Determinants and Socioeconomic Inequalities in Breast and Cervical Cancer Screening in Tajikistan: Evidence From the 2023 Demographic and Health Survey

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ABSTRACT

PURPOSE This study examined the determinants of breast and cervical cancer screening and quantified socioeconomic inequalities in service use.

METHODS We analyzed data from women age 15-49 years from the 2023 Tajikistan Demographic and Health Survey. The outcomes were self-reported ever having received a clinical breast examination for breast cancer and ever having been tested for cervical cancer. The prevalence was estimated using weighted descriptive statistics and Rao-Scott chi-square tests. Determinants were examined with multivariable logistic regression, reporting adjusted odds ratios (AORs), and 95% confidence intervals. Socioeconomic inequality was assessed using concentration curves and concentration indices, accounting for the complex survey design.

RESULTS The final sample size was 9,824. Breast and cervical cancer screening prevalence was 6.2% and 9.3%, respectively. Uptake increased with age (25-34 years: breast AOR = 2.68; cervical AOR = 2.41; 35-49 years: breast AOR = 3.54; cervical AOR = 3.27, *v* 15-24 years) and with household wealth (richest *v* poorest, cervical AOR = 1.95). Higher screening odds were associated with parity, recent health care visits, contraceptive use, and media exposure, whereas lower odds were associated with nonmotorized transport use. The prevalence was greater in urban areas. Concentration indices showed significant pro-rich inequality for both screening services (breast = 0.05; cervical = 0.05; $P < .001$).

CONCLUSION Strategies prioritizing integrating screening into reproductive and primary care, expanding outreach to poorer households, ensuring financial protection, and delivering community-based services in rural areas, alongside monitoring equity indicators, are critical to advancing universal access to breast and cervical cancer screening in Tajikistan.

ACCOMPANYING CONTENT

Reflexivity Statement

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INTRODUCTION

Cancer has now emerged as the leading cause of death in both developed and developing countries.[1] Among women, breast cancer is the most common, representing nearly one quarter of new cases and about one sixth of cancer deaths globally.[2] Although incidence is lower in developing countries, mortality is disproportionately higher, reflecting gaps in early detection, diagnosis, and treatment.[3] Cervical cancer is also a major public health concern, ranking as the fourth most common cancer in women worldwide and contributing to a large share of cancer-related deaths.[4] In 2022, breast cancer accounted for more than 2.3 million new cases and over 665,000 deaths, whereas cervical cancer caused about 662,000 new cases and 348,000 deaths worldwide.[5]

In the WHO European Region, countries in Eastern Europe and Central Asia (EECA) experience high cervical cancer incidence and mortality, along with elevated breast cancer mortality.[6] Tajikistan, one of the poorest countries in this region, reported a cancer incidence rate of 91.7 per 100,000 and mortality of 63.9 per 100,000, with breast cancer being the most common cancer among women.[7] Cervical cancer is also a major health challenge, with approximately 400 new cases and 130 deaths annually, more than half diagnosed at advanced stages and one fifth of women dying within a year of diagnosis.[8]

Global evidence shows that socioeconomic disparities strongly influence participation in cancer screening. Low household income, lower education, rural residence, and

CONTEXT

Key Objective

To examine the determinants of breast and cervical cancer screening among women of reproductive age in Tajikistan and to quantify the extent of socioeconomic inequalities in access to and utilization of these screening services.

Knowledge Generated

Participation in breast and cervical cancer screening was low (6.2% and 9.3%, respectively). Uptake increased with age, parity, wealth, contraceptive use, health care contact, and media exposure. However, strong pro-rich inequalities persisted, and women in rural areas or using nonmotorized transport had lower screening rates, reflecting access and affordability barriers.

Relevance

Findings highlight major gaps in screening coverage and equity in Tajikistan. Integrating screening into primary and reproductive care, expanding outreach to poor and rural women, and improving financial protection could enhance early detection and guide policies toward equitable access to women's cancer screening.

limited health service access are consistently associated with reduced screening uptake.[13-16]

Given the gaps in organized screening programs in Tajikistan and the evidence of socioeconomic disparities across similar contexts, it is essential to generate country-specific evidence. This study, therefore, investigates the determinants of breast and cervical cancer screening and quantifies socioeconomic inequalities in uptake using nationally representative data.

METHODS

Study Design and Data Source

This study used nationally representative cross-sectional data from the 2023 Tajikistan Demographic and Health Survey (TjDHS 2023), the third DHS conducted in the country. The survey was implemented by the Agency on Statistics under the President of Tajikistan in collaboration with the Ministry of Health and Social Protection of Population, with technical assistance from ICF through the DHS Program. Data collection was conducted from August to November 2023, with additional support from USAID, UNICEF, and UNFPA.[17] The detailed methodology, sampling procedures, and main findings of the 2023 TjDHS have been reported elsewhere.[17]

The primary objective of the TjDHS 2023 was to generate up-to-date estimates of key demographic and health indicators, including fertility, contraceptive use, maternal and child health, nutrition, childhood mortality, and awareness of HIV/AIDS and other health conditions.

The survey used a two-stage stratified sampling design based on the 2020 Population and Housing Census. In the first stage, 370 enumeration areas (166 urban and 204 rural) were selected using probability proportional to size. In the second stage, 22 households per cluster were systematically chosen, yielding a target sample of about 8,140 households. The design ensured representativeness at national, regional, and urban-rural levels, with separate estimates for the 12 Feed the Future districts in Khatlon. All women age 15-49 years who were permanent residents or present the night before the survey were eligible to participate.

Data Collection Instruments

The TjDHS 2023 used three standardized instruments: the Household Questionnaire, the Women's Questionnaire, and the Biomarker Questionnaire. All were adapted from the DHS Program's core models and tailored to address Tajikistan's demographic and health priorities. Drafts were reviewed by national ministries, nongovernmental organizations (NGO), and international partners to ensure policy relevance, and then finalized in English and translated into Tajik and Russian for field use.[17] The Household Questionnaire collected demographic data (eg, age, sex, education, marital status, parental survival for children <18 years) and information on living conditions, including water and sanitation, housing materials, migration, remittances, and household assets.[17] The Women's Questionnaire was administered to all women age 15-49 years and captured information on sociodemographic characteristics, fertility, maternal and child health, nutrition, health behaviors, noncommunicable diseases, domestic violence, autonomy, HIV/AIDS, and breast and cervical cancer screening.[17] Data for this study were derived from the Household and Women's Questionnaires.

Data Collection Procedures

Data collection was conducted using computer-assisted personal interviewing (CAPI) on tablet computers programmed

with CSPro software. Before the main survey, an extensive pretest was carried out to evaluate questionnaire translation, technical functionality of the CAPI system, and the accuracy of biomarker procedures. Feedback from this phase was incorporated into the final survey instruments.[17]

Outcome Variable

The two primary outcomes were breast cancer screening and cervical cancer screening. To assess breast cancer screening, women were asked: Has a doctor or health care provider ever examined your breasts to check for breast cancer? Those who answered yes were coded as 1 (screened), whereas those who answered no were coded as 0 (not screened).[17]

Cervical cancer screening was measured using the question: Has a doctor or health care provider ever tested you for cervical cancer? Responses were similarly coded as 1 (screened) and 0 (not screened). For both outcomes, participants who responded don't know were excluded from the analysis.[17]

Explanatory Variables

On the basis of prior literature and biological and social plausibility,[15,18,19] a range of explanatory variables were examined. These included age (15-24, 25-34, or 35-49 years), educational attainment (no schooling/primary, secondary, or higher), household wealth quintile (poorest to richest), and parity (none, one, two, or three or more children). Health service–related variables included undergoing a health care visit within the past year (yes or no), perceived travel time to the nearest health facility (≤10 minutes, 11-20 minutes, or >20 minutes), usual mode of transport (motorized or nonmotorized/other), and contraceptive use at the time of the survey (yes or no), region of residence (Dushanbe, Gorno-Badakhshan Autonomous Oblast [GBAO], Sughd, Districts of Republican Subordination [DRS], or Khatlon), place of residence (urban or rural), frequency of reading newspapers, listening to radio, and watching television (not at all, less than once a week, or at least once a week). The wealth index was calculated using principal component analysis of household assets, dwelling characteristics, and access to basic services and was then categorized into quintiles following DHS guidelines.[17,20-22]

Statistical Analysis

All analyses were conducted in Stata version 18.0. Survey weights and design variables were applied to account for the complex two-stage sampling, ensuring representativeness at national and regional levels. Weighted prevalence estimates of breast and cervical cancer screening were calculated, with unweighted sample sizes reported alongside weighted percentages. Group differences were tested using the Rao-Scott chi-square statistic, which adjusts for survey clustering and stratification. To identify independent determinants of screening, we fitted multivariable logistic regression models for each outcome. Results were presented as crude odds ratios (ORs) and adjusted ORs (AORs) with corresponding 95% CIs. Statistical significance was determined using a two-sided threshold of $P < .05$. Given that missing data were minimal (<1%), analyses were restricted to complete cases. Reporting adhered to the Strengthening the Reporting of Observational Studies in Epidemiology guidelines.[23]

Socioeconomic inequalities in breast and cervical cancer screening were further examined using concentration curves and concentration indices. The concentration curve plots the cumulative proportion of screened women against the cumulative population ranked by household wealth, from poorest to richest. A curve along the 45° line represents perfect equity; curves below this line indicate pro-rich concentration, whereas curves above it indicate pro-poor concentration. The concentration index (CIX), calculated as twice the area between the curve and the line of equality, was used to quantify the magnitude of inequality. Values range from −1 to +1, where 0 denotes perfect equity, negative values indicate concentration among the poor, and positive values indicate concentration among the wealthy. These inequality analyses incorporated survey weights and design features to ensure unbiased estimates.[24-27]

Ethical Considerations

The survey protocol of TjDHS 2023 was reviewed and approved by the Institutional Review Board (IRB) of ICF (Project Number: 2023-029). In Tajikistan, the national statistics agency is legally mandated to carry out population-based surveys, and therefore local IRB approval was not required.

RESULTS

Background Characteristics of Participants

The TjDHS 2023 achieved high response rates, with about 99.5% of the 8,140 sampled households successfully interviewed. Of the 9,930 eligible women identified, 9,879 completed interviews,[17] and the final analytic sample included 9,824 women age 15-49 years.

The background characteristics of participants and the prevalence of breast and cervical cancer screening status by covariates are presented in Table 1.

Prevalence of Breast and Cervical Cancer Screening

The weighted prevalence of breast cancer screening was 6.24%, whereas 9.34% of women reported ever being screened for cervical cancer. Breast cancer screening rates were 1.89% among women age 15-24 years, 7.68% among those age 25-34 years, and 9.14% among women age 35-49 years ($P < .001$). Cervical cancer screening rates were 3.12% in women age 15-24 years, 11.06% in those age 25-

TABLE 1. Background Characteristics of Participants and Prevalence of Breast and Cervical Cancer Screening Status by Covariates in Tajikistan, Demographic and Health Survey 2023 (N = 9,824)

		Breast Cancer Screening, No. (%)		Cervical Cancer Screening, No. (%)	
Variable	No. (%)	Yes	*P*[a]	Yes	*P*[b]
Age group			<.001		<.001
15-24	3,256 (33.60)	71 (1.89)		103 (3.12)	
25-34	3,010 (31.44)	269 (7.68)		368 (11.06)	
35-49	3,558 (34.96)	382 (9.14)		555 (13.79)	
Education			.002		.058
No education or primary	393 (4.47)	25 (5.61)		33 (7.71)	
Secondary	6,995 (75.93)	461 (5.77)		699 (9.03)	
Higher	2,436 (19.60)	236 (8.20)		294 (10.95)	
Wealth index			<.001		<.001
Poorest	1,622 (18.56)	59 (2.98)		102 (5.10)	
Poorer	1,585 (19.94)	103 (5.66)		151 (8.54)	
Middle	1,590 (19.85)	96 (5.61)		152 (9.33)	
Richer	1,747 (19.91)	135 (7.14)		210 (11.25)	
Richest	3,280 (21.75)	329 (9.31)		411 (11.96)	
Parity group			<.001		<.001
0 children	2,779 (27.36)	42 (1.39)		69 (2.72)	
1 child	1,101 (11.07)	95 (7.76)		118 (9.04)	
2 children	1,758 (17.21)	183 (8.60)		224 (10.47)	
3+ children	4,186 (44.36)	402 (7.94)		615 (13.07)	
Health care visit			<.001		<.001
No	2,764 (30.67)	82 (2.60)		115 (3.94)	
Yes	7,060 (69.33)	640 (7.86)		911 (11.73)	
Distance to health facility			.772		.764
≤10 minutes	2,923 (29.42)	204 (6.11)		297 (8.97)	
11-20 minutes	3,876 (39.01)	285 (6.07)		427 (9.19)	
>20 minutes	3,025 (31.57)	233 (6.58)		302 (9.88)	
Transport to health facility			.001		<.001
Motorized	2,909 (25.79)	284 (8.11)		400 (13.43)	
Nonmotorized/Others	6,915 (74.21)	438 (5.60)		626 (7.92)	
Contraceptive use			<.001		<.001
Not using	7,440 (76.23)	440 (5.07)		639 (7.66)	
Using	2,384 (23.77)	282 (10.02)		387 (14.73)	
Region of residence			<.001		.002
Dushanbe	1,997 (10.93)	245 (12.19)		312 (15.41)	
GBAO	814 (1.60)	94 (11.47)		123 (15.69)	
Sughd	2,107 (28.18)	168 (7.66)		166 (7.59)	
DRS	2,274 (23.98)	96 (4.10)		213 (9.30)	
Khatlon	2,632 (35.31)	119 (4.49)		212 (8.61)	
Place of residence			<.001		.019
Urban	4,198 (27.44)	401 (9.04)		505 (11.31)	
Rural	5,626 (72.56)	321 (5.18)		521 (8.60)	
Frequency of reading newspapers			.015		.039
Not at all	5,836 (65.07)	383 (5.63)		584 (8.87)	
Less than once a week	1,763 (15.94)	142 (7.43)		210 (11.65)	
At least once a week	2225 (18.99)	197 (7.34)		232 (9.02)	

(continued on following page)

TABLE 1. Background Characteristics of Participants and Prevalence of Breast and Cervical Cancer Screening Status by Covariates in Tajikistan, Demographic and Health Survey 2023 (N = 9,824) (continued)

Variable	No. (%)	Breast Cancer Screening, No. (%)		Cervical Cancer Screening, No. (%)	
		Yes	P^a	Yes	P^b
Frequency of listening to radio			.003		.006
Not at all	7,653 (78.96)	543 (5.84)		771 (8.82)	
Less than once a week	1,235 (12.03)	87 (6.60)		133 (10.06)	
At least once a week	936 (9.01)	92 (9.28)		122 (12.95)	
Frequency of watching television			.001		<.001
Not at all	1,223 (14.56)	53 (3.83)		80 (5.71)	
Less than once a week	1,807 (19.17)	115 (5.52)		187 (9.51)	
At least once a week	6,794 (66.27)	554 (6.98)		759 (10.09)	
Total	9,824 (100.00)	722 (6.24)		1,026 (9.34)	

NOTE. All the frequencies are unweighted frequencies, and percentages are weighted percentages.
Abbreviations: DRS, Districts of Republican Subordination; GBAO, Gorno-Badakhshan Autonomous Oblast.
[a]The *P* value was yielded by a Rao-Scott chi-square comparison between women who had breast cancer screening and those who did not.
[b]The *P* value was yielded by a Rao-Scott chi-square comparison between women who had cervical cancer screening and those who did not.

34 years, and 13.79% among women age 35-49 years ($P < .001$).

By household wealth, breast cancer screening rates were 2.98% among women in the poorest quintile and 9.31% among those in the richest quintile. Cervical cancer screening rates were 5.10% in the poorest quintile and 11.96% in the richest quintile ($P < .001$ for both). By educational attainment, breast cancer screening rates were 5.61% among women with no or primary education and 8.20% among those with higher education ($P = .002$). Cervical cancer screening rates were 7.71% among women with no or primary education and 10.95% among those with higher education ($P = .058$). By parity, the highest prevalence of breast cancer screening was observed among women with two children (8.60%), whereas cervical cancer screening was highest among women with three or more children (13.07%; $P < .001$ for both).

For media exposure, the highest prevalence of breast and cervical cancer screening among newspaper readers was observed in women who read less than once per week (breast: 7.43%, $P = .015$ and cervical: 11.65%, $P = .039$). Among television viewers, the highest prevalence was found in women who watched at least once per week (breast: 6.98%, $P < .001$; cervical: 10.09%, $P < .001$). For radio exposure, women who listened at least once per week reported the highest screening prevalence (breast: 9.28%, $P = .003$; cervical: 12.95%, $P = .006$).

Factors Associated With Breast and Cervical Cancer Screening

Table 2 presents the findings of multivariable logistic regression presenting the factors associated with breast and cervical cancer screening. Compared with women age 15-24 years, those age 25-34 had 2.68 times odds of breast cancer screening (95% CI, 1.80 to 3.99) and 2.41 times odds of cervical cancer screening (95% CI, 1.74 to 3.33). Women age 35-49 years had even higher adjusted odds for both outcomes (breast: 3.54, 95% CI, 2.32 to 5.38; cervical: 3.27, 95% CI, 2.32 to 4.61).

Wealth index was associated with breast cancer screening and cervical cancer screening. Women in the middle quintile had 1.78 times the odds of breast cancer screening (95% CI, 1.03 to 3.08) and 1.99 times the odds of cervical cancer screening (95% CI, 1.41 to 2.81) compared with the poorest. Women in the richer quintile had similarly higher odds for both outcomes. For cervical cancer, women in the richest quintile had nearly double the odds of screening (AOR, 1.95, 95% CI, 1.29 to 2.95).

Parity was also associated with screening. Compared with nulliparous women, those with one child had more than three times the odds of breast cancer screening (AOR, 3.23, 95% CI, 1.97 to 5.29) and nearly twice the odds of cervical cancer screening (AOR, 1.93, 95% CI, 1.27 to 2.93).

Health care contact was also found to be associated with breast and cervical cancer screening. Women who had visited a health care facility in the past 12 months had more than twice the odds of reporting breast cancer screening (AOR, 2.12, 95% CI, 1.59 to 2.82) and cervical cancer screening (AOR, 2.35, 95% CI, 1.79 to 3.10). Transportation medium was also apparent; women using nonmotorized or other forms of transport were less likely to be screened compared with those using motorized transport (breast cancer screening: AOR, 0.78, 95% CI, 0.61 to 0.99; cervical cancer screening: AOR, 0.59, 95% CI, 0.45 to 0.76).

TABLE 2. Logistic Regression Analysis Results of Factors Associated With Breast Cancer and Cervical Cancer Screening in Tajikistan, Demographic and Health Survey 2023

	Breast Cancer Screening				Cervical Cancer Screening			
Variable	COR (95% CI)	*P*	AOR (95% CI)	*P*	COR (95% CI)	*P*	AOR (95% CI)	*P*
Age group								
15-24	Ref		Ref		Ref		Ref	
25-34	4.32 (3.15 to 5.92)	<.001	2.68 (1.80 to 3.99)	<.001	3.87 (3.00 to 4.99)	<.001	2.41 (1.74 to 3.33)	<.001
35-49	5.22 (3.78 to 7.21)	<.001	3.54 (2.32 to 5.38)	<.001	4.97 (3.90 to 6.35)	<.001	3.27 (2.32 to 4.61)	<.001
Education								
No education or primary	Ref		Ref		Ref		Ref	
Secondary	1.03 (0.66 to 1.62)	.896	1.0 (0.63 to 1.59)	.991	1.19 (0.81 to 1.75)	.382	1.21 (0.81 to 1.8)	.359
Higher	1.5 (0.93 to 2.44)	.099	1.03 (0.62 to 1.72)	.897	1.47 (0.97 to 2.22)	.067	1.2 (0.79 to 1.82)	.384
Wealth index								
Poorest	Ref		Ref		Ref		Ref	
Poorer	1.95 (1.15 to 3.33)	.014	1.89 (1.08 to 3.31)	.027	1.74 (1.26 to 2.40)	.001	1.87 (1.33 to 2.63)	<.001
Middle	1.94 (1.15 to 3.27)	.014	1.78 (1.03 to 3.08)	.038	1.92 (1.39 to 2.64)	<.001	1.99 (1.41 to 2.81)	<.001
Richer	2.5 (1.47 to 4.26)	.001	2.05 (1.15 to 3.65)	.015	2.36 (1.72 to 3.24)	<.001	2.4 (1.69 to 3.40)	<.001
Richest	3.34 (1.99 to 5.61)	<.001	1.65 (0.90 to 3.03)	.103	2.53 (1.84 to 3.47)	<.001	1.95 (1.29 to 2.95)	.002
Parity group								
0 children	Ref		Ref		Ref		Ref	
1 child	5.97 (3.92 to 9.1)	<.001	3.23 (1.97 to 5.29)	<.001	3.56 (2.55 to 4.96)	<.001	1.93 (1.27 to 2.93)	.002
2 children	6.68 (4.60 to 9.71)	<.001	2.85 (1.76 to 4.61)	<.001	4.19 (3.04 to 5.78)	<.001	1.82 (1.21 to 2.73)	.004
3+ children	6.13 (4.35 to 8.63)	<.001	2.19 (1.36 to 3.54)	.001	5.39 (4.13 to 7.03)	<.001	1.92 (1.28 to 2.89)	.002
Health care visit								
No	Ref		Ref		Ref		Ref	
Yes	3.2 (2.43 to 4.20)	<.001	2.12 (1.59 to 2.82)	<.001	3.24 (2.52 to 4.18)	<.001	2.35 (1.79 to 3.10)	<.001
Distance to health facility								
≤10 minutes	Ref		Ref		Ref		Ref	
11-20 minutes	0.99 (0.77 to 1.29)	.963	0.93 (0.72 to 1.19)	.551	1.03 (0.81 to 1.30)	.83	0.98 (0.76 to 1.24)	.838
>20 minutes	1.08 (0.81 to 1.44)	.588	1.07 (0.81 to 1.42)	.617	1.11 (0.77 to 1.6)	.569	1.04 (0.76 to 1.41)	.823
Transport to health facility								
Motorized	Ref		Ref		Ref		Ref	
Nonmotorized/Others	0.67 (0.53 to 0.85)	.001	0.78 (0.61 to 0.99)	.041	0.56 (0.42 to 0.73)	<.001	0.59 (0.45 to 0.76)	<.001
Contraceptive use								
Not using	Ref		Ref		Ref		Ref	
Using	2.09 (1.73 to 2.52)	<.001	1.23 (1.00 to 1.52)	.048	2.08 (1.76 to 2.47)	<.001	1.3 (1.08 to 1.57)	.006
Region of residence								
Dushanbe	Ref		Ref		Ref		Ref	
GBAO	0.93 (0.65 to 1.34)	.711	1.02 (0.63 to 1.65)	.925	1.02 (0.76 to 1.38)	.892	1.06 (0.70 to 1.62)	.779
Sughd	0.6 (0.45 to 0.79)	<.001	0.69 (0.48 to 1.00)	.05	0.45 (0.34 to 0.60)	<.001	0.45 (0.31 to 0.66)	<.001
DRS	0.31 (0.23 to 0.42)	<.001	0.4 (0.27 to 0.61)	<.001	0.56 (0.42 to 0.75)	<.001	0.67 (0.46 to 0.98)	.04
Khatlon	0.34 (0.24 to 0.49)	<.001	0.51 (0.33 to 0.79)	.002	0.52 (0.34 to 0.79)	.002	0.73 (0.47 to 1.13)	.155
Place of residence								
Urban	Ref		Ref		Ref		Ref	
Rural	0.55 (0.44 to 0.69)	<.001	0.89 (0.64 to 1.22)	.455	0.74 (0.57 to 0.95)	.02	1.22 (0.86 to 1.72)	.271
Frequency of reading newspapers								
Not at all	Ref		Ref		Ref		Ref	
Less than once a week	1.35 (1.04 to 1.74)	.023	1.16 (0.87 to 1.55)	.301	1.35 (1.08 to 1.70)	.009	1.32 (1.01 to 1.71)	.041
At least once a week	1.33 (1.04 to 1.69)	.023	1.11 (0.84 to 1.47)	.456	1.02 (0.79 to 1.31)	.893	0.93 (0.72 to 1.21)	.589

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TABLE 2. Logistic Regression Analysis Results of Factors Associated With Breast Cancer and Cervical Cancer Screening in Tajikistan, Demographic and Health Survey 2023 (continued)

	Breast Cancer Screening				Cervical Cancer Screening			
Variable	COR (95% CI)	*P*	AOR (95% CI)	*P*	COR (95% CI)	*P*	AOR (95% CI)	*P*
Frequency of listening to radio								
Not at all	Ref		Ref		Ref		Ref	
Less than once a week	1.14 (0.86 to 1.51)	.372	0.94 (0.70 to 1.27)	.707	1.16 (0.88 to 1.51)	.294	1.07 (0.81 to 1.42)	.615
At least once a week	1.65 (1.22 to 2.23)	.001	1.31 (0.93 to 1.85)	.117	1.54 (1.18 to 2.00)	.001	1.52 (1.14 to 2.03)	.005
Frequency of watching television								
Not at all	Ref		Ref		Ref		Ref	
Less than once a week	1.47 (1.01 to 2.14)	.047	1.04 (0.71 to 1.50)	.855	1.73 (1.28 to 2.36)	<.001	1.27 (0.90 to 1.80)	.171
At least once a week	1.89 (1.35 to 2.64)	<.001	1.28 (0.91 to 1.81)	.158	1.85 (1.37 to 2.50)	<.001	1.41 (1.00 to 1.98)	.049

Abbreviations: AOR, adjusted odds ratio; COR, crude odds ratio; DRS, Districts of Republican Subordination; GBAO, Gorno-Badakhshan Autonomous Oblast.

Contraceptive use was positively associated with screening. Women using contraception had 23% higher odds of breast cancer screening (95% CI, 1.00 to 1.52) and 30% higher odds of cervical cancer screening (95% CI, 1.08 to 1.57). Regional disparities persisted after adjustment; women in Sughd, DRS, and Khatlon were significantly less likely to be screened compared with those in Dushanbe.

Socioeconomic Inequalities in Breast and Cervical Cancer Screening

Figure 1 presents the socioeconomic inequalities in breast cancer and cervical cancer screening in Tajikistan, respectively. Analysis of the concentration indices revealed significant pro-rich inequalities in screening uptake. For breast cancer, the CIX was 0.05 (SE, 0.01, $P < .001$), indicating that wealthier women were disproportionately more likely to be screened. Screening prevalence increased from 2.98% among women in the poorest quintile to 9.31% among those in the richest quintile (Table 3). Cervical cancer screening showed a similar pattern, with a CIX of 0.05 (SE, 0.01, $P < .001$). Screening prevalence rose from 5.10% among the poorest quintile to 11.96% among the richest (Table 4). Socioeconomic inequalities in both cancer screenings were evident across most subgroups.

DISCUSSION

The findings observed in this study highlight major gaps in cancer prevention in Tajikistan. The low screening coverage observed align with broader evidence from the EECA region.

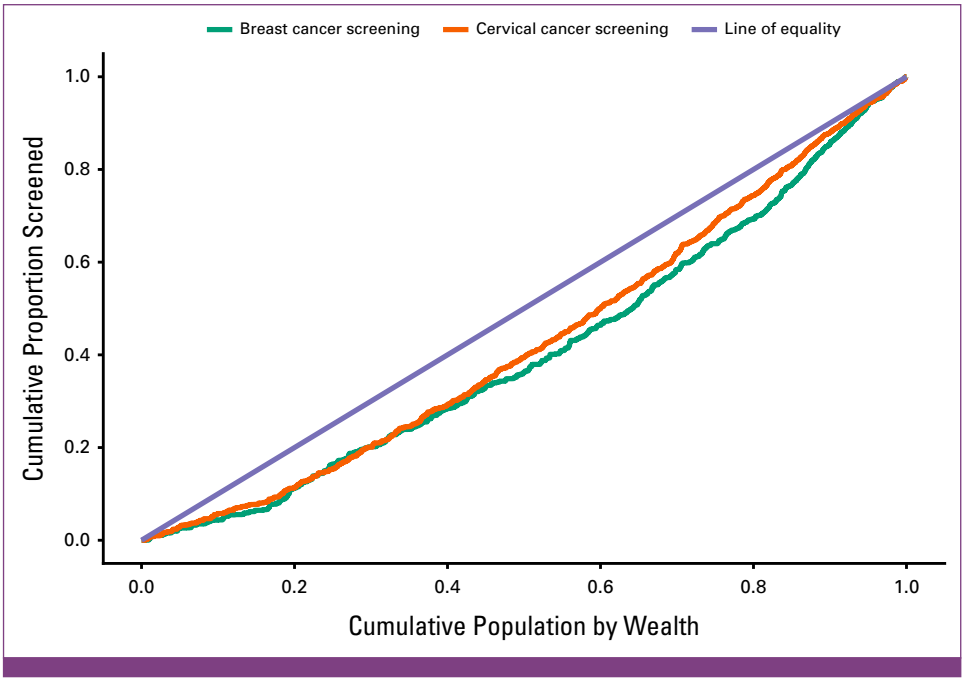

FIG 1. Concentration indices of breast and cervical cancer screening in Tajikistan, Demographic and Health Survey, 2023.

TABLE 3. Socioeconomic Inequalities in Breast Cancer Screening in Tajikistan, Demographic and Health Survey 2023

Variable	Q1 (%)	Q5 (%)	Q5-Q1 (%)	Q5/Q1	Index Value	SE	*P*
Total	2.98	9.31	6.33	3.12	0.05	0.01	<.001
Age group							
15-24	1.95	3.01	1.06	1.54	0.01	0.01	>.05
25-34	3.67	11.07	7.40	3.02	0.05	0.01	<.001
35-49	3.21	14.04	10.83	4.37	0.08	0.01	<.001
Education							
No education or primary	5.00	9.37	4.37	1.87	0.02	0.03	>.05
Secondary	2.59	8.64	6.05	3.34	0.04	0.01	<.001
Higher	5.84	10.36	4.52	1.78	0.04	0.01	<.001
Parity group							
0 children	1.25	1.66	0.41	1.33	0.00	0.01	>.05
1 child	2.66	12.19	9.53	4.58	0.05	0.02	<.01
2 children	6.25	11.93	5.68	1.91	0.04	0.02	<.05
3+ children	3.03	13.18	10.15	4.35	0.08	0.01	<.001
Health care visit							
No	1.90	3.34	1.44	1.76	0.02	0.01	<.05
Yes	3.69	11.18	7.49	3.03	0.05	0.01	<.001
Distance to health facility							
≤10 minutes	3.63	8.50	4.87	2.34	0.04	0.01	<.001
11-20 minutes	2.53	10.04	7.51	3.97	0.05	0.01	<.001
>20 minutes	3.02	9.12	6.10	3.02	0.05	0.01	<.001
Transport to health facility							
Motorized	3.16	10.80	7.64	3.42	0.05	0.01	<.001
Nonmotorized/Others	2.93	8.21	5.28	2.80	0.04	0.01	<.001
Contraceptive use							
Not using	2.68	7.51	4.83	2.80	0.03	0.01	<.001
Using	4.19	13.64	9.45	3.26	0.07	0.01	<.001
Region of residence							
Dushanbe	15.84	12.08	-3.76	0.76	-0.02	0.02	>.05
GBAO	7.87	12.97	5.10	1.65	0.05	0.03	>.05
Sughd	6.83	9.08	2.25	1.33	0.02	0.01	>.05
DRS	1.03	5.25	4.22	5.10	0.03	0.01	<.001
Khatlon	2.32	3.70	1.38	1.60	0.03	0.01	<.001
Place of residence							
Urban	1.94	10.05	8.11	5.18	0.03	0.01	<.001
Rural	3.07	4.94	1.87	1.61	0.02	0.01	<.001
Frequency of reading newspapers							
Not at all	2.97	10.00	7.03	3.37	0.04	0.01	<.001
Less than once a week	5.29	7.19	1.90	1.36	0.02	0.01	>.05
At least once a week	1.10	9.85	8.75	8.96	0.06	0.01	<.001
Frequency of listening to radio							
Not at all	2.90	10.02	7.12	3.46	0.05	0.01	<.001
Less than once a week	4.65	6.30	1.65	1.35	0.01	0.02	>.05
At least once a week	0.96	9.75	8.79	10.16	0.02	0.02	>.05
Frequency of watching television							
Not at all	2.51	4.58	2.07	1.82	0.02	0.01	>.05
Less than once a week	4.88	7.07	2.19	1.45	0.02	0.01	>.05
At least once a week	2.53	10.25	7.72	4.05	0.05	0.01	<.001

Abbreviations: DRS, Districts of Republican Subordination; GBAO, Gorno-Badakhshan Autonomous Oblast.

TABLE 4. Socioeconomic Inequalities in Cervical Cancer Screening in Tajikistan, Demographic and Health Survey 2023

Variable	Q1 (%)	Q5 (%)	Q5-Q1 (%)	Q5/Q1	Index Value	SE	*P*
Total	5.10	11.96	6.86	2.35	0.05	0.01	<.001
Age group							
15-24	1.58	3.60	2.02	2.28	0.02	0.01	<.05
25-34	5.94	13.39	7.45	2.25	0.06	0.01	<.001
35-49	7.17	18.99	11.82	2.65	0.09	0.01	<.001
Education							
No education or primary	4.58	13.85	9.27	3.02	0.06	0.03	<.05
Secondary	4.97	12.26	7.29	2.47	0.05	0.01	<.001
Higher	7.35	11.34	3.99	1.54	0.03	0.02	>.05
Parity group							
0 children	2.54	1.92	−0.62	0.76	-0.01	0.01	>.05
1 child	3.70	12.63	8.93	3.42	0.06	0.02	<.01
2 children	4.34	15.76	11.42	3.63	0.08	0.02	<.001
3+ children	6.88	17.76	10.88	2.58	0.09	0.01	<.001
Health care visit							
No	3.08	4.92	1.84	1.60	0.01	0.01	>.05
Yes	6.42	14.16	7.74	2.21	0.06	0.01	<.001
Distance to health facility							
≤10 minutes	6.84	11.55	4.71	1.69	0.04	0.01	<.001
11-20 minutes	4.45	13.20	8.75	2.97	0.07	0.01	<.001
>20 minutes	4.69	10.52	5.83	2.24	0.05	0.01	<.001
Transport to health facility							
Motorized	8.35	14.15	5.80	1.69	0.03	0.02	<.05
Nonmotorized/Others	4.09	10.34	6.25	2.53	0.05	0.01	<.001
Contraceptive use							
Not using	4.11	9.69	5.58	2.36	0.04	0.01	<.001
Using	9.10	17.43	8.33	1.92	0.07	0.02	<.001
Region of residence							
Dushanbe	32.92	14.51	−18.41	0.44	-0.05	0.02	<.01
GBAO	13.19	13.13	−0.06	1.00	0.00	0.03	>.05
Sughd	4.20	9.47	5.27	2.26	0.03	0.01	<.05
DRS	5.28	10.70	5.42	2.03	0.06	0.01	<.001
Khatlon	4.72	9.23	4.51	1.96	0.06	0.01	<.001
Place of residence							
Urban	3.42	12.30	8.88	3.60	0.03	0.01	<.05
Rural	5.24	9.93	4.69	1.90	0.05	0.01	<.001
Frequency of reading newspapers							
Not at all	4.84	13.65	8.81	2.82	0.06	0.01	<.001
Less than once a week	8.45	9.69	1.24	1.15	0.00	0.02	>.05
At least once a week	4.34	11.07	6.73	2.55	0.05	0.01	<.01
Frequency of listening to radio							
Not at all	5.17	13.11	7.94	2.54	0.05	0.01	<.001
Less than once a week	6.27	7.94	1.67	1.27	0.03	0.02	>.05
At least once a week	0.31	11.62	11.31	37.48	0.02	0.03	>.05
Frequency of watching television							
Not at all	3.54	6.44	2.90	1.82	0.02	0.02	>.05
Less than once a week	8.01	12.34	4.33	1.54	0.04	0.02	<.05
At least once a week	4.81	12.39	7.58	2.58	0.06	0.01	<.001

Abbreviations: DRS, Districts of Republican Subordination; GBAO, Gorno-Badakhshan Autonomous Oblast.

A recent nine-country survey reported that although Kazakhstan and Georgia have introduced population-based mammography and cervical screening programs with comparatively higher coverage (>50% and >70%, respectively), most other countries in the region including Tajikistan continue to rely on opportunistic screening through dispensarization (routine preventive check-ups rather than organized population-based screening).[19] In these settings, coverage remains limited, screening often begins at early ages not aligned with WHO recommendations, and Romanowsky-Giemsa staining is still widely used for cervical smears.[19]

Screening uptake increased with age, with women age 25-34 and 35-49 years having higher odds compared with those age 15-24 years. This pattern is consistent with prior studies,[28-33] which suggest that older women are more likely to use health care services and have greater awareness of early detection.[33]

The odds of breast and cervical cancer screening increased with household wealth index. This is consistent with multicountry evidence from sub-Saharan Africa, where a pooled analysis of 138,605 women reported a pro-rich CIX of about 0.25 for cervical screening and identified wealth, education, and media exposure as major contributors to inequality.[35] Similar results were reported in Jordan, where women in the highest wealth quintile had more than twice the odds of Pap testing compared with those in the lowest quintile.[36] Even in higher coverage settings such as South Korea, income-based gaps persisted despite substantial increases in participation, with significant absolute and relative inequalities between the richest and poorest groups.[37]

Health care contact was positively associated with both breast cancer and cervical cancer screening. Women who visited health facilities in the past year had more than twice the odds of screening compared with those who did not. Routine health maintenance visits function as an important facilitator of preventive care, indicating that stronger engagement with the health care system is a key determinant of cancer screening uptake.[18] Contraceptive use was also positively associated with screening, suggesting that integration of cancer screening into reproductive health and family planning services could be an effective strategy. Similar findings have been reported in Nepal and Ghana, where integration of preventive services increased uptake.[15,18]

Marked regional and geographic variation were observed. Women in urban areas, especially in Dushanbe, were more likely to be screened compared with rural residents. These patterns are consistent with the uneven distribution of health infrastructure and specialist services in Tajikistan. Access challenges are compounded in mountainous regions such as GBAO, although the prevalence there was higher than expected, possibly reflecting localized outreach or NGO-supported programs.[38]

Media exposure also played a role. Regular television viewing and newspaper reading were positively associated with cervical screening, in line with previous evidence.[15,19] The frequency of television viewing and newspaper reading likely reflects broader access to health information and public health messaging, which can influence awareness of cancer prevention and health care utilization. In Tajikistan and similar settings, traditional mass media remain important channels for health communication, particularly where digital access and structured health education are limited. However, these indicators do not directly capture cancer-specific knowledge or individual health literacy. Future research would benefit from incorporating more granular measures, such as exposure to targeted cancer awareness campaigns, use of digital media, or validated health literacy instruments, to better elucidate the pathways linking information access and screening behavior. These findings suggest that although public health campaigns delivered through mass media may increase awareness and demand, they must be complemented by affordable and accessible screening services, particularly for women from poorer households and rural areas. The inequality analysis confirmed significant pro-rich disparities. The CIX for both breast and cervical screenings was 0.05, indicating that wealthier women were more likely to access services. This pattern reflects not only financial barriers but also broader social determinants such as education, mobility, and health literacy. Similar pro-rich inequalities have been documented across many LMICs, including other Asian countries, where preventive services remain concentrated among privileged groups. For example, research in India involving 707,119 women from NFHS-5 reported concentration indices of approximately 0.20 for breast cancer screening and 0.15 for cervical cancer screening, with markedly lower uptake among poorer, less educated, and rural women.[16] In China, national estimates from 2018 to 2019 showed that cervical screening coverage was substantially lower in rural areas and in central and western regions compared with urban and eastern areas.[39] In Nepal, analysis of DHS data linked higher education, insurance coverage, and urban residence to increased likelihood of breast and cervical cancer screening, underscoring the role of household resources and health care access.[15]

The study has several notable strengths. First, it used a nationally representative sample, which enhances the generalizability of the findings in the context of Tajikistan. The 2023 TjDHS also achieved a high response rate and used standardized, validated tools for data collection. However, the study has limitations that warrant discussion. First, its cross-sectional design precludes establishing temporal relationships and thus limits causal inference. Second, screening history was self-reported and based on standardized DHS questions, which may be subject to recall bias and misclassification. In particular, respondents with lower health literacy may not clearly distinguish cancer screening from diagnostic evaluations or routine clinical examinations. This limitation, inherent to large-scale population surveys,

could result in either underestimation or overestimation of true screening prevalence. Third, the DHS does not collect detailed information on the timing, frequency, or quality of screening, which restricts interpretation of clinical effectiveness. Fourth, the analysis could not adjust for health insurance coverage or formal financial protection mechanisms because such information is not collected in the 2023 TjDHS. Fifth, the TjDHS included only women age 15-49 years, reflecting the standard age eligibility of the Demographic and Health Survey. Consequently, we were unable to assess screening uptake among women age 50 years and older, who constitute the primary target population for guideline-recommended population-based breast cancer screening. Although we conducted age-stratified prevalence analyses and explicitly modeled age groups in multivariable analyses, our findings primarily capture opportunistic screening practices among women of reproductive age rather than coverage of organized, guideline-based screening programs. Therefore, the results should be interpreted in the context of early detection behaviors within the TjDHS-eligible population.

In conclusion, breast and cervical cancer screening prevalence among women in Tajikistan is low and characterized by marked socioeconomic and geographic disparities. To advance cancer prevention and reduce inequities, Tajikistan should focus on integrating screening into reproductive health services, strengthening rural infrastructure, and implementing targeted outreach for disadvantaged populations to achieve equitable distribution of cancer screening services.

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DATA SHARING STATEMENT

The dataset analyzed in this study is drawn from publicly available sources provided by the Demographic and Health Surveys (DHS) Program. Interested researchers may access these data by registering and submitting an official data request through the DHS Program's online portal at https://dhsprogram.com.

AUTHOR CONTRIBUTIONS

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AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

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Open Payments is a public database containing information reported by companies about payments made to US-licensed physicians (Open Payments).

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