, II 34.5%, III 18.8%, <3.4 23.8%	Self-reported at diagnosis	Overall survival	<30 vs ≥30 kg/m^2	0.81 (0.62 - 1.06)	Unadjusted
					Disease-free survival	<30 vs ≥30 kg/m^2	0.8 (0.63 - 1.01)	Unadjusted
Dignam J, 2003[63], National Surgical Adjuvant Breast and Bowel Project (NSABP) B-14, United States BMI – Excluded (mortality, other second primary cancers) Included, meta-analysis (breast cancer mortality, recurrence, second primary breast cancer)	Secondary analysis of clinical trial (n= 3385) (2355 from trial, 1030 from registration arm) Pre- (30.6%) and postmenopausal (69.4%) White 91.1%	1982-1988 Follow up= 166 months 983 deaths 595 breast cancer deaths 388 other deaths 193 contralateral breast cancer, 232 other second primary cancers	Early stage ER+, node-invasive breast cancer 64.9% received tamoxifen 35.1% received placebo	From records at trial enrolment	Total mortality(n=983)	≥30 vs 18.5-24.9 kg/m^2	1.31 (1.12 - 1.54)	Age, menopausal status, ethnicity, tumour size, oestrogen receptor level, progesterone receptor level, treatment
					Deaths following breast cancer events (n=595)	≥30 vs 18.5-24.9 kg/m^2	1.20 (0.97 - 1.49)	

					Other deaths(n=388)	≥30 vs 18.5-24.9 kg/m^2	1.49 (1.15 - 1.92)	
					Death prior to recurrence or second primary cancer (death as first event) (n=243)	≥30 vs 18.5-24.9 kg/m^2	1.37 (0.99 - 1.89)	
					Breast cancer recurrence(n=787)	≥30 vs <25 kg/m^2	0.98 (0.8 - 1.18)	
					Contralateral Breast Cancer(n=193)	≥30 vs <25 kg/m^2	1.58 (1.1 - 2.25)	
					Contralateral Breast Cancer pre-menopausal	≥30 vs <25 kg/m^2	1.52 (0.77 - 3.03)	
					Contralateral Breast Cancer post-menopausal	≥30 vs <25 kg/m2	1.63 (1.07 - 2.51)	
					Other second primary cancers (n=232)	≥30 vs <25 kg/m^2	1.62 (1.16 - 2.24)	
					Endometrial cancer(n=51)	≥30 vs <25 kg/m^2	1.45 (0.72 - 2.94)	
Kmet, 2003[175], Washington SEER Nested Case-Control Study, United States BMI – Excluded (other second primary cancer)	Nested case-control study within a retrospective cohort Pre- and post-menopausal age range:40-84	Diagnosis year: 1978-1992 Follow up= Until 1995	Stages I or II: 96% of cases, 94% of controls At least one + (ER+, PR+, ER+PR+) 66.1%, Both ER-/PR- 11.5% Unknown 8.7% Not done 13.7%	From records at diagnosis	Colorectal cancer(n=146)	≥30 vs <30 kg/m^2	2.2 (1.2-3.9)	Matching factors, family history

Goodwin, 2002[292], Canada BMI - Excluded	Prospective cohort study (n= 512) Pre- and post-menopausal Mean age:50.4 years Excluded diabetes	1989-1996 Follow up= 50 months 45 deaths, 42 breast cancer deaths 8 patients lost to follow up	Early stage invasive breast cancer ER+ 61.3% ER- 19.1% ER equivocal 5.5% Unknown 14.1% PR+ 55.7% PR -23.2% PR equivocal 5.7% Unknown 15.4% Mastectomy 22.1% Lumpectomy 77.9% Chemotherapy only 28.7% Chemotherapy plus tamoxifen 9.0% Tamoxifen 29.5%	Measured between 4- and 12-weeks post operation, before adjuvant therapy	Total mortality(n=45)	27.8-54.8 vs 21.9-24.4 kg/m^2	1.78 (1.25 - 2.53)	
					Distant recurrence(n=76)	27.8-54.8 vs 21.9-24.4 kg/m^2	1.72 (1.27 - 2.34)	
Pukkala, 2002[195], Finland BMI – Excluded (other second primary cancer)	Nested case-control study, within a population-based cohort of breast cancer survivor (n= 512) Pre- and postmenopausal	Diagnosis year: 1980-Follow up until 1995 144 endometrial cancers	Grade 1-3 breast cancer Localized 60.5% Regional 30.1% Distant breast Cancer 3.5% Unknown 5.9% ER+/PR+ 40.6% ER-/PR- 12.3% ER+/PR- or ER-/PR+ 19.3% Unknown 27.7%	From records at diagnosis	Endometrial cancer(n=142)	>30 vs ≤30 kg/m^2	2.0 (1.2 - 3.3) P =0.01	Tamoxifen use, progesterone receptor level, parity, radiotherapy, chemotherapy, HRT

			Chemotherapy 7.6% Radiotherapy 59.8% Tamoxifen 29% Toremifene 1.8%					
Fowble B, 2001[399], USA BMI - Excluded	Female, Prospective Cohort of Cancer Survivors (n=1253) mean age:55 Pre- 33%, peri- 6%, postmenopausal 61% Mostly white	Diagnosed:Treatment: 1978-1994 follow Up: Median 8.9 years , Loss to Follow-up: Not reported	Unilateral invasive breast cancer. DCIS and LCIS. Stage I-II. ER+ 62%, ER- 18%, unknown 20%. PR 49%, PR- 26%, unknown 25%. Node+ 26%, node- 74%. Treated with conservative surgery and radiation. Chemotherapy 19%. Tamoxifen 19%. Both 8%. None 54%.	Medical records	Second primary cancers (n=98)	Q3 vs Q1	P=0.81	
					Contralateral breast cancer (n=87)		P=0.98	
					Second primary cancers (n=69)		P=0.80	
Marret, 2001[92], Tours University Hospital Review Study, France BMI – Included, meta-analysis	Retrospective cohort study (n= 605) age range: 27-85 years Pre- and postmenopausal	Recruitment:1976 -1988 Follow up= 82 months	Invasive breast cancer	From records	Breast cancer recurrence	Per 1 kg/m^2	0.92 (0.85 - 0.99)	Age
Chang, 2000[150], MD Anderson Cancer Center (MDACC), Texas, United States BMI – Included, review	Prospective cohort study (n= 177) Pre- and postmenopausal	1974-1993 Follow up= 100 months for women alive at last contact 101 breast cancer deaths	Invasive Inflammatory breast cancer No distant metastasis	From medical records at diagnosis	Breast cancer-specific mortality(n=101)	≥30 vs <30 kg/m^2	1.34 (0.88 - 2.05)	Nodal status, chemotherapy
					Breast cancer-specific mortality Pre-menopausal	≥30 vs <30 kg/m^2	0.63 (0.34 - 1.15)	
					Breast cancer-specific mortality Post-menopausal	≥30 vs <30 kg/m^2	1.86 (1.02 - 3.40)	

Kumar, 2000[179], United States BMI – Included, review	Follow-up of cases from a case-control (n= 166) Pre and postmenopausal	Follow-up= 10 years (min)	Stage I-IV	BMI measured within 3 months of diagnosis before treatment	All-cause mortality	Obese vs non-obese	0.92 (0.87 - 0.98)	Tumour stage
Bernstein L, 1999[47], Four US Regions BMI – Excluded (other second primary cancer)	Population-based nested case-control study (n= 995) Pre- and postmenopausal Age range: 38 - 94 years	1978 - 1992 Follow up= 3.9 years 324 second primary cancers (endometrial)	Chemotherapy 24.1% Radiotherapy 29.3% Tamoxifen 39.7%	From medical records, at diagnosis	Endometrial cancer(n=324)	≥28 vs <22.1 kg/m^2	2.06 (1.31 - 3.24)	Tamoxifen use, month of oestrogen use, HRT, OC use, smoking status at diagnosis, history of high blood pressure
Chen CM, 1999[400], Taiwan BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=332) mean age:51.7, Pre- 46.4%, peri- 6.9%, postmenopausal 46.7% Chinese	Diagnosed: Treatment: 1990-1997 follow Up: Median 23.5 months , Loss to Follow-up: Not reported	Early stage breast cancer. Stage 0 8.1%, I 19.6%, IIA 38%, IIB 34.3%. ER+ 45.2%, ER- 34.6%, unknown 20.2%. PR+ 34.9%, PR- 3.9%, unknown 33.1%. Node+ 38.3%.	Medical records	Overall survival		P Log rank test >0.05	
					Disease-free survival		P Log rank test >0.05	
Menon, 1999[314], United Kingdom BMI - Excluded	Retrospective cohort study (n= 448) Pre- and postmenopausal	Follow up= 6 years	Invasive primary breast cancer; all stages	Self-reported at diagnosis	Overall survival(n=162)	Per 1 kg/m^2	1.000 (0.968 - 1.034)	Unadjusted
					Disease-free survival(n=190)	Per 1 kg/m^2	1.002 (0.973 - 1.031)	Unadjusted
Saxe, 1999[329], United States BMI - Excluded	Prospective cohort study (n= 149)	1989-1991 Follow up= 5 years 26 deaths	In situ 29 cases (19.6%) Invasive 120 cases Stage I 34.5% Stage II 34.5%	Measured as close to the time of her breast cancer diagnosis	Total mortality(n=26)	>27 vs ≤27 kg/m^2	0.74 (0.32 - 1.71)	Unadjusted

	Pre- and postmenopausal Mean age:57.8 years	0% lost to follow-up	Stage III 8.8% Stage IV 2.7% ER+ 73.4% ER- 26.6%	as possible, no info on treatment				
					Breast cancer recurrence(n=28)	>27 vs ≤27 kg/m^2	0.62 (0.27 - 1.41)	Unadjusted
Habel LA, 1998[73], Washington SEER, United States BMI -Included, meta-analysis	Retrospective cohort study of cancer survivors (n= 480) age range: 20-74 years Pre- and postmenopausal Response rate 67.7% Excluded women with mastectomy as initial treatment for DCIS	Diagnosed: 1980-1992 Follow up= 62 months 103 recurrences	DCIS Had breast conserving surgery	Self-reported at diagnosis	Breast cancer recurrence(n=75)	≥30.8 vs ≤22.8kg/m^2	2.3 (1.1 - 4.8)	Age, follow-up time (Tested potential confounders, when appropriate: tumor size and histology of the initial DCIS lesion; radiotherapy; marital status; education level; average alcohol use at diagnosis; age at menarche; menopausal status; parity; age at first birth; breast cancer in first-degree relatives; exogenous hormone use)
					Invasive breast cancer recurrence(n=34)	≥30.8 vs ≤22.8kg/m^2	3.5 (1.1 - 10.8)	
Hebert J, 1998[74], Memorial Sloan Kettering Cancer Center (MSKCC), United States BMI – Included, meta-analysis	Prospective cohort study of cancer survivors (n= 546) Pre- (47.3%) and postmenopausal Mean age:52.2 years White 86.8%	1982-1984 Follow up= 10 years max 87 deaths 73 breast cancer deaths 109 recurrences Vital status obtained for all but one woman	Early-stage invasive breast cancer TNM stage I 39.7% II 40.6%, IIIa 19.7% ER+ 57.1%	Measured at diagnosis and 2 years post-diagnosis BMI at diagnosis	Records from cancer centre, registry, National Death Index Breast cancer-specific mortality(n=73)	Per 1 kg/m^2	1.06 (1.00 - 1.12)	Age, menopausal status, Tumour stage, Meat intake, Butter/margarine/lard, Beer, ER status

					Breast cancer-specific mortality Premenopausal	Per 1 kg/m^2	1.12 (1.03-1.22)	
					Breast cancer recurrence(n=109)	Per 1 kg/m^2	1.04 (1.00 - 1.09)	As above but without ER status
					Breast cancer recurrence Premenopausal	Per 1 kg/m^2	1.09 (1.02-1.17)	
Newman S, 1997[99], Northern Alberta, Canada BMI – Included, meta-analysis	Prospective cohort study of cancer survivors (final n= 1169) Pre- and postmenopausal (61%) Mean age:56.1 years Excluded 2260 cases with any missing data	1978-1989 Follow up= 4.35 years 295 deaths, 244 breast cancer deaths 7.3% loss to follow-up	Early stage breast cancer, no metastasis Stage I 32.1%, II 61.6%, III 6.3% ER+ 67.3% ER- 32.7%	Measured at diagnosis	Breast cancer-specific mortality(n=244)	≥29 vs ≤22.7 kg/m^2	2.47 (1.17 - 5.22)	Age, Tumour size, number of positive nodes, oestrogen receptor level, number of positive nodes X BMI
Cook LS, 1996[58] United States BMI – Included, meta-analysis	Nested case-control study, within a population-based cohort of breast cancer survivor (n= 640) Pre- and postmenopausal	1978-1990 Follow up= 35 months 234 contralateral breast cancer	Invasive stage I Stage II 9.8% 19.8% ER-ve, 51.8% ER+ve,	At initial breast cancer diagnosis	Contralateral Breast Cancer(n=207)	≥30 vs <22 kg/m^2	0.98 (0.57 - 1.69)	Age at diagnosis, stage, year of diagnosis, family history, tumour histology, menopausal status

			4.1% ER intermediate, 17.9% not done, 6.3% unknown, 19.8% PR-ve, 0.1% PR intermediate, 38.7% ER+ve, 26.1% not done, 15.1% unknown Chemotherapy 29.3%		Contralateral Breast Cancer(n=68) Premenopausal	≥30 vs <22 kg/m^2	2.25 (0.93 - 5.42)	
			Unknown 9.9% Radiation therapy 41.3% Unknown 11.5%		Contralateral Breast Cancer(n=139) Postmenopausal	≥30 vs <22 kg/m^2	0.61 (0.29 - 1.27)	
Lethaby, 1996[308], ABCSG, New Zealand BMI - Excluded	Prospective cohort study (n= 1138) Pre- and postmenopausal	1976-1985 Follow up= 10.2 years	Non-metastatic, node-negative breast cancer	From records	Overall survival Age<50y	≥28 vs <28 kg/m^2	P log-rank test = 0.29	Unadjusted
					Overall survival Age≥50y		P log-rank test = 0.13	Unadjusted
Rosner GL, 1996[253], Cancer and Leukemia Group (CALGB) 8541, USA BMI – Included, review	Female, Prospective Cohort of Cancer Survivors (n=1435) Pre- and postmenopausal		Breast cancer. Stage II. Positive regional lymph nodes. Undergoing cycle 1 of adjuvant cyclophosphamide, doxorubicin, and fluorouracil (CAF). Three levels of dose-intensity.	Measured	Received within 5% of the weight-based doses of CAF 300/30/300 Disease-free survival (n=195.0)	≥27.3 vs <27.3 kg/m^2	1.11(0.80-1.53)	Estrogen receptor status, menopausal status, number of positive lymph nodes, tumor size
					Received within 5% of the weight-based doses of CAF 400/40/400 Disease-free survival (n=158.0)		1.04(0.73-1.49)	
					Received within 5% of the weight-based doses of		0.87(0.58-1.31)	

					CAF 600/60/600 Disease-free survival (n=134.0)			
Katoh, 1994[174], United States BMI – Included, review	Retrospective cohort study (n= 301) Postmenopausal Mean age:72 years	1977-1985 Follow up= 5 years 94	Invasive breast cancer Stage I 34% Stage II 51% Stage III 10% Stage IV 6% ER+ 78% ER- 22% PR+ 56% PR- 44% Surgery alone 62% Surgery plus either chemotherapy or radiation therapy 38%	From records	5-year breast cancer survival(n=94) Recurrence	≥27.1 vs <27 kg/m^2	0.99 (0.41-2.42) 1.37 (0.73-2.56)	Age, ER status, PR status, Treatment, Tumor stage, Tumor size, Nodal status
Ewertz M, 1993[288], Danish Breast Cancer Cooperative Group (DBCCG), Demark BMI - Excluded	Prospective cohort of cancer survivors (n= 2445) Pre- and postmenopausal	1983-1984 Follow up= 7 years (max) 805 total deaths 3 patients lost to follow-up	Primary invasive breast cancer Grade I 44.8% Grade II 42.3% Grade III 12.8% Adjuvant therapy	Self-reported, data collected a year after diagnosis	Total mortality Advanced disease	≥ 30 vs <20-24 kg/m^2	0.98 (-) Not significant	Tumor size, grade, nodal status, skin invasion
Bastarrachea J, 1993 [265], MD Anderson Cancer Center (MDACC), Texas Review Study, United States BMI - Excluded	Retrospective cohort of cancer survivors (n= 735) Pre- and postmenopausal	Treatment: 1974-1982 Follow up= 10.7 years 298 breast cancer deaths 362 disease-free survival events 1% lost to follow-up	Node+ primary invasive breast cancer Stage II 69.2% Stage III 30.7% Treated with fluorouracil-doxorubicin-cyclophosphaide-containing adjuvant chemotherapy protocols	From records at the start of adjuvant therapy	Breast cancer mortality(n=298)	Obese (>20% ideal weight) vs non-obese (≤20% ideal weight)	1.36 (1.06-1.76)	Tumour stage, nodal status, menopausal status
					Disease free survival(n=362)	Obese (>20% ideal weight) vs non-obese (≤20% ideal weight)	1.33 (1.05-1.68)	
Rohan, 1993[326], Australia BMI - Excluded	Follow-up of cases of population-based	1982-1984 Follow up= 5.5 years 112 breast cancer mortality, 11	Primary breast cancer, any stages	FFQ, interviewed on average 4.8 months after diagnosis	Breast cancer-specific mortality(n=112)	≥30 vs <23 kg/m^2	3.39 (1.84 - 6.25) P trend=<0.001	Unadjusted

	case-control study (n= 412) Pre- and post-menopausal Mean age:55.1 years	other causes of deaths 39 patients lost to follow-up						
Albain KS, 1992[260], United States BMI - Excluded	Secondary analysis of clinical trial (n= 768) Pre- and postmenopausal	Treatment 1975-1989 Follow up= 263 deaths	Node+ breast cancer ER+ 54% ER- 25% Unknown 21% Tumor size: T1 or T2 (<=5cm) 89% T3 (>5cm) 9% Unknown 2% Undergoing adjuvant treatment	From records, prior to adjuvant therapy	Overall survival	>28 vs ≤28 kg/ m^2	No independent prognostic significance	Unadjusted
					Disease-free survival	>28 vs ≤28 kg/ m^2	No independent prognostic significance	Unadjusted
Gordon, 1992[293], United States BMI - Excluded	Prospective cohort study (n= 1392) Pre- and postmenopausal Mean age; 76 years	1974-1985 Follow up= 16 years 2.9% loss to follow up	Any stages ER+ 76.4% ER- 23.6% Tumor diameter (cm): T1:≤2 44.4%, T2:>2-≤5 48.1%, T3:>5 7.5%, among those with data All mastectomy	Measured	Overall survival	≥36 vs ≤19 kg/m^2	1.43 (1.09-1.88)	Unadjusted
					Disease-free survival	≥36 vs ≤19 kg/m^2	1.22 (0.93-1.60)	Unadjusted
Senie, 1992[201], United States BMI – Included, review	Prospective cohort study (n= 923) Pre- and postmenopausal Mean age:55.5 years	1976-1978 Follow up= 10 years	In situ 82 cases Invasive 841 cases	Measured at hospital admission post-surgery	10y disease free survival(n=448)	Obese vs Non-obese	1.29 (1 - 1.67)	Tumor size, Nodal status, Age at diagnosis, Adjuvant chemotherapy

Storm HH, 1992[108], Danish Cancer Registry Case-Control Study, Denmark BMI – Included, meta-analysis	Nested case-control study, within a cohort of breast cancer survivor (n= 1058) Pre- and postmenopausal	1943-1978 Follow up= 8 years 271 contralateral breast cancer	In situ:0 Invasive:1058 Primary invasive breast cancer; localized, regional, distant metastasis > 90% mastectomy, 82% adjuvant radiotherapy	At first breast cancer diagnosis	Contralateral Breast Cancer(n=271)	≥30 vs <20	1.77 (1.00 - 3.14)	Age, year of diagnosis, survival time radiotherapy, hormonal therapy, chemotherapy, menopausal status, family history, parity,
Ewertz M, 1991[67], Danish Breast Cancer Cooperative Group (DBCG) and DCR (Danish Cancer Registry), Denmark BMI – Included, meta-analysis	Prospective cohort study of cancer survivors (n=2445) Pre- and postmenopausal Response rate 87%, 1744 patients with complete data	1983-1984 Max follow up= 7 years 805 deaths	Invasive breast cancer, grade I-III	Self-reported a year after diagnosis	Record linkage with population registry Total mortality (n=514)	≥30 vs 20-24.9 kg/m^2	0.98 (0.72 - 1.34)	Age, tumour size, nodal status, tumour grade, skin invasion, stratified for residence
					Total mortality Advanced disease (n=456)	≥30 vs 20-24.9 kg/m^2	0.98 (0.71-1.36)	

					Total mortality Early disease (n=58)	≥30 vs 20-24.9 kg/m^2	1.53 (0.54-4.36)	Adjusted for age, stratified for residence.
Nomura, 1991[192], Hawaii, United States BMI – Included, review	Follow up of cases from a case-control study (n= 343) Pre- and postmenopausal Age range: 45-74 years Caucasian and Japanese	1975 and 1980 Follow up= 12.5 years (max)	In situ:29 Invasive:314 Japanese: 12% in situ, 63% localized, 24% regional, 1% distant; Caucasian: 5% in situ, 56% localized, 36% regional, 3% distant	Interviewed on average 2.2 months after diagnosis	Breast cancer-specific mortality Caucasian	High vs Low obesity index ((kg/m$^{1.5182}$)	1.15 (0.51 - 2.62)	Tumor stage, menopausal status, Hormonal therapy, Fat intake
					Breast cancer-specific mortality Japanese	High vs Low	3.53 (1.25 - 10)	
Camoriano, 1990[147], United States BMI – Included, review	Secondary analysis of clinical trial (n= 646) Pre- and postmenopausal Age range:20-75 years	Follow up= 6.6 years	Node-positive breast cancer All had mastectomy	Measured within 8 weeks of post-surgery, followed during and after receiving 60 weeks of treatment or observation	Overall survival pre-menopausal	≥28 vs <28 kg/m^2	1.70 (0.99 - 2.94)	Age, Nodal status, estrogen receptor level, Tumor size, Nuclear grade, Weight change
Coates, 1990[281], Georgia BMI - Excluded	Prospective cohort study (n=1960) Pre- and post-menopausal	1975-1979 Follow-up: 5 years (min)	Stage I 23.37% Stage II 53.93% Stage III 16.58% Stage IV 6.12% Surgery 95.82% Radiation 11.37% Hormonal therapy 1.79%	Measured at study baseline	Breast cancer mortality	20.6-24.5 vs ≥24.6 kg/m^2	P trend= <0.001	

			Chemotherapy 5.67%					
Kimura, 1990[302], Japan BMI - Excluded	Retrospective cohort study (n= 593) Pre- and post-menopausal	Treatment: 1972-1988 Follow-up= 16 years (max)	Stage I-III Had radical operation	From medical records	Overall survival	<21 to 21.1-23 vs >23 kg/m^2	5 year survival Not significant 10 y survival P<0.05	
Kyogoku S, 1990[305], Fukuoka, Japan BMI - Excluded	Follow-up of cases from a case-control study (n= 213) Pre- and postmenopausal Mean age: 55.5 years	1975-1978 Follow up= 12 years 64 deaths, 47 breast cancer deaths, 6 deaths from second primary cancer, 4 deaths from cardiac failures, 3 deaths from cerebrovascular diseases, 4 other causes of death 9 patients lost to follow-up	Invasive breast cancer TNM Stage I 80 cases Stage II 102 cases Stage III 13 cases Radical surgery 96% Radical mastectomy 93.9% Palliate surgery 13 Chemotherapy 40.8% Radiation therapy 7.5% Endocrine therapy 61.0%	Interviewed, assessed 1-3 months after surgery	Total mortality(n=64)	≥25 vs <20 kg/ m^2	2.51 (-) P trend=<0.01	Tumor stage, age of menarche, age at first birth, menopausal status, history of abortion, smoking, radiotherapy, chemotherapy, hormonal therapy, type of operative procedure, history of benign breast disease
Mason, 1990[188], ABCSG, Australia BMI – Included, review	Prospective cohort study (n= 2706) Pre- and post-menopausal	1976-1985 Follow up= 7 years	Incident breast cancer; any stages	From records at diagnosis	Breast cancer mortality (n=586)	<28 vs ≥28 kg/m^2	0.67 (0.55 - 0.83)	Age, Age at first birth, Age of menarche, parity, Lactation, Season
					Breast cancer mortality (n=176) Age<50y	<28 vs ≥28 kg/m^2	0.73 (0.5 - 1.09)	
					Breast cancer mortality (n=410) Age≥50y	<28 vs ≥28 kg/m^2	0.65 (0.52 - 0.83)	
Kamby C, 1989[299], Danish Breast Cancer Cooperative Group (DBCG), Denmark	Secondary analysis of clinical trial (n= 3802) Pre- and postmenopausal recruited: 1977-1984	Follow up= 4.9 years	Primary breast cancer	From records, after treatment	Overall survival Premenopausal	≥2.4 vs <2.4 g/cm^2	P = 0.78	Unadjusted

(Superseded by Ewertz, 2011) BMI - Excluded								
					Overall survival Postmenopausal	≥2.4 vs <2.4 g/cm^2	P = 0.83	Unadjusted
					Progression-free survival Premenopausal	≥2.4 vs <2.4 g/cm^2	P = 0.99	
					Progression-free survival Postmenopausal	≥2.4 vs <2.4 g/cm^2	P = 0.73	
Suissa, 1989[341], NSABBP B-04, Canada BMI - Excluded	Retrospective cohort study of cases of RCT (n= 68) Premenopausal 38% Postmenopausal 62% Mean age:52.7 years	1971-1973 Follow up= 13 years	Stage II 31% Total mastectomy with irritation 41% Total mastectomy with no further treatment 37%	At the time of the mastectomy	Overall survival	Per 1 unit (0.01 x wt in lbs/ht^2 in inches)	Significant curvilinear relationship P=0.002	Age, Tumor stage, menopausal status, Treatment
Taylor SG IV, 1989[345], ECOG E, United States BMI - Excluded	Secondary analysis of clinical trial (n= 265) Post-menopausal Age ≤65 years Recruited until 1981	Follow up= 74 months 109 deaths	Invasive breast cancer with axillary nodal involvement Mastectomy and axillary node dissection: 100%; No postoperative radiation therapy	Prior to adjuvant therapy	Overall survival	>28 vs <24 kg/m^2	Obesity was a significant independent risk factor for overall survival	Unadjusted
Hebert, 1988[295], Memorial Sloan Kettering Cancer Center (MSKCC), Two-Year Follow-up Study, United States BMI – Excluded	Prospective cohort study (n= 472) age range: 20-80 years Pre- and post-menopausal	Enrolment: 1982-1986 Follow up= 27 months	Invasive breast cancer	From records	Recurrence-free Stage I	≤28 vs >28 kg/m^2	4.17 (1.35 - 12.93)	Unadjusted
					Recurrence-free Stage II	≤28 vs >28 kg/m^2	1.35 (0.44 - 4.15)	Unadjusted

					Recurrence-free Stage III	≤28 vs >28 kg/m^2	1.12 (0.34 - 3.65)	Unadjusted
Horn, 1988[171], Connecticut Tumor Registry Case-Control Study, United States BMI – Included, review	Follow-up of cases of a case-control study (n= 556) Pre- and postmenopausal mean age:57	Since 1935 Follow up= 8 years 292 contralateral breast cancer, 264 unilateral breast cancer	First primary breast cancer 75% radical or modified radical mastectomy (both cases and controls)	From records	Contralateral Breast Cancer(n=251)	≥35 vs ≤34 kg/m^2	1.1 (0.7 - 1.7)	Nulliparity, menopausal status, Estrogen use, smoking, family history, Histology , chemotherapy, radiotherapy, Time since diagnosis, Age, Benign breast disease
Mohle-Boetani, 1988[315], United States BMI - Excluded	Follow-up of cases from a case-control study (n= 838) Pre- and postmenopausal Mean age:56 years	1973 - 1982 Follow up= 6 years 257 deaths	Invasive breast cancer AJCC Stages I 24% Stage II 32% Stage II or IIIA 34% Stage IIIA 5% Stage IIIB 4% Stage IV 2%	Self-reported at diagnosis	All-cause mortality (n=256)	34.7 vs ≤30.4 lb/in^2	1.4 (-) P trend=0.02	Age at diagnosis, Tumor stage, Follow up time
					All-cause mortality(n=61) Pre-menopausal	34.7 vs ≤30.4 lb/in^2	1.6 (-) P trend=0.0 8	
					All-cause mortality (n=193) Post-menopausal	34.7 vs ≤30.4 lb/in^2	1.3 (-) P trend=0.08	
McNee, 1987[313], Auckland Breast Cancer Records, New Zealand BMI - Excluded	Prospective cohort study (n=) Pre- and post-menopausal Age range:34-64 calendar year:1976-1983	Follow up= 4 years		Measured/self-reported pre-operative weight	Disease-free survival cases with tumor size	≥28 vs <28 kg/m^2	P log-rank test <0.05	Unadjusted
Papatestas, 1986[318], United States BMI - Excluded	Retrospective cohort study (n= 377) Pre- and postmenopausal	Surgery 1977-1984 Follow up= 7 years	All invasive breast cancer	From records	Disease-free survival(n=98)	3.4 vs 3.5	P = 0.1	Nodal status, Tumor differentiation, Hormone receptor status
Eberlein T, 1985 [394], USA	Female, Retrospective Cohort of Cancer	Diagnosed: From 1971	Primary breast cancer. Stage I-III. 38% had mastectomy prior to but	Medical records	Overall survival (n=57.0)	Quetelet index >3.5 vs <=3.5	Mantel-Haenszel test P=0.11	Age, number of positive lymph nodes

BMI - Excluded	Survivors (n=231) Pre- and postmenopausal		within 6 months of study admission. Underwent chemotherapy and radiotherapy.		Disease free survival (n=67.0)	(100 x weight in pounds/height in inches^2)	Mantel-Haenszel test P=0.04	
Heasman KZ, 1985[395], Canada, BMI - Excluded	Female, Retrospective Cohort of Cancer Survivors (n=237) Pre- and postmenopausal mean age:47.5 Pre- (80.2%) and postmenopausal (18.1%). Unknown (1.7%).	Diagnosed:1975-1981	Breast cancer. 1-3 lymph nodes+ 44%, 4 nodes+ 25%, unknown no. Nodes+ 27%, undetermined 2%, nodes - 2%. ER+ 38%, ER- 42%, ER equivocal 20%. Undergone adjuvant chemotherapy	Before and after treatment	Overall survival	Per 1 unit	P=0.04	
					Recurrence-free		P=0.05	
Ewertz M, 1984[287], Denmark BMI – Excluded (other second primary cancer)	Case control study (115 cases, 235 controls) Pre- and post-menopausal Mean age: 59 years	1943-1977	Primary breast cancer		Endometrial cancer(n=106)	>31 vs <22 kg/m^2	2.3 (0.9 - 6.2) P trend=0.055	Matched by age at breast cancer diagnosis, length of survival with an intact uterus, calendar year of breast cancer diagnosis
Boyd, 1981[272], Canada BMI - Excluded	Secondary analysis of clinical trial (n= 749) Pre- and postmenopausal age range:35-70 calendar year:1965-1972	Follow up= ranged from 8-15 years	All invasive breast cancer	From records at enrolment that was made within 10 days to 3 months after surgery of breast cancer	Disease-free survival	Per 1 unit	P = 0.02	Unadjusted
Tartter, 1981[344], United States BMI - Excluded	Retrospective cohort study (n= 374) Pre- and postmenopausal	Follow up= 5 years		Pre-operative	5y disease free survival(n=28)	≥3.5 vs <3.5	P = 0.24	Unadjusted
Sohrabi, 1980[338], United States BMI - Excluded	Retrospective cohort study Pre- and postmenopausal calendar year:1968-1979	Follow up=		After treatment	Recurrence-free normal axillary nodes	≤2.45 vs >2.45	P = 0.425	Unadjusted

					Recurrence-free abnormal axillary nodes	≤2.45 vs >2.45	P = 0.343	Unadjusted
Donegan, 1978[285] United States BMI - Excluded	Hospital-based study (n=83) Mean age: 56.4	Follow up= 5 years max	Had mastectomy	From hospital records	Overall survival	≤2.45 vs >2.45 lb/inch	Not significantly lower for obese women	
Abe, 1976[258], Japan, BMI - Excluded	Retrospective cohort study (n= 134, 82 in analysis) Pre and postmenopausal Mean age:47 years	Follow up= 5 years (max)	Stages: 31.3% I, 42.5% II, 19.4% III, 6.7% IV; Tumor grades: 22.4% T1, 53% T2, 17.2% T3, 7.5% T4	No description	5-year survival(n=21)	Obese vs non-obese (>20% vs <=20% standard weight)	5-year survival 55.6% vs 79.9%	Unadjusted

Supplementary Table S5 Description of studies included in or excluded from the descriptive review or meta-analysis of waist circumference (WC)

Author, year, study name, country	Study description	Time of diagnosis and follow-up	Disease characteristics treatment	Exposure assessment	Outcome (Events)	Contrast	RR (95% CI)	Covariates
Bandera EV, 2021[118], Women's Circle of Health Study and the Women's Circle of Health Follow-Up Study (WCHFS), USA WC – Included, meta-analysis	Population-based cohort (n=1891), mean age:54.5, Pre-menopausal 39%, post-menopausal 61%, African-American	Diagnosed: 2005-2020, Follow Up: median 5.9 years	Ductal carcinoma in situ or invasive breast cancer. Stage 0 18%, I 36%, II 32%, III 10%, IV 2%. ER positive 70%, negative 27%, missing 3%. No surgery 3%, lumpectomy 51%, mastectomy 46%. Chemotherapy 55%. Radiotherapy 68%. Endocrine therapy 64%.	Measured 2005- February 2020 to September 2020	All-cause mortality (n=274.0)	110.91 vs 90.5	1.74 (1.26-2.41) P trend=0.19	Age, income, smoking, tumor stage, tumor subtype, type of surgery
						Per 10 cm	1.14 (1.06-1.23)	
					Premenopausal All-cause mortality (n=102.0)	110.91 vs 90.5	1.55 (0.93-2.59) P trend=0.17	
						Per 10 cm	1.10 (0.98-1.24)	
					Postmenopausal All-cause mortality (n=172.0)	110.91 vs 90.5	2.12 (1.35-3.31) P trend=0.19	
						Per 10 cm	17 (1.07-1.29)	
					ER positive All-cause mortality (n=167.0)	110.91 vs 90.59	1.57 (1.03-2.39) P trend=0.18	
						Per 10 cm	1.16 (1.06-1.28)	
					ER negative All-cause mortality (n=103.0)	110.91 vs 90.59	1.90 (1.10-3.29) P trend=0.20	
						Per 10 cm	1.12 (0.99-1.27)	
					Age <=45y All-cause mortality (n=66)		1.16 (0.97-1.40)	
					Age 46-59y All-cause mortality (n=118)		1.07 (0.96-1.19)	
					Age >=60 All-cause mortality (n=90)		1.28 (1.12-1.46)	
					Breast cancer-specific mortality (n=168.0)	110.91 vs 90.5	1.64 (1.08-2.48) P trend=0.19	
						Per 10 cm	1.11 (1.01-1.22)	
Buono G, 2020[255], Italy WC – Included, review	Retrospective cohort (n=717)	Diagnosed: 2009-2013	Early breast cancer. Stage I-III	Measured during diagnosis	Overall survival (n=88.0)	88 vs 88.1	2.34 (1.32-4.14) P trend=0.003	Age, stage, treatment, tumor subtype
					Cancer specific mortality		3.24 (1.64-6.41) P trend=0.001	
					Disease free survival (n=156.0)		1.36 (0.91-2.02) P trend=0.1	

Author, year, study name, country	Study description	Time of diagnosis and follow-up	Disease characteristics treatment	Exposure assessment	Outcome (Events)	Contrast	RR (95% CI)	Covariates
Wisse A, 2018[207], Breast Cancer Blood Study (BC Blood Study), Sweden WC – Included, review	Prospective cohort study of cancer survivors (n= 1640), mean age:60.9 year	Follow up= 3.05 years, Calendar year: 2002-2016	Invasive breast cancer ER+ 88.5%, PgR+ 71.1%, HER2+ 11.1% Invasive breast cancer, tumour grade: 27.8% III Chemotherapy: 27.6%; Radiotherapy: 61.7%; Trastuzumab: 8.1%	Before chemotherapy circumference measured by a trained nurse.	Overall survival (n=134)	≥80 cm vs. < 80 cm	1.92 (1.16 - 3.18)	Age, Tumour size, lymph node involvement, histological grade, ER status, alcohol intake, smoking, Treatment
					Overall survival (n=111)	≥80 cm vs. < 80 cm	1.34 (0.70-2.54)	Above factors + BMI
					Overall survival (n=17) Age <50 years	≥80 cm vs. < 80 cm	1.36 (0.43-4.30)	Age, Tumour size, lymph node involvement, histological grade, ER status
					Overall survival (n=117) Age ≥50 years	≥80 cm vs. < 80 cm	2.06 (1.17-3.62)	
					Overall survival ER positive	≥80 cm vs. < 80 cm	1.61 (0.94 - 2.75)	
					Overall survival ER negative	≥80 cm vs. < 80 cm	3.54 (0.83-15.22)	
					Overall survival Radiotherapy treated	≥80 cm vs. < 80 cm	1.79 (0.93-3.45)	
					Overall survival Tamoxifen treated	≥80 cm vs. < 80 cm	2.07 (0.96-4.45)	
					Overall survival Chemo naive	≥80 cm vs. < 80 cm	1.90 (1.09-3.31)	
					Breast cancer recurrence (n=162)	≥80 cm vs. < 80 cm	1.70 (1.14 - 2.54)	Age, Tumour size, lymph node involvement, histological grade, ER status, alcohol intake, smoking, Treatment
					Breast cancer recurrence (n=144)	≥80 cm vs. < 80 cm	1.45 (0.89-2.38)	Above factors + BMI
					Breast cancer recurrence (n=129.0) Age ≥50 years	≥80 cm vs. < 80 cm	2.00 (1.20-3.34)	Age, Tumour size, lymph node involvement, histological grade, ER status
					Breast cancer recurrence (n=129.0) ER positive	≥80 cm vs. < 80 cm	2.09 (0.71 - 6.12)	

Author, year, study name, country	Study description	Time of diagnosis and follow-up	Disease characteristics treatment	Exposure assessment	Outcome (Events)	Contrast	RR (95% CI)	Covariates
					Breast cancer recurrence (n=33.0) ER negative	≥80 cm vs. < 80 cm	1.46 (0.95 - 2.24)	
					Breast cancer recurrence(n=129.0) Age ≥50 years ER positive	≥80 cm vs. < 80 cm	2.07 (0.96-4.45)	
					Breast cancer recurrence Radiotherapy naive	≥80 cm vs. < 80 cm	2.35 (1.22-4.53)	
					Breast cancer recurrence Chemo naive	≥80 cm vs. < 80 cm	1.55 (0.98-2.45)	
					Breast cancer recurrence ER+ and ≥50 years Aromatase inhibitors treated	≥80 cm vs. < 80 cm	2.82 (0.99-8.04)	
					Breast cancer recurrence ER+ and ≥50 years Tamoxifen treated	≥80 cm vs. < 80 cm	2.05 (1.01-4.15)	
Chen HL, 2016[151], China WC – Included, review	Retrospective cohort (n= 206), mean age:48.5	Follow up= 59 months	AJCC stage I to III TNBC (triple negative breast cancer) The majority of the study population who received adjuvant/neoadjuvant chemotherapy received an anthracycline- based regimen (96.1 %); doxorubicin plus cyclophosphamide followed by a taxane was the most frequent regimen administered.	Before Chemotherapy Waist circumference, from medical records at diagnosis	Overall survival (n=38)	>80cm vs. ≤80cm cm	2.30 (1.18 - 4.46)	Nodal status, Tumour stage, Lymphovascular invasion
					Disease-free survival (n=52)	>80cm vs. ≤80cm	1.76 (1.00 - 3.07)	Nodal status, Tumour stage, Lymphovascular invasion
Berrino F, 2014[143], Diet and Androgen-5 (DIANA-5), Italy	Secondary analysis of a lifestyle intervention trial	Follow up= 2.8 years, Calendar year: 2008-2012	Invasive breast cancer Stage I 46.1%, IIa 29.1%, ≥IIb 24.8%	Measured waist circumference, average 1.74 years post-diagnosis	Breast cancer recurrence (n=419)	≥85 cm vs. < 85 cm	1.18 (0.82 - 1.7)	Age, education, stage at diagnosis, ER status

Author, year, study name, country	Study description	Time of diagnosis and follow-up	Disease characteristics treatment	Exposure assessment	Outcome (Events)	Contrast	RR (95% CI)	Covariates
WC – Included, review	(n= 2092) , mean age: 51.4 years 419 cases with metabolic syndrome			before chemotherapy Waist circumference				
George SM, 2014[71], Health, Eating, Activity, and Lifestyle study (HEALS), USA WC – Included, meta-analysis	Prospective cohort of cancer survivors (n= 621) Pre- and postmenopausal, Multi-ethnic	Follow up= 9.5 years	Invasive early stage breast cancer	Around 30-month post-diagnosis, anthropometric measurements were conducted by trained staff using a standardized protocol. After chemotherapy Waist circumference	All-cause mortality(n=107)	99.1-150 vs. 59.4-79.5 cm	2.99 (1.14 - 7.86) P trend=0.033	Age as underlying time metric in Cox regression model, Treatment, number of activity-limiting comorbidities, Race, healthy eating index, post diagnosis recreational physical activity, BMI
					Breast cancer-specific mortality(n=48)	99.1-150 vs. 59.4-79.5 cm	2.69 (0.69 - 12.01) P trend=0.145	
Kwan ML, 2014[304], The California Breast Cancer Survivorship Consortium (CBCSC), United States WC - Excluded	Pooled analysis of 3 case-control (AABCS, SFBCS, CARE), and 3 prospective cohort studies (LACE, MEC, CTS) (n= 11351) Analysis included 4 studies with data. Pre and Post-menopausal Mean age: 60.2 years	Follow up= 11 years, Calendar year: 1993-2007	AJCC stage: I: 48.8%; II: 40.5%; III: 5.7%; IV: 1.7% Unknown: 3.3% ER and/or PR+: 69.3% ER- and PR-: 16% Unknown: 14.8% Breast conserving: 55.5% Mastectomy: 42.1% Chemotherapy: 40.8% Radiation therapy: 51.7%	Self-reported or measured, average 1.7 years post-diagnosis in AABCS, SFBCS LACE; average 3.8 years pre-diagnosis in 80% of CTS and 0.9 years post-diagnosis in 20% of CTS; no data in CARE and MEC Waist circumference ascertained pre- or post-diagnosis	All-cause mortality (n=1531)	≥37.1 vs. <29.8 cm	1.06 (0.86 - 1.32) P trend = 0.09	Age at breast cancer diagnosis, log age at breast cancer diagnosis, cancer stage, race/ethnicity, education, neighbourhood socioeconomic status, place of birth, marital status, menopausal status, age at first birth, history of smoking, alcohol intake, hormone receptor status, nodal positivity , tumour grade, tumour size, prior cancer history, surgery type, chemotherapy, radiation therapy, hormonal therapy, comorbidity, pre-diagnosis BMI, indicator of pre-
					Breast cancer mortality (n=757)	≥37.1 vs. <29.8 cm	1.20 (0.88-1.63) P trend = 0.12	

Author, year, study name, country	Study description	Time of diagnosis and follow-up	Disease characteristics treatment	Exposure assessment	Outcome (Events)	Contrast	RR (95% CI)	Covariates
								diagnosis vs post-diagnosis waist-hip ratio, weight-height ratio, or waist circumference
Williams PT, 2014[117], National Runners' and Walkers' Health Surveys (NRWHS), United States WC – Included, meta-analysis	Population-based study (n= 986) Pre- and postmenopausal Runners (n= 272) or walkers (n= 714) Caucasian 90.35%-100%	Follow up= 9.1 years, Calendar year: 1998-2001	Self-reported breast cancer, no other clinical and pathological information	Self-reported in questionnaire, average 7.9 years post-diagnosis Waist circumference	Breast cancer-specific mortality(n=46)	Per 1 cm	1.014 (0.982 - 1.045)	Age, Race, Exercise
				Hip circumference	Breast cancer-specific mortality(n=46)	Per 1 cm	1.013 (0.979-1.044)	
Goodwin PJ, 2012[72], Toronto, Canada WC – Included, meta-analysis (mortality) Review (recurrence)	Prospective cohort study of cancer survivors (n= 535), pre- and postmenopausal, mean age: 50.3 years, Multi-ethnic Excluded women with serious coexisting medical conditions including diabetes	Follow up= 12.1 years, 4.3% loss to follow-up, Calendar year: 1989-1996	Invasive breast cancer T1 55.5%, T2 32.5%, T3 5%, Tx 6.9% N0 69.2%, N1 30.8% M0 ER+ 67.7% ER- 18.7% Unknown 13.6% PR+ 61.7% PR- 23.4% Unknown 15% Mastectomy: 22.8% Lumpectomy: 77.2% Chemotherapy: 39.8% Hormone therapy: 39.1%	Measured Waist circumference before chemotherapy	Overall survival (n=134)	88.5-123.5 vs. 73-79 cm	1.12 (0.78 - 1.61)	Age, Tumour stage, Tumour grade, Hormone receptor status, Adjuvant chemotherapy, Hormonal therapy
				Waist circumference	Distant disease free(n=134)	88.5-123.5 vs. 59-73 cm	0.95 (0.63 - 1.42)	
				Hip circumference	Overall survival (n=134)	166 vs. 107 cm	1.12 (0.80 - 1.55)	
Markkula A, 2012[311], Swedish Cohort, Sweden WC - Excluded	Prospective cohort of cancer survivors (n= 772) Mean age: 60.4 years	Follow up= 2.94 years for disease-free survival, Loss to follow-up 9.2%, Calendar year: 2002-2010	In situ:28 Invasive:739 ER+ 86.8%, PR+ 69.3% Histological grade: I 25%, II 50%, III 25%	Waist circumferences measured at the preoperative visit. Before chemotherapy	Disease-free survival (n =62) Distant metastasis-free survival (n = 40)	≥80 vs. <80 cm	P log rank test=0.042 P log rank test=0.088	Unadjusted

Author, year, study name, country	Study description	Time of diagnosis and follow-up	Disease characteristics treatment	Exposure assessment	Outcome (Events)	Contrast	RR (95% CI)	Covariates
Abrahamson, 2006[39], Atlanta, Seattle, New Jersey Follow-up Study, United States WC – Included, meta-analysis	Follow-up of cases of a population-based case-control study (n= 1254) Pre- and postmenopausal age range: 20-54	Diagnosis 1990-2000, Follow up= 9.8 years	Invasive:1254 56% ER+ve, 35%ER-ve, 3% borderline, 6% unknown Invasive breast cancer; AJCC; any stage; 57% local, 40% regional, 3% distant	Measured at interview, 4.2months post-diagnosis before chemotherapy Waist circumference Superior to the iliac crest of the pelvis, usually at the level of the umbilicus	Record linkage with National Death index Overall mortality (n=228)	≥88 cm vs. < 80 cm	1.86 (1.4 - 2.46) P trend <0.0001	Tumour stage, Income
					Overall mortality (n=228)	≥88 cm vs. < 80 cm	1.75 (1.20-2.55) P trend =0.03	Above factors + BMI
				Hip circumference Maximum extension of the buttocks	Overall mortality (n=281)	223 vs. 50.7 cm	1.21 (0.88 - 1.66) P trend =0.04	Tumour stage, Income
					Overall survival (n=281)	223 vs. 50.7 cm	0.80 (0.49-1.30) P trend = 0.54	Above factors + BMI
Tao MH, 2006[112], Shanghai Breast Cancer Study (SBCS), China WC – Included, meta-analysis (mortality) Review (recurrence)	Follow-up of cases of a population-based case-control study (n= 1455) Pre- and postmenopausal, age range: 25-64	Diagnosis: 1996-1998 Follow up= 5.1 years, calendar year: Until 2002	44.4% ER+ve, 25.5% ER-ve, 30.0% unknown; 43.5% PR+ve, 25.2% PR-ve, 31.1% unknown Primary breast cancer; TNM; 24.6% Stage 0-I, 34.9% stage IIA, 21.9% stage IIB, 11.3% stage III-IV, 7.1% unknown Surgery: 99%; Adjuvant chemotherapy: 94% ; adjuvant chemotherapy and traditional Chinese medicine: 63%; radiotherapy: 38.9% yes, 47.4% no, 13.6% unknown; tamoxifen use: 63.2% yes, 18.0 no, 18.6% unknown	Waist circumferences measured at or soon after diagnosis	Self-reported, record linkage with death registry Overall survival (n=240)	≥84 cm vs. < 72 cm	1.2 (0.8 - 1.7) P trend=0.24	Age at diagnosis, education, menopausal status, Tumour stage, chemotherapy, Tamoxifen use, radiotherapy, oestrogen receptor level, progesterone receptor level
					Disease-free survival (n=298)	≥84 cm vs. < 72 cm	1.2 (0.9 - 1.7) P trend=0.35	

Supplementary Table S6 Description of studies included in or excluded from the descriptive review or meta-analysis of waist-to-hip ratio (WHR)

Author, year, study name, country	Study description	Time of diagnosis and follow-up	Disease characteristics treatment	Exposure assessment	Outcome (Events)	Contrast	RR (95% CI)	Covariates
Bandera EV, 2021[118], Women's Circle of Health Study and the Women's Circle of Health Follow-Up Study (WCHFS), USA WHR – Included, meta-analysis	Population based cohort (n=1891), mean age:54.5, Pre-menopausal 39%, post-menopausal 61%, African American	Diagnosed:2005-2020 follow Up: median 5.9 years	Ductal carcinoma in situ or invasive breast cancer. Stage 0 18%, I 36%, II 32%, III 10%, IV 2%. ER positive 70%, negative 27%, missing 3%. No surgery 3%, lulmpectomy 51%, mastectomy 46%. Chemotherapy 55%. Radiotherapy 68%. Endocrine therapy 64%.	Measured 2005-February 2020 to September 2020	All-cause mortality (n=274.0)	0.951 vs 0.65	1.61 (1.12-2.33) P trend=0.03	Age, income, smoking, tumor stage, tumor subtype, type of surgery
						Per 5 unit	1.29 (1.11-1.50)	
					Premenopausal All-cause mortality (n=102.0)	0.951 vs 0.65	1.14 (0.67-1.96) P trend=0.03	
						Per 5 unit	1.03 (0.79-1.34)	
					Postmenopausal All-cause mortality (n=172.0)	0.951 vs 0.65	2.15 (1.28-3.61) P trend=0.02	
						Per 5 unit	1.47 (1.22-1.77)	
					ER positive All-cause mortality (n=167.0)	0.951 vs 0.65	1.38 (0.89-2.15) P trend=0.03	
						Per 5 unit	1.29 (1.06-1.57)	
					ER negative All-cause mortality (n=103.0)	0.951 vs 0.65	2.24 (1.14-4.41)	
						Per 5 unit	1.31 (1.03-1.66)	
					Age <=45y All-cause mortality (n=66)		0.90 (0.65-1.25)	
					Age 46-59y All-cause mortality (n=118)		1.25 (0.97-1.60)	
					Age >=60 All-cause mortality (n=90)		1.76 (1.37-2.26)	
					Breast cancer-specific mortality (n=168.0)	0.951 vs 0.65	1.68 (1.04-2.71)	
						Per 5 unit	1.19 (0.99-1.44)	
Tryggvadottir H, 2019[240], Sweden WHR – Included, review	Prospective cohort (n=1178) mean age:61.5	Diagnosed:2002-2014, follow Up: Maximum 13 years	Breast cancer. Histological grade I 24.7%, II 47.7%, III 27.6%. ER + 88.5%. PR+ 71.8%. Chemotherapy 28.2%. Radiotherapy 61.2%	Measured during diagnosis 2002-2014 to 2016	All-cause mortality	0.85 vs 0.851	1.44 (0.99-2.10)	Age at diagnosis, axillary node dissection, er status, histological grade, tumor size, weight
					Recurrence		P trend=0.013	Unadjusted

Bao PP, 2016[42], Shanghai Breast Cancer Survival Study (SBCSS), China WHR – Excluded (mortality) Included, review (recurrence)	Prospective cohort study of cancer survivors (n= 518) 53.09% postmenopausal Mean age:53.4 years 80% response rate 6.51 months from diagnosis to study enrolment	Follow up= 9.1 years, 10-year post-diagnosis survey completed for 55% survivors	Triple-negative breast cancer Stage (%): I: 30.89%; II: 55.60%; III: 10.23%; Unknown: 3.28% Mastectomy: 95.56 % Chemotherapy: 94.40 % Radiotherapy: 27.41 % Immunotherapy: 17.76 % Tamoxifen use: 21.62 %	Waist and hip circumferences were measured at diagnosis by trained interviewers according to a standard protocol	All-cause mortality(n=128) Recurrence/ breast cancer mortality (n= 112)	≥0.87 vs. <0.87	0.93 (0.56 - 1.54) P trend=0.89 1.11 (0.64-1.91) P trend=0.83	Age at diagnosis, education, menopausal status, Exercise, type of surgery, chemotherapy, radiotherapy, TNM stage
Shariff-Marco S, 2015[107] Neighborhoods	Prospective cohort study of cancer survivors	Follow up= 7.4 years	Invasive breast cancer Mainly ER+ or PR+ AJCC stage at	Waist and hip circumference measured at	All-cause mortality (n=489)	≥0.87 vs. <0.77	1.65 (1.20 - 2.26) P trend=<0.01	

and Breast Cancer (NABC), (San Francisco Bay Area Breast Cancer Study (SFBCS), Northern California site of the Breast Cancer Family Registry (NC-BCFR)), United States WHR – Included, meta-analysis	(n= 4347) Pre and Post-menopausal Age range: 18-64 years		diagnosis: I to IV and unknown Type of surgery: None, lumpectomy, mastectomy, unknown Chemotherapy: No, yes, unknown Radiation: No, yes	interview in SFBCS (average 21 months after diagnosis)	Breast cancer-specific mortality (n=267)	≥0.87 vs. <0.77	1.62 (1.06 - 2.48) P trend=0.03	Age at diagnosis, year of diagnosis, race/ethnicity, Histology , histological grade, ERPR status, first subsequent primary tumour, time to first subsequent primary tumour, type of surgery, chemotherapy, radiation therapy, Marital status, education, History of benign breast disease, menopausal status, age at menarche, number of full-term pregnancies, breastfeeding, years since last full-term pregnancy, History of hormonal contraception use, history of menopausal hormone therapy use, recent recreational physical activity, alcohol intake, stratified by study, pre-diagnosis BMI
Sun X, 2015[109], Carolina Breast Cancer Study (CBCS), USA WHR – Included, meta-analysis	Follow-up of cases in case-control study (n= 1109) Pre- (49%) and postmenopausal (51%) Mean age: 50.60 years White 55% African-American 45%	Follow up= 13.5 years, Calendar year: 1993-2001	Invasive breast cancer Stage I 37%, II 50%, III-IV 12% Luminal 64% Basal-like 18% HER2+ 6% Normal-like 11% No treatment information	Waist circumference, hip circumference, height, and body weight were measured by trained nurses at interview average 145 days post-diagnosis	Overall survival (n=442)	≥0.84 vs. <0.77	1.25 (0.91 - 1.72)	Age, race, study phase, income, education, physical activity, alcohol intake, smoking, parity, tumour stage, tumour size, lymph node status, histological type
					Overall survival (n=84) Basal-like	≥0.84 vs. <0.77	0.87 (0.39-1.93)	
					Overall survival (n=278) Luminal	≥0.84 vs. <0.77	1.33 (0.89-1.97)	
					Breast cancer-specific mortality(n=273)	≥0.84 vs. <0.77	0.91 (0.62 - 1.34)	

					Breast cancer-specific mortality(n=61) Basal-like	≥0.84 vs. <0.77	0.94 (0.37- 2.41)	
					Breast cancer-specific mortality(n=152) Luminal	≥0.84 vs. <0.77	0.82 (0.50- 1.36)	
					Overall survival (n=442)	≥0.84 vs. <0.77	1.44 (1.04-1.99)	Age, race, study phase, income, education, physical activity, alcohol intake, smoking, parity, BMI
					Overall survival (n=84) Basal-like	≥0.84 vs. <0.77	0.52 (0.22-1.23)	
					Overall survival (n=278) Luminal	≥0.84 vs. <0.77	1.79 (1.20-2.68)	
					Breast cancer-specific mortality(n=273)	≥0.84 vs. <0.77	1.12 (0.76-1.64)	
					Breast cancer-specific mortality(n=61) Basal-like	≥0.84 vs. <0.77	0.64 (0.24-1.74)	
					Breast cancer-specific mortality(n=152) Luminal	≥0.84 vs. <0.77	1.21 (0.73-2.08)	
George SM, 2014[71], Health, Eating, Activity, and Lifestyle study (HEALS), USA WHR – Included, meta-analysis	Prospective cohort of cancer survivors (n= 621) Pre- and postmenopausal Multi-ethnic	Follow up= 9.5 years	Invasive early stage breast cancer	Around 30-month post-diagnosis, anthropometric measurements were conducted by trained staff using a standardized protocol	All-cause mortality(n=107)	0.88-1.04 vs. 0.64 – 0.77	2.1 (1.08 - 4.05) P trend=0.028	Age as underlying time metric in Cox regression model, Treatment, number of activity-limiting comorbidities, Race, healthy eating index, post diagnosis recreational physical activity, BMI
					Breast cancer-specific mortality(n=48)	0.88-1.04 vs. 0.64 – 0.77	4.02 (1.31 -12.31) P trend=0.029	
Chen Y, 2013[397], Shanghai Breast Cancer Survival Study (SBCSS), China WHR - Excluded	Prospective cohort (n=4842) mean age:53.3, Pre and postmenopausal, Chinese	Diagnosed:2002-2006 follow Up: Median 5.3 years, Loss to Follow-up: Not reported	Primary breast cancer. Stage 0-III.	FFQ Measured 2002-2006 until 2011	Breast cancer recurrence (n=720)		P interaction 0.05-0.65	Age at diagnosis, comorbidity, education, er/pr status, marital status, number of parity, quality of life, tnm stage, treatment

Chen X, 2010[55], Shanghai Breast Cancer Survival Study (SBCSS), China WHR – Included, meta-analysis	Prospective cohort study of cancer survivors (n= 5042) Pre- and postmenopausal (51.1%) Mean age: 53.5 years Response rate 80%	Average 6.5 months from diagnosis to study enrolment Follow up= 46 months, Calendar year: 2002-2006	Invasive and in situ breast cancer Stage 0-I 36.4% IIA 32.6%, IIB 16.6%, III-IV 9.8% ER+/PR+ 49.9% ER-/PR- 27.6% ER+/PR- or ER-/PR+ 20.4% Mastectomy 93.9% Chemotherapy 91.2% Radiotherapy 32.1% Tamoxifen: 52% Comorbidity 20%	Anthropometric measurements were taken twice according to a standard protocol by trained interviewers at the baseline interview 6 months post diagnosis	Total mortality (n=442)	≥0.87 vs. <0.77	1.22 (0.91 - 1.63) P trend = 0.057	Age at diagnosis, education, Income, Marital status, Comorbidity, Exercise, Meat intake, Cruciferous vegetables, Soy protein, Time from diagnosis to randomization, menopausal status, Menopausal symptoms, chemotherapy, Surgery type, radiotherapy, Tamoxifen use, Receptor status, Nodal status, Immunotherapy, BMI at 6 months post-diagnosis
					Relapse/disease-specific mortality (n=481)	≥0.87 vs. <0.77	1.17 (0.88 - 1.56) P trend = 0.226 In text: WHR was not significantly related to mortality with or without adjustment for BMI in pre- or post-menopausal women	
Dal Maso L, 2008[60], Six Italian Regions Follow-up Study, Italy WHR – Included, meta-analysis	Follow-up of cases of a case-control study (n= 1453) Pre- and postmenopausal Mean age:55 years	Follow up= 12.6 years, Calendar year: 1991-1994	Invasive breast cancer Stage I 475 cases II 642 cases III-IV 193 cases Unknown 143 cases ER+PR+ 603 cases ER-PR+ 52 cases ER+PR- 92 cases ER-PR- 147 cases Unknown 559 cases	Measured waist (2 cm above the umbilicus), and hip (maximal Protrusion) in women diagnosed no longer than a year before interview	Overall survival(n=482)	≥0.85 vs. <0.80	1.31 (1.05 - 1.64) P trend=0.01	Region, Age at diagnosis, year of diagnosis, TNM stage, Receptor status
					Breast cancer-specific mortality(n=378)	≥0.85 vs. <0.80	1.27 (0.98 - 1.64) P trend=0.06	
					Breast cancer-specific mortality stage I-II (n=256)	≥0.85 vs. <0.80	1.35 (0.99-0.84) P trend = 0.06	

					Breast cancer-specific mortality stage III-IV (n=108)	≥0.85 vs. <0.80	1.02 (0.59-1.76) P trend = 0.94	
					Breast cancer-specific mortality Age at diagnosis < 55y (n=181)	≥0.85 vs. <0.80	1.84 (1.25-2.69) P trend < 0.01	
					Breast cancer-specific mortality Age at diagnosis ≥55y (n=217)	≥0.85 vs. <0.80	1.07 (0.76-1.51) P trend=0.58	
					Breast cancer-specific mortality ER+PR+ (n=169)	≥0.85 vs. <0.80	1.31 (0.88-1.95) P trend =0.18	
					Breast cancer-specific mortality Other ER/PR status (n=229)	≥0.85 vs. <0.80	1.22 (0.76-1.95) P trend=0.40	
Abrahamson, 2006 [39], Atlanta, Seattle, New Jersey, United States WHR – Included, meta-analysis	Follow-up of cases in case-control study (n= 1254) Pre- (78%) and postmenopausal (22%) Age range: 20-54 years White 75% Non-white 25% 86% completed interviews at median 4.2 months post-diagnosis	Diagnosis: 1990-2000, follow up= max 9.8 years <2% loss to follow-up	Invasive breast cancer Local 57% Regional 40% Distant 3% ER+ 56% ER- 35% Borderline 3% Unknown 6%	Measured at interview, 4.2months post-diagnosis and before treatment Waist circumference, superior to the iliac crest of the pelvis, usually at the level of the umbilicus Hip circumference, maximum extension of the buttocks	Overall survival(n=281) (85% breast cancer deaths)	≥0.86 vs. <0.76	1.74 (1.23 - 2.46) P trend =0.0009	Tumour stage, Income
					Overall survival(n=281)	≥0.86 vs. <0.76	1.52 (1.05-2.19) P trend =0.02	Tumour stage, Income, BMI
Tao MH, 2006[112], Shanghai Breast Cancer Study (SBCS), China WHR – Included, meta-analysis (mortality) Included, review (recurrence)	Follow-up of cases in case-control study (n= 1455) Pre- and postmenopausal Age range: 25-64 years Response rate: 91.1%	Follow up= 5.1 years, Calendar year: 1996-1998	Stage 0-I 24.6% IIA 34.9% IIB 21.9% III-IV 11.3% Unknown 7.1% ER+ 44% ER- 25.5% Unknown 30.0% PR+ 43.5% PR- 25.2% Unknown 31.1% Surgery 99% Chemotherapy 94%	Measured at or soon after diagnosis at interview	Overall survival(n=240) (218 breast cancer deaths, 22 other deaths)	≥0.84 vs. <0.77	1.1 (0.8 - 1.6) P trend=0.31	Age at diagnosis, education, menopausal status, tumour stage, chemotherapy, tamoxifen use, radiotherapy, oestrogen receptor level, progesterone receptor level
					Disease-free survival (n=298)	≥0.84 vs. <0.77	1.1 (0.8 - 1.6) P trend=0.26	

			Chemotherapy and traditional Chinese medicine 63% Radiotherapy 38.9% Tamoxifen 63.2%					
Borugian M, 2003[49], Canada WHR – Included, meta-analysis	Prospective cohort of breast cancer survivors (n= 603) Pre- and postmenopausal Mean age: 54.4 years	Follow up= 10 years, Calendar year: 1991-2002	Tumour grades: Well differentiated 7.6%, moderately differentiated 46.4%, poorly differentiated 46% ER+ 76.4% Tamoxifen 21.9%; Chemotherapy 14.7%; Chemotherapy and tamoxifen 21.4%; Other hormone 1.9%; None 40.1%	Self-administered questionnaire, after surgery before treatment	Breast cancer-specific mortality(n=112) pre-menopausal	≥0.85 vs. <0.76	1.2 (0.4 - 3.4)	Age, family history, oestrogen receptor level, TNM stage, systemic treatment (chemotherapy or tamoxifen), BMI
						Per 0.1 unit	1.0 (0.6 - 1.8)	
					Breast cancer-specific mortality(n=63) post-menopausal	≥0.85 vs. <0.76	3.3 (1.1 - 10.4)	
						Per 0.1 unit	1.4 (0.9 - 2.1)	

Supplementary Table S7 Description of studies included in or excluded from the descriptive review or meta-analysis of weight change

Author, year, study name, country	Study description	Time of diagnosis and follow-up	Disease characteristics treatment	Exposure assessment	Outcome (events)	Contrast	RR (95% CI)	Covariates
Franzoi MA, 2021[238], MONARCH 2 AND MONARCH 3 trials, Multi-national Weight change during treatment - Excluded	Secondary analysis of clinical trials (n=1138)		Advanced ER-positive, Her2-negative breast cancer; 757 abemaciclib + endocrine therapy, 381 only endocrine therapy	Measured	Abemaciclib + endocrine therapy Progression-free survival	<5% vs >=5%	Log-rank test: P=0.55	
					Placebo + endocrine therapy Progression-free survival	<5% vs >=5%	Log-rank test: P=0.95	
Jung AY, 2021[218], Mammary Carcinoma Risk Factor Investigation (MARIE) study, Germany Post diagnosis weight change - Included, review	Population-based Cohort Study (n=2216), mean age:62.9	Diagnosed: 2002-2005	Invasive breast cancer. Grade low/moderate 69.1%, high 21.7%. HER2 positive 16.5%, negative 69.9%. Mastectomy 2.6%, mastectomy + axilla 23.5%, breast conserving 8.6%, breast conserving + axilla 65.3%. Chemotherapy 45.6%. Radiotherapy 80%. Tamoxifen/aromatase inhibitor use 80.9%.	Self-reported	All-cause mortality (n=234.0)	Large loss (>10%) vs Maintenance (within 5%)	2.49(1.61-3.88)	Age at diagnosis, BMI at diagnosis, grade, hormone receptor status, mode of detection, nodal status, recurrence, study centre, tumor size, baseline height, menopausal hormone therapy at diagnosis and chemotherapy, physical activity, waist-hip ratio, type of surgery, radiation therapy, tamoxifen/aromatase inhibitor therapy, comorbidities [CCI], smoking, alcohol, education, HER2 status, self-perceived health
						Moderate loss (>=5% to <=10%) vs Maintenance (within 5%)	1.42(0.95-2.13)	
						Moderate gain (>=5% to <=10%) vs Maintenance (within 5%)	0.77(0.50-1.20)	
						Large gain (>10%) vs Maintenance (within 5%)	1.64(1.02-2.62)	
					Cancer specific mortality (n=129.0)	Large loss (>10%) vs Maintenance (within 5%)	3.09(1.70-5.62)	
						Moderate loss (>=5% to <=10%) vs Maintenance (within 5%)	1.16(0.62-2.16)	
						Moderate gain (>=5% to <=10%) vs	0.81(0.46-1.42)	

						Maintenance (within 5%)		
						Large gain (>10%) vs Maintenance (within 5%)	2.24(1.25-4.02)	
					Recurrence-free survival (n=239.0)	Large loss (>10%) vs Maintenance (within 5%)	1.43(0.86-2.35)	
						Moderate loss (>=5% to <=10%) vs Maintenance (within 5%)	1.28(0.86-1.89)	
						Moderate gain (>=5% to <=10%) vs Maintenance (within 5%)	0.73(0.46-1.15)	
						Large gain (>10%) vs Maintenance (within 5%)	1.22(0.74-2.01)	
					Normal weight at baseline All-cause mortality (n=83.0)	Weight loss >=5% vs Maintenance (within 5%)	2.33(1.30-4.16)	
						Weight gain >=5% vs Maintenance (within 5%)	1.11(0.62-1.99)	
					Overweight All-cause mortality (n=148.0)	Weight loss >=5% vs Maintenance (within 5%)	1.70(1.15-2.53)	
						Weight gain >=5% vs Maintenance (within 5%)	0.94(0.60-1.48)	
					Normal weight at baseline Cancer	Weight loss >=5% vs Maintenance (within 5%)	2.17(0.87-5.42)	

					specific mortality (n=45.0)	Weight gain >=5% vs Maintenance (within 5%)	1.76(0.84-3.69)	
					Overweight at baseline Cancer specific mortality (n=84.0)	Weight loss >=5% vs Maintenance (within 5%)	1.69(0.97-2.96)	
						Weight gain >=5% vs Maintenance (within 5%)	0.88(0.48-1.59)	
					Normal weight at baseline Recurrence-free survival (n=87.0)	Weight loss >=5% vs Maintenance (within 5%)	1.60(0.91-2.84)	
						Weight gain >=5% vs Maintenance (within 5%)	0.64(0.33-1.24)	
					Overweight at baseline Recurrence-free survival (n=149.0)	Weight loss >=5% vs Maintenance (within 5%)	1.29(0.86-1.95)	
						Weight gain >=5% vs Maintenance (within 5%)	0.98(0.63-1.53)	
					Charlson comorbidity index 0-1 All-cause mortality (n=171.0)	Weight loss >=5% vs Maintenance (within 5%)	1.48(1.00-2.20)	
						Weight gain >=5% vs Maintenance (within 5%)	1.08(0.71-1.62)	
					Charlson comorbidity index >=2 All-cause mortality (n=171.0)	Weight loss >=5% vs Maintenance (within 5%)	2.80(1.46-5.34)	
						Weight gain >=5% vs Maintenance (within 5%)	0.97(0.47-1.99)	
					Charlson comorbidity index 0-1 Cancer	Weight loss >=5% vs Maintenance (within 5%)	1.63(0.95-2.79)	

					specific mortality (n=102.0)	Weight gain >=5% vs Maintenance (within 5%)	1.45(0.87-2.42)	
					Charlson comorbidity index >=2 Cancer specific mortality (n=26.0)	Weight loss >=5% vs Maintenance (within 5%)	2.56(0.74-8.90)	
						Weight gain >=5% vs Maintenance (within 5%)	1.39(0.45-4.26)	
					Charlson comorbidity index 0-1 Recurrence-free survival (n=178.0)	Weight loss >=5% vs Maintenance (within 5%)	1.08(0.71-1.62)	
						Weight gain >=5% vs Maintenance (within 5%)	0.91(0.60-1.36)	
					Charlson comorbidity index >=2 Recurrence-free survival (n=61.0)	Weight loss >=5% vs Maintenance (within 5%)	2.57(1.33-4.95)	
						Weight gain >=5% vs Maintenance (within 5%)	0.77(0.35-1.68)	
					All-cause mortality (n=234.0)	Fast weight loss (>10%) vs Maintenance (within 5%)	1.83(1.27-2.63)	
						Slow weight loss (>=5% to <=1%) vs Maintenance (within 5%)	1.36(0.88-2.09)	
						Slow weight gain (>=5% to <=1%) vs Maintenance (within 5%)	1.04(0.66-1.64)	
						Fast weight gain (>1%) vs Maintenance (within 5%)	1.23(0.84-1.79)	

					Cancer specific mortality (n=129.0)	Fast weight loss (>10%) vs Maintenance (within 5%)	1.82(1.07-3.10)	
						Slow weight loss (>=5% to <=1%) vs Maintenance (within 5%)	1.11(0.59-2.11)	
						Slow weight gain (>=5% to <=1%) vs Maintenance (within 5%)	1.38(0.75-2.52)	
						Fast weight gain (>1%) vs Maintenance (within 5%)	1.54(0.93-2.55)	
					Recurrence-free survival (n=239.0)	Fast weight loss (>10%) vs Maintenance (within 5%)	1.32(0.93-1.89)	
						Slow weight loss (>=5% to <=1%) vs Maintenance (within 5%)	1.06(0.68-1.64)	
						Slow weight gain (>=5% to <=1%) vs Maintenance (within 5%)	0.88(0.58-1.35)	
						Fast weight gain (>1%) vs Maintenance (within 5%)	0.95(0.65-1.39)	
					Weight gain >=5% All-cause mortality (n=47)	Per 1 %	1.02(1.00-1.05)	
					Weight gain >=5% Cancer specific mortality (n=32)		1.04(1.02-1.07)	

					Weight gain >=5% Recurrence-free survival (n=40)		1.02(0.99-1.04)	
					Weight loss >=5% All-cause mortality (n=61)		1.05(1.03-1.08)	
					Weight loss >=5% Cancer specific mortality (n=30)		1.06(1.03-1.10)	
					Weight loss >=5% Recurrence-free survival (n=52)		1.02(1.00-1.05)	
Martel S, 2021[120], ALTO BIG 2-06 trial, Multi-country Post diagnosis weight change - Included, review	Secondary analysis of clinical trials (n=8381), mostly White	Follow-up: median 4.5 years	HER2-positive early breast cancer	Measured	Overall survival (n=141.0)	Weight loss (>=5%) vs Stable weight	1.83(1.18-2.84)	Region, ethnicity, age, menopausal status, nodal status, size, location, grade, type of chemo, surgery, HER status
						Weight gain (>=5%) vs Stable weight	1.21(0.82-1.77)	
					Disease free survival (n=559.0)	Weight loss (>=5%) vs Stable weight	1.34(1.05-1.71)	
						Weight gain (>=5%) vs Stable weight	1.16(0.96-1.40)	
					Distant disease-free survival (n=341.0)	Weight loss (>=5%) vs Stable weight	1.46(1.07-1.98)	
						Weight gain (>=5%) vs Stable weight	1.25(0.99-1.59)	
					Normal weight at baseline Overall survival (n=260.0)	Weight loss (>=5%) vs Stable weight	2.00(0.95-4.19)	
						Weight gain (>=5%) vs Stable weight	1.29(0.72-2.32)	
					Normal weight at baseline Disease free survival (n=260.0)	Weight loss (>=5%) vs Stable weight	1.33(0.91-1.95)	
						Weight gain (>=5%) vs Stable weight	1.05(0.80-1.38)	
					Normal weight at baseline Distant	Weight loss (>=5%) vs Stable weight	1.69(1.04-2.77)	

					disease-free survival (n=260.0)	Weight gain (>=5%) vs Stable weight	1.39(0.98-1.97)	
					Overweight at baseline Overall survival (n=122.0)	Weight loss (>=5%) vs Stable weight	0.89(0.34-2.38)	
						Weight gain (>=5%) vs Stable weight	1.27(0.63-2.54)	
					Overweight at baseline Disease free survival (n=122.0)	Weight loss (>=5%) vs Stable weight	1.28(0.82-2.00)	
						Weight gain (>=5%) vs Stable weight	1.40(0.99-1.97)	
					Overweight at baseline Distant disease-free survival (n=122.0)	Weight loss (>=5%) vs Stable weight	1.02(0.55-1.86)	
						Weight gain (>=5%) vs Stable weight	1.13(0.72-1.77)	
					Obese at baseline Overall survival (n=83.0)	Weight loss (>=5%) vs Stable weight	3.01(1.38-6.57)	
						Weight gain (>=5%) vs Stable weight	0.97(0.38-2.49)	
					Obese at baseline Disease free survival (n=122.0)	Weight loss (>=5%) vs Stable weight	1.45(0.91-2.30)	
						Weight gain (>=5%) vs Stable weight	1.10(0.70-1.71)	
					Obese at baseline Distant disease-free survival (n=83.0)	Weight loss (>=5%) vs Stable weight	1.59(0.91-2.78)	
						Weight gain (>=5%) vs Stable weight	1.17(0.68-1.99)	
					Premenopausal Overall survival (n=56.0)	Weight loss (>=5%) vs Stable weight	2.97(1.55-5.68)	
						Weight gain (>=5%) vs Stable weight	1.35(0.71-2.55)	
						Weight loss (>=5%) vs Stable weight	1.57(1.11-2.22)	

					Premenopausal Disease-free survival (n=255.0)	Weight gain (>=5%) vs Stable weight	1.28(0.97-1.68)	
					Premenopausal Distant disease-free survival (n=161.0)	Weight loss (>=5%) vs Stable weight	1.97(1.29-3.02)	
						Weight gain (>=5%) vs Stable weight	1.51(1.06-2.14)	
					Postmenopausal Overall survival (n=85.0)	Weight loss (>=5%) vs Stable weight	1.20(0.63-2.28)	
						Weight gain (>=5%) vs Stable weight	1.14(0.70-1.86)	
					Postmenopausal Disease-free survival (n=304.0)	Weight loss (>=5%) vs Stable weight	1.18(0.84-1.66)	
						Weight gain (>=5%) vs Stable weight	1.07(0.82-1.39)	
					Postmenopausal Distant disease-free survival (n=180.0)	Weight loss (>=5%) vs Stable weight	1.11(0.71-1.75)	
						Weight gain (>=5%) vs Stable weight	1.11(0.79-1.55)	
					Hormone receptor +ve Overall survival (n=79.0)	Weight loss (>=5%) vs Stable weight	2.24(1.25-4.02)	
						Weight gain (>=5%) vs Stable weight	1.63(0.98-2.70)	
					Hormone receptor +ve Disease free survival (n=330.0)	Weight loss (>=5%) vs Stable weight	1.46(1.07-1.99)	
						Weight gain (>=5%) vs Stable weight	1.35(1.06-1.73)	
					Hormone receptor +ve Distant disease-free survival (n=202.0)	Weight loss (>=5%) vs Stable weight	1.48(0.99-2.22)	
						Weight gain (>=5%) vs Stable weight	1.48(1.09-2.00)	
						Weight loss (>=5%) vs Stable weight	1.35(0.68-2.69)	

					Hormone receptor - ve Overall survival (n=62.0)	Weight gain (>=5%) vs Stable weight	0.98(0.66-1.44)	
					Hormone receptor - ve Disease-free survival (n=229.0)	Weight loss (>=5%) vs Stable weight	1.21(0.82-1.77)	
						Weight gain (>=5%) vs Stable weight	0.93(0.69-1.27)	
					Hormone receptor - ve Distant disease-free survival (n=139.0)	Weight loss (>=5%) vs Stable weight	1.47(0.92-2.35)	
						Weight gain (>=5%) vs Stable weight	0.98(0.66-1.44)	
					Treated with trastuzumab alone Overall survival (n=94.0)	Weight loss (>=5%) vs Stable weight	1.87(0.83-4.21)	
						Weight gain (>=5%) vs Stable weight	1.09(0.54-2.21)	
					Treated with trastuzumab alone Disease-free survival (n=151.0)	Weight loss (>=5%) vs Stable weight	1.42(0.88-2.28)	
						Weight gain (>=5%) vs Stable weight	1.20(0.84-1.71)	
					Treated with trastuzumab alone Distant disease-free survival (n=94.0)	Weight loss (>=5%) vs Stable weight	1.51(0.82-2.76)	
						Weight gain (>=5%) vs Stable weight	1.33(0.85-2.09)	
					Treated with lapatinib alone Overall survival (n=41.0)	Weight loss (>=5%) vs Stable weight	2.62(1.19-5.79)	
						Weight gain (>=5%) vs Stable weight	1.79(0.86-3.70)	
					Treated with lapatinib alone Disease-free survival (n=147.0)	Weight loss (>=5%) vs Stable weight	1.62(1.05-2.49)	
						Weight gain (>=5%) vs Stable weight	1.00(0.68-1.47)	
					Treated with lapatinib alone	Weight loss (>=5%) vs Stable weight	1.98(1.19-3.30)	

					Distant disease-free survival (n=102.0)	Weight gain (>=5%) vs Stable weight	1.24(0.79-1.96)	
					Treated with trastuzumab followed by lapatinib Overall survival (n=24.0)	Weight loss (>=5%) vs Stable weight	0.99(0.28-3.47)	
						Weight gain (>=5%) vs Stable weight	0.90(0.35-2.36)	
					Treated with trastuzumab followed by lapatinib Disease free survival (n=126.0)	Weight loss (>=5%) vs Stable weight	1.34(0.81-2.24)	
						Weight gain (>=5%) vs Stable weight	1.10(0.73-1.66)	
					Treated with trastuzumab followed by lapatinib Distant disease-free survival (n=126.0)	Weight loss (>=5%) vs Stable weight	1.61(0.84-3.11)	
						Weight gain (>=5%) vs Stable weight	1.11(0.65-1.92)	
					Treated with trastuzumab + lapatinib Overall survival (n=33.0)	Weight loss (>=5%) vs Stable weight	1.62(0.64-4.15)	
						Weight gain (>=5%) vs Stable weight	1.17(0.53-2.60)	
					Treated with trastuzumab + lapatinib Disease free survival (n=135.0)	Weight loss (>=5%) vs Stable weight	1.00(0.58-1.73)	
						Weight gain (>=5%) vs Stable weight	1.37(0.94-2.00)	
					Treated with trastuzumab + lapatinib Distant disease-free survival (n=74.0)	Weight loss (>=5%) vs Stable weight	0.69(0.29-1.62)	
						Weight gain (>=5%) vs Stable weight	1.40(0.85-2.31)	
Corona SP, 2020[365], BALLET study, Multi-country	Secondary analysis of clinical trials (n=687)		Advanced or metastatic hormone receptor-positive breast cancer	Measured	Progression-free survival	Weight loss <=-6.90%	Log-rank test: P=0.009	
						weight loss -6.9% to -3.17%		
						Weight loss -3.17% to 0%		
						Weight loss >=0%		

Weight change during treatment - Excluded						Absolute weight loss <=-4.90	Log-rank test: P=0.069	
						Absolute weight loss -4.90 to -2		
						Absolute weight loss -2 to 0		
						Absolute weight loss >=0		
						Weight loss -6.9% to -3.17% vs Weight loss <=-6.90%	1.13(0.56-2.29)	Unadjusted
						Weight loss -3.17% to 0% vs Weight loss <=-6.90%	1.18(0.84-1.64)	
						Weight loss >=0% vs Weight loss <=-6.90%	1.39(1.09-1.76)	
						Weight loss -6.9% to -3.17% vs Weight loss <=-6.90%	1.36(0.95-1.95)	
						Weight loss -3.17% to 0% vs Weight loss <=-6.90%	1.23(0.98-1.55)	
						Weight loss >=0% vs Weight loss <=-6.90%	1.14(0.91-1.43)	
						Grade 1 vs Grade 0	0.93(0.73-1.18)	
						Grade 2 vs Grade 0	0.91(0.71-1.17)	
						Grade 3 vs Grade 0	0.69(0.53-0.87)	
						Grade 4 vs Grade 0	0.69(0.48-0.99)	
Fadelu T, 2020[124], Haiti	Retro-spective Cohort of Cancer Survivors (n=224),	Diagnosed: 2012-2016, follow-up:	Nonmetastatic breast cancer; Locally advance disease; 58.5%. ER	Medical records	Disease free survival (n=80.0)	Weight loss weight gain	Log-rank test: P= 0.7514	

Weight change during treatment - Excluded	mean age:49.1 years, Postmenopausal 36.2%.	median 21.7 months	positive 61.8%; Neoadjuvant chemotherapy 45.1%, adjuvant chemotherapy 82.6%.			Loss >3% Stable +=3% Gain >3%	Log-rank test: P= 0.1327	
Tryggvadottir H, 2019[240], Sweden Post diagnosis weight change – Included, review	Prospective Cohort of Cancer Survivors (n=1178) mean age:61.5	Diagnosed: 2002-2014, follow-up:13 years maximum	Breast cancer. Histological grade I 24.7%, II 47.7%, III 27.6%. ER + 88.5%. PR+ 71.8%. Chemotherapy 28.2%. Radiotherapy 61.2%	Measured	Age >= 70 years All-cause mortality	Weight loss (>5%) vs Stable weight (<=5%)	3.56 (1.5-8.44)	Age at diagnosis, axillary node dissection, er status, histological grade, tumor size, weight
					Age < 50y Recurrence (n=33.0)	Weight gain (>5%) vs Stable weight (<=5%)	2.64 (1.28-5.45)	
					Age >= 70 years Recurrence (n=20.0)	Weight loss (>5%) vs Stable weight (<=5%)	3.47 (1.06-11.33)	
Flanagan MR, 2018[132], USA Post diagnosis weight change - Included, review	Nested Case-control Study (n=1310), 520 Pre or perimenopausal, 749 Postmenopausal, 41 Unknown. Mostly white	Diagnosed: 1995-2013 (diagnosed with DCIS)	Breast cancer: Ductal carcinoma In situ; Histology of DCIS (n): 494 Mixed, 298 NOS, 171 Comedo, 158 Cribriform, 128 Solid, 61 other; Treatment for initial DCIS (n): 13 Biopsy only, 707 BCS with radiation, 308 without radiation, 282 Mastectomy. Adjuvant endocrine therapy (n): 863 No, 445 Yes, 2 Unknown.	Interview Medical records	Any second breast cancer	Weight Loss >/=6 kg vs Weight Gain or loss within 2 kg	1.30(0.90-2.00)	Adjuvant endocrine therapy, age, grade, histology, menopausal status at diagnosis, other covariates, radiation therapy, surgery, survival time, year of diagnosis
						Weight Loss >2-5.9 kg vs Weight Gain or loss within 2 kg	0.90(0.60-1.30)	
						Weight Gain >2-5.9 kg vs Weight Gain or loss within 2 kg	0.90(0.60-1.20)	
						Weight Gain >2-5.9 kg vs Weight Gain or loss within 2 kg	1.00(0.70-1.50)	
					Invasive secondary breast cancer	Weight Loss >/=6 kg vs Weight Gain or loss within 2 kg	1.30(0.80-2.10)	
						Weight Loss >2-5.9 kg vs Weight Gain or loss within 2 kg	0.90(0.50-1.40)	
						Weight Gain >2-5.9 kg vs Weight Gain or loss within 2 kg	1.00(0.60-1.50)	

						Weight gain >/=6 kg vs Weight Gain or loss within 2 kg	1.10(0.70-1.80)	
					In-situ secondary breast cancer	Weight Loss >/=6 kg vs Weight Gain or loss within 2 kg	1.40(0.70-2.80)	
						Weight Loss >2-5.9 kg vs Weight Gain or loss within 2 kg	0.90(0.50-1.90)	
						Weight Gain >2-5.9 kg vs Weight Gain or loss within 2 kg	0.70(0.40-1.30)	
						Weight gain >/=6 kg vs Weight Gain or loss within 2 kg	0.80(0.40-1.70)	
Mutschler, 2018 [191], ADEBAR, Germany Weight change during adjuvant chemo-therapy - Included, review	Secondary analysis of clinical trial (n=1080), Pre- and postmenopausal, mean age: 53 years	Follow up= 62.9 months	High-risk early breast cancer patients, lymph node+ positive	Measured weight between the first and the last cycle of chemotherapy	Overall survival	Weight loss ≥5% vs. stable weight <5%	1.55 (0.97-2.47)	Age, menopausal status, tumor stage, nodal status, grade, histological type, hormone receptor status, HER2 status, chemotherapy
						Weight gain ≥5% vs. stable weight <5%	1.55 (1.01-2.40)	
					Disease-free survival	Weight loss ≥5% vs. stable weight <5%	1.43 (0.97-2.11)	
						Weight gain ≥5% vs. stable weight <5%	1.26 (0.88-1.79)	
Raghavendra A, 2018[257] Weight change during treatment - Included, review	Retro-spective Cohort of Cancer Survivors (n=1282) mean age:56.4, Multi-ethnic	Diagnosed: 1997-2008	Stage I-III, hormone receptor positive, human epidermal growth factor receptor 2-negative Chemotherapy 54.8%. Endocrine therapy tamoxifen 30.65, aromatase inhibitor 51.8%, sequential aromatase inhibitor and tamoxifen 17.8%. Radiotherapy 67.8%.	Medical records	Recurrence-free survival	Weight gain >5% vs weight change <=5%	0.95(0.62-1.47)	Unadjusted

			Lumpectomy 54.3%, mastectomy 45.7%.					
Cespedes Feliciano EM, 2017[149], Kaiser Permanente Northern California (KPNC), United States Post-diagnosis weight change - Included, review	Follow-up study of a cancer survivors' cohort (n= 12590), mean age:59 years	Diagnosed: 2005-2013, follow up: 3.4 years median	Early-stage invasive breast cancer; 55% stage I, 35% stage II, 10% stage III; 47% surrogate luminal A; 36% surrogate luminal B; 5% HER2+ endocrine negative; 12% triple negative; 46% chemotherapy; 42% radiotherapy	Measured height and weight at diagnosis and 18 months after diagnosis	All-cause mortality (n=980) From diagnosis to 18 months post-diagnosis	Large loss (≥10%) vs stable within 5%	2.24 (1.87-2.69)	Age, Race, alcohol intake, smoking status, Comorbidity, pre-diagnosis BMI, stage, grade, receipt of adjuvant chemotherapy, receipt of radiotherapy, tumour characteristics ER, PR and HER2 status
						Modest loss (>5-<10%) vs. stable within 5%	1.15 (0.95-1.39)	
						Large gain (≥10%) vs. stable within 5%	0.98 (0.74 - 1.31)	
						Modest gain (>5-<10%) vs. stable within 5%	0.96 (0.78-1.19)	
					All-cause mortality Early follow-up: before 3-year (18-54 months post-diagnosis)	Large loss (≥10%) vs stable within 5%	2.63 (2.12-3.26)	
						Modest loss (>5-<10%) vs. stable within 5%	1.39 (1.11-1.74)	
					All-cause mortality Late follow-up: after 3-year (>54 months post-diagnosis)	Large loss (≥10%) vs stable within 5%	1.60 (1.14-2.25)	
						Modest loss (>5-<10%) vs. stable within 5%	0.77 (0.54-1.11)	
					Breast cancer-specific mortality (n=503) Early follow-up: before 3-year (18-54 months post-diagnosis)	Large loss (≥10%) vs stable within 5%	2.13 (1.65-2.76)	
						Modest loss (>5-<10%) vs. stable within 5%	1.24 (0.95-1.61)	
						Large gain (≥10%) vs. stable within 5%	0.98 (0.67 - 1.44)	
						Modest gain (>5-<10%) vs. stable within 5%	1.06 (0.79-1.41)	

Bao PP, 2016 [42], Shanghai Breast Cancer Survival Study (SBCSS), China Pre-to-post-diagnosis weight change – Included, review	Prospective cohort study of cancer survivors, (n= 518) Pre- and postmenopausal (53.09%), mean age: 53.4 years	Recruited approx.6.5 months after diagnosis; Follow-up: 9.1 years	Invasive TNBC; stage I 30.9%, II 55.6%, III 10.2%; no metastasis; Mastectomy: 95.6%, Chemotherapy: 94.4 %, Radiotherapy: 27.4 %, Immunotherapy: 17.8 %, Tamoxifen: 21.6%	Self-reported weight 1 year prior and at diagnosis; measured approximately 6, 18, 36 and 60 months after diagnosis Pre- to 18 months post-diagnosis weight change	All-cause mortality (n=110)	Loss ≥5% vs. ±5%	2.08 (1.25-3.46)	Age at diagnosis, education, menopausal status, Exercise, type of surgery, chemotherapy, radiotherapy, TNM stage
						Gain ≥5% vs. ±5%	1.26 (0.80-2.00)	
					All-cause mortality (n= 56) Pre-diagnosis BMI <24 kg/m²	Loss ≥5% vs. ±5%	1.73 (0.74-4.04)	
						Gain ≥5% vs. ±5%	1.13 (0.60-2.13)	
					All-cause mortality (n= 53) Pre-diagnosis BMI ≥24 kg/m²	Loss ≥5% vs. ±5%	2.15 (1.09-4.26)	
						Gain ≥5% vs. ±5%	1.88 (0.92-3.85)	
					All-cause mortality (n= 39) Premenopausal	Loss ≥5% vs. ±5%	6.22 (2.13-8.13)	
						Gain ≥5% vs. ±5%	2.84 (1.23-6.58)	
					All-cause mortality (n= 71) Postmenopausal	Loss ≥5% vs. ±5%	1.64 (0.91-2.98)	
						Gain ≥5% vs. ±5%	0.95 (0.50-1.80)	
					Relapse/ Disease specific mortality (n=97)	Loss ≥5% vs. ±5%	2.50 (1.45 - 4.30)	
						Gain ≥5% vs. ±5%	1.32 (0.81-2.15)	
					Relapse/ Disease specific mortality (n= 52) Pre-diagnosis BMI <24 kg/m²	Loss ≥5% vs. ±5%	1.80 (0.72-4.52)	
						Gain ≥5% vs. ±5%	1.30 (0.67-2.50)	
					Relapse/ Disease specific mortality (n= 45) Pre-diagnosis BMI ≥24 kg/m²	Loss ≥5% vs. ±5%	2.65 (1.28-5.46)	
						Gain ≥5% vs. ±5%	1.91 (0.85-4.31)	
						Loss ≥5% vs. ±5%	7.26 (2.62-20.11)	

					Relapse/Disease specific mortality (n=40) Premenopausal	Gain ≥5% vs. ±5%	2.38 (1.08-5.25)	
					Relapse/Disease specific mortality (n=57) Postmenopausal	Loss ≥5% vs. ±5%	1.92 (0.98-3.79)	
						Gain ≥5% vs. ±5%	1.01 (0.50-2.05)	
Brooks JD, 2016[138], Women's Environmental Cancer and Radiation Epidemiology (WECARE), USA Post-diagnosis body weight change - Included, review	Nested Case-control Study (n=3431), mean age:46, Mostly White	Diagnosed: 1985-2008	Invasive breast cancer stage I-III	Self-reported, Weight change from first diagnosis to second diagnosis/reference date	Pre-menopausal Contralateral breast cancer	>3 loss vs -3 to <3 loss	0.60(0.30-1.30)	Age at diagnosis, age at menarche, chemotherapy, er status, family history, histology, hormonal therapy, number of full-term pregnancies, radiotherapy, tumor stage
						3 to <10 gain vs -3 to <3 loss	0.90(0.50-1.40)	
						>=10 gain vs -3 to <3 loss	0.50(0.30-1.20)	
					Post-menopausal Contralateral breast cancer	>3 loss vs -3 to <3 loss	1.10(0.70-1.90)	
						3 to <10 gain vs -3 to <3 loss	1.00(0.70-1.50)	
						>=10 gain vs -3 to <3 loss	1.30(0.80-2.10)	
					Pre- to post-menopausal Contralateral breast cancer	>3 loss vs -3 to <3 loss	1.10 (0.70-1.50)	
						3 to <10 gain vs -3 to <3 loss	1.2	
						>=10 gain vs -3 to <3 loss	1.40 (1.01-1.90)	
					Pre-menopausal, ER+ Contralateral breast cancer	>3 loss vs -3 to <3 loss	0.50(0.10-1.40)	
						3 to <10 gain vs -3 to <3 loss	1.00(0.50-2.10)	
						>=10 gain vs -3 to <3 loss	0.50(0.20-1.60)	
						>3 loss vs -3 to <3 loss	0.50(0.10-2.60)	

					Pre-menopausal, ER- Contralateral breast cancer	3 to <10 gain vs -3 to <3 loss	0.60(0.20-1.30)	
						>=10 gain vs -3 to <3 loss	0.40(0.10-1.40)	
					Post-menopausal, ER+ Contralateral breast cancer	>3 loss vs -3 to <3 loss	1.40(0.70-2.80)	
						3 to <10 gain vs -3 to <3 loss	0.90(0.50-1.60)	
						>=10 gain vs -3 to <3 loss	0.70(0.40-1.40)	
					Post-menopausal, ER- Contralateral breast cancer	>3 loss vs -3 to <3 loss	1.20(0.50-3.00)	
						3 to <10 gain vs -3 to <3 loss	1.00(0.40-2.10)	
						>=10 gain vs -3 to <3 loss	2.20(0.70-6.40)	
					Pre- to post-menopausal, ER+ Contralateral breast cancer	>3 loss vs -3 to <3 loss	0.70(0.40-1.20)	
						3 to <10 gain vs -3 to <3 loss	1.00(0.70-1.50)	
						>=10 gain vs -3 to <3 loss	1.20(0.80-1.90)	
					Pre- to post-menopausal, ER- Contralateral breast cancer	>3 loss vs -3 to <3 loss	1.70(0.80-3.50)	
						3 to <10 gain vs -3 to <3 loss	1.40(0.90-2.30)	
						>=10 gain vs -3 to <3 loss	1.90(0.99-3.80)	
					Pre- to post-menopausal & <25 kg/m2 Contralateral breast cancer	>=10 gain vs -3 to <3 loss	1.60(1.10-2.40)	
Nechuta S, 2016[27], After Breast Cancer Pooling	Pooled analysis (prospective studies) (final n=	Diagnosed: 1976–2004, follow up= 12 years for	5-year disease free (survived average 2 years) invasive ER+	Measured/self-reported, about 1 year before	Late mortality (≥5 years) (n=1183)	5-10% loss vs. ±5%	1.16 (0.95-1.41)	Age at diagnosis, TNM stage, PR status, chemotherapy,
						≥10% loss vs. ±5%	1.17 (0.53-2.59)	

Project (ABCPP) (Women's Healthy Eating and Living (WHEL), Life After Cancer Epidemiology (LACE), Nurses' Health Study (NHS), United States Pre-to-post-diagnosis weight change – Included, review	5675 in recurrence analysis; 6596 in mortality analysis); Mean age: 59.4 years; Pre- and postmenopausal (72.9%) Excluded 921 and 599 women due to event/loss to follow-up prior to 5 years after diagnosis in respective analysis	mortality, 10.6 years for recurrence	breast cancer; Stage I 53.2%, II 35.7%, III 11.1%; PR+ 81.9%; Mastectomy 48.6%; Chemotherapy 46.2%, Radiotherapy 61.6%, Hormonal therapy 86.3%	diagnosis and average 2.1 years after diagnosis		5-10% gain vs. ±5%	1.08 (0.85-1.36)	radiotherapy, Surgery, Hormonal therapy, race/ethnicity, menopausal status, Comorbidity, time between exposure measurement and 5-year post-diagnosis date, stratified by study, pre-diagnosis BMI, Exercise, alcohol intake, smoking,
						≥10% gain vs. ±5%	1.06 (0.82 - 1.38)	
					Early mortality (<5 years) (n=216)	5-10% loss vs. ±5%	1.39 (0.93-2.08)	Age at diagnosis, TNM stage, PR status, chemotherapy, radiotherapy, Surgery, Hormonal therapy, race/ethnicity, menopausal status, Comorbidity, time between exposure measurement and 5-year post-diagnosis date, stratified by study, post diagnosis BMI, Exercise, alcohol intake, smoking
						≥10% loss vs. ±5%	1.60 (0.99-2.56)	
						5-10% gain vs. ±5%	0.81 (0.53-1.25)	
						≥10% gain vs. ±5%	1.09 (0.71-1.68)	
					Late recurrence (≥5 years) (n=593)	5-10% loss vs. ±5%	0.77 (0.56-1.07)	Age at diagnosis, TNM stage, PR status, chemotherapy, radiotherapy, Surgery, Hormonal therapy, race/ethnicity, menopausal status, Comorbidity, time between exposure measurement and 5-year post-diagnosis date, stratified by study, pre-diagnosis BMI, Exercise, alcohol intake, smoking
						≥10% loss vs. ±5%	0.67 (0.42-1.05)	
						5-10% gain vs. ±5%	1.05 (0.84-1.31)	
						≥10% gain vs. ±5%	1.24 (1.00 - 1.53)	

					Early recurrence (<5 years) (n=396)	5-10% loss vs. ±5%	0.71 (0.48-1.04)	Age at diagnosis, TNM stage, PR status, chemotherapy, radiotherapy, Surgery, Hormonal therapy, race/ethnicity, menopausal status, Comorbidity, time between exposure measurement and 5-year post-diagnosis date, stratified by study, post diagnosis BMI, Exercise, alcohol intake, smoking,
						≥10% loss vs. ±5%	1.01 (0.66-1.55)	
						5-10% gain vs. ±5%	0.88 (0.66-1.17)	
						≥10% gain vs. ±5%	1.00 (0.75-1.32)	
Shariff-Marco S, 2015 [107], Neighborhoods and Breast Cancer (NABC), (San Francisco Bay Area Breast Cancer Study (SFBCS), Northern California site of the Breast Cancer Family Registry (NC-BCFR)), United States Pre- to post-diagnosis weight change - Included, meta-analysis	Prospective cohort study (n= 4347), age range: 18-64 years, pre-menopausal 34.9%, post-menopausal 58.9%, Response rate SFBCS: 84%, NC-BCFR: 83% Excluded Native American or mixed race/ethnicity	Diagnosed: 1995-2009, follow up= 7.4 years average	Invasive breast cancer; AJCC stage I 43.7%, II 44.4%, III 7%, IV 1.8% ER+ or PR+ 69.1%; ER-/PR- 21.2%; Unknown HR status 9.7%; Chemotherapy: 55.2%; Radiation: 58.9%	Interviewed (NC-BCFR) or measured (SFBCS) post-diagnosis weight (average 21 months after diagnosis) from self-reported adult height and weight a year prior to diagnosis	All-cause mortality (n=895)	≥2 % loss vs stable ±1%	1.23 (0.92 - 1.63)	Age at diagnosis, year of diagnosis, race/ethnicity, Histology, histological grade, ERPR status, first subsequent primary tumour, time to first subsequent primary tumour, type of surgery, chemotherapy, radiation therapy, Marital status, education, History of benign breast disease, menopausal status, age at menarche, number of full-term pregnancies, breastfeeding, years since last full-term pregnancy, History of hormonal contraception use, history of menopausal hormone therapy use, recent recreational physical activity, alcohol intake, stratified by study, pre-diagnosis BMI
						2-10% gain vs stable ±1%	0.88 (0.65-1.20)	
						>10% gain vs stable ±1%	0.89 (0.65 - 1.21) P trend=0.61	

					Breast cancer-specific mortality (n=560)	≥2 % loss vs stable ±1%	1.35(0.94-1.95)	Age at diagnosis, year of diagnosis, race/ethnicity, Histology, histological grade, ERPR status, first subsequent primary tumour, time to first subsequent primary tumour, type of surgery, chemotherapy, radiation therapy, Marital status, education, History of benign breast disease, menopausal status, age at menarche, number of full-term pregnancies, breastfeeding, years since last full-term pregnancy, History of hormonal contraception use, history of menopausal hormone therapy use, recent recreational physical activity, alcohol intake, stratified by study
						2-10% gain vs stable ±1%	1.09 (0.73-1.63)	
						>10% gain vs stable ±1%	1.19 (0.79-1.79) P trend=0.25	
Jeon, 2014 [172], Catholic University of Korea Post-diagnosis weight change - Included, review	Retro-spective Study (n= 108)	Diagnosed: 2005-2010, follow up: Max 5 years	Stage: II 59%, III 49%	Medical record reviewed at diagnosis, after chemotherapy, 12 months, or 24 months after diagnosis	Relapse free survival (n= 16)	After chemo: Loss ≥5% vs. Stable	Infinite	Age, BMI at diagnosis, menopausal status, stage, ER and PR status, surgery, comorbidity
						After chemo: Gain ≥5% vs stable	1.2 (0.4-3.4)	
						After 12 months: Loss ≥5% vs. Stable	0.8 (0.2-3.7)	
						After 12 months: Gain ≥5% vs stable	1.9 (0.6-5.9)	
						After 24 months: Loss ≥5% vs. Stable	1.6 (0.4-6.2)	

						After 24 months: Gain ≥5% vs stable	2.4 (0.8-7.5)	
Ladoire S, 2014[181], PACS01 and PAC04 phase I Weight change during treatment - Excluded	Secondary analysis of clinical trials (n=4996) Pre and Post-menopausal mean age:50.556.4% pre, 43.6% post	Follow Up: Median 5.9 years	Tumour grade Unknown: 3% 1: 12.3% 2: 45.1% 3: 39.7% Tumour size (mm): =50 mm: 6% Breast cancer subtypes: HER2+++:18% Triple negative: 12% RE or RP+ and HER2-: 70.1%. Treatment arm: Six FEC: 50.1% Three FEC+ three docetaxel: 20.2% Six (epirubicin + docetaxel): 29.8%	At baseline before initiation of chemotherapy treatment.	Overall survival	No weight change vs weight change +-10%	P trend= 0.90	Unadjusted
					Disease-free	No weight change vs weight change +-10%	P trend= 0.59	
Bradshaw PT, 2012[50], Long Island Breast Cancer Study Project (LIBCSP), United States Pre- to post-diagnosis weight change – Included, meta-analysis	Follow-up of cases from case-control study (n= 1436), mean age:59 years, pre- and postmenopausal, 82% response rate	Diagnosed: 1996-1997, follow up= 8.8 years	Primary in situ or invasive breast cancer; ER+ 74%, ER- 26%, Unknown 483 patients; PR+ 64%, PR- 36% Unknown 487 patients; Chemotherapy: 41% yes, 59% no, 459 unknown	Self-reported weight and height 1 year before diagnosis, at diagnosis, 1 year after diagnosis and at time of follow-up (about 5 years after diagnosis)	All-cause mortality (n=292)	>5% loss vs. ±5%	5.29 (3.48-8.09)	Age at diagnosis, chemotherapy, ER status, PR status, Tumour size, pre-diagnosis BMI and weight change
						5-10% gain vs. ±5%	1.09 (0.51-2.18)	
						>10% gain vs. ±5%	2.67 (1.37-5.05)	
					Breast cancer-specific mortality (n= 156)	>5% loss vs. ±5%	7.09 (3.93-13.4)	
						5-10% gain vs. ±5%	0.85 (0.24-2.46)	
						>10% gain vs. ±5%	2.84 (1.15-6.65)	
Brooks JD, 2012 [275], The Women's Environmental Cancer and Radiation Epidemiology Study (WECARE I), USA And Denmark	Nested Case-control Study (n=1510) Pre- and postmenopausal mean age:45, Cancer 56.4% postmenopausal, mostly white	Diagnosed: 1985-2000 follow up: Average 4 years	In situ or invasive breast cancer; 65.3% localized, 34.7% regional Chemotherapy: 44.3% yes, 55.7% no; Hormone treatment: 70.7% yes, 29.2% no; Radiation treatment: 70% ever, 30% never	Self-reported First diagnosis and 1 year after	Pre-menopausal (n=247) Contralateral breast cancer	>5kg loss vs -5 to <5kg change	0.43(0.14-1.30)	Age at diagnosis, age of menarche, chemotherapy, family history, histology, hormonal therapy, number of full-term pregnancies, radiation therapy, tumor stage
						5-<10kg gain vs -5 to <5kg change	1.19(0.67-2.11)	
						>=10kg gain vs -5 to <5kg change	0.63(0.32-1.24)	
					Post-menopausal (n=264)	>5kg loss vs -5 to <5kg change	0.49(0.15-1.61)	

Post diagnosis weight change - Excluded					Contralateral breast cancer	5-<10kg gain vs -5 to <5kg change	0.86(0.53-1.40)	
						>=10kg gain vs -5 to <5kg change	1.33(0.73-2.42)	
Caan BJ, 2012 [52], After Breast Cancer Pooling Project (ABCPP) (Women's Healthy Eating and Living (WHEL), Life After Cancer Epidemiology (LACE), Nurses' Health Study (NHS), United States and Shanghai Breast Cancer Survival Study (SBCSS), China Pre- to post-diagnosis weight change – Included, meta-analysis	Pooled analysis (prospective studies (n= 12915), mean age 57 years, premenopausal 32.2%, postmenopausal 64.6%; Non-Hispanic white 57.8%, Asian 36.4%, Hispanic 2.1%, Non-Hispanic black 1.7%	Diagnosed: 1990-2006, follow up= 8.1 years	Invasive breast cancer, Stage I 46.6%, II 40.8%, III 12.6%; ER+/PR+ 60.8%, ER-/PR+ 4.8% ER+/PR- 14%, ER-/PR- 20.4%; Chemotherapy only 34.5%, Radiation only 19%, Both 31.4%, Hormone therapy 66.8%; Any comorbidity 35.6%	Self-reported weight 1 year before diagnosis, self-report weight (SBCSS, LACE, NHS) or weight measured (WHEL) about 2.1 years post-diagnosis	All-cause mortality (n=1271) U.S. sites	5-10% loss vs. ±5%	1.20 (0.99-1.45)	Age, Race, menopausal status, stage, Hormone receptor status, positive lymph nodes, Treatment, smoking, pre-diagnosis BMI
						>10% loss vs. ±5%	1.41 (1.14-1.75)	
						>10% loss vs. ±5% With comorbidity	1.70 (1.29–2.23)	
						>10% loss vs. ±5% No comorbidity	1.13 (0.77–1.65)	
						>10% loss vs. ±5% Underweight/normal weight	1.74 (1.16–2.60)	
						>10% loss vs. ±5% Overweight/Obese	1.40 (1.09–1.81)	
						>10% loss vs. ±5% Ever smoker	1.58 (1.20–2.09)	
						>10% loss vs. ±5% Never smoker	1.27 (0.91–1.79)	
						5-10% gain vs. ±5%	0.98 (0.83-1.15)	
						>10% gain vs. ±5%	1.15 (0.98-1.35)	
						With comorbidity >10% gain vs. ±5%	1.10 (0.83–1.45)	
						>10% gain vs. ±5% No comorbidity	1.17 (0.94–1.46)	
						>10% gain vs. ±5% Underweight/normal weight	1.24 (0.98–1.56)	
						>10% gain vs. ±5% Overweight/obese	1.04 (0.83–1.31	
						>10% gain vs. ±5% Ever smoker	1.20 (0.97–1.48)	

						>10% gain vs. ±5% Never smoker	1.03 (0.80–1.33)	
					All-cause mortality (n=326) Shanghai	5-10% loss vs. ±5%	1.35 (0.94-1.94)	
						>10% loss vs. ±5% With Comorbidity	3.25 (2.24-4.73)	
						>10% loss vs. ±5% No comorbidity	3.68 (2.09–6.47)	
						>10% loss vs. ±5% Underweight/ normal weight	2.89 (1.71–4.89)	
						>10% loss vs. ±5% Overweight/ obese	4.08 (1.07–2.83)	
						5-10% gain vs. ±5%	2.62 (1.58–4.36)	
						>10% gain vs. ±5%	0.93 (0.68-1.28)	
						>10% gain vs. ±5% With comorbidity	1.16 (0.84 -1.62)	
						>10% gain vs. ±5% No comorbidity	1.46 (0.67–3.18)	
						>10% gain vs. ±5% Underweight/ normal weight	1.05 (0.73–1.51)	
						>10% gain vs. ±5% Overweight/ obese	1.20 (0.83–1.75)	
						>10% gain vs. ±5%No subgroup on smoking	1.42 (0.67–3.00)	
					Breast cancer-specific mortality (n= 757) U.S. sites	5-10% loss vs. ±5%	1.09 (0.84-1.42)	
						>10% loss vs. ±5%	1.13 (0.83-1.56)	

						5-10% gain vs. ±5%	0.97 (0.79-1.19)	
						>10% gain vs. ±5%	1.03 (0.84-1.26)	
					Breast cancer-specific mortality (n= 279) Shanghai	5-10% loss vs. ±5%	1.54 (1.05-2.28)	
						>10% loss vs. ±5%	3.60 (2.39-5.42)	
						5-10% gain vs. ±5%	1.00 (0.71-1.41)	
						>10% gain vs. ±5%	1.25 (0.88-1.77)	
Bradshaw PT, 2010 [273], Long Island Breast Cancer Study Project (LIBCSP), United States Pre- to-post-diagnosis weight change – Excluded	Follow-up of cases of population-based case-control study (n=1436), mean age:58.79 years, pre- and postmenopausal	Diagnosed: 1996-1997, follow up= 8.8 years	35.5% ER+, 22.1% ER-, 42.4% missing among those with data; 42.4% PR+, 23.7% PR-, 33.9% missing Tumour size >2cm: 16.3% yes, 52.2% no, 31.5% missing Chemotherapy: 28.1% yes, 39.9% no, 32% missing	Pre-to-post-diagnosis weight change Post-treatment; 1 year after diagnosis	All-cause mortality	5% loss vs. maintain within 5%	4.48(2.53-7.92)	Age, chemotherapy, ER status, PR status, Tumour size
						5-10%gain vs. maintain within 5%	0.89(0.32-2.2)	
						>10% gain vs. maintain within 5%	1.75 (0.76 - 3.97)	
					Breast cancer-specific mortality	5% loss vs. maintain within 5%	8.58(3.67-21.98)	
						5-10%gain vs. maintain within 5%	1.0(0.91-3.94)	
						>10% gain vs. maintain within 5%	1.65 (0.46 - 5.58)	
Chen X, 2010 [55], Shanghai Breast Cancer Survival	Prospective cohort study of cancer survivors	Average 6.5 months from diagnosis to study	Invasive and in situ breast cancer; Stage 0-I 36.4%; IIA 32.6%, IIB	Self-reported weight at 1 year prior to diagnosis	All-cause mortality (n=291)	Pre to 18m post >1 kg loss vs. ±1 kg	2.41 (1.62-3.58)	Age at diagnosis, education, Income, Marital status,

Study (SBCSS), China Pre-to-post-diagnosis weight change – Excluded	(n= 5042), mean age: 53.5 years, Pre- and postmenopausal (51.1%) , Response rate 80%	enrolment, Follow up= 46 months , Calendar year: 2002-2006	16.6%, III-IV 9.8%; ER+/PR+ 49.9%; ER-/PR- 27.6%; ER+/PR- or ER-/PR+ 20.4%; Mastectomy: 93.9%, Chemotherapy: 91.2%, Radiotherapy: 32.1%; Tamoxifen: 52%, Comorbidity 20%	and at diagnosis, weight measured approximately 6 and 18 months after diagnosis Weight change from pre-diagnosis to 18 months post-diagnosis		1-5 kg gain vs. ±1 kg	1.89 (1.27-2.82)	Comorbidity, Exercise, Meat intake, Cruciferous vegetables, Soy protein, Time from diagnosis to randomization, menopausal status, Menopausal symptoms, chemotherapy, Surgery type, radiotherapy, Tamoxifen use, Receptor status, Nodal status, Immunotherapy, pre-diagnosis BMI
						≥5 kg gain vs. ±1 kg	1.71 (1.12-2.60)	
						Pre to 6m post >1 kg loss vs. ±1 kg	2.41 (1.62- 3.58)	
						1-5 kg gain vs. ±1 kg	1.89 1.27- 2.82	
						≥5 kg gain vs. ±1 kg	1.71 1.12, 2.60	
					Relapse/ disease-specific mortality (n= 251)	Pre to 18m post >1 kg loss vs. ±1 kg	1.60 (1.03-2.48)	
						1-5 kg gain vs. ±1 kg	1.97 (1.30-2.97)	
						≥5 kg gain vs. ±1 kg	1.90 (1.23-2.93)	
						Pre to 6 m post >1 kg loss vs. ±1 kg	1.13 (0.87-1.48)	
						1-5 kg gain vs. ±1 kg	1.10 (0.85- 1.43)	
						≥5 kg gain vs. ±1 kg	1.31 (0.97- 1.75)	
Thivat E, 2010[204], Jean Perrin Center, Clermont-Ferrand Review Study, France	Retro-spective Cohort of Cancer Survivors (n=111), mean age:54 years, 45% premenopausal, 55% post-menopausal	Follow Up: Average ranged from 19.4-27.6 years; loss to follow-up: 0% lost	Early stage and locally advanced breast cancer; 19% T1, 44% T2, 15% T3, 22% T4; 8% patients had Scarff-Bloom-Richardson Grade I, 55% II, 20% III Anthracycline-based chemotherapy: all patients;	Measured at the beginning of treatment and in the last chemotherapy cycle	Overall survival (n=57)	>5% vs <5%	2.11(1.21-3.66)	BMI, hormonal therapy, menopausal status, nodal status, tumor stage
					Disease-free survival (n=55)	>5% vs <5%	2.28(1.29-4.03)	

Weight change during treatment - Included, review			Tumourectomy: 66 patients; Mastectomy: 44 patients; Radiation: 97% (after chemotherapy); Hormonal therapy: 44% (90% with tamoxifen)					
Nichols HB, 2009[100], Collaborative Women's Longevity Study (CWLS), United States Pre-to-post-diagnosis weight change – Included, review	Follow-up of cases from case-control studies (final n= 3993), mean age:58.4 years, Pre- and postmenopausal, white >98% Excluded women with metastatic or unknown stage of disease (n= 649), breast cancer recurrence before enrolment (n= 553), or un-intentional weight loss (n= 262)	Diagnosed: 1988-1999, recruited on average 5.8 years after diagnosis, follow up= 6.3 years, response rate 40%	Invasive non-metastatic breast cancer; Local 64.1%, Regional 24.7%, Distant 0.6%, Unknown stage 10.6%	Self-reported weight in questionnaire Weight change from 1-5 years before diagnosis to within the past year of enrolment (average 5.8 years after diagnosis)	Total mortality (n=421)	Loss 10 to 50 kg vs -2 to 2 kg	2.66 (1.73, 4.07)	Age, Tumour stage, time from diagnosis to exposure assessment, family history, smoking, Physical activity, menopausal status, pre-diagnosis weight
						Gain 10.1 to 103 kg vs. -2 to 2 kg	1.7 (1.21 - 2.41)	
						Per 5 kg decrease	1.24 (1.07-1.43)	
						Per 5 kg increase	1.12 (1.04-1.22)	
					Breast cancer-specific mortality (n=121)	Loss 10 to 50 kg vs -2 to 2 kg	0.64 (0.15-2.79)	
						Gain 10.1 to 103 Kg vs. -2 to 2 kg	1.78 (1.01 -3.14)	
						Per 5 kg decrease	0.79 (0.42-1.47)	
						Per 5 kg increase	1.13 (1.03-1.25)	
					CVD mortality (n=95)	Loss 10 to 50 kg vs -2 to 2 kg	1.08 (0.42, 2.78)	
						Gain 10.1 to 103 Kg vs. -2 to 2 kg	1.73 (0.83, 3.62)	
						Per 5 kg decrease	1.02 (0.75-1.40)	
						Per 5 kg increase	1.19 (1.01-1.40)	
Caan BJ, 2008 [51], (Life After Cancer Epidemiology (LACE), United States Pre-to-post-diagnosis weight	Prospective cohort study, (n= 1692), mean age:58.3 years, Pre- and postmenopausal	Diagnosed: 1997-2000; Entered study on average 1.9 years post-diagnosis, follow up: 83.9 months; Response rate 46%	Stage I-IIIA invasive breast cancer; 1551 ER+/PR+; 348 ER-/PR-; 343 others HR status; 793 node+; 1363 node-cases; 423 patients chemotherapy, 552 patients radiotherapy, 855 patients chemo-	Self-reported pre-diagnosis weight and weight at study entry and height, 11-39 months (average 22.7) after diagnosis	All-cause mortality (n=160)	5-10% loss vs. ±5%	1.1 (0.6-1.9)	Tumour stage, Age at diagnosis, Tamoxifen use, Treatment, Nodal status, oestrogen receptor level, progesterone receptor level, smoking, Physical activity
						≥10% loss vs. ±5%	2.1 (1.3-3.4)	
						5-10% gain vs. ±5%	1.2 (0.8-1.9)	
						≥10% gain vs. ±5%	0.7 (0.4-1.2)	
					Total mortality (n=98) ER+/PR+	5-10% loss vs. ±5%	1.0 (0.5-2.0)	
						≥10% loss vs. ±5%	1.8 (0.9-3.3)	

change – Excluded			and radiotherapy, 1610 patients current tamoxifen use, 153 patients past tamoxifen use			5-10% gain vs. ±5%	1.1 (0.6 -1.9)	
						≥10% gain vs. ±5%	0.7 (0.4-1.3)	
					Total mortality (n=64) ER- or PR-	5-10% loss vs. ±5%	1.1 (0.5-2.7)	
						≥10% loss vs. ±5%	2.5 (1.1-5.5)	
						5-10% gain vs. ±5%	1.3 (0.7-2.6)	
						≥10% gain vs. ±5%	0.8 (0.4-1.8) P interaction = 0.95	
					Total mortality (n=110) Pre-diagnosis BMI <30 kg/m^2	5-10% loss vs. ±5%	1.4 (0.8-2.7)	
						≥10% loss vs. ±5%	1.6 (0.8- 3.5)	
						5-10% gain vs. ±5%	1.2 (0.7- 2.0)	
						≥10% gain vs. ±5%	0.7 (0.4- 1.3)	
					Total mortality (n=52) Pre-diagnosis BMI >=30 kg/m^2	5-10% loss vs. ±5%	0.4 (0.1-1.5)	
						≥10% loss vs. ±5%	2.8 (1.4-5.6)	
						5-10% gain vs. ±5%	1.1 (0.4-2.8)	
						≥10% gain vs. ±5%	0.8 (0.3-2.1) P interaction: 0.40	
					Breast cancer recurrence (n=207)	5-10% loss vs. ±5%	0.9 (0.6-1.5)	
						≥10% loss vs. ±5%	1.7 (1.0-2.6)	
						5-10% gain vs. ±5%	0.8 (0.5-1.2)	
						≥10% gain vs. ±5%	0.8 (0.5-1.2)	
					Breast cancer recurrence (n=123) ER+/PR+	5-10% loss vs. ±5%	0.8 (0.4-1.5)	
						≥10% loss vs. ±5%	1.3 (0.7-2.5)	
						5-10% gain vs. ±5%	0.7 (0.4-1.3)	
						≥10% gain vs. ±5%	0.6 (0.4-1.1)	

					Breast cancer recurrence (n=84) ER- or PR-	5-10% loss vs. ±5%	1.1 (0.5-2.4)	
						≥10% loss vs. ±5%	2.1 (1.0-4.4)	
						5-10% gain vs. ±5%	0.8 (0.4-1.6)	
						≥10% gain vs. ±5%	1.2 (0.7-2.2) P interaction = 0.53	
					Breast cancer recurrence (n=149) Pre-diagnosis BMI <30 kg/m^2	5-10% loss vs. ±5%	1.1 (0.6-2.0)	
						≥10% loss vs. ±5%	1.4 (0.7-2.8)	
						5-10% gain vs. ±5%	0.9 (0.5-1.4)	
						≥10% gain vs. ±5%	0.8 (0.5-1.2)	
					Breast cancer recurrence (n=58) Pre-diagnosis BMI >=30 kg/m^2	5-10% loss vs. ±5%	0.5 (0.2-1.4)	
						≥10% loss vs. ±5%	2.5 (1.2-5.1)	
						5-10% gain vs. ±5%	0.7 (0.2- 1.9)	
						≥10% gain vs. ±5%	1.0 (0.4-2.4) P interaction = 0.47	
Makari-Judson G, 2007[406], Review of a Oncology Practise and Clinical Trials Participants, US, United States Weight change post diagnosis - Excluded	Retrospective cohort study (n=185) Pre- and postmenopausal mean age:50.8, Cancer Diagnosis: 1997-2002 50% pre-treatment postmenopausal, 24% treatment-associated menopause, 26%	Diagnosed: 1997-2002 follow Up: Maximum 38 months, Loss to Follow-up: 12 patients lost, Unknown	Invasive breast cancer; AJCC; 34% Stage I, 34% Stage IIA, 23% Stage IIB, 6% Stage IIIA, 3% Stage IIIB 60% breast-conserving therapy, 40% mastectomy; systemic adjuvant therapy: 4% none, 27% hormonal therapy, 30% chemotherapy, 39%	At diagnosis, during treatment, 1,2 and 3 years later	Overall Survival	<=2.5 kg gain	Log-rank test: P=0.58	

	post-treatment premenopausal		both hormonal and chemotherapy			>2.5 kg gain		
Abrahamson, 2006 [39], Atlanta, Seattle, New Jersey, United States Pre- to post-diagnosis weight change – Included, review Weight change during treatment – Included, review	Follow-up of cases in case-control study (n=1254), age range: 20-54 years; Pre-(78%) and postmenopausal (22%); White 75%, Non-white 25%; 86% completed interviews at median 4.2 months post-diagnosis	Diagnosed: 1990-1992 Follow up= 9.8 years, <2% loss to follow-up	Invasive breast cancer Local 57%; Regional 40%; Distant 3%; ER+ 56%; ER- 35%; Borderline 3%; Unknown 6%	Self-reported height and weight at age 20 years. Weight measured at interview Weight change from age 20 years to interview (median 4.2 months post-diagnosis)	Overall mortality (n=275)	>3% loss vs. ±3%	1.44 (0.78-2.67)	Tumour stage, Income, BMI
						3.1-25% gain vs. ±3%	1.03 (0.66-1.62)	
						>25% gain vs. ±3%	1.36 (0.88-2.12) P trend=0.16	
					Overall mortality	Lost >3% vs. maintenance ±3%	1.27 (0.93-1.74)	Waist-hip-ratio, BMI, tumour stage, Income (Tested other covariates, no change to estimate by >10% and not included in final model No confounding or modifying effects of treatment status)
						Gained 3.1-8.0% vs. maintenance ±3%	0.81 (0.57-1.14)	
						Gained >8% vs. maintenance ±3%	0.86 (0.63-1.18) P trend = 0.007	
Caan B, 2006 [146], Women's Healthy Eating and Living (WHEL) and Life After Cancer Epidemiology	Pooled analysis of prospective studies (n= 3215), mean age: 58.8	Diagnosed within 39 months (LACE) or 48 months (WHEL) of enrolment (enrolled 1995-	Stage I 43.7%, II 52.7%, IIIA 3.6%; ER+ 78.2%, PR+ 69.3%; Surgery type: mastectomy 50.7%, conserving 49.3%; No radiation/no	Self-reported pre-diagnosis (1 year prior) weight (LACE, WHEL)	Breast cancer relapse (n=141) LACE	5-10% loss vs. ±5%	0.9 (0.5-1.6)	Age, stage, tamoxifen use, treatment, number of positive nodes, progesterone and oestrogen receptor
						≥10% loss vs. ±5%	1.4 (0.7-2.5)	
						5-10% gain vs. ±5%	0.9 (0.5-1.4)	

(LACE), United States Pre-to-post-diagnosis weight change – Excluded	years, Pre- and postmenopausal	2002); all completed primary cancer treatment at enrolment Follow up= 5 years (LACE), 7 years (WHEL)	chemotherapy 15.1%, Chemotherapy only 22.5%, Radiation only 23% Chemotherapy and radiation 39.4%; Tamoxifen use at diagnosis: never 28.5%, past 6.6%, current 64.9%	Self-reported post-diagnosis weight and height (LACE) or measured post-diagnosis weight and height (WHEL) at study enrolment (median 2 years since diagnosis)		≥10% gain vs. ±5%	0.8 (0.5-1.3)	status, pre-diagnosis BMI
					Breast cancer relapse (n=192) WHEL	5-10% loss vs. ±5%	0.5 (0.2-0.9)	BMI, Age at diagnosis, treatment, tumor stage, Nodal status, Hormone receptor status
						≥10% loss vs. ±5%	0.7 (0.3-1.4)	
						5-10% gain vs. ±5%	0.8 (0.5-1.2)	
						≥10% gain vs. ±5%	1.1 (0.7-1.5)	
Costa L, 2002[407], Brazilian Breast Cancer Survivors Review Study, Brazil Weight change during treatment - Excluded	Retrospective cohort study (n=106) Pre- and postmenopausal mean age:49, 47.2% premenopausal	Follow Up: Average 4.9 months	Adjuvant treatment: 69.8% yes; Neoadjuvant: 7.5% yes; Palliative chemotherapy: 22.6%	Treatment	Patients in palliative chemotherapy Overall survival	Weight loss: Weight change <0% Weight change >= 0%	Log-rank test: P=0.12	
					Patients in adjuvant chemotherapy Disease free survival	Weight gain: Weight change <0% Weight change >= 0%	Log-rank test: P=0.08	
Marinho LA, 2001[408], Campinas Breast Cancer Survivors Follow-up Study, Brazil Post-diagnosis weight - Excluded	Prospective cohort study (n=109) Pre- and postmenopausal	Follow Up: Average 10.4 months		After treatment, radiotherapy	Recurrence-free (n=25)	No weight loss weight loss	p<0.001	
Kumar NB, 1997[409], H.Lee Moffitt Cancer Center and Research Institute Follow-up Study, United States Weight change during treatment - Excluded	Retrospective cohort study (n=200) Mixed age range: 25-85 years, Cancer Diagnosis: 1986-1997 Multi-ethnic	Diagnosed: 1986-1997 follow Up: Maximum 40 months	Stages IA-IIB All had surgery with or without radiotherapy and tamoxifen, not receiving systemic chemotherapy	Weight change was defined as observed change in weight from diagnosis to completion of treatment	Overall survival	Per 1 kg	Not significant	
					Recurrence-free survival	Per 1 kg	Not significant	

Levine, 1991 [309], United States Weight change during treatment - Excluded	Prospective cohort study (n=32), mean age: 46 years, Pre- and postmenopausal	Follow up: Over 2 years	Treatment: CMF with/without prednisone, CAF with/without vinblastine sulfate, melphalan	Within 1 month of adjuvant chemotherapy to 2 years later	Breast cancer recurrence	Weight gain vs. no weight gain	1.36, not significant	
Camoriano, 1990[147], United States Weight change during treatment - Included, review	Secondary analysis of clinical trial (n= 545), age range:20-75, Pre- and postmenopausal	Follow-up: 6.6 years Average Weight at 60 weeks was not available in 84% participants including those with disease recurrence	Node-positive breast cancer; Treatment: CMF	Measured post-surgery during and after receiving 60 weeks of chem-otherapy	Overall survival Pre-menopausal	Weight gain ≥ median vs. < median at 60 weeks	1.62 (1.01-2.62) P=0.04	Age, Nodal status, estrogen receptor level, Tumor size, Nuclear grade, initial Quetelet index
					Overall survival Post-menopausal	Weight gain ≥ median vs. < median at 60 weeks	P = 0.25	
					Relapse-free survival Pre-menopausal	Weight gain ≥ median vs. < median at 60 weeks	1.5 P=0.17	
					Relapse-free survival Post-menopausal	Weight gain ≥ median vs. < median at 60 weeks	P = 0.25	
Goodwin PJ, 1988[410], Princess Margaret Hospital, Toronto, Canada Post-diagnosis weight change - Excluded	Retrospective cohort study (n=637) Pre and Post-menopausal mean age:51.3Group 1 35.2% pre, 2 43.9% pre, 3 86.9%, 3A 78.6%, 3B 98.7%			Weight at 6 and 12 months after initial visit	Breast cancer survival	Weight gain	P=0.2	Age, menopausal status, height, weight, axillary node status
Swenerton K, 1979[411], United States Pre to post diagnosis weight change - Excluded	Retrospective cohort study (n=694), Cancer Diagnosis: Treatment 1973-1976 34.1% premenopausal, 16% early postmenopausal, 42.8% late	Follow-up: Minimum 1 years	Metastatic breast cancer	Pre-treatment	Overall	<5% 5-10% >10%	Breslow's test: P<0.01	

	postmenopausal, 7.1% unknown							

Supplementary Table S8 Description of studies included in or excluded from the descriptive review of BMI change

Author, year, study name, country	Study description	Time of diagnosis and follow-up	Disease characteristics treatment	Exposure assessment	Outcome (events)	Contrast	RR (95% CI)	Covariates
Shang L, 2021[225], Chicago Multiethnic Epidemiologic Breast Cancer Cohort (ChiMEC), USA Pre to post diagnosis BMI change - Included, review	Follow-up of Case-control Study (n=2888), multi-ethnic	Diagnosed: 2000-2017 follow Up: Median 6.4 years	Non-metastatic breast cancer. Stages 0-III	Measured	Overall survival (n=387)	Loss >0.5kg/m2/year vs Stable (<=0.5 kg/m2/year)	2.60(1.88-3.59)	Age, charlson comorbidity index, histological grade, molecular subtype, race, tumor stage, radiotherapy, hormonal therapy, chemotherapy
						Gain>0.5 kg/m2/year vs Stable (<=0.5 kg/m2/year)	1.60(1.10-2.33)	
					Cancer specific mortality (n=190)	Loss >0.5kg/m2/year vs Stable (<=0.5kg/m2/year)	3.05(1.91-4.86)	
						Gain >0.5kg/m2/year vs Stable (<=0.5kg/m2/year)	1.73(1.04-2.87)	
					Disease free survival	Loss >0.5kg/m2/year vs Stable (<=0.5kg/m2/year)	2.12(1.52-2.96)	
						Gain >0.5kg/m2/year vs Stable (<=0.5kg/m2/year)	1.54(1.06-0.24)	
					Normal weight at diagnosis Overall survival (n=47.0)	Loss >0.5kg/m2/year vs Stable (<=0.5kg/m2/year)	1.92(0.91-4.05)	
						Gain >0.5kg/m2/year vs Stable (<=0.5kg/m2/year)	0.99(0.45-2.16)	
					Overweight at diagnosis Overall survival (n=151.0)	Loss >0.5kg/m2/year vs Stable (<=0.5kg/m2/year)	3.07(1.96-4.80)	
						Gain >0.5kg/m2/year vs Stable (<=0.5kg/m2/year)	1.96(1.14-3.37)	

					Normal weight at diagnosis Cancer specific mortality (n=24.0)	Loss >0.5kg/m2/year vs Stable (<=0.5kg/m2/year)	2.73(0.90-8.31)	
						Gain >0.5kg/m2/year vs Stable (<=0.5kg/m2/year)	1.33(0.44-4.03)	
					Overweight at diagnosis Cancer specific mortality (n=78.0)	Loss >0.5kg/m2/year vs Stable (<=0.5kg/m2/year)	3.08(1.62-5.87)	
						Gain >0.5kg/m2/year vs Stable (<=0.5kg/m2/year)	1.47(0.69-3.12)	
					Normal weight at diagnosis Disease free survival (n=44.0)	Loss >0.5kg/m2/year vs Stable (<=0.5kg/m2/year)	1.91(0.87-4.16)	
						Gain >0.5kg/m2/year vs Stable (<=0.5kg/m2/year)	1.16(0.53-2.55)	
					Overweight at diagnosis Disease free survival (n=147.0)	Loss >0.5kg/m2/year vs Stable (<=0.5kg/m2/year)	2.21(1.41-3.45)	
						Gain >0.5kg/m2/year vs Stable (<=0.5kg/m2/year)	1.56(0.90-2.71)	
					Overall survival (n=229.0)	Loss >0.5kg/m2/year vs Stable (<=0.5 kg/m2/year)	1.69(1.20-2.40)	
						Gain>0.5 kg/m2/year vs Stable (<=0.5 kg/m2/year)	1.10(0.74-1.63)	

					Cancer specific mortality (n=117.0)	Loss >0.5kg/m2/year vs Stable (<=0.5kg/m2/year)	2.00(1.20-3.34)	
						Gain >0.5kg/m2/year vs Stable (<=0.5kg/m2/year)	1.26(0.72-2.22)	
					Disease free survival (n=287.0)	Loss >0.5kg/m2/year vs Stable (<=0.5kg/m2/year)	1.54(1.13-2.11)	
						Gain >0.5kg/m2/year vs Stable (<=0.5kg/m2/year)	1.16(0.83-1.63)	
					Overall survival (n=174.0)	Loss >0.5% vs Stable (<=0.5%)	1.60(1.11-2.31)	
						Gain>0.5% vs Stable (<=0.5%)	1.14(0.74-1.81)	
					Cancer specific mortality (n=91.0)	Loss >0.5% vs Stable (<=0.5%)	1.63(0.99-2.69)	
						Gain >0.5% vs Stable (<=0.5%)	0.95(0.49-1.84)	
					Disease free survival (n=211.0)	Loss >0.5% vs Stable (<=0.5%)	1.33(0.95-1.88)	
						Gain >0.5% vs Stable (<=0.5%)	1.05(0.70-1.57)	
Fang Q, 2019[236], China BMI change during treatment – Included, review	Retrospective cohort study (n=409), Pre/peri-menopausal 53.1%, Postmenopausal 46.9%	Diagnosed: 2009-2015, follow up: 43.2 median months	AJCC stage II 65.5%, III 34.5%; ER negative 44.5%, PR negative 63.1%, positive 36.9% Underwent neoadjuvant chemotherapy	Measured BMI from day 1 of the 1st cycle of neoadjuvant chemotherapy to the day before surgery	Overall survival	Gain vs stable/loss	1.97 (1.04-3.74) P=0.039	clinical stage, stage, ER status, PR status, Tumor subtype, PCR status
					Disease-free survival		2.09 (1.28-3.42) P=0.003	BMI at diagnosis, clinical stage, stage, ER status, PR status, Tumor subtype, PCR status
Flanagan MR, 2018[132], USA	Nested case-control study (n=1310), mostly white	Diagnosed with Ductal Carcinoma in situ: 1995-2013,	Breast cancer: Ductal carcinoma in situ. Histology of DCIS (n): 494 mixed, 298 NOS,	BMI change measured from initial DCIS	Any second breast cancer	BMI loss >/=3 vs BMI change +/-1	1.5 (0.95-2.4)	Age, year of diagnosis, county, histology, grade, surgery, radiation therapy, survival time,
						BMI loss >1-<3 vs BMI change +/-1	1.0 (0.6-1.4)	

Post diagnosis BMI change - Included, review			171 Comedo, 158 Cribriform, 128 Solid, 61 other	diagnosis to referent date		BMI gain >1-<3 vs BMI change +/-1	1.0 (0.7-1.4)	menopausal status at diagnosis, adjuvant endocrine therapy
						BMI gain >/=3 vs BMI change +/-1	1.1 (0.7-1.6) P trend= 0.302	
					Invasive secondary breast cancer	BMI loss >/3 vs BMI change +/-1	1.4 (0.8-2.5)	
						BMI loss >1-<3 vs BMI change +/-1	0.8 (0.5-1.4)	
						BMI gain >1-<3 vs BMI change +/-1	1.1 (0.8-1.7)	
						BMI gain >/=3 vs BMI change +/-1	1.0 (0.6-1.7) P trend=0.572	
					In situ secondary breast cancer	BMI loss >/3 vs BMI change +/-1	1.7 (0.8-3.8)	
						BMI loss >1-<3 vs BMI change +/-1	1.3 (0.6-2.5(	
						BMI gain >1-<3 vs BMI change +/-1	0.7 (0.4-1.3)	
						BMI gain >/=3 vs BMI change +/-1	1.2 (0.5-2.5) P trend=0.326	
					Ipsilateral secondary breast cancer Without unilateral mastectomy (n=173)	BMI loss >/3 vs BMI change +/-1	0.8 (0.4-1.9)	
						BMI loss >1-<3 vs BMI change +/-1	1.1 (0.6-2.1)	
						BMI gain >1-<3 vs BMI change +/-1	1.0 (0.6-1.7)	
						BMI gain >/=3 vs BMI change +/-1	1.3 (0.7-2.4) P trend=0.991	
					Contralateral secondary breast cancer	BMI loss >/3 vs BMI change +/-1	2.0 (1.1-3.6)	
						BMI loss >1-<3 vs BMI change +/-1	0.8 (0.5-1.4)	
						BMI gain >1-<3 vs BMI change +/-1	1.0 (0.7-1.6)	
						BMI gain >/=3 vs BMI change +/-1	0.9 (0.5-1.6)	

Kogawa T, 2018[177], MD Anderson Cancer Centre (MDACC), USA BMI change - during treatment Included, review	Retrospective Cohort of Cancer Survivors (n=4029) age range: 19-83 years, multi-ethnic	Follow Up: Median 3.95 years,848 patients (21.1%) experienced recurrence and 694 (17.2%) had died by the time of analysis.	Nuclear grade: I 131= (3.3); grade II =1238 (30.7); grade III= 2660 (66) Clinical stage: I=83 (2.1); II=2266 (56.2); III=1680 (41.7) Histological type: Ductal=3707 (9); Lobular 241=(6); Other 81 (2) Nuclear grade: I 131=(3.3); grade II =1238 (30.7); grade III= 2660 (66)	>at time of diagnosis until the start of chemotherapy (baseline BMI) >from the completion of chemotherapy to the date of surgery (post-NAC BMI)	Overall survival	>=30 to >=25-<30 vs 18.5-<25 to 18.5-<25	1.14(0.73-1.77) P trend=0.5743	Adjuvant therapy, clinical stage, ethnicity, histological subtype, nuclear grade, PCR status, skin involvement
						>=25-<30 to 18.5-<25 vs 18.5-<25 to 18.5-<25	0.97(0.60-1.57) P trend=0.9015	
						18.5-<25 to <18.5 vs 18.5-<25 to 18.5-<25	1.83(0.67-5.03) P trend=0.2388	
						>= 30 to >=30 vs 18.5-<25 to 18.5-<25	1.20(0.97-1.48) P trend=0.0988	
						>=25-<30 to >=25-<30 vs 18.5-<25 to 18.5-<25	0.98(0.77-1.23) P trend=0.8353	
						18.5-<25 to >=25-<30 vs 18.5-<25 to 18.5-<25	1.22(0.79-1.87)	
						>=25-<30 to >=30 vs 18.5-<25 to 18.5-<25	1.34(0.96-1.88) P trend=0.087	
						18.5-<25 to >=30 vs 18.5-<25 to 18.5-<25	1.66(1.09-2.54) P trend=0.019	
					Recurrence free survival	>=30 to >=25-<30 vs 18.5-<25 to 18.5-<25	0.87(0.57-1.31) P trend=0.5043	
						>=25-<30 to 18.5-<25 vs 18.5-<25 to 18.5-<25	1.01(0.66-1.52) P trend=0.9822	
						18.5-<25 to <18.5 vs 18.5-<25 to 18.5-<25	2.22(1.03-4.77) P trend=0.0413	
						>=30 to >=30 vs 18.5-<25 to 18.5-<25	1.13(0.94-1.36) P trend=0.1804	
						>=25-<30 to >=25-<30 vs 18.5-<25 to 18.5-<25	0.97(0.79-1.18) P trend=0.7466	
						18.5-<25 to >=25-<30 vs 18.5-<25 to 18.5-<25	1.02(0.70-1.49) P trend=0.9304	

						>=25-<30 to >=30 vs 18.5-<25 to 18.5-<25	0.99(0.74-1.33) P trend=0.9596	
						18.5-<25 to >=30 vs 18.5-<25 to 18.5-<25	1.21(0.84-1.75) P trend=0.3108	
Liu LN, 2017[254], Taiwan (Re-calculated RR and 95% CI from results in text) Post-diagnosis/BMI change during treatment - Included, review	Prospective Cohort of Cancer Survivors (n=131), pre- and postmenopausal, mean age: 46.9 years	Follow up: median 7.6 years, 23 (17.6%) patients developed distant organ metastasis 13 (9.9%) died.	AJCC stage 0/I 38.2%, II 42.7%, III 19.1%. Chemotherapy yes 83.2%, no 16.8%. Radiotherapy yes 55.0%, no 45.0%. Hormone therapy yes 63.4%, no 36.6%. Type of surgery BCT 43.5%, MRM 56.5%.	BMI change, Questionnaire At diagnosis baseline and 6 months after surgery.	All-cause mortality	Increased BMI	1.42 (0.99-2.04) (P=0.058)	Age, disease stage, estrogen receptor level, exercise, progesterone receptor level
					Distant metastasis		1.12 (0.99-1.26) (P=0.066)	
Schvartsman, 2017[200] UTMDACC United States BMI change during treatment - Excluded	Retro-spective cohort study (n= 1998) Pre and post-menopausal	Follow-up: 7.1 median years, Calendar year: 2004-2015 (treated)	Invasive early-stage breast cancer	Measured BMI before and after chemotherapy	Locoregional recurrence-free survival	>0.5 gain in BMI vs ±0.5 BMI	2.53 (1.18-5.45)	Grade, stage, and radiation delivery
					Locoregional recurrence-free survival Postmenopausal		3.77 (1.24-11.45) P=0.019	HER2 status
					Locoregional recurrence-free survival	>0.5 loss in BMI vs ±0.5 BMI	1.33 (0.55-3.22)	Unadjusted
						>0.5 gain in BMI vs ±0.5 BMI	2.59 (1.21-5.56)	
					Overall survival	>0.5 loss in BMI vs ±0.5 BMI	1.29 (0.81-2.03)	
						>0.5 gain in BMI vs ±0.5 BMI	1.34 (0.87-2.08)	
					Progression-free survival	>0.5 loss in BMI vs ±0.5 BMI	1.06 (0.72-1.57)	
						>0.5 gain in BMI vs ±0.5 BMI	1.28 (0.90-1.84)	
					Distant recurrence-free survival	>0.5 loss in BMI vs ±0.5 BMI	1.06 (0.70-1.60)	
						>0.5 gain in BMI vs ±0.5 BMI	1.18 (0.80-1.73)	

					Contralateral breast cancer-free survival	>0.5 loss in BMI vs ±0.5 BMI	0.21 (0.05-0.96)	
						>0.5 gain in BMI vs ±0.5 BMI	0.74 (0.29-1.86)	
Yerushalmi R, 2017[211], CCTG trials, Canada Post-diagnosis BMI change – Included, review	Randomized controlled trials: Adjuvant chemotherapy trials. MA.5 (n=710), premenopausal (100%), MA.21 (n=2083), premenopausal (68%) Total n=2793	MA.5 10-year follow-up; MA.21 8-year follow-up	MA.5 Node+ 100%, T1/in situ 37%, HR+ 68%; Chemotherapy 100%, Anthracyclines 49%, Randomised to CEF or CMF; MA.21 Node+ 72%, High risk node- 28%, T1/in situ 35%, HR+ 61%, Chemotherapy 100%, Anthracyclines 100%, Randomised to CEF or dose dense EC/T or AC/T	Weight and height measured at baseline, 1, 3 and 5 years after accrual	Overall survival	BMI change 1 y post diagnosis Per 1 log unit	1.046 (0.983-1.113)	Baseline risk factors
					Overall survival	BMI change 3 y post diagnosis Per 1 log unit	0.910 (0.854-0.969)	
					Overall survival	BMI change 5 y post diagnosis Per 1 log unit	0.926 (0.859-0.999)	
					Disease-specific survival	BMI change 1 y post diagnosis Per 1 log unit	1.064 (0.995-1.138)	
					Disease-specific survival	BMI change 3 y post diagnosis Per 1 log unit	0.908 (0.848- 0.973)	
					Disease-specific survival	BMI change 5 y post diagnosis Per 1 log unit	0.896 (0.822-0.979)	
					Breast cancer-free interval	BMI change 1 y post diagnosis Per 1 log unit	1.069 (1.007-1.135)	
					Breast cancer-free interval	BMI change 3 y post diagnosis Per 1 log unit	1.050 (0.982-1.123)	
					Breast cancer-free interval	BMI change 5 y post diagnosis Per 1 log unit	1.008 (0.932-1.090)	

Yerushalmi R, 2017[211], CCTG trials Post-diagnosis BMI change – Included, review	Randomized controlled trials: Adjuvant endocrine therapy trial MA.12 (n=672), Premenopausal (100%)		MA.12, Node+ 75%, T1/in situ 43%, HR+ 75%, Chemotherapy 100%, Anthracyclines 55% Women completed CMF, CEF, or AC received tamoxifen or placebo	Weight and height measured at baseline, 1, 3 and 5 years after accrual	Overall survival	BMI change 1 y post diagnosis Per 1 log unit	1.083 (0.978-1.200)	Baseline risk factors
					Overall survival	BMI change 3 y post diagnosis Per 1 log unit	0.948 (0.858-1.048)	
					Overall survival	BMI change 5 y post diagnosis Per 1 log unit	0.939 (0.777-1.135)	
					Disease-specific survival	BMI change 1 y post diagnosis Per 1 log unit	1.085 (0.978-1.204)	
					Disease-specific survival	BMI change 3 y post diagnosis Per 1 log unit	0.966 (0.871-1.017)	
					Disease-specific survival	BMI change 5 y post diagnosis Per 1 log unit	0.961 (0.791-1.167)	
					Breast cancer-free interval	BMI change 1 y post diagnosis Per 1 log unit	1.116 (1.027-1.213)	
					Breast cancer-free interval	BMI change 3 y post diagnosis Per 1 log unit	1.003 (0.913-1.102)	
					Breast cancer-free interval	BMI change 5 y post diagnosis Per 1 log unit	1.007 (0.899-1.128)	
Yerushalmi R, 2017[211], CCTG trials	Randomized controlled trials Pre-, peri-, and early post-		Triple-negative breast cancer	Weight and height measured at baseline, 1, 3	Overall survival	BMI change 1 y post diagnosis Per 1 log unit	1.000 (0.887- 1.128)	Baseline risk factors

Post-diagnosis BMI change – Included, reivew	menopausal trials: MA.5 Premenopausal (100%), MA.12 Premenopausal (100%), MA.21 Premenopausal (68%)			and 5 years after accrual	Overall survival	BMI change 3 y post diagnosis Per 1 log unit	0.825 (0.709-0.960)	
					Overall survival	BMI change 5 y post diagnosis Per 1 log unit	0.864 (0.704-1.059)	
					Disease-specific survival	BMI change 1 y post diagnosis Per 1 log unit	1.022 (0.893- 1.171)	
					Disease-specific survival	BMI change 3 y post diagnosis Per 1 log unit	0.843 (0.712-0.997)	
					Disease-specific survival	BMI change 5 y post diagnosis Per 1 log unit	0.814 (0.630-1.051)	
					Breast cancer-free interval	BMI change 1 y post diagnosis Per 1 log unit	1.101 (0.968- 1.252)	
					Breast cancer-free interval	BMI change 3 y post diagnosis Per 1 log unit	1.110 (0.899-1.370)	
					Breast cancer-free interval	BMI change 5 y post diagnosis Per 1 log unit	1.279 (0.894-1.830)	
Yerushalmi R, 2017[211], CCTG trials, review	Randomized controlled trials: Endocrine therapy trials: MA.14 (n=665), MA.27 (n=7571), Postmenopausal		MA.14 Node+ 47%, T1/in situ 58%, HR+ 91%, Chemotherapy 31%, Anthracyclines 25%, Received tamoxifen +/-octreotide LAR; MA.27, Node+	Weight and height measured at baseline, 1, 3 and 5 years after accrual	Overall survival	BMI change 1 y post diagnosis Per 1 log unit	0.938 (0.887-0.991)	
					Overall survival	BMI change 3 y post diagnosis Per 1 log unit	0.941 (0.871-1.017)	

Post-diagnosis BMI change – Included, review			28%, T1/in situ 72%, HR+ 100% Chemotherapy 31% Anthracyclines 28%		Overall survival	BMI change 5 y post diagnosis Per 1 log unit	0.925 (0.275-3.119)	
					Disease-specific survival	BMI change 1 y post diagnosis Per 1 log unit	0.965 (0.886-1.052)	
					Disease-specific survival	BMI change 3 y post diagnosis Per 1 log unit	0.947 (0.795-1.128)	
					Disease-specific survival	BMI change 5 y post diagnosis Per 1 log unit	Low events	
					Breast cancer-free interval	BMI change 1 y post diagnosis Per 1 log unit	0.991 (0.932- 1.053)	
					Breast cancer-free interval	BMI change 3 y post diagnosis Per 1 log unit	0.984 (0.904-1.071)	
					Breast cancer-free interval	BMI change 5 y post diagnosis Per 1 log unit	1.087 (0.844-1.401)	
Yerushalmi R, 2017[211], CCTG trials Post-diagnosis BMI change – Included, review	Randomized controlled trials: Adjuvant herceptin trials: MA.21, MA.27, HERA (n=1249), Pre and postmenopausal		Trastuzumab patients		Overall survival	BMI change 1 y post diagnosis Per 1 log unit	0.976 (0.885-1.075)	
					Disease-specific survival	BMI change 1 y post diagnosis Per 1 log unit	0.966 (0.838-1.114)	
					Breast cancer-free interval	BMI change 1 y post diagnosis Per 1 log unit	1.023 (0.978-1.069)	

Kogawa T, 2015[84], MD Anderson Cancer Centre (MDACC), USA BMI change during treatment - Included, review	Female, Retrospective Cohort of Cancer Survivors (n=1002)	Diagnosed: 2006-2012 Follow Up: Median 19.6 months	Locally advanced. Inflammatory breast cancer (IBC) or stage III non-IBC Stage III/IIIA: 29.7%; IIIB: 25.8%; IIIC:44.4% cT stage: T1: 4.1%; T2: 22.5%; T3:32.8%; T4: 40.6% All patients received standard NST consisting of anthracyclines and/or taxanes with or without concurrent trastuzumab followed by definitive surgery	BMI was measured at diagnosis before neoadjuvant chemotherapy and again at the last cycle of NST	Overall survival BMI <25	Per 1 kg/m^2	1.00 (0.83-1.20)	clinical stage, her2 status, hormonal receptor status, inflammatory breast cancer, lymphovascular invasion
					Overall survival 25<=BMI<30	Per 1 kg/m^2	1.04 (0.88-1.23)	
					Overall survival BMI >30	Per 1 kg/m^2	0.99 (0.91-1.08)	
					Recurrence free survival BMI <25	Per 1 kg/m^2	0.97 (0.85-1.11)	
					Recurrence free survival 25<=BMI<30	Per 1 kg/m^2	1.12 (0.99-1.28)	
					Recurrence free survival BMI >30	Per 1 kg/m^2	1.02 (0.97-1.08)	
Fedele, 2014 [160],Brindisi study, Italy BMI change during treatment	Retrospective cohort study (n= 520). Mean age: 55 years	Follow up: 66 median months	Early stage: stage 1 38%, 2 51%, 3A 11%; Luminal A 71%, Luminal B 9%; HER2 type 5%, TNBC 15%; Adjuvant	Measured BMI from 1 month after surgery to 12 months after surgery	Breast cancer recurrence	BMI variation (gain/loss) >5.71% vs <5.71%	1.018 (1.002-1.034)	Stage, family history, menopausal status, age, smoking, stage, type of treatment, surgery, baseline BMI

(surgery) - Included, review			chemotherapy 65%, Adjuvant radiation 72%, Mastectomy 29%, Breast conserving 71%			BMI loss <1 vs loss >1 kg/m2	1.297 (0.658-2.554) P=0.452	Unadjusted
						No BMI loss vs loss >1 kg/m2	0.676 (0.360-1.268) P=0.222	
						BMI gain <2 vs loss >1 kg/m2	1.142 (0.690-1.890) P=0.607	
						BMI gain >2 vs loss >1 kg/m2	1.703 (1.039-2.790) P=0.035	
Kroenke C, 2005[178], Nurses' Health Study (NHS), United States Pre-to-post diagnosis BMI change - Included, review	Population-based prospective cohort study (n= 5204). Pre- and postmenopausal; Age range:30-55 years	Diagnosis: 1976-2000; Follow up= 9 years	Invasive non metastatic breast cancer 73.2% ER+ 86.9% tumour size >2cm Chemotherapy: 63.9% Tamoxifen: 64.8%	Self-reported, height in 1976, weight in biennial survey prior and most recent to the diagnosis and ≥12 months after diagnosis BMI change from before to 1st BMI reported ≥12 months after diagnosis	Overall survival (n=312) Never smoker	≥2 kg/m2 gain vs. ±0.5 kg/m2	1.59 (1.12 - 2.27) P trend=0.01	Age, oral contraceptive, Birth index, Age at menopause, HRT use, Tumour size, Nodal status, chemotherapy, Tamoxifen use, Protein intake, menopausal status, pre-diagnosis BMI
						> 0.5 kg/m2 loss vs. ±0.5 kg/m2	1.11 (0.78-1.56)	
					Breast cancer specific mortality (n=209) Never smoker	≥2 kg/m2 gain vs. ±0.5 kg/m2	1.64 (1.07 - 2.51) P trend=0.03	
						> 0.5 kg/m2 loss vs. ±0.5 kg/m2	1.01(0.65-1.58)	
					Breast cancer recurrence (n=280) Never smoker	≥2 kg/m2 gain vs. ±0.5 kg/m2	1.53 (1.04 - 2.24) P trend=0.04	
						> 0.5 kg/m2 loss vs. ±0.5 kg/m2	0.99 (0.67-1.46)	

					Overall survival (n=548) Past/Current smokers	≥2 kg/m2 gain vs. ±0.5 kg/m2	1.18 (0.91 - 1.54) P trend=0.24 P interaction by smoking=0.006	
						> 0.5 kg/m2 loss vs. ±0.5 kg/m2	1.23(0.96-1.57)	
					Breast cancer-specific mortality (n=324) Past/Current smokers	≥2 kg/m2 gain vs. ±0.5 kg/m2	1.05 (0.74 - 1.47) P trend=0.84 P interaction by smoking=0.006	
						> 0.5 kg/m2 loss vs. ±0.5 kg/m2	1.18 (0.85-1.63)	
					Breast cancer recurrence (n=433) Past/Current smokers	≥2 kg/m2 gain vs. ±0.5 kg/m2	1.06 (0.78 - 1.43) P trend=0.78 P interaction by smoking=0.03	
						> 0.5 kg/m2 loss vs. ±0.5 kg/m2	1.13 (0.85-1-51)	
					Breast cancer-specific mortality (n=296) Baseline BMI<25kg/m2	≥2 kg/m2 gain vs. ±0.5 kg/m2	1.9 (1.32 - 2.72) P trend=0.01	
						> 0.5 kg/m2 loss vs. ±0.5 kg/m2	1.41 (0.95-2.09)	

					Breast cancer-specific mortality (n=237) Baseline BMI≥25kg/m2	≥2 kg/m2 gain vs. ±0.5 kg/m2	0.75 (0.51 - 1.11) P trend=0.18 P interaction by baseline BMI<0.01	
						> 0.5 kg/m2 loss vs. ±0.5 kg/m2	0.81(0.57-1.15)	
McLaughlin VH, 2014[312], WISC, United States Pre-to-post BMI change – Excluded	Prospective cohort study of cancer survivors (n= 162). Pre and Post-menopausal. Age range: 20-74 years	Enrolled median 1.3 years after diagnosis. Follow up= 6.7 years	DCIS patients Ipsilateral mastectomy 30.8% Bilateral mastectomy 4.2%, BSC without radiation 9.1% BCS with radiation 42.9% Biopsy only 2.6%	Self-reported post-diagnosis weight in biennial questionnaires from weight one year before diagnosis	Second breast cancer (n=140)	Increase>0.13 vs. ±0.13 kg/m2/year	0.88 (0.55 - 1.41)	Age at diagnosis, menopausal status, mode of detection, treatment type, postmenopausal hormone use, tamoxifen use, year of diagnosis, tumour size, tumour grade, physical activity, alcohol use, time since diagnosis, remaining lifestyle factors, and pre-diagnosis levels of each lifestyle factor
						Decrease >0.13 vs. ±0.13 kg/m2/year	0.95 (0.55-1.63) P trend=0.61	
						Per 1 kg/m2 per year change	0.98 (0.84 - 1.15)	
					Invasive second breast cancer (n=52)	Increase>0.13 vs. ±0.13 kg/m2/year	1.00 (0.44 - 2.26)	
						Decrease >0.13 vs. ±0.13 kg/m2/year	1.06 (0.43-2.65) P trend=0.33	
						Per 1 kg/m2 per year change	0.93 (0.71 - 1.21)	

REFERENCES

1. Ferlay JEM, Lam F, Colombet M, Mery L, Piñeros M, Znaor A, Soerjomataram I, Bray F. Global Cancer Observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer, 2020.

2. Chan DSM, Abar L, Cariolou M, Nanu N, Greenwood DC, Bandera EV, McTiernan A, Norat T. World Cancer Research Fund International: Continuous Update Project-systematic literature review and meta-analysis of observational cohort studies on physical activity, sedentary behavior, adiposity, and weight change and breast cancer risk. Cancer Causes Control 2019; 30: 1183-200.

3. Kyrgiou M, Kalliala I, Markozannes G, Gunter MJ, Paraskevaidis E, Gabra H, Martin-Hirsch P, Tsilidis KK. Adiposity and cancer at major anatomical sites: umbrella review of the literature. BMJ 2017; 356: j477.

4. Collaboration NCDRF. Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128.9 million children, adolescents, and adults. Lancet 2017; 390: 2627-42.

5. World Cancer Research Fund/American Institute for Cancer Research. Diet, Nutrition, Physical Activity and Cancer: a Global Perspective. Continuous Update Project Expert Report, 2018.

6. Chan DSM, Vieira AR, Aune D, Bandera EV, Greenwood DC, McTiernan A, Navarro Rosenblatt D, Thune I, Vieira R, Norat T. Body mass index and survival in women with breast cancer-systematic literature review and meta-analysis of 82 follow-up studies. Ann Oncol 2014; 25: 1901-14.

7. Lee K, Kruper L, Dieli-Conwright CM, Mortimer JE. The Impact of Obesity on Breast Cancer Diagnosis and Treatment. Curr Oncol Rep 2019; 21: 41.

8. Buch K, Gunmalm V, Andersson M, Schwarz P, Brons C. Effect of chemotherapy and aromatase inhibitors in the adjuvant treatment of breast cancer on glucose and insulin metabolism-A systematic review. Cancer Med 2019; 8: 238-45.

9. Niraula S, Ocana A, Ennis M, Goodwin PJ. Body size and breast cancer prognosis in relation to hormone receptor and menopausal status: a meta-analysis. Breast Cancer Res Treat 2012; 134: 769-81.

10. Chan DS, Norat T. Obesity and breast cancer: not only a risk factor of the disease. Curr Treat Options Oncol 2015; 16: 22.

11. Mei L, He L, Song Y, Lv Y, Zhang L, Hao F, Xu M. Association between obesity with disease-free survival and overall survival in triple-negative breast cancer: A meta-analysis. Medicine (Baltimore) 2018; 97: e0719.

12. Pan H, Gray R, Braybrooke J, Davies C, Taylor C, McGale P, Peto R, Pritchard KI, Bergh J, Dowsett M, Hayes DF, Ebctcg. 20-Year Risks of Breast-Cancer Recurrence after Stopping Endocrine Therapy at 5 Years. N Engl J Med 2017; 377: 1836-46.

13. U.S. Cancer Statistics Data Visualizations Tool, based on 2019 submission data (1999-2017): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute, ed. June 2020. Available: www.cdc.gov/cancer/dataviz. Accessed: May 2021.

14. Breast cancer burden in EU-27. Available: https://ecis.jrc.ec.europa.eu. Accessed: May 2021.

15. Tsilidis KK, Cariolou M, Becerra-Tomás N, Balducci K, Vieira R, Abar L, Aune D, Markozannes G, Nanu N, Greenwood DC, Giovannucci EL, Gunter MJ, Jackson AA, Kampman E, Lund V, Allen K, Brockton NT, Croker H, Katsikioti D, McGinley-Gieser D, Mitrou P, Wiseman M, Cross AJ, Riboli E, Clinton SK, McTiernan A, Norat T, Chan DSM. Post-diagnosis body fatness, recreational physical activity, dietary factors and breast cancer prognosis: Global Cancer Update Programme (CUP Global) summary of evidence grading. Int J Cancer 2022. In press.

16. Becerra-Tomás N, Balducci K, Abar L, Aune D, Cariolou M, Greenwood DC, Markozannes G, Nanu N, Vieira R, Giovannucci EL, Gunter MJ, Jackson AA, Kampman E, Lund V, Allen K, Brockton NT, Croker H, Katsikioti D, McGinley-Gieser D, Mitrou P, Wiseman M, Cross AJ, Riboli E, Clinton SK,

McTiernan A, Norat T, Tsilidis KK, Chan DSM. Post-diagnosis dietary factors, supplement use and breast cancer prognosis: Global Cancer Update Programme (CUP Global) systematic literature review and meta-analysis. Int J Cancer 2022. In press.

17. Cariolou M, Abar L, Aune D, Balducci K, Becerra-Tomás N, Greenwood DC, Markozannes G, Nanu N, Vieira R, Giovannucci EL, Gunter MJ, Jackson AA, Kampman E, Lund V, Allen K, Brockton NT, Croker H, Katsikioti D, McGinley-Gieser D, Mitrou P, Wiseman M, Cross AJ, Riboli E, Clinton SK, McTiernan A, Norat T, Tsilidis KK, Chan DSM. Post-diagnosis recreational physical activity and breast cancer prognosis: Global Cancer Update Programme (CUP Global) systematic literature review and meta-analysis. Int J Cancer 2022. In press.

18. World Cancer Research Fund/American Institute for Cancer Research Continuous Update Project (CUP), 2021. Available: https://www.imperial.ac.uk/school-public-health/epidemiology-and-biostatistics/research/cancer-and-nutritional-epidemiology/global-cancer-update-programme/. Accessed: July 2022.

19. Imperial College London CUP Global Team. Continuous Update Project on diet and cancer: Protocol for the data collection and systematic literature reviews on the role of diet, nutrition and physical activity on outcomes after diagnosis of breast cancer., ed. Version 3, 2019. Available: https://www.imperial.ac.uk/school-public-health/epidemiology-and-biostatistics/research/cancer-and-nutritional-epidemiology/global-cancer-update-programme/. Accessed: July 2022.

20. Chubak J, Boudreau DM, Wirtz HS, McKnight B, Weiss NS. Threats to validity of nonrandomized studies of postdiagnosis exposures on cancer recurrence and survival. J Natl Cancer Inst 2013; 105: 1456-62.

21. Savitz DA, Wellenius GA, Trikalinos TA. The Problem With Mechanistic Risk of Bias Assessments in Evidence Synthesis of Observational Studies and a Practical Alternative: Assessing the Impact of Specific Sources of Potential Bias. Am J Epidemiol 2019; 188: 1581-5.

22. DerSimonian R, Laird N. Meta-analysis in clinical trials. Control Clin Trials 1986; 7: 177-88.

23. Greenland S, Longnecker MP. Methods for trend estimation from summarized dose-response data, with applications to meta-analysis. Am J Epidemiol 1992; 135: 1301-9.

24. Orsini NBR, Greenland S. Generalized least squares for trend estimation of summarized dose-response data. Stata J 2006; 6: 40-57.

25. Aune D, Greenwood DC, Chan DS, Vieira R, Vieira AR, Navarro Rosenblatt DA, Cade JE, Burley VJ, Norat T. Body mass index, abdominal fatness and pancreatic cancer risk: a systematic review and non-linear dose-response meta-analysis of prospective studies. Ann Oncol 2012; 23: 843-52.

26. Bekkering GE, Harris RJ, Thomas S, Mayer AM, Beynon R, Ness AR, Harbord RM, Bain C, Smith GD, Sterne JA. How much of the data published in observational studies of the association between diet and prostate or bladder cancer is usable for meta-analysis? Am J Epidemiol 2008; 167: 1017-26.

27. Nechuta S, Chen WY, Cai H, Poole EM, Kwan ML, Flatt SW, Patterson RE, Pierce JP, Caan BJ, Ou Shu X. A pooled analysis of post-diagnosis lifestyle factors in association with late estrogen-receptor-positive breast cancer prognosis. Int J Cancer 2016; 138: 2088-97.

28. Playdon MC, Bracken MB, Sanft TB, Ligibel JA, Harrigan M, Irwin ML. Weight Gain After Breast Cancer Diagnosis and All-Cause Mortality: Systematic Review and Meta-Analysis. J Natl Cancer Inst 2015; 107: djv275.

29. Higgins JP, Thompson SG. Quantifying heterogeneity in a meta-analysis. Stat Med 2002; 21: 1539-58.

30. Stram DO. Meta-analysis of published data using a linear mixed-effects model. Biometrics 1996; 52: 536-44.

31. Verrill M. Chemotherapy for early-stage breast cancer: a brief history. Br J Cancer 2009; 101 Suppl 1: S2-5.

32. Giordano SH, Lin YL, Kuo YF, Hortobagyi GN, Goodwin JS. Decline in the use of anthracyclines for breast cancer. J Clin Oncol 2012; 30: 2232-9.

33. Pinto AC, Ades F, de Azambuja E, Piccart-Gebhart M. Trastuzumab for patients with HER2 positive breast cancer: delivery, duration and combination therapies. Breast 2013; 22 Suppl 2: S152-5.

34. Egger M, Davey Smith G, Schneider M, Minder C. Bias in meta-analysis detected by a simple, graphical test. BMJ 1997; 315: 629-34.

35. Viechtbauer W, Cheung MW. Outlier and influence diagnostics for meta-analysis. Res Synth Methods 2010; 1: 112-25.

36. Jackson D, White IR, Thompson SG. Extending DerSimonian and Laird's methodology to perform multivariate random effects meta-analyses. Stat Med 2010; 29: 1282-97.

37. Orsini N, Li R, Wolk A, Khudyakov P, Spiegelman D. Meta-analysis for linear and nonlinear dose-response relations: examples, an evaluation of approximations, and software. Am J Epidemiol 2012; 175: 66-73.

38. Royston P. A strategy for modelling the effect of a continuous covariate in medicine and epidemiology. Stat Med 2000; 19: 1831-47.

39. Abrahamson PE, Gammon MD, Lund MJ, Flagg EW, Porter PL, Stevens J, Swanson CA, Brinton LA, Eley JW, Coates RJ. General and abdominal obesity and survival among young women with breast cancer. Cancer Epidemiol Biomarkers Prev 2006; 15: 1871-7.

40. Abubakar M, Sung H, Bcr D, Guida J, Tang TS, Pfeiffer RM, Yang XR. Breast cancer risk factors, survival and recurrence, and tumor molecular subtype: analysis of 3012 women from an indigenous Asian population. Breast Cancer Res 2018; 20: 114.

41. Ademuyiwa FO, Groman A, O'Connor T, Ambrosone C, Watroba N, Edge SB. Impact of body mass index on clinical outcomes in triple-negative breast cancer. Cancer 2011; 117: 4132-40.

42. Bao PP, Cai H, Peng P, Gu K, Su Y, Shu XO, Zheng Y. Body mass index and weight change in relation to triple-negative breast cancer survival. Cancer Causes Control 2016; 27: 229-36.

43. Baumgärtner AK, Häusler A, Seifert-Klauss V, Schuster T, Schwarz-Boeger U, Kiechle M. Breast cancer after hormone replacement therapy--does prognosis differ in perimenopausal and postmenopausal women? Breast 2011; 20: 448-54.

44. Behrouzi B, Mohagheghi MA, Sadighi S. Demographic Characteristics, Survival and Prognostic Factors of Early Breast Cancer Patients with Type 2 Diabetes Mellitus: A Hospital-Based Cohort Study. Asian Pac J Cancer Prev 2017; 18: 2485-91.

45. Berclaz G, Li S, Price KN, Coates AS, Castiglione-Gertsch M, Rudenstam CM, Holmberg SB, Lindtner J, Erien D, Collins J, Snyder R, Thürlimann B, Fey MF, Mendiola C, Werner ID, Simoncini E, Crivellari D, Gelber RD, Goldhirsch A. Body mass index as a prognostic feature in operable breast cancer: the International Breast Cancer Study Group experience. Ann Oncol 2004; 15: 875-84.

46. Bergom C, Kelly T, Bedi M, Saeed H, Prior P, Rein LE, Szabo A, Wilson JF, Currey AD, White J. Association of Locoregional Control With High Body Mass Index in Women Undergoing Breast Conservation Therapy for Early-Stage Breast Cancer. Int J Radiat Oncol Biol Phys 2016; 96: 65-71.

47. Bernstein L, Deapen D, Cerhan JR, Schwartz SM, Liff J, McGann-Maloney E, Perlman JA, Ford L. Tamoxifen therapy for breast cancer and endometrial cancer risk. J Natl Cancer Inst 1999; 91: 1654-62.

48. Biganzoli E, Desmedt C, Fornili M, de Azambuja E, Cornez N, Ries F, Closon-Dejardin MT, Kerger J, Focan C, Di Leo A, Nogaret JM, Sotiriou C, Piccart M, Demicheli R. Recurrence dynamics of breast cancer according to baseline body mass index. Eur J Cancer 2017; 87: 10-20.

49. Borugian MJ, Sheps SB, Kim-Sing C, Olivotto IA, Van Patten C, Dunn BP, Coldman AJ, Potter JD, Gallagher RP, Hislop TG. Waist-to-hip ratio and breast cancer mortality. Am J Epidemiol 2003; 158: 963-8.

50. Bradshaw PT, Ibrahim JG, Stevens J, Cleveland R, Abrahamson PE, Satia JA, Teitelbaum SL, Neugut AI, Gammon MD. Postdiagnosis change in bodyweight and survival after breast cancer diagnosis. Epidemiology 2012; 23: 320-7.

51. Caan BJ, Kwan ML, Hartzell G, Castillo A, Slattery ML, Sternfeld B, Weltzien E. Pre-diagnosis body mass index, post-diagnosis weight change, and prognosis among women with early stage breast cancer. Cancer Causes Control 2008; 19: 1319-28.

52. Caan BJ, Kwan ML, Shu XO, Pierce JP, Patterson RE, Nechuta SJ, Poole EM, Kroenke CH, Weltzien EK, Flatt SW, Quesenberry CP, Jr., Holmes MD, Chen WY. Weight change and survival after breast cancer in the after breast cancer pooling project. Cancer Epidemiol Biomarkers Prev 2012; 21: 1260-71.

53. Caan BJ, Cespedes Feliciano EM, Prado CM, Alexeeff S, Kroenke CH, Bradshaw P, Quesenberry CP, Weltzien EK, Castillo AL, Olobatuyi TA, Chen WY. Association of Muscle and Adiposity Measured by Computed Tomography With Survival in Patients With Nonmetastatic Breast Cancer. JAMA Oncol 2018; 4: 798-804.

54. Cecchini RS, Swain SM, Costantino JP, Rastogi P, Jeong JH, Anderson SJ, Tang G, Geyer CE, Jr., Lembersky BC, Romond EH, Paterson AH, Wolmark N. Body Mass Index at Diagnosis and Breast Cancer Survival Prognosis in Clinical Trial Populations from NRG Oncology/NSABP B-30, B-31, B-34, and B-38. Cancer Epidemiol Biomarkers Prev 2016; 25: 51-9.

55. Chen X, Lu W, Zheng W, Gu K, Chen Z, Zheng Y, Shu XO. Obesity and weight change in relation to breast cancer survival. Breast Cancer Res Treat 2010; 122: 823-33.

56. Christiansen N, Chen L, Gilmore J, Pechar D, Szabo S. Association between African American race and outcomes in patients with nonmetastatic triple-negative breast cancer: a retrospective analysis by using results from the Georgia Cancer Specialist Database. Clin Breast Cancer 2012; 12: 270-5.

57. Connor AE, Baumgartner RN, Pinkston C, Baumgartner KB. Obesity and risk of breast cancer mortality in Hispanic and Non-Hispanic white women: the New Mexico Women's Health Study. J Womens Health (Larchmt) 2013; 22: 368-77.

58. Cook LS, White E, Schwartz SM, McKnight B, Daling JR, Weiss NS. A population-based study of contralateral breast cancer following a first primary breast cancer (Washington, United States). Cancer Causes Control 1996; 7: 382-90.

59. Crozier JA, Moreno-Aspitia A, Ballman KV, Dueck AC, Pockaj BA, Perez EA. Effect of body mass index on tumor characteristics and disease-free survival in patients from the HER2-positive adjuvant trastuzumab trial N9831. Cancer 2013; 119: 2447-54.

60. Dal Maso L, Zucchetto A, Talamini R, Serraino D, Stocco CF, Vercelli M, Falcini F, Franceschi S. Effect of obesity and other lifestyle factors on mortality in women with breast cancer. Int J Cancer 2008; 123: 2188-94.

61. Dawood S, Broglio K, Gonzalez-Angulo AM, Kau SW, Islam R, Hortobagyi GN, Cristofanilli M. Prognostic value of body mass index in locally advanced breast cancer. Clin Cancer Res 2008; 14: 1718-25.

62. Dawood S, Lei X, Litton JK, Buchholz TA, Hortobagyi GN, Gonzalez-Angulo AM. Impact of body mass index on survival outcome among women with early stage triple-negative breast cancer. Clin Breast Cancer 2012; 12: 364-72.

63. Dignam JJ, Wieand K, Johnson KA, Fisher B, Xu L, Mamounas EP. Obesity, tamoxifen use, and outcomes in women with estrogen receptor-positive early-stage breast cancer. J Natl Cancer Inst 2003; 95: 1467-76.

64. Dignam JJ, Wieand K, Johnson KA, Raich P, Anderson SJ, Somkin C, Wickerham DL. Effects of obesity and race on prognosis in lymph node-negative, estrogen receptor-negative breast cancer. Breast Cancer Res Treat 2006; 97: 245-54.

65. Elwood JM, Tin Tin S, Kuper-Hommel M, Lawrenson R, Campbell I. Obesity and breast cancer outcomes in chemotherapy patients in New Zealand - a population-based cohort study. BMC Cancer 2018; 18: 76.

66. Erbes T, Stickeler E, Rücker G, Buroh S, Asberger J, Dany N, Thornton S, Iborra S, Hirschfeld M, Gitsch G, Mayer S. BMI and Pathologic Complete Response to Neoadjuvant Chemotherapy in Breast Cancer: A Study and Meta-Analysis. Clin Breast Cancer 2016; 16: e119-32.

67. Ewertz M, Gillanders S, Meyer L, Zedeler K. Survival of breast cancer patients in relation to factors which affect the risk of developing breast cancer. Int J Cancer 1991; 49: 526-30.

68. Ewertz M, Gray KP, Regan MM, Ejlertsen B, Price KN, Thürlimann B, Bonnefoi H, Forbes JF, Paridaens RJ, Rabaglio M, Gelber RD, Colleoni M, Láng I, Smith IE, Coates AS, Goldhirsch A, Mouridsen HT. Obesity and risk of recurrence or death after adjuvant endocrine therapy with letrozole or tamoxifen in the breast international group 1-98 trial. J Clin Oncol 2012; 30: 3967-75.

69. Flatt SW, Thomson CA, Gold EB, Natarajan L, Rock CL, Al-Delaimy WK, Patterson RE, Saquib N, Caan BJ, Pierce JP. Low to moderate alcohol intake is not associated with increased mortality after breast cancer. Cancer Epidemiol Biomarkers Prev 2010; 19: 681-8.

70. Gennari A, Nanni O, Puntoni M, DeCensi A, Scarpi E, Conte P, Antonucci G, Amadori D, Bruzzi P. Body mass index and prognosis of metastatic breast cancer patients receiving first-line chemotherapy. Cancer Epidemiol Biomarkers Prev 2013; 22: 1862-7.

71. George SM, Bernstein L, Smith AW, Neuhouser ML, Baumgartner KB, Baumgartner RN, Ballard-Barbash R. Central adiposity after breast cancer diagnosis is related to mortality in the Health, Eating, Activity, and Lifestyle study. Breast Cancer Res Treat 2014; 146: 647-55.

72. Goodwin PJ, Ennis M, Pritchard KI, Trudeau ME, Koo J, Taylor SK, Hood N. Insulin- and obesity-related variables in early-stage breast cancer: correlations and time course of prognostic associations. J Clin Oncol 2012; 30: 164-71.

73. Habel LA, Daling JR, Newcomb PA, Self SG, Porter PL, Stanford JL, Seidel K, Weiss NS. Risk of recurrence after ductal carcinoma in situ of the breast. Cancer Epidemiol Biomarkers Prev 1998; 7: 689-96.

74. Hebert JR, Hurley TG, Ma Y. The effect of dietary exposures on recurrence and mortality in early stage breast cancer. Breast Cancer Res Treat 1998; 51: 17-28.

75. Hou G, Zhang S, Zhang X, Wang P, Hao X, Zhang J. Clinical pathological characteristics and prognostic analysis of 1,013 breast cancer patients with diabetes. Breast Cancer Res Treat 2013; 137: 807-16.

76. Imkampe AK, Bates T. Impact of a raised body mass index on breast cancer survival in relation to age and disease extent at diagnosis. Breast J 2010; 16: 156-61.

77. Izano M, Satariano WA, Tammemagi MC, Ragland D, Moore DH, Allen E, Naeim A, Sehl ME, Hiatt RA, Kerlikowske K, Sofrygin O, Braithwaite D. Long-term outcomes among African-American and white women with breast cancer: what is the impact of comorbidity? J Geriatr Oncol 2014; 5: 266-75.

78. Jeon YW, Kang SH, Park MH, Lim W, Cho SH, Suh YJ. Relationship between body mass index and the expression of hormone receptors or human epidermal growth factor receptor 2 with respect to breast cancer survival. BMC Cancer 2015; 15: 865.

79. Jiralerspong S, Kim ES, Dong W, Feng L, Hortobagyi GN, Giordano SH. Obesity, diabetes, and survival outcomes in a large cohort of early-stage breast cancer patients. Ann Oncol 2013; 24: 2506-14.

80. Jung SY, Sereika SM, Linkov F, Brufsky A, Weissfeld JL, Rosenzweig M. The effect of delays in treatment for breast cancer metastasis on survival. Breast Cancer Res Treat 2011; 130: 953-64.

81. Jung SY, Rosenzweig M, Sereika SM, Linkov F, Brufsky A, Weissfeld JL. Factors associated with mortality after breast cancer metastasis. Cancer Causes Control 2012; 23: 103-12.

82. Kawai M, Minami Y, Nishino Y, Fukamachi K, Ohuchi N, Kakugawa Y. Body mass index and survival after breast cancer diagnosis in Japanese women. BMC Cancer 2012; 12: 149.

83. Kim HJ, Kwon H, Lee JW, Kim HJ, Lee SB, Park HS, Sohn G, Lee Y, Koh BS, Yu JH, Son BH, Ahn SH. Metformin increases survival in hormone receptor-positive, HER2-positive breast cancer patients with diabetes. Breast Cancer Res 2015; 17: 64.

84. Kogawa T, Fouad TM, Wei C, Masuda H, Kai K, Fujii T, El-Zein R, Chavez-MacGregor M, Litton JK, Brewster A, Alvarez RH, Hortobagyi GN, Valero V, Theriault R, Ueno NT. Association of Body Mass Index Changes during Neoadjuvant Chemotherapy with Pathologic Complete Response and Clinical Outcomes in Patients with Locally Advanced Breast Cancer. J Cancer 2015; 6: 310-8.

85. Labidi SI, Mrad K, Mezlini A, Ouarda MA, Combes JD, Ben Abdallah M, Ben Romdhane K, Viens P, Ben Ayed F. Inflammatory breast cancer in Tunisia in the era of multimodality therapy. Ann Oncol 2008; 19: 473-80.

86. Lee KH, Keam B, Im SA, Kim TY, Han SW, Oh DY, Kim JH, Lee SH, Han W, Kim DW, Kim TY, Park IA, Noh DY, Heo DS, Bang YJ. Body mass index is not associated with treatment outcomes of breast cancer patients receiving neoadjuvant chemotherapy: korean data. J Breast Cancer 2012; 15: 427-33.

87. Li CI, Daling JR, Porter PL, Tang MT, Malone KE. Relationship between potentially modifiable lifestyle factors and risk of second primary contralateral breast cancer among women diagnosed with estrogen receptor-positive invasive breast cancer. J Clin Oncol 2009; 27: 5312-8.

88. Ligibel JA, Cirrincione CT, Liu M, Citron M, Ingle JN, Gradishar W, Martino S, Sikov W, Michaelson R, Mardis E, Perou CM, Ellis M, Winer E, Hudis CA, Berry D, Barry WT. Body Mass Index, PAM50 Subtype, and Outcomes in Node-Positive Breast Cancer: CALGB 9741 (Alliance). J Natl Cancer Inst 2015; 107.

89. Majed B, Moreau T, Senouci K, Salmon RJ, Fourquet A, Asselain B. Is obesity an independent prognosis factor in woman breast cancer? Breast Cancer Res Treat 2008; 111: 329-42.

90. Majed B, Moreau T, Asselain B. Overweight, obesity and breast cancer prognosis: optimal body size indicator cut-points. Breast Cancer Res Treat 2009; 115: 193-203.

91. Maliniak ML, Patel AV, McCullough ML, Campbell PT, Leach CR, Gapstur SM, Gaudet MM. Obesity, physical activity, and breast cancer survival among older breast cancer survivors in the Cancer Prevention Study-II Nutrition Cohort. Breast Cancer Res Treat 2018; 167: 133-45.

92. Marret H, Perrotin F, Bougnoux P, Descamps P, Hubert B, Lefranc T, Le Floch O, Lansac J, Body G. Low body mass index is an independent predictive factor of local recurrence after conservative treatment for breast cancer. Breast Cancer Res Treat 2001; 66: 17-23.

93. Maskarinec G, Pagano I, Lurie G, Bantum E, Gotay CC, Issell BF. Factors affecting survival among women with breast cancer in Hawaii. J Womens Health (Larchmt) 2011; 20: 231-7.

94. Mazzarella L, Disalvatore D, Bagnardi V, Rotmensz N, Galbiati D, Caputo S, Curigliano G, Pelicci PG. Obesity increases the incidence of distant metastases in oestrogen receptor-negative human epidermal growth factor receptor 2-positive breast cancer patients. Eur J Cancer 2013; 49: 3588-97.

95. Moore AH, Trentham-Dietz A, Burns M, Gangnon RE, Greenberg CC, Vanness DJ, Hampton J, Wu XC, Anderson RT, Lipscomb J, Kimmick GG, Cress R, Wilson JF, Sabatino SA, Fleming ST. Obesity and mortality after locoregional breast cancer diagnosis. Breast Cancer Res Treat 2018; 172: 647-57.

96. Mu L, Zhu N, Zhang J, Xing F, Li D, Wang X. Type 2 diabetes, insulin treatment and prognosis of breast cancer. Diabetes Metab Res Rev 2017; 33.

97. Nakamura K, Okada E, Ukawa S, Hirata M, Nagai A, Yamagata Z, Kiyohara Y, Muto K, Kamatani Y, Ninomiya T, Matsuda K, Kubo M, Nakamura Y, Tamakoshi A. Characteristics and prognosis of Japanese female breast cancer patients: The BioBank Japan project. J Epidemiol 2017; 27: S58-s64.

98. Nelson SH, Marinac CR, Patterson RE, Nechuta SJ, Flatt SW, Caan BJ, Kwan ML, Poole EM, Chen WY, Shu XO, Pierce JP. Impact of very low physical activity, BMI, and comorbidities on mortality among breast cancer survivors. Breast Cancer Res Treat 2016; 155: 551-7.

99. Newman SC, Lees AW, Jenkins HJ. The effect of body mass index and oestrogen receptor level on survival of breast cancer patients. Int J Epidemiol 1997; 26: 484-90.

100. Nichols HB, Trentham-Dietz A, Egan KM, Titus-Ernstoff L, Holmes MD, Bersch AJ, Holick CN, Hampton JM, Stampfer MJ, Willett WC, Newcomb PA. Body mass index before and after breast cancer diagnosis: associations with all-cause, breast cancer, and cardiovascular disease mortality. Cancer Epidemiol Biomarkers Prev 2009; 18: 1403-9.

101. Olsson A, Garne JP, Tengrup I, Zackrisson S, Manjer J. Body mass index and breast cancer survival in relation to the introduction of mammographic screening. Eur J Surg Oncol 2009; 35: 1261-7.

102. Pajares B, Pollán M, Martín M, Mackey JR, Lluch A, Gavila J, Vogel C, Ruiz-Borrego M, Calvo L, Pienkowski T, Rodríguez-Lescure Á, Seguí MA, Tredan O, Antón A, Ramos M, Cámara Mdel C, Rodríguez-Martín C, Carrasco E, Alba E. Obesity and survival in operable breast cancer patients treated with adjuvant anthracyclines and taxanes according to pathological subtypes: a pooled analysis. Breast Cancer Res 2013; 15: R105.

103. Panagopoulou P, Gogas H, Dessypris N, Maniadakis N, Fountzilas G, Petridou ET. Survival from breast cancer in relation to access to tertiary healthcare, body mass index, tumor characteristics and treatment: a Hellenic Cooperative Oncology Group (HeCOG) study. Eur J Epidemiol 2012; 27: 857-66.

104. Pfeiler G, Stöger H, Dubsky P, Mlineritsch B, Singer C, Balic M, Fitzal F, Moik M, Kwasny W, Selim U, Renner K, Ploner F, Steger GG, Seifert M, Hofbauer F, Sandbichler P, Samonigg H, Jakesz R, Greil R, Fesl C, Gnant M. Efficacy of tamoxifen ± aminoglutethimide in normal weight and overweight postmenopausal patients with hormone receptor-positive breast cancer: an analysis of 1509 patients of the ABCSG-06 trial. Br J Cancer 2013; 108: 1408-14.

105. Rier HN, Jager A, Sleijfer S, van Rosmalen J, Kock M, Levin MD. Low muscle attenuation is a prognostic factor for survival in metastatic breast cancer patients treated with first line palliative chemotherapy. Breast 2017; 31: 9-15.

106. Sestak I, Distler W, Forbes JF, Dowsett M, Howell A, Cuzick J. Effect of body mass index on recurrences in tamoxifen and anastrozole treated women: an exploratory analysis from the ATAC trial. J Clin Oncol 2010; 28: 3411-5.

107. Shariff-Marco S, Gomez SL, Sangaramoorthy M, Yang J, Koo J, Hertz A, John EM, Cheng I, Keegan TH. Impact of neighborhoods and body size on survival after breast cancer diagnosis. Health Place 2015; 36: 162-72.

108. Storm HH, Andersson M, Boice JD, Jr., Blettner M, Stovall M, Mouridsen HT, Dombernowsky P, Rose C, Jacobsen A, Pedersen M. Adjuvant radiotherapy and risk of contralateral breast cancer. J Natl Cancer Inst 1992; 84: 1245-50.

109. Sun X, Nichols HB, Robinson W, Sherman ME, Olshan AF, Troester MA. Post-diagnosis adiposity and survival among breast cancer patients: influence of breast cancer subtype. Cancer Causes Control 2015; 26: 1803-11.

110. Sun L, Zhu Y, Qian Q, Tang L. Body mass index and prognosis of breast cancer: An analysis by menstruation status when breast cancer diagnosis. Medicine (Baltimore) 2018; 97: e11220.

111. Tait S, Pacheco JM, Gao F, Bumb C, Ellis MJ, Ma CX. Body mass index, diabetes, and triple-negative breast cancer prognosis. Breast Cancer Res Treat 2014; 146: 189-97.

112. Tao MH, Shu XO, Ruan ZX, Gao YT, Zheng W. Association of overweight with breast cancer survival. Am J Epidemiol 2006; 163: 101-7.

113. Tichy JR, Deal AM, Anders CK, Reeder-Hayes K, Carey LA. Race, response to chemotherapy, and outcome within clinical breast cancer subtypes. Breast Cancer Res Treat 2015; 150: 667-74.

114. Veal CT, Hart V, Lakoski SG, Hampton JM, Gangnon RE, Newcomb PA, Higgins ST, Trentham-Dietz A, Sprague BL. Health-related behaviors and mortality outcomes in women diagnosed with ductal carcinoma in situ. J Cancer Surviv 2017; 11: 320-8.

115. Warren LE, Ligibel JA, Chen YH, Truong L, Catalano PJ, Bellon JR. Body Mass Index and Locoregional Recurrence in Women with Early-Stage Breast Cancer. Ann Surg Oncol 2016; 23: 3870-9.

116. Widschwendter P, Friedl TW, Schwentner L, DeGregorio N, Jaeger B, Schramm A, Bekes I, Deniz M, Lato K, Weissenbacher T, Kost B, Andergassen U, Jueckstock J, Neugebauer J, Trapp E, Fasching PA, Beckmann MW, Schneeweiss A, Schrader I, Rack B, Janni W, Scholz C. The influence of obesity on survival in early, high-risk breast cancer: results from the randomized SUCCESS A trial. Breast Cancer Res 2015; 17: 129.

117. Williams PT. Significantly greater reduction in breast cancer mortality from post-diagnosis running than walking. Int J Cancer 2014; 135: 1195-202.

118. Bandera EV, Qin B, Lin Y, Zeinomar N, Xu B, Chanumolu D, Llanos AAM, Omene CO, Pawlish KS, Ambrosone CB, Demissie K, Hong CC. Association of Body Mass Index, Central Obesity, and Body Composition With Mortality Among Black Breast Cancer Survivors. JAMA Oncol 2021; 7: 1-10.

119. Ko SM, Lee J, Bae SJ, Baik SJ, Ji J, Kim D, Ahn SG, Jeong J. Body mass index and absolute lymphocyte count predict disease-free survival in Korean breast cancer patients. Br J Cancer 2021; 125: 119-25.

120. Martel S, Lambertini M, Agbor-Tarh D, Ponde NF, Gombos A, Paterson V, Hilbers F, Korde L, Manukyants A, Dueck A, Maurer C, Piccart M, Moreno-Aspitia A, Desmedt C, Di Cosimo S, de Azambuja E. Body Mass Index and Weight Change in Patients With HER2-Positive Early Breast Cancer: Exploratory Analysis of the ALTTO BIG 2-06 Trial. J Natl Compr Canc Netw 2021; 19: 181-9.

121. Polley MC, Dickler MN, Sinnwell J, Tenner K, de la Haba J, Loibl S, Goetz MP, Bergh J, Roberston J, Couch F, Ellis MJ, Martin M. A clinical calculator to predict disease outcomes in women with hormone receptor-positive advanced breast cancer treated with first-line endocrine therapy. Breast Cancer Res Treat 2021; 189: 15-23.

122. Tan X, Huang D, Zhang F, Zhao Y, Tan M, Li H, Zhang H, Wang K, Li H, Liu D, Guo R, Tang S. Evaluation of the body mass index in breast cancer prognosis in a cohort of small-stature overweight patients: multi-center study in China. Gland Surg 2021; 10: 23-34.

123. Desmedt C, Fornili M, Clatot F, Demicheli R, De Bortoli D, Di Leo A, Viale G, de Azambuja E, Crown J, Francis PA, Sotiriou C, Piccart M, Biganzoli E. Differential Benefit of Adjuvant Docetaxel-Based Chemotherapy in Patients With Early Breast Cancer According to Baseline Body Mass Index. J Clin Oncol 2020; 38: 2883-91.

124. Fadelu T, Damuse R, Lormil J, Pecan E, Greenberg L, Dubuisson C, Pierre V, Triedman SA, Shulman LN, Rebbeck TR. Body Mass Index, Chemotherapy-Related Weight Changes, and Disease-Free Survival in Haitian Women With Nonmetastatic Breast Cancer. JCO Glob Oncol 2020; 6: 1656-65.

125. Gondo N, Sawaki M, Hattori M, Yoshimura A, Kotani H, Adachi Y, Kataoka A, Sugino K, Mori M, Horisawa N, Terada M, Ozaki Y, Iwata H. Impact of BMI for clinical outcomes in Japanese breast cancer patients. Jpn J Clin Oncol 2020; 50: 230-40.

126. Oudanonh T, Nabi H, Ennour-Idrissi K, Lemieux J, Diorio C. Progesterone receptor status modifies the association between body mass index and prognosis in women diagnosed with estrogen receptor positive breast cancer. Int J Cancer 2020; 146: 2736-45.

127. Walsh SM, Zabor EC, Flynn J, Stempel M, Morrow M, Gemignani ML. Breast cancer in young black women. Br J Surg 2020; 107: 677-86.

128. Blair CK, Wiggins CL, Nibbe AM, Storlie CB, Prossnitz ER, Royce M, Lomo LC, Hill DA. Obesity and survival among a cohort of breast cancer patients is partially mediated by tumor characteristics. NPJ Breast Cancer 2019; 5: 33.

129. Kim JY, Kang D, Nam SJ, Kim SW, Lee JE, Yu JH, Lee SK, Im YH, Ahn JS, Guallar E, Cho J, Park YH. Clinical Features and Outcomes of Invasive Breast Cancer: Age-Specific Analysis of a Modern Hospital-Based Registry. J Glob Oncol 2019; 5: 1-9.

130. Vernaci G, Dieci MV, Manfrin S, Mantiero M, Falci C, Faggioni G, Mioranza E, Menichetti A, Tasca G, Griguolo G, Miglietta F, Di Liso E, Saibene T, Michieletto S, Ghiotto C, Conte P, Guarneri V. BMI is an independent prognostic factor for late outcome in patients diagnosed with early breast cancer: A landmark survival analysis. Breast 2019; 47: 77-84.

131. Zhang JY, Liao YH, Lin Y, Liu Q, Xie XM, Tang LY, Ren ZF. Effects of tea consumption and the interactions with lipids on breast cancer survival. Breast Cancer Res Treat 2019; 176: 679-86.

132. Flanagan MR, Tang MC, Baglia ML, Porter PL, Malone KE, Li CI. Relationship Between Anthropometric Factors and Risk of Second Breast Cancer Among Women With a History of Ductal Carcinoma In Situ. JNCI Cancer Spectr 2018; 2: pky020.

133. Hamy AS, Pierga JY, Sabaila A, Laas E, Bonsang-Kitzis H, Laurent C, Vincent-Salomon A, Cottu P, Lerebours F, Rouzier R, Lae M, Reyal F. Stromal lymphocyte infiltration after neoadjuvant chemotherapy is associated with aggressive residual disease and lower disease-free survival in HER2-positive breast cancer. Ann Oncol 2017; 28: 2233-40.

134. Xiao Y, Zhang S, Hou G, Zhang X, Hao X, Zhang J. Clinical pathological characteristics and prognostic analysis of diabetic women with luminal subtype breast cancer. Tumour Biol 2014; 35: 2035-45.

135. Hartog H, Boezen HM, de Jong MM, Schaapveld M, Wesseling J, van der Graaf WT. Prognostic value of insulin-like growth factor 1 and insulin-like growth factor binding protein 3 blood levels in breast cancer. Breast 2013; 22: 1155-60.

136. Barba M, Sperati F, Stranges S, Carlomagno C, Nasti G, Iaffaioli V, Caolo G, Mottolese M, Botti G, Terrenato I, Vici P, Serpico D, Giordano A, D'Aiuto G, Crispo A, Montella M, Capurso G, Delle Fave G, Fuhrman B, Botti C, De Placido S. Fasting glucose and treatment outcome in breast and colorectal cancer patients treated with targeted agents: results from a historic cohort. Ann Oncol 2012; 23: 1838-45.

137. Andersson TM, Crowther MJ, Czene K, Hall P, Humphreys K. Mammographic Density Reduction as a Prognostic Marker for Postmenopausal Breast Cancer: Results Using a Joint Longitudinal-Survival Modeling Approach. Am J Epidemiol 2017; 186: 1065-73.

138. Brooks JD, John EM, Mellemkjaer L, Lynch CF, Knight JA, Malone KE, Reiner AS, Bernstein L, Liang X, Shore RE, Stovall M, Bernstein JL. Body mass index, weight change, and risk of second primary breast cancer in the WECARE study: influence of estrogen receptor status of the first breast cancer. Cancer Med 2016; 5: 3282-91.

139. Al Jarroudi O, Abda N, Seddik Y, Brahmi SA, Afqir S. Overweight: Is It a Prognostic Factor in Women with Triple-Negative Breast Cancer? Asian Pac J Cancer Prev 2017; 18: 1519-23.

140. Arce-Salinas C, Aguilar-Ponce JL, Villarreal-Garza C, Lara-Medina FU, Olvera-Caraza D, Alvarado Miranda A, Flores-Díaz D, Mohar A. Overweight and obesity as poor prognostic factors in locally advanced breast cancer patients. Breast Cancer Res Treat 2014; 146: 183-8.

141. Barba M, Pizzuti L, Sperduti I, Natoli C, Gamucci T, Sergi D, Di Lauro L, Moscetti L, Izzo F, Rinaldi M, Mentuccia L, Vaccaro A, Iezzi L, Grassadonia A, Michelotti A, Landucci E, Perracchio L, Pescarmona E, Di Filippo F, Giordano A, Maugeri-Saccà M, Vici P. Body Mass Index and Treatment Outcomes in Metastatic Breast Cancer Patients Treated With Eribulin. J Cell Physiol 2016; 231: 986-91.

142. Barnett GC, Shah M, Redman K, Easton DF, Ponder BA, Pharoah PD. Risk factors for the incidence of breast cancer: do they affect survival from the disease? J Clin Oncol 2008; 26: 3310-6.

143. Berrino F, Villarini A, Traina A, Bonanni B, Panico S, Mano MP, Mercandino A, Galasso R, Barbero M, Simeoni M, Bassi MC, Consolaro E, Johansson H, Zarcone M, Bruno E, Gargano G, Venturelli E, Pasanisi P. Metabolic syndrome and breast cancer prognosis. Breast Cancer Res Treat 2014; 147: 159-65.

144. Bonsang-Kitzis H, Chaltier L, Belin L, Savignoni A, Rouzier R, Sablin MP, Lerebours F, Bidard FC, Cottu P, Sastre-Garau X, Laé M, Pierga JY, Reyal F. Beyond Axillary Lymph Node Metastasis, BMI and Menopausal Status Are Prognostic Determinants for Triple-Negative Breast Cancer Treated by Neoadjuvant Chemotherapy. PLoS One 2015; 10: e0144359.

145. Buono G, Crispo A, Giuliano M, De Angelis C, Schettini F, Forestieri V, Lauria R, Pensabene M, De Laurentiis M, Augustin LSA, Amore A, D'Aiuto M, Tortoriello R, Accurso A, Cavalcanti E, Botti G, Montella M, De Placido S, Arpino G. Combined effect of obesity and diabetes on early breast cancer outcome: a prospective observational study. Oncotarget 2017; 8: 115709-17.

146. Caan BJ, Emond JA, Natarajan L, Castillo A, Gunderson EP, Habel L, Jones L, Newman VA, Rock CL, Slattery ML, Stefanick ML, Sternfeld B, Thomson CA, Pierce JP. Post-diagnosis weight gain and breast cancer recurrence in women with early stage breast cancer. Breast Cancer Res Treat 2006; 99: 47-57.

147. Camoriano JK, Loprinzi CL, Ingle JN, Therneau TM, Krook JE, Veeder MH. Weight change in women treated with adjuvant therapy or observed following mastectomy for node-positive breast cancer. J Clin Oncol 1990; 8: 1327-34.

148. Carmichael AR, Bendall S, Lockerbie L, Prescott RJ, Bates T. Does obesity compromise survival in women with breast cancer? Breast 2004; 13: 93-6.

149. Cespedes Feliciano EM, Kroenke CH, Bradshaw PT, Chen WY, Prado CM, Weltzien EK, Castillo AL, Caan BJ. Postdiagnosis Weight Change and Survival Following a Diagnosis of Early-Stage Breast Cancer. Cancer Epidemiol Biomarkers Prev 2017; 26: 44-50.

150. Chang S, Alderfer JR, Asmar L, Buzdar AU. Inflammatory breast cancer survival: the role of obesity and menopausal status at diagnosis. Breast Cancer Res Treat 2000; 64: 157-63.

151. Chen HL, Ding A, Wang ML. Impact of central obesity on prognostic outcome of triple negative breast cancer in Chinese women. Springerplus 2016; 5: 594.

152. Cho WK, Choi DH, Park W, Cha H, Nam SJ, Kim SW, Lee JE, Yu J, Im YH, Ahn JS, Park YH, Kim JY, Ahn S. Effect of Body Mass Index on Survival in Breast Cancer Patients According to Subtype, Metabolic Syndrome, and Treatment. Clin Breast Cancer 2018; 18: e1141-e7.

153. Chung IY, Lee JW, Lee JS, Park YR, Min YH, Lee Y, Yoon TI, Sohn G, Lee SB, Kim J, Kim HJ, Ko BS, Son BH, Ahn SH. Interaction between body mass index and hormone-receptor status as a prognostic factor in lymph-node-positive breast cancer. PLoS One 2017; 12: e0170311.

154. Clough-Gorr KM, Stuck AE, Thwin SS, Silliman RA. Older breast cancer survivors: geriatric assessment domains are associated with poor tolerance of treatment adverse effects and predict mortality over 7 years of follow-up. J Clin Oncol 2010; 28: 380-6.

155. Contiero P, Berrino F, Tagliabue G, Mastroianni A, Di Mauro MG, Fabiano S, Annulli M, Muti P. Fasting blood glucose and long-term prognosis of non-metastatic breast cancer: a cohort study. Breast Cancer Res Treat 2013; 138: 951-9.

156. Copson ER, Cutress RI, Maishman T, Eccles BK, Gerty S, Stanton L, Altman DG, Durcan L, Wong C, Simmonds PD, Jones L, Eccles DM. Obesity and the outcome of young breast cancer patients in the UK: the POSH study. Ann Oncol 2015; 26: 101-12.

157. Crispo A, Grimaldi M, D'Aiuto M, Rinaldo M, Capasso I, Amore A, D'Aiuto G, Giudice A, Ciliberto G, Montella M. BMI and breast cancer prognosis benefit: mammography screening reveals differences between normal weight and overweight women. Breast 2015; 24: 86-9.

158. Deluche E, Leobon S, Desport JC, Venat-Bouvet L, Usseglio J, Tubiana-Mathieu N. Impact of body composition on outcome in patients with early breast cancer. Support Care Cancer 2018; 26: 861-8.

159. Ewertz M, Jensen MB, Gunnarsdóttir K, Højris I, Jakobsen EH, Nielsen D, Stenbygaard LE, Tange UB, Cold S. Effect of obesity on prognosis after early-stage breast cancer. J Clin Oncol 2011; 29: 25-31.

160. Fedele P, Orlando L, Schiavone P, Quaranta A, Lapolla AM, De Pasquale M, Ardizzone A, Bria E, Sperduti I, Calvani N, Marino A, Caliolo C, Mazzoni E, Cinieri S. BMI variation increases recurrence risk in women with early-stage breast cancer. Future Oncol 2014; 10: 2459-68.

161. Fontanella C, Lederer B, Gade S, Vanoppen M, Blohmer JU, Costa SD, Denkert C, Eidtmann H, Gerber B, Hanusch C, Hilfrich J, Huober J, Schneeweiss A, Paepke S, Jackisch C, Mehta K, Nekljudova V, Untch M, Neven P, von Minckwitz G, Loibl S. Impact of body mass index on neoadjuvant treatment outcome: a pooled analysis of eight prospective neoadjuvant breast cancer trials. Breast Cancer Res Treat 2015; 150: 127-39.

162. Furlanetto J, Eiermann W, Marmé F, Reimer T, Reinisch M, Schmatloch S, Stickeler E, Thomssen C, Untch M, Denkert C, von Minckwitz G, Lederer B, Nekljudova V, Weber K, Loibl S, Möbus V. Higher rate of severe toxicities in obese patients receiving dose-dense (dd) chemotherapy according to unadjusted body surface area: results of the prospectively randomized GAIN study. Ann Oncol 2016; 27: 2053-9.

163. Gao YC, S.; Ren, X.B.; Zhou, L. The effect of obesity on the overall survival in node-positive breast cancer patients. Tumor 2010; 30: 5.

164. Gennari A, Amadori D, Scarpi E, Farolfi A, Paradiso A, Mangia A, Biglia N, Gianni L, Tienghi A, Rocca A, Maltoni R, Antonucci G, Bruzzi P, Nanni O. Impact of body mass index (BMI) on the prognosis of high-risk early breast cancer (EBC) patients treated with adjuvant chemotherapy. Breast Cancer Res Treat 2016; 159: 79-86.

165. Gonzalez-Angulo AM, Broglio K, Kau SW, Eralp Y, Erlichman J, Valero V, Theriault R, Booser D, Buzdar AU, Hortobagyi GN, Arun B. Women age < or = 35 years with primary breast carcinoma: disease features at presentation. Cancer 2005; 103: 2466-72.

166. Haakinson DJ, Leeds SG, Dueck AC, Gray RJ, Wasif N, Stucky CC, Northfelt DW, Apsey HA, Pockaj B. The impact of obesity on breast cancer: a retrospective review. Ann Surg Oncol 2012; 19: 3012-8.

167. Hao S, Liu Y, Yu KD, Chen S, Yang WT, Shao ZM. Overweight as a Prognostic Factor for Triple-Negative Breast Cancers in Chinese Women. PLoS One 2015; 10: e0129741.

168. He X, Esteva FJ, Ensor J, Hortobagyi GN, Lee MH, Yeung SC. Metformin and thiazolidinediones are associated with improved breast cancer-specific survival of diabetic women with HER2+ breast cancer. Ann Oncol 2012; 23: 1771-80.

169. He Y, Peng L, Huang Y, Liu C, Zheng S, Wu K. Blood cadmium levels associated with short distant metastasis-free survival time in invasive breast cancer. Environ Sci Pollut Res Int 2017; 24: 28055-64.

170. Herlevic VC, Mowad R, Miller JK, Darensburg NA, Li BD, Kim RH. Breast cancer outcomes in a population with high prevalence of obesity. J Surg Res 2015; 198: 371-6.

171. Horn PL, Thompson WD. Risk of contralateral breast cancer: associations with factors related to initial breast cancer. Am J Epidemiol 1988; 128: 309-23.

172. Jeon YW, Lim ST, Choi HJ, Suh YJ. Weight change and its impact on prognosis after adjuvant TAC (docetaxel-doxorubicin-cyclophosphamide) chemotherapy in Korean women with node-positive breast cancer. Med Oncol 2014; 31: 849.

173. Karpińska A, Safranow K, Kładny J, Sulżyc-Bielicka V. The Influence Of Obesity On Results Of AT (Doxorubicin Plus Docetaxel) Neoadjuvant Chemotherapy In Locally Advanced Breast Cancer Patients. Pol Przegl Chir 2015; 87: 231-7.

174. Katoh A, Watzlaf VJ, D'Amico F. An examination of obesity and breast cancer survival in post-menopausal women. Br J Cancer 1994; 70: 928-33.

175. Kmet LM, Cook LS, Weiss NS, Schwartz SM, White E. Risk factors for colorectal cancer following breast cancer. Breast Cancer Res Treat 2003; 79: 143-7.

176. Kobayashi T, Tomomatsu J, Fukada I, Shibayama T, Teruya N, Ito Y, Iwase T, Ohno S, Takahashi S. Eribulin-induced liver dysfunction as a prognostic indicator of survival of metastatic breast cancer patients: a retrospective study. BMC Cancer 2016; 16: 404.

177. Kogawa T, Fujii T, Fouad TM, Liu DD, Harano K, Masuda H, Iwase T, Barnett C, Park YS, Lim B, Tripathy D, Litton JK, Ueno NT. Impact of change in body mass index during neoadjuvant chemotherapy and survival among breast cancer subtypes. Breast Cancer Res Treat 2018; 171: 501-11.

178. Kroenke CH, Chen WY, Rosner B, Holmes MD. Weight, weight gain, and survival after breast cancer diagnosis. J Clin Oncol 2005; 23: 1370-8.

179. Kumar NB, Cantor A, Allen K, Cox CE. Android obesity at diagnosis and breast carcinoma survival: Evaluation of the effects of anthropometric variables at diagnosis, including body composition and body fat distribution and weight gain during life span,and survival from breast carcinoma. Cancer 2000; 88: 2751-7.

180. Kwak M, Kim C. Disparities by Age, Sex, Tumor Stage, Diagnosis Path, and Area-level Socioeconomic Status in Survival Time for Major Cancers: Results from the Busan Cancer Registry. J Korean Med Sci 2017; 32: 1974-83.

181. Ladoire S, Dalban C, Roché H, Spielmann M, Fumoleau P, Levy C, Martin AL, Ecarnot F, Bonnetain F, Ghiringhelli F. Effect of obesity on disease-free and overall survival in node-positive breast cancer patients in a large French population: a pooled analysis of two randomised trials. Eur J Cancer 2014; 50: 506-16.

182. Larsen SB, Kroman N, Ibfelt EH, Christensen J, Tjønneland A, Dalton SO. Influence of metabolic indicators, smoking, alcohol and socioeconomic position on mortality after breast cancer. Acta Oncol 2015; 54: 780-8.

183. Litton JK, Gonzalez-Angulo AM, Warneke CL, Buzdar AU, Kau SW, Bondy M, Mahabir S, Hortobagyi GN, Brewster AM. Relationship between obesity and pathologic response to neoadjuvant chemotherapy among women with operable breast cancer. J Clin Oncol 2008; 26: 4072-7.

184. Liu YL, Saraf A, Catanese B, Lee SM, Zhang Y, Connolly EP, Kalinsky K. Obesity and survival in the neoadjuvant breast cancer setting: role of tumor subtype in an ethnically diverse population. Breast Cancer Res Treat 2018; 167: 277-88.

185. Loi S, Milne RL, Friedlander ML, McCredie MR, Giles GG, Hopper JL, Phillips KA. Obesity and outcomes in premenopausal and postmenopausal breast cancer. Cancer Epidemiol Biomarkers Prev 2005; 14: 1686-91.

186. Majed B, Dozol A, Ribassin-Majed L, Senouci K, Asselain B. Increased risk of contralateral breast cancers among overweight and obese women: a time-dependent association. Breast Cancer Res Treat 2011; 126: 729-38.

187. Martel S, Poletto E, Ferreira AR, Lambertini M, Sottotetti F, Bertolini I, Montemurro F, Bernardo A, Risi E, Zanardi E, Ziliani S, Mura S, Dellepiane C, Del Mastro L, Minisini AM, Puglisi F. Impact of body mass index on the clinical outcomes of patients with HER2-positive metastatic breast cancer. Breast 2018; 37: 142-7.

188. Mason BH, Holdaway IM, Stewart AW, Neave LM, Kay RG. Season of tumour detection influences factors predicting survival of patients with breast cancer. Breast Cancer Res Treat 1990; 15: 27-37.

189. Moon HG, Han W, Noh DY. Underweight and breast cancer recurrence and death: a report from the Korean Breast Cancer Society. J Clin Oncol 2009; 27: 5899-905.

190. Mowad R, Chu QD, Li BD, Burton GV, Ampil FL, Kim RH. Does obesity have an effect on outcomes in triple-negative breast cancer? J Surg Res 2013; 184: 253-9.

191. Mutschler NS, Scholz C, Friedl TWP, Zwingers T, Fasching PA, Beckmann MW, Fehm T, Mohrmann S, Salmen J, Ziegler C, Jäger B, Widschwendter P, de Gregorio N, Schochter F, Mahner S, Harbeck N, Weissenbacher T, Jückstock J, Janni W, Rack B. Prognostic Impact of Weight Change During Adjuvant Chemotherapy in Patients With High-Risk Early Breast Cancer: Results From the ADEBAR Study. Clin Breast Cancer 2018; 18: 175-83.

192. Nomura AM, Marchand LL, Kolonel LN, Hankin JH. The effect of dietary fat on breast cancer survival among Caucasian and japanese women in Hawaii. Breast Cancer Res Treat 1991; 18 Suppl 1: S135-41.

193. Pfeiler G, Königsberg R, Fesl C, Mlineritsch B, Stoeger H, Singer CF, Pöstlberger S, Steger GG, Seifert M, Dubsky P, Taucher S, Samonigg H, Bjelic-Radisic V, Greil R, Marth C, Gnant M. Impact of body mass index on the efficacy of endocrine therapy in premenopausal patients with breast cancer: an analysis of the prospective ABCSG-12 trial. J Clin Oncol 2011; 29: 2653-9.

194. Pizzuti L, Natoli C, Gamucci T, Mauri M, Sergi D, Di Lauro L, Paoletti G, Ruggeri E, Iezzi L, Sperduti I, Mentuccia L, Fabbri A, Maugeri-Saccà M, Moscetti L, Barba M, Vici P. Anthropometric, clinical and molecular determinants of treatment outcomes in postmenopausal, hormone receptor positive metastatic breast cancer patients treated with fulvestrant: Results from a real word setting. Oncotarget 2017; 8: 69025-37.

195. Pukkala E, Kyyrönen P, Sankila R, Holli K. Tamoxifen and toremifene treatment of breast cancer and risk of subsequent endometrial cancer: a population-based case-control study. Int J Cancer 2002; 100: 337-41.

196. Robinson PJ, Bell RJ, Davis SR. Obesity is associated with a poorer prognosis in women with hormone receptor positive breast cancer. Maturitas 2014; 79: 279-86.

197. Sahin S, Erdem GU, Karatas F, Aytekin A, Sever AR, Ozisik Y, Altundag K. The association between body mass index and immunohistochemical subtypes in breast cancer. Breast 2017; 32: 227-36.

198. Sánchez L, Lana A, Hidalgo A, Rodríguez JM, Del Valle Mdel O, Cueto A, Folgueras MV, Belyakova E, Comendador MA, López ML. Risk factors for second primary tumours in breast cancer survivors. Eur J Cancer Prev 2008; 17: 406-13.

199. Scholz C, Andergassen U, Hepp P, Schindlbeck C, Friedl TW, Harbeck N, Kiechle M, Sommer H, Hauner H, Friese K, Rack B, Janni W. Obesity as an independent risk factor for decreased survival in node-positive high-risk breast cancer. Breast Cancer Res Treat 2015; 151: 569-76.

200. Schvartsman G, Gutierrez-Barrera AM, Song J, Ueno NT, Peterson SK, Arun B. Association between weight gain during adjuvant chemotherapy for early-stage breast cancer and survival outcomes. Cancer Med 2017; 6: 2515-22.

201. Senie RT, Rosen PP, Rhodes P, Lesser ML, Kinne DW. Obesity at diagnosis of breast carcinoma influences duration of disease-free survival. Ann Intern Med 1992; 116: 26-32.

202. Song EJ, Lee CW, Jung SY, Kim BN, Lee KS, Lee S, Kang HS, Park IH, Lee MH, Kim YJ, Ko K, Kim S, Nam BH, Lee ES. Prognostic impact of skeletal muscle volume derived from cross-sectional computed tomography images in breast cancer. Breast Cancer Res Treat 2018; 172: 425-36.

203. Sparano JA, Wang M, Zhao F, Stearns V, Martino S, Ligibel JA, Perez EA, Saphner T, Wolff AC, Sledge GW, Jr., Wood WC, Fetting J, Davidson NE. Obesity at diagnosis is associated with inferior outcomes in hormone receptor-positive operable breast cancer. Cancer 2012; 118: 5937-46.

204. Thivat E, Thérondel S, Lapirot O, Abrial C, Gimbergues P, Gadéa E, Planchat E, Kwiatkowski F, Mouret-Reynier MA, Chollet P, Durando X. Weight change during chemotherapy changes the prognosis in non metastatic breast cancer for the worse. BMC Cancer 2010; 10: 648.

205. Tomiguchi M, Yamamoto Y, Yamamoto-Ibusuki M, Goto-Yamaguchi L, Fujiki Y, Fujiwara S, Sueta A, Hayashi M, Takeshita T, Inao T, Iwase H. Fibroblast growth factor receptor-1 protein expression is associated with prognosis in estrogen receptor-positive/human epidermal growth factor receptor-2-negative primary breast cancer. Cancer Sci 2016; 107: 491-8.

206. Turkoz FP, Solak M, Petekkaya I, Keskin O, Kertmen N, Sarici F, Arik Z, Babacan T, Ozisik Y, Altundag K. The prognostic impact of obesity on molecular subtypes of breast cancer in premenopausal women. J buon 2013; 18: 335-41.

207. Wisse A, Tryggvadottir H, Simonsson M, Isaksson K, Rose C, Ingvar C, Jernström H. Increasing preoperative body size in breast cancer patients between 2002 and 2016: implications for prognosis. Cancer Causes Control 2018; 29: 643-56.

208. Wolters R, Schwentner L, Regierer A, Wischnewsky M, Kreienberg R, Wöckel A. Endocrine therapy in obese patients with primary breast cancer: another piece of evidence in an unfinished puzzle. Breast Cancer Res Treat 2012; 131: 925-31.

209. Wu SY, Tan Y, Guan YS. [Clinical features and prognosis of patients with first-episode liver metastasis of different molecular subtypes of breast cancer]. Zhonghua Gan Zang Bing Za Zhi 2016; 24: 422-8.

210. Yan M, Wang J, Xuan Q, Dong T, He J, Zhang Q. The Relationship Between Tamoxifen-associated Nonalcoholic Fatty Liver Disease and the Prognosis of Patients With Early-stage Breast Cancer. Clin Breast Cancer 2017; 17: 195-203.

211. Yerushalmi R, Dong B, Chapman JW, Goss PE, Pollak MN, Burnell MJ, Levine MN, Bramwell VHC, Pritchard KI, Whelan TJ, Ingle JN, Shepherd LE, Parulekar WR, Han L, Ding K, Gelmon KA. Impact of baseline BMI and weight change in CCTG adjuvant breast cancer trials. Ann Oncol 2017; 28: 1560-8.

212. Zewenghiel L, Lindman H, Valachis A. Impact of body mass index on the efficacy of endocrine therapy in patients with metastatic breast cancer - A retrospective two-center cohort study. Breast 2018; 40: 136-40.

213. Zhang Y, Qu Q, Mao Y, Shen K. [Effect of body mass index on disease-free and overall survival in Chinese women with breast cancer]. Zhonghua Zhong Liu Za Zhi 2015; 37: 395-9.

214. Zhang M, Cai H, Bao P, Xu W, Qin G, Shu XO, Zheng Y. Body mass index, waist-to-hip ratio and late outcomes: a report from the Shanghai Breast Cancer Survival Study. Sci Rep 2017; 7: 6996.

215. Almeida NR, Brenelli FP, Dos Santos CC, Torresan RZ, Shinzato JY, Cardoso-Filho C, Duarte GM, de Azevedo NS, Zeferino LC. Comparative study of surgical and oncological outcomes in oncoplastic versus non oncoplastic breast-conserving surgery for breast cancer treatment. JPRAS Open 2021; 29: 184-94.

216. Anwar SL, Cahyono R, Prabowo D, Avanti WS, Choridah L, Dwianingsih EK, Harahap WA, Aryandono T. Metabolic comorbidities and the association with risks of recurrent metastatic disease in breast cancer survivors. BMC Cancer 2021; 21: 590.

217. Cárdenas-Cárdenas E, Tenorio-Torres A, Méndez JP, Orozco-Arguelles L, Leal-García M, Tejeda ME, Morales A, Canto P. Different body mass indexes and their relation to prognosis of early-stage breast cancer in postmenopausal Mexican-Mestizo women. Women Health 2021; 61: 210-7.

218. Jung AY, Hüsing A, Behrens S, Krzykalla J, Obi N, Becher H, Chang-Claude J. Postdiagnosis weight change is associated with poorer survival in breast cancer survivors: A prospective population-based patient cohort study. Int J Cancer 2021; 148: 18-27.

219. Ligorio F, Zambelli L, Bottiglieri A, Castagnoli L, Zattarin E, Lobefaro R, Ottini A, Vingiani A, Pupa SM, Bianchi GV, Capri G, Pruneri G, de Braud F, Vernieri C. Hormone receptor status influences the impact of body mass index and hyperglycemia on the risk of tumor relapse in early-stage HER2-positive breast cancer patients. Ther Adv Med Oncol 2021; 13: 17588359211006960.

220. Lin YC, Cheng HH, Chen SC, Shen WC, Huang YT. Pre-treatment high body mass index is associated with poor survival in Asian premenopausal women with localized breast cancer. J Cancer 2021; 12: 4488-96.

221. Modi ND, Tan JQE, Rowland A, Koczwara B, Abuhelwa AY, Kichenadasse G, McKinnon RA, Wiese MD, Sorich MJ, Hopkins AM. The obesity paradox in early and advanced HER2 positive breast cancer: pooled analysis of clinical trial data. NPJ Breast Cancer 2021; 7: 30.

222. Nakatsukasa K, Niikura N, Kashiwabara K, Amemiya T, Watanabe KI, Hata H, Kikawa Y, Taniike N, Yamanaka T, Mitsunaga S, Nakagami K, Adachi M, Kondo N, Shibuya Y, Hayashi N, Naito M, Yamashita T, Umeda M, Mukai H, Ota Y. Secondary endpoints analysis in patients with estrogen receptor-positive metastatic breast cancer treated with everolimus and exemestane enrolled in Oral Care-BC. BMC Cancer 2021; 21: 34.

223. Orlandini LF, Pimentel FF, Andrade JM, Reis F, Mattos-Arruda L, Tiezzi DG. Obesity and high neutrophil-to-lymphocyte ratio are prognostic factors in non-metastatic breast cancer patients. Braz J Med Biol Res 2021; 54: e11409.

224. Saleh K, Carton M, Dieras V, Heudel PE, Brain E, D'Hondt V, Mailliez A, Patsouris A, Mouret-Reynier MA, Goncalves A, Ferrero JM, Petit T, Emile G, Uwer L, Debled M, Dalenc F, Jouannaud C, Ladoire S, Leheurteur M, Cottu P, Veron L, Savignoni A, Courtinard C, Robain M, Delaloge S, Deluche E. Impact of body mass index on overall survival in patients with metastatic breast cancer. Breast 2021; 55: 16-24.

225. Shang L, Hattori M, Fleming G, Jaskowiak N, Hedeker D, Olopade OI, Huo D. Impact of post-diagnosis weight change on survival outcomes in Black and White breast cancer patients. Breast Cancer Res 2021; 23: 18.

226. Ahn HR, Kang SY, Youn HJ, Jung SH. Hyperglycemia during Adjuvant Chemotherapy as a Prognostic Factor in Breast Cancer Patients without Diabetes. J Breast Cancer 2020; 23: 398-409.

227. Chen B, Lai J, Guo L, Dai D, Chen R, Wei G, Liao N. Adverse effects of being underweight on young female breast cancer patients with lymph node metastases. J Cancer 2020; 11: 1976-84.

228. Engkakul T, Thnogtang N, Nimmannit A, Chuthapisith S, Akewanlop C. Impact of Obesity on Outcomes of Operable Breast Cancer: A Retrospective Cohort Study. Asian Pac J Cancer Prev 2020; 21: 953-60.

229. Godina C, Ottander E, Tryggvadottir H, Borgquist S, Isaksson K, Jernström H. Prognostic Impact of Menopausal Hormone Therapy in Breast Cancer Differs According to Tumor Characteristics and Treatment. Front Oncol 2020; 10: 80.

230. Krasniqi E, Pizzuti L, Barchiesi G, Sergi D, Carpano S, Botti C, Kayal R, Sanguineti G, Marchetti P, Botticelli A, Marinelli D, Gamucci T, Natoli C, Grassadonia A, Tinari N, Tomao S, Tonini G, Santini D, Michelotti A, Mentuccia L, Vaccaro A, Magnolfi E, Gelibter A, Magri V, Cortesi E, D'Onofrio L, Cassano A, Cazzaniga M, Moscetti L, Fabbri A, Scinto AF, Corsi D, Carbognin L, Bria E, La Verde N, Garufi C, Di Stefano P, Mirabelli R, Veltri E, Paris I, Giotta F, Lorusso V, Landucci E, Ficorella C, Roselli M, Adamo V, Ricciardi G, Russo A, Valerio MR, Berardi R, Pistelli M, Cannita K, Zamagni C, Garrone O, Baldini E, Livi L, Meattini I, Del Medico P, Generali D, De Maria R, Risi E, Ciliberto G, Villa A, Sperduti I, Mazzotta M, Barba M, Giordano A, Vici P. Impact of BMI on HER2+ metastatic breast cancer patients treated with pertuzumab and/or trastuzumab emtansine. Real-world evidence. J Cell Physiol 2020; 235: 7900-10.

231. Liu G, Luo J. TIMP-2 gene rs4789936 polymorphism is associated with increased risk of breast cancer and poor prognosis in Southern Chinese women. Aging (Albany NY) 2020; 12: 19325-34.

232. Tiainen S, Masarwah A, Oikari S, Rilla K, Hämäläinen K, Sudah M, Sutela A, Vanninen R, Ikonen J, Tammi R, Tammi M, Auvinen P. Tumor microenvironment and breast cancer survival: combined effects of breast fat, M2 macrophages and hyaluronan create a dismal prognosis. Breast Cancer Res Treat 2020; 179: 565-75.

233. Al-Saleh K, Abd El-Aziz N, Ali A, Abo Zeed W, Salah T, Elsamany S, Rasmy A, El Farargy O, Husain S, Al-Rikabi A, Alsaeed E, Aldiab A, Abd El-Warith A. A Multicenter Study of the Impact of Body Mass Index (BMI) on the incidence of Pathologic Complete Response (pCR) Among Saudi Patients with locally advanced Breast cancer (LABC) post Neoadjuvant Chemotherapy (NAC). Gulf J Oncolog 2019; 1: 33-42.

234. Ayoub NM, Yaghan RJ, Abdo NM, Matalka, II, Akhu-Zaheya LM, Al-Mohtaseb AH. Impact of Obesity on Clinicopathologic Characteristics and Disease Prognosis in Pre- and Postmenopausal Breast Cancer Patients: A Retrospective Institutional Study. J Obes 2019; 2019: 3820759.

235. Cacho-Díaz B, Spínola-Maroño H, Reynoso N, González-Aguilar A, Mohar-Betancourt A. Role of Overweight, Obesity, and Comorbidities in the Prognosis of Patients With Breast Cancer With Brain Metastases. Clin Breast Cancer 2019; 19: e394-e8.

236. Fang Q, Huang J, Gan L, Shen K, Chen X, Wu B. Weight Gain during Neoadjuvant Chemotherapy is Associated with Worse Outcome among the Patients with Operable Breast Cancer. J Breast Cancer 2019; 22: 399-411.

237. Fasching PA, Gass P, Häberle L, Volz B, Hein A, Hack CC, Lux MP, Jud SM, Hartmann A, Beckmann MW, Slamon DJ, Erber R. Prognostic effect of Ki-67 in common clinical subgroups of patients with HER2-negative, hormone receptor-positive early breast cancer. Breast Cancer Res Treat 2019; 175: 617-25.

238. Franzoi MA, Eiger D, Ameye L, Ponde N, Caparica R, De Angelis C, Brandão M, Desmedt C, Di Cosimo S, Kotecki N, Lambertini M, Awada A, Piccart M, Azambuja E. Clinical Implications of Body Mass Index in Metastatic Breast Cancer Patients Treated With Abemaciclib and Endocrine Therapy. J Natl Cancer Inst 2021; 113: 462-70.

239. Kim JY, Lee DW, Lee KH, Min A, Ryu HS, Lee HB, Moon HG, Kim TY, Han SW, Oh DY, Han W, Park IA, Noh DY, Im SA, Kim S. Prognostic role of body mass index is different according to menopausal status and tumor subtype in breast cancer patients. Breast Cancer Res Treat 2019; 176: 453-60.

240. Tryggvadottir H, Ygland Rödström M, Markkula A, Kenéz X, Isaksson K, Borgquist S, Jernström H. The impact of body size changes on recurrence risk depends on age and estrogen receptor status in primary breast cancer. Cancer Causes Control 2019; 30: 1157-70.

241. Wang K, Wu YT, Zhang X, Chen L, Zhu WM, Zhang AJ, Zheng K, Yin XD, Li F, Kong LQ, Ma BL, Li H, Liu JP, Jiang J, Li ZY, Shi Y, Ren GS, Li HY. Clinicopathologic and Prognostic Significance of Body Mass Index (BMI) among Breast Cancer Patients in Western China: A Retrospective Multicenter Cohort Based on Western China Clinical Cooperation Group (WCCCG). Biomed Res Int 2019; 2019: 3692093.

242. Wang X, Hui TL, Wang MQ, Liu H, Li RY, Song ZC. Body Mass Index at Diagnosis as a Prognostic Factor for Early-Stage Invasive Breast Cancer after Surgical Resection. Oncol Res Treat 2019; 42: 195-201.

243. Bouvard B, Chatelais J, Soulié P, Hoppé E, Saulnier P, Capitain O, Mege M, Mesgouez-Nebout N, Jadaud E, Abadie-Lacourtoisie S, Campone M, Legrand E. Osteoporosis treatment and 10 years' oestrogen receptor+ breast cancer outcome in postmenopausal women treated with aromatase inhibitors. Eur J Cancer 2018; 101: 87-94.

244. Hwang KT, Chu AJ, Kim J, Lee JY, Chang JH, Oh S, Kim YA, Jung J, Oh B. Prognostic Influence of Preoperative Mammographic Breast Density in Operable Invasive Female Breast Cancer. Sci Rep 2018; 8: 16075.

245. Strand F, Humphreys K, Holm J, Eriksson M, Törnberg S, Hall P, Azavedo E, Czene K. Long-term prognostic implications of risk factors associated with tumor size: a case study of women regularly attending screening. Breast Cancer Res 2018; 20: 31.

246. Pizzuti L, Marchetti P, Natoli C, Gamucci T, Santini D, Scinto AF, Iezzi L, Mentuccia L, D'Onofrio L, Botticelli A, Moscetti L, Sperati F, Botti C, Ferranti F, Buglioni S, Sanguineti G, Di Filippo S, di Lauro L, Sergi D, Catenaro T, Tomao S, Giordano A, Maugeri-Saccà M, Barba M, Vici P. Fasting glucose and body mass index as predictors of activity in breast cancer patients treated with everolimus-exemestane: The EverExt study. Sci Rep 2017; 7: 10597.

247. Ohara M, Akimoto E, Noma M, Matsuura K, Doi M, Kagawa N, Itamoto T. Prognostic impact of progesterone receptor status combined with body mass index in breast cancer patients treated with adjuvant aromatase inhibitor. Oncol Lett 2015; 10: 3286-92.

248. Zeichner SB, Koru-Sengul T, Shah N, Liu Q, Markward NJ, Montero AJ, Glück S, Silva O, Ahn ER. Improved clinical outcomes associated with vitamin D supplementation during adjuvant chemotherapy in patients with HER2+ nonmetastatic breast cancer. Clin Breast Cancer 2015; 15: e1-11.

249. Kaviani A, Neishaboury M, Mohammadzadeh N, Ansari-Damavandi M, Jamei K. Effects of obesity on presentation of breast cancer, lymph node metastasis and patient survival: a retrospective review. Asian Pac J Cancer Prev 2013; 14: 2225-9.

250. Xing P, Li JG, Jin F, Zhao TT, Liu Q, Dong HT, Wei XL. Prognostic significance of body mass index in breast cancer patients with hormone receptor-positive tumours after curative surgery. Clin Invest Med 2013; 36: E297-305.

251. Zheng Z, Cao H, Qu S, Liu Y, Piao Y, Xie X. Clinical features and prognosis of obese breast cancer patients: a retrospective study*. Chinese-German J Clin Oncol 2013; 12: 5.

252. Greenlee H, Unger JM, LeBlanc M, Ramsey S, Hershman DL. Association between Body Mass Index and Cancer Survival in a Pooled Analysis of 22 Clinical Trials. Cancer Epidemiol Biomarkers Prev 2017; 26: 21-9.

253. Rosner GL, Hargis JB, Hollis DR, Budman DR, Weiss RB, Henderson IC, Schilsky RL. Relationship between toxicity and obesity in women receiving adjuvant chemotherapy for breast cancer: results from cancer and leukemia group B study 8541. J Clin Oncol 1996; 14: 3000-8.

254. Liu LN, Lin YC, Miaskowski C, Chen SC, Chen ML. Association between changes in body fat and disease progression after breast cancer surgery is moderated by menopausal status. BMC Cancer 2017; 17: 863.

255. Buono G, Crispo A, Giuliano M, De Angelis C, Schettini F, Forestieri V, Lauria R, De Laurentiis M, De Placido P, Rea CG, Pacilio C, Esposito E, Grimaldi M, Nocerino F, Porciello G, Giudice A, Amore A, Minopoli A, Botti G, De Placido S, Trivedi MV, Arpino G. Metabolic syndrome and early stage breast cancer outcome: results from a prospective observational study. Breast Cancer Res Treat 2020; 182: 401-9.

256. Goodwin PJ, Segal RJ, Vallis M, Ligibel JA, Pond GR, Robidoux A, Findlay B, Gralow JR, Mukherjee SD, Levine M, Pritchard KI. The LISA randomized trial of a weight loss intervention in postmenopausal breast cancer. NPJ Breast Cancer 2020; 6: 6.

257. Raghavendra A, Sinha AK, Valle-Goffin J, Shen Y, Tripathy D, Barcenas CH. Determinants of Weight Gain During Adjuvant Endocrine Therapy and Association of Such Weight Gain With Recurrence in Long-term Breast Cancer Survivors. Clin Breast Cancer 2018; 18: e7-e13.

258. Abe R, Kumagai N, Kimura M, Hirosaki A, Nakamura T. Biological characteristics of breast cancer in obesity. Tohoku J Exp Med 1976; 120: 351-9.

259. Al Saeed EF, Ghabbban AJ, Tunio MA. Impact of BMI on Locoregional Control among Saudi Patients with Breast Cancer after Breast Conserving Surgery and Modified Radical Mastectomy. Gulf J Oncolog 2015; 1: 7-14.

260. Albain KS, Green S, LeBlanc M, Rivkin S, O'Sullivan J, Osborne CK. Proportional hazards and recursive partitioning and amalgamation analyses of the Southwest Oncology Group node-positive adjuvant CMFVP breast cancer data base: a pilot study. Breast Cancer Res Treat 1992; 22: 273-84.

261. Allin KH, Nordestgaard BG, Flyger H, Bojesen SE. Elevated pre-treatment levels of plasma C-reactive protein are associated with poor prognosis after breast cancer: a cohort study. Breast Cancer Res 2011; 13: R55.

262. Anderson SJ, Wapnir I, Dignam JJ, Fisher B, Mamounas EP, Jeong JH, Geyer CE, Jr., Wickerham DL, Costantino JP, Wolmark N. Prognosis after ipsilateral breast tumor recurrence and locoregional recurrences in patients treated by breast-conserving therapy in five National Surgical Adjuvant Breast and Bowel Project protocols of node-negative breast cancer. J Clin Oncol 2009; 27: 2466-73.

263. Artac M, Bozcuk H, Afacan B, Ozdogan M, Samur M. The impact of waist-to-hip ratio on clinical outcomes in metastatic breast cancer patients treated with aromatase inhibitors. Breast 2008; 17: 418-22.

264. Artac M, Bozcuk H, Kiyici A, Eren OO, Boruban MC, Ozdogan M. Serum leptin level and waist-to-hip ratio (WHR) predict the overall survival of metastatic breast cancer (MBC) patients treated with aromatase inhibitors (AIs). Breast Cancer 2013; 20: 174-80.

265. Bastarrachea J, Hortobagyi GN, Smith TL, Kau SW, Buzdar AU. Obesity as an adverse prognostic factor for patients receiving adjuvant chemotherapy for breast cancer. Ann Intern Med 1994; 120: 18-25.

266. Bayraktar S, Hernadez-Aya LF, Lei X, Meric-Bernstam F, Litton JK, Hsu L, Hortobagyi GN, Gonzalez-Angulo AM. Effect of metformin on survival outcomes in diabetic patients with triple receptor-negative breast cancer. Cancer 2012; 118: 1202-11.

267. Bergmann A, Bourrus NS, de Carvalho CM, Dias Rde A, Fabro EA, Sales NS, de Aguiar SS. Arm symptoms and overall survival in Brazilian patients with advanced breast cancer. Asian Pac J Cancer Prev 2011; 12: 2939-42.

268. Biglia N, Peano E, Sgandurra P, Moggio G, Pecchio S, Maggiorotto F, Sismondi P. Body mass index (BMI) and breast cancer: impact on tumor histopathologic features, cancer subtypes and recurrence rate in pre and postmenopausal women. Gynecol Endocrinol 2013; 29: 263-7.

269. Björner S, Rosendahl AH, Simonsson M, Markkula A, Jirström K, Borgquist S, Rose C, Ingvar C, Jernström H. Body Mass Index Influences the Prognostic Impact of Combined Nuclear Insulin Receptor and Estrogen Receptor Expression in Primary Breast Cancer. Front Endocrinol (Lausanne) 2017; 8: 332.

270. Boivin L, Diguisto C, Chas M, Bédouet L, Etienne C, Arbion F, Body G, Ouldamer L. [Outcomes of patients with breast cancer in function of their body mass index]. Gynecol Obstet Fertil Senol 2017; 45: 215-23.

271. Borgquist S, Hjertberg M, Henningson M, Ingvar C, Rose C, Jernström H. Given breast cancer, is fat better than thin? Impact of the estrogen receptor beta gene polymorphisms. Breast Cancer Res Treat 2013; 137: 849-62.

272. Boyd NF, Campbell JE, Germanson T, Thomson DB, Sutherland DJ, Meakin JW. Body weight and prognosis in breast cancer. J Natl Cancer Inst 1981; 67: 785-9.

273. Bradshaw PT, Ibrahim JG, Gammon MD. A Bayesian proportional hazards regression model with non-ignorably missing time-varying covariates. Stat Med 2010; 29: 3017-29.

274. Brewster AM, Do KA, Thompson PA, Hahn KM, Sahin AA, Cao Y, Stewart MM, Murray JL, Hortobagyi GN, Bondy ML. Relationship between epidemiologic risk factors and breast cancer recurrence. J Clin Oncol 2007; 25: 4438-44.

275. Brooks JD, John EM, Mellemkjær L, Reiner AS, Malone KE, Lynch CF, Figueiredo JC, Haile RW, Shore RE, Bernstein JL, Bernstein L. Body mass index and risk of second primary breast cancer: the WECARE Study. Breast Cancer Res Treat 2012; 131: 571-80.

276. Burkheimer E, Starks L, Khan M, Oostendorp L, Melnik MK, Chung MH, Wright GP. The impact of obesity on treatment choices and outcomes in operable breast cancer. Am J Surg 2019; 217: 474-7.

277. Cakar B, Muslu U, Erdogan AP, Ozisik M, Ozisik H, Tunakan Dalgic C, Durusoy R, Karaca B, Sezgin C, Karabulut B, Uslu R. The Role of Body Mass Index in Triple Negative Breast Cancer. Oncol Res Treat 2015; 38: 518-22.

278. Cespedes Feliciano EM, Kwan ML, Kushi LH, Chen WY, Weltzien EK, Castillo AL, Sweeney C, Bernard PS, Caan BJ. Body mass index, PAM50 subtype, recurrence, and survival among patients with nonmetastatic breast cancer. Cancer 2017; 123: 2535-42.

279. Chapman JA, Pritchard KI, Goss PE, Ingle JN, Muss HB, Dent SF, Vandenberg TA, Findlay B, Gelmon KA, Wilson CF, Shepherd LE, Pollak MN. Competing risks of death in younger and older postmenopausal breast cancer patients. World J Clin Oncol 2014; 5: 1088-96.

280. Chen CH, Lo YF, Tsai HP, Shen SC, Chao TC, Chen MF, Chen SC. Low body mass index is an independent risk factor of locoregional recurrence in women with breast cancer undergoing breast conserving therapy. Chang Gung Med J 2009; 32: 553-62.

281. Coates RJ, Clark WS, Eley JW, Greenberg RS, Huguley CM, Jr., Brown RL. Race, nutritional status, and survival from breast cancer. J Natl Cancer Inst 1990; 82: 1684-92.

282. Crujeiras AB, Cueva J, Vieito M, Curiel T, López-López R, Pollán M, Casanueva FF. Association of breast cancer and obesity in a homogeneous population from Spain. J Endocrinol Invest 2012; 35: 681-5.

283. de Azambuja E, McCaskill-Stevens W, Francis P, Quinaux E, Crown JP, Vicente M, Giuliani R, Nordenskjöld B, Gutiérez J, Andersson M, Vila MM, Jakesz R, Demol J, Dewar J, Santoro A, Lluch A, Olsen S, Gelber RD, Di Leo A, Piccart-Gebhart M. The effect of body mass index on overall and disease-free survival in node-positive breast cancer patients treated with docetaxel and doxorubicin-containing adjuvant chemotherapy: the experience of the BIG 02-98 trial. Breast Cancer Res Treat 2010; 119: 145-53.

284. Demirkan B, Alacacioglu A, Yilmaz U. Relation of body mass index (BMI) to disease free (DFS) and distant disease free survivals (DDFS) among Turkish women with operable breast carcinoma. Jpn J Clin Oncol 2007; 37: 256-65.

285. Donegan WLJ, S.; Koehler, M.R. The prognostic implications of obesity for the surgical cure of breast cancer. Breast Dis Breast 1978: 4.

286. Eralp Y, Smith TL, Altundağ K, Kau SW, Litton J, Valero V, Buzdar A, Hortobagyi GN, Arun B. Clinical features associated with a favorable outcome following neoadjuvant chemotherapy in women with localized breast cancer aged 35 years or younger. J Cancer Res Clin Oncol 2009; 135: 141-8.

287. Ewertz M, Machado SG, Boice JD, Jr., Jensen OM. Endometrial cancer following treatment for breast cancer: a case-control study in Denmark. Br J Cancer 1984; 50: 687-92.

288. Ewertz M. Breast cancer in Denmark. Incidence, risk factors, and characteristics of survival. Acta Oncol 1993; 32: 595-615.

289. Fan Y, Ding X, Xu B, Ma F, Yuan P, Wang J, Zhang P, Li Q, Luo Y. Prognostic Significance of Single Progesterone Receptor Positivity: A Comparison Study of Estrogen Receptor Negative/Progesterone Receptor Positive/Her2 Negative Primary Breast Cancer With Triple Negative Breast Cancer. Medicine (Baltimore) 2015; 94: e2066.

290. Farr A, Stolz M, Baumann L, Bago-Horvath Z, Oppolzer E, Pfeiler G, Seifert M, Singer CF. The effect of obesity on pathological complete response and survival in breast cancer patients receiving uncapped doses of neoadjuvant anthracycline-taxane-based chemotherapy. Breast 2017; 33: 153-8.

291. Gnant M, Pfeiler G, Stöger H, Mlineritsch B, Fitzal F, Balic M, Kwasny W, Seifert M, Stierer M, Dubsky P, Greil R, Steger G, Samonigg H, Fesl C, Jakesz R. The predictive impact of body mass index on the efficacy of extended adjuvant endocrine treatment with anastrozole in postmenopausal patients with breast cancer: an analysis of the randomised ABCSG-6a trial. Br J Cancer 2013; 109: 589-96.

292. Goodwin PJ, Ennis M, Pritchard KI, Trudeau ME, Koo J, Madarnas Y, Hartwick W, Hoffman B, Hood N. Fasting insulin and outcome in early-stage breast cancer: results of a prospective cohort study. J Clin Oncol 2002; 20: 42-51.

293. Gordon NH, Crowe JP, Brumberg DJ, Berger NA. Socioeconomic factors and race in breast cancer recurrence and survival. Am J Epidemiol 1992; 135: 609-18.

294. Guo Q, Burgess S, Turman C, Bolla MK, Wang Q, Lush M, Abraham J, Aittomäki K, Andrulis IL, Apicella C, Arndt V, Barrdahl M, Benitez J, Berg CD, Blomqvist C, Bojesen SE, Bonanni B, Brand JS, Brenner H, Broeks A, Burwinkel B, Caldas C, Campa D, Canzian F, Chang-Claude J, Chanock SJ, Chin SF, Couch FJ, Cox A, Cross SS, Cybulski C, Czene K, Darabi H, Devilee P, Diver WR, Dunning AM, Earl HM, Eccles DM, Ekici AB, Eriksson M, Evans DG, Fasching PA, Figueroa J, Flesch-Janys D, Flyger H, Gapstur SM, Gaudet MM, Giles GG, Glendon G, Grip M, Gronwald J, Haeberle L, Haiman CA, Hall P, Hamann U, Hankinson S, Hartikainen JM, Hein A, Hiller L, Hogervorst FB, Holleczek B, Hooning MJ, Hoover RN, Humphreys K, Hunter DJ, Hüsing A, Jakubowska A, Jukkola-Vuorinen A, Kaaks R,

Kabisch M, Kataja V, Knight JA, Koppert LB, Kosma VM, Kristensen VN, Lambrechts D, Le Marchand L, Li J, Lindblom A, Lindström S, Lissowska J, Lubinski J, Machiela MJ, Mannermaa A, Manoukian S, Margolin S, Marme F, Martens JWM, McLean C, Menéndez P, Milne RL, Marie Mulligan A, Muranen TA, Nevanlinna H, Neven P, Nielsen SF, Nordestgaard BG, Olson JE, Perez JIA, Peterlongo P, Phillips KA, Poole CJ, Pylkäs K, Radice P, Rahman N, Rüdiger T, Rudolph A, Sawyer EJ, Schumacher F, Seibold P, Seynaeve C, Shah M, Smeets A, Southey MC, Tollenaar R, Tomlinson I, Tsimiklis H, Ulmer HU, Vachon C, van den Ouweland AMW, Van't Veer LJ, Wildiers H, Willett W, Winqvist R, Zamora MP, Chenevix-Trench G, Dörk T, Easton DF, García-Closas M, Kraft P, Hopper JL, Zheng W, Schmidt MK, Pharoah PDP. Body mass index and breast cancer survival: a Mendelian randomization analysis. Int J Epidemiol 2017; 46: 1814-22.

295. Hebert JR, Augustine A, Barone J, Kabat GC, Kinne DW, Wynder EL. Weight, height and body mass index in the prognosis of breast cancer: early results of a prospective study. Int J Cancer 1988; 42: 315-8.

296. Hyun SH, Ahn HK, Lee JH, Choi JY, Kim BT, Park YH, Im YH, Lee JE, Nam SJ, Lee KH. Body Mass Index with Tumor 18F-FDG Uptake Improves Risk Stratification in Patients with Breast Cancer. PLoS One 2016; 11: e0165814.

297. Iwase T, Nakamura R, Yamamoto N, Yoshi A, Itami M, Miyazaki M. The effect of molecular subtype and body mass index on neo-adjuvant chemotherapy in breast cancer patients. Breast 2014; 23: 264-72.

298. Jeon SJ, Lee JI, Jeon MJ, Lee M. Prognostic Effects of Adjuvant Chemotherapy-Induced Amenorrhea and Subsequent Resumption of Menstruation for Premenopausal Breast Cancer Patients. Medicine (Baltimore) 2016; 95: e3301.

299. Kamby C, Ejlertsen B, Andersen J, Birkler NE, Rytter L, Zedeler K, Rose C. Body size and menopausal status in relation to the pattern of spread in recurrent breast cancer. Acta Oncol 1989; 28: 795-9.

300. Karatas F, Erdem GU, Sahin S, Aytekin A, Yuce D, Sever AR, Babacan T, Ates O, Ozisik Y, Altundag K. Obesity is an independent prognostic factor of decreased pathological complete response to neoadjuvant chemotherapy in breast cancer patients. Breast 2017; 32: 237-44.

301. Kawai M, Tomotaki A, Miyata H, Iwamoto T, Niikura N, Anan K, Hayashi N, Aogi K, Ishida T, Masuoka H, Iijima K, Masuda S, Tsugawa K, Kinoshita T, Nakamura S, Tokuda Y. Body mass index and survival after diagnosis of invasive breast cancer: a study based on the Japanese National Clinical Database-Breast Cancer Registry. Cancer Med 2016; 5: 1328-40.

302. Kimura M. Obesity as prognostic factors in breast cancer. Diabetes Res Clin Pract 1990; 10 Suppl 1: S247-51.

303. Kneubil MC, Brollo J, Botteri E, Curigliano G, Rotmensz N, Goldhirsch A, Lohsiriwat V, Manconi A, Martella S, Santillo B, Petit JY, Rietjens M. Breast cancer subtype approximations and loco-regional recurrence after immediate breast reconstruction. Eur J Surg Oncol 2013; 39: 260-5.

304. Kwan ML, John EM, Caan BJ, Lee VS, Bernstein L, Cheng I, Gomez SL, Henderson BE, Keegan TH, Kurian AW, Lu Y, Monroe KR, Roh JM, Shariff-Marco S, Sposto R, Vigen C, Wu AH. Obesity and mortality after breast cancer by race/ethnicity: The California Breast Cancer Survivorship Consortium. Am J Epidemiol 2014; 179: 95-111.

305. Kyogoku S, Hirohata T, Takeshita S, Nomura Y, Shigematsu T, Horie A. Survival of breast-cancer patients and body size indicators. Int J Cancer 1990; 46: 824-31.

306. Lara-Medina F, Pérez-Sánchez V, Saavedra-Pérez D, Blake-Cerda M, Arce C, Motola-Kuba D, Villarreal-Garza C, González-Angulo AM, Bargalló E, Aguilar JL, Mohar A, Arrieta Ó. Triple-negative breast cancer in Hispanic patients: high prevalence, poor prognosis, and association with menopausal status, body mass index, and parity. Cancer 2011; 117: 3658-69.

307. Lee Y, Lee SA, Choi JY, Song M, Sung H, Jeon S, Park SK, Yoo KY, Noh DY, Ahn SH, Kang D. Prognosis of breast cancer is associated with one-carbon metabolism related nutrients among Korean women. Nutr J 2012; 11: 59.

308. Lethaby AE, Mason BH, Harvey VJ, Holdaway IM. Survival of women with node negative breast cancer in the Auckland region. N Z Med J 1996; 109: 330-3.

309. Levine EG, Raczynski JM, Carpenter JT. Weight gain with breast cancer adjuvant treatment. Cancer 1991; 67: 1954-9.

310. Loehberg CR, Almstedt K, Jud SM, Haeberle L, Fasching PA, Hack CC, Lux MP, Thiel FC, Schrauder MG, Brunner M, Bayer CM, Hein A, Heusinger K, Heimrich J, Bani MR, Renner SP, Hartmann A, Beckmann MW, Wachter DL. Prognostic relevance of Ki-67 in the primary tumor for survival after a diagnosis of distant metastasis. Breast Cancer Res Treat 2013; 138: 899-908.

311. Markkula A, Bromée A, Henningson M, Hietala M, Ringberg A, Ingvar C, Rose C, Jernström H. Given breast cancer, does breast size matter? Data from a prospective breast cancer cohort. Cancer Causes Control 2012; 23: 1307-16.

312. McLaughlin VH, Trentham-Dietz A, Hampton JM, Newcomb PA, Sprague BL. Lifestyle factors and the risk of a second breast cancer after ductal carcinoma in situ. Cancer Epidemiol Biomarkers Prev 2014; 23: 450-60.

313. McNee RK, Mason BH, Neave LM, Kay RG. Influence of height, weight, and obesity on breast cancer incidence and recurrence in Auckland, New Zealand. Breast Cancer Res Treat 1987; 9: 145-50.

314. Menon KV, Hodge A, Houghton J, Bates T. Body mass index, height and cumulative menstrual cycles at the time of diagnosis are not risk factors for poor outcome in breast cancer. Breast 1999; 8: 328-33.

315. Mohle-Boetani JC, Grosser S, Whittemore AS, Malec M, Kampert JB, Paffenbarger RS, Jr. Body size, reproductive factors, and breast cancer survival. Prev Med 1988; 17: 634-42.

316. Morrison VA, McCall L, Muss HB, Jatoi A, Cohen HJ, Cirrincione CT, Ligibel JA, Lafky JM, Hurria A. The impact of actual body weight-based chemotherapy dosing and body size on adverse events and outcome in older patients with breast cancer: Results from Cancer and Leukemia Group B (CALGB) trial 49907 (Alliance A151436). J Geriatr Oncol 2018; 9: 228-34.

317. Mousa U, Onur H, Utkan G. Is obesity always a risk factor for all breast cancer patients? c-erbB2 expression is significantly lower in obese patients with early stage breast cancer. Clin Transl Oncol 2012; 14: 923-30.

318. Papatestas AE, Miller SR, Pertsemlidis D, Fagerstrom R, Lesnick G, Aufses AH. Association between prognosis and hormone receptors in women with breast cancer. Cancer Detect Prev 1986; 9: 303-10.

319. Perez CA, Zumsteg ZS, Gupta G, Morrow M, Arnold B, Patil SM, Traina TA, Robson ME, Wen YH, McCormick B, Powell SN, Ho AY. Black race as a prognostic factor in triple-negative breast cancer patients treated with breast-conserving therapy: a large, single-institution retrospective analysis. Breast Cancer Res Treat 2013; 139: 497-506.

320. Pierce JP, Stefanick ML, Flatt SW, Natarajan L, Sternfeld B, Madlensky L, Al-Delaimy WK, Thomson CA, Kealey S, Hajek R, Parker BA, Newman VA, Caan B, Rock CL. Greater survival after breast cancer in physically active women with high vegetable-fruit intake regardless of obesity. J Clin Oncol 2007; 25: 2345-51.

321. Pizzuti L, Sergi D, Sperduti I, Lauro LD, Mazzotta M, Botti C, Izzo F, Marchetti L, Tomao S, Marchetti P, Natoli C, Grassadonia A, Gamucci T, Mentuccia L, Magnolfi E, Vaccaro A, Cassano A, Rossi E, Botticelli A, Sini V, Sarobba MG, Fabbri MA, Moscetti L, Astone A, Michelotti A, De Angelis C, Bertolini I, Angelini F, Ciliberto G, Maugeri-Saccà M, Giordano A, Barba M, Vici P. Body mass index in HER2-negative metastatic breast cancer treated with first-line paclitaxel and bevacizumab. Cancer Biol Ther 2018; 19: 328-34.

322. Prado CM, Baracos VE, McCargar LJ, Reiman T, Mourtzakis M, Tonkin K, Mackey JR, Koski S, Pituskin E, Sawyer MB. Sarcopenia as a determinant of chemotherapy toxicity and time to tumor progression in metastatic breast cancer patients receiving capecitabine treatment. Clin Cancer Res 2009; 15: 2920-6.

323. Pritchard KI, Shepherd LE, Chapman JA, Norris BD, Cantin J, Goss PE, Dent SF, Walde D, Vandenberg TA, Findlay B, O'Reilly SE, Wilson CF, Han L, Piura E, Whelan TJ, Pollak MN. Randomized trial of tamoxifen versus combined tamoxifen and octreotide LAR Therapy in the adjuvant treatment of early-stage breast cancer in postmenopausal women: NCIC CTG MA.14. J Clin Oncol 2011; 29: 3869-76.

324. Rier HN, Jager A, Sleijfer S, van Rosmalen J, Kock M, Levin MD. Changes in body composition and muscle attenuation during taxane-based chemotherapy in patients with metastatic breast cancer. Breast Cancer Res Treat 2018; 168: 95-105.

325. Robinson B, Currie M, Phillips E, Dachs G, Strother M, Morrin H, Davey V, Frampton C. Body mass index (BMI): association with clinicopathological factors and outcome of women with newly diagnosed breast cancer in New Zealand. N Z Med J 2017; 130: 46-56.

326. Rohan TE, Hiller JE, McMichael AJ. Dietary factors and survival from breast cancer. Nutr Cancer 1993; 20: 167-77.

327. Rossi L, Stevens D, Pierga JY, Lerebours F, Reyal F, Robain M, Asselain B, Rouzier R. Impact of Adjuvant Chemotherapy on Breast Cancer Survival: A Real-World Population. PLoS One 2015; 10: e0132853.

328. Sarkissyan M, Wu Y, Vadgama JV. Obesity is associated with breast cancer in African-American women but not Hispanic women in South Los Angeles. Cancer 2011; 117: 3814-23.

329. Saxe GA, Rock CL, Wicha MS, Schottenfeld D. Diet and risk for breast cancer recurrence and survival. Breast Cancer Res Treat 1999; 53: 241-53.

330. Schuetz F, Diel IJ, Pueschel M, von Holst T, Solomayer EF, Lange S, Sinn P, Bastert G, Sohn C. Reduced incidence of distant metastases and lower mortality in 1072 patients with breast cancer with a history of hormone replacement therapy. Am J Obstet Gynecol 2007; 196: 342.e1-9.

331. Sendur MA, Aksoy S, Zengin N, Altundag K. Efficacy of adjuvant aromatase inhibitor in hormone receptor-positive postmenopausal breast cancer patients according to the body mass index. Br J Cancer 2012; 107: 1815-9.

332. Sendur MA, Aksoy S, Ozdemir NY, Zengin N, Yazici O, Sever AR, Altundag K. Effect of body mass index on the efficacy of adjuvant tamoxifen in premenopausal patients with hormone receptor-positive breast cancer. J buon 2016; 21: 27-34.

333. Sestak I, Dowsett M, Ferree S, Baehner FL, Cuzick J. Retrospective analysis of molecular scores for the prediction of distant recurrence according to baseline risk factors. Breast Cancer Res Treat 2016; 159: 71-8.

334. Shachar SS, Deal AM, Weinberg M, Nyrop KA, Williams GR, Nishijima TF, Benbow JM, Muss HB. Skeletal Muscle Measures as Predictors of Toxicity, Hospitalization, and Survival in Patients with Metastatic Breast Cancer Receiving Taxane-Based Chemotherapy. Clin Cancer Res 2017; 23: 658-65.

335. Shu XO, Zheng Y, Cai H, Gu K, Chen Z, Zheng W, Lu W. Soy food intake and breast cancer survival. Jama 2009; 302: 2437-43.

336. Singh AK, Pandey A, Tewari M, Pratyush DD, Singh HK, Pandey HP, Shukla HS. Obesity augmented breast cancer risk: a potential risk factor for Indian women. J Surg Oncol 2011; 103: 217-22.

337. Slaoui M, Mouh FZ, Ghanname I, Razine R, El Mzibri M, Amrani M. Outcome of Breast Cancer in Moroccan Young Women Correlated to Clinic-Pathological Features, Risk Factors and Treatment: A Comparative Study of 716 Cases in a Single Institution. PLoS One 2016; 11: e0164841.

338. Sohrabi A, Sandoz J, Spratt JS, Polk HC, Jr. Recurrence of breast cancer. Obesity, tumor size, and axillary lymph node metastases. Jama 1980; 244: 264-5.

339. Sparano JA, Wang M, Zhao F, Stearns V, Martino S, Ligibel JA, Perez EA, Saphner T, Wolff AC, Sledge GW, Jr., Wood WC, Davidson NE. Race and hormone receptor-positive breast cancer outcomes in a randomized chemotherapy trial. J Natl Cancer Inst 2012; 104: 406-14.

340. Su Y, Cai H, Zheng Y, Qiu Q, Lu W, Shu XO, Cai Q. Associations of the Transforming Growth Factor β/Smad Pathway, Body Mass Index, and Physical Activity With Breast Cancer Outcomes: Results From the Shanghai Breast Cancer Study. Am J Epidemiol 2016; 184: 501-9.

341. Suissa S, Pollak M, Spitzer WO, Margolese R. Body size and breast cancer prognosis: a statistical explanation of the discrepancies. Cancer Res 1989; 49: 3113-6.

342. Tammemagi CM, Nerenz D, Neslund-Dudas C, Feldkamp C, Nathanson D. Comorbidity and survival disparities among black and white patients with breast cancer. Jama 2005; 294: 1765-72.

343. Tamura N, Tsuda H, Yoshida M, Hojo T, Akashi-Tanaka S, Kinoshita T, Sugihara K. Clinicopathological predictive factors for ipsilateral and contralateral events following initial surgery to treat ductal carcinoma in situ. Breast Cancer 2016; 23: 510-8.

344. Tartter PI, Papatestas AE, Ioannovich J, Mulvihill MN, Lesnick G, Aufses AH, Jr. Cholesterol and obesity as prognostic factors in breast cancer. Cancer 1981; 47: 2222-7.

345. Taylor SGt, Knuiman MW, Sleeper LA, Olson JE, Tormey DC, Gilchrist KW, Falkson G, Rosenthal SN, Carbone PP, Cummings FJ. Six-year results of the Eastern Cooperative Oncology Group trial of observation versus CMFP versus CMFPT in postmenopausal patients with node-positive breast cancer. J Clin Oncol 1989; 7: 879-89.

346. Venturelli E, Orenti A, Fabricio ASC, Garrone G, Agresti R, Paolini B, Bonini C, Gion M, Berrino F, Desmedt C, Coradini D, Biganzoli E. Observational study on the prognostic value of testosterone and adiposity in postmenopausal estrogen receptor positive breast cancer patients. BMC Cancer 2018; 18: 651.

347. Villaseñor A, Ballard-Barbash R, Baumgartner K, Baumgartner R, Bernstein L, McTiernan A, Neuhouser ML. Prevalence and prognostic effect of sarcopenia in breast cancer survivors: the HEAL Study. J Cancer Surviv 2012; 6: 398-406.

348. Vitolins MZ, Kimmick GG, Case LD. BMI influences prognosis following surgery and adjuvant chemotherapy for lymph node positive breast cancer. Breast J 2008; 14: 357-65.

349. von Drygalski A, Tran TB, Messer K, Pu M, Corringham S, Nelson C, Ball ED. Obesity is an independent predictor of poor survival in metastatic breast cancer: retrospective analysis of a patient cohort whose treatment included high-dose chemotherapy and autologous stem cell support. Int J Breast Cancer 2011; 2011: 523276.

350. Wu X, Ye Y, Barcenas CH, Chow WH, Meng QH, Chavez-MacGregor M, Hildebrandt MA, Zhao H, Gu X, Deng Y, Wagar E, Esteva FJ, Tripathy D, Hortobagyi GN. Personalized Prognostic Prediction Models for Breast Cancer Recurrence and Survival Incorporating Multidimensional Data. J Natl Cancer Inst 2017; 109.

351. Zekri J, Farag K, Allithy A. Obesity and outcome of post-menopausal women receiving adjuvant letrozole for breast cancer. Ecancermedicalscience 2018; 12: 821.

352. Zhou P, Jiang YZ, Hu X, Sun W, Liu YR, Liu F, Luo RC, Shao ZM. Clinicopathological characteristics of patients with HER2-positive breast cancer and the efficacy of trastuzumab in the People's Republic of China. Onco Targets Ther 2016; 9: 2287-95.

353. Ballinger TJ, Jiang G, Kassem N, Radovich M, Schneider BP. Impact of Body Mass Index on Presence of ctDNA and Disease Recurrence after Neoadjuvant Chemotherapy for Triple-Negative Breast Cancer: Analysis from BRE12-158. Clin Cancer Res 2021; 27: 1195-9.

354. Behrouzi B, Zokaasadi M, Mohagheghi MA, Emami AH, Sadighi S. The Effect of Metformin on Survival Outcomes of Non-Metastatic Breast Cancer Patients with Type 2 Diabetes. Asian Pac J Cancer Prev 2021; 22: 611-6.

355. Iwase T, Parikh A, Dibaj SS, Shen Y, Shrimanker TV, Chainitikun S, Kida K, Sapon ME, Sahin O, James A, Medrano AYD, Klopp AH, Ueno NT. The Prognostic Impact of Body Composition for Locally Advanced Breast Cancer Patients Who Received Neoadjuvant Chemotherapy. Cancers (Basel) 2021; 13.

356. Jeon YW, Park HS, Ko Y, Sung YS, Shim BY, Suh YJ, Kim HA. Intermuscular fat density as a novel prognostic factor in breast cancer patients treated with adjuvant chemotherapy. Breast Cancer Res Treat 2021; 189: 759-68.

357. Kennard K, Buckley ME, Sizer LM, Larson S, Carter WB, Frazier TG, Carp NZ. Metabolic Syndrome: does this influence breast cancer outcomes in the triple-negative population? Breast Cancer Res Treat 2021; 186: 53-63.

358. Kim SW, Chun M, Jung YS, Oh YT, Noh OK, Cho O. Impact of Body Mass Index on Local Recurrence according to Intrinsic Subtype Approximation in Korean Women with Early Stage Invasive Breast Cancer Receiving Contemporary Treatments. J Cancer 2021; 12: 4648-54.

359. Kreklau A, Nel I, Kasimir-Bauer S, Kimmig R, Frackenpohl AC, Aktas B. An Observational Study on Breast Cancer Survival and Lifestyle Related Risk Factors. In Vivo 2021; 35: 1007-15.

360. Liu YS, Wu PE, Chou WC, Vikram R, Chen WT, Yang SL, Bolla MK, Wang Q, Dennis J, Chan TL, Choi JY, Hou MF, Ito H, Kang D, Kim SW, Kwong A, Matsuo K, Park SK, Shu XO, Zheng W, Dunning AM, Easton DF, Shen CY. Body mass index and type 2 diabetes and breast cancer survival: a Mendelian randomization study. Am J Cancer Res 2021; 11: 3921-34.

361. Tong Y, Gao W, Wu J, Zhu S, Huang O, He J, Zhu L, Chen W, Li Y, Shen K, Chen X. Comprehensive Association Analysis of 21-Gene Recurrence Score and Obesity in Chinese Breast Cancer Patients. Front Oncol 2021; 11: 619840.

362. Bayraktar S, Zhou JZ, Bassett R, Gutierrez Barrera AM, Layman RM, Valero V, Arun B. Clinical outcome and toxicity from taxanes in breast cancer patients with BRCA1 and BRCA2 pathogenic germline mutations. Breast J 2020; 26: 1572-82.

363. Caleffi M, Crivelatti I, Burchardt NA, Ribeiro RA, Acevedo Y, Job LG, Nonnemacher N, Rosa DD. Breast cancer survival in Brazil: How much health care access impact on cancer outcomes? Breast 2020; 54: 155-9.

364. Cantini L, Pistelli M, Merloni F, Fontana A, Bertolini I, De Angelis C, Bastianelli L, Della Mora A, Santinelli A, Savini A, Maccaroni E, Diodati L, Falcone A, Berardi R. Body Mass Index and Hormone Receptor Status Influence Recurrence Risk in HER2-Positive Early Breast Cancer Patients. Clin Breast Cancer 2020; 20: e89-e98.

365. Corona SP, Giudici F, Jerusalem G, Ciruelos E, Strina C, Sirico M, Bernocchi O, Milani M, Dester M, Ziglioli N, Barbieri G, Cervoni V, Montemurro F, Generali D. Impact of BMI on the outcome of metastatic breast cancer patients treated with everolimus: a retrospective exploratory analysis of the BALLET study. Oncotarget 2020; 11: 2172-81.

366. da Silva JL, de Paula BHR, Small IA, Thuler LCS, de Melo AC. Sociodemographic, Clinical, and Pathological Factors Influencing Outcomes in Locally Advanced Triple Negative Breast Cancer: A Brazilian Cohort. Breast Cancer (Auckl) 2020; 14: 1178223420962488.

367. Di Cosimo S, Porcu L, Agbor-Tarh D, Cinieri S, Franzoi MA, De Santis MC, Saura C, Huober J, Fumagalli D, Izquierdo M, Piccart M, Daidone MG, de Azambuja E. Effect of body mass index on response to neo-adjuvant therapy in HER2-positive breast cancer: an exploratory analysis of the NeoALTTO trial. Breast Cancer Res 2020; 22: 115.

368. Huh J, Park B, Lee H, An YS, Jung Y, Kim JY, Kang DK, Kim KW, Kim TH. Prognostic Value of Skeletal Muscle Depletion Measured on Computed Tomography for Overall Survival in Patients with Non-Metastatic Breast Cancer. J Breast Cancer 2020; 23: 80-92.

369. Patel V, James M, Frampton C, Robinson B, Davey V, Timmings L. Body Mass Index and Outcomes in Breast Cancer Treated With Breast Conservation. Int J Radiat Oncol Biol Phys 2020; 106: 369-76.

370. Schmidt G, Schneider C, Gerlinger C, Endrikat J, Gabriel L, Ströder R, Müller C, Juhasz-Böss I, Solomayer EF. Impact of body mass index, smoking habit, alcohol consumption, physical activity and parity on disease course of women with triple-negative breast cancer. Arch Gynecol Obstet 2020; 301: 603-9.

371. Tong Y, Wu J, Huang O, He J, Zhu L, Chen W, Li Y, Chen X, Shen K. IGF-1 Interacted With Obesity in Prognosis Prediction in HER2-Positive Breast Cancer Patients. Front Oncol 2020; 10: 550.

372. Abdel-Rahman O. Outcomes of metastatic breast cancer patients in relationship to disease-free interval following primary treatment of localized disease; a pooled analysis of two clinical trials. Breast J 2019; 25: 823-8.

373. Kus T, Cinkir HY, Aktas G, Abali H. Hepatosteatosis may predict late recurrence of breast cancer: A single-center observational study. Curr Probl Cancer 2019; 43: 100461.

374. Lee JW, Kim SY, Lee HJ, Han SW, Lee JE, Lee SM. Prognostic Significance of Abdominal-to-Gluteofemoral Adipose Tissue Distribution in Patients with Breast Cancer. J Clin Med 2019; 8.

375. Omarini C, Palumbo P, Pecchi A, Draisci S, Balduzzi S, Nasso C, Barbolini M, Isca C, Bocconi A, Moscetti L, Galetti S, Tazzioli G, Torricelli P, Cascinu S, Piacentini F. Predictive Role Of Body Composition Parameters In Operable Breast Cancer Patients Treated With Neoadjuvant Chemotherapy. Cancer Manag Res 2019; 11: 9563-9.

376. Yao D, Wang Z, Cai H, Li Y, Li B. Relationship between red cell distribution width and prognosis in patients with breast cancer after operation: a retrospective cohort study. Biosci Rep 2019; 39.

377. Zhang M, Zhang X, Liu J, Su W, Li J, Zhang S, Zhang J. Body mass index and diabetes are important prognostic signatures for bilateral breast cancer prognosis. J Cell Biochem 2019.

378. Desmedt C, Demicheli R, Fornili M, Bachir I, Duca M, Viglietti G, Berlière M, Piccart M, Sotiriou C, Sosnowski M, Forget P, Biganzoli E. Potential Benefit of Intra-operative Administration of Ketorolac on Breast Cancer Recurrence According to the Patient's Body Mass Index. J Natl Cancer Inst 2018; 110: 1115-22.

379. Espelund U, Renehan AG, Cold S, Oxvig C, Lancashire L, Su Z, Flyvbjerg A, Frystyk J. Prognostic relevance and performance characteristics of serum IGFBP-2 and PAPP-A in women with breast cancer: a long-term Danish cohort study. Cancer Med 2018; 7: 2391-404.

380. Wu R, Liu T, Yang P, Liu X, Liu F, Wang Y, Xiong H, Yu S, Huang X, Zhuang L. Association of 15-hydroxyprostaglandin dehydrogenate and poor prognosis of obese breast cancer patients. Oncotarget 2017; 8: 22842-53.

381. Yue CF, Feng PN, Yao ZR, Yu XG, Lin WB, Qian YM, Guo YM, Li LS, Liu M. High serum uric acid concentration predicts poor survival in patients with breast cancer. Clin Chim Acta 2017; 473: 160-5.

382. Zhang S, Lei R, Wu J, Shan J, Hu Z, Chen L, Ren X, Yao L, Wang J, Wang X. Role of high mobility group A1 and body mass index in the prognosis of patients with breast cancer. Oncol Lett 2017; 14: 5719-26.

383. Asaga S, Kinoshita T, Hojo T, Suzuki J, Jimbo K, Tsuda H. Prognostic factors for triple-negative breast cancer patients receiving preoperative systemic chemotherapy. Clin Breast Cancer 2013; 13: 40-6.

384. Fei F, Messina C, Slaets L, Chakiba C, Cameron D, Bogaerts J, Bonnefoi H. Tumour size is the only predictive factor of distant recurrence after pathological complete response to neoadjuvant chemotherapy in patients with large operable or locally advanced breast cancers: a sub-study of EORTC 10994/BIG 1-00 phase III trial. Eur J Cancer 2015; 51: 301-9.

385. Osman MA, Hennessy BT. Obesity Correlation With Metastases Development and Response to First-Line Metastatic Chemotherapy in Breast Cancer. Clin Med Insights Oncol 2015; 9: 105-12.

386. Huober J, Cole BF, Rabaglio M, Giobbie-Hurder A, Wu J, Ejlertsen B, Bonnefoi H, Forbes JF, Neven P, Láng I, Smith I, Wardley A, Price KN, Goldhirsch A, Coates AS, Colleoni M, Gelber RD, Thürlimann B. Symptoms of endocrine treatment and outcome in the BIG 1-98 study. Breast Cancer Res Treat 2014; 143: 159-69.

387. Lee SA, Sung H, Han W, Noh DY, Ahn SH, Kang D. Serum adiponectin but not leptin at diagnosis as a predictor of breast cancer survival. Asian Pac J Cancer Prev 2014; 15: 6137-43.

388. Vici P, Sperati F, Maugeri-Saccà M, Melucci E, Di Benedetto A, Di Lauro L, Pizzuti L, Sergi D, Terrenato I, Esposito L, Iannuzzi CA, Pasquale R, Botti C, Fuhrman B, Giordano A, Mottolese M, Barba M. p53 status as effect modifier of the association between pre-treatment fasting glucose and breast cancer outcomes in non diabetic, HER2 positive patients treated with trastuzumab. Oncotarget 2014; 5: 10382-92.

389. Ampil F, Caldito G, Li B, Devarakonda S, Burton G, Kim RH, Chu Q. Morbid obesity does not disadvantage patients with in situ or early-stage carcinoma undergoing breast-conserving surgery. Anticancer Res 2013; 33: 3867-9.

390. Pande M, Thompson PA, Do KA, Sahin AA, Amos CI, Frazier ML, Bondy ML, Brewster AM. Genetic variants in the vitamin D pathway and breast cancer disease-free survival. Carcinogenesis 2013; 34: 587-94.

391. Natori A, Hayashi N, Soejima K, Deshpande GA, Takahashi O, Cristofanilli M, Ueno NT, Yamauchi H. A comparison of epidemiology, biology, and prognosis of inflammatory breast cancer in Japanese and US populations. Clin Breast Cancer 2013; 13: 460-4.

392. Del Fabbro E, Parsons H, Warneke CL, Pulivarthi K, Litton JK, Dev R, Palla SL, Brewster A, Bruera E. The relationship between body composition and response to neoadjuvant chemotherapy in women with operable breast cancer. Oncologist 2012; 17: 1240-5.

393. Melhem-Bertrandt A, Chavez-Macgregor M, Lei X, Brown EN, Lee RT, Meric-Bernstam F, Sood AK, Conzen SD, Hortobagyi GN, Gonzalez-Angulo AM. Beta-blocker use is associated with improved relapse-free survival in patients with triple-negative breast cancer. J Clin Oncol 2011; 29: 2645-52.

394. Eberlein T, Simon R, Fisher S, Lippman ME. Height, weight, and risk of breast cancer relapse. Breast Cancer Res Treat 1985; 5: 81-6.

395. Heasman KZ, Sutherland HJ, Campbell JA, Elhakim T, Boyd NF. Weight gain during adjuvant chemotherapy for breast cancer. Breast Cancer Res Treat 1985; 5: 195-200.

396. Bao PP, Zhao ZG, Gao YT, Zheng Y, Zhang B, Cai H, Zheng W, Shu XO, Lu W. Association of type 2 diabetes genetic variants with breast cancer survival among Chinese women. PLoS One 2015; 10: e0117419.

397. Chen Y, Dorjgochoo T, Bao PP, Zheng Y, Cai H, Lu W, Shu XO. Menopausal symptoms among breast cancer patients: a potential indicator of favorable prognosis. PLoS One 2013; 8: e75926.

398. Kim JY, Han W, Moon HG, Ahn SK, Kim J, Lee JW, Kim MK, Kim T, Noh DY. Prognostic effect of preoperative serum estradiol level in postmenopausal breast cancer. BMC Cancer 2013; 13: 503.

399. Fowble B, Hanlon A, Freedman G, Nicolaou N, Anderson P. Second cancers after conservative surgery and radiation for stages I-II breast cancer: identifying a subset of women at increased risk. Int J Radiat Oncol Biol Phys 2001; 51: 679-90.

400. Chen CM, Chang HT, Mok KT, Liu CI, Tsai CC, Jou NW, Wang BW, Chen IS. Analysis of prognostic factors in Chinese women with breast cancer in southern Taiwan. Zhonghua Yi Xue Za Zhi (Taipei) 1999; 62: 717-23.

401. Sheean P, Gomez-Perez S, Joyce C, O'Connor P, Bojko M, Smith A, Vasilopoulos V, Rao R, Sclamberg J, Robinson P. Myosteatosis at diagnosis is adversely associated with 2-year survival in women with estrogen receptor-negative metastatic breast cancer. Breast Cancer Res Treat 2021; 190: 121-32.

402. Cespedes Feliciano EM, Popuri K, Cobzas D, Baracos VE, Beg MF, Khan AD, Ma C, Chow V, Prado CM, Xiao J, Liu V, Chen WY, Meyerhardt J, Albers KB, Caan BJ. Evaluation of automated computed tomography segmentation to assess body composition and mortality associations in cancer patients. J Cachexia Sarcopenia Muscle 2020; 11: 1258-69.

403. Iwase T, Sangai T, Fujimoto H, Sawabe Y, Matsushita K, Nagashima K, Sato Y, Nakagawa A, Masuda T, Nagashima T, Ohtsuka M. Quality and quantity of visceral fat tissue are associated with

insulin resistance and survival outcomes after chemotherapy in patients with breast cancer. Breast Cancer Res Treat 2020; 179: 435-43.

404. Bradshaw PT, Cespedes Feliciano EM, Prado CM, Alexeeff S, Albers KB, Chen WY, Caan BJ. Adipose Tissue Distribution and Survival Among Women with Nonmetastatic Breast Cancer. Obesity (Silver Spring) 2019; 27: 997-1004.

405. Iwase T, Sangai T, Nagashima T, Sakakibara M, Sakakibara J, Hayama S, Ishigami E, Masuda T, Miyazaki M. Impact of body fat distribution on neoadjuvant chemotherapy outcomes in advanced breast cancer patients. Cancer Med 2016; 5: 41-8.

406. Makari-Judson G, Judson CH, Mertens WC. Longitudinal patterns of weight gain after breast cancer diagnosis: observations beyond the first year. Breast J 2007; 13: 258-65.

407. Costa LJ, Varella PC, del Giglio A. Weight changes during chemotherapy for breast cancer. Sao Paulo Med J 2002; 120: 113-7.

408. Marinho LA, Rettori O, Vieira-Matos AN. Body weight loss as an indicator of breast cancer recurrence. Acta Oncol 2001; 40: 832-7.

409. Kumar NB, Allen K, Cantor A, Cox CE, Greenberg H, Shah S, Lyman GH. Weight gain associated with adjuvant tamoxifen therapy in stage I and II breast cancer: fact or artifact? Breast Cancer Res Treat 1997; 44: 135-43.

410. Goodwin PJ, Panzarella T, Boyd NF. Weight gain in women with localized breast cancer--a descriptive study. Breast Cancer Res Treat 1988; 11: 59-66.

411. Swenerton KD, Legha SS, Smith T, Hortobagyi GN, Gehan EA, Yap HY, Gutterman JU, Blumenschein GR. Prognostic factors in metastatic breast cancer treated with combination chemotherapy. Cancer Res 1979; 39: 1552-62.

412. Feigelson HS, Bodelon C, Powers JD, Curtis RE, Buist DSM, Veiga LHS, Bowles EJA, Berrington de Gonzalez A, Gierach GL. Body Mass Index and Risk of Second Cancer Among Women With Breast Cancer. J Natl Cancer Inst 2021; 113: 1156-60.

413. Minicozzi P, Berrino F, Sebastiani F, Falcini F, Vattiato R, Cioccoloni F, Calagreti G, Fusco M, Vitale MF, Tumino R, Sigona A, Budroni M, Cesaraccio R, Candela G, Scuderi T, Zarcone M, Campisi I, Sant M. High fasting blood glucose and obesity significantly and independently increase risk of breast cancer death in hormone receptor-positive disease. Eur J Cancer 2013; 49: 3881-8.

414. Iyengar NM, Hudis CA, Dannenberg AJ. Obesity and cancer: local and systemic mechanisms. Annu Rev Med 2015; 66: 297-309.

415. Hursting SD, Digiovanni J, Dannenberg AJ, Azrad M, Leroith D, Demark-Wahnefried W, Kakarala M, Brodie A, Berger NA. Obesity, energy balance, and cancer: new opportunities for prevention. Cancer Prev Res (Phila) 2012; 5: 1260-72.

416. Lohmann AE, Goodwin PJ, Chlebowski RT, Pan K, Stambolic V, Dowling RJ. Association of Obesity-Related Metabolic Disruptions With Cancer Risk and Outcome. J Clin Oncol 2016; 34: 4249-55.

417. Picon-Ruiz M, Morata-Tarifa C, Valle-Goffin JJ, Friedman ER, Slingerland JM. Obesity and adverse breast cancer risk and outcome: Mechanistic insights and strategies for intervention. CA Cancer J Clin 2017; 67: 378-97.

418. Bhardwaj P, Au CC, Benito-Martin A, Ladumor H, Oshchepkova S, Moges R, Brown KA. Estrogens and breast cancer: Mechanisms involved in obesity-related development, growth and progression. J Steroid Biochem Mol Biol 2019; 189: 161-70.

419. Rose DP, Vona-Davis L. The cellular and molecular mechanisms by which insulin influences breast cancer risk and progression. Endocr Relat Cancer 2012; 19: R225-41.

420. Iyengar NM, Hudis CA, Dannenberg AJ. Obesity and inflammation: new insights into breast cancer development and progression. Am Soc Clin Oncol Educ Book 2013: 46-51.

421. Yoon YS, Kwon AR, Lee YK, Oh SW. Circulating adipokines and risk of obesity related cancers: A systematic review and meta-analysis. Obes Res Clin Pract 2019; 13: 329-39.

422. Himbert C, Delphan M, Scherer D, Bowers LW, Hursting S, Ulrich CM. Signals from the Adipose Microenvironment and the Obesity-Cancer Link-A Systematic Review. Cancer Prev Res (Phila) 2017; 10: 494-506.

423. Lee DH, Giovannucci EL. The Obesity Paradox in Cancer: Epidemiologic Insights and Perspectives. Curr Nutr Rep 2019; 8: 175-81.

424. Karampela I, Chrysanthopoulou E, Christodoulatos GS, Dalamaga M. Is There an Obesity Paradox in Critical Illness? Epidemiologic and Metabolic Considerations. Curr Obes Rep 2020; 9: 231-44.

425. James FR, Wootton S, Jackson A, Wiseman M, Copson ER, Cutress RI. Obesity in breast cancer--what is the risk factor? Eur J Cancer 2015; 51: 705-20.

426. Bandera EV, Fay SH, Giovannucci E, Leitzmann MF, Marklew R, McTiernan A, Mullee A, Romieu I, Thune I, Uauy R, Wiseman MJ, World Cancer Research Fund International Continuous Update Project P. The use and interpretation of anthropometric measures in cancer epidemiology: A perspective from the world cancer research fund international continuous update project. Int J Cancer 2016; 139: 2391-7.

427. Aleixo GFP, Williams GR, Nyrop KA, Muss HB, Shachar SS. Muscle composition and outcomes in patients with breast cancer: meta-analysis and systematic review. Breast Cancer Res Treat 2019; 177: 569-79.

428. Christakoudi S, Tsilidis KK, Evangelou E, Riboli E. A Body Shape Index (ABSI), hip index, and risk of cancer in the UK Biobank cohort. Cancer Med 2021; 10: 5614-28.

429. Hudis CA, Barlow WE, Costantino JP, Gray RJ, Pritchard KI, Chapman JA, Sparano JA, Hunsberger S, Enos RA, Gelber RD, Zujewski JA. Proposal for standardized definitions for efficacy end points in adjuvant breast cancer trials: the STEEP system. J Clin Oncol 2007; 25: 2127-32.

430. Warren JL, Yabroff KR. Challenges and opportunities in measuring cancer recurrence in the United States. J Natl Cancer Inst 2015; 107.

431. Care DoHaS, Improving outcomes: a strategy for cancer, 2011.

432. Afifi AM, Saad AM, Al-Husseini MJ, Elmehrath AO, Northfelt DW, Sonbol MB. Causes of death after breast cancer diagnosis: A US population-based analysis. Cancer 2020; 126: 1559-67.

433. Riihimaki M, Thomsen H, Brandt A, Sundquist J, Hemminki K. Death causes in breast cancer patients. Ann Oncol 2012; 23: 604-10.

434. Dwivedi AK, Dubey P, Cistola DP, Reddy SY. Association Between Obesity and Cardiovascular Outcomes: Updated Evidence from Meta-analysis Studies. Curr Cardiol Rep 2020; 22: 25.

435. Baracos VE, Martin L, Korc M, Guttridge DC, Fearon KCH. Cancer-associated cachexia. Nat Rev Dis Primers 2018; 4: 17105.

436. Pang Y, Wei Y, Kartsonaki C. Associations of adiposity and weight change with recurrence and survival in breast cancer patients: a systematic review and meta-analysis. Breast Cancer 2022; 29: 575-88.

437. van den Berg MM, Winkels RM, de Kruif JT, van Laarhoven HW, Visser M, de Vries JH, de Vries YC, Kampman E. Weight change during chemotherapy in breast cancer patients: a meta-analysis. BMC Cancer 2017; 17: 259.

438. Harborg S, Zachariae R, Olsen J, Johannsen M, Cronin-Fenton D, Boggild H, Borgquist S. Overweight and prognosis in triple-negative breast cancer patients: a systematic review and meta-analysis. NPJ Breast Cancer 2021; 7: 119.

439. Lohmann AE, Soldera SV, Pimentel I, Ribnikar D, Ennis M, Amir E, Goodwin PJ. Association of Obesity with Breast Cancer Outcome in Relation to Cancer Subtypes: A Meta-Analysis. J Natl Cancer Inst 2021.

440. Vance V, Mourtzakis M, McCargar L, Hanning R. Weight gain in breast cancer survivors: prevalence, pattern and health consequences. Obes Rev 2011; 12: 282-94.

441. Pedersen B, Delmar C, Lorincz T, Falkmer U, Gronkjaer M. Investigating Changes in Weight and Body Composition Among Women in Adjuvant Treatment for Breast Cancer: A Scoping Review. Cancer Nurs 2019; 42: 91-105.

442. Trestini I, Carbognin L, Monteverdi S, Zanelli S, De Toma A, Bonaiuto C, Nortilli R, Fiorio E, Pilotto S, Di Maio M, Gasbarrini A, Scambia G, Tortora G, Bria E. Clinical implication of changes in body composition and weight in patients with early-stage and metastatic breast cancer. Crit Rev Oncol Hematol 2018; 129: 54-66.

443. Makari-Judson G, Braun B, Jerry DJ, Mertens WC. Weight gain following breast cancer diagnosis: Implication and proposed mechanisms. World J Clin Oncol 2014; 5: 272-82.

444. Calle EE, Kaaks R. Overweight, obesity and cancer: epidemiological evidence and proposed mechanisms. Nat Rev Cancer 2004; 4: 579-91.

445. Chlebowski RT, Reeves MM. Weight Loss Randomized Intervention Trials in Female Cancer Survivors. J Clin Oncol 2016; 34: 4238-48.

446. Rock CL, Thomson CA, Sullivan KR, Howe CL, Kushi LH, Caan BJ, Neuhouser ML, Bandera EV, Wang Y, Robien K, Basen-Engquist KM, Brown JC, Courneya KS, Crane TE, Garcia DO, Grant BL, Hamilton KK, Hartman SJ, Kenfield SA, Martinez ME, Meyerhardt JA, Nekhlyudov L, Overholser L, Patel AV, Pinto BM, Platek ME, Rees-Punia E, Spees CK, Gapstur SM, McCullough ML. American Cancer Society nutrition and physical activity guideline for cancer survivors. CA Cancer J Clin 2022; 72: 230-62.

447. Inoue-Choi M, Robien K, Lazovich D. Adherence to the WCRF/AICR guidelines for cancer prevention is associated with lower mortality among older female cancer survivors. Cancer Epidemiol Biomarkers Prev 2013; 22: 792-802.