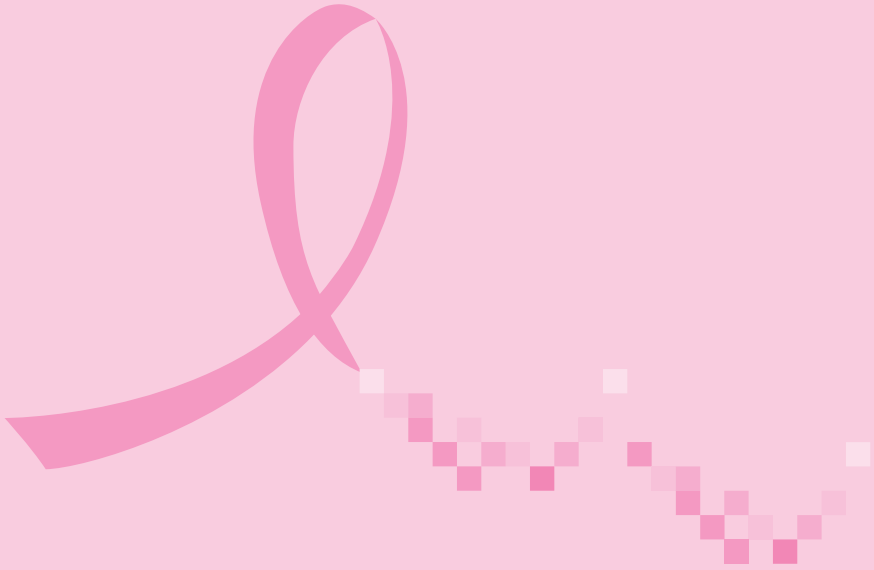

CHAPTER 1

PREVENTION AND EARLY DETECTION OF BREAST CANCER

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PREVENTION AND EARLY DETECTION OF BREAST CANCER

This chapter reviews patient demographics, socioeconomic status and lifestyle of Hong Kong breast cancer patients through analysis drawn from data collected from patients registered at the Hong Kong Breast Cancer Registry (HKBCR), consisting of 12,053 patients. Through this, identification of key factors that contribute to increased risk of breast cancer and insight into potential risk factors that contribute to increasing incidence rate of breast cancer observed in Hong Kong may be achieved.

KEY FINDINGS

- The mean age of diagnosis of patients was 50.9 years (standard deviation: 10.4 years) and median was 49.6 years
- Breast cancer occurrence was highest among the 40-49 age group (38.5%)
- The top 10 most common known risk factors in the HKBCR patient cohort were
  - Lack of exercise (<3 hours/week) (76.9%)
  - No breastfeeding (65.5%)
  - High level of stress (> 50% of the time) 37.3%)
  - Being overweight/obese (37.0%)
  - No childbirth / delayed child birth (first live birth after age 35) (24.2%)
  - Meat rich or dairy products rich diet (14.4%)
  - Family history of breast cancer (14.3%)
  - Early menarche (<12 years old) (13.4%)
  - Use of hormone replacement therapy (5.2%)
  - Night shift (5.0%)
- Screening Habits
  - Less than 25% of patients in all age groups conducted regular breast self examination.
  - Less than 45% of patients in all age groups attended regular clinical breast examination, and less than 25% of patients in all age groups had regular mammography screening (MMG) or breast ultrasound screening (USG).
  - In general, the number of patients who never conducted breast self-examination or clinical breast examination was positively correlated to increasing age, with the exception of the under 40s age group.

1.1 Demographics

Age distribution in each breast cancer population group differs significantly[2-4]. It is therefore important to analyze age distribution individually for each population group.

The analysis of age distribution data showed that although the age of patients with breast cancer ranged from 18.8 to 101.5 years, the relative frequency of breast cancer was highest among the 40-49 age group (38.5%), followed by the 50-59 age group (30.5%) (Figure 1.1). The mean age of diagnosis was 50.9 years with a standard deviation of 10.4 years, and median age of diagnosis was 49.6 years.

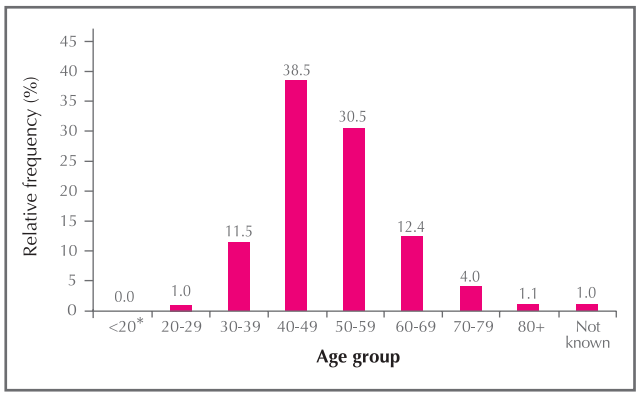

Figure 1.1 Distribution of age at diagnosis (N=12,053)

* 2 patients belonged to the <20 age group.

The patient cohort occupation status analysis showed that 57.1% of patients were employed or self-employed. A higher proportion of patients had a professional/clerical occupation (31.3%) than non-clerical/labour occupation (23.3%) (Figure 1.2). The average working hours of the patient cohort was 46.4 hours per week with a standard deviation of 14.4 hours per week.

It has been hypothesized that night shift work with increased artificial light exposure at night is associated with breast cancer and many studies have studied this association[5-9]. Shift work has been classified as "probably carcinogenic" to humans by the International Agency for Research on Cancer (IARC) in 2007. However a recent dose-response analysis of published observational data found no association between sleep duration, disruption of circadian rhythm and breast cancer[10]. Therefore the risk of breast cancer associated with night shift remains controversial.

Of the patient cohort, 577 (8.4%) of patients were carrying out night shifts before diagnosis with a median frequency of night shifts of 84 nights per year.

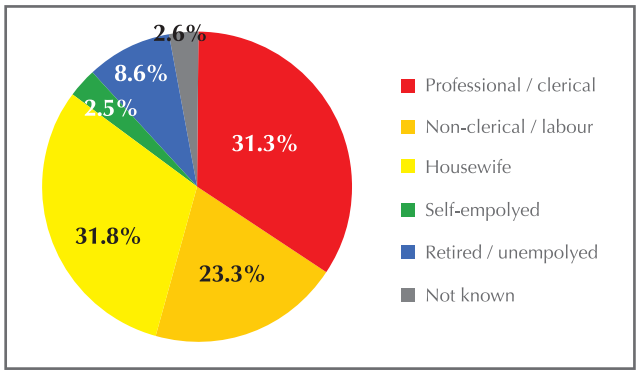

Figure 1.2 Occupation of the patients (N=12,053)

69.6% of the patients were educated to secondary school or above, while 29.3% of patients were educated to primary school level or below (Figure 1.3). 35.2% of patients had a monthly household income of 30,000 HKD or higher, while 20.7% of patients had a monthly household income less than 10,000 HKD (Figure 1.4).

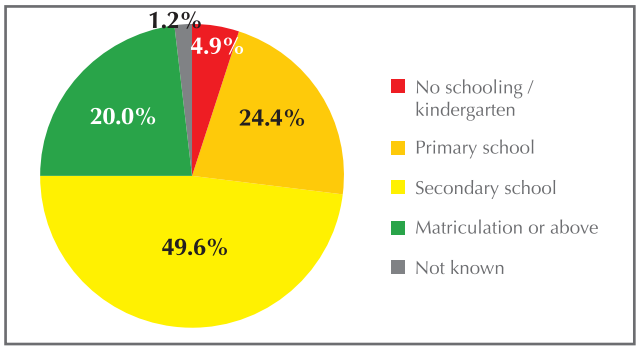

Figure 1.3 Education level of the patients (N=12,053)

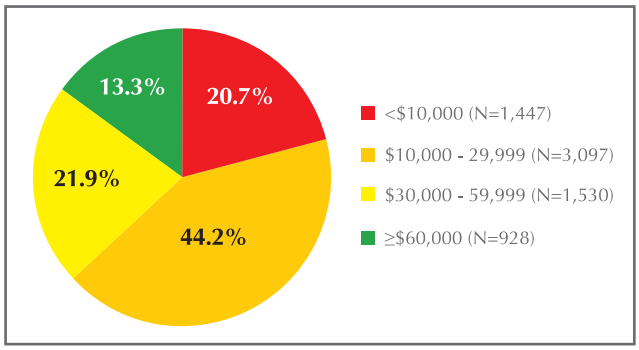

Figure 1.4 Monthly household income of the patients (HKD) (N=7,002)

56.2% of the patient cohort resided in the New Territories, while 23.3% resided in Kowloon, and 16.0% resided on Hong Kong Island (Figure 1.5).

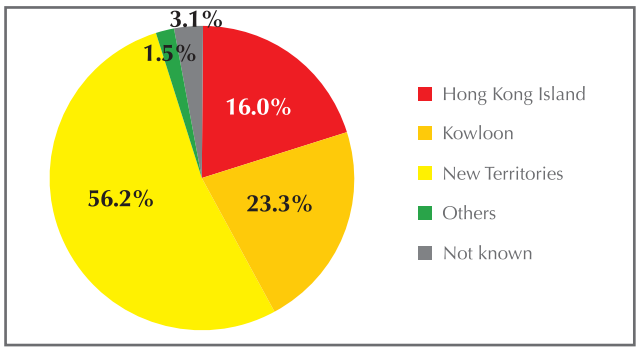

Figure 1.5 Distribution of residential districts of the patients (N=12,053)

The most common bra size among the patients was 34 inches (24.8%, Figure 1.6) and cup B or smaller (52.9%, Figure 1.7).

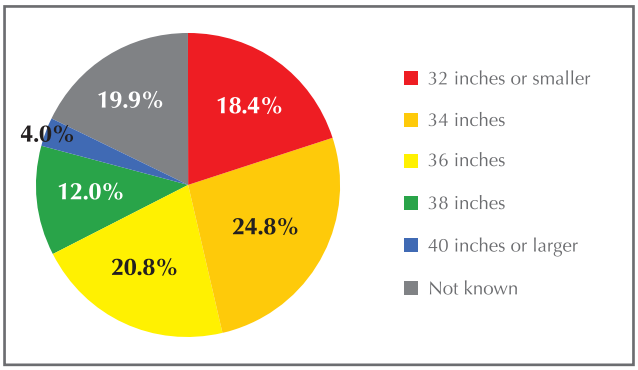

Figure 1.6 Bra size of the patients (N=12,053)

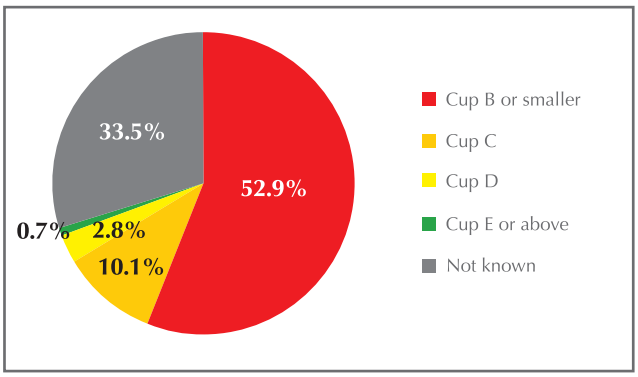

Figure 1.7 Bra cup size of the patients (N=12,053)

1.2 Risk factors and health background

1.2.1 Smoking

Smoking and alcohol drinking are known factors that increase the risk of breast cancer.

Many studies have studied the effect of smoking on breast cancer with inconclusive results[11]. Recent studies have shown a significant increased risk of postmenopausal breast cancer[12], and increased risk of ER positive breast cancer in active smoking young women[13]. Of the patients in the cohort, 4.5% were smokers smoking for a mean duration of 18.3 years with a standard deviation of 10.9 years. These patients smoked at a rate of 3.6 cigarette packs per week with a standard deviation of 3.1 packs per week. 45.0% of these patients had quit smoking, and had quit for 6.8 years (with a standard deviation of 8.3 years) at the time of diagnosis.

1.2.2 Alcohol drinking

The International Agency for Research on Cancer considers alcohol to be causally related to invasive breast cancer[14]. 4.7% of patients drank alcohol, with a mean duration of 14.6 years and standard deviation of 10.4 years. The average consumption of alcohol was 4.5 glasses per week. The most commonly consumed alcoholic beverage was red wine (28.3%), beer (23.7%) and beer and red wine (14.1%). 14.6% of patients had stopped drinking at the time of diagnosis.

1.2.3 Dietary and exercise habits and stress level

68.2% of patients ate a balanced diet, while 14.4% of patients ate a meat rich/dairy product rich diet. 45.6% of patients never exercised, while 31.3% of patients exercised less than 3 hours per week. 37.3% of patients experienced high levels of stress, while 27.9% of patients had moderate volume of stress (Table 1.1).

Table 1.1 Dietary habits, exercise habits and stress level at the time of diagnosis (N=12,053)

	Number	(%)
Dietary habit		
Meat rich / dairy product rich	1,739	(14.4)
Vegetable rich / Vegetarian	1,647	(13.7)
Balanced diet	8,219	(68.2)
Not known	448	(3.7)
Exercise		
Never	5,495	(45.6)
< 3 hours per week	3,774	(31.3)
≥ 3 hours per week	2,678	(22.2)
Not known	106	(0.9)
Stress level		
High level*	4,497	(37.3)
Moderate level**	3,365	(27.9)
Low level	4,026	(33.4)
Not known	165	(1.4)

* High level: defined as more than 50% of the time

** Moderate level: defined as 25-50% of the time

1.2.4 Height, Weight and Body Mass Index

Body mass index (BMI) is a heuristic method of estimating human body fat based on an individual's height and weight. The average height of the patient cohort was 157.8cm with a standard deviation of 5.6cm while the average weight was 56.8kg with a standard deviation of 9.1 kg.

Increased BMI has been shown to be a risk factor for breast cancer particularly in postmenopausal women[15-16]. Renehan et al reported a 12% increase in relative risk of postmenopausal breast cancer for every 5 kg/m^2 increase in BMI[17]. Although 42.9% of patients had a normal BMI, 37.1% of patients were overweight or obese (Table 1.2).

Table 1.2 Body mass index at the time of diagnosis (N=12,053)

BMI	Number	(%)
≥ 25.0 (Obese)	2,443	(20.3)
23.0-24.9 (Overweight)	2,019	(16.8)
18.5-22.9 (Normal weight)	5,172	(42.9)
< 18.5 (Underweight)	848	(7.0)
Not known	1,571	(13.0)

1.2.5 Family history of breast cancer

Family history of breast cancer is a known important risk factor of breast cancer. Increasing number of relatives with breast cancer has been shown to be associated with increased risk of breast cancer. 14.3% of patients had a family history of breast cancer, and 84.3% of patients had no family history of breast cancer (Table 1.3).

Table 1.3 Family history of patient cohort at the time of diagnosis (N=12,053)

Family history of breast cancer	Number	(%)
No	**10,157**	**(84.3)**
Yes		
First-degree relative(s)	1,205	(10.0)
Non first-degree relative(s)	488	(4.0)
Details not known	35	(0.3)
Family history not known	**168**	**(1.4)**

1.2.6 Personal history of tumours

17.2% of patients had a previous history of tumours, however only 2% had previous history of malignant tumours (Table 1.4). Of these patients, the most frequent malignant tumours were thyroid cancer (12.9%) and colorectal cancer (11.2%) (Table 1.5).

Table 1.4 Personal histories of tumours of the patient cohort at the time of diagnosis (N=12,053)

History of tumours	Number	(%)
No	9,668	(80.2)
Benign tumour	1,772	(14.7)
Malignant tumour	241	(2.0)
Nature of previous tumours not known	57	(0.5)
History of tumours not known	315	(2.6)

Table 1.5 Types of malignant tumours reported by the patients (N=241)

Type of malignant tumours	Number	(%)
Thyroid cancer	31	(12.9)
Colorectal cancer	27	(11.2)
Uterine cancer	18	(7.5)
Cervical cancer	14	(5.8)
Lymphoma	7	(2.9)
Ovarian cancer	7	(2.9)
Nasopharyngeal cancer	6	(2.5)
Lung cancer	5	(2.1)
Intestinal cancer	4	(1.7)
Urological cancer	4	(1.7)
Liver cancer	3	(1.2)
Skin cancer	3	(1.2)
Stomach cancer	3	(1.2)
Bone cancer	2	(0.8)
Esophagus cancer	2	(0.8)
Leukemia	2	(0.8)
Medullary	2	(0.8)
Sigmoid Cancer	2	(0.8)
Tongue cancer	2	(0.8)
Others*	6	(2.5)
Not known	98	(40.7)

* Others include: brain cancer, fallopian tube cancer, nasal cancer, neck cancer, parotid gland cancer, and salivary gland cancer.

1.2.7 History of benign breast disease

Benign breast disease is common among young women of reproductive age. While most benign breast diseases are not a cause for concern, some conditions such as atypia and papillomatosis are known risk factors of breast cancer. The magnitude of associated risk of breast cancer is dependent on the type of lesion[18-20]. Of the patients, 15.1% of patients had previous history of breast disease. Of the patients with benign breast disease, 1% had atypia and only 0.2% had papillomatosis (Table 1.6).

Table 1.6 History of breast disease at the time of diagnosis

	Number	(%)
History of previous breast disease	1,814	(15.1)
Type of previous breast disease		
Fibroadenoma	828	(45.6)
Fibrocystic disease	117	(6.4)
Papilloma	28	(1.5)
Papillomatosis	3	(0.2)
Atypia	18	(1.0)
Others (Gynaecomastia, other benign tumours)	836	(46.1)

1.2.8 Early menarche, late menopause and reproductive history

Reproductive factors such as early age at menarche, late onset of menopause, older age at first birth or no child birth, no breast feeding and parity are factors associated with increased risk of breast cancer[21-22]. Menarche to first pregnancy represents a window where the breast is particularly vulnerable to carcinogenesis[23]. In the patient cohort, the mean age at menarche was 13.3 years, and the mean age of menopause was 49.3 years.

13.4% of patients experienced early menarche. 48.6% of patients were postmenopausal women and among them, 4.5% experienced late menopause. 21.1% of patients did not experience child birth, and 4% of patients had their first child after the age of 35. Of the patients that had children, the mean age of first live birth was 26.8 years (Table 1.7). Number of live births is shown in Table 1.8.

65.5% of patients did not breastfeed (Table 1.7). The average duration of breast feeding was 15.4 months with a standard deviation of 21.3 months, and range of 0.1 month to 252 months.

Table 1.7 Early menarche, late menopause and reproductive history at the time of diagnosis

	Number	(%)
Menarche (N=12,053)		
Early menarche (<12 years of age)	1,617	(13.4)
Normal menarche (≥ 12 years of age)	9,609	(79.7)
Not known	827	(6.9)
Menopause (N=5,861)		
Late menopause (>55 years of age)	264	(4.5)
Normal menopause (≤ 55 years of age)	4,764	(81.3)
Age at menopause not known	833	(14.2)
Reproductive history (N=11,616)		
No childbirth	2,447	(21.1)
First childbirth at early stage (≤ 35 years of age)	8,425	(72.5)
First childbirth at late age (>35 years of age)	469	(4.0)
Age at first live birth not known	275	(2.4)
Breastfeeding (N=12,053)		
Yes	3,677	(30.5)
No (Had childbirth)	5,392	(44.7)
No (No childbirth)	2,443	(20.3)
No (Reproductive history not known)	64	(0.5)
Not known	477	(4.0)

Table 1.8 Number of live births reported by patients (N=9,169)

No. of live births	Number	(%)
1	2,453	(26.8)
2	4,109	(44.8)
3	1,612	(17.6)
4	565	(6.2)
5	208	(2.3)
6	100	(1.1)
7	36	(0.4)
8	12	(0.1)
10+	7	(0.1)
Not known	67	(0.7)

1.2.9 Use of oral contraceptives

The use of oral contraceptives and its association to breast cancer risk is an area of controversy and requires further investigation. Of the patients, 32.8% used oral contraceptives, among which 12.4% of patients used oral contraceptives for more than 5 years (Table 1.9).

Table 1.9 Use of oral contraceptives at the time of diagnosis (N=12,053)

OC use	Number	(%)
Non-user	7,692	(63.8)
OC use < 5 years	1,859	(15.4)
OC use 5-10 years	1,049	(8.7)
OC use > 10 years	444	(3.7)
Length of OC use not known	598	(5.0)
Not known if OC was used	411	(3.4)

OC: Oral contraceptives

1.2.10 Use of hormone replacement therapy

Hormone replacement therapy (HRT) is used to provide relief from symptoms of menopause. HRT use is associated with increased risk of breast cancer in women[24-25]. Only one-tenth (10.7%) of the postmenopausal patients used HRT in which 3.6% of patients used HRT for over 5 years (Table 1.10).

Table 1.10 Use of hormone replacement therapy (by post-menopausal patients) at the time of diagnosis (N=5,861)

HRT use	Number	(%)
Non-user	5,003	(85.4)
HRT use < 5 years	340	(5.8)
HRT use 5-10 years	182	(3.1)
HRT use > 10 years	31	(0.5)
Length of HRT use not known	75	(1.3)
Not known if HRT was used	230	(3.9)

HRT: Hormone replacement therapy

1.2.11 The ten most common risk factors associated with breast cancer in the patient cohort

Many risk factors are associated with increased risk of breast cancer. Of the risk factors studied in the Hong Kong Breast Cancer Registry, lack of exercise (76.9%) was the most common risk factor in the patient cohort, followed by lack of breastfeeding (65.5%) and high stress levels (37.3%) (Table 1.11).

Multiple risk factors result in accumulated increased risk of breast cancer. 59.7% of patients had 3 or more risk factors (Figure 1.8).

Table 1.11 The ten most common risk factors in the patient cohort (N=12,053)

Risk factor	Number	(%)
Lack of exercise (<3hrs / week)	9,269	(76.9)
No breastfeeding	7,899	(65.5)
High level of stress (>50% of time)	4,497	(37.3)
Being overweight / obese	4,462	(37.0)
No childbirth / First live birth after age 35	2,916	(24.2)
Diet rich in meat / dairy products	1,739	(14.4)
Family history of breast cancer	1,728	(14.3)
Early menarche (<12 years old)	1,617	(13.4)
Use of hormonal replacement therapy	628	(5.2)
Night shift*	599	(5.0)

* Night shift was defined as having duties during 23:00-06:00, and having more than a night in a year was also regarded as "Night shift" in the above table.

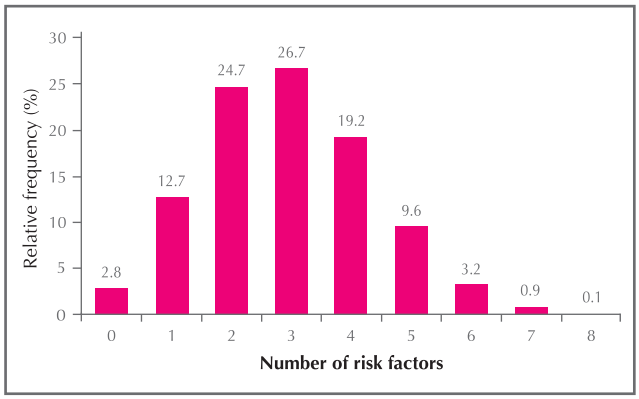

Figure 1.8 Number of risk factors for breast cancer at the time of diagnosis (N=12,053)

1.3 Breast screening habits

Regular breast screening is the best method available for early detection of breast cancer. Early detection reduces mortality from breast cancer. The Hong Kong Breast Cancer Foundation recommends women aged 40 and over conduct monthly breast self-examination (BSE) and regularly attend clinical breast examination (CBE) and mammography screening (MMG). In addition to MMG, ultrasound examination (USG) can be used for women with dense breasts.

BSE, MMG and USG were regularly conducted by less than a quarter of patients. Number of patients who never conducted BSE and USG were positively correlated to increasing age. With the exception of those aged 40-49, number of patients who never conducted MMG was also positively correlated with age.

CBE was regularly conducted by around 40% of the patients aged 59 or under, but only regularly conducted by 27.8% and 11.9% of women aged 60-69, and above 70, respectively. With the exception of women under 40, never conducting CBE was positively correlated with increasing age (Table 1.12).

Table 1.12 Breast screening habits by age group

Breast examination	Age Group (years), Number (%)				
	<40	40-49	50-59	60-69	70+
BSE					
Never	565 (37.4)	1,700 (36.6)	1,494 (40.7)	701 (46.9)	382 (62.0)
Occasional	586 (38.8)	1,703 (36.7)	1,206 (32.8)	424 (28.4)	152 (24.7)
Monthly	332 (22.0)	1,150 (24.8)	882 (24.0)	338 (22.6)	63 (10.2)
Not known	27 (1.8)	86 (1.9)	90 (2.5)	31 (2.1)	19 (3.1)
CBE					
Never	689 (45.6)	1,910 (41.2)	1,637 (44.6)	873 (58.4)	465 (75.5)
Occasional	193 (12.8)	571 (12.3)	459 (12.5)	162 (10.8)	54 (8.8)
Regular*	608 (40.3)	2,081 (44.9)	1,498 (40.8)	415 (27.8)	73 (11.9)
Not known	20 (1.3)	77 (1.7)	78 (2.1)	44 (2.9)	24 (3.9)
MMG#					
Never		3,179 (68.5)	2,307 (62.8)	1,018 (68.1)	507 (82.3)
Occasional		417 (9.0)	415 (11.3)	151 (10.1)	39 (6.3)
Regular*		951 (20.5)	869 (23.7)	285 (19.1)	45 (7.3)
Not known		92 (2.0)	81 (2.2)	40 (2.7)	25 (4.1)
USG#					
Never		3,154 (68.0)	2,519 (68.6)	1,131 (75.7)	513 (83.3)
Occasional		417 (9.0)	350 (9.5)	109 (7.3)	34 (5.5)
Regular*		868 (18.7)	649 (17.7)	183 (12.2)	35 (5.7)
Not known		200 (4.3)	154 (4.2)	71 (4.8)	34 (5.5)

BSE: Breast self-examination, CBE: Clinical breast examination, MMG: Mammography screening, USG: Breast ultrasound screening

* "Regular" is defined as having the breast screening test every 1-3 years.

Included patients aged 40 or above only

Analysis of breast screening habits by residential district showed that less patients in Hong Kong Island never conducted BSE, CBE, MMG or USG compared to Kowloon and the New Territories. More patients in Hong Kong Island conducted health care service assisted regular breast screening (CBE, MMG and USG) than in Kowloon and the New Territories (Table 1.13).

Table 1.13 Breast screening habits by residential district

Breast examination	Residential District, Number (%)					
	Hong Kong Island		Kowloon		New Territories	
BSE						
Never	580	(30.1)	1,223	(43.6)	2,887	(42.6)
Occasional	854	(44.3)	946	(33.7)	2,110	(31.2)
Monthly	419	(21.7)	572	(20.4)	1,691	(25.0)
Not known	76	(3.9)	65	(2.3)	85	(1.3)
CBE						
Never	580	(30.1)	1,461	(52.1)	3,363	(49.7)
Occasional	275	(14.3)	332	(11.8)	787	(11.6)
Regular*	991	(51.4)	950	(33.9)	2,543	(37.5)
Not known	83	(4.3)	63	(2.2)	80	(1.2)
MMG#						
Never	789	(47.9)	1,694	(69.6)	4,279	(72.6)
Occasional	237	(14.4)	226	(9.3)	520	(8.8)
Regular*	550	(33.4)	463	(19.0)	999	(17.0)
Not known	70	(4.3)	51	(2.1)	92	(1.6)
USG#						
Never	855	(51.9)	1,784	(73.3)	4,429	(75.2)
Occasional	214	(13.0)	205	(8.4)	451	(7.7)
Regular*	409	(24.8)	353	(14.5)	865	(14.7)
Not known	168	(10.2)	92	(3.8)	145	(2.5)

BSE: Breast self-examination, CBE: Clinical breast examination, MMG: Mammography screening, USG: Breast ultrasound screening

* "Regular" is defined as having the breast screening test every 1-3 years.

Included patients aged 40 or above only