THE LANCET Global Health

Supplementary appendix

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

Supplement to: Jedy-Agba E, McCormack V, Adebamowo C, dos-Santos-Silva I. Stage at diagnosis of breast cancer in sub-Saharan Africa: a systematic review and meta-analysis. *Lancet Glob Health* 2016; **4:** e923–35.

Web-Appendix

Webappendix-Text 1: Systematic Review Protocol

Title: Stage at Diagnosis of Breast Cancer in Sub-Saharan Africa: A Systematic Review and Meta-analysis

Reviewers: Elima Jedy-Agba, Valerie McCormack and Isabel dos-Santos-Silva

Background

Breast cancer is by far the most common cancer affecting women worldwide[1]. In 2012, there were 1.67 million new cases of breast cancer constituting 25% of all cancers worldwide of which 883,000 new cases occurred in less developed regions[2]. Breast incidence rates in sub-Saharan Africa (SSA) are increasing, and although they remain among the lowest in the world, mortality rates from this disease are as high as those in high-income countries due to poor survival.

Stage at diagnosis is a major determinant of survival from breast cancer, with early disease (stages I/II) being associated with a better prognosis than late stage disease (stages III/IV). In high-income countries mortality rates from breast cancer have declined sharply in recent decades due to earlier stage at diagnosis, better diagnosis and improved treatment. However, in SSA where systems and facilities for accurate and timely diagnosis are scarce, the majority of breast cancer patients present late and are diagnosed at an advanced stage[3-9], in part contributing to poor outcomes[10-12]. Variations in stage of breast cancer at diagnosis across SSA, and over time in some of its settings[13], have been previously reported in individual settings[3,7,11,14,15] but, to our knowledge, have not been examined systematically across SSA.

In this study, we will systematically review the published literature on stage at presentation of breast cancer in SSA countries, examine trends over time, and investigate possible sources of between-study heterogeneity. The findings may help to identify locally-appropriate approaches for early detection and treatment of this disease.

Objectives

The main objective of this review is to ascertain the distribution of stage at diagnosis of breast cancer patients in SSA.

The specific aims of the systematic review are:

(i) To provide an overview of stage at diagnosis of breast cancer across SSA;
(ii) To identify and investigate the extent and sources of variations in stage at diagnosis of breast cancer across SSA and over time;
(iii) To compare the frequency of late stage breast cancer in SSA to the corresponding figures for Black and White women in the US over a similar time period.

Search Strategy

The search strategy will aim to identify all published studies conducted in SSA on stage at diagnosis of breast cancer.

Inclusion criteria

Studies will be included if they met the following inclusion criteria:

- Studies that reported on the distribution of stage at diagnosis of primary invasive breast cancer in women in any sub-Saharan African country (as defined by the United Nations[16]);
- Studies conducted and published before 1st January 2014;
- Studies published in any language (no language restrictions will be imposed);

Exclusion criteria

Studies will be excluded if they were:

- Not conducted in humans;
- Not conducted in SSA (articles from North Africa – i.e. Algeria, Egypt, Libya, Morocco, Sudan, Tunisia, Western Sahara – and those among African-Americans will be excluded);
- Studies with no information on breast cancer;
- Studies which included only male patients *;
- Meeting abstracts, review papers, reports, and commentaries;
- Studies whose eligibility criteria restricted patient entry to those with a particular stage (e.g. metastatic breast cancer only).

* Studies that include both male and female breast cancer cases recruited over a given period of time will not be excluded even if data are not presented separately by gender because the number of male cases is expected to be rather small.

Database searches
The databases to be searched will include:

- EMBASE
- Medline
- Web of Science
- Africa Wide Information (including African Journals Online)

Only these four databases will be searched as it is expected that saturation will be reached with the majority of studies appearing in all databases.

Search Terms
Keywords and Medical Subject Headings (MeSH) will be used to search the databases listed above. Broad search terms such as "breast cancer", "Sub-Saharan Africa or SSA" will be used. A complete list of search terms will be developed and used across all four databases [see Webappendix-Text3]. Hand-searching of references from retrieved articles, meeting abstracts, review papers, reports and commentaries will also be performed to identity any additional papers not captured by the electronic searches.

Title and abstract screening
The databases listed above will be searched and the citations retrieved will be downloaded into the Endnote software. Any duplicate articles identified by more than one data will be removed.

The titles and abstracts will be screened by one reviewer, with a random sample being also screened independently by a second reviewer. Any study excluded from the review will be documented and the reason(s) for exclusion noted in a systematic way.

Full text screening and data extraction
The full text of all the papers identified during the abstract screening step will be retrieved for full text screening to confirm eligibility and, if eligible, to extract relevant data. For each eligible paper data will be abstracted on the number of patients with breast cancer who presented in each one of the four stages (I, II , III and IV) or in early (i.e. stages I and II combined) and late (i.e. III and IV combined) stages if data were only presented in these aggregated categories. If a study provides numbers of patients in each specific American Joint Committee Cancer Tumour Node Metastases (TNM) category (e.g. T2, N0, M0) these will also be extracted. Information on the following variables will also be extracted: country, study design, study population and type of clinical setting (e.g. primary, secondary, tertiary, population-based cancer registry), years when breast cancer patients were diagnosed, age at time of diagnosis, methods and classification used to ascertain tumour stage. Whenever available data will also be extracted on reproductive history (e.g. age at menarche, age at first birth, parity and menopausal status at presentation); tumour's characteristics (e.g. histology, size, grade, node positivity, receptor status); and time from first symptoms to breast cancer diagnosis. In the course of the data abstraction, should there be any eligible papers resulting from the same study, only the one with the most complete information on stage will be included in the systematic review. The full-text of any potentially eligible studies identified through hand searches will also be reviewed using the methodology described above.

The full-text review and data extraction will be done independently by two reviewers using an adapted version of a pre-tested data entry form[17]. Any discrepancies will be resolved by discussion among the reviewers.

Assessment of Methodological Quality of the Papers
The quality of the papers included in the review will be assessed independently by two reviewers using an adapted version of a standardised form[17], which was developed using an approach similar to that of the Cochrane collaboration. The quality assessment form will be designed to capture three broad categories of items which will aim to assess the potential for selection bias and information bias as well as the availability of data on other variables relevant to stage. Each item within these three categories will be allocated a score ranging from 0 (if it did not meet the criteria or if the information provided was unclear) to a maximum of 2 or 4, depending on the item. The overall quality of the study will be expressed as a sum of the item-specific scores. The higher the score the higher the quality of the paper.

Data Analysis
The extracted data will be analysed using the STATA Statistical Software version 13 (StataCorp, Texas). An initial descriptive analysis will be done to provide information about the study population, study design, the

region of Sub-Saharan Africa, stage at presentation and other variables described above in the section on data abstraction. These results will be presented in both narrative and tabular form.

The percentage (p_{34}) of breast cancer patients diagnosed at late stages (III and IV) will be the primary outcome of interest in this review. This will be defined as the percentage $p_{34}=n_{34}/n$ where n_{34} is the number of women who presented at stages III or IV and n is the total number of women with known stage information. The suite of *metan* and *metaprop* commands will be used to graphically display population-specific late stage percentages and, if appropriate, to estimate pooled percentages using random effect models. Between-study heterogeneity will be examined using the I^2-statistics and the *P*-value for heterogeneity (Cochrane's *Q* statistic) test. Meta-regression analysis will be performed to identify independent sources of heterogeneity (e.g. calendar year, country/region, type of clinical setting). Small study bias will be assessed using funnel plots and the Egger test.

The findings on late stage breast cancer in SSA will be compared with those from African-American and Caucasian populations in the United States (US), for the same time period, using data from the US Surveillance Epidemiology and End Results (SEER) database. The SEER database includes data on all cancer incident cases from nine population-based cancer registries in the US.

Webappendix-Text 2. 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.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	3
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	5, 6
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.	3, Webappendix-Text 1
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, 6
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, 6
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Webappendix-Text 3
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, 6
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, 6
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	6
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.	7, Webappendix Text 4
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	7

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.	6,7

Section/topic	#	Checklist item	Reported on page #
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).	Page 5, Webappendix Text 4
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	8
RESULTS			
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.	Webappendix 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.	Webappendix - Table1, References
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).	Supplementary Text 4
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 1b, Figure 2, Webappendix Figures 2 and 3
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	Figures 1b, Figure 2, Webappendix Figures 2 and 3
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	Webappendix- Figure 4
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	Table 2
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
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, 13

Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	11, 13
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.	13

Webappendix-Text 3: Literature Search Strategy

Database	Search Terms
Embase	1. (breast cancer* or breast neoplasm* or breast carcinoma* or breast sarcoma* or breast tumor* or breast tumour* or breast malignanc*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier] 2. (Stage or presentation or grade or clinical features or clinical findings).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier] 3. (Africa or sub-Saharan Africa or Angola or Benin or Botswana or Burkina Faso or Burundi or Cameroun or Cape Verde or Chad or Central African Republic of Comoros or Congo or Cote d'Ivoire or Democratic Republic of Congo or Equatorial Guinea or Eritrea or Ethiopia or Gabon or Gambia or Ghana or Guinea or Guinea-Bissau or Kenya or Lesotho or Liberia or Madagascar or Malawi or Mali or Mozambique or Namibia or Niger or Nigeria or Rwanda or Sao Tome or Senegal or Seychelles or Sierra Leone or Somalia or South Africa or Swaziland or Togo or Uganda or Tanzania or Zambia or Zimbabwe).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier] 4. 1 and 2 and 3 5. exp Breast Neoplasms/ 6. cancer staging.mp. or exp Neoplasm Staging/ 7. Africa, Western/ or South Africa/ or Africa, Eastern/ or Africa.mp. or "Africa South of the Sahara"/ or Africa, Central/ or Africa/ or Africa, Southern/ 8. 1 or 5 9. 2 or 6 10. 3 or 7 11. 8 and 9 and 10
Africa-wide Information	1.breast cancer* or breast neoplasm* or breast carcinoma* or breast sarcoma* or breast tumor* or breast tumour* or breast malignanc* 2.breast neoplasms 3. Stage or presentation or grade or clinical features or clinical findings 4.Neoplasm staging 5. Africa 6. Africa or sub-Saharan Africa or Angola or Benin or Botswana or Burkina Faso or Burundi or Cameroun or Cape Verde or Chad or Central African Republic of Comoros or Congo or Cote d'Ivoire or Democratic Republic of Congo or Equatorial Guinea or Eritrea or Ethiopia or Gabon or Gambia or Ghana or Guinea or Guinea-Bissau or Kenya or Lesotho or Liberia or Madagascar or Malawi or Mali or Mozambique or Namibia or Niger or Nigeria or Rwanda or Sao Tome or Senegal or Seychelles or Sierra Leone or Somalia or South Africa or Swaziland or Togo or Uganda or Tanzania or Zambia or Zimbabwe 7.1 or 2 8.3 or 4 9. 5 or 6 10.7 and 8 and 9
Medline	1.(breast cancer* or breast neoplasm* or breast carcinoma* or breast sarcoma* or breast tumor* or breast tumour* or breast malignanc*).mp. [mp=title, abstract, subject headings,

	heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 2. (Stage or presentation or grade or clinical features or clinical findings).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 3.(Africa or sub-Saharan Africa or Angola or Benin or Botswana or Burkina Faso or Burundi or Cameroun or Cape Verde or Chad or Central African Republic of Comoros or Congo or Cote d'Ivoire or Democratic Republic of Congo or Equatorial Guinea or Eritrea or Ethiopia or Gabon or Gambia or Ghana or Guinea or Guinea-Bissau or Kenya or Lesotho or Liberia or Madagascar or Malawi or Mali or Mozambique or Namibia or Niger or Nigeria or Rwanda or Sao Tome or Senegal or Seychelles or Sierra Leone or Somalia or South Africa or Swaziland or Togo or Uganda or Tanzania or Zambia or Zimbabwe).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] 4.exp breast cancer/ 5.1 or 4 6.exp cancer staging/ 7.2 or 6 8. "Africa south of the Sahara"/ or South Africa/ or Africa/ or Central Africa/ or Africa.mp. 9. 3 or 8 10. 5 and 7 and 9
Web of Science	1. Topic=(breast cancer* or breast neoplasm* or breast carcinoma* or breast sarcoma* or breast tumor* or breast tumour* or breast malignanc*) 2.Topic=(stage or presentation or grade or clinical features or clinical findings) 3.Topic=(Africa or sub-Saharan Africa or Angola or Benin or Botswana or Burkina Faso or Burundi or Cameroun or Cape Verde or Chad or Central African Republic of Comoros or Congo or Cote d'Ivoire or Democratic Republic of Congo or Equatorial Guinea or Eritrea or Ethiopia or Gabon or Gambia or Ghana or Guinea or Guinea-Bissau or Kenya or Lesotho or Liberia or Madagascar or Malawi or Mali or Mozambique or Namibia or Niger or Nigeria or Rwanda or Sao Tome or Senegal or Seychelles or Sierra Leone or Somalia or South Africa or Swaziland or Togo or Uganda or Tanzania or Zambia or Zimbabwe) 4.1 and 2 and 3

Webappendix-Text 4: Assessment of Study Quality

The methodological quality of the papers included in the review was evaluated by adapting a standardized quality assessment form previously used by Eng *et al.*[17]. Each paper was scored separately on ten individual parameters within three broad categories aimed at evaluating the potential for biases in the way breast cancer patients were recruited or in the way stage at diagnosis was assessed and reported, as well as the availability of information on stage-related variables. A full list of all items considered is given below.

Minimizing selection bias

1. Timing of data collection
   Score 0 if unclear
   Score 2 if retrospective
   Score 4 if prospective

2. Study Design
   Score 0 if unclear
   Score 1.5 if opportunistic case series
   Score 2.5 if consecutive case series
   Score 4 if population-based study

3. Percentage of overall study sample size for which information on stage is provided
   Score 0 if unclear
   Score 2 if < 80% of total cases
   Score 4 if ≥ 80% of total cases

Minimizing information bias

4. What staging criteria was used?
   Score 0 if staging criteria was not reported
   Score 4 if TNM or Manchester criteria were used

5. Staging methods
   Score 0 if unclear
   Score 2 if clinical only
   Score 4 if clinical and imaging and other complementary exams

6. How were data on stage at presentation reported?
   Score 0 if unclear
   Score 2 if only data for aggregated categories of early (stages I and II combined) and late stage (stages III and IV combined) were given
   Score 4 if data provided separately for each one of the four stages (I, II, III and IV)

Assessment of other important variables related to stage at presentation

7. Age at presentation (e.g. mean, median or age-categories)
   Score 0 if not reported
   Score 1 if reported

8. Menopausal status at presentation
   Score 0 if not described
   Score 1 if described

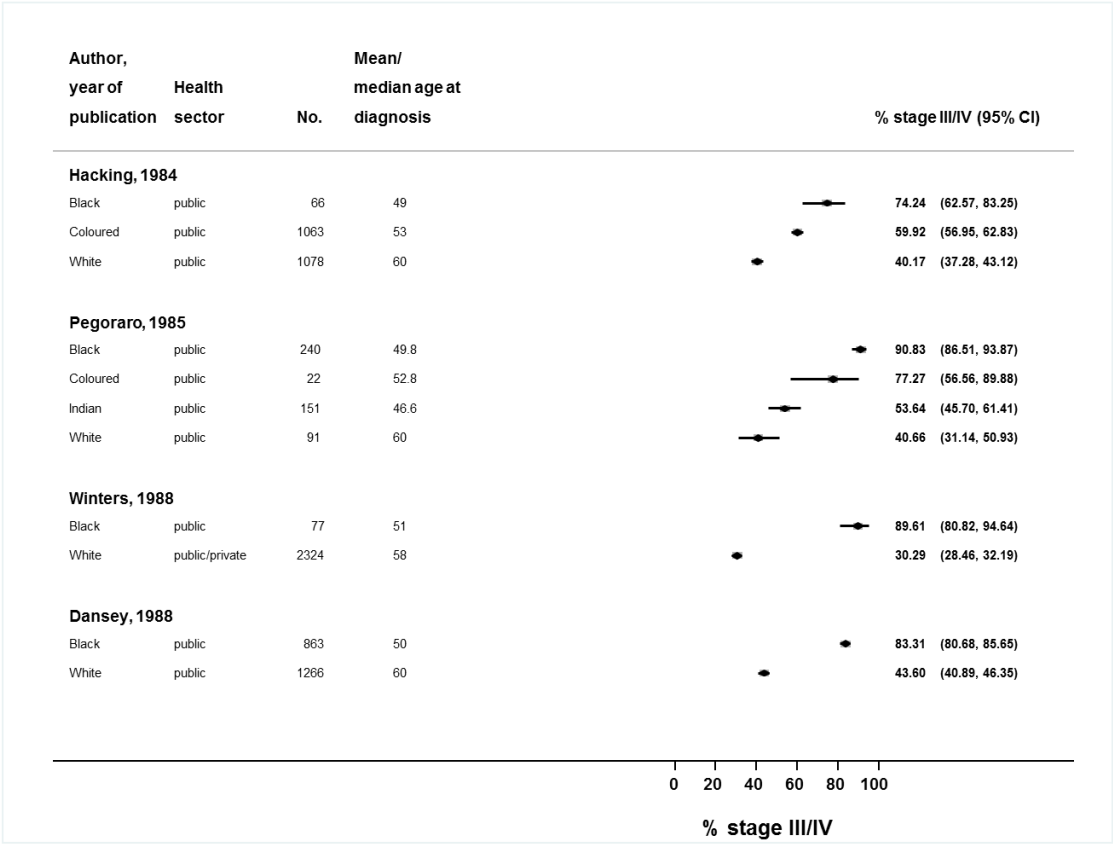
9. Year of Diagnosis
   Score 0 if not reported
   Score 1 if reported

10. Tumor grade
    Score 0 if not reported
    Score 1 if reported

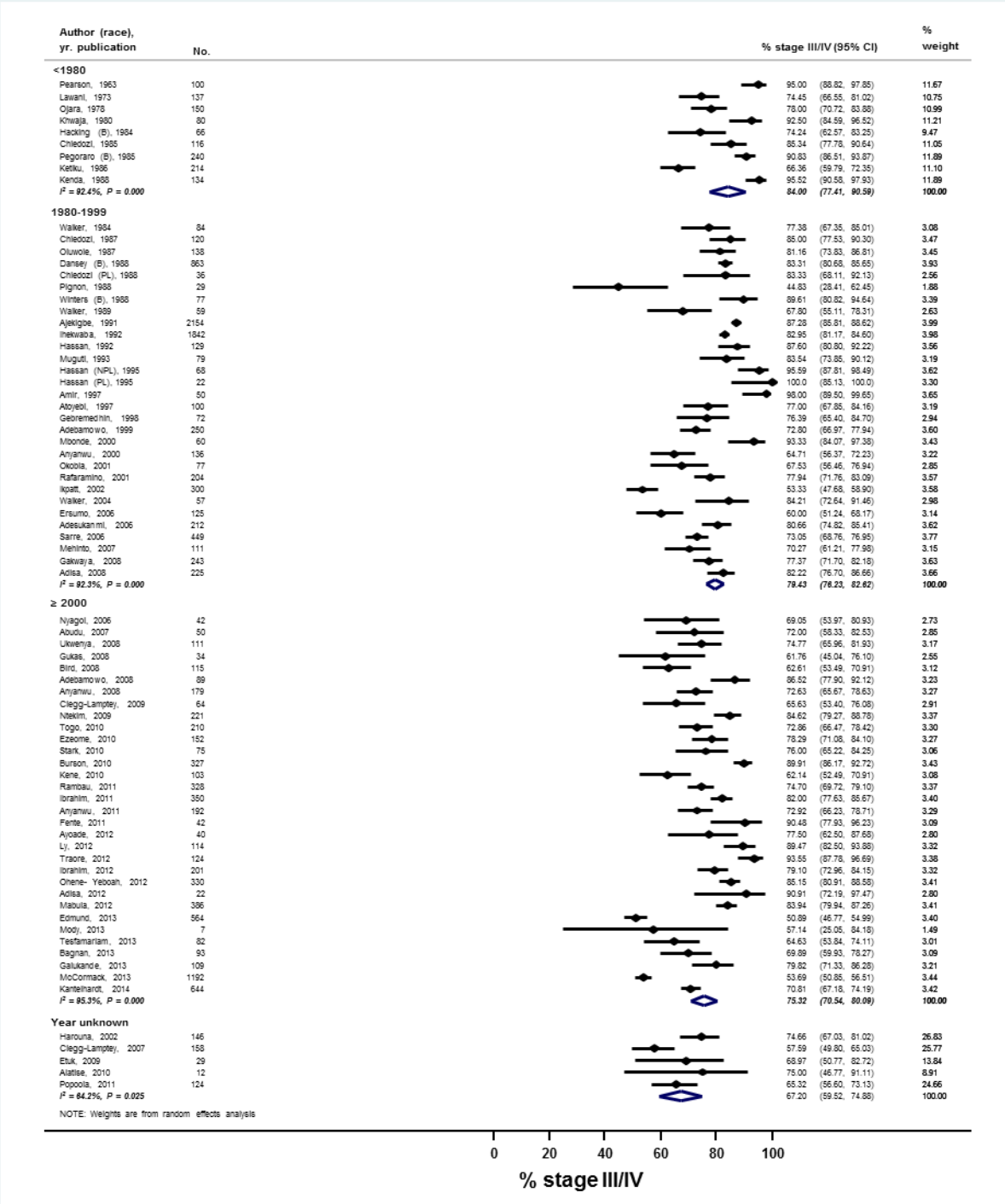
More weight was given to the items in the selection and information bias categories with each one being given a score between 0 and 4, as indicated above.

The category of other variables related to stage at diagnosis included items on the availability of information on age at diagnosis, year at diagnosis, menopausal status at diagnosis and tumour grade. Tumour size was not included in this category because this variable is a component of the TNM staging, and the latter was included as an item in the information bias category. Tumour receptor status was also considered but not included because receptor testing is not routinely carried out in most SSA settings. For each of the four items in this category, a score of 0 was assigned if no information on that variable was provided or a score of 1 if such information was given.

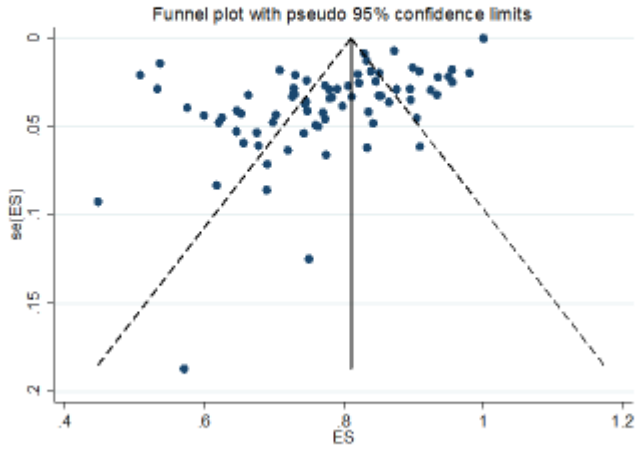
Individual item-specific scores were summed up across the three categories to arrive at a total score for each study. The total score for a study could range from 0 to 28. The lower the score the poorer the methodological quality of the study, i.e. the higher the likelihood it would have been affected by bias. We did not use an arbitrary cut off point to classify studies as being high vs. low quality; instead, we reported the individual scores for each study.



Webappendix-Figure 1. Study-specific percentage late stage breast cancer at diagnosis in multi-racial South African studies



Webappendix-Figure 2. Study-specific percentage of late stage breast cancer at diagnosis by calendar year at diagnosis



Webappendix-Figure 3. Funnel plot assessing small study bias

Webappendix-Table 1. Characteristics of the study populations included in the systematic review, by SSA region

First author, year of publication [ref no.]	Country	Race		Hospital/clinic, location	Study design	Sample size females (males)	No. of patients with known stage	Staging classification / edition (yr)	Joint TNM distribution given (Y/N)	Criteria used to define late stage	Staging methods	Percent stage III/IV	Year of diagnosis	Mean/ Median age at diagnosis (males where given)	Study quality score
		As reported in the original publication	As assigned in the present review [a]												
West Africa															
Abudu, 2007[18]	Nigeria	NR	Black	Olabisi Onabajo University Teaching Hospital, Shagamu	OCS	50	50	Manchester (NK)	N	Manchester Stage III and IV	NR	72	2003-2004	47·5	18·5
Adebamowo, 1999[19]	Nigeria	Black	Black	University College Hospital, Ibadan	CCS	250	250	Manchester (NK)	N	Manchester Stage III and IV	NR	72·8	1992-1995	43	16·5
Adebamowo, 2008[20]	Nigeria	NR	Black	University College Hospital, Ibadan	CCS	192	89	TNM (NK)	Y	**Stage IIIA** T0 N2 M0 T1 N2 M0 T2 N2 M0 T3 N1 M0 T3 N2 M0 **Stage IIIB** T4 N0 M0 T4 N1 M0 T4 N2 M0 Stage IIIC Any T N3M0 **Stage IV** Any T Any N M1	NR	86·5	2004-2005	48·8	19·5
Adesunkanmi, 2006[21]	Nigeria	NR	Black	Obafemi Awolowo University Teaching Hospital, Ife	CCS	211 (+1)	212	Manchester (NK)	N	Stage III & IV	NR	80·6	1996-2003	48	22·5
Adisa, 2008[22]	Nigeria	NR	Black	Obafemi Awolowo University Teaching Hospital, Ife	OCS	219 (+6)	225	TNM (NK)	N	Stages III & IV	NR	82·2	1993-2002	48	15·5
Adisa, 2012[23]	Nigeria	NR	Black	Abia State University Teaching Hospital, Abia	CCS	22	22	NR	-	Stages III & IV	NR	90·9	2008-2009	47	20·5
Ajekigbe, 1991[24]	Nigeria	NR	Black	Lagos University Teaching Hospital, Lagos	CCS	2154	2154	TNM (NK)	N	Stages III & IV	NR	87·3	1984-1989	50·8% <50 yrs	17·5
Alatise, 2010[25]	Nigeria	NR	Black	Surgery Clinic Obafemi Awolowo University Teaching Hospital, Ife	OCS	12	12	TNM (NK)	Y	Stages III & IV	NR	75	NR	50	17·5
Anyanwu, 2000[26]	Nigeria	NR	Black	University of Nigeria Teaching Hospital, Enugu; Iyi-Enu Hospital, Onitsha; Nnamdi Azikiwe University Teaching Hospital, Nnewi; Ace Specialist Hospital, Onitsha	CCS	134 (+2)	136	Manchester (2008)	N	Stages III & IV	C & I (occasional Imaging, likely under-staged)	64	1987-1997	44·3	25·5
Anyanwu, 2008[27]	Nigeria	NR	Black	Nnamdi Azikiwe University Teaching Hospital, Nnewi; Ace Specialist Hospital, Onitsha	CCS	179	179	NR	-	NR	C & I (Occasional imaging, likely understaged)	72	1998-2005	46·9	22·5
Anyanwu,	Nigeria	NR	Black	Nnamdi Azikiwe	CCS	273 (+2)	196	NR	-	Stages III & IV	C & I	72	2004-2008	45·2	21·5

First author, year of publication [ref no.]	Country	Race		Hospital/clinic, location	Study design	Sample size females (males)	No. of patients with known stage	Staging classification / edition (yr)	Joint TNM distribution given (Y/N)	Criteria used to define late stage	Staging methods	Percent stage III/IV	Year of diagnosis	Mean/ Median age at diagnosis (males where given)	Study quality score
		As reported in the original publication	As assigned in the present review [a]												
2011[28]				University Teaching Hospital, Nnewi; & Ace Specialist Hospital, Onitsha											
Atoyebi, 1997[29]	Nigeria	NR	Black	Lagos University Teaching Hospital, Lagos	CCS	99 (+1)	100	Manchester (NK)	N	Stages III & IV	NR	77	1992-1995	45·8	19·5
Ayoade, 2012[30]	Nigeria	NR	Black	Olabisi Onabanjo University Teaching Hospital, Shagamu	CCS	44	40	TNM	Y	Stage III & IV T3N1M0,T4N1Mx & T4N2M1	NR	77·5	2005-2006	47	18·5
Bagnan, 2013[31]	Benin	NR	Black	Hopital de la Mere et de l'enfant-Lagune Cotonou & Clinique Universitaire de gynécologie et d'obstétrique, Cotonou	CCS	93	93	NR	-	Stages III and IV	NR	69·9	2000-2008	34·2	15·5
Chiedozi, 1985[32]	Nigeria	Black	Black	University of Benin Teaching Hospital, Benin	CCS	116	116	TNM (1985)	N	Stages III & IV	C	85·3	1974-1979	42·4	20·5
Chiedozi, 1987[33]	Nigeria	NR	Black	University of Benin Teaching Hospital, Benin	CCS	120	120	TNM (1973)	N	Stages III & IV	NR	85	1978-1983	44·8	22·5
Chiedozi (PL[b]), 1988[34]	Nigeria	NR	Black	University of Benin Teaching Hospital, Benin	CCS	36	36	TNM (1988)	N	Stages III & IV	C	83·4	1977-1984	28·3	22·5
Clegg-Lamptey, 2007[35]	Ghana	NR	Black	Korle Bu Teaching Hospital, Kumasi	CCS	156 (+2)	158	TNM (2002)	N	Stages III & IV	C & I	57·6	NR	48·1	21·5
Clegg-Lamptey, 2009[36]	Ghana	NR	Black	Korle bu Teaching Hospital, Accra	OCS	64	64	NR	-	Stages III & IV	NR	66	2001-2005	51	14·5
Edmund, 2013[37]	Ghana	NR	Black	Dept. Of Pathology, University of Ghana Medical School, Accra	CCS	1342	564	TNM (2013)	Y	Stages III & IV	NR	50·9	2005-2009	50·3	16·5
Etuk, 2009[38]	Nigeria	NR	Black	Lagos University Teaching Hospital & Lagos State University Teaching Hospital (LASUTH).Lagos	OCS	29	29	NR	-	Stages III & IV	NR	68·9	NR	47·2	16·5
Ezeome, 2010[12]	Nigeria	NR	Black	University of Nigeria Teaching Hospital, Enugu	CCS	162 (+2)	152	NR	-	Stages III & IV	NR	78·3	1999-2005	45·7	20·5
Fente, 2011[39]	Nigeria	NR	Black	Niger Delta University Teaching Hospital, Okolobiri	OCS	42	42	TNM & Manchester (UICC 1960)	N	Stage IV (Manchester)	NR	90·5	2007-2009	40	16·5
Gukas, 2008[40]	Nigeria	NR	Black	Jos University Teaching Hospital, Jos	OCS	34	34	TNM (2008)	Y	Stages III & IV	C	61·8	1999-2001	45	21·5
Harouna, 2002[41]	Niger	NR	Black	General Surgery Unit, Issaka Gazoby's Maternity Hospital, Niamey	CCS	146	146	TNM (2002)	Y	Stages III & IV	C & I	74·7	NR	41·1	22·5
Hassan, 1992[42]	Nigeria	NR	Black	Ahmadu Bello University Teaching Hospital, Zaria	CCS	129	129	TNM (1979)	Y	Stages III & IV	C	88	1977-1989	38	21·5
Hassan (PL), 1995[43]	Nigeria	NR	Black	Ahmadu Bello Univeristy Teaching Hospital, Shika	OCS	25	22	TNM (1979)	N	Stages III & IV	NR	100	1977-1989	34	19·5

First author, year of publication [ref no.]	Country	Race		Hospital/clinic, location	Study design	Sample size females (males)	No. of patients with known stage	Staging classification / edition (yr)	Joint TNM distribution given (Y/N)	Criteria used to define late stage	Staging methods	Percent stage III/IV	Year of diagnosis	Mean/ Median age at diagnosis (males where given)	Study quality score
		As reported in the original publication	As assigned in the present review [a]												
Hassan (NPL), 1995[43]	Nigeria	NR	Black	Ahmadu Bello University Teaching Hospital, Shika	OCS	70	68	TNM (1979)	N	Stages III & IV	NR	95·5	1977-1989	37	19·5
Ibrahim, 2011[44]	Nigeria	NR	Black	Lagos State University Teaching Hospital, Lagos	CCS	344 (+6)	350	TNM (2002)	Y	Stages III & IV	C & I	82	2006-2009	48·9	25·5
Ibrahim, 2012[45]	Nigeria	NR	Black	Lagos State University Teaching Hospital, Lagos	CCS	201	201	NR	-	Stages III & IV	C	79·1	2009-2010	49·8	22·5
Ihekwaba, 1992[46]	Nigeria	Black	Black	University College Hospital, Ibadan	CCS	1842	1842	TNM (1992)	Y	Stage III (T2/T3 N2M0) and Stage IV (T2-4N2M1)	C & I	82·8	1971-1990	48	18·5
Ikpatt, 2002[47]	Nigeria	NR	Black	University of Calabar Teaching Hospital, Calabar	OCS	300	300	TNM (1997)	N	Stages III & IV	C & I	53·3	1983-1999	42·7	25·5
Kene, 2010[11]	Nigeria	Black	Black	Ahmadu Bello University Teaching Hospital, Shika (near Zaria)	OCS	99 (+4)	103	Manchester	N	Stages III & IV	NR	62·1	2001-2005	44·5	18·5
Ketiku, 1986[48]	Nigeria	NR	Black	Lagos State University Teaching Hospital, Lagos	OCS	214	188	NR	-	Stages III & IV	C & I	66·3	1971-1981	45·1	19·5
Khwaja, 1980[49]	Nigeria	NR	Black	Ahmadu Bello University Teaching Hospital, Shika	CCS	73 (+7)	80	NR	-	Stages III & IV	C	82·5	1972-1977	42	19·5
Lawani, 1973[50]	Nigeria	NR	Black	University College Hospital, Ibadan	CCS	169	137	Manchester	N	Stages III & IV	C	74·5	1961-1968	43·5	24·5
Ly, 2012[51]	Mali	NR	Black	Hopital du Point G, Bamako University Hospital, Bamako	CCS	114	114	TNM (NK)	N	T3 & T4	C & I	90	2008-2011	46	23·5
Mehinto, 2007[52]	Benin	NR	Black	Centre National Hospitalier et Universite Hubert K. Maka de Cotonou, Cotonou	OCS	111	111	TNM (UICC 1987)	Y	**Stage III** T3N1M0 T4N1M1 T4N2M1 **Stage IV** T4N1M2	NR (but metastatic sites listed)	70·3	1994-2005	48·5	18·5
Ntekim, 2009[9]	Nigeria	NR	Black	University College Hospital, Ibadan	OCS	221	221	NR	-	NR	NR	85	2003-2006	35·0 [c]	17·5
Ohene-Yeboah, 2012[53]	Ghana	NR	Black	Komfo Anokye Teaching Hospital, Kumasi	CCS	325 (+5)	330	TNM (AJCC 2002)	Y	**Stage IIIA** T2N2M0 T3N1M0 T3N2M0 Total **Stage IIIB** T4N1M0 T4N2M0 Total **Stage IIIC** Any TN3Mx **Stage VI** M1	C & I (no bone scans done; likely most patients were under-staged)	85·2	2004-2009	49·1	24·5
Oluwole, 1987[54]	Nigeria	NR	Black	University of Ife, Ile-Ife	CCS	138 (+1)	138	NR	-	Stages III & IV	NR	81·2	1977-1986	42	15·5
Okobia, 2001[4]	Nigeria	NR	Black	University of Benin Teaching Hospital, Benin	OCS	75 (+2)	77	Manchester	N	Stages III & IV	C (mostly late stage)	67·5	1987-1996	43·8	19·5
Pearson, 1963[5]	Nigeria	NR	Black	University College	CCS	99 (+1)	100	Manchester	N	Stages III & IV	NR	95	1957-1963	44·9	19·5

First author, year of publication [ref no.]	Country	Race		Hospital/clinic, location	Study design	Sample size females (males)	No. of patients with known stage	Staging classification / edition (yr)	Joint TNM distribution given (Y/N)	Criteria used to define late stage	Staging methods	Percent stage III/IV	Year of diagnosis	Mean/ Median age at diagnosis (males where given)	Study quality score
		As reported in the original publication	As assigned in the present review [a]												
				Hospital, Ibadan											
Popoola, 2011[55]	Nigeria	NR	Black	Lagos State University Teaching Hospital, Lagos	CCS	129	124	TNM (NK)	N	Stages III & IV	NR	65·3	NR	50·5	19·5
Sarre, 2006[56]	Senegal	NR	Black	Hospital Principal de Dakar, Dakar	OCS	473	449	TNM (NK)	Y	T4N1M & T3N1M0	NR	73·1	1986-2001	42·5	18·5
Stark, 2010[57]	Ghana	NR	Black	Komfe Anokye Teaching Hospital, Kumasi	OCS	75	75	NR	-	Stages III & IV	C	76	2007-2008	48	17·5
Togo, 2010[58]	Mali	NR	Black	Teaching Hospital of Gabriel Toure & Mother and Children Hospital Luxembourg, Bamako	OCS	205 (+5)	210	TNM (NK)	Y	NR	NR (but metastatic sites listed)	72·9	1999-2008	47·4	19·5
Traore, 2012[59]	Guinea	NR	Black	Surgical Oncology Unit, Donka University Hospital, Conakry	CCS	178 (+6)	124	NR	-	Loco-regional involvement & Metastatic	C & I (skeletal x-ray, chest x-ray, US scans)	93·5	2007-2009	48	16·5
Ukwenya, 2008[60]	Nigeria	NR	Black	Ahmadu Bello University Teaching Hospital, Kaduna	CCS	111	111	Manchester (NK)	N	Stages III & IV	NR	74·7	2003-2005	43·8	20·5
East Africa															
Amir, 1997[61]	Tanzania	NR	Black	Muhimbili Medical Centre, Dar Es Salaam	CCS	50	50	TNM (NK)	Y	**Stage IIIA** T3N0M0,T1N2M0, T3N2M0 **Stage IIIB** T3N3M0 T4N1MO, T4N2MO **Stage IV** M1	C & I (rays, abdominal US, bone scans)	98	1996-1996	90% < 50years	25·5
Bird, 2008[62]	Kenya	NR	Black	Africa Inland Church Kijabe Hospital, Kijabe	CCS	125 (+4)	115	NR	-	NR	C & I (No bone scans performed so patients might have been under-staged)	62·6	2001-2007	48	21·5
Burson, 2010[63]	Tanzania	NR	Black	Muhimbili National Hospital and Ocean Road Cancer Institute, Dar es Salaam	OCS	474 (+14)	356	TNM (2002)	N	Stages III & IV	NR	90·7	2007-2009	43·4	16·5
Ersumo, 2006[64]	Ethiopia	Black	Black	Tikur Anbessa Hospital Addis Ababa	OCS	112 (+13)	125	TNM (1992)	N	Stages III & IV	C & I	60·2	1995-1999	42·4	18·5
Gakwaya, 2008[15]	Uganda	NR	Black	Mulago Hospital, Kampala	CCS	285 (+12)	243	TNM (AJCC, 2002)	N	Stages IIIA, IIIIB, IIIC & IV	NR	77·4	1996-2000	47	18·5
Galukande, 2013[65]	Uganda	NR	Black	Mulago Hospital, Kampala; Makarere University Teaching Hospital; & Ugandan Cancer Institute, Kampala	CCS	113	109	NR	-	Stages III & IV	NR	79·8	2011-2012	46·7	20·5

First author, year of publication [ref no.]	Country	Race		Hospital/clinic, location	Study design	Sample size females (males)	No. of patients with known stage	Staging classification / edition (yr)	Joint TNM distribution given (Y/N)	Criteria used to define late stage	Staging methods	Percent stage III/IV	Year of diagnosis	Mean/ Median age at diagnosis (males where given)	Study quality score
		As reported in the original publication	As assigned in the present review [a]												
Gebremedhin, 1998[7]	Ethiopia	NR	Black	Tikur Anbessa Hospital, Addis Ababa	CCS	62 (+10)	72	NR	-	Stages III & IV	NR	76·4	1992-1997	41·8 (52·1)	21·5
Kantelhardt, 2014[66]	Ethiopia	NR	Black	Addis Ababa University Radiotherapy Center, Addis Ababa	OCS	1070	644	TNM (AJCC 7th Edition 2010)	N	Stage III & IV [d]	C & I (Chest x-ray and abdominal US)	74·7	2005-2010	43	26
Kenda, 1988[67]	Zaire (Democratic Republic of Congo)	NR	Black	Kinshasa University Hospital, Kinshasa	CCS	134	134	TNM (NK)	N	Stages III & IV	NR	95·6	1974-1983	47	17·5
Mabula, 2012[3]	Tanzania	NR	Black	Bugando Medical centre, Mwanza	CCS	376 (+8)	384	TNM (AJCC 2012)	N	Stages III & IV	C & I	84·4	2002-2011	45	18·5
Mbonde, 2000[68]	Tanzania	NR	Black	Muhimbili Medical Center, Dar Es Salaam	OCS	60	60	TNM (NK)	N	Stages III & IV	NR	93·3	1995-1997	52	22·5
Mody, 2013[69]	Rwanda	NR	Black	Butare University Teaching Hospital; Kigali University Teaching Hospital; Kigali & King Faisal Hospital, Kigali	CCS	141 (+4)	7	TNM (2013)	N	NR	NR	57	2007-2011	48·5	13·5
Muguti, 1993[70]	Zimbabwe	Black (B) 100%	Black	Mpilo Central Hospital, Bulawayo	CCS	82 (+2)	79	TNM (NK)	N	T3 and T4 tumours	C & I	83·5	1987-1990	50	24·5
Nyagol, 2006[71]	Kenya	NR	Black	Pathology Department Nairobi Hospital, Nairobi	CCS	158	42	TNM (2006)	N	Stages IIIA, IIIB & IV	NR	69·1	2002-2004	47	20·5
Ojara, 1978[72]	Uganda	Black	Black	Mulago Hospital, Kampala	CCS	152	150	M (1978)	N	Stage III & IV	NR	78	1970-1975	35	21·5
Pignon, 1988[73]	Madagascar	Black	Black	The island's only cancer hospital, Antananarivo	CCS	30	29	TNM (1988)	N	NR	NR	44·8	1977-1986	30·7 [e]	20·5
Rafaramino, 2001[74]	Madagascar	Black	Black	The island's only cancer hospital, Antananarivo	CCS	259	204	TNM (1998)	N	T3 & T4 tumours	C & I	77·9	1996-1998	48·5	22·5
Rambau, 2011[75]	Tanzania	NR	Black	Bugando Medical centre, Mwanza	OCS	328	328	TNM (AJCC 2011)	N	Stages III & IV	NR	74·7	2002-2010	47·8	18·5
Tesfamariam, 2013[76]	Eritrea	NR	Black	Orotta Medical Surgical National Referral Hospital, Asmara; Halibet Hospital, Asmara & Sembel Hospital, Asmara	OCS	77 (+5)	82	TNM (WHO classification of tumours 2003)	N	Stages III & IV	C & I (Imaging in 29% of patients)	64	2007-2008	48·4	22·5
Southern Africa															
Ariad, 1991[77]	South Africa	NR	Non-Black	Johannesburg Hospital, Johannesburg	OCS	58	58	NR	-	Stages III & IV	C & I	70·7	NR	45·5	20·5
Basro, 2010[8]	South Africa	NR	Non-Black	Tertiary Hospital and private breast health center in South Africa	OCS	141	139	TNM (AJCC 2002)	N	Stage III (locally advanced) & Stage IV (metastatic disease)	NR	55·3	2000-2008	31 [f]	19·5
Dansey, 1988[78]	South	White:	Non-Black	Johannesburg and	CCS	1351	1267	TNM (AJCC	N	**Stage 3:** T3 and	C & I	43·6	1976-1985	60	22·5

First author, year of publication [ref no.]	Country	Race		Hospital/clinic, location	Study design	Sample size females (males)	No. of patients with known stage	Staging classification / edition (yr)	Joint TNM distribution given (Y/N)	Criteria used to define late stage	Staging methods	Percent stage III/IV	Year of diagnosis	Mean/ Median age at diagnosis (males where given)	Study quality score
		As reported in the original publication	As assigned in the present review [a]												
	Africa	60.5%		Hilbrow Hospitals, Johannesburg				1983)		T4 & any N; any T & N3; **Stage 4:** any T & any N & M1					
		Black: 39.5%	Black	Johannesburg and Hilbrow Hospitals, Johannesburg	CCS	882	863	TNM (AJCC 1983)	N	**Stage 3:** T3 and T4 & N, any T & N3; **Stage 4:** any T any N & MI	C & I	83·3	1976-1985	50	22·5
Du Toit, 1988[79]	South Africa	White: 45% Black: 55%	Non-Black	Bloemfontein Academic Hospital, Bloemfontein	CCS	20	20	TNM (AJCC 1988)	N	Stages III & IV	NR	40	1971-1982	53·6	17·5
Hacking, 1984[80]	South Africa	White: 49%	Non-Black	Groote Schuur Hospital, Cape Town	OCS	1085	1078 [g]	TNM (1978) & Manchester	Y	T3-4, N0-3,M0 & T1-4,N0-3, M1	NR	40·2	1971-1981	60	17·5
		Coloured: 48%	Non-Black	Groote Schuur Hospital, Cape Town	OCS	1063	1063 [g]	TNM (1978) & Manchester	Y	T3-4, N0-3,M0 & T1-4,N0-3, M1	NR	59·9	1971-1981	53	17·5
		Black: 3%	Black	Groote Schuur Hospital, Cape Town	OCS	66	66 [g]	TNM (1978) & Manchester	Y	T3-4, N0-3,M0 & T1-4,N0-3, M1	NR	74·2	1971-1981	49	17·5
Hoffman, 2000[81]	South Africa	Black: 15%; Coloured: 85%	Non-Black	2 Tertiary Hospitals in Cape Town	PB	485	478	TNM (1992)	N	Stages III & IV (advanced breast cancer)	NR	42·2	1994-1997	59% < 45 years	19·5
McCormack, 2013[13]	South Africa	Black: 90.3%; White: 4.1%, Coloured: 3.8% & Asian: 1.8%	Black	Chris Hani Baragwanath Academic Hospital (CHBAH) [h]	CCS	1216	1192	TNM & Manchester	N	Stages III & IV	C & I	54	2006-2012	55·3	25·5
Odendaal, 2003[82]	South Africa	NR	Non-Black	NR	OCS	236	201	TNM (1988)	Y	Stage III & T4b N0-1 lesions only	C & I	53·2 [i]	1990-1996	79 [j]	25·5
Ostyn, 1987[83]	South Africa	Mostly Coloured or Indian	Non-Black	Coronation Hospital, Johannesburg	OCS	156	120	TNM (1979)	N	Stages III & IV	NR	51·7	1974-1984	52·1	16·5
Pegoraro, 1980[84]	South Africa	Whites: 23%, Indians: 35% Blacks: 42%	Non-Black	NR	OCS	167 (+4)	110	TNM (1980)	N	T3 & T4	NR	77·2	NR	50% were between 45-64 years	14·5
Pegoraro, 1985[85]	South Africa	White: 31%	Non-Black	University of Natal Teaching Hospital & all major hospitals, Durban	OCS	197	91	TNM (AJCC 1983)	N	Stages III & IV	NR	41	1975-1983	60	19·5
		Indian: 26%	Non-Black	University of Natal Teaching Hospital & all major hospitals, Durban	OCS	168	151	TNM (AJCC 1983)	N	Stages III & IV	NR	54	1975-1983	46·6	19·5
		Coloured: 4%	Non-Black	University of Natal Teaching Hospital & all major hospitals, Durban	OCS	23	22	TNM (AJCC 1983)	N	Stages III & IV	NR	77	1975-1983	52·8	19·5
		Black: 39%	Black	University of Natal Teaching Hospital & all major hospitals, Durban	OCS	252	240	TNM (AJCC 1983)	N	Stages III & IV	NR	90	1975-1983	49·8	19·5

First author, year of publication [ref no.]	Country	Race		Hospital/clinic, location	Study design	Sample size females (males)	No. of patients with known stage	Staging classification / edition (yr)	Joint TNM distribution given (Y/N)	Criteria used to define late stage	Staging methods	Percent stage III/IV	Year of diagnosis	Mean/ Median age at diagnosis (males where given)	Study quality score
		As reported in the original publication	As assigned in the present review [a]												
Walker, 1984[86]	South Africa	Black: 100%	Black	Baragwanath Hospital, Johannesburg	CCS	96	84	NR	-	NR	NR	77·5	1980-1982	51·7	17·5
Walker, 1989[87]	South Africa	Black 100%	Black	Baragwanath Hospital, Johannesburg	CCS	65	59	NR	-	Stages III & IV	NR	67	1986-1987	52·5	
Walker, 2004[88]	South Africa	Black: 100%	Black	King Edward the VIII Hospital, Durban	CCS	57	57	NR	-	Stages III & IV	NR	84·2	1999-1999	54·1	12·5
Wasserman, 2007[89]	South Africa	NR	Non-Black	Tygerberg Hospital, Tygerberg	OCS	483	421 [j]	TNM (6th edition)	Y	Stages III & IV	NR	(14) 54·8 [k]	1990-2004	77·3 [l]	20·5
Winters, 1988[6]	South Africa	White: 96%	Non-Black	NR [m]	OCS	2346	2324	NR	-	NR	NR	30	NR	58	19·5
		Black: 4%	Black	Baragwanath Hospital, Johannesburg	OCS	94	77	NR	-	NR	NR	90	1980-1986	51	20·5

C: Clinical methods; CCS: Consecutive case series; I: Imaging methods; M: Manchester staging classification; NPL: Non-pregnant/non-lactating women; NR: Not reported in the original publication; OCS: Opportunistic (convenience) case series; PBS: Population-based study; PL: Pregnant/lactating women; TNM: Tumour Node Metastases.

[a] As defined in Table 1.

[b] This study included a group of PL and a group of NPL, but the latter was not included in the review because NPL women were matched the PL women on stage at diagnosis.

[c] This study included women aged ≤40 years only.

[d] Information in supplementary material used to calculate number in Stage IV.

[e] This study included women aged ≤35 years only.

[f] This study included women aged ≤35 years only.

[g] Numbers of women by stage and race were not given; hence, approximate numbers were inferred from the data shown in table 1 and figure 1 of the original publication.

[h] Chris Hani Baragwanath Academic Hospital Johannesburg was previously the Baragwanath Hospital Johannesburg.

[i] The authors included stages I to III and early stage IV cancers in their study but provided stage information on the patients excluded and we included these in the calculation of % late stage in our review.

[j] This was a study of elderly breast cancer patients aged ≥70 years with T1-T3 and small localised T4N0-1 tumours.

[k] The authors gave stage distribution for the included patients (n=188) with % stage III as 14% in table 5 of the paper, however, the stage of distribution of excluded patients (n=233) was also given in the text, so a total of 421 patients were used to derive % III/IV (54.8%).

[l] This study included women aged ≥70 years only.

[m] The authors stated that their series of Black patients was compared with a similar unpublished study of White women but did not provide details on how the latter were recruited.

Webappendix-Table 2. Late stage (III/IV) breast cancer at diagnosis, self-reported duration of symptoms, and tumour characteristics (size, grade, ER positivity and histology), by study population in SSA [a, b]

First author, year (race) [c]	% Late stage (III/IV) at diagnosis	Mean/median duration of symptoms (months)	Mean/median tumour size (cm)	% ER-positive tumours	% grade 3 tumours	Histology (% ductal NST)
West Africa						
Abudu, 2007 (B)	72	-	-	-	62	92
Adebamowo, 2008 (B)	86·5	-	-	65·1	15·6	82·3
Adesunkanmi, 2006 (B)	80·6	11·2	-	-	-	90
Adisa, 2012 (B)	90·9	-	-	24	100	53 [d]
Alatise, 2010 (B)	75·0	-	8·5	-	91·7	100
Anyanwu, 2000 (B)	64·0	4·5	-	-	-	73
Anyanwu, 2008 (B)	72·0	3·5	-	-	-	80
Anyanwu, 2011 (B)	72·0	52% >6 months	-	-	-	85·5
Atoyebi, 1997 (B)	77·0	13·3	-	-	-	94
Ayoade, 2012 (B)	77·5	6·7	-	-	-	-
Bagnan, 2013 (B)	69·9	-	-	-	-	33·3 [e]
Chiedozi, 1985 (B)	85·3	-	-	-	50	19 [f]
Chiedozi, 1987 (B)	85.0	-	-	-	50	-
Chiedozi, 1988 (B, PL)	83·4	6	-	-	55·6	-
Clegg-Lamptey, 2007 (B)	57·6	10	7	-	-	85·8
Edmund, 2013 (B)	50·9	7·5	4·5	-	28·9	91·6
Ezeome, 2010 (B)	78·3	2	-	-	-	-
Fente, 2011 (B)	90·5	-	-	-	-	54·7 [g]
Gukas, 2008 (B)	61·8	-	-	26·5	70·6	97
Harouna, 2002 (B)	74·7	8·8	-	-	-	-
Hassan, 1992 (B)	88·0	9·3	10	-	-	85
Hassan, 1995 (B, PL)	100	10	8	-	-	72
Hassan, 1995 (B, NPL)	95·5	9	8	-	-	70·5
Ibrahim, 2011 (B)	82·0	10·8	-	-	-	93
Ibrahim, 2012 (B)	79·1	12·1	-	-	-	-
Ihekwaba, 1992 (B)	82·8	10·9	6·5	-	-	49·2 [h]
Ikpatt, 2002 (B)	53·3	-	4·8	-	45·7	84
Kene, 2010 (B)	62·1	-				82·5
Ketiku, 1986 (B)	66·3	-	-	-	-	33·6 [i]
Khwaja, 1980 (B)	92·5	11	-	-	90·9	82·5
Lawani, 1973 (B)	74·5	9	-	-	31	53·8 [j]
Ly, 2012 (B)	90·0	-	90% >5	39	78	94
Mehinto, 2007 (B)	70·3 [k]	-	-	-	38·9	86·4
Ntekim, 2009 (B)	85	-	-	-	-	95
Ohene-Yeboah, 2012 (B)	85·2	13·8	-	47·1	53·7	82·1
Okobia, 2001 (B)	67·5	9	-	-	-	66·8
Oluwole, 1987 (B)	81·2	-	-	-	-	30·2 [l]
Pearson, 1963 (B)	95·0	6	9·7	-	80	-
Sarre, 2006 (B)	73·1	9	-	-	45·6	89·9
Stark, 2010 (B)	76·0	-	3·2	24	76	66·7
Togo, 2010 (B)	72·9	17·8	-	58·1	-	57·4 [m]
Traore, 2012 (B)	93·5	-	-	30·7	-	73·8
Ukwenya, 2008 (B)	74·7	9	-	-	-	-
East Africa						
Amir, 1997 (B)	98	-	-	-	-	100
Bird, 2008 (B)	62·6	12	6·8	24	50	90
Burson, 2010 (B)	90·7	17·2	69·1% ≥5	50·8	-	85·5
Ersumo, 2006 (B)	60·2	11·5	60% >5	-	-	77·6
Gakwaya, 2008 (B)	77·4	-	-	-	58	76
Galukande, 2013 (B)	79·8	-	-	47	65·2	93·8
Gebremedhin, 1998 (B)	76·4	12	6·5	-	-	85·2

Kantelhardt, 2014 (B)	71	-	5	-	24·8	79·2
Kenda, 1988 (B)	95·6	-	-	-	26·5	68·9
Mabula, 2012 (B)	84·4	11·4	6	-	63·8	91·7
Mbonde, 2000 (B)	93·3	11	8	33·3	46·6	78·3
Mody, 2013 (B)	57	11·2	-	-	-	-
Muguti, 1993 (B)	83·5	7	8	-	-	-
Nyagol, 2006 (B)	69·1	-	4·5	37·3	66	92·4
Pignon, 1988 (B)	44·8	14·1	-	-	60	0 [n]
Rafaramino, 2001 (B)	77·9	9·4	-	-	56·5	55·6 [o]
Rambau 2011 (B)	74·7	-	5·5	-	56·4	91·5
Tesfamariam, 2013 (B)	64	34·8	-	-	-	82
South Africa						
Ariad, 1991 (NB)	70·7	-	-	40·7	-	84·5
Basro, 2010 (NB)	55·3	-	79% ≥2	67·8	46·7	92·9
Du Toit, 1988 (NB)	40	-	-	-	-	85 [p]
McCormack, 2013 (B)	54	-	-	64·9	42·3	80
Odendaal, 2003 (NB)	53·2	-	4	-	11·2	73
Ostyn, 1987 (NB)	51·7	-	-	-	-	67
Pegoraro, 1980 (NB)	77·2	-	7·5	52·7	-	-
Pegoraro, 1985 (B)	90	-	7·5	-	71	-
Pegoraro, 1985 (NB, I)	54	-	5	-	72	-
Pegoraro, 1985 (NB, W)	41	-	3·5	-	47	-
Winters, 1988 (B)	90	-	-	55	27	90
Winters, 1988 (NB, W)	30	-	-	65	-	-
No. of study populations with available information [a]						
All (Black & non-Black)	73 [b]	36	27	19	36	58
Black only	64	36	22	15	32	53

- Information not provided in the original publication; B: Black women; I: Indian women; NST: invasive intra-ductal carcinoma; NB: Non-Black women; NPL: Non-pregnant and non-lactating women; PL: Non-pregnant and non-lactating women; SSA: sub-Saharan Africa; W: White women

[a] Some studies have more than one study population (i.e. PL and NPL women; multiple racial groups) – see Table 1 (footnote a).

[b] Restricted to study populations with information on stage at presentation and at least one of the other variables shown in this Table.

[c] Reference numbers as in webappendix-Table 1. Race as defined in Table 1 (footnote b) and webappendix-Table 1.

[d] The authors reported that 53% of the tumours were invasive ductal carcinoma, not otherwise specified (NST), 18% invasive lobular carcinoma (ILC), 18% a mix of NST and ILC, and 12% other subtypes.

[e] Other histological subtypes not reported.

[f] Other histological subtypes included anaplastic carcinoma (50%), scirrhous carcinoma (28.4%), Paget's disease (1.7%), and mucoid carcinoma (0.9%).

[g] Other histological subtypes comprised undifferentiated (19.1%), lobular carcinoma (12%), papillary (7.4%), others (6.9%).

[h] Other histological types included infiltrating anaplastic carcinoma (33.3%), medullary carcinoma (5.9%), lobular carcinoma (2.8%), papillary carcinoma (2.3%), mucinous carcinoma (1.5%), others (5%).

[i] Other histological subtypes comprised anaplastic carcinoma (22.9%), scirrhous carcinoma (8.9%), adenocarcinoma (7.5%), medullary carcinoma (4.2%), mixed carcinoma (3.7%), colloid carcinoma (2.8%), comedo carcinoma (2.8%) and other subtypes (13.6%).

[j] The most common subtypes reported were adenocarcinoma 33.7%, and other subtypes 12.5%

[k] The authors used the UICC 1987 TNM classification (33rd Edition). Stage reclassified using the AJCC TNM classification 7th Edition

[l] Other histological subtypes were poorly differentiated adenocarcinoma (33.8%), anaplastic carcinoma (9.4%), inflammatory carcinoma (7.9%), and others (18.7%).

[m] Other histological subtypes comprised infiltrating lobular carcinoma (21.4%), medullary carcinoma (3.3%), and others (17.9%)

[n] Most common subtypes were adenocarcinoma not otherwise specified (31.3%), intraductal carcinoma (6.3%), atypical carcinoma (28.1%), and others (34.4%).

[o] Other histological subtypes included adenocarcinoma (31.7%), mucinous carcinoma (3.5%), infiltrating lobular carcinoma (2.3%),and others (6.9%).

[p] All patients in this study had Paget's disease of the breast; histologically, they were all ductal carcinomas but three were intra-ductal.

Webappendix-References

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