Preplanned Studies

Cervical Cancer Screening Coverage — China, 2018–2019

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Summary

What is already known about this topic?

The World Health Organization set a 2030 target of 70% cervical cancer screening coverage for women aged 35–45 years. Coverage stood at 37% in China in 2015.

What is added by this report?

In 2018–2019, China's cervical cancer screening coverage reached 43.4% in women aged 35–44 years and 36.8% in women aged 35–64 years. Screening coverage was still lower in rural areas as well as central and western regions; large variations existed across provincial-level administrative divisions.

What are the implications for public health practice?

National and local policy and financial support should be maintained for cervical cancer screening, along with more targeted health education and outreach efforts and strengthened accessibility of health services in the rural areas and central and western regions.

Effective prevention and control measures have tamed cervical cancer in most parts of the world. In November 2020, the World Health Organization (WHO) set a 2030 target of 70% cervical cancer screening coverage for women aged 35–45 years. (*1*) China launched a national free screening program for rural women aged 35–64 years in 2009, in order to combat rising cervical cancer incidence, particularly in younger and rural populations, since the late 1990s (*2*) and an imbalanced disease burden in the central and western regions (*3*). It set a goal that screening coverage should reach 50% in women aged 35–64 years by 2025 (*4*). This study used the latest nationally and provincially representative survey data to estimate screening coverage in China and analyze its key sociodemographic and geographic factors via Rao Scott chi-square tests and logistic regression models. This study still suggests gaps in cervical cancer screening coverage with the WHO 2030 target. It also suggests that national and local policy and financial support should be maintained, health education and outreach efforts should be directed more toward the targeted age groups, and accessibility of health-related services should be further strengthened in the rural areas and central and western regions.

This study estimated China's latest cervical cancer screening uptake by using newly released national survey data from China Chronic Disease and Nutrition Surveillance in 2018–2019. Women aged 18 years and older were selected from 298 districts/counties across all 31 provincial-level administrative divisions (PLADs) in the mainland of China through multi-stage and cluster randomized sampling. Women were interviewed by trained local health staff about history of previous cervical cancer screening as well as the month and year of the most recent screening, if applicable. A total of 102,779 participants aged 20–64 years old completed the survey, yielding a 95.0% response rate. Among them, 27,471 female participants were excluded from the final analysis because of incomplete sociodemographic data, lack of response to the cervical cancer screening question, or age falling outside the targeted age groups. The screening rates of stratified sociodemographic groups were compared through chi-square tests, and predictors of screening uptake were investigated via multivariate logistic regression analysis. Standard errors (SE) were estimated by Taylor linearization with a finite population correction. Statistical significance was determined using two-sided $P<0.05$. All statistical analyses were performed over SAS (version 9.4, SAS Institute Inc., Cary, USA).

The final sample consists of 75,308 participants aged 20–64 years old. Participants were 40 years old on average with 44.6% from urban areas, 42.2% from the eastern region of China, 96.9% with health insurance coverage, and 43.8% with health check-ups done in the previous three years (Table 1).

The estimated results show that in 2018–2019, cervical cancer lifetime screening coverage (i.e., the percentage of women who had ever taken screening) reached 43.4% [95% confidence interval (*CI*): 41.5%–45.3%] in women aged 35–44 years, 39.6%

TABLE 1. Sociodemographic characteristics of female participants aged 20–64 years in the cervical cancer screening survey — China, 2018–2019.

Characteristics	No. of participants (*N*=72,095)	Weighted proportion (%)*
Age (years)		
20–24	1,534	15.9
25–34	8,318	22.0
35–44	12,163	26.7
45–54	24,840	20.0
55–64	25,240	15.2
Area type		
Urban	33,068	44.6
Rural	39,027	55.4
Location		
Eastern	26,674	42.2
Central	21,147	32.4
Western	24,274	25.3
Education		
Primary or less	34,596	31.6
Middle school	21,781	32.3
High school	9,553	16.1
College or above	6,165	20.0
Income (CNY)		
Q1 (<6,667)	15,278	18.3
Q2 (6,667–13,332)	13,943	18.0
Q3 (13,333–27,999)	13,355	19.2
Q4 (28,000+)	14,142	23.0
Don't know/refused	15,377	21.5
Employment		
Employed	47,155	69.1
Housework	14,835	18.3
Retired	6,541	4.3
Unemployed	3,564	8.3
With health insurance		
No	1,462	3.1
Yes	70,633	96.9
With health check–ups in the past 3 years		
No	40,195	51.9
Yes	31,900	48.1
Self-assessed health status		
Poor or fair	41,913	56.5
Good	30,182	43.5

* Percentages are weighted to represent the national total population with poststratification for age and gender.

(95% *CI*: 37.9%–41.4%) in women aged 30–49 years, and 36.8% (95% *CI*: 35.1%–38.4%) in women aged 35–64 years. (Table 2) Screening coverage peaked at 45.0% in the 40–44 age group and declined to 18.8% in the 60–64 age group. About 90% of the screened women reported doing so within the previous three

TABLE 2. Sociodemographic stratifications and multivariate logistic regression results of cervical cancer screening coverage in China, 2018–2019.

Sociodemographic variables	Screen rates among 20–64 years old % (95% *CI*)			*P*-value*	35–64 years old	
	Total	Urban	Rural		Screen rates % (95% *CI*)	Screen *OR* (95% *CI*)
Total	29.5 (28.1, 30.9)	32.2 (30.2, 34.2)	26.6 (24.9, 28.3)	<0.001	36.8 (35.1, 38.4)	
Age (years)						
20–24	8.6 (6.6, 10.6)	7.8 (4.8, 10.9)	9.5 (6.7, 12.3)	0.473	–	–
25–29	19.2 (17.0, 21.3)	21.8 (18.5, 25.1)	15.7 (13.7, 17.7)	0.001	–	–
30–34	29.7 (27.3, 32.1)	32.3 (29.0, 35.6)	26.1 (22.9, 29.3)	0.012	–	–
35–39	41.7 (39.3, 44.1)	47.3 (44.0, 50.5)	34.9 (31.7, 38.2)	<0.001	41.7 (39.3, 44.1)	2.82 (2.48, 3.22)
40–44	45.0 (42.7, 47.2)	48.3 (44.9, 51.6)	41.6 (38.8, 44.3)	0.002	45.0 (42.7, 47.2)	3.51 (3.10, 3.98)
45–49	40.1 (37.8, 42.4)	43.6 (40.4, 46.7)	36.7 (33.7, 39.6)	0.001	40.1 (37.8, 42.4)	3.02 (2.69, 3.39)
50–54	34.5 (32.5, 36.4)	38.6 (35.8, 41.4)	30.4 (27.7, 33.2)	<0.001	34.5 (32.5, 36.4)	2.33 (2.13, 2.55)
55–59	27.5 (25.6, 29.3)	30.9 (27.9, 33.9)	24.5 (22.2, 26.7)	0.001	27.5 (25.6, 29.3)	1.60 (1.48, 1.74)
60–64	18.8 (17.2, 20.5)	21.4 (19.0, 23.8)	16.7 (14.6, 18.8)	0.005	18.8 (17.2, 20.5)	1.00 [Reference]
P_{trend}	<0.001	<0.001	<0.001		<0.001	
30–49	39.6 (37.9, 41.4)	43.2 (40.7, 45.6)	35.6 (33.6, 37.7)	<0.001	–	–
35–44	43.4 (41.4, 45.3)	47.8 (44.9, 50.6)	38.5 (36.3, 40.7)	<0.001	–	–
Area type						
Urban	32.2 (30.2, 34.2)	–	–		41.1 (38.7, 43.4)	0.92 (0.81, 1.00)
Rural	26.6 (24.9, 28.3)	–	–		32.4 (30.5, 34.4)	1.00 [Reference]
$P_{difference}$	<0.001				<0.001	
Geographic region						
Eastern	33.4 (31.1, 35.7)	36.0 (33.1, 39.0)	29.3 (26.6, 32.0)	<0.001	41.6 (38.9, 44.3)	1.31 (1.12, 1.53)
Central	28.1 (25.5, 30.7)	29.9 (25.9, 33.9)	26.6 (23.1, 30.0)	0.242	34.9 (31.9, 38.0)	1.11 (0.93, 1.32)
Western	24.8 (23.1, 26.6)	26.6 (24.0, 29.2)	23.4 (21.3, 25.6)	0.070	31.3 (28.9, 33.6)	1.00 [Reference]
$P_{difference}$	<0.001	<0.001	0.023		<0.001	
Education						
Primary or less	25.3 (23.6, 26.9)	26.4 (23.4, 29.3)	24.8 (23.0, 26.6)	0.348	26.9 (25.2, 28.6)	1.00 [Reference]
Middle school	32.1 (30.1, 34.0)	35.3 (32.4, 38.3)	29.2 (27.1, 31.4)	<0.001	40.2 (38.2, 42.3)	1.53 (1.40, 1.67)
High school	33.5 (30.9, 36.1)	36.0 (32.9, 39.1)	28.1 (23.5, 32.8)	0.011	46.5 (42.9, 50.1)	1.81 (1.58, 2.08)
College or above	28.9 (26.3, 31.5)	30.2 (27.2, 33.2)	22.4 (18.3, 26.6)	0.006	55.7 (51.9, 59.4)	1.85 (1.56, 2.20)
P_{trend}	0.005	0.489	0.493		<0.001	
Household income per capita (CNY)						
Q1 (<6,667)	24.2 (22.3, 26.1)	24.8 (20.0, 29.5)	24.0 (22.0, 26.0)	0.783	29.7 (27.5, 31.8)	1.00 [Reference]
Q2 (6,667–13,332)	27.6 (25.7, 29.5)	29.6 (27.3, 31.9)	26.0 (23.4, 28.6)	0.038	34.2 (32.2, 36.1)	1.09 (0.97, 1.23)
Q3 (13,333–27,999)	32.4 (30.4, 34.4)	34.0 (31.2, 36.7)	30.2 (27.6, 32.8)	0.054	40.2 (37.9, 42.4)	1.15 (1.01, 1.31)
Q4 (>28,000)	36.3 (33.9, 38.7)	37.2 (34.4, 40.1)	33.1 (29.5, 36.6)	0.085	47.3 (44.6, 50.1)	1.24 (1.07, 1.43)
Don't know/refused	26.1 (23.9, 28.3)	28.0 (24.7, 31.4)	24.2 (21.7, 26.8)	0.075	31.8 (28.8, 34.8)	0.92 (0.80, 1.06)
P_{trend}†	<0.001	<0.001	<0.001		<0.001	
Employment status						
Employed	30.5 (29.1, 31.9)	33.4 (31.2, 35.5)	27.6 (25.9, 29.2)	<0.001	37.9 (36.2, 39.5)	1.11 (0.96, 1.28)
Housework	28.5 (25.9, 31.1)	32.4 (28.5, 36.2)	25.7 (23.1, 28.4)	0.001	33.0 (30.4, 35.6)	1.10 (0.94, 1.30)
Retired	35.3 (31.7, 38.9)	35.0 (31.3, 38.6)	45.5 (35.8, 55.2)	0.034	35.8 (32.2, 39.4)	1.00 [Reference]
Unemployed	20.3 (17.6, 23.0)	21.7 (18.1, 25.3)	18.1 (14.0, 22.1)	0.215	37.0 (32.4, 41.5)	1.07 (0.84, 1.38)
$P_{difference}$	<0.001	<0.001	<0.001		0.002	

TABLE 2. (Continued)

Sociodemographic variables	Screen rates among 20–64 years old % (95% *CI*)			*P*-value*	35–64 years old	
	Total	Urban	Rural		Screen rates % (95% *CI*)	Screen *OR* (95% *CI*)
Health insurance						
No	15.4 (11.9, 18.9)	15.9 (11.5, 20.3)	14.4 (9.1, 19.7)	0.678	21.3 (17.3, 25.4)	1.00 [Reference]
Yes	30.0 (28.6, 31.4)	32.9 (30.9, 34.8)	26.9 (25.1, 28.6)	<0.001	37.1 (35.4, 38.7)	1.96 (1.57, 2.45)
$P_{difference}$	<0.001	<0.001	0.001		<0.001	
Health check-up in the last 3 years						
No	20.2 (18.8, 21.5)	20.5 (18.3, 22.7)	19.9 (18.4, 21.4)	0.654	24.5 (22.8, 26.1)	1.00 [Reference]
Yes	40.8 (39.1, 42.5)	42.0 (39.8, 44.2)	38.8 (36.2, 41.4)	0.066	51.4 (49.3, 53.2)	3.09 (2.84, 3.36)
$P_{difference}$	<0.001	<0.001	<0.001		<0.001	
Self-assessed health						
Poor or fair	31.4 (29.9, 32.9)	34.5 (32.2, 36.9)	28.3 (26.7, 29.9)	<0.001	37.2 (35.5, 38.8)	1.00 [Reference]
Good	27.5 (25.9, 29.1)	29.9 (27.9, 32.0)	24.5 (22.3, 26.7)	0.001	36.2 (34.1, 38.3)	0.85 (0.78, 0.93)
$P_{difference}$	<0.001	<0.001	<0.001		0.349	

Note: Screening rates are all weighted proportions to represent the national total population with poststratification for age and gender.
Abbreviation: *OR*=odds ratio; *CI*=confidence interval.
* *P*-value denotes *P*-value for difference between urban screening coverage and rural screening coverage in women aged 20–64 years.
† Participants answering "Don't know/refused" are not included in the calculation.

years.

Low screening uptake for the 20–64 age groups was found in women with the lowest education (25.3%; 95% *CI*: 23.6%–26.9%), income (24.2%; 95% *CI*: 22.3%–26.1%), without health insurance coverage (15.4%; 95% *CI*: 11.9%–18.9%), without health check-ups in the previous three years (20.2%; 95% *CI*: 18.8%–21.5%), and in the 20–24 age group (urban, 7.8%; 95% *CI*: 4.8%–10.9%, *vs.* rural, 9.5%; 95% *CI*: 6.7%–12.3%). Screening coverage for women aged 35–64 years in urban areas was 45.6% (95% *CI*: 42.0%–49.2%) in the eastern region, 37.9% (95% *CI*: 33.3%–42.5%) in the central region, and 35.3% (95% *CI*: 32.1%–38.5%) in the western region; for rural women aged 35–64 years, it was 36.0% (95% *CI*: 32.9%–39.1%) in the eastern region, 32.4% (95% *CI*: 28.5%–36.3%) in the central region, and 28.3% (95% *CI*: 25.8%–30.9%) in the western region.

Multivariate logistic regression results for women aged 35–64 years surprisingly revealed that the urban factor was statistically insignificant, if not negative, in predicting screening uptake compared to the rural areas [odds ratio (*OR*): 0.92; 95% *CI*: 0.81–1.00]. However, the likelihood of screening in the eastern region still prevailed over the western region (*OR*: 1.31; 95% *CI*: 1.12–1.53), whereas the central region showed an insignificant advantage over the western region (*OR*: 1.11; 95% *CI*: 0.93–1.32). The likelihood of screening was 96% higher in women with health insurance than in women without health insurance (*OR*: 1.96; 95% *CI*: 1.57–2.45), and 2.09 times higher in women with health check-ups during the past three years than in women without health check-ups (*OR*: 3.09; 95% *CI*: 2.84–3.36).

PLADs' data showed that Beijing Municipality went beyond 70% in screening coverage, followed by Zhejiang Province at above 60%, Jiangsu Province at above 50%, Tianjin Municipality, Hunan Province, and Shanghai Municipality at nearly 50%, while Hebei Province, Xizang (Tibet) Autonomous Region and Guizhou Province fell under 25% in screening coverage (Figure 1).

DISCUSSION

This study estimated that in 2018–2019, 43.4% of women aged 35–44 years, 39.6% of women aged 30–49 years, and 36.8% of women aged 35–64 years had ever participated in cervical cancer screening in China. These results reveal both progress and gaps in cervical cancer screening in China. On the one hand, screening coverage for women aged 35–64 years, the targeted range of China's national screening program, rose continuously from about 25% in 2010 (5), 27% in 2013 (6), 31% in 2015 (7), to the current 37% in 2018–2019. The upward trend provides strong evidence for the positive impact of the national screening program. Screening coverage for women aged 30–49 years, the age groups recommended by the

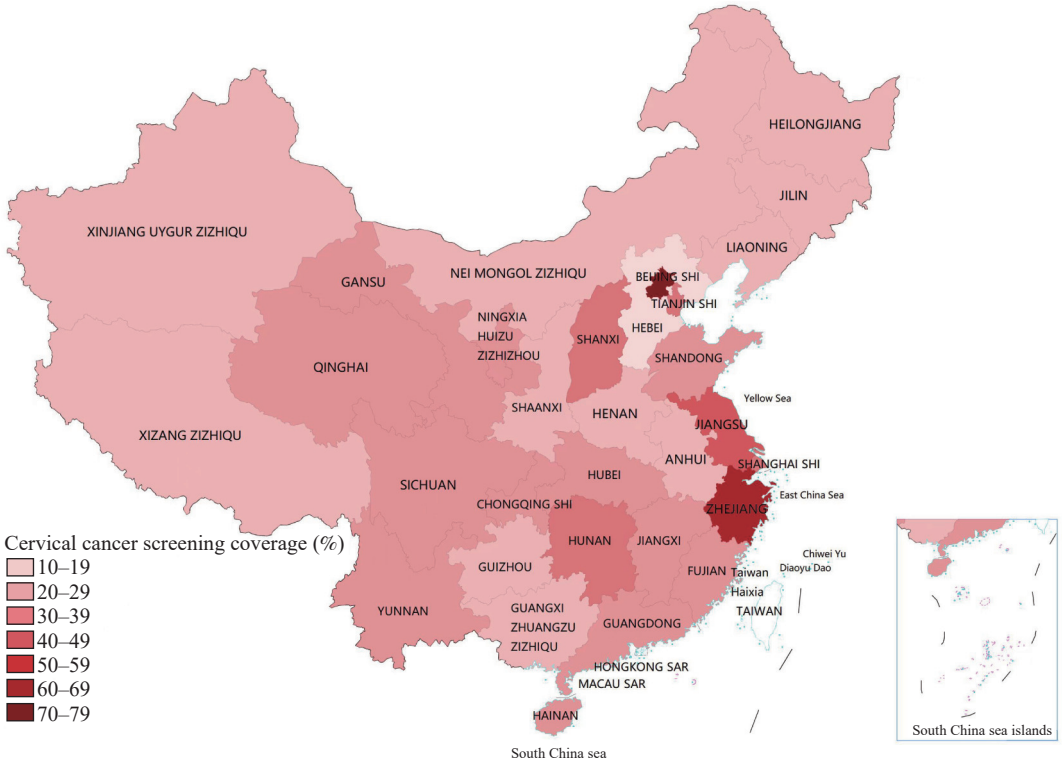

FIGURE 1. Provincial-level administrative divisions variations of cervical cancer screening coverage in women aged 35–64 years in China, 2018–2019.

WHO to monitor screening performance and results (*1*), also slightly exceeds the estimated worldwide screening coverage of 36% in 2019 (*8*). On the other hand, the 43% screening coverage for women aged 35–44 years is still far off the WHO 2030 target of 70% screening coverage.

One exciting finding of this study is that traditional disadvantages borne by the rural areas may have begun to dissipate as suggested by multivariate logistic analysis. It again points to the positive impact of the national free screening program in rural areas over the past decade. As the national screening program became the National Basic Public Health Service Program in 2019, national and local policy as well as financial support for cervical cancer screening should be continued to maintain ongoing progress in rural screening uptake. Furthermore, among individual socioeconomic and health-related disparities in screening uptake, which corroborate with previous studies in China and abroad (*9*), regular health-checkups had strong positive effects over screening uptake, which highlights the importance of strengthened access to health services and health education beyond cancer screening. Moreover, this study suggests excessive screening uptake in the 20–24 age group especially in rural areas, which falls outside the recommended age groups of national screening recommendations (*10*). To meet the WHO 2030 target, health education and outreach efforts should be directed more toward the targeted age groups.

This study is limited by inaccuracies of self-reported data, potential unequal representation of screening program areas across the sampling regions, and the lack of survey questions on sociopsychological factors of screening uptake. Future studies using administrative data will offer a more definitive look into screening coverage. Qualitative studies on the drivers and barriers of screening uptake will also be helpful in improving screening program design. Moreover, this study only addresses screening coverage without touching upon screening quality control, which is crucial to the effectiveness of any screening program.

In conclusion, this study provides the latest estimate of cervical cancer screening coverage in China based on nationally and provincially representative survey data in 2018–2019. Approximately 43.4% of women aged 35–44 years and 36.8% of women aged 35–64 years reported having had cervical cancer screening in China in 2018–2019. To close the gaps with the WHO target for 2030, national and local policy and financial

support should be maintained for cervical cancer screening services, health education and outreach efforts should be focused on targeted age groups, and accessibility of health services should be strengthened in the rural areas and in central and western regions.

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REFERENCES

1. World Health Organization. Global strategy to accelerate the elimination of cervical cancer as a public health problem. 2020. https://www.who.int/publications/i/item/9789240014107. [2022-6-28].
2. Zheng RS, Sun KX, Zhang SW, Zeng HM, Zou XN, Chen R, et al. Report of cancer epidemiology in China, 2015. Chin J Oncol 2019;41(1):19 – 28. http://dx.doi.org/10.3760/cma.j.issn.0253-3766.2019.01.008. (In Chinese).
3. Chen WQ, Zheng RS, Zhang SW, Zeng HM, Xia CF, Zuo TT, et al. Cancer incidence and mortality in China, 2013. Cancer Lett 2017;401:63 – 71. http://dx.doi.org/10.1016/j.canlet.2017.04.024.
4. National Health Commission. Working plan of cervical cancer screening. http://www.nhc.gov.cn/fys/s3581/202201/cad44d88acca4ae49e12dab9176ae21c/files/7afa7269d02c4ba793b40561e8088c27.pdf. [2022-1-18]. (In Chinese).
5. Wang BH, He MF, Chao A, Engelgau MM, Saraiya M, Wang LM, et al. Cervical cancer screening among adult women in China, 2010. Oncologist2015;20(6):627 – 34http://dx.doi.org/10.1634/theoncologist.2014-0303.
6. Bao HL, Wang LH, Wang LM, Fang LW, Zhang M, Zhao ZP, et al. Study on the coverage of cervical and breast cancer screening among women aged 35-69 years and related impact of socioeconomic factors in China, 2013. Chin J Epidemiol 2018;39(2):208 – 12. http://dx.doi.org/10.3760/cma.j.issn.0254-6450.2018.02.014. (In Chinese).
7. Zhang M, Zhong YJ, Zhao ZP, Huang ZJ, Zhang X, Li C, et al. Cervical cancer screening rates among Chinese women — China, 2015. China CDC Wkly 2020;2(26):481 – 6. http://dx.doi.org/10.46234/ccdcw2020.128.
8. Bruni L, Serrano B, Roura E, Alemany L, Cowan M, Herrero R, et al. Cervical cancer screening programmes and age-specific coverage estimates for 202 countries and territories worldwide: a review and synthetic analysis. Lancet Glob Health 2022;10(8):E1115 – 27. http://dx.doi.org/10.1016/S2214-109X(22)00241-8.
9. Islam RM, Billah B, Hossain N, Oldroyd J. Barriers to cervical cancer and breast cancer screening uptake in low-income and middle-income countries: a systematic review. Asian Pac J Cancer Prev 2017;18(7):1751 – 63. http://dx.doi.org/10.22034/APJCP.2017.18.7.1751.
10. Wang LH, Zhao GL. Expert panel interpretation: comprehensive prevention and control guidelines for cervical cancer in China. Chin J Woman Child Health Res 2018;29(1):1 – 3. http://dx.doi.org/10.3969/j.issn.1673-5293.2018.01.001. (In Chinese).