

Preplanned Studies

Breast Cancer Screening Coverage — China, 2018–2019

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Summary**What is already known about this topic?**

In 2015, only 18.9% of adult women underwent breast cancer screening in China.

What is added by this report?

Breast cancer screening coverage for women aged 20 years and above in China reached 22.3% during 2018–2019. Women with lower socioeconomic status had lower screening coverage. There were significant variations across the provincial-level administrative divisions.

What are the implications for public health practice?

The promotion of breast cancer screening requires the maintenance of national and local policies, as well as financial support for screening services. In addition, there is a need for the strengthening of health education and the improvement of accessibility to health services.

Breast cancer became the most commonly diagnosed form of cancer worldwide in 2020, with approximately 2.3 million women affected, surpassing the number of new cases of lung cancer for the first time. It is still the primary cause of cancer mortality in women and is also the fifth most common cause of cancer deaths globally (1). China had 24% of newly diagnosed cases and 30% of cancer-related deaths worldwide in 2020 (2). The age-standardized incidence of breast cancer increased from 17.07 per 100,000 in 1990 to 35.61 per 100,000 in 2019 over the past three decades (3). Early detection, along with available, low-cost, and effective treatment, can result in improved cancer staging upon presentation and reduced mortality. To combat this rising incidence of breast cancer since the 1990s, China implemented a free screening program nationally in 2009 for rural women aged 35–64 years. During the course of the study, 18.9% of all women aged 20 and above and 25.7% of women aged 35 to 64 participated in breast cancer screening (4), slightly higher than rates in the early 2010s (5). This study aimed to provide an

update on the current status of breast cancer screening levels in China, estimating the screening rates across subgroups using the latest nationally and provincially representative surveillance data. The findings showed that 22.3% of women aged 20 years and above and 30.9% of women aged 35–64 years had ever participated in breast cancer screening in China. Lower screening uptake was noted among women from lower socioeconomic status (SES); with considerable variations observed across provincial-level administrative divisions (PLADs).

This study utilized data from the sixth field survey named China Adults Chronic Disease and Nutrition Surveillance, which is part of the China Chronic Disease and Risk Factor Surveillance (CCDRFS), to estimate the latest uptake of breast cancer screening in China (6). The field survey was conducted from August 2018 to June 2019 in 298 districts/counties across all 31 PLADs directly under the central government in Chinese mainland. A multistage and cluster randomized sampling approach was used to select adults aged 18 years or older who had lived at their residence for more than 6 months in the past year, were not pregnant, and did not have serious health conditions or illnesses that would prevent participation, including intellectual disability or language disorders. Trained local health staff conducted interviews with all participants to collect information on major chronic diseases and related risk factors. Female participants were also asked about their breast cancer screening history and the date of their most recent screening, if applicable. The Ethical Committee of the National Center for Chronic and Noncommunicable Disease Control and Prevention and Chinese Center for Disease Control and Prevention approved the CCDRFS survey, and all participants provided written informed consent. A total of 184,876 participants completed the survey, yielding a response rate of 97.4%. After data cleaning, 184,509 participants (including 109,317 females) were included in the basic database. For the final analysis, 15,354 female participants were excluded due to their age being less than 20 years old, having incomplete

sociodemographic data, or lacking responses to the breast cancer screening questions. All estimates were weighted based on China's 2010 census, which was released by the National Bureau of Statistics. The chi-square test was used to analyze differences in unordered categorical variables, and logistic regression was employed to investigate trends with ordered categorical variables. A multiple logistic regression analysis based on complex sampling design was conducted, and standard errors (SEs) were estimated using Taylor linearization with a finite population correction. Statistical significance was determined using a two-sided *P*-value of less than 0.05. All statistical analyses were performed using SAS software (version 9.4, SAS Institute Inc., Cary, USA).

This study included a total of 93,963 female participants who were 20 years of age or older. As of 2018–2019, 54.8% of Chinese women lived in rural areas, 37.3% had received primary school education or less, and 46.4% had undergone health examinations within the past three years (Table 1).

In 2018–2019, among women aged 20 years and above, 22.3% [95% confidence interval (CI): 21.1%–23.5%] of women reported undergoing at least one lifetime screening for breast cancer. The rate was higher in women aged 35 to 64 years with a prevalence of 30.9% (95% CI: 29.2%–32.5%) (Table 2). When considering the past three years, 20.5% of women had undergone screening. The highest ever screening rate was among women aged 40–49 years, with a prevalence of 36.0% (95% CI: 33.9%–38.2%), while women aged 70 years and above had the lowest screening rates (4.3%, 95% CI: 3.7%–4.9%). The study also found that reporting breast screening was less likely among women with the lowest education level (16.6%, 95% CI: 15.3%–18.0%) or income (17.2%, 95% CI: 15.4%–19.1%), unemployed women (14.8%, 95% CI: 12.6%–17.0%), and women who had not undergone a health examination during the past 3 years (14.3%, 95% CI: 13.2%–15.4%). Urban women (24.5%, 95% CI: 22.4%–26.6%) were more likely to undergo screening than rural women (20.6%, 95% CI: 18.8%–22.4%). Additionally, women living in eastern China had higher screening rates (27.0%, 95% CI: 25.1%–29.0%) than those in central (20.6%, 95% CI: 18.3%–22.8%) and western China (16.7%, 95% CI: 14.9%–18.6%).

A multivariate logistic regression analysis was conducted on women between the ages of 35 and 64. Results showed that the odds of receiving breast cancer screening were higher among rural women compared to urban women [odds ratio (OR)=1.25, 95% CI:

TABLE 1. Sociodemographic characteristics of female participants aged 20 years and above, 2018–2019.

Characteristic	No. of participants (N=93,963)	Weighted proportion (%)*
Age (years)		
20–29	5,047	24.2
30–39	10,178	21.0
40–49	17,921	22.3
50–59	25,555	15.4
60–69	24,377	9.5
70 and above	10,885	7.7
Residence		
Urban	44,176	45.2
Rural	49,787	54.8
Location		
East	35,196	42.2
Middle	27,851	32.4
West	30,916	25.5
Education		
Primary or less	51,956	37.3
Secondary	24,755	29.9
High	10,640	14.7
College or above	6,612	18.0
Household income per capita (CNY)		
Q ₁ (<7,200)	17,022	15.3
Q ₂ (7,200–14,999)	19,310	19.0
Q ₃ (15,000–24,999)	16,170	18.0
Q ₄ (25,000 and above)	20,672	25.7
Don't know/refused	20,789	21.9
Employment status		
Employed	57,093	66.3
Housework	21,016	19.5
Retired	11,013	6.0
Unemployed	4,841	8.2
Health examination in the past 3 years		
No	56,992	53.6
Yes	36,971	46.4
Self-assessed health status		
Poor or fair	47,820	54.1
Good	46,143	45.9

Abbreviation: CNY=Chinese Yuan.

* Proportions are weighted to represent the national total population with poststratification for age, and urban/rural residence.

1.03–1.50]. However, the likelihood of breast cancer screening in eastern China was still higher compared to

TABLE 2. Breast cancer screening rates among Chinese adult women by sociodemographic factors — China, 2018–2019.

Sociodemographic variable	Screening rates among 20 years and above				Screening rates among 35–64 years		
	Total	Urban	Rural	P value*	Screened in 3 years (%) (95% CI)	Ever screened (%) (95% CI)	OR (95% CI)
Total	22.3 (21.1, 23.5)	24.5 (22.4, 26.6)	20.6 (18.8, 22.4)	<0.0001	20.5 (19.3, 21.7)	30.9 (29.2, 32.5)	
Age (years)							
20–29	10.8 (9.1, 12.6)	11.5 (8.7, 14.2)	10.3 (8.2, 12.4)	0.5242	10.6 (8.9, 12.3)	–	–
30–39	27.3 (25.5, 29.2)	29.8 (27.2, 32.4)	25.3 (22.3, 28.2)	0.0413	25.7 (23.7, 27.6)	–	–
40–49	36.0 (33.9, 38.2)	39.2 (35.6, 42.8)	33.7 (30.5, 36.9)	0.0510	33.4 (31.3, 35.4)	–	–
50–59	27.3 (25.4, 29.1)	31.1 (28.1, 34.2)	24.5 (21.7, 27.3)	0.0075	24.3 (22.6, 26.0)	–	–
60–69	14.7 (13.5, 16.0)	19.2 (17.1, 21.3)	11.5 (9.5, 13.5)	<0.0001	12.4 (11.2, 13.6)	–	–
70 and above	4.3 (3.7, 4.9)	6.6 (5.4, 7.8)	2.7 (2.0, 3.4)	<0.0001	3.4 (2.8, 3.9)	–	–
P value for difference	<0.0001	<0.0001	<0.0001		<0.0001		
Residence							
Urban	–	–	–		22.7 (20.7, 24.7)	34.4 (31.7, 37.2)	1.00 (Reference)
Rural	–	–	–		18.8 (17.1, 20.6)	28.2 (25.7, 30.8)	1.11 (0.86, 1.43) [§]
P value for difference					<0.0001	<0.0001	
Geographic location							
East	27.0 (25.1, 29.0)	29.2 (26.2, 32.2)	24.7 (21.2, 28.1)	0.1018	25.1 (23.2, 27.1)	37.1 (34.5, 39.6)	1.58 (1.33, 1.88)
Middle	20.6 (18.3, 22.8)	22.1 (17.7, 26.5)	19.6 (17.2, 22.1)	0.3440	18.5 (16.3, 20.6)	28.8 (25.7, 31.9)	1.22 (0.99, 1.50)
West	16.7 (14.9, 18.6)	17.5 (14.6, 20.5)	16.2 (13.6, 18.8)	0.5390	15.5 (13.8, 17.3)	23.5 (20.9, 26.2)	1.00 (Reference)
P value for difference	<0.0001	<0.0001	0.0003		<0.0001	<0.0001	
Education							
Primary or less	16.6 (15.3, 18.0)	16.3 (13.8, 18.9)	16.7 (15.0, 18.4)	0.8299	15.0 (13.7, 16.3)	22.2 (20.3, 24.0)	1.00 (Reference)
Secondary	25.1 (23.3, 26.9)	25.9 (23.3, 28.4)	24.7 (22.0, 27.3)	0.5658	22.9 (21.2, 24.6)	33.8 (31.7, 35.8)	1.41 (1.23, 1.62) [§]
High	27.5 (25.1, 29.9)	29.0 (25.9, 32.1)	25.3 (21.3, 29.3)	0.1867	25.5 (23.2, 27.8)	39.0 (35.8, 42.2)	1.40 (1.15, 1.70) [§]
College or above	25.2 (22.8, 27.7)	26.6 (23.9, 29.2)	20.3 (15.0, 25.6)	0.0573	24.1 (21.7, 26.5)	48.7 (45.2, 52.2)	1.84 (1.49, 2.28) [§]
P value for trend	<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	

TABLE 2. (Continued)

Sociodemographic variable	Screening rates among 20 years and above				Screening rates among 35–64 years		
	Ever screened (%) (95% CI)			P value*	Screened in 3 years (%) (95% CI)	Ever screened (%) (95% CI)	OR (95% CI)
	Total	Urban	Rural				
Household income per capita (CNY)							
Q ₁ (<6,000)	17.2 (15.4, 19.1)	16.2 (12.6, 19.8)	17.5 (15.4, 19.6)	0.5789	15.4 (13.7, 17.2)	23.7 (21.1, 26.2)	1.00 (Reference)
Q ₂ (6,000–12,499)	19.1 (17.7, 20.6)	19.7 (17.5, 21.9)	18.9 (16.9, 20.8)	0.6290	17.8 (16.3, 19.2)	26.9 (25.0, 28.8)	1.08 (0.93, 1.24)
Q ₃ (12,500–23,999)	24.4 (22.4, 26.4)	24.4 (22.0, 26.9)	24.4 (21.3, 27.6)	0.9978	22.5 (20.6, 24.4)	33.4 (31.2, 35.7)	1.21 (1.04, 1.40)
Q ₄ (24,000 and above)	29.7 (27.6, 31.7)	30.0 (27.4, 32.6)	28.9 (24.5, 33.3)	0.7105	27.4 (25.3, 29.4)	40.8 (38.5, 43.1)	1.36 (1.16, 1.58)
Don't know or refused	18.3 (16.5, 20.1)	20.1 (17.3, 23.0)	16.8 (14.4, 19.3)	0.1148	17.0 (15.2, 18.7)	25.6 (22.9, 28.3)	0.93 (0.79, 1.11)
P value for trend†	<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	
Employment status							
Employed	23.7 (22.4, 25.1)	26.7 (24.4, 28.9)	21.6 (19.6, 23.6)	0.0035	22.1 (20.8, 23.4)	31.6 (29.8, 33.3)	1.00 (Reference)
Housework	19.4 (17.5, 21.4)	20.2 (16.7, 23.6)	19.1 (16.6, 21.6)	0.6575	17.8 (15.9, 19.7)	28.1 (25.8, 30.4)	1.01 (0.92, 1.11)
Retired	26.1 (23.5, 28.6)	26.1 (23.4, 28.8)	25.6 (12.8, 38.3)	0.9390	21.4 (18.9, 23.9)	33.1 (29.7, 36.6)	0.95 (0.81, 1.11)
Unemployed	14.8 (12.6, 17.0)	15.3 (12.5, 18.1)	14.2 (10.6,17.7)	0.6478	13.9 (11.7, 16.1)	28.7 (24.7, 32.7)	0.90 (0.72, 1.22)
P value for difference	<0.0001	<0.0001	0.0068		<0.0001	0.0085	
Health examination in past 3 years							
No	14.3 (13.2, 15.4)	13.1 (11.4, 14.9)	14.9 (13.5, 16.4)	0.1577	12.5 (11.5, 13.6)	19.4 (17.9, 20.9)	1.00 (Reference)
Yes	31.8 (30.2, 33.4)	33.4 (31.2, 35.7)	29.8 (27.3, 32.4)	0.0628	30.0 (28.4, 31.6)	45.6 (43.7, 47.6)	3.17 (2.95, 3.41)
P value for difference	<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	
Self-assessed health status							
Poor or fair	23.0 (21.6, 24.4)	25.9 (23.7, 28.1)	20.8 (18.8, 22.8)	0.0026	21.0 (19.7, 22.4)	31.1 (29.3, 32.9)	1.15 (1.05, 1.27)
Good	21.6 (20.2, 22.9)	23.1 (20.7, 25.4)	20.3 (18.2, 22.3)	0.1232	20.0 (18.6, 21.3)	30.6 (28.6, 32.6)	1.00 (Reference)
P value for difference	0.0464	0.0053	0.5666		0.1275	0.6084	

Note: The screening rates presented in this study are weighted proportions that have been adjusted for age through poststratification to ensure representation of the entire national population.

Abbreviation: CI=confidence interval; CNY=Chinese Yuan.

* P value denotes the difference between urban screening coverage and rural screening coverage in women aged 20 years and above.

[†] Participants who responded with "don't know/refused" were excluded from the calculation.

[§] The model accounted for the interaction between residence and education.

western China ($OR=1.58$, 95% CI : 1.33–1.88). Additionally, the odds of screening were three times higher among women who had received a health examination within the past three years compared to those who had not ($OR=3.17$, 95% CI : 2.95–3.41) (Table 2).

In Beijing, over 40% of women aged 20 years and above and more than 60% of women aged 35–64 years underwent screening, and in economically developed

eastern coastal PLADs such as Jiangsu Province, Zhejiang Province, Tianjin, and Shanghai, more than 30% of women aged 20 years and above and 40% of women aged 35–64 years underwent screening. In contrast, the Xizang (Tibet) Autonomous Region, Guizhou Province, and Hebei Province demonstrated the lowest rates of screening, all below 10%. Refer to Figure 1 for more details.

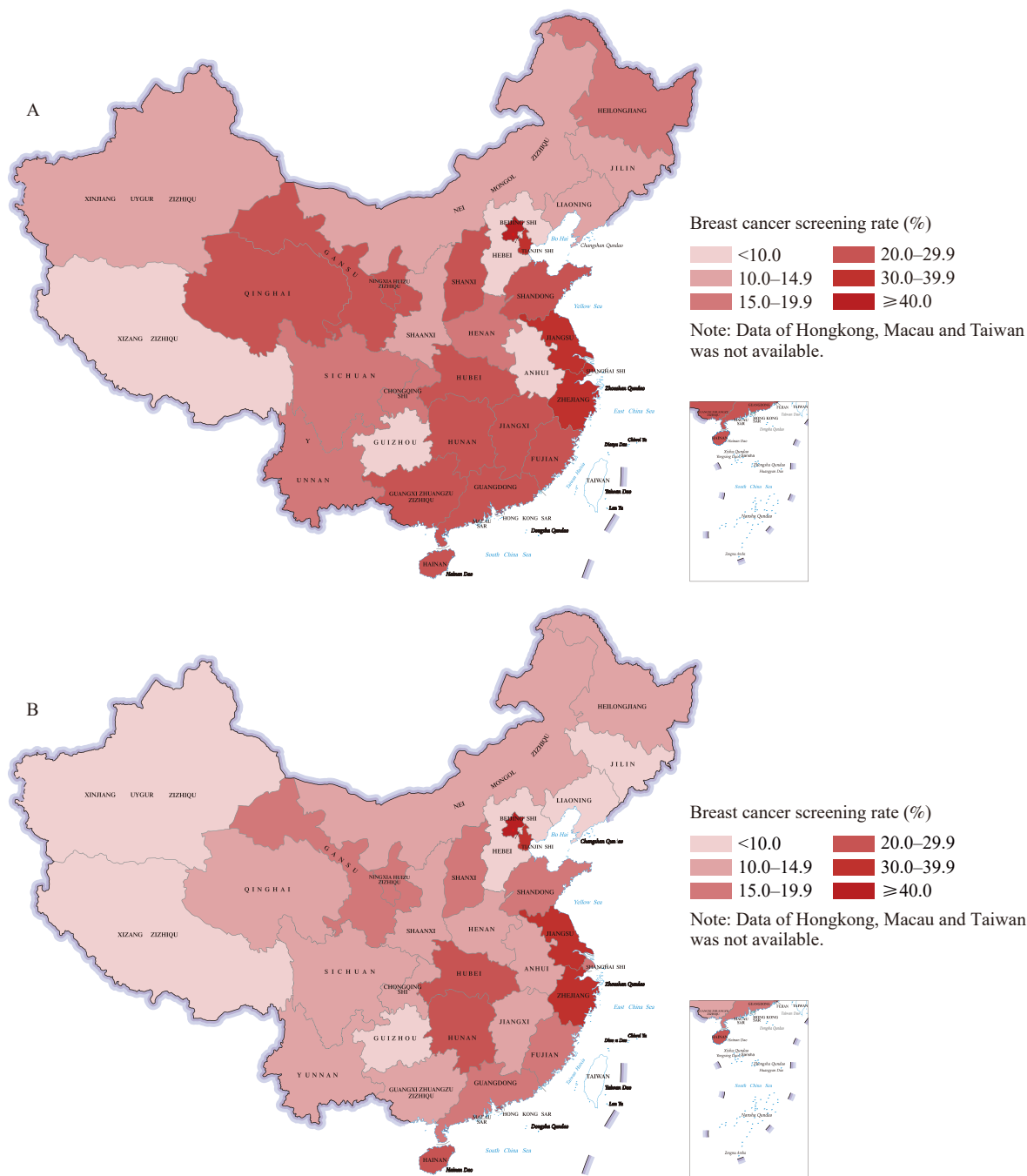


FIGURE 1. Provincial variations in breast cancer screening coverage in adult women in China, 2018–2019. (A) Screening rates among 20 years and above; (B) Screening rates among 35–64 years.

DISCUSSION

According to the findings of the China CDC, the use of breast cancer screening among adult women in China continues to be inadequate. Although there has been a slight increase in breast cancer screening rates for women aged 20 years and above, as well as for those aged 35–64 years, when compared to the statistics of 2015, the breast cancer screening coverage is still way below the standard in developed countries (7). As of 2018, more than 1,700 counties had conducted breast cancer screening programs (8). Since 2022, the scope of free screening services has been broadened to include both urban and rural women. However, this study reveals that despite the expansion of breast cancer screening programs, the proportion of women availing of screening services is still considerably low.

Numerous factors have the potential to restrict the uptake of cancer screening in women, including but not limited to low socioeconomic status, cultural barriers, and cancer fatalism (9). Upon conducting this study, we discovered that women who underwent health examinations were significantly more likely to obtain cancer screening even when other potential restricting factors were accounted for. This outcome underscores the significance of both accessible health services and effective health education.

There are two limitations to be taken into account. Initially, the self-reported screening history may have been subject to recall bias. To minimize this, the interviewers were instructed to carefully define and explain the types of breast cancer screening and assist participants in recalling the timing of their last test. Second, the CCDFRS did not collect information on the reasons for non-participation in screening.

Based on nationally and provincially representative survey data from 2018–2019, this study provides the most current estimate of breast cancer screening coverage in China. Women aged 20 years and older had a breast cancer screening coverage of 22.3%, while women aged 35–64 years had a coverage of 30.9%. Women with lower socioeconomic status had lower screening coverage, and there were still significant disparities across PLADs. To increase the utilization of breast cancer screening, it is crucial to continue national and local policies and provide financial support for breast cancer screening services. Additionally, health education and accessibility of

health services should be strengthened, particularly in targeted age groups, those with low SES, and underdeveloped PLADs, to encourage more women to participate in screening.

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