women's health AUSTRALIA | Australian Longitudinal Study on Women's Health

Reproductive health: Contraception, conception and change of life - Findings from the Australian Longitudinal Study on Women's Health

Report prepared for the Australian Government Department of Health

May 2021

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9. MENOPAUSE

Authors: Hsin-Fang Chung, Katrina Moss, Gita D Mishra.

9.1 Key points

Natural menopause

- In the 1946-51 cohort, 90% of women reached natural menopause by age 55, with an average age at 50.9 years. However, 1.3% experienced premature menopause (<40 years), and 5.8% experienced early menopause (40-44 years).
- Women who were less educated, separated/divorced/single, and reported finding income management difficult all the time were more likely to have an earlier age at menopause.
- In the 1973-78 cohort, almost 10% of women had reached menopause by age 40-45 years, and 20% had entered perimenopause.
- Cigarette smoking, being underweight, early age at menarche (≤11 years), and nulliparity/low parity were associated with an increased risk of premature and early menopause. Smokers who quit smoking for more than ten years prior to the menopause can minimise this risk.
- Women with premature menopause or a very short reproductive lifespan (<30 years) had an increased risk of non-fatal CVD, especially early onset CVD events before age 60.

Hysterectomy and oophorectomy

- In the 1946-51 cohort, 37.9% of women had had a hysterectomy and/or oophorectomy by age 68-73 years – 12.6% reported a hysterectomy with bilateral oophorectomy (surgical menopause). The average age at hysterectomy was 46.3 years, with one third occurring before age 45.

- In the 1973-78 cohort, 5.7% of women had undergone a hysterectomy and/or oophorectomy by age 40-45 years – 0.8% reported a hysterectomy with bilateral oophorectomy.

- Earlier surgical menopause before age 45 was associated with an additional risk of CVD, compared with natural menopause at the same age.

- Women with hysterectomy/oophorectomy were at a higher risk of type 2 diabetes in both healthy weight and overweight/obese BMI groups.

- Hysterectomy with ovarian conservation before age 50 did not increase the risk of all-cause mortality, compared with the no hysterectomy group. However, women with hysterectomy and bilateral oophorectomy before age 50 who did not take MHT had an increased risk of premature mortality.

VMS; hot flushes and night sweats

- In the 1946-51 cohort, almost 25% of women experienced hot flushes 'often' at age 50-58 years. Only 5.8% still experienced hot flushes 'often' at age 68-73. The prevalence of night sweats 'often' was lower.

- Five symptom profiles of hot flushes were identified over a 20 year period from age 45-73 years: minimal (62.2%), later onset, resolved (17.4%), early onset (10.8%), later onset, not resolved (5.9%), and persistent (3.3%). The 'persistent' and 'later onset, not resolved' groups still experienced hot flushes at age 68-73 years. Similar results were found for night sweats.

- Three in four women who experienced hot flushes 'often' sought help at age 45-50, and this decreased over time to 25% at age 59-64. Of these women, 20-25% reported that they were not satisfied with the help given.

- In the 1973-78 cohort, less than 3% of women reported that they experienced hot flushes 'often' at age 37-45 years. However, help-seeking among those women experiencing hot flushes 'often' rose from 30.7% at age 37-42 to 41.3% at age 40-45.

- Cigarette smoking, having a BMI in the overweight/obese range, and a high fat-sugar diet were associated with a higher risk of VMS, while high intakes of soy products, fruit, and Mediterranean diet were associated with a lower risk of VMS. Women who quit smoking before age 40 had a similar level of risk as never smokers.

- Both hot flushes and night sweats were associated with increased risk of CVD, especially those experiencing both symptoms often.

MHT

- In the 1946-51 cohort, the use of MHT peaked at age 50-55 years (32.6%), and 7.3% were still taking MHT at age 68-73 years. Among women taking MHT at age 45-50, 52.4% reported a hysterectomy and/or bilateral oophorectomy.

- In the 1973-78 cohort, 1.4% reported currently taking MHT at age 40-45 years. Of these, 40.2% reported a hysterectomy and/or bilateral oophorectomy.

9.2 Introduction

Menopause is a natural part of ageing and marks the end of a woman's reproductive years. Menopause occurs when the ovaries no longer release an egg every month and menstruation stops. Menopause usually occurs between 45 and 55 years of age. Menopause before age 45 is called early menopause. Early menopause may occur naturally or following chemoradiation or removal of both ovaries.

During the menopausal transition, changes in hormones may lead to symptoms. Hot flushes and night sweats (VMS) are the main reason women seek treatment,and they may continue for ten years or more. For women who seek medical advice for their menopausal symptoms, hormone therapy (also known as menopausal hormone therapy) is the most effective treatment. This chapter includes new analyses and previous research findings for four main topics: natural menopause, hysterectomy/oophorectomy, VMS, and MHT.

9.3 Natural menopause

9.3.1 Background

Natural menopause is defined as the permanent cessation of menstruation resulting from a depletion of ovarian primordial follicles. It is diagnosed based on 12 consecutive months of amenorrhea that is not attributable to other causes. Some women experience induced menopause due to chemoradiation or removal of ovaries (oophorectomy). Timing of natural menopause is an important indicator for subsequent morbidity and mortality. Early menopause is associated with an increased risk of cardiovascular disease, type 2 diabetes, depression, and osteoporosis.

9.3.2 1946-51 cohort

Age at natural menopause

Age at menopause was determined from responses to the question 'if you have reached menopause, at what age did your periods completely stop' asked in Surveys 2-6 (when women of this cohort were aged 47-64 years). Natural menopause was confirmed by at least 12 months of cessation of menses not attributable to hysterectomy or bilateral oophorectomy. By age 59-64 years (at Survey 6), more than 95% of women had reached menopause (either naturally or surgically), 61.7% experienced natural menopause, and 34.3% had undergone a hysterectomy and/or bilateral oophorectomy.

Overall, 7,616 women reported experiencing natural menopause and recorded their age at last menstrual period (Figure 9-1). About 90% of women reached natural menopause by age 55, with an average age of 50.9 years (SD 4.3; range 31-63). Most women (82%) reported experiencing menopause between 45 and 55 years. However, 1.3% (N = 102) experienced premature menopause before 40 years, and 5.8% (N = 444) experienced early menopause between 40 and 44 years.

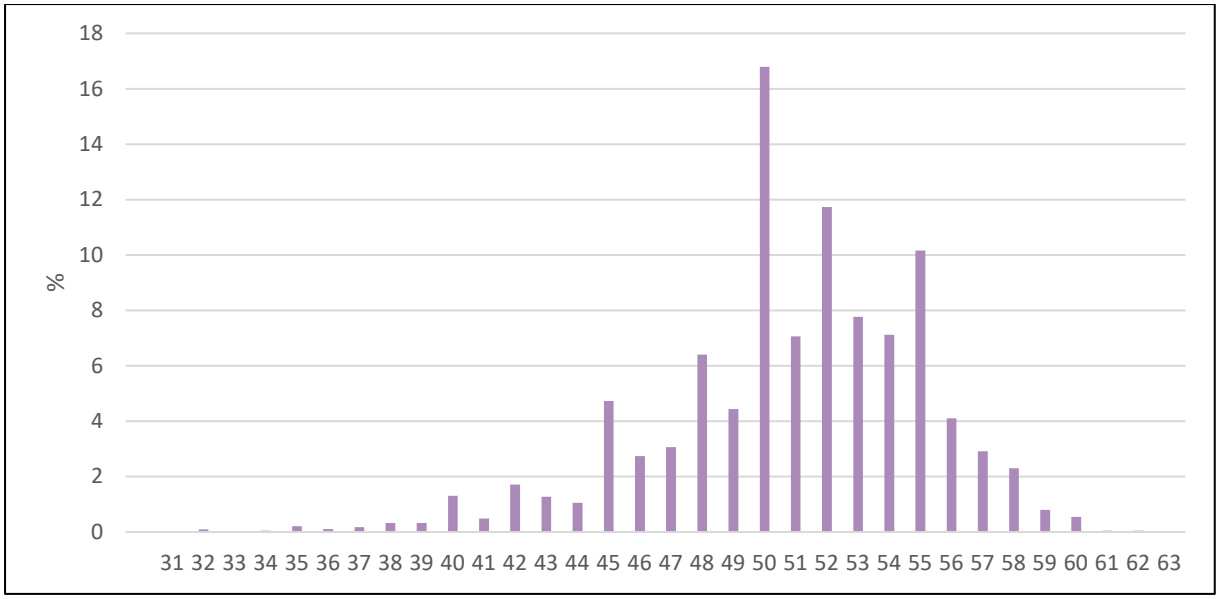


Figure 9-1 Age at natural menopause (N = 7,616).

Age at natural menopause by socio-demographic characteristics

Figure 9-2 shows the mean age at natural menopause by socio-demographic characteristics collected at age 45-50 years (at Survey 1). There was a delay in age at menopause for women with a university degree or higher, compared with those with no formal qualifications (51.5 vs 50.2 years). However, women who reported finding income management difficult all the time or impossible had an earlier age at menopause, compared with those who found income management easy (50.4 vs 51.0 years). Women who were separated/divorced or single also reported an earlier age at menopause (50.5 and 49.9 years, respectively), compared with those who were married or de facto (50.9 years). There was no apparent difference in age at menopause between women living in urban and rural/remote areas.

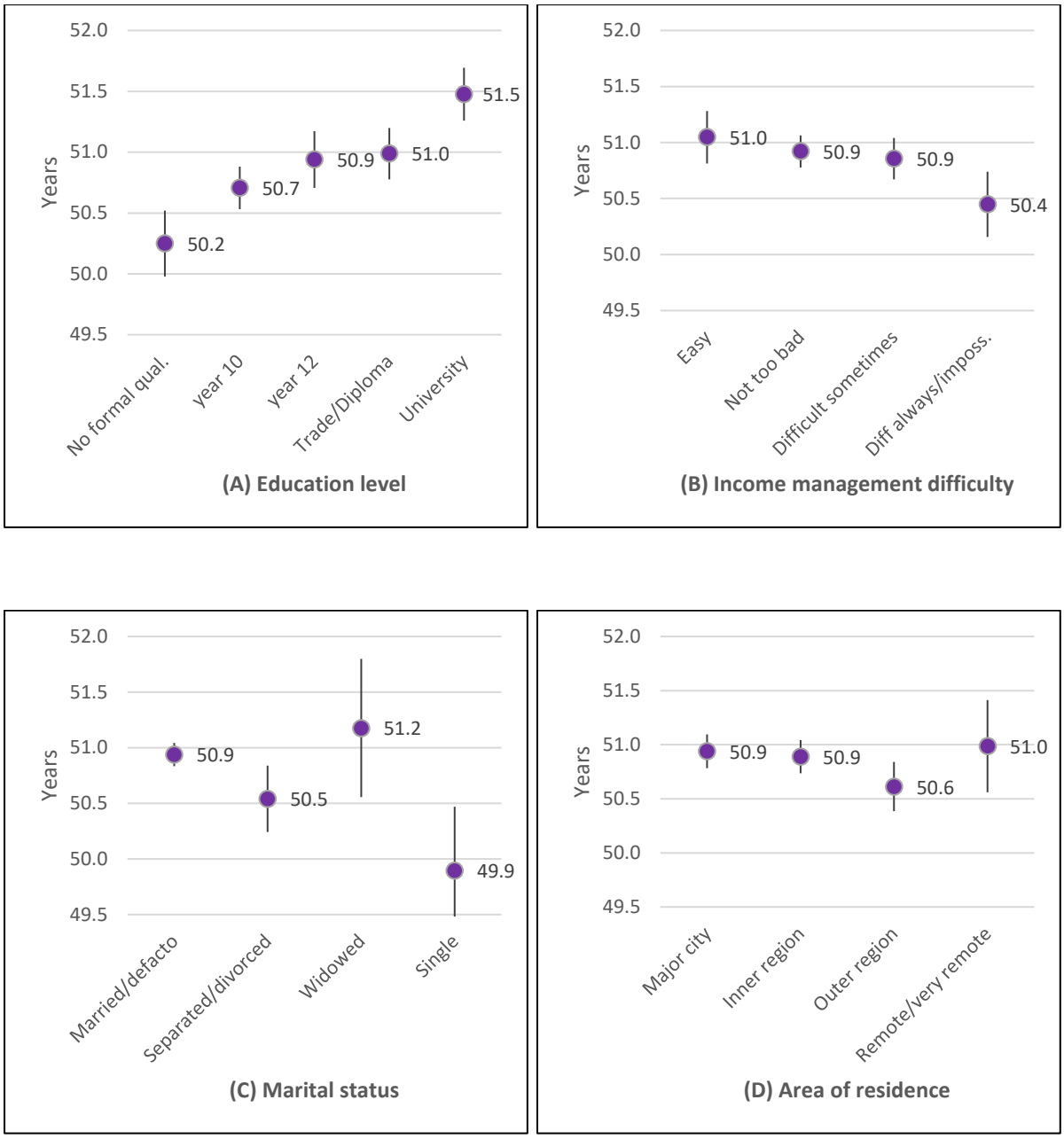


Figure 9-2 Mean age at natural menopause by (A) education level (N = 7,548), (B) income management difficulty (N = 7,573), (C) marital status (N = 7,581), and (D) area of residence (N = 7,615).

9.3.3 1973-78 cohort

When aged 40-45 years (at Survey 8; N = 6,731), almost one in ten (N = 667) women born 1973-78 had reached natural menopause, which is similar to the prevalence of early menopause in previous studies. Over 5% (N = 385) reported having had a hysterectomy and/or bilateral oophorectomy. Almost 20% had entered perimenopause, based on changes to the regularity of the menstrual period. Half (50.8%) were still premenopausal, based on having a menstrual period in the past two months and no changes to regularity. Menopausal status could not be determined for the remaining women due to the use of OCP (13.1%) or MHT (0.9%).

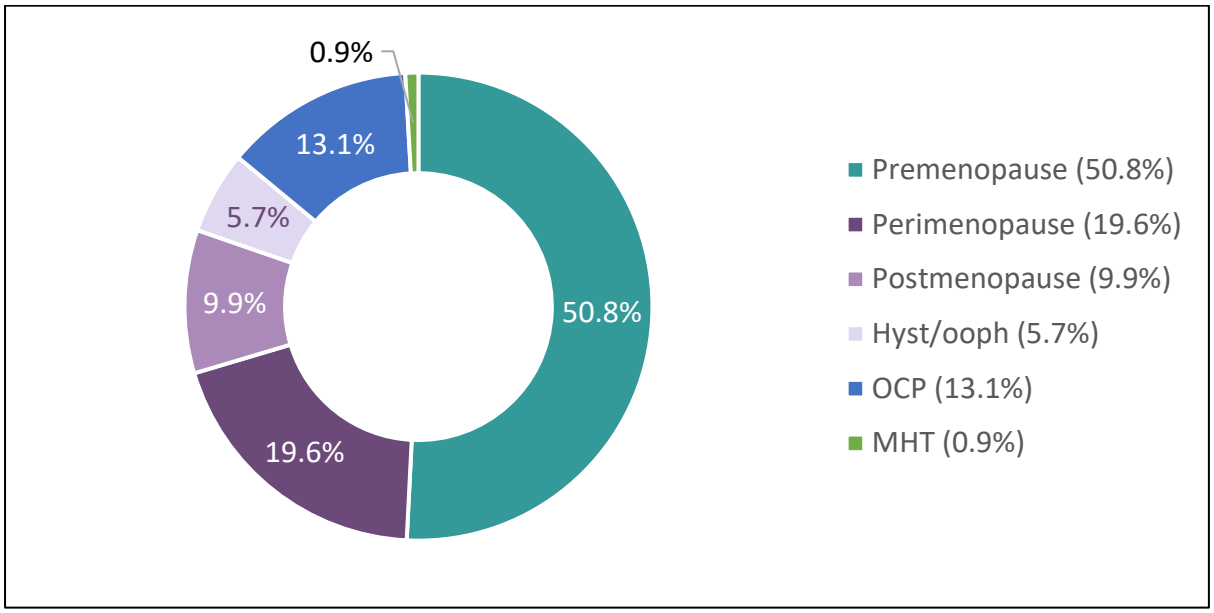


Figure 9-3 Menopausal status of the 1973-78 cohort at age 40-45 years (N = 6,731).

9.3.4 Previous research: predictors of premature and early menopause

Data collected from the 1946-51 cohort comprise a core dataset of the International collaboration on the Life course Approach to reproductive health and Chronic disease Events (InterLACE) consortium, which has pooled individual-level data from over 20 studies on women's reproductive health in midlife (Mishra et al., 2016). The InterLACE study reported that the mean age at natural menopause was 50.5 years, with substantial variations across racial/ethnic groups and education levels (Inter et al., 2019). Previous ALSWH and InterLACE research have shown certain lifestyle (Zhu et

al., 2018a; Zhu et al., 2018b), reproductive (Mishra et al., 2017), and social/environmental factors (Mishra et al., 2018) were associated with premature menopause (<40 years; also known as primary ovarian insufficiency) and early menopause (40-44 years). These findings, outlined below, have contributed to the EMAS position statement (Mishra et al., 2019).

- Women who currently smoked were at twice (95% CI 1.73-2.44) the risk of premature menopause (<40 years), while the risk was considerably lower for women who no longer smoked (only 15% increased risk), compared with women who had never smoked (Zhu et al., 2018b).

- Women who had quit smoking for more than ten years had a similar risk as those who had never smoked, suggesting women should quit smoking early, preferably before the age of 30 years (Zhu et al., 2018b).

- Underweight women (BMI<18.5 kg/m^2) had over twice (95% CI 1.50-3.06) the risk of early menopause (<45 years), while women in the overweight or obese BMI category had a 50% (95% CI 1.18-2.01) increased risk of late menopause (≥56 years). These findings highlighted the role of optimal weight in reducing the risk of early or late menopause (Inter et al., 2019).

- Women with early menarche (≤11 years) had an 80% (95% CI 1.53-2.12) increased risk of premature menopause (<40 years), compared with those who experienced menarche at age 13 years. Nulliparous women had over twice (95% CI 1.84-2.77) the risk of premature menopause, compared with those with two or more children (Mishra et al., 2017).

- The combination of early menarche and nulliparity resulted in a five-fold (95% CI 4.04-7.87) increased risk of premature menopause, compared with women who experienced menarche at age 12 or older and women who had two or more children (Mishra et al., 2017).

- Women who experienced intimate partner violence had a 40% (95% CI 1.03-1.80) increased risk of early menopause (<45 years). This risk was attenuated and no longer significant after adjusting for smoking status. The mediation

analyses showed that cigarette smoking explained 36.7% of the overall relationship between intimate partner violence and early menopause (Mishra et al., 2018).

9.3.5 Previous research: early menopause and risk of chronic conditions

Previous studies have shown that age at menopause and the duration of the reproductive lifespan (defined as the time interval between menarche and menopause) were associated with the risk of non-fatal CVD events (Zhu et al., 2019; Mishra et al., 2020).

- Compared with women who experienced menopause at age 50-51 years, women who experienced premature menopause (<40 years) were at 1.5 times (95% CI 1.38-1.73) higher risk of CVD, and had almost twice (95% CI 1.62-2.20) the risk of having a CVD event before age 60 (Zhu et al., 2019).
- Women with a very short reproductive lifespan (<30 years) were at 1.7 times (95% CI 1.58-1.84) higher risk of CVD than those with a reproductive lifespan of 36-38 years (Mishra et al., 2020).
- These findings suggest that women who experience premature or early menopause need early screening tests (e.g., blood pressure, lipids, blood glucose) for monitoring cardiovascular health before age 60.

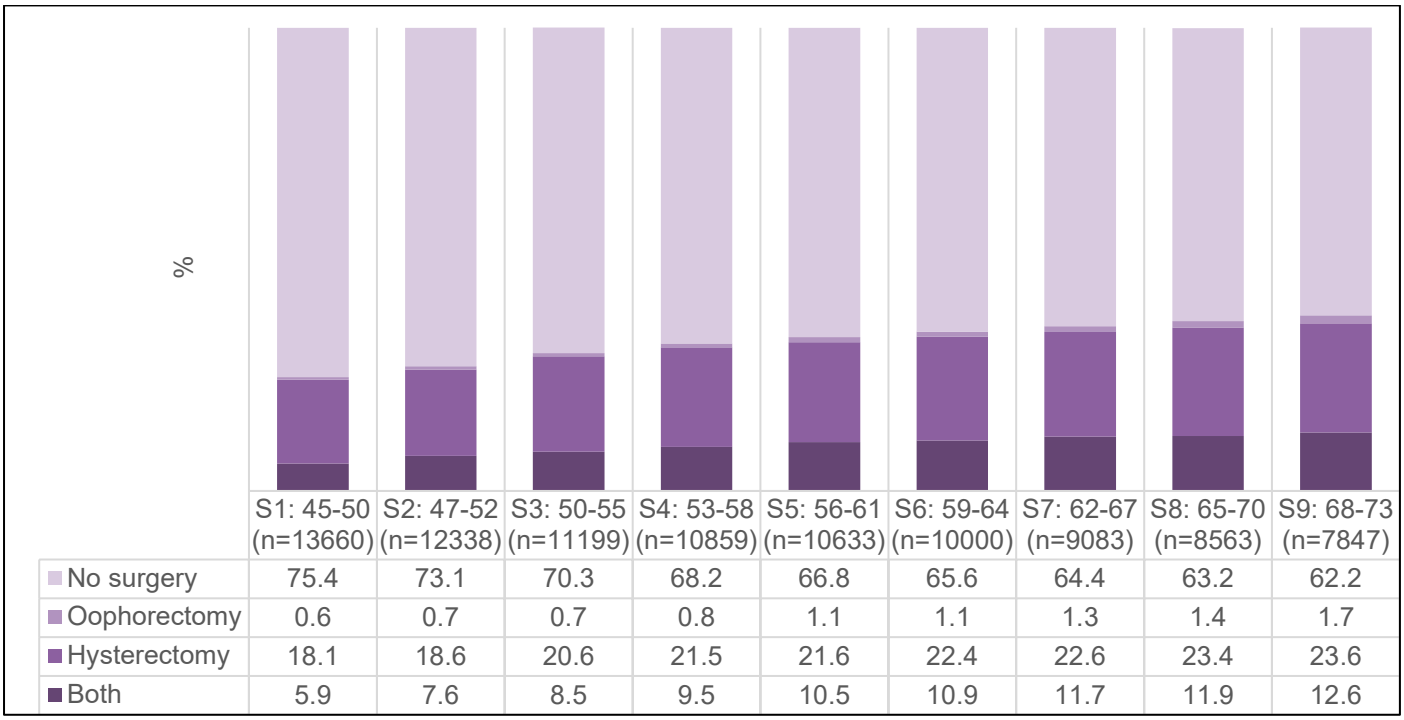
9.4 Hysterectomy and oophorectomy

9.4.1 Background

Hysterectomy is one of the most common gynaecological procedures performed in developed countries. In the past, bilateral oophorectomy (removal of both ovaries) was commonly performed at the time of hysterectomy for benign diseases in order to prevent ovarian cancer. Removal of normal ovaries is no longer recommended apart from women at high inherited risk of ovarian cancer.

9.4.2 1946-51 cohort

From Survey 1-9 (aged 45-73 years), ALSWH participants born 1946-51 were asked whether they had ever had a hysterectomy or both ovaries removed (bilateral oophorectomy). By age 68-73 years, over one third (37.9%) had undergone a hysterectomy and/or oophorectomy. 1.7% reported having both ovaries removed without a hysterectomy, 23.6% reported a hysterectomy with ovarian conservation, and 12.6% reported a hysterectomy and both ovaries removed (Figure 9-4).



	S1: 45-50 (n=13660)	S2: 47-52 (n=12338)	S3: 50-55 (n=11199)	S4: 53-58 (n=10859)	S5: 56-61 (n=10633)	S6: 59-64 (n=10000)	S7: 62-67 (n=9083)	S8: 65-70 (n=8563)	S9: 68-73 (n=7847)
No surgery	75.4	73.1	70.3	68.2	66.8	65.6	64.4	63.2	62.2
Oophorectomy	0.6	0.7	0.7	0.8	1.1	1.1	1.3	1.4	1.7
Hysterectomy	18.1	18.6	20.6	21.5	21.6	22.4	22.6	23.4	23.6
Both	5.9	7.6	8.5	9.5	10.5	10.9	11.7	11.9	12.6

Figure 9-4 History of hysterectomy and/or oophorectomy over time.

Age at hysterectomy

Overall, 4,884 women born 1946-51 reported a hysterectomy and recorded their age at hysterectomy (Figure 9-5). The average age when a hysterectomy was performed was 46.3 years (SD 9.8; range = 17-73). One third (35.7%, N = 1,745) of women had undergone a hysterectomy before the age of 45 years, and 39.5% were between 45 and 50 years. The majority (87.1%) had undergone a hysterectomy before natural menopause.

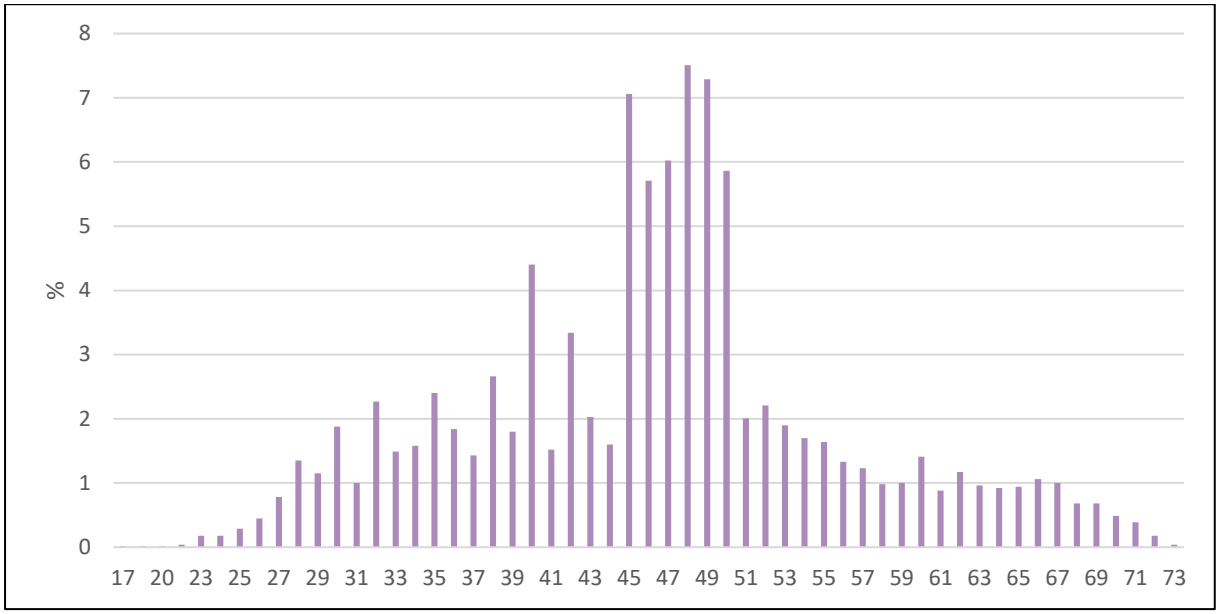


Figure 9-5 Age at hysterectomy (N = 4,884).

9.4.3 1973-78 cohort

In Surveys 5-8, participants born 1973-78 (then aged 31-45 years) were asked whether they had ever had a hysterectomy or both ovaries removed. By age 40-45 years (at Survey 8; N = 6,731), 5.7% (N = 385) had undergone a hysterectomy and/or oophorectomy: 0.3% (N = 20) reported having both ovaries removed without a hysterectomy, 4.6% (N = 310) reported a hysterectomy with ovarian conservation, and 0.8% (N = 55) reported a hysterectomy with both ovaries removed.

9.4.4 Previous research: hysterectomy, oophorectomy and risk of chronic conditions

Previous ALSWH and InterLACE research has shown that hysterectomy and oophorectomy were associated with increased risk of CVD (Zhu et al., 2020a), type 2 diabetes (Pandeya et al., 2018), depressive symptoms (Wilson et al., 2018), and all-cause mortality (Wilson et all, 2019).

- Hysterectomy with bilateral oophorectomy (defined as surgical menopause) was associated with over 20% higher risk of CVD (95% CI 1.16-1.28), compared with natural menopause (Zhu et al., 2020a).

- Earlier surgical menopause was associated with an additional risk of CVD compared with women with natural menopause at the same age. For instance, women with surgical menopause before 35 years (HR 2.55, 95% CI 2.22-2.94) had a much higher risk of CVD than those with natural menopause before 35 years (HR 1.59, 95% CI 1.23-2.05) (Zhu et al., 2020a).

- Hysterectomy and/or oophorectomy was associated with a 20% (95% CI 1.07-1.29) higher risk of type 2 diabetes after adjusting for BMI, compared with pre- and perimenopausal women (Pandeya et al., 2018).

- Women with a hysterectomy were at increased risk of incident depressive symptoms compared with those without a hysterectomy, with a slightly higher risk among those with a hysterectomy and bilateral oophorectomy (RR 1.44, 95% CI 1.22-1.68) than those with a hysterectomy and ovarian conservation (RR 1.20. 95% CI 1.06-1.36) (Wilson et al., 2018).

- Women who reported a hysterectomy and ovarian conservation before the age of 50 years were not at increased risk of all-cause mortality compared with women without a hysterectomy, regardless of the use of hormone therapy. However, the risk of premature mortality was higher among women who had undergone a hysterectomy and bilateral oophorectomy before the age of 50 and did not take hormone therapy (HR 1.81, 95% CI 1.01-3.25) (Wilson et al., 2019).

- These findings on chronic diseases lend some support to the position that normal ovaries should not be removed at the time of hysterectomy before age 50, except in women at high inherited risk of ovarian cancer.

9.5 VMS

9.5.1 Background

VMS (hot flushes and night sweats), are the main reason women seek treatment, and drivers of menopause-related health service use.

9.5.2 1946-51 cohort

At each survey, participants were asked how frequently they had experienced hot flushes and night sweats in the last 12 months. The response categories were 'never', 'rarely', 'sometimes', and 'often'. Previous research has identified four symptom profiles of VMS using data from Surveys 1-6, covering ages 45-64 years: early severe (11.2%), late severe (28.9%), moderate (18.2%), and mild (41.7%) (Mishra & Dobson, 2012). The early severe group reported VMS while still premenopausal, and the prevalence of VMS peaked just before menopause or around menopause, followed by a steady decline through postmenopause. The late severe group was characterised with the peak prevalence occurring one to four years into postmenopause, and still experiencing VMS ten or more years after menopause. The moderate group followed a similar symptom pattern as the late severe group but reported a lower prevalence.

Building on previous research (Mishra & Dobson, 2012), VMS were dichotomised as either often present or absent (collapsed never, rarely, and sometimes). As night sweats are associated with sleep disturbances, and our data showed that night sweats were less common than hot flushes, we examined the symptom profiles of hot flushes and nightsweats separately using data from Surveys 1-9, when women were aged 45-73 years. Participants were also asked whether they sought help for VMS at age 45-64 years (in Surveys 1-6), and whether they were satisfied with the help that they received at age 47-58 years (in Surveys 2-4).

Hot flushes

Of the 4,459 women born 1946-51 who reported hot flushes at all nine surveys, 8.4% 'often' experienced hot flushes when aged 45-50 years. This prevalence peaked at age 50-58 years, with almost one in four women reporting hot flushes (Figure 9-6).

When aged 68-73 years, 5.8% of women ‘often’ experienced hot flushes. Across all nine surveys, nearly half (45.6%) the women born 1946-51 only reported experiencing hot flushes ‘sometimes’, ‘rarely’ or ‘never’.

A latent class analysis determined five symptom profiles of hot flushes, with the prevalence of hot flushes over time for each symptom profile presented in Figure 9-7. Overall, nearly two-thirds (62.6%) of women born 1946-51 only had minimal hot flushes throughout the survey period (i.e., from ages 45-50 to 68-73 years). The later onset group comprised over 20% of women, characterised by peaked prevalence of hot flushes at age 53-58 years or after, while the majority (17.4%) reported that their hot flushes had ceased by age 62-67 years. 5.9% were still experiencing hot flushes at age 68-73 years. Around 10% of women experienced hot flushes early at age 45-50, with the prevalence peaking at age 47-52 years, followed by a steady decline (early onset group). Finally, the persistent group,consisting of 3.3% of women, experienced hot flushes throughout the survey period.

The baseline demographic and health characteristics associated with the symptom profiles of hot flushes are shown in Table 9-1. Education level, income management difficulty, and cigarette smoking were significantly associated with the symptom groups in the multiple regression analysis (data not shown). Women with no formal qualifications were at higher risk of experiencing all symptom profiles other than minimal hot flushes, and had the highest likelihood of having persistent hot flushes (RRR 5.75, 95% CI 2.81-11.75). Women who reported always having difficulty managing on their available income were also more likely to experience persistent hot flushes (RRR 2.08, 95% CI 1.13-3.83), while current smokers were more likely to experience early onset hot flushes (RRR 1.90, 95% CI 1.35-2.66).

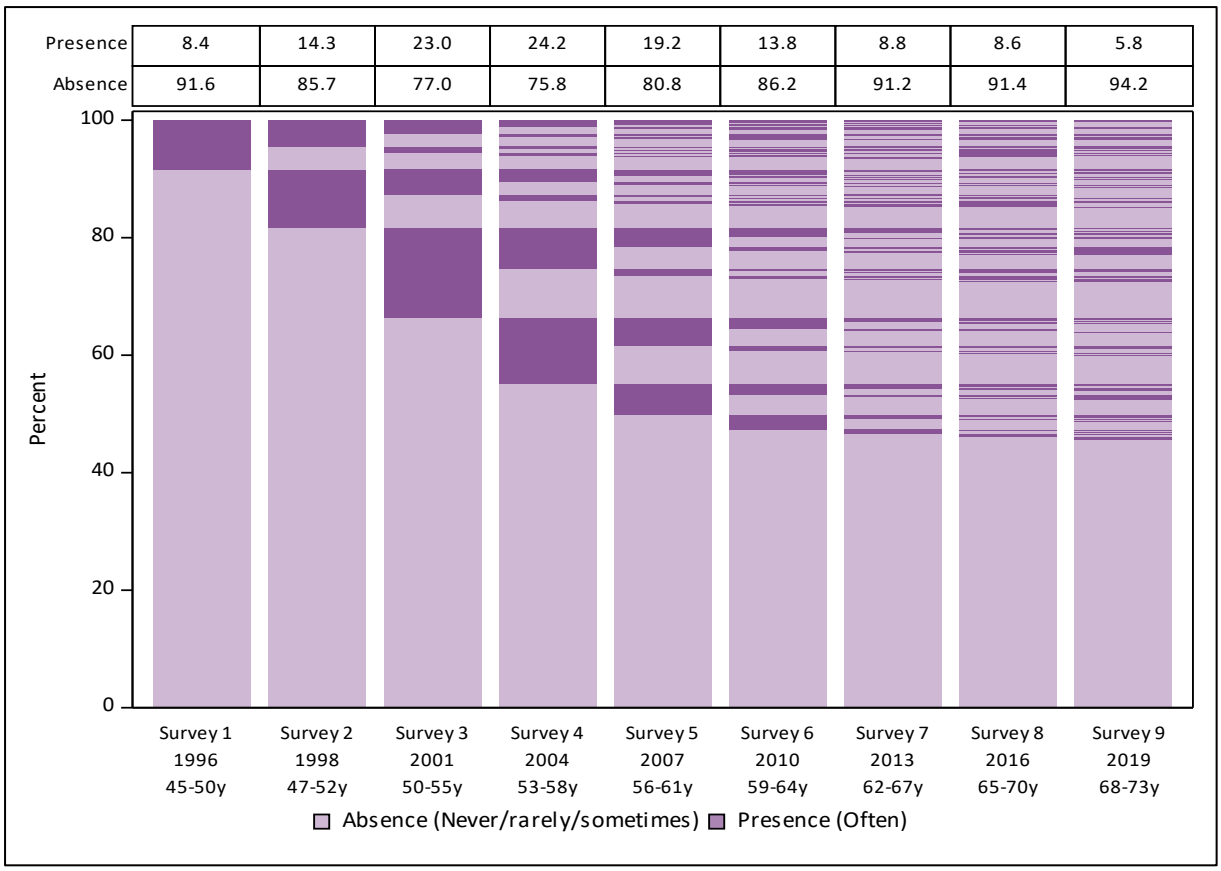


Figure 9-6 Prevalence of hot flushes over time (N = 4,459).

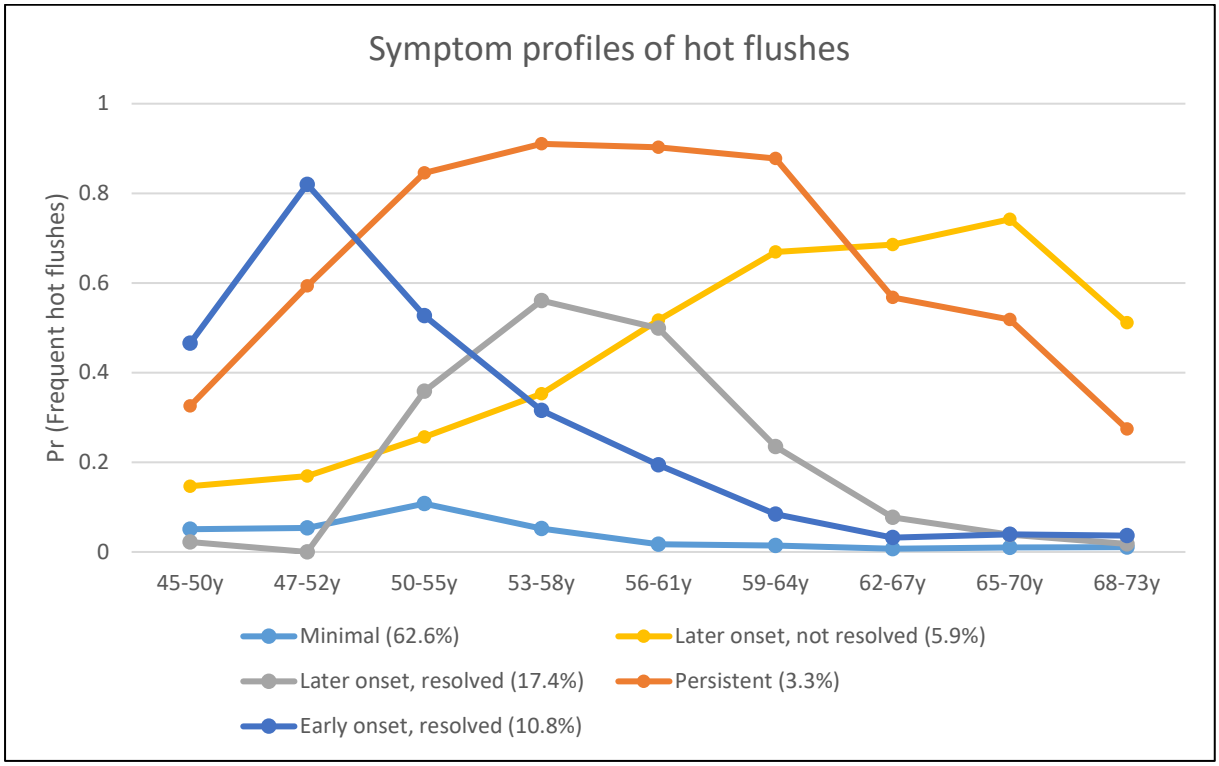


Figure 9-7 Symptom profiles of hot flushes, with the prevalence of hot flushes over time (N = 4,459).

Table 9-1 Baseline demographic and health characteristics associated with the symptom profiles of hot flushes (N = 4,131)

	Minimal hot flushes		Later onset, resolved		Early onset, resolved		Later onset, not resolved		Persistent hot flushes		Total	
	n	row %	n	row %	n	row %	n	row %	n	row %	n	col %
N	2,756		643		331		261		140		4,131	
Survey 1 Education status												
No formal qualification	268	55.6%	82	17.0%	59	12.2%	41	8.5%	32	6.6%	482	11.7%
Year 12 or less	1,309	65.2%	326	16.2%	167	8.3%	137	6.8%	69	3.4%	2,008	48.6%
Trade/Certificate	626	70.7%	127	14.3%	57	6.4%	48	5.4%	28	3.2%	886	21.4%
University degree or higher	553	73.2%	108	14.3%	48	6.4%	35	4.6%	11	1.5%	755	18.3%
Pearson chi2(12) = 68.2 Pr = 0.000												
Survey 1 Area of residence												
Major cities of Australia	989	67.6%	234	16.0%	112	7.7%	82	5.6%	45	3.1%	1,462	35.4%
Inner regional Australia	1,093	65.4%	249	14.9%	151	9.0%	116	6.9%	63	3.8%	1,672	40.5%
Outer regional Australia	539	67.7%	126	15.8%	53	6.7%	52	6.5%	26	3.3%	796	19.3%
Remote Australia	135	67.2%	34	16.9%	15	7.5%	11	5.5%	6	3.0%	201	4.9%
Pearson chi2(12) = 9.7 Pr = 0.641												

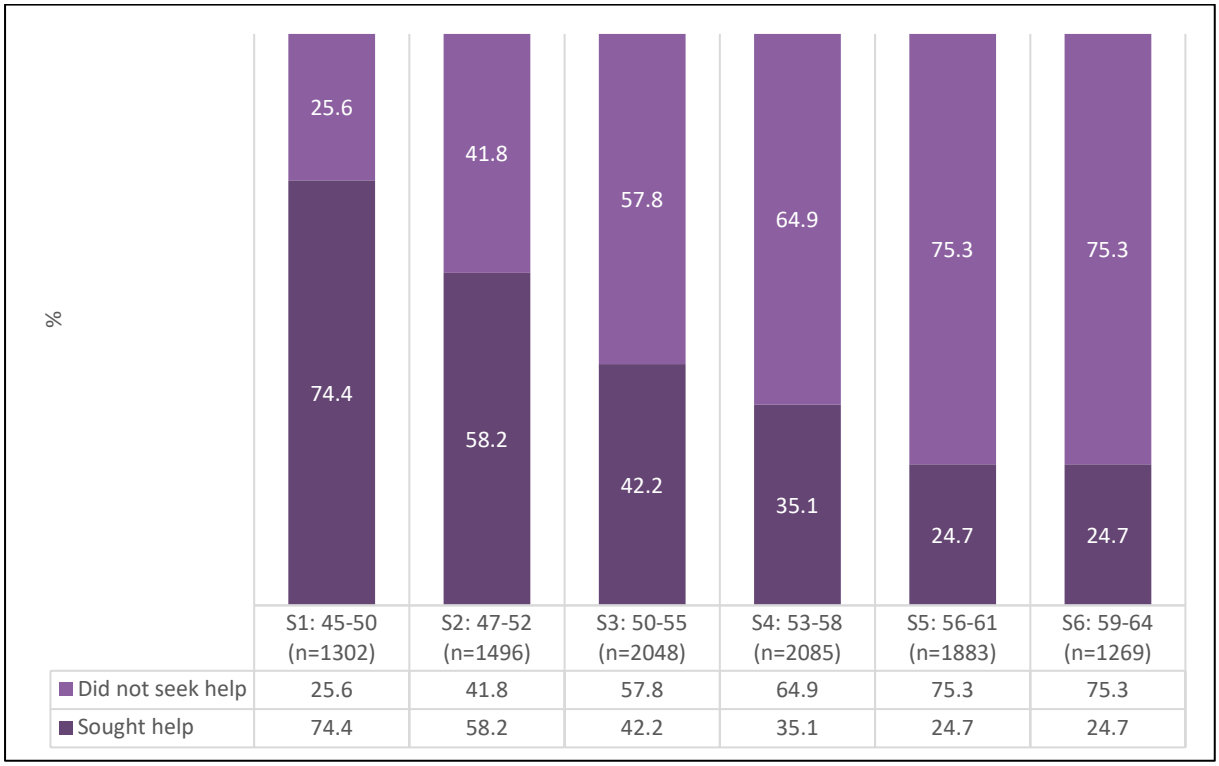
	Minimal hot flushes		Later onset, resolved		Early onset, resolved		Later onset, not resolved		Persistent hot flushes		Total	
	n	row %	n	row %	n	row %	n	row %	n	row %	n	col %
Survey 1 Marital status												
Married/De facto	2,357	66.7%	555	15.7%	282	8.0%	222	6.3%	119	3.4%	3,535	85.6%
Separated/Divorced	259	65.4%	57	14.4%	32	8.1%	32	8.1%	16	4.0%	396	9.6%
Widowed	52	64.2%	19	23.5%	6	7.4%	1	1.2%	3	3.7%	81	2.0%
Single	88	73.9%	12	10.1%	11	9.2%	6	5.0%	2	1.7%	119	2.9%
Pearson chi2(12) = 14.4 Pr = 0.274												
Survey 1 Income difficulty												
Easy	541	70.8%	107	14.0%	48	6.3%	46	6.0%	22	2.9%	764	18.5%
Not too bad	1,230	67.7%	286	15.7%	144	7.9%	109	6.0%	49	2.7%	1,818	44.0%
Difficult some of the time	702	64.9%	173	16.0%	91	8.4%	73	6.7%	43	4.0%	1,082	26.2%
Difficult all the time/impossible	283	60.6%	77	16.5%	48	10.3%	33	7.1%	26	5.6%	467	11.3%
Pearson chi2(12) = 24.9 Pr = 0.015												

	Minimal hot flushes		Later onset, resolved		Early onset, resolved		Later onset, not resolved		Persistent hot flushes		Total	
	n	row %	n	row %	n	row %	n	row %	n	row %	n	col %
Survey 1 BMI category (WHO)												
Healthy weight, <18.5 kg/m^2	1,567	66.7%	366	15.6%	171	7.3%	160	6.8%	85	3.6%	2,349	56.9%
Overweight, 25 to 29.9 kg/m^2	769	67.6%	172	15.1%	104	9.1%	59	5.2%	34	3.0%	1,138	27.5%
Obese, ≥30 kg/m^2	420	65.2%	105	16.3%	56	8.7%	42	6.5%	21	3.3%	644	15.6%
arson chi2(8) = 8.7 Pr = 0.371												
Survey 1 Smoking status												
Non-smoker	1,659	68.5%	363	15.0%	156	6.4%	151	6.2%	93	3.8%	2,422	58.6%
Ex-smoker	797	65.6%	200	16.5%	118	9.7%	67	5.5%	33	2.7%	1,215	29.4%
Current smoker	300	60.7%	80	16.2%	57	11.5%	43	8.7%	14	2.8%	494	12.0%
Pearson chi2(8) = 34.1 Pr = 0.000												
Survey 1 Alcohol status (NHMRC)												
Non-drinker	334	64.9%	72	14.0%	52	10.1%	32	6.2%	25	4.9%	515	12.5%
Rarely drinks	778	67.0%	182	15.7%	90	7.7%	72	6.2%	40	3.4%	1,162	28.1%

	Minimal hot flushes		Later onset, resolved		Early onset, resolved		Later onset, not resolved		Persistent hot flushes		Total	
	n	row %	n	row %	n	row %	n	row %	n	row %	n	col %
Low risk drinker	1,508	66.9%	370	16.4%	164	7.3%	141	6.3%	70	3.1%	2,253	54.5%
Risky/high risk drinker	136	67.7%	19	9.5%	25	12.4%	16	8.0%	5	2.5%	201	4.9%
Pearson chi2(12) = 21.6 Pr = 0.043												

Seeking help for hot flushes

Among women born 1946-51 who 'often' experienced hot flushes, almost three in four women sought help at age 45-50 years, and the proportion of those who sought help decreased over time to around 25% at age 59-64 years (Figure 9-8). Participants were also asked whether they were satisfied with the help they had received. Among those who 'often' experienced hot flushes and sought help, 20-25% reported not being satisfied with that help at age 47-58 years (Surveys 2-4).



	S1: 45-50 (n=1302)	S2: 47-52 (n=1496)	S3: 50-55 (n=2048)	S4: 53-58 (n=2085)	S5: 56-61 (n=1883)	S6: 59-64 (n=1269)
Did not seek help	25.6	41.8	57.8	64.9	75.3	75.3
Sought help	74.4	58.2	42.2	35.1	24.7	24.7

Figure 9-8 Seeking help among women who experienced hot flushes often.

Night sweats

Similar to hot flushes, the prevalence of night sweats peaked at age 50-58 years, but it was lower than that of hot flushes (16.9% vs 24.2%)(Figure 9-9). When aged 68-73 years, 4.1% of women still 'often' experienced night sweats. Across all nine surveys, more than half (57.6%) of women only reported experiencing night sweats 'sometimes', 'rarely', or 'never'.

The five symptom profiles of night sweats are presented in Figure 9-10, with the prevalence of night sweats over time for each symptom profile presented. Over 70% of women reported only having minimal night sweats throughout the survey period. The later onset group comprised over 15% of women, characterised by peaked prevalence of night sweats at age 53-58 years or after, while the majority (11.9%) ceased experiencing night sweats by age 62-67 years. 4.6% were still experiencing night sweats atage 68-73 years. Around 8% of women experienced nightsweats early at age 45-50, with the peak prevalence at age 47-52 years (early onset group). Finally, 3% of women reportedpersistent night sweats across surveys.

The baseline demographic and health characteristics of the women by symptom profiles of night sweats are presented in Table 9-2. In the multiple regression analysis, education level, income management difficulty, cigarette smoking, and BMI were the main factors associated with night sweats. Similar to hot flushes, women who did not have formal qualifications were at higher risk of experiencing all symptom profiles other than minimal night sweats, and had the highest likelihood of having early onset night sweats (RRR 4.06, 95% CI 2.31-7.12). Women who were in the obese category (RRR 1.54, 95% CI 1.06-2.23) and women who currently smoked (RRR 1.81, 95% CI 1.21-2.71) were also more likely to experience early onset night sweats. Women who currently smoked were twice (95% CI 1.35-3.20) as likely to have persistent night sweats. Women who reported they always had difficulty managing on their available income were more likely to experience later onset night sweats.

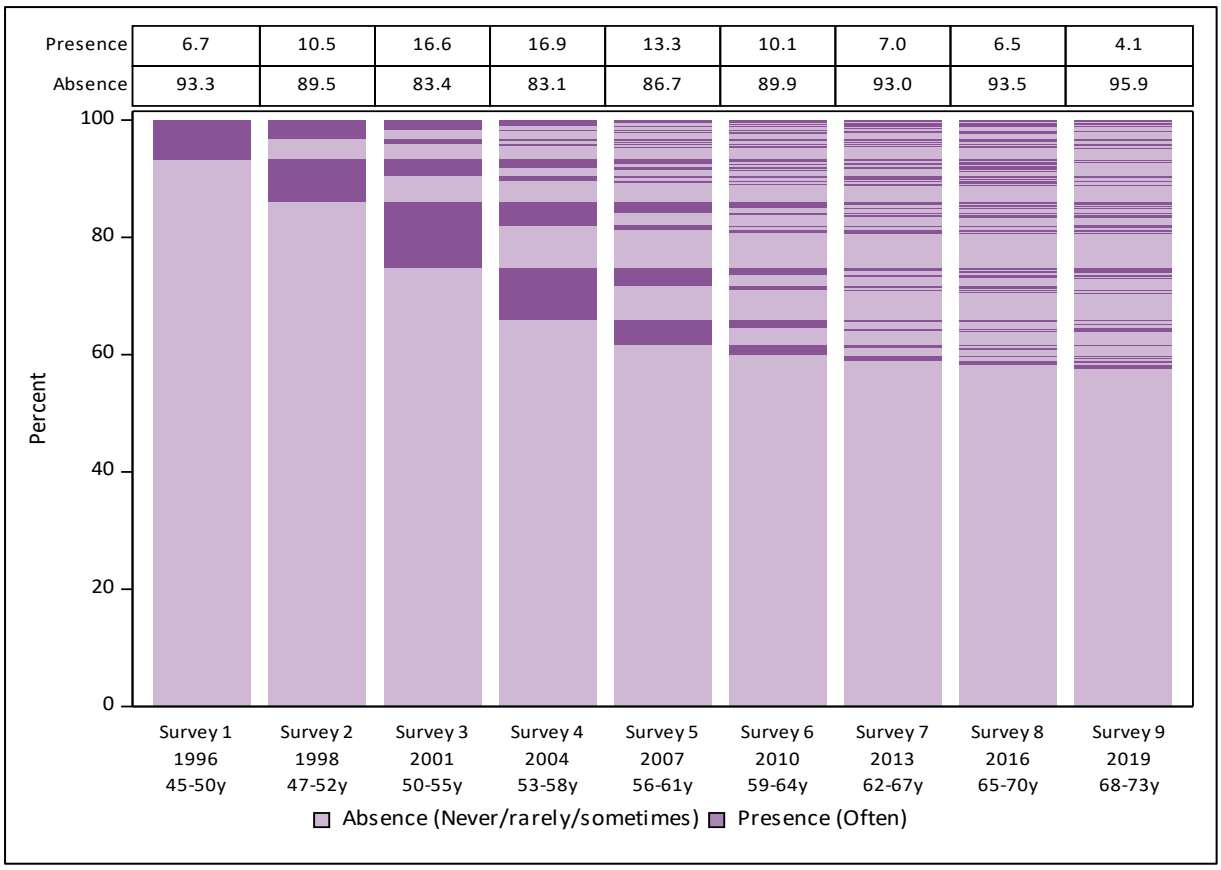


Figure 9-9 Prevalence of night sweats over time (N = 4,085).

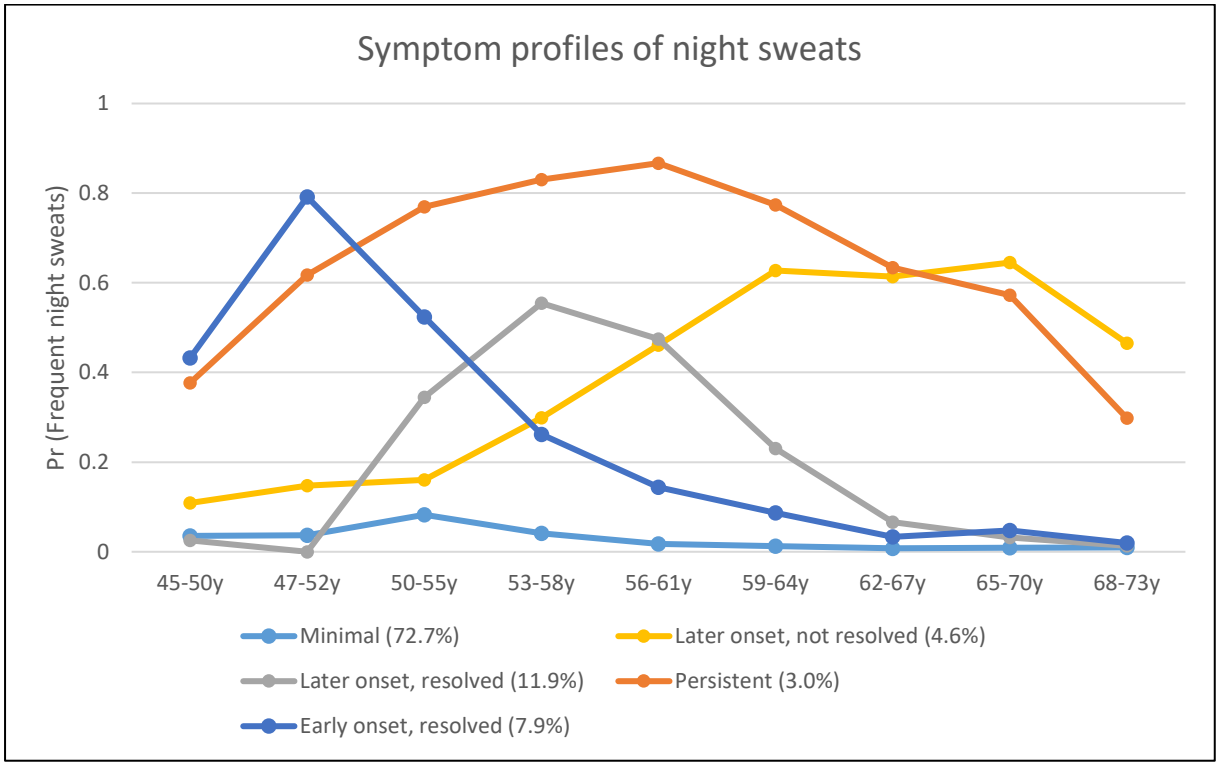


Figure 9-10 Symptom profiles of night sweats, with the prevalence of night sweats over time (N = 4,085).

Table 9-2 Baseline demographic and health characteristics associated with the symptom profiles of night sweats (N = 3,775)

	Minimal night sweats		Later onset, resolved		Early onset, resolved		Later onset, not resolved		Persistent night sweats		Total	
	n	row %	n	row %	n	row %	n	row %	n	row %	n	col %
N	2,909		389		203		167		107		3,775	
Survey 1 Education status												
No formal qualification	282	65.0%	55	12.7%	44	10.1%	25	5.8%	28	6.5%	434	11.5%
Year 12 or less	1,394	76.2%	199	10.9%	95	5.2%	88	4.8%	54	3.0%	1,830	48.5%
Trade/Certificate	650	80.6%	74	9.2%	44	5.5%	27	3.3%	11	1.4%	806	21.4%
University degree or higher	583	82.7%	61	8.7%	20	2.8%	27	3.8%	14	2.0%	705	18.7%
Pearson chi2(12) = 78.4 Pr = 0.000												
Survey 1 Area of residence												
Major cities of Australia	1,033	76.9%	145	10.8%	77	5.7%	50	3.7%	38	2.8%	1,343	35.6%
Inner regional Australia	1,186	77.6%	146	9.5%	81	5.3%	72	4.7%	44	2.9%	1,529	40.5%
Outer regional Australia	545	76.2%	78	10.9%	37	5.2%	37	5.2%	18	2.5%	715	18.9%
Remote Australia	145	77.1%	20	10.6%	8	4.3%	8	4.3%	7	3.7%	188	5.0%
Pearson chi2(12) = 5.9 Pr = 0.923												

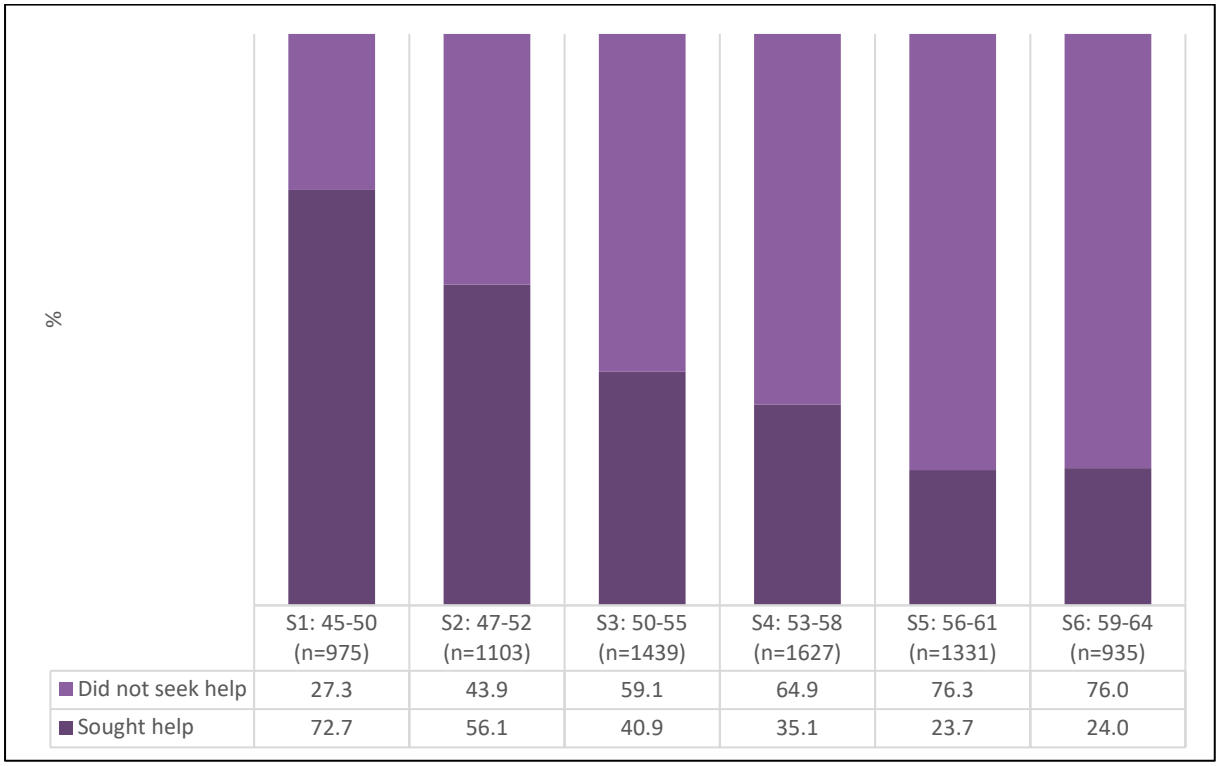
	Minimal night sweats		Later onset, resolved		Early onset, resolved		Later onset, not resolved		Persistent night sweats		Total	
	n	row %	n	row %	n	row %	n	row %	n	row %	n	col %
Survey 1 Marital status												
Married/Defacto	2,488	76.7%	344	10.6%	175	5.4%	142	4.4%	94	2.9%	3,243	85.9%
Separated/Divorced	273	78.0%	28	8.0%	17	4.9%	21	6.0%	11	3.1%	350	9.3%
Widowed	60	81.1%	9	12.2%	3	4.1%	2	2.7%	0	0.0%	74	2.0%
Single	88	81.5%	8	7.4%	8	7.4%	2	1.9%	2	1.9%	108	2.9%
Pearson chi2(12) = 11.7 Pr = 0.470												
Survey 1 Income difficulty												
Easy	565	80.8%	63	9.0%	28	4.0%	27	3.9%	16	2.3%	699	18.5%
Not too bad	1,290	78.1%	159	9.6%	94	5.7%	74	4.5%	34	2.1%	1,651	43.7%
Difficult some of the time	752	75.3%	117	11.7%	51	5.1%	43	4.3%	36	3.6%	999	26.5%
Difficult all the time/impossible	302	70.9%	50	11.7%	30	7.0%	23	5.4%	21	4.9%	426	11.3%
Pearson chi2(12) = 28.1 Pr = 0.005												

	Minimal night sweats		Later onset, resolved		Early onset, resolved		Later onset, not resolved		Persistent night sweats		Total	
	n	row %	n	row %	n	row %	n	row %	n	row %	n	col %
Survey 1 BMI category (WHO)												
Healthy weight, <18.5 kg/m^2	1,672	77.4%	218	10.1%	102	4.7%	105	4.9%	64	3.0%	2,104	55.7%
Overweight, 25 to 29.9 kg/m^2	791	77.7%	112	11.0%	54	5.3%	34	3.3%	27	2.7%	1,018	27.0%
Obese, ≥30 kg/m^2	446	74.8%	59	9.9%	47	7.9%	28	4.7%	16	2.7%	596	15.8%
Pearson chi2(8) = 13.9 Pr = 0.085												
Survey 1 Smoking status												
Non-smoker	1,738	78.7%	226	10.2%	103	4.7%	82	3.7%	60	2.7%	2,209	58.5%
Ex-smoker	847	77.1%	107	9.7%	62	5.6%	50	4.6%	32	2.9%	1,098	29.1%
Current smoker	324	69.2%	56	12.0%	38	8.1%	35	7.5%	15	3.2%	468	12.4%
Pearson chi2(8) = 27.7 Pr = 0.001												
Survey 1 Alcohol status (NHMRC)												
Non-drinker	350	74.8%	46	9.8%	33	7.1%	23	4.9%	16	3.4%	468	12.4%
Rarely drinks	787	76.1%	115	11.1%	60	5.8%	43	4.2%	29	2.8%	1,034	27.4%

	Minimal night sweats		Later onset, resolved		Early onset, resolved		Later onset, not resolved		Persistent night sweats		Total	
	n	row %	n	row %	n	row %	n	row %	n	row %	n	col %
Low risk drinker	1,634	78.6%	208	10.0%	96	4.6%	87	4.2%	55	2.6%	2,080	55.1%
Risky/high risk drinker	138	71.5%	20	10.4%	14	7.3%	14	7.3%	7	3.6%	193	5.1%
Pearson chi2(12) = 14.5 Pr = 0.269												

Seeking help for night sweats

Similar to hot flushes, of women born 1946-51 who 'often' experienced night sweats, almost three in four women sought help when aged 45-50 years, and the proportion of women who sought help decreased over time to 24% at age 59-64 years (Figure 9-11). Among the women who 'often' experienced night sweats and sought help, 20-30% reported not being satisfied with that help at Surveys 2 to 4, when aged 47-58 years.



	S1: 45-50 (n=975)	S2: 47-52 (n=1103)	S3: 50-55 (n=1439)	S4: 53-58 (n=1627)	S5: 56-61 (n=1331)	S6: 59-64 (n=935)
Did not seek help	27.3	43.9	59.1	64.9	76.3	76.0
Sought help	72.7	56.1	40.9	35.1	23.7	24.0

Figure 9-11 Seeking help among women who experienced night sweats often.

9.5.3 1973-78 cohort

Hot flushes

Of women who completed both Surveys 7 and 8 (aged 37-45 years; N = 6,158), less than 3% reported that they 'often' experienced hot flushes. Although the prevalence was steady between the surveys (Survey 7: 1.5%; Survey 8: 2.3%), help-seeking

among those who 'often' experienced hot flushes rose from 30.7% in Survey 7 to 41.3% in Survey 8 (Figure 9-12).

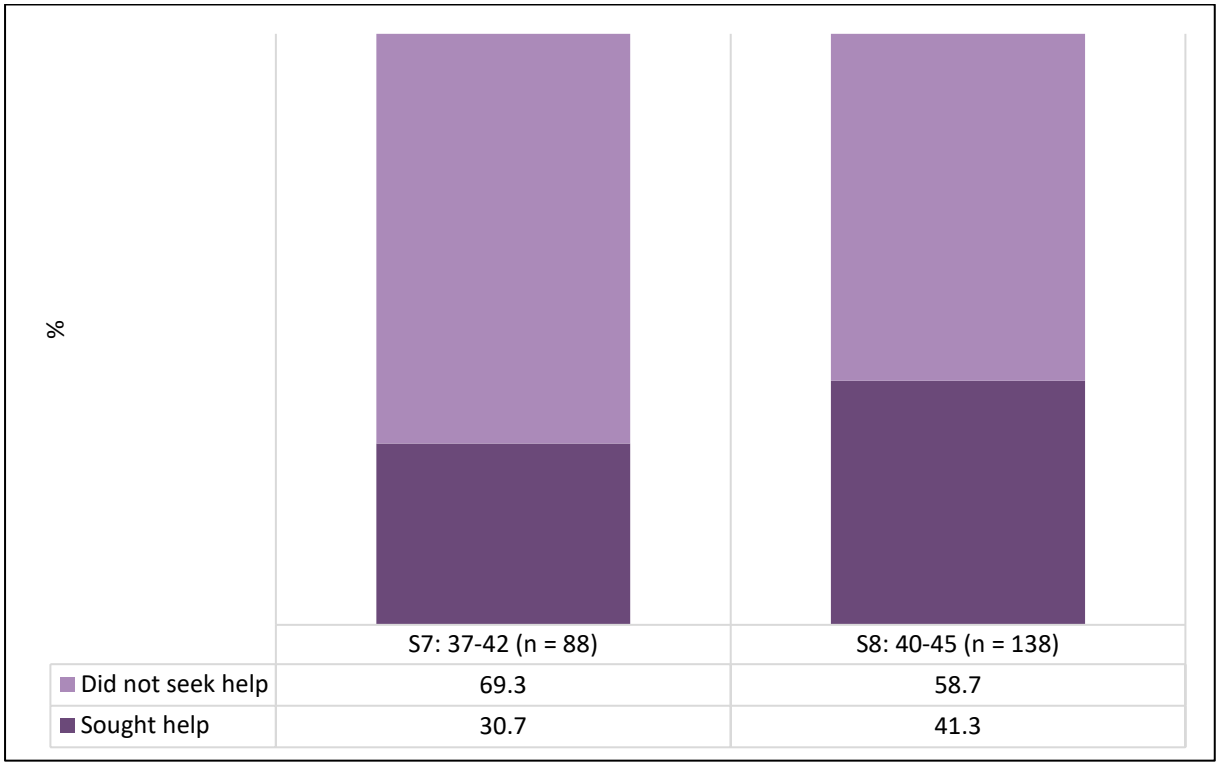


Figure 9-12 Seeking help among women who experienced hot flushes often.

Night sweats

The prevalence of night sweats was similar to that of hot flushes. Of women who completed both Surveys 7 and 8 (aged 37-45 years), only 3% or fewer reported that they 'often' experienced night sweats (Survey 7: 2.1%; Survey 8: 2.7%). Help-seeking among those who 'often' experienced night sweats was similar at both surveys, at approximately 31% (Figure 9-13).

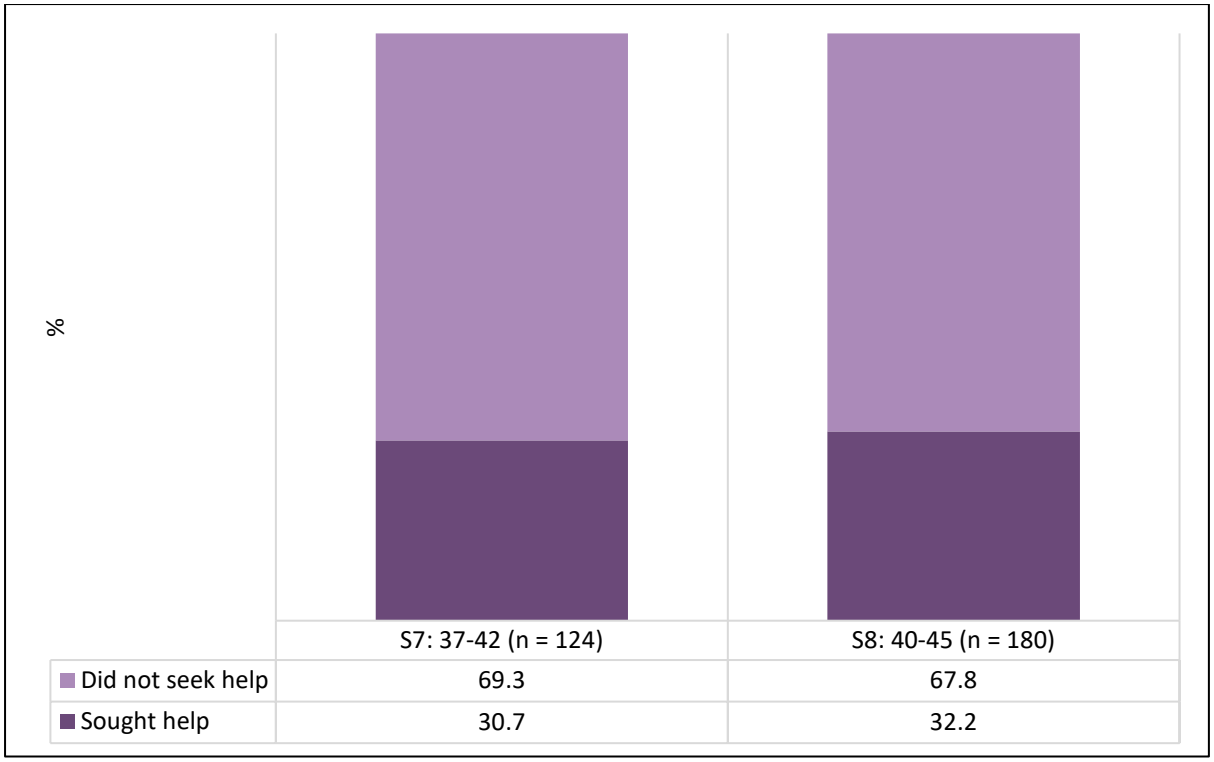


Figure 9-13 Seeking help among women who experienced night sweats often.

9.5.4 Previous research: predictors of vasomotor symptoms

Although menopause-related hormonal changes are associated primarily with VMS, previous ALSWH and InterLACE studies have shown that certain lifestyle factors (Anderson et al., 2020) and diet (Dunneram et al., 2019; Herber-Gast & Mishra 2013) were also associated with the frequency and severity of VMS.

- Obesity was associated with a 60% (95% CI 1.41-1.78) increased risk of experiencing often/severe VMS, compared with normal weight. Women who smoked were 80% (95% CI 1.45-2.30) more likely to experience often/severe VMS, compared with women who never smoked (Anderson et al., 2020).

- Women who quit smoking before 40 years had a similar level of risk of VMS as those who had never smoked (Anderson et al., 2020).

- Frequent (daily or weekly) consumption of soy products (OR 0.63, 95% CI 0.45-0.89) but not soy milk (OR 1.11, 95% CI 0.85-1.45) was associated with a lower likelihood of reporting subsequent VMS (Dunneram et al., 2019).

- A higher consumption of fruit (OR 0.81, 95% CI 0.71-0.93) or a Mediterranean diet (OR 0.80, 95% CI 0.69-0.92) were both associated with a decreased risk of reporting VMS, whereas a high fat and high sugar diet was associated with an increased risk of reporting VMS (OR 1.23, 95% CI 1.05-1.44), when comparing the top 20% with the bottom 20% of dietary intakes (Herber-Gast & Mishra, 2013).

9.5.5 Previous research: VMS and risk of chronic conditions

- Greater severity of VMS, rather than frequency, was associated with a higher risk of CVD. Women who reported experiencing both hot flushes and night sweats had a higher risk of CVD (HR 1.55, 95% CI 1.24-1.94) than those with hot flushes alone (HR 1.33, 95% CI 0.94-1.88) or night sweats alone (HR 1.32, 95% CI 0.84-2.07) (Zhu et al., 2020b).

- Compared with women without VMS, those with either early onset (before menopause) or late onset VMS (after menopause) had an increased risk of CVD, with a slightly higher risk in the late onset group (HR 1.69, 95% CI 1.32-2.16) than in the early onset group (HR 1.38, 95% CI 1.10-1.75) (Zhu et al., 2020b).

- Women who experienced often/severe VMS were more likely to have concurrent (OR 2.59, 95% CI 2.35-2.85) and subsequent depressed mood (OR 1.56, 95% CI 1.27-1.92), compared with those without VMS. This association may be largely explained by sleeping difficulties (Chung et al., 2018).

9.6 MHT

9.6.1 1946-51 cohort

At each survey, participants were asked whether they were currently undergoing MHT. The use of MHT peaked at age 50-55 (Survey 3 in 2001), with one third (32.6%) of women taking MHT (Figure 9-14). When aged 68-73 years, 7.3% of women were still taking MHT. Half (50.6%) of women did not take MHT throughout the survey period.

Among women who were taking MHT at age 45-50, more than half (52.4%) reported a hysterectomy and/or bilateral oophorectomy.

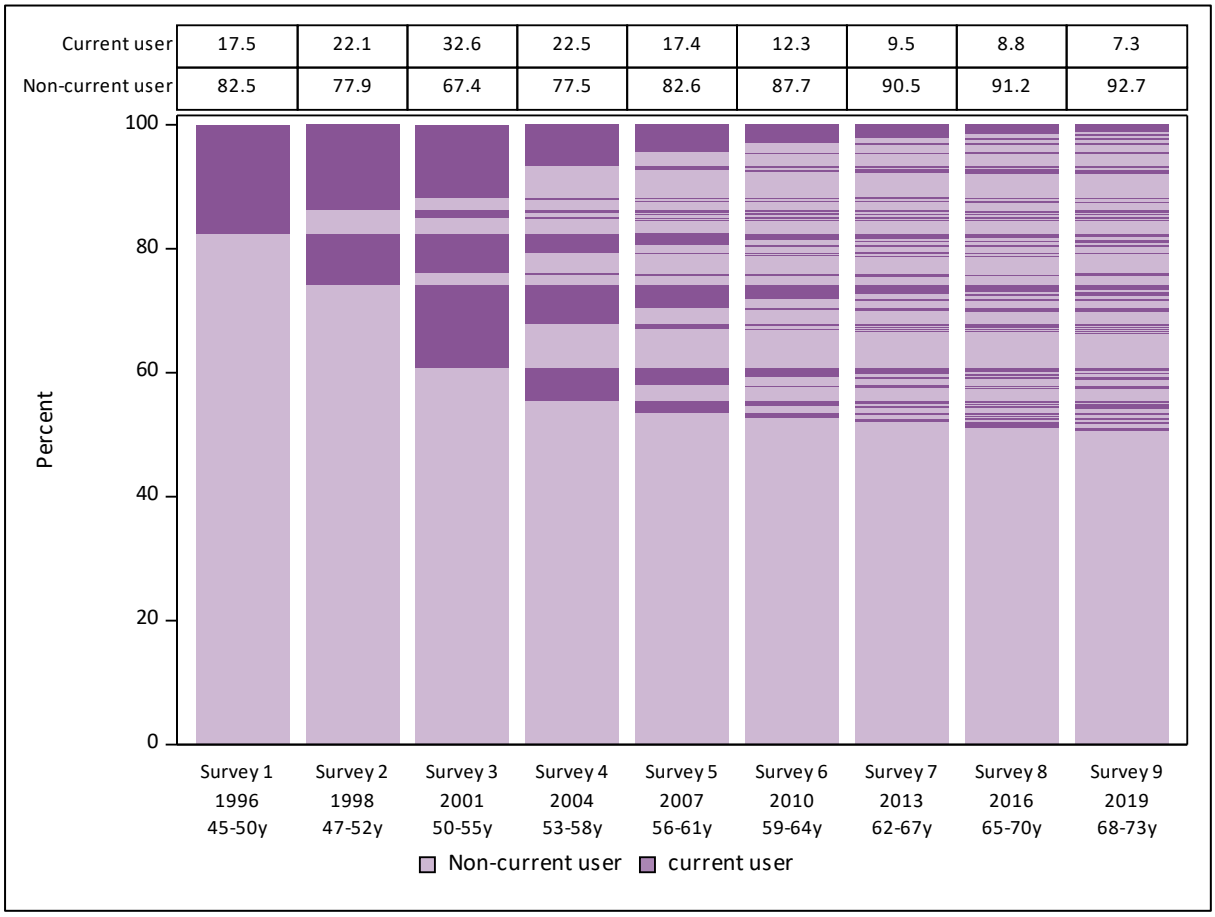


Figure 9-14 Use of MHT over time (N = 6,021).

9.6.2 1973-78 cohort

At Survey 8, when aged 40-45 years, only 1.4% (N = 102) of women born 1973-78 reported they were currently taking MHT. Of these, 40.2% (N = 41) reported a hysterectomy and/or bilateral oophorectomy. Of those who reported 'often' experiencing hot flushes, 11.9% (N = 20) were taking MHT, and of those who reported 'often' experiencing night sweats, 7.8% (N = 17) were taking MHT.

9.7 Conclusion

These findings provide robust evidence that an earlier age at menopause (<45 years) and surgical menopause (bilateral oophorectomy) are associated with adverse health outcomes in later life, especially CVD. Hot flushes and night sweats were also linked to CVD. Women with early menopause, having had a hysterectomy and/or oophorectomy, and experiencing frequent/severe vasomotor symptoms need early screening tests (e.g., blood pressure, lipids, blood glucose) for monitoring cardiovascular health before age 60. Age and type of menopause should be considered as an important factor when assessing CVD risk for women. Removal of normal ovaries at the time of hysterectomy should not be recommended before age 50, except in women at high inherited risk of ovarian cancer.

Some modifiable lifestyle factors may reduce the risk of early menopause and mitigate vasomotor symptoms. Maintaining a normal weight before the menopausal transition and quitting smoking early, preferably before the age of 30, may mitigate the excess risk of early menopause and vasomotor symptoms.

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