

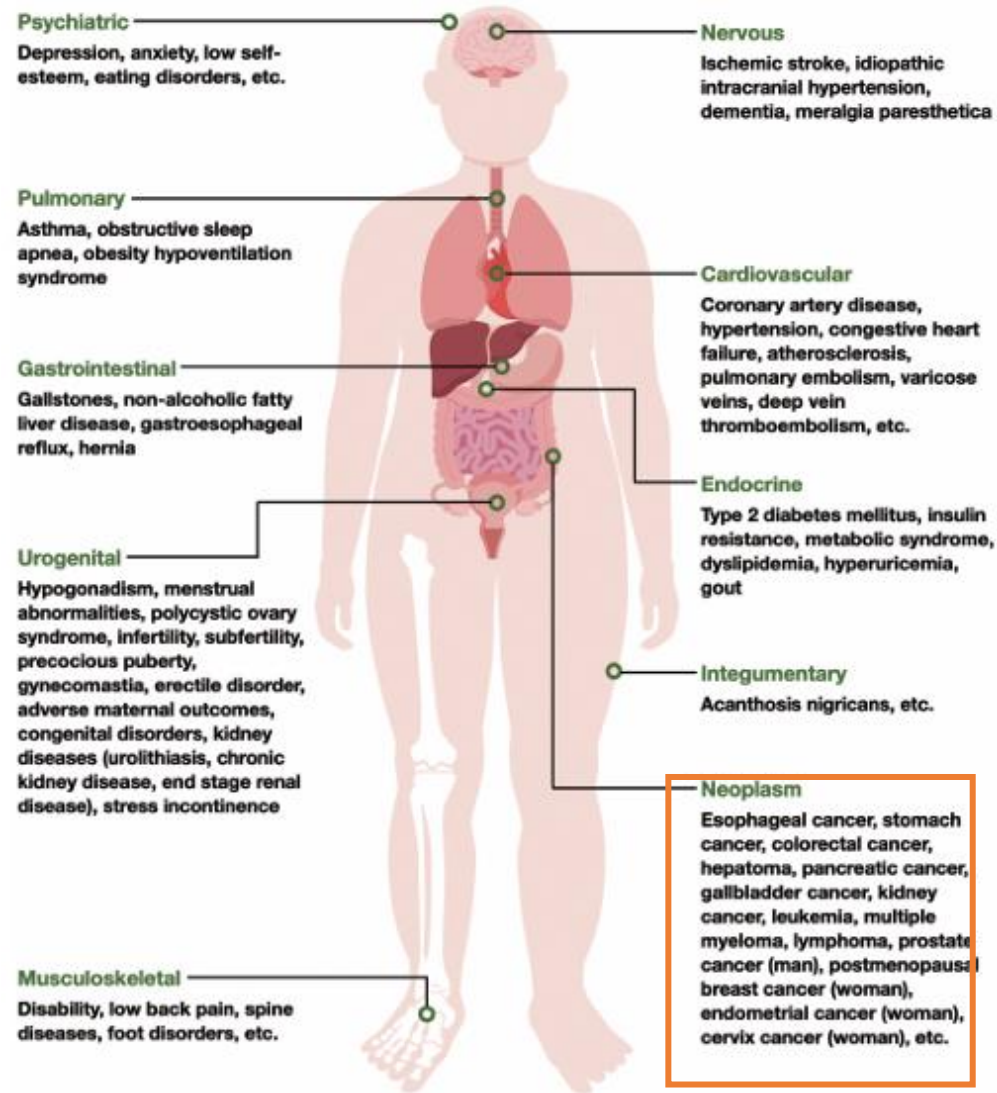
Screening and Prevention of Cancer in People Living with Obesity

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1. Obesity and cancer



Obesity and cancer

- Overweight or obese is clearly linked to an increased risk of cancer
 - 11% of cancers in women 5% of cancers in men in the United States, as well as about 7% of all cancer deaths
- Cancer causes one in six deaths globally
- Of all new global cancer cases in 2012, 3.6% were considered to be attributable to excess body mass index (BMI).

Cancer linked with excess body weight

Cancer preventive effect in the absence of excess body fatness

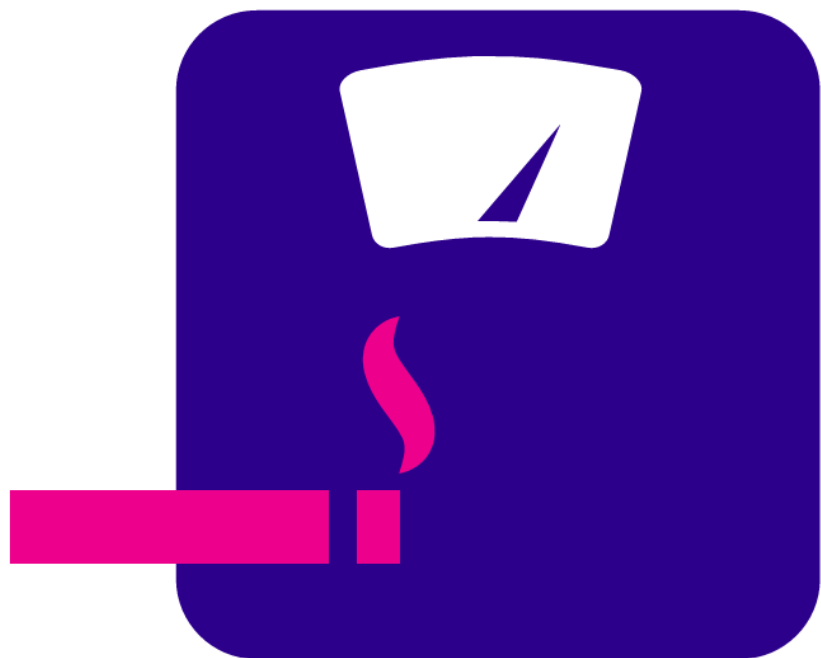
- Breast cancer (in women past menopause)
- Colon and rectal cancer
- Endometrial cancer (cancer of the lining of the uterus)
- Esophagus cancer
- Gallbladder cancer
- renal cell carcinoma
- Liver cancer
- Ovarian cancer
- Pancreas cancer
- Stomach cancer (Cardia)
- Thyroid cancer
- Multiple myeloma
- Meningioma (a tumor of the lining of the brain and spinal cord)

Might also raise the risk

- Non-Hodgkin lymphoma
- Male breast cancer
- Cancers of the mouth, throat, and voice box
- Aggressive forms of prostate cancer

WHEN COULD OVERWEIGHT AND OBESITY OVERTAKE SMOKING AS THE BIGGEST CAUSE OF CANCER IN THE UK?

Cancer Intelligence Team, Policy & Information Directorate,
Cancer Research UK, September 2018



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EXECUTIVE SUMMARY

Introduction

Smoking is currently the biggest cause of cancer in the UK with overweight and obesity the second biggest. Smoking prevalence has fallen over recent decades, whilst overweight and obesity prevalence has risen. Projections indicate these past trends will continue in future. This report brings together available trends and evidence to understand whether overweight and obesity could contribute more UK cancer cases than smoking in the foreseeable future.

Method

This report uses the established epidemiological method of Population Attributable Fractions (PAFs) to combine projections of cancer incidence, smoking prevalence and overweight and obesity prevalence, in order to calculate the number and proportion of UK cancer cases attributable to each factor in 2025-2035, based on risk factor prevalence 10 years prior (e.g. risk factor prevalence in 2025 impacts cancer incidence in 2035).

Results

The number of overweight and obesity-attributable cancer cases is projected to draw ever-nearer to the number of smoking-attributable cancer cases. By 2035 overweight and obesity could contribute only around 2,000 fewer cancer cases than smoking, in UK females. In UK males, projections indicate around 16,200 cases could separate the two risk factors in 2035.

Based on these calculations, we estimate that overweight and obesity could cause more cancer cases than smoking in UK females by 2043.

Discussion

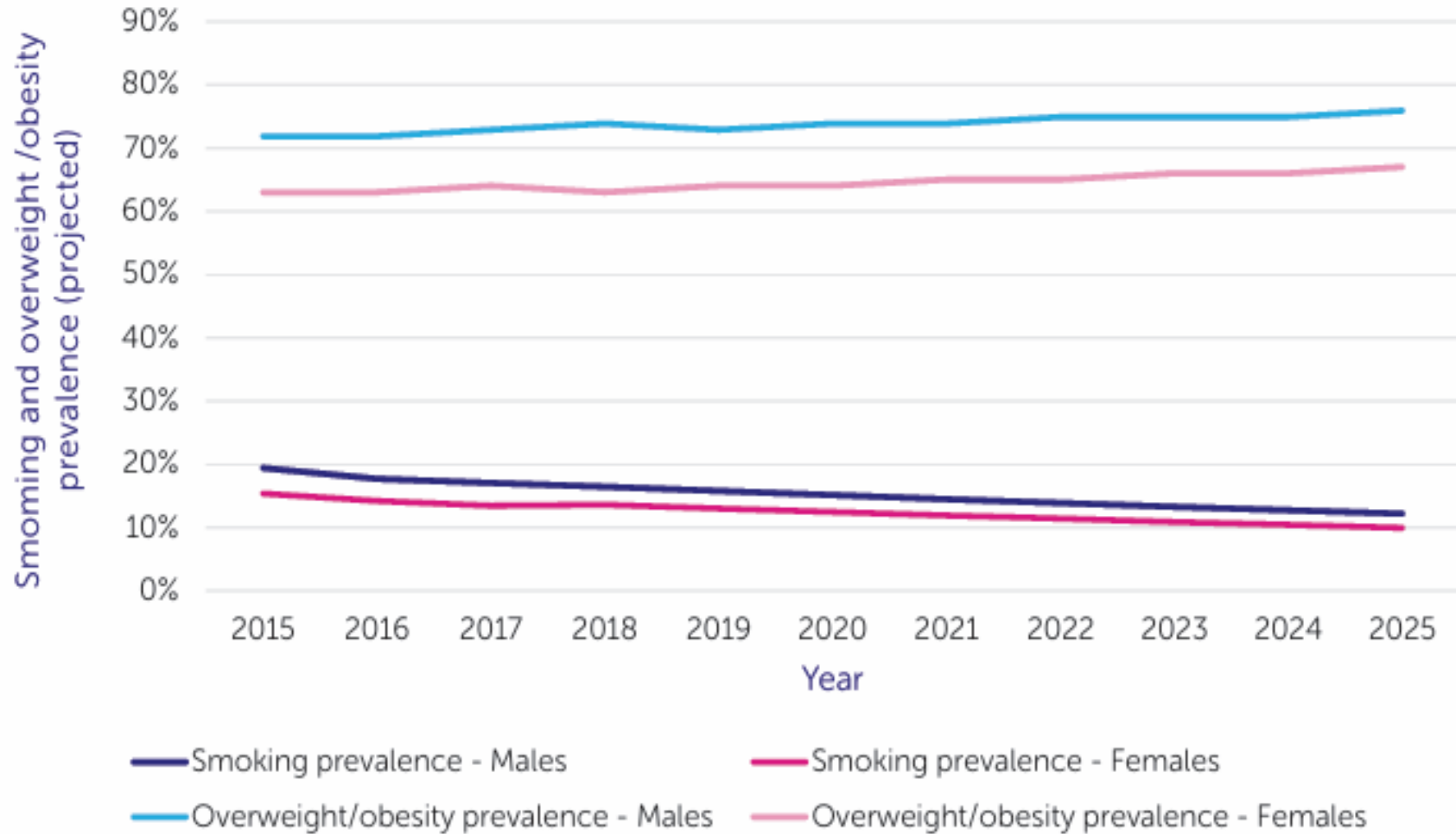
This is the first attempt to quantify and compare the future smoking- and overweight and obesity-attributable cancer burdens in the UK. The method is well-established and the data inputs are of high quality. However these calculations are based entirely on projections which are by their nature uncertain; they may exclude some risk factor-cancer type relationships which are only becoming clear in recent years; and they may underplay the long-term impact of risk factors. Whilst a 'crossover' between smoking and overweight and obesity appears almost inevitable if recent trends continue, the precise point at which this will occur is difficult to predict, and the results presented here are indicative rather than definitive.

Conclusion

Overweight and obesity could overtake smoking as the single biggest cause of cancer in UK women in around a quarter of a century, if current trends continue as projected. For UK males this crossover is likely to occur later, but it is not possible to estimate a timeframe for this as it is too far in the future to project reliably. Together, smoking and overweight and obesity could cause more than 95,000 UK cancer cases in 2035 alone – compared with around 75,000 cases in 2015.

Our success as a nation in bringing down smoking prevalence, through a combination of raising awareness of the harms of the habit, and legislating to reduce accessibility and exposure, shows that these approaches work. It is CRUK's aim to reverse the rise in overweight and obesity prevalence. These calculations demonstrate just how vital that aim is to reduce the number of people diagnosed with cancer in the UK in future.

Figure 2. Prevalence of smoking and overweight/obesity, by sex, UK projections, 2015-2025



- Prevalence of smoking in the UK is to decrease by 37% in males and 35% in females
- Prevalence of overweight and obesity in the UK is projected to increase by 6% in both males and females



Appendix Figure 1. Cancer cases attributable to smoking and overweight/obesity, by sex, UK projections 2026-2035, linear extrapolation 2036-2045

Therefore, especially in females, around 2043, overweight or obesity could cause more cancer than smoking.

Obesity increase the risk of cancer?

- Mechanism
 - Sex hormone metabolism
 - Insulin and insulin-like growth factor signaling
 - Adipokine pathophysiology
 - Low-grade chronic inflammation

2. Cancer screening in people with obesity

Cancer screening in general population

암종	검진대상	검진주기	검진방법
 위암	만 40세 이상 남녀	2년	기본검사 : 위내시경검사 (단, 위내시경검사를 실시하기 어려운 경우 위장조영검사를 선택적으로 시행)
 간암	만 40세 이상 성인 고위험군 (간경변증이나 B형 간염 바이러스 항원 또는 C형 간염바이러스 항체 양성으로 확인된 자)	6개월	간초음파검사 + 혈청알파태아단백검사
 대장암	만 50세 이상 남녀	1년	분변잠혈반응검사(FOBT) : 이상소견시 대장내시경검사(단, 대장내시경을 실시하기 어려운 경우 대장이종조영검사 선택적 시행)
 유방암	만 40세 이상 여성	2년	유방촬영술
 자궁경부암	만 20세 이상 여성	2년	자궁경부세포검사(Pap smear)
 폐암	만 54세 이상 만 74세 이하의 남·여 중 폐암 발생 고위험군	2년	저선량흉부 CT

Cancer Screening	Patient's Age	Frequency
Stomach cancer (胃がん, igan)	Over 50 years old (in some cases x-rays are conducted for people over 40 years old)	Every 2 years
Cervical cancer (子宮頸がん, shikyukeigan)	Over 20 years old	Every 2 years
Lung cancer (肺がん, haigan)	Over 40 years old	Every year
Breast cancer (乳がん, nyuugan)	Over 40 years old	Every 2 years
Colorectal cancer (大腸がん, daichougan)	Over 40 years old	Every year

Cancer screening in obesity patients

- Complexity can arise due to patients often reporting significant recent weight loss via lifestyle attempts.
- Clinical history : enquiring regarding dysphagia, change of bowel habits and any intermenstrual/ postmenopausal PV bleeding.
- Physical examination : abdominal examination for abdominal masses and breast examination in situations where the patient hasn't attended recent screening tests.
- Other: Urinalysis, which should be performed on all patients presenting to the obesity clinic, should be assessed for any hematuria.

RESEARCH ARTICLE

Open Access



Cancer prevention in females with and without obesity: Does perceived and internalised weight bias determine cancer prevention behaviour?

Marie Bernard^{1,2,3*}, Magrit Löbner⁴, Florian Lordick⁵, Anja Mehnert-Theuerkauf⁶, Steffi G. Riedel-Heller⁴ and Claudia Luck-Sikorski^{2,3,7}

- Women with obesity were **less likely** to undergo **Pap smear** ($p < 0.001$) and clinical **breast examination** ($p < 0.01$) compared to women without obesity.
- Instead, **previous cancer diagnoses** and **knowledge about cancer prevention screening** (CPS) forms were found to reinforce CPS behavior.

Table 2 Assessment of cancer prevention screening behaviour

CPS	Sample	Assessment	Construction of variables assessing CPS ¹
HPV vaccination ²	Women aged < 31	"Have you had an HPV vaccination?" 0 = no, 1 = yes	0 = no vaccination 1 = being vaccinated
Pap smear test	Women aged ≥ 20	"How often do you use this particular CPS?" five-point Likert scale (0 = never, 1 = less than once a year, 2 = once a year, 3 = twice a year, 4 = more than twice a year)	0 = less than once a year 1 = at least once a year
Clinical examination of the breast	Women aged ≥ 30	"Have you ever used this particular CPS and if so how often?" seven-point Likert scale (0 = never, 1 once, 2 = twice, 3 = three times, 4 = four times, 5 = five times, 6 = more than five times)	0 = less than every two years 1 = at least every two years
Mammography screening	Women aged 50–69	"Have you ever used this particular CPS and if so how often?" seven-point Likert scale (0 = never, 1 once, 2 = twice, 3 = three times, 4 = four times, 5 = five times, 6 = more than five times)	0 = less than once a year for women aged 50–54 or less than every other year for women aged ≥ 55 1 = at least annually for women aged 50–54 or at least every other year for women aged ≥ 55
FOBT	Women aged ≥ 50	"Have you ever used this particular CPS and if so how often?" seven-point Likert scale (0 = never, 1 once, 2 = twice, 3 = three times, 4 = four times, 5 = five times, 6 = more than five times)	0 = no colonoscopy or less than every ten years 1 = at least every ten years
Colonoscopy	Women aged ≥ 50	"How often do you examine your breast by yourself?" Seven-point Likert scale (0 = never, 1 = infrequent, 2 = once a month, 3 = several times a month, 4 = once a week, 5 = several times a week, 6 = daily)	Metric variable
Self-examination of the breast	Women aged ≥ 30	"How often do you examine your breast by yourself?" Seven-point Likert scale (0 = never, 1 = infrequent, 2 = once a month, 3 = several times a month, 4 = once a week, 5 = several times a week, 6 = daily)	Metric variable

¹ The value 0 displays insufficient, the value of 1 displays at least sufficient utilisation of CPS

² The HPV vaccination is a relatively new prevention method for cervical cancer that is applied since the early 2000s. We therefore asked only participants under 31 years if they had been HPV vaccinated

Table 5 Logistic regression model: influencing factors on the utilisation of clinical cancer prevention screenings among women with and without obesity

	Pap smear (women aged ≥ 20)			Clinical breast examination (women aged ≥ 30)			Mammography* (women aged ≥ 50)			Faecal occult blood test* (women aged ≥ 50)			Colonoscopy* (women aged ≥ 55)		
	OR	p	[95% CI]	OR	p	[95% CI]	OR	p	[95% CI]	OR	p	[95% CI]	OR	p	95% CI
Weight Status ¹	0.63**	.004	(0.46–0.86)	0.61**	.003	(0.44–0.85)	1.11	.564	(0.78–1.58)	1.28	.189	(0.89–1.85)	0.67	.056	(0.44–1.01)
Cancer awareness															
Current/previous (other) cancer diagnosis in participants ²	2.34**	.008	(1.24–4.39)	2.20*	.017	(1.15–4.21)	3.84***	<.001	(2.09–7.05)	0.78	.402	(0.43–1.40)	2.83**	0.003	(1.41–5.66)
Current/previous (other) cancer in participant's environment ³	1.19	.336	(0.83–1.71)	1.35	.109	(0.94–1.95)	1.36	.134	(0.91–2.04)	1.25	.325	(0.80–1.93)	1.64*	.039	(1.03–2.63)
CPS knowledge ⁴	2.26***	<.001	(1.65–3.10)	2.35***	.001	(1.44–3.85)	1.39	.066	(0.98–1.97)	1.55*	.023	(1.06–2.27)	4.05***	<.001	(2.68–6.13)
Confounding variables															
Health Insurance ⁵	1.86*	.043	(1.02–3.41)	2.06*	.035	(1.05–4.04)	0.72	.259	(0.41–1.27)	2.10**	.010	(1.20–3.70)	2.27*	.018	(1.15–4.49)
Age	0.97***	<.001	(0.95–0.99)	0.98**	.009	(0.96–0.99)	0.84***	<.001	(0.81–0.88)	0.87***	<.001	(0.84–0.91)	1.14***	<.001	(1.07–1.22)
Educational Level ⁶	0.81	.256	(0.58–1.12)	0.81	.222	(0.58–1.13)	.82	.280	(0.57–1.18)	1.01	.964	(0.69–1.47)	0.98	.945	(0.64–1.51)
Marital status ⁷	1.48*	.013	(1.09–2.02)	1.55	.002	(1.13–2.13)	1.13	.476	(0.80–1.61)	1.15	.441	(0.80–1.66)	1.24	.301	(0.82–1.86)
Household income ⁸															
2. Quartile	1.27	.186	(0.84–1.93)	1.55*	.039	(1.08–2.47)	1.19	.481	(0.73–1.95)	1.25	.409	(0.74–2.12)	1.12	.713	(0.62–2.01)
3. Quartile	1.25	.264	(0.80–1.95)	1.53	.063	(1.02–2.48)	0.98	.921	(0.59–1.60)	1.62	.074	(0.95–2.76)	1.27	.419	(0.71–2.29)
4. Quartile	1.14	.546	(0.73–1.78)	1.94**	.006	(1.21–3.09)	1.12	.660	(0.68–1.82)	1.55	.104	(0.91–2.61)	1.02	.947	(0.58–1.79)
n	910			891			642			638			475		
Prob > chi2	<0.001			<0.001			<0.001			<0.001			<0.001		
Pseudo R2	0.07			0.06			0.13			0.09			0.15		

*Women who reported a current breast (n = 5) or colorectal (n = 1) cancer diagnosis were excluded in the corresponding models since diagnostic procedures or interventions could have been misclassified as CPS behaviour. Outcome variable sufficient utilisation cancer screenings (0 = not sufficient, 1 = sufficient); OR Odds ratios

¹ 0 = not obese, 1 = obese

² -0 = no, 1 = yes

⁵ 0 = statutory health insurance, 1 = private health insurance

⁶ 0 = less than 12 years of education

⁷ 0 = not married or not living together, 1 = married and living together

⁸ Reference category (= 0): first quartile

***p ≤ 0.001, **p ≤ 0.01, *p ≤ 0.05

Table 6 Logistic regression model: influencing factors on the utilisation of clinical cancer prevention screenings among women with obesity

	Pap smear (women with obesity, aged ≥ 20)			Clinical breast examination (women with obesity, aged ≥ 30)			Mammography* (women with obesity, aged ≥ 50)			Faecal occult blood test* (women with obesity, aged ≥ 50)			Colonoscopy* (women with obesity, aged ≥ 55)		
	OR	p	95% CI	OR	p	95% CI	OR	p	95% CI	OR	p	95% CI	OR	p	95% CI
Self-perceived Weight Status ¹															
Slightly overweight	1.39	.730	(0.21–9.12)	1.55	.642	(0.24–9.98)	0.29	.207	(0.04–1.98)	1.76	.635	(0.17–18.00)	1.26	.632	(0.49–3.24)
Overweight	0.74	.737	(0.12–4.38)	0.55	.501	(0.10–3.14)	0.34	.244	(0.05–2.10)	3.24	.300	(0.35–30.01)	1.13	.709	(0.59–2.20)
Extremely overweight	0.49	.438	(0.08–2.96)	0.53	.484	(0.09–3.10)	0.33	.237	(0.05–2.09)	3.53	.272	(0.37–33.32)	Omitted because of collinearity		
Experienced weight bias															
Inadequate treatment by HCPs ²	0.89	.604	(0.56–1.39)	0.93	.760	(0.58–1.48)	0.96	.938	(0.57–1.68)	1.34	.315	(0.76–2.36)	1.08	.810	(0.57–2.06)
Treatment refused ³	0.88	.842	(0.24–3.16)	0.54	.316	(0.16–1.81)	0.71	.726	(0.11–4.67)	0.87	.867	(0.17–4.53)	0.79	.860	(0.06–10.70)
Weight-based discrimination by HPCs ⁴	1.03	.894	(0.62–1.72)	0.95	.860	(0.56–1.61)	1.04	.914	(0.55–1.94)	0.83	.566	(0.44–1.56)	1.60	.208	(0.77–3.33)
General weight-based discrimination ⁵	1.04	.887	(0.64–1.67)	1.04	.864	(0.64–1.71)	1.21	.538	(0.66–2.20)	0.96	.889	(0.52–1.75)	0.77	.478	(0.38–1.57)
Internalised weight bias															
WBIS	0.99	.520	(0.98–1.01)	1.01	.518	(0.99–1.02)	0.99	.174	(0.96–1.01)	1.00	.885	(0.98–1.02)	1.05***	.001	(1.02–1.08)
Cancer awareness															
Current/previous (other) cancer diagnosis in participants ⁶	2.43*	.036	(1.06–5.58)	1.78	.160	(0.80–3.95)	3.93**	.002	1.62–9.55)	0.63	.290	(0.27–1.48)	3.62*	.012	(1.32–9.92)
Current/previous (other) cancer in participant's environment ⁷	1.11	.647	(0.69–1.84)	1.31	.291	(0.79–2.18)	1.64	.169	(0.86–2.37)	1.07	.827	(0.57–2.04)	1.61	.166	(0.82–3.17)
CPS knowledge ⁸	2.17***	<.001	(1.43–3.30)	3.33***	.001	(1.66–6.66)	1.43	.169	(0.86–2.37)	1.45	.205	(0.82–2.55)	3.84***	<.001	(2.10–7.02)
Confounding variables															
Health Insurance ⁹	1.39	.452	(0.59–3.32)	1.98	.174	(0.74–5.27)	0.90	.809	(0.37–2.18)	2.03	.120	(0.83–4.94)	2.18	.142	(0.77–6.16)
Age	0.98*	.033	(0.95–1.00)	0.99	.294	(0.96–1.01)	0.80***	<.001	(0.75–0.86)	0.84***	<.001	(0.79–0.89)	1.13*	.012	(1.03–1.24)
Educational Level ¹⁰	1.04	.873	(0.67–1.60)	0.98	.940	(0.63–1.54)	1.03	.926	(0.60–1.75)	1.24	.430	(0.72–2.13)	1.33	.376	(0.71–2.50)
Marital Status ¹¹	1.55	.040	(1.02–2.35)	1.70	.016	(1.11–2.62)	1.18	.515	(0.54–2.36)	0.94	.827	(0.56–1.59)	1.23	.497	(0.41–2.16)
Household income ¹²															
2. Quartile	1.05	.860	(0.62–1.78)	1.69	.060	(1.07–3.13)	0.94	.865	(0.47–1.88)	1.03	.925	(0.50–2.12)	1.00	.998	(0.45–2.23)
3. Quartile	1.43	.249	(0.78–2.64)	1.78	.067	(1.04–3.49)	1.10	.789	(0.53–2.29)	2.10*	.046	(1.01–4.36)	1.72	.216	(0.73–4.05)
4. Quartile	1.21	.552	(0.65–2.26)	1.93*	.049	(0.98–3.58)	1.13	.739	(0.54–2.36)	1.00	.990	(0.46–2.19)	0.94	.876	(0.41–2.16)
n	473			463			339			336			247		
Prob > chi ²	0.003			0.001			<0.001			<0.001			<0.001		

Other studies about cancer screening in women with obesity

- Women with obesity are **less likely to undergo cervical cancer screening**.
- Weight-based differences in CPS behaviour were **more pronounced in the utilisation of cervical cancer screenings**. (from systematic review)
- **A decreased use of mammograms in women with obesity** compared to women of normal weight.
- *The utilisation of breast cancer* between women with and without obesity were *less consistent*.
- *Colorectal cancer screenings* in women of different weight groups and found a more *inconsistent study situation*.

Cancer screening and incorrect cytology result in women with obesity

- A retrospective review (1080 cases of cervical screening)
 - 29.5% (n=311) women with obesity
 - 10% (n=107) women with severe and complex obesity
 - **Women with severe and complex obesity** having **the highest incorrect rate (64.4%) of cytologic result**, followed by women with obesity (51.5%).
 - > women with obesity may have disproportionate inappropriate screening before cervical cancer diagnosis & worse overall survival rates than normal weight counterparts

Reasons for low cancer screening rate in people with obesity

- **Negative attitudes** (e.g. embarrassment, stress, and fear)
 - > **Mediator** between obesity and decreased utilisation of CPS.
- **Less Mobile**
 - > People with a BMI higher than 40 kg/m^2 (i.e., morbid obesity) might be **less mobile**, which could make it difficult to get to healthcare practices.

TABLE 1 Studies included in the review

Ref	Title and author	Year	Country	Aim of study	Participant type and number	Type of study	Type of screening	Main findings	Recommendations
18	Family physicians' barriers to cancer screening in extremely obese patients Ferrante JM, Fyffe DC, Vega ML, et al. <i>Obesity</i> , 18(4):1153-1159	2010	USA	To better understand the barriers that family physicians face in performing breast and cervical screening examination in women living with higher levels of obesity	Family physicians (n = 270)	Mixed methods (interviews, n = 15 and surveys, n = 255)	Breastcervical	<ul style="list-style-type: none"> • Main barriers: • Difficulty performing breast and pelvic exams • Inadequate equipment, • Challenges overcoming patient barriers and refusal of screening 	Future interventions should focus on educating physicians on specific exam techniques, provision of adequate equipment and supplies, and identifying resources to assist with patient barriers and refusal of screening
19	The determinants of cervical cancer screening uptake in women with obesity: Application of the Andersen's behavioral model to the CONSTANCES survey Franck JE, Ringa V, Coeuret-Pellicer et al. <i>Cancer Causes and Control</i> , 31(1):51-62	2020	France	To explore the clinical and healthcare related determinants of CCS uptake among women living with obesity	Women aged 25–65 years living with obesity (n = 2934)	Survey	Cervical	<ul style="list-style-type: none"> • Women with obesity were more likely to uptake CCS if they had regular follow-up by a gynecologist, good quality of primary care, and comorbidities. • Being older, single, having no children, having limited literacy, and financial strain were barriers to screening uptake. 	Further efforts are needed to increase CCS uptake, including reducing obstacles to CCS among women living with obesity
20	Patterns of gynecological check-up and their association with Body Mass Index within the CONSTANCES cohort Franck JE, Ringa V, Rigal L, et al. <i>Journal of Medical Screening</i> , 10.1177/0969141320914323	2020	France	To identify patterns of gynecological check-up and regularity of breast and cervical cancer screening and the association of body mass index	Women aged 54–65 years (n = 6182)	Survey	CervicalBreast	<ul style="list-style-type: none"> • Women living with obesity were most commonly found to have no or inappropriate check-ups. • Women living with obesity and overweight were screened for breast cancer more than cervical cancer and were not over-screened as often as normal weight women. 	The healthcare system should adapt to be a more supportive and welcoming environment for women with obesity in order to increase cancer screening uptake.

Ref	Title and author	Year	Country	Aim of study	Participant type and number	Type of study	Type of screening	Main findings	Recommendations
25	Body Mass Index and screening for colorectal cancer: gender and attitudinal factors Messina CR, Lane DS, Anderson J Cancer Epidemiology, 35:400-408	2012	USA	To explore the association between BMI and colorectal cancer screening uptake, the role of gender in this relationship, and the impact of attitudes and perception about colorectal cancer and screening.	Women and men aged 50–75 (n = 1098)	Survey	Colorectal	<ul style="list-style-type: none"> • Women with obesity and overweight were less likely to partake in colorectal cancer screening than women with normal weight. • BMI category did not influence screening uptake in men. • Women with obesity were less aware of the increased risk of colorectal cancer among people with obesity, and were less worried about colorectal cancer. 	Future research is warranted to fully understand the process by which BMI affects colorectal cancer screening uptake. There is a need for interventions to increase awareness of the need for colorectal cancer screening, including discussions about weight-associated risk for colorectal cancer.
26	National disparities in colorectal cancer screening among obese adults Seibert RG, Hanchate AD, Berz JP, et al American Journal of Preventive Medicine, 53(2):e41-49	2017	USA	To explore the uptake of colorectal screening among obese older adults and identify obesity-specific screening barriers.	Men and women aged 50–75 (n = 8550)	Survey	Colorectal	<ul style="list-style-type: none"> • Men with severe and complex obesity were less likely to be up to date with screening. • There was no difference in screening uptake among women according to weight status. • Men living with obesity reported a lack of physician screening recommendation as the most important screening barrier. • Women with obesity were more likely than women with normal body weight to report pain and embarrassment as a barrier to screening uptake. 	Healthcare providers should recognize obesity-specific screening barriers and tailor strategies to encourage screening uptake in this population.

Patients

TABLE 2 Patient reported barriers and challenges to screening

Barrier	Studies (n = 3)
Modesty/embarrassment	21 (Friedman et al.)
	24 (McBride et al.)
	26 (Seibert et al.)
Fear of pain	21 (Friedman et al.)
	24 (McBride et al.)
	26 (Seibert et al.)
Competing demands on time	21 (Friedman et al.)
	24 (McBride et al.)
Belief of being at low risk of developing cancer	21 (Friedman et al.)
Lack of awareness of the need for screening	24 (McBride et al.)
	26 (Seibert et al.)
Lack of physician recommendation (discussed in more detail in Section 3.4)	26 (Seibert et al.)
Previous negative experiences of screening	21 (Friedman et al.)
	24 (McBride et al.)

Healthcare professionals

TABLE 3 Healthcare professional reported barriers and challenges to screening (all types)

Barrier	Studies (n = 2)
Lack of knowledge/difficulties performing examination techniques (breast and cervical) in women with obesity	18 (Ferrante et al.)
Lack of equipment which is suitable for women with obesity	18 (Ferrante et al.)
Lack of resources to support healthcare professionals to deal with and support women with obesity who are reluctant or refuse to undergo screening interventions	18 (Ferrante et al.)
Patient size impacts on mammogram efficiency and safety	24 (McBride et al.)
Patient inaccessibility to mobile screening vans	24 (McBride et al.)
Health and safety issues for the healthcare professional	24 (McBride et al.)
Maintaining quality of image against patient comfort	24 (McBride et al.)
Difficulties in discussing weight	18 (Ferrante et al.)
	24 (McBride et al.)
Cultural	24 (McBride et al.)
Health and safety concerns (moving patients/ service users)	18 (Ferrante et al.)
Extra time needed to carry out breast examinations in women with obesity	18 (Ferrante et al.)

Overcome Barriers to Cancer Screening

- **Excess weight is a barrier** to accessing cancer screening services for both sexes.
- The importance of healthcare professionals **to understand the concerns and fears** of people living with obesity when attending for cancer screening.
- Make every attempt to **ensure that facilities are weight-friendly, from equipment, language used, and overall environment.**

3. Prevention of cancer in people with obesity

The American Cancer Society recommendation – Diet –

- Stay at a healthy weight throughout life.
 - The best way is to balance how much (and what) you eat with how active you are.
- Follow a healthy eating pattern
 - Lower the number of calories you take in by eating healthier foods
 - Eating smaller amounts of food (smaller portion sizes)
 - Limiting between-meal snacks
 - Limiting foods and drinks that are high in calories, fat, and/or added sugars

The American Cancer Society recommendation – Physical activity -

- **Be physically active:** adults get 150 to 300 minutes of moderate intensity or 75 to 150 minutes of vigorous intensity activity each week (or a combination of these).
- Getting more is even better, **no matter what your level of activity.**
- **Children and teens should get at least 1 hour** of moderate or vigorous intensity activity each day.
- ***Limit the time you spend sitting, lying down, watching TV, and looking at your phone or computer.***

Does losing weight reduce cancer risk?

- Research on how losing weight might lower the risk of developing cancer is **limited**.
- Weight loss might reduce the risk of some types of cancer, such as **breast cancer in menopausal women and endometrial cancer**.
- **Intentional loss of weight** have **reduced levels of certain hormones** that are related to cancer risk, such as insulin, estrogens, and androgens.
- Losing weight can have **many other health benefits** (e.g. CVD and diabetes).
- **Losing even a small amount of weight has health benefits** (<2, 2~4.5kg in breast cancer)

Weight management trials:

The Women's Health Initiative

- Long-term follow-up (mean 11.4 yrs)
 - **Modest weight loss** (≥ 10 pounds from baseline weight during the initial 3-year study) had **a lower risk of endometrial cancer** compared with those who did not lose weight. (esp. on women with obesity or who had obesity at baseline)
 - **Losing weight (5%)** has **lower risk of breast cancer (HR: 0.88)** (compared with women whose weight remained stable)

Table 2 Multivariable-Adjusted HRs and 95% CIs for the Association Between Weight Change and Endometrial Cancer Risk Stratified by BMI

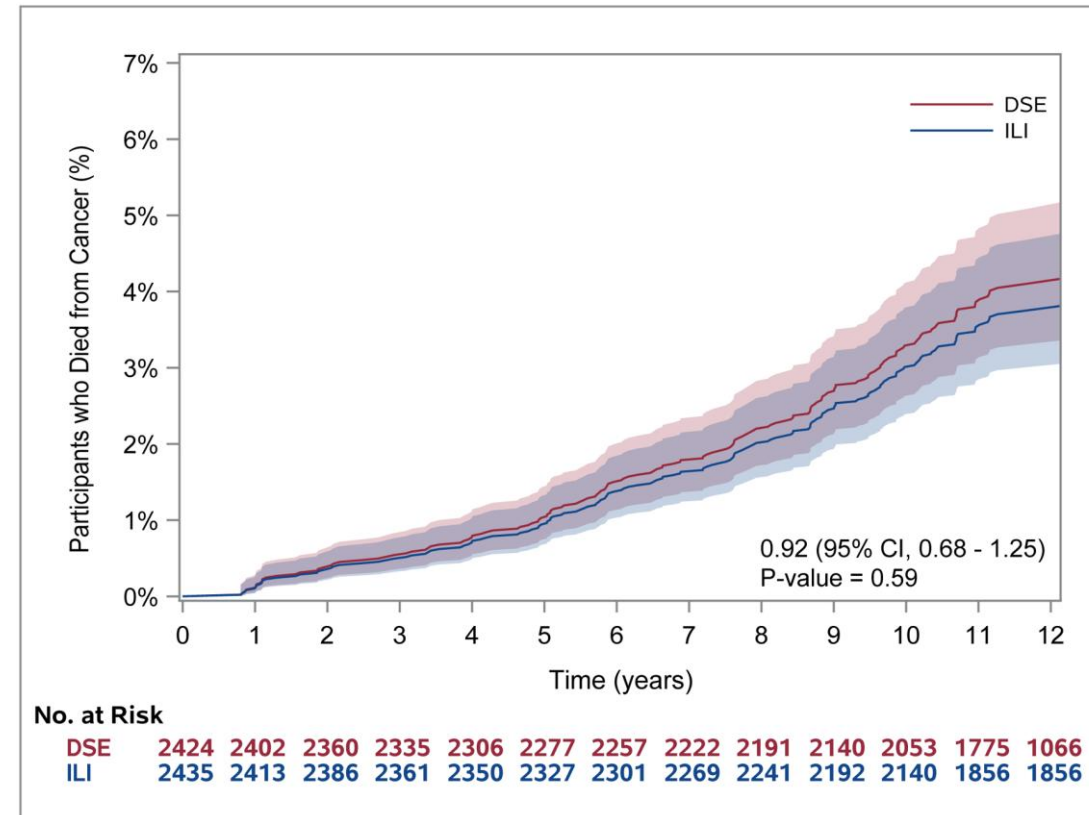
Weight Change Between Baseline and Year 3	Normal Weight (BMI 18.5 to < 25 kg/m ²)		Overweight (BMI 25 to < 30 kg/m ²)		Obese (BMI ≥ 30 kg/m ²)	
	No. of Patients	HR (95% CI)*	No. of Patients	HR (95% CI)	No. of Patients	HR (95% CI)
Change in pounds						
Stable weight (within ± 10)	198	Reference	112	Reference	115	reference
Weight gain (≥ 10)	25	1.08 (0.71 to 1.64)	30	1.49 (0.99 to 2.24)	41	1.29 (0.90 to 1.86)
Weight loss (≥ 10)	5	0.59 (0.24 to 1.43)	18	1.36 (0.82 to 2.25)	22	0.53 (0.33 to 0.87)
Intentional	2	0.52 (0.13 to 2.08)	9	1.04 (0.52 to 2.05)	16	0.52 (0.30 to 0.90)
Unintentional	3	0.64 (0.21 to 2.02)	9	2.00 (1.01 to 3.96)	6	0.57 (0.25 to 1.33)
% weight change						
Stable weight (within $\pm 5\%$ change)	164	Reference	100	Reference	120	Reference
Weight gain ($\geq 5\%$)	49	1.08 (0.78 to 1.49)	37	1.23 (0.84 to 1.80)	38	1.14 (0.78 to 1.65)
Weight loss ($\geq 5\%$)	15	0.80 (0.47 to 1.35)	23	1.16 (0.74 to 1.83)	20	0.47 (0.29 to 0.77)
Intentional	6	0.61 (0.27 to 1.38)	13	1.01 (0.57 to 1.81)	14	0.44 (0.25 to 0.78)
Unintentional	9	1.00 (0.51 to 1.97)	10	1.44 (0.75 to 2.78)	6	0.57 (0.25 to 1.30)

Abbreviations: BMI, body mass index; HR, hazard ratio.
 *Multivariable models adjusted for age at enrollment, race/ethnicity, education, smoking pack-years, recreational physical activity, history of hormone therapy use, parity, age of menarche, age at first birth, family history of endometrial cancer, and BMI (measured continuously and included as a covariate only for the obese group).

Weight-management trials:

The Look AHEAD Randomized Clinical Trial

- Intensive lifestyle-intervention trial of 5,145 participants (median follow-up of 11 years)
- Weight loss lowered the incidence of obesity-related cancers by 16% in adults with overweight or obesity and type 2 diabetes
- Weight-loss trials reported a significant reduction in the risk of all-cause mortality, cardiovascular mortality and cancer mortality in a systematic review and meta analysis.

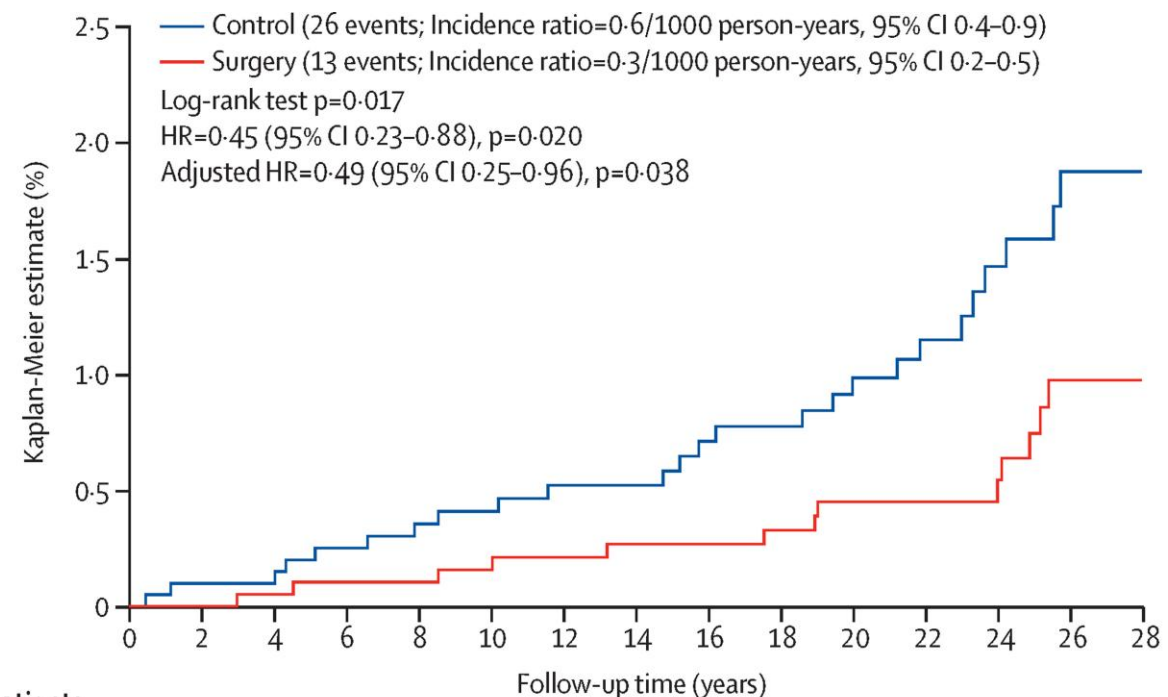


Look Ahead Research Group. (2020). Obesity 28, 1678–1686.
 Ma, C. et al. BMJ 359, j4849 2017

Obesity surgery and cancer risk:

Swedish Obese Subjects Study

- A prospective cohort study.
 - Lymphoma was the predominant haematological cancer in the study.
 - a 55% risk reduction of incident lymphoma
- Weight loss reduce low-grade chronic inflammation, independent of the bariatric surgical procedure.



Number of patients

Control	2040	1981	1880	1727	1538	1386	862	327
Surgery	2007	1932	1869	1791	1712	1580	1057	387

Sjöholm K, et al. Lancet Healthy Longev 2023; e544-e551

Chiappetta S et al. Obes Surg 2018; 28: 3028–40.

Weight management for people already diagnosed with cancer

- Overweight or obese **raises the risk of cancer** coming back after treatment and may **lower the chances of survival** for many cancers.
- Both during and after cancer treatment, **people should try to get to and stay at a healthy weight**
- Many people with overweight or obesity may **choose to wait until after treatment is finished**
- **Weight loss should be done safely**, through a well-balanced diet and increased physical activity
- After cancer treatment, **weight should be managed with both dietary and physical activity**

4. Conclusions

- Obesity is associated with increased cancer incidence and decreased cancer screening rate in some cancer types.
- People living with obesity especially in women, showed decreased cancer screening rate on cervical and breast cancer
- Healthcare professionals should understand the concerns and fears of people living with obesity when attending for cancer screening.
- Eliminate the barriers to cancer screening for both patients and healthcare providers.
- Weight loss may reduce the risk of cancer and this should be done safely, through a well-balanced diet and increased physical activity

Thank you