Supplemental materials for

Loewenberg Weisband Y, Torres L, Paltiel O, Wolf Saggy Y, Calderon-Margalit R, Manor O. Socioeconomic disparity trends in cancer screening among women after introduction of national quality indicators. *Ann Fam Med*. 2021;19(5):396-404.

Supplemental Appendix 1 – Detailed outcome measure definitions

The QICH breast cancer screening quality indicator assessed the percentage of women aged 50–74 years who had at least one mammogram performed during the previous two years, based on the Israeli Ministry of Health guidelines, in accordance with the Israeli Oncology Society.[1] These guidelines also form the basis for Israel's organized breast cancer screening program.

The Israeli Ministry of Health, in accordance with the National Council of Oncology, recommends screening via an annual fecal occult blood test (FOBT) and fecal immunochemical test (FIT) between the ages of 50 and 74 years.[1] Israel's organized colorectal cancer screening program is based on these guidelines. Colonoscopy is widely used for screening as well, although there is no such directive in Israel.[2] Therefore, the QICH colorectal cancer screening quality indicator assessed the percentage of individuals aged 50–74 years who had FOBT or FIT performed during the past year or a colonoscopy during the past 10 years.

The Israeli Ministry of Health, in accordance with international cervical cancer screening guidelines, recommends that women aged 25-65 undergo a cytology screening (PAP) test once every three years.[1] There is currently no organized cervical cancer screening program in Israel. In addition, PAP tests are only provided for free, within the universal health basket of covered procedures and medications, for women aged 35-54.[1] Therefore, the QICH cervical cancer screening quality indicator assessed the percentage of women aged 35-54 who had at least one PAP test performed in the past three years.

All the indicators which we used assessed care that is provided as part of the universal health basket of covered procedures and medications. The guidelines for screening for the three cancers that we assessed have not changed throughout the time period which we have included in our study.

When quality indicators are introduced, data for that measure are available for three years prior. The indicator for cervical cancer screening was introduced in 2015, and we therefore had data regarding cervical cancer screening as of 2013. Similarly, we had data regarding breast cancer screening from 2002, and colorectal cancer screening from 2003.

Supplemental Appendix 2 – Do SES disparities vary by age?

In addition to the aims discussed in the body of the paper, we also assessed whether older women experience greater SES disparities in screening compared to younger women.

To assess whether SES disparities differed by age, interactions between age and SES were considered. As we identified significant interactions between SES and age, we assessed the association between SES and cancer screening stratified by age. These models were adjusted for individual-level SES.

Stratifying our analyses by age, we found that area-level SES disparities for breast and colorectal cancer screening were more pronounced among older women compared to younger women (**Supplemental Table 1**). Among women aged 50-59, those in SES 4 were 1.3 times more likely to be screened for breast cancer compared to those in SES 1, whereas among women aged 70-74, those in SES 4 were 2.0 times more likely to be screened for breast cancer compared to those in SES 1. Colorectal cancer screening also showed a more pronounced SES gradient among women who were older. In contrast, SES disparities in cervical cancer screening did not show substantial differences by age group and were only slightly more pronounced in women aged 35-44 compared to those age 45-54.

We found widening disparities for breast and colorectal cancer screening in older women. The impact that age has on SES disparities in health outcomes is debated. Various hypotheses have been suggested, including: aging-as-leveler, which asserts that SES disparities decline with age, due to mortality selection in which the most disadvantageous groups are removed, along with a delayed onset and progression of disease in the more advantageous group which in turn leads to a more rapid decline in this group later in life. In contrast, the persistent inequality

hypothesis suggests that SES disparities are stable throughout the life course. A third hypothesis, the cumulative disadvantage hypothesis, suggests that health trajectories of individuals from low and high SESs diverge as age increases. Our findings are in-line with this theory. The cumulative disadvantage theory suggests that disparities in health outcomes widen with age, as those with advantageous backgrounds have access to more resources and better opportunities which allow them to avoid health risks later in life, whereas the opposite is true for those from disadvantageous backgrounds. This can lead to a cumulative effect of being in a disadvantaged situation multiple times throughout the lifecourse.[3,4] Women from lower SESs are less likely to actively seek cancer screening,[5] potentially due to less access to health education and having lower health literacy.

References

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Supplemental Table 1 - Association between area-level socioeconomic position and breast, colorectal and cervical cancer screening among women in Israel, stratified by age groups, 2017

Breast cancer screening

Age groups	50-59		60-69		70-74	
	OR	99.9% CI	OR	99.9% CI	OR	99.9% CI
Area-level Socioeconomic position						
1	Ref		Ref		Ref	
2	1.08	1.04 – 1.12	1.16	1.11 – 1.21	1.42	1.32 – 1.53
3	1.23	1.18 – 1.27	1.31	1.25 – 1.36	1.87	1.74 – 2.01
4	1.30	1.24 – 1.36	1.27	1.21 – 1.33	2.04	1.88 – 2.21

Colorectal cancer screening

Age groups	50-59		60-69		70-79	
	OR	99.9% CI	OR	99.9% CI	OR	99.9% CI
Area-level Socioeconomic position						
1	Ref		Ref		Ref	
2	1.01	0.98 – 1.05	1.10	1.05 – 1.15	1.25	1.16 – 1.35
3	1.10	1.06 – 1.14	1.21	1.16 – 1.26	1.54	1.43 – 1.66
4	1.19	1.14 – 1.24	1.28	1.22 – 1.34	1.64	1.51 – 1.78

Cervical cancer screening

Age groups	35-44		45-54	
	OR	99.9% CI	OR	99.9% CI
Area-level Socioeconomic position				
1	Ref		Ref	
2	1.95	1.89 – 2.01	1.86	1.79 – 1.93
3	2.99	2.91 – 3.08	2.78	2.69 – 2.88
4	3.62	3.51 – 3.74	3.46	3.33 – 3.60

*****all models were adjusted for area-level socioeconomic position and individual-level socioeconomic position (co-payment exemption)

[*]P-trend for all associations was <0.001