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Women's empowerment and its influence on the uptake of breast cancer screening in Tanzania: an analysis of 2022 Tanzania demographic health survey data

Maureen Treasure Bamusi^{1*}, Neena Elezebeth Philip² and Lekha D Bhat²

Abstract

Background Breast cancer is the second most commonly diagnosed cancer worldwide, with a high mortality rate in developing countries, including sub-Saharan Africa. Screening is one way to ensure early detection and management of breast cancer, and it is influenced by several factors. Education and socio-economic status may also affect the utilization of breast cancer screening services as these impact decision-making. This study aimed to investigate women's empowerment and its influence on the uptake of breast cancer screening among women in Tanzania.

Methods This study utilized the 2022 Tanzania Demographic and Health Survey data, and included 4216 women aged 20 to 49 years. Women empowerment variables used include social independence, decision-making, ownership of assets, and attitude towards violence. Statistical Package for Social Sciences version 26 was used for data cleaning and analysis. Descriptive statistics and bivariate analysis were done, including a multivariate logistic regression to assess the level of association between independent variables with breast cancer screening.

Results Findings indicate that the prevalence of breast cancer screening is 5.2%. Age, education level, literacy, ownership of assets, attitude towards violence, and decision making are associated with ever going for breast cancer screening. Women aged 45 to 49 years (AOR=6.28, 95% CI=6.27–6.28), those with secondary or higher education (AOR 1.1, 95% CI=1.05–1.06), literate women (AOR=1.13, 95% CI=1.13–1.13), those who own a house (AOR=3.08, 95% CI=3.08–3.09), who jointly decide on their healthcare with partners on healthcare (AOR=1.18, 95% CI=1.18–1.19) had significantly higher odds of going for breast cancer screening.

Conclusion Women's empowerment is significantly associated with the likelihood of engaging in breast cancer screening. Empowered women are more likely to undergo screening. Focus should be on empowering women through education, businesses, and community involvement. Country-specific interventions and breast cancer screening awareness campaigns should include empowerment initiatives to promote screening uptake.

Keywords Women's empowerment, Breast cancer, Screening, Demographic health survey

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Introduction

In the report on Global Cancer Incidence, Mortality, and Prevalence (GLOBOCAN) estimates for 2022 by the International Association of Research on Cancer (IARC), new cancer cases were estimated to be 20 million, and deaths from cancer were estimated to be almost 10 million. The current second most commonly diagnosed cancer is female breast cancer, which contributes to about 11.6% of all cancers worldwide. The burden of cancer is estimated to increase by the year 2050 to about 35 million new cases worldwide [1]. Previously, the burden of cancer was reported to be at 28.4 million new cases by 2040 in 2020 [2]. Female breast cancer accounted for 670,000 deaths globally in 2022 [3] and affects all women of reproductive age.

Women's empowerment is a crucial and multidimensional process that has various effects on women's health. A woman's level of empowerment predicts several decisions in the household, community, and country. Women's empowerment affects decision-making concerning a woman's health and the health of family members, especially children. Women's empowerment is a process by which those who cannot make strategic choices get the chance and ability to do so [4]. It is a process that happens and changes over time and is described as a state of agency, as stated by Kabeer [5], where women themselves must take an active instead of passive role in ensuring that they are empowered. This is expected to promote women's sense of worthiness, increase their ability to make their own choices, and thus be influential in social change. Some prerequisites for women's empowerment are resources, perceptions, attitudes, and power [6].

Globally, it is reported that women live to achieve only 60% of their maximum capabilities following an assessment done using the Women Empowerment Index (WEI). Women also accomplish 28% less than men in crucial human development dimensions as measured by the Global Gender Parity Index (GGPI) [7]. According to the United Nations Women 2023 report, there are about 3.1 billion girls and women in countries with low or average empowerment levels, which represent almost 90% of the female population and this indicates that even at the global level, women's empowerment levels remain low [7, 8].

The Gender Inequality Index (GII) is vital in assessing women's empowerment. This index explicitly targets gender-based inequalities using three measures: reproductive health, empowerment, and economic activity. It focuses on the entire well-being of women and their empowerment in all countries across the globe. Some factors considered by this index include labor force participation, maternal mortality, and educational attainment [9]. As of 2022, Tanzania had a GII of 0.513 and ranked

131 out of 193 countries [10]. Tanzania ranks 54th out of 146 economies in the Global Gender Gap Index with a score of 0.734 [11]. This implies that despite some progress in closing the gender gap, gender inequalities and disparities are still prevalent in Tanzania. These inequalities affect women's attainment of empowerment which in turn influences health services utilization.

The Survey-based Women Empowerment Index (SWPER) is an index that is used to measure women's empowerment in Africa [12]. The index was developed based on Demographic and Health Survey (DHS) data from 34 African countries and focused on 15 variables that were indicative of women's empowerment. These variables were under three domains of attitude towards violence (if beating is justified under any of the five reasons which include if the wife goes out without telling the husband, burns food, argues with her husband or refuses to have sex with her husband, or neglects the children), social independence (frequency of reading newspaper, woman's education, age of woman at first birth and first cohabitation, age difference with husband or partner and if respondent worked in the past 12 months). Finally, the domain of decision making which included decision-makers on respondents' healthcare, large household purchases and visits to family or relatives [12, 13]. The SWPER index was compared to the Gender Development Index and found to be reliable since it measures crucial aspects of women's empowerment. One strength of this index is that it can be applied at the population and individual levels, unlike other indices [12].

The concept of women's empowerment varies worldwide, and its indicators and indices are not uniform in all countries [14], because some of the indicators are context-specific; hence there is a need for every country to have a country-level index to measure women's empowerment that applies to their setting. Mganga et al. [15] set out to develop a specific women empowerment index for Tanzania based on data from the demographic and health surveys. The index has six domains with 23 items, these domains include access to skilled health care, decision-making, attitude towards violence, age at menarche, age at first childbirth, and property ownership. These domains are also similar to those identified by Asaolu et al. [16] hence confirming their relevance in most African settings.

As a community and country, achieving public health goals also depends on women's empowerment. Health-seeking behaviors among women to a large extent will rely on their level of empowerment. Women who are empowered have more control over decisions regarding the utilization of healthcare services [17, 18] for example, breast cancer screening [19]. These women tend to have an increased economic and social capacity, enabling

them to seek health care. On the other hand, women who are not economically and intellectually empowered may be less assertive, have low decision-making attributes, and are less likely to utilize healthcare services [17].

Women's empowerment also influences the uptake of obstetrics and gynecology services as the odds of a woman accessing such healthcare services are proven to be higher in women who are autonomous and empowered, unlike those who are not empowered [18, 20]. Despite some improvements in the accessibility of healthcare services in low-income countries, such services are underutilized. A cross-sectional study done in Liberia discovered that utilization of health services is high in empowered women, unlike unempowered women [21]. Furthermore, Bello et al. [22] also agree that women's empowerment affects their utilization of healthcare services, for example, antenatal care visits. Findings revealed that women's empowerment does not affect when women report for their first antenatal care visit, but women who are empowered attend more antenatal care visits than those not empowered.

The incidence of breast cancer is higher in developing countries as compared to developed countries and is attributed to various demographic changes and globalization [2]. Health systems must be empowered and have sustainable screening, prevention, and cancer management measures, as this will result in the control of the increasing cancer burden. Despite Africa having the lowest age-standardized breast cancer incidence rate of 36.2 for every 100,000 women per year, it has the highest mortality rate of 17.3 per 100,000 women compared to other regions of the world [23].

Many regions in sub-Saharan Africa are reporting an increasing incidence of breast cancer every year [1]. This may be caused by changes in lifestyles, for example, having diets rich in calories and low in fruits and vegetables and the use of hormonal contraceptives [1, 24]. The survival rate from breast cancer after diagnosis is low in Sub-Saharan Africa as compared to developed and high-income countries [2]. This is because most cases of breast cancer are identified at a late stage, leading to poor prognosis. In developed countries, the survival rate is high as there is routine screening, proper cancer treatment, and management for those diagnosed with breast cancer [3].

In Tanzania, a country in East Africa, many women lose their lives to breast cancer despite there being a low incidence [25]. It is reported that almost 50% of women diagnosed with breast cancer do not survive, as the mortality-to-incidence ratio for breast cancer is 0.5 [26]. This high mortality is attributed to late diagnosis and treatment of breast cancer. Approximately 90% of women seek medical care in the advanced cancer stages [25]. Breast cancer screening, having access to healthcare without

any barriers, and commencing cancer treatment while in the early stages are effective in reducing mortality. In Sub-Saharan Africa, the majority of late detections of breast cancer are found in countries like South Africa, Cameroon, Central Africa Republic, Malawi, and Tanzania [27].

Breast cancer screening identifies cancer in its early stages and helps find treatment therapies that deter further spread. Breast cancer screening is an essential aspect in reducing mortality secondary to late identification and management of breast cancers [3]. The National Comprehensive Cancer Network (NCCN) states that breast cancer screening varies according to factors like age, family, and medical history. It may include physical examination, risk assessment, screening mammography, and Magnetic Resonance Imaging (MRI). There are two main ways of screening for breast cancer, and these include Breast Self-Examination (BSE) and Clinical Breast Examination [28].

The mortality due to breast cancer has been shown to reduce following early adoption of breast cancer screening and treatment. In a study done in Norway, it was discovered that screening was associated with the reduction of breast cancer mortality as it contributed about one-third of the total reduction of breast cancer deaths [29] another study done in Sweden found a 40 to 50% reduction rate. Similar studies done in India and other low-middle-income countries emphasize the role of screening in reducing mortality [30, 31].

Women's empowerment, as it is a process and dynamic concept keeps evolving; it is multidimensional, and dramatically influences health decision-making in women. Many studies have discovered that women's empowerment influences various health services utilization in women [21, 22, 32]. However, a knowledge gap exists regarding women's empowerment and its influence on the uptake of breast cancer screening as there is little information known. Moreover, there are no studies done in Africa, specifically Tanzania, that examined the role of women's empowerment in the uptake of breast cancer screening services using demographic and health survey data. The study findings will provide valuable insights that will help to promote women's empowerment and improve access and utilization of breast cancer screening services.

Objectives of the study

Using the Tanzania 2022 DHS data, the study aimed to investigate the association between women's empowerment and the uptake of breast cancer screening, estimate the prevalence of breast cancer screening in Tanzania, and assess levels of women empowerment among Tanzanian women.

Methods

Study design and data collection

This study is based on secondary data obtained from the DHS program, which carries out nationally representative population-based household surveys that are often conducted every five years. It was implemented by the Tanzania National Bureau of Statistics in collaboration with the Ministries of Tanzania Mainland and Zanzibar [33]. Data collection was carried out in two stages to provide representative estimates for the whole population, and a stratified two-stage sampling technique was followed. This first involved a selection of sampling points consisting of enumeration areas (EAs) using the 2012 Tanzania population and housing census [33]. The EAs were selected with a probability proportional to their size within each stratum. A total of 629 clusters were selected, among which 211 were from urban areas, and 418 were from rural areas. In the second stage, about 26 households were selected from each cluster, which led to an estimated 16,312 households being selected. Tanzania is divided into nine

zones to estimate geographical differentials. The sampling frame excluded institutional populations, such as those in hotels, barracks, hospitals, camps, and prisons.

The Tanzania Demographic Health Survey (TDHS) 2022, included 15,254 women and used five questionnaires. The women's questionnaire is of interest to this study, as it collected information from all eligible women aged 15 to 49 years. The questionnaire included sociodemographic characteristics and questions regarding women's work, reproductive and maternal history. It specifically included questions regarding knowledge of breast cancer and if the woman has ever undergone breast cancer screening.

After selecting the 20 to 49 years age group (as risk increases with age and screening is recommended for women in older age groups), 12,112 women remained. After data cleaning and excluding those with missing responses in variables relevant to the study, 4227 women remained. Of these only 4216 women had a valid response to the outcome variable and hence were included in the analysis as shown in Fig. 1.

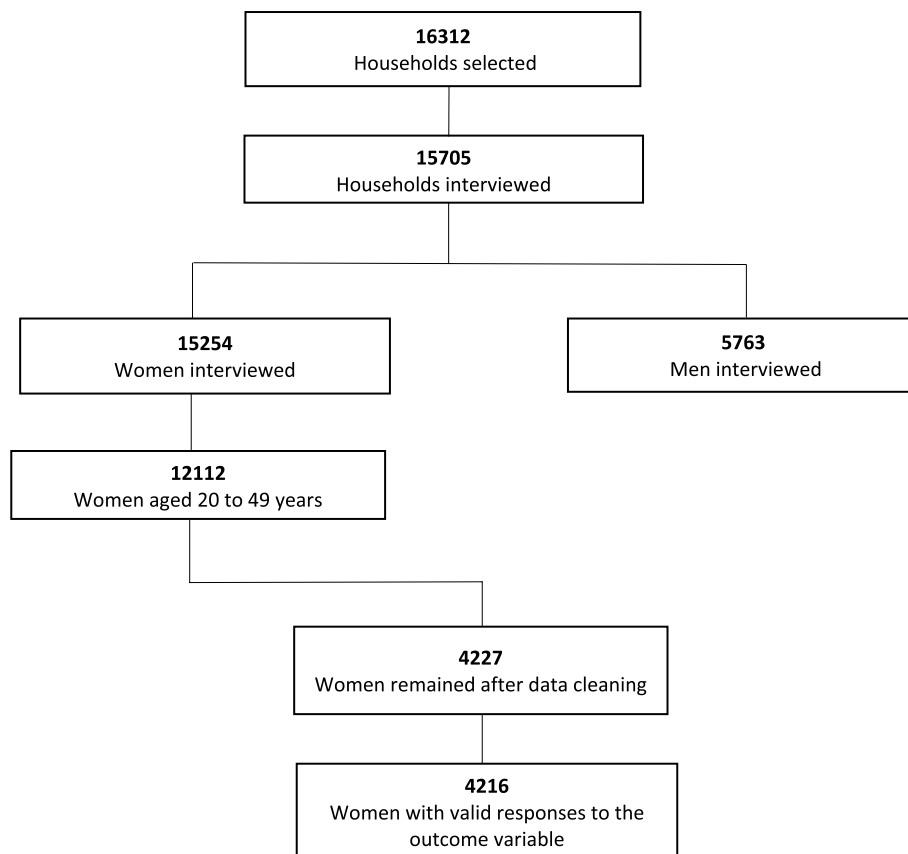


Fig. 1 Sample selection, Tanzania Demographic Health Survey, 2022

Variables and measurement

Outcome variable

The uptake of breast cancer screening services is the outcome variable. Information on breast cancer screening was gathered by asking this question, 'has a doctor or other healthcare provider examined your breasts to check for breast cancer?' Responses were recorded as 'One' indicating 'Yes' (they have ever undergone breast cancer screening) and 'two' indicating 'No'.

Independent variables

Some studies found age, place of residence, education, and parity as determining factors in the uptake of breast cancer screening [19, 34]. Literacy [35] and employment status [36] are other factors affecting breast cancer screening uptake. Independent variables used include the following, with their responses listed in brackets. Age was grouped into six age groups (20–24, 25–29, 30–34, 35–39, 40–44, 45–49 years), education (No education, Primary, Secondary, Higher), marital status (married, living with partner), place of residence (urban, rural), Region or Zone (Western, Northern, Central, Southern Highlands, Southern, South West Highlands, Lake, Eastern, Zanzibar), Occupation (non-employed, employed, self-employed, professional, clerical, agricultural), wealth index (poorest, poorer, middle, richer, richest), heard about breast cancer (yes or no). Covered by health insurance (yes, no), and finally, parity which was categorized as nullipara (no children), low parity (1–3 children), moderate parity (4–7 children, and high parity (equal to or more than eight children).

Women empowerment indicators

The women empowerment variables used in the analysis were derived from various indices used to measure women empowerment that apply to Sub-Saharan Africa and specifically Tanzania. These include the following with their responses in brackets; ownership of a mobile phone or bank account (yes or no). When getting medical help, one needs permission to go, distance to a health facility, getting the money needed for treatment, and not wanting to go alone when seeking medical help. Responses were recorded as; no problem, big problem, not a big problem. Decision maker on the respondent's healthcare, large household purchases, and visits to family or relatives (respondent, respondent and partner, self and another person, partner alone, someone else). Ownership of land or house alone or jointly (does not own, alone only, jointly with husband, jointly with someone else only, both alone and jointly), the respondent can refuse sex (yes or no).

Media exposure: frequency of reading newspapers or magazines, listening to the radio, and watching television

(not at all, less than once a week, at least once a week, almost every day). Attitude towards domestic violence is comprised of five scenarios to which the respondent answered 'yes', meaning it is justified, and 'no', meaning it is not justified. The scenarios include; beating justified if the wife goes out without telling the husband, neglects children, if food is burnt, argues with the husband, or refuses to have sex. The responses were coded as 0 for No and 1 for Yes, respectively. A score was calculated for each case, and a combined variable indicating overall attitude towards violence was included in the analysis. A score of zero represented those who stated that violence is not justified, and any score equal to or greater than one represented those who accepted domestic violence under any of the reasons stated.

Data analysis

Analysis was performed using SPSS version 26, and descriptive statistics were used to describe the characteristics or attributes of the women included in this study. A bivariate analysis was done using the Pearson chi-square test to check the relationship between the outcome variable and each independent variable. The strength of associations between the variables was assessed using multivariate logistic regression. Variables with a statistically significant *P-value* of less than 0.05 were entered in the multivariate logistic regression model, and an adjusted odds ratio (AOR) with 95% confidence intervals was estimated. Adjusting the population size for sampling weights and computing weights was done. The researcher weighted the cases and inserted variables using the women's sample weight (V005) which is the unit of analysis in this study.

Results

Sociodemographic characteristics

Table 1 The majority of the study participants were aged between 20 and 39 years (74.6%), with a mean age of 33.07 years and a standard deviation of 8.23. Most of the women (68.3%) reside in rural areas, while 31.7% dwell in urban areas. About 20.3% were uneducated, 53.4% had attained primary-level education, 25.1% were educated up to secondary level, and only 1.2% had attained tertiary-level education. Married women constituted 75.7% of the study population, while 24.3% were not married but living with their partner. Regarding literacy level, 23.7% could not read, 7.1% could read parts of a sentence, or they were visually impaired. Those who could read a whole sentence constituted 69.2% of the whole study population. Only 5.5% of the study population was covered by health insurance.

The wealth index measures the living standard by looking into areas of ownership of selected assets like housing

Table 1 Demographic characteristics of study participants, TDHS 2022

Demographic characteristics	<i>n</i> = 4216	Women %
Age group (Years)		
20–24	765	18.1
25–29	887	21.0
30–34	759	18.0
35–39	738	17.5
40–44	558	13.2
45–49	509	12.1
Mean(± SD) age (years)	33.07 ± 8.23	
Residence		
Urban	1337	31.7
Rural	2879	68.3
Region/Zone		
Western	328	7.8
Northern	369	8.8
Central	379	9.0
Southern Highlands	337	8.0
Southern	221	5.2
South West highlands	523	12.4
Lake	849	20.1
Eastern	493	11.7
Zanzibar	717	17.0
Education level		
No education	856	20.3
Primary	2250	53.4
Secondary	1060	25.1
Higher	50	1.2
Marital status		
Married	3191	75.7
Living with partner	1025	24.3
Literacy		
Cannot read at all	1000	23.7
Able to read only parts of a sentence or no card with required language or blind/Visually impaired	298	7.1
Able to read the whole sentence	2918	69.2
Wealth index		
Poorest	674	16.0
Poorer	753	17.9
Middle	865	20.5
Richer	949	22.5
Richest	975	23.1
Respondent's occupation		
Not working	1309	31.0
Professional/Technical/Managerial	146	3.5
Clerical/Sales/Services	378	9.0
Agricultural-employee	958	22.7
Skilled manual	468	11.1
Unskilled manual	721	17.1

Table 1 (continued)

Demographic characteristics	<i>n</i> = 4216	Women %
Other	236	5.6
Covered by health insurance		
Yes	231	5.5
No	3985	94.5
Parity (Children ever born)		
Nullipara	203	4.8
Low parity (1–3)	2047	48.6
Moderate parity (4–7)	1609	38.2
High parity (> 8)	357	8.5
Heard about breast cancer		
Yes	3882	92.1
No	334	7.9
Ever had breast cancer screening		
Yes	218	5.2
No	3998	94.8

materials used, television, access to safe water, and basic sanitation facilities [33]. According to the scale, which categorizes the classes from the poorest to the richest, the richer and richest cumulatively accounted for 45.6%, the poorest and poorer constituted 33.9%, and 20.5% were in the middle class. Concerning the respondents' occupations, about 31% were not working. The most prevalent occupation was agricultural employees, which comprised about 22.7% of the study population, seconded by unskilled manual workers at 17.1%. Skilled manual employees, women in service, clerical, sales, technical or professional positions, and other occupations cumulatively accounted for 29.2%. About 48.6% of the women had low parity, 38.2% had moderate parity, 8.5% had high parity, and 4.8% had never given birth. The majority (92.1%) of the women had ever heard of breast cancer. On the other hand, 94.8% of the women had never undergone breast cancer screening, those who did were only 5.2%.

Women empowerment in Tanzania

In Table 2, about 51.3% of women in the study population do not own any house. Only 3% own a house individually, and the majority (64.3%) do not own any land. Only 2.6% own land individually, and about 33.1% own lands alone and other lands jointly owned by their husband or partner. For 72.6% of the women, the distance to the nearest health facility was not a major problem, 85.1% also stated that it is not a major problem for them to go and get medical help alone while 14.9% considered seeking medical help by themselves as a major problem. About 67.4% of the women had no problem getting the money needed

Table 2 Demographic characteristics and breast cancer screening, bivariate analysis of breast cancer screening among Tanzanian women

Demographic characteristics	Ever had breast cancer screening				Chi-Square	Degrees of freedom	P value
	Yes		No				
	N	%	N	%			
Age group (Years)					39.86	5	< 0.001
20–24	16	0.4	749	17.8			
25–29	33	0.8	854	20.3			
30–34	39	0.9	720	17.1			
35–39	46	1.1	692	16.4			
40–44	37	0.9	521	12.4			
45–49	47	1.1	462	11.0			
Residence					57.8	1	< 0.001
Urban	120	2.8	1217	28.9			
Rural	98	2.3	2781	66.0			
Region/Zone					22.8	8	0.004
Western	8	0.2	320	7.6			
Northern	23	0.5	346	8.2			
Central	14	0.3	385	8.7			
Southern Highlands	25	0.6	312	7.4			
Southern	7	0.2	214	5.1			
South West highlands	23	0.5	500	11.9			
Lake	37	0.9	812	19.3			
Eastern	39	0.9	454	10.8			
Zanzibar	42	1.0	675	16.0			
Education level					61.5	3	< 0.001
No education	18	0.4	838	19.9			
Primary	106	2.5	2144	50.9			
Secondary	83	2.0	977	23.2			
Higher	11	0.3	39	0.9			
Marital status					3.18	1	0.074
Married	176	4.2	3015	71.5			
Living with partner	42	1.0	983	23.3			
Literacy					17.39	2	< 0.001
Cannot read at all	28	0.7	972	23.1			
Able to read only parts of a sentence or no card with required language or blind/Visually impaired	12	0.3	286	6.8			
Able to read the whole sentence	178	4.2	2740	65.0			
Wealth index					1.15	4	< 0.001
Poorest	7	0.2	667	15.8			
Poorer	20	0.5	733	17.4			
Middle	35	0.8	830	19.7			
Richer	44	1.0	905	21.5			
Richest	112	2.7	863	20.5			

Table 2 (continued)

Demographic characteristics	Ever had breast cancer screening				Chi-Square	Degrees of freedom	P value
	Yes		No				
	N	%	N	%			
Respondent's occupation					77.8	6	< 0.001
Not working	49	1.2	1260	29.9			
Professional/Technical/Managerial	26	0.6	120	2.8			
Clerical/Sales/Services	32	0.8	346	0.3			
Agricultural-employee	26	0.6	932	22.1			
Skilled manual	28	0.7	440	10.4			
Unskilled manual	38	0.9	683	16.2			
Other	19	0.5	217	5.1			
Covered by health insurance					68.3	1	< 0.001
Yes	179	4.2	192	4.6			
No	39	0.9	3806	90.3			
Parity (Children ever born)					8.19	3	0.042
Nullipara	8	0.2	195	4.6			
Low parity (1–3)	109	2.6	1938	46.0			
Moderate parity (4–7)	93	2.2	1518	36.0			
High parity (> 8)	8	0.2	349	8.3			

*p < 0.05 - Statistically significant

for medical treatment, while 32.6% did. Decision-making is another aspect used to measure women's empowerment [22]. Only 21.8% could decide on their health care, while 55.8% of the respondents made such decisions jointly with their husbands or partners. Concerning large household purchases, 50.9% decided jointly with their husband or partner, and 35% of the population stated that only the husband or partner makes such decisions. Women who make such decisions alone accounted for 14.1% of the study population.

In terms of overall attitude toward violence, 53.9% reported that beating is not justified under any circumstance, while 46.1% stated that it is justified under one or more of the scenarios mentioned. The majority 64% of the women had mobile phones while only 7.7% had bank accounts. Only 6.1% of the women read newspapers or magazines at least once a week, while 80% never read newspapers or magazines. Women who never listened to the radio accounted for 42% of the study population, while those who listened at least once per week were 33.3%. About 56.1% of the women never watched television, while 27.7%, watched television at least once a week.

Factors associated with breast cancer screening

The bivariate analysis results in Table 3 indicate that age, place of residence, educational level, literacy, wealth

index, occupation, health insurance, and parity are significantly associated with breast cancer screening. Breast cancer screening is high in women aged 35 to 49 years (3.1%), those residing in urban areas (2.8%), and those who have undergone up to the secondary education level (4.5%). Screening was also high in women covered by health insurance (4.2%), literate (4.2%), the richest at 2.7%, those with low parity (2.6%), and women who had ever heard of breast cancer (4.7%).

In Table 4, the women empowerment variables that are statistically significant concerning breast cancer screening are ownership of assets, having a mobile phone and bank account, media exposure, attitude towards violence, access to health care, decision-making on large household purchases, and respondents' healthcare.

Table 5 (in the supplementary file) shows the results of the logistic regression. Women aged 45 to 49 years were 6.28 times more likely to go for screening, while those dwelling in rural areas were 1.48 times more likely to go for breast cancer screening. Those who could read the whole sentence were 1.13 times more likely to undergo breast cancer screening, and those with secondary or higher education were 1.1 times more likely to go for screening. The odds were 1.22 for those working than those not working and those women who had low parity were 3.02 times more likely to go for screening.

Table 3 Prevalence of women's empowerment among women in Tanzania, TDHS 2022

Women empowerment variables	Women	
	n = 4216	%
Property ownership		
Owns a house alone/jointly		
Does not own	2164	51.3
Alone only	128	3.0
Both alone and jointly with husband/partner or someone else	1924	45.6
Owns land alone/jointly		
Does not own	2711	64.3
Alone only	109	2.6
Both alone and jointly with husband/partner or someone else	1396	33.1
Access to healthcare		
Distance to a health facility		
Big problem	1155	27.4
Not a big problem	3061	72.6
Getting medical help: not wanting to go alone		
Big problem	628	14.9
Not a big problem	3588	85.1
Getting medical help: needs permission to seek medical help		
Big problem	185	4.4
Not a big problem	4031	95.6
Getting medical help: getting the money needed for treatment		
Big problem	1373	32.6
Not a big problem	2843	67.4
Decision making		
Decision maker on respondents' healthcare		
Respondent alone	917	21.8
Respondent & husband/partner	2351	55.8
Husband/partner alone or someone else	948	22.5
Decision maker on large household purchases		
Respondent alone	593	14.1
Respondent & husband/partner	2147	50.9
Husband/partner alone or someone else	1476	35.0
Decision maker on visits to family/relatives		
Respondent alone	673	16.0
Respondent & husband/partner	2374	56.3
Husband/partner alone or someone else	1169	27.7
Attitude towards violence		
Justified if the wife goes out without telling the husband		
No	2909	69.0
Yes	1307	31.0
Justified if the wife neglects the children		
No	2735	64.9
Yes	1481	35.1
Justified if the wife burns the food		
No	3731	88.5
Yes	485	11.5
Justified if the wife argues with the husband		
No	2870	68.1
Yes	1346	31.9

Table 3 (continued)

Women empowerment variables	Women	
	n = 4216	%
Justified if the wife refuses to have sex with the husband		
No	3201	75.9
Yes	1015	24.1
Social Independence		
Owns a mobile phone		
No	1518	36.0
Yes	2698	64.0
Owns a bank/financial account		
No	3893	92.3
Yes	323	7.7
Frequency of reading newspaper/magazine		
Not at all	3372	80
Less than once a week	588	13.9
At least once a week	256	6.1
Frequency of listening to radio		
Not at all	1771	42.0
Less than once a week	1042	24.7
At least once a week	1403	33.3
Frequency of watching television		
Not at all	2365	56.1
Less than once a week	683	16.2
At least once a week	1168	27.7
Respondent can refuse sex		
No	1364	32.4
Yes	2852	67.6

Women who owned a house alone were 3.08 times more likely to go for breast cancer screening while the odds in those who jointly did with their husband or partner were 1.7 times. Women who jointly owned land with their husbands or partners were 3.09 times more likely to go for breast cancer screening, while the odds were 1.6 times in those who owned land alone. Women who jointly decided on their healthcare with their husbands or partners were 1.18 times more likely to go for breast cancer screening.

The odds were 1.21 times higher in women whose husbands or someone else made decisions about large household purchases than when such decisions were made by the woman alone. The odds of going for breast cancer screening were 1.12 times in women who accepted that beating is justified for any of the five reasons, as compared to those who said beating is not justified for any reason. Women who had a phone were 1.23 times more likely to go for breast cancer screening. When it comes to media exposure, women who read newspapers or magazines, listen to the radio, and watch television at least once a week are less likely to go for breast cancer

screening as compared to those who do not utilize any media at all.

Discussion

The major findings of the study indicate that age, education, literacy, ownership of assets, decision-making, and attitude toward domestic violence are significantly associated with the likelihood of going for breast cancer screening. These factors have been shown to increase the odds of going for screening. Findings also show that only 5.2% of women in Tanzania had ever undergone breast cancer screening. In most African countries, the prevalence of breast cancer screening among women in the reproductive age group is low. A similar study conducted in Kenya also revealed a low prevalence of only 10.2% [37]. Another study done in four African countries (Burkina Faso, Ivory Coast, Kenya, and Namibia) also found an overall prevalence of 12.9% [38]. The low prevalence of breast cancer screening has led to low survival rates in most low and middle-income countries, including Tanzania as diagnosis and management occur in later stages [39]. Lack of awareness of breast

Table 4 Women empowerment and breast cancer screening, bivariate analysis of breast cancer screening among Tanzanian women

Women empowerment variables	Breast cancer screening				Chi-Square	Degree of freedom	P-value
	Yes		No				
	n	%	n	%			
Property ownership							
Owens a house alone/jointly					10.84	3	0.013
Does not own	116	2.8	2048	48.6			
Alone only	14	0.3	114	2.7			
Both alone and jointly with husband/partner or someone else	88	2.1	1836	43.5			
Owens land alone/jointly					14.25	3	0.003
Does not own	140	3.3	2571	61.0			
Alone only	14	0.3	95	2.3			
Both alone and jointly with husband/partner or someone else	64	1.5	1332	31.6			
Access to healthcare							
Distance to a health facility					7.63	1	0.006
Big problem	42	1.0	1113	26.4			
Not a big problem	176	4.2	2885	68.4			
Getting medical help: not wanting to go alone					0.763	1	0.382
Big problem	28	0.7	600	14.2			
Not a big problem	190	4.5	3398	80.6			
Getting medical help: needs permission to seek medical help					0.037	1	0.848
Big problem	9	0.2	176	4.2			
Not a big problem	209	5.0	3822	90.7			
Getting medical help: getting the money needed for treatment					21.16	1	<0.001
Big problem	40	0.9	1333	31.6			
Not a big problem	178	4.2	2665	63.2			
Decision making							
Decision maker on respondents' healthcare					8.48	2	0.014
Respondent alone	56	1.3	861	20.4			
Respondent & husband/partner	130	3.1	2221	52.7			
Husband/partner alone or someone else	32	0.8	916	21.7			
Decision maker on large household purchases					12.2	2	0.013
Respondent alone	44	1.0	549	13.0			
Respondent & husband/partner	118	2.8	2029	48.1			
Husband/partner alone or someone else	56	1.3	1420	33.7			
Decision maker on visits to family/relatives					8.20	2	0.017
Respondent alone	45	1.1	628	14.9			
Respondent & husband/partner	129	3.1	2245	53.2			
Husband/partner alone or someone else	44	1.0	1125	26.7			
Attitude towards violence							
Justified for any of the five reasons					4.07	1	0.044
No	132	3.1	2141	50.8			
Yes	86	2.0	1857	44.0			
Social Independence							
Owens a mobile phone					31.10	1	<0.001
No	40	0.9	1478	35.1			
Yes	178	4.2	2520	59.8			
Owens a bank/financial account					1.11	1	<0.001
No	161	3.8	3732	88.5			
Yes	57	1.4	266	6.3			

Table 4 (continued)

Women empowerment variables	Breast cancer screening				Chi-Square	Degree of freedom	P-value
	Yes		No				
	n	%	n	%			
Frequency of reading newspaper/magazine					26.49	2	< 0.001
Not at all	152	3.6	3220	76.4			
Less than once a week	36	0.9	552	13.1			
At least once a week	30	0.7	226	5.4			
Frequency of listening to radio					27.81	2	< 0.001
Not at all	60	1.4	1711	40.6			
Less than once a week	52	1.2	990	23.5			
At least once a week	106	2.5	1297	30.8			
Frequency of watching television					69.03	2	< 0.001
Not at all	68	1.6	2297	54.5			
Less than once a week	40	0.9	643	15.3			
At least once a week	110	2.6	1058	25.1			
Respondent can refuse sex					2.93	1	0.087
No	59	1.4	1305	31.0			
Yes	159	3.8	2693	63.9			

* $p < 0.05$ - Statistically significant

cancer screening, shortage of resources, and socio-economic and cultural constraints are some of the contributing factors [26, 40]. Addressing such issues through education campaigns, sufficient allocation of resources, and eliminating any sociocultural barriers through community engagement is vital in enhancing the uptake of screening services.

Education and literacy are associated with an increased likelihood of going for breast cancer screening. Findings indicate that most of the women (92.1%) had ever heard of breast cancer. Nevertheless, only 5.2% of the women had ever undergone breast cancer screening while 94.8% had never undergone breast cancer screening. The highest prevalence of screening is seen in literate and women educated to at least the secondary level of education. Similar findings can be seen in studies done in Taiwan and Turkey [34, 41]. A study in India also found that states with high literacy levels had a high uptake of breast cancer screening [35]. According to the health belief model, for someone to engage in health preventive behavior, there has to be a perceived risk, benefits, barriers, and confidence to engage in that action [42, 43]. Education and literacy play a major role in this regard as learned and literate women understand and comprehend health information received and make informed decisions that may prompt preventive action and increase the likelihood of going for screening. Education is one requisite to ensure empowerment, improve decision-making,

gain financial independence, and improve one's social status [44].

Education empowers women through knowledge and awareness and enables them to be assertive, address any inequalities that may prevent them from achieving a healthy life, and make informed decisions [5] unlike their counterparts [34]. Despite there being an improvement in enrollment rates of girls in schools over the years, gender disparities remain. In 2010, the enrollment rate for girls in secondary school in low- and middle-income countries was 34% while for boys, it was at 40%, whereas 20 years ago the enrolment rate for girls was 22%, and for boys, it was 30% [45]. Addressing such inequalities through policies and legislation that encourage equal allotment and provide a good learning environment will help ensure that girls get an education and empower them to lead successful and healthy lives.

Ownership of assets has also been found to be significantly associated with ever going for breast cancer screening. This may be indicative of a good socioeconomic status (SES), which leads to economic empowerment [34]. SES is a vital aspect of achieving women's empowerment as it determines financial status and improves access to better healthcare. According to the fundamental cause theory, SES highly influences and addresses health inequalities over time as those with high socioeconomic status use resources at their disposal to utilize health services [46]. Strategies to improve the

Table 5 Multivariate analyses of independent variables associated with breast cancer screening among women in Tanzania, TDHS 2022

Variables	COR	95% CI		P value	AOR	95% CI		P-value
		Lower	Upper			Lower	Upper	
Age group (Years)								
20–24					1			
25–29	1.82	1.82	1.83	$p < 0.001$	1.54	1.54	1.55	$p < 0.001$
30–34	2.91	2.91	2.92	$p < 0.001$	2.18	2.18	2.19	$p < 0.001$
35–39	2.95	2.95	3.0	$p < 0.001$	2.93	2.93	2.94	$p < 0.001$
40–44	3.75	3.75	3.76	$p < 0.001$	3.9	3.8	3.9	$p < 0.001$
45–49	4.84	4.84	4.85	$p < 0.001$	6.28	6.27	6.28	$p < 0.001$
Residence								
Urban					1			
Rural	0.273	0.273	0.273	$p < 0.001$	1.48	1.48	1.49	$p < 0.001$
Region/Zone								
Western					1			
Northern	1.98	1.98	2.0	$p < 0.001$	1.206	1.204	1.207	$p < 0.001$
Central	1.413	1.412	1.414	$p < 0.001$	1.256	1.255	1.257	$p < 0.001$
Southern Highlands	2.64	2.63	2.64	$p < 0.001$	0.968	0.967	0.969	$p < 0.001$
Southern	1.09	1.09	1.10	$p < 0.001$	1.56	1.56	1.57	$p < 0.001$
South West highlands	1.74	1.74	1.75	$p < 0.001$	0.698	0.698	0.699	$p < 0.001$
Lake	1.86	1.85	1.86	$p < 0.001$	1.410	1.40	1.41	$p < 0.001$
Eastern	3.29	3.28	3.29	$p < 0.001$	1.511	1.510	1.512	$p < 0.001$
Zanzibar	2.14	2.14	2.15	$p < 0.001$	1.57	1.57	1.58	$p < 0.001$
Education level								
No education					1			
Primary	3.06	3.06	3.07	$p < 0.001$	0.564	0.563	0.564	$p < 0.001$
Secondary	5.48	5.48	5.49	$p < 0.001$	1.05	1.05	1.06	$p < 0.001$
Higher	20.28	20.27	20.30	$p < 0.001$	1.06	1.06	1.06	$p < 0.001$
Literacy								
Cannot read at all					1			
Able to read only parts of a sentence or no card with required language or blind/Visually impaired	1.904	1.903	1.906	$p < 0.001$	1.132	1.131	1.133	$p < 0.001$
Able to read the whole sentence	3.01	3.01	3.02	$p < 0.001$	1.130	1.130	1.131	$p < 0.001$
Wealth index								
Poorest					1			$p < 0.001$
Poorer	3.26	3.25	3.26	$p < 0.001$	0.270	0.270	0.270	$p < 0.001$
Middle	3.97	3.97	3.98	$p < 0.001$	0.697	0.697	0.698	$p < 0.001$
Richer	6.12	6.11	6.12	$p < 0.001$	0.674	0.674	0.675	$p < 0.001$
Richest	17.60	17.59	17.62	$p < 0.001$	0.747	0.747	0.747	$p < 0.001$
Respondent's occupation								
Not working					1			
Professional/Technical/Managerial	6.81	6.81	6.82	$p < 0.001$	0.891	0.890	0.892	$p < 0.001$
Clerical/Sales/Services	2.37	2.37	2.38	$p < 0.001$	1.159	1.159	1.160	$p < 0.001$
Agricultural-employee	0.641	0.641	0.641	$p < 0.001$	0.979	0.979	0.980	$p < 0.001$
Skilled manual	1.59	1.59	1.60	$p < 0.001$	0.703	0.702	0.703	$p < 0.001$
Unskilled manual	1.29	1.29	1.29	$p < 0.001$	1.029	1.029	1.030	$p < 0.001$
Other	2.25	2.25	2.26	$p < 0.001$	1.218	1.211	1.219	$p < 0.001$
Covered by health insurance								
No					1			
Yes	5.974	5.972	5.98	$p < 0.001$	0.480	0.480	0.480	$p < 0.001$

Table 5 (continued)

Variables	COR	95% CI		P value	AOR	95% CI		P-value
		Lower	Upper			Lower	Upper	
Parity (Children ever born)								
Nullipara					1			
Low parity (1–3)	1.21	1.21	1.22	$p < 0.001$	3.02	3.02	3.03	$p < 0.001$
Moderate parity (4–7)	1.108	1.107	1.109	$p < 0.001$	2.46	2.46	2.47	$p < 0.001$
High parity (> 8)	0.476	0.475	0.476	$p < 0.001$	2.18	2.17	2.19	$p < 0.001$
Owens a house alone/jointly								
Does not own					1			
Alone only	1.08	1.08	1.08	$p < 0.001$	3.08	3.08	3.09	$p < 0.001$
Jointly with husband/partner	0.720	0.720	0.721	$p < 0.001$	1.701	1.699	1.704	$p < 0.001$
Both alone and jointly with husband/partner or someone else	0.486	0.485	0.487	$p < 0.001$	2.035	2.032	2.038	$p < 0.001$
Owens land alone/jointly								
Does not own					1			
Alone only	2.35	2.35	2.35	$p < 0.001$	1.605	1.602	1.609	$p < 0.001$
Jointly with husband/partner	0.694	0.694	0.694	$p < 0.001$	3.09	3.08	3.1	$p < 0.001$
Both alone and jointly with husband/partner or someone else	0.532	0.530	0.533	$p < 0.001$	2.00	2.00	2.01	$p < 0.001$
Distance to a health facility								
Big problem					1			
Not a big problem	1.60	1.60	1.61	$p < 0.001$	1.38	1.38	1.39	$p < 0.001$
Getting medical help: getting the money needed for treatment								
Big problem					1			
Not a big problem	1.89	1.89	1.9	$p < 0.001$	0.756	0.755	0.756	$p < 0.001$
Decision maker on respondents' healthcare								
Respondent alone					1			
Respondent & husband/partner	0.735	0.735	0.736	$p < 0.001$	1.18	1.18	1.19	$p < 0.001$
Husband/partner alone or someone else	0.399	0.399	0.399	$p < 0.001$	1.013	1.012	1.013	$p < 0.001$
Decision maker on large household purchases								
Respondent alone					1			
Respondent & husband/partner	0.818	0.817	0.818	$p < 0.001$	1.04	1.04	1.04	$p < 0.001$
Husband/partner alone or someone else	0.427	0.427	0.427	$p < 0.001$	1.21	1.20	1.21	$p < 0.001$
Decision maker on visits to family/relatives								
Respondent alone					1			
Respondent & husband/partner	0.893	0.893	0.894	$p < 0.001$	0.839	0.839	0.839	$p < 0.001$
Husband/partner alone or someone else	0.511	0.511	0.511	$p < 0.001$	0.935	0.935	0.936	$p < 0.001$
Attitude towards violence								
Justified for any one or more of the five reasons (if the wife neglects the children, burns the food, argues with the husband, refuses to have sex with the husband, goes out without telling the husband)								
No					1			
Yes	0.623	0.623	0.623	$p < 0.001$	1.12	1.12	1.12	$p < 0.001$
Owens a mobile phone								
No					1			
Yes	2.86	2.86	2.87	$p < 0.001$	1.23	1.23	1.24	$p < 0.001$
Owens a bank/financial account								
No					1			
Yes	7.326	7.32	7.33	$p < 0.001$	0.432	0.432	0.432	$p < 0.001$
Frequency of reading newspaper/magazine								
Not at all					1			
Less than once a week	1.26	1.26	1.26	$p < 0.001$	0.794	0.794	0.795	$p < 0.001$
At least once a week	3.01	3.01	3.02	$p < 0.001$	0.548	0.547	0.548	$p < 0.001$

Table 5 (continued)

Variables	COR	95% CI		P value	AOR	95% CI		P-value
		Lower	Upper			Lower	Upper	
Frequency of listening to radio								
Not at all					1			
Less than once a week	1.878	1.877	1.88	<i>p</i> < 0.001	0.844	0.844	0.844	<i>p</i> < 0.001
At least once a week	2.59	2.59	2.60	<i>p</i> < 0.001	0.935	0.935	0.936	<i>p</i> < 0.001
Frequency of watching television								
Not at all					1			
Less than once a week	2.47	2.47	2.47	<i>p</i> < 0.001	0.666	0.665	0.666	<i>p</i> < 0.001
At least once a week	4.74	4.74	4.74	<i>p</i> < 0.001	0.901	0.901	0.902	<i>p</i> < 0.001

utilization of breast cancer screening must, therefore address all inequalities that hinder women from owning properties. Equal property ownership rights ought to be given to both men and women to help bridge the poverty gap [44].

Women who take part in decisions regarding health-care and large household purchases are more likely to undergo breast cancer screening. This implies a shared decision-making practice, which may promote support but, in other instances, may limit the woman's autonomy. Joint decision-making between couples is a strong determinant in healthcare utilization by women and is also influenced by other factors like education [47]. Findings from studies done in Bangladesh and Liberia [17, 21] show that women's empowerment in these areas is important as women with high decision-making power can utilize various health services. Women's participation in decision-making is a concept that is highly indicative of women's empowerment. Improving women's decision-making capabilities has been shown to affect women's health decision-making and utilization of services [48]. As Kabeer mentions in her Empowerment framework, 'agency' is a vital factor in achieving empowerment that incorporates being able to make decisions amidst challenging power relations, followed by decisive actions given the available resources [5].

There are several variations concerning whether domestic violence is justified or not in Tanzania and how it influences the uptake of breast cancer screening. Women who say that violence is justified based on either of the five reasons stated, were more likely to undergo breast cancer screening. There are higher levels of intimate partner violence among women who accept domestic abuse in Tanzania; such women have a low social value and are at more risk than those who oppose violence [49]. Contrary to the study findings, negative attitudes toward domestic violence are associated with the likelihood of utilizing health services [50] as women

who strongly oppose violence under any circumstance are more likely to go and access and utilize health services [51]. Women who oppose violence are more likely to defend their rights and live empowered lives, which maximizes their chances of independence and adopting healthy lifestyles. These varying findings may be a result of underlying traditional or cultural norms that are welcomed in various settings, which is worrisome and a barrier to women's empowerment. Community engagement, awareness campaigns, and entrepreneurship are some of the measures to correct such attitudes and promote women's empowerment.

Empowerment enables women to make informed decisions regarding health by equipping them with knowledge, skills, resources, and opportunities that enhance their overall quality of life. Country-specific interventions and breast cancer screening awareness campaigns should include empowerment initiatives to promote healthy behavior and the uptake of screening to reduce the breast cancer burden, as well as enable women to lead healthy lives. The government and stakeholders should also have policies that ensure equity in the allocation of infrastructure, equipment, and resources to promote accessibility and utilization of breast cancer screening services in Tanzania.

Conclusion

Achieving gender equality and empowering all women and girls is the fifth goal of the Sustainable Development Goals (SDGs). It is essential to note that this goal is an intrinsic rather than instrumental goal. Attaining global women empowerment requires successfully incorporating education, employment, and political participation [5]. Findings from the study imply the need to focus on empowering women and advancing their abilities through promoting projects regarding education, small or large-scale businesses, and community involvement.

Strengths and limitations of the study

The study used women empowerment variables applicable to Tanzania and the findings give insight on the state of women empowerment in the country. The dataset did not include questions regarding attitudes and beliefs surrounding breast cancer screening, which can be used to better understand the varying prevalence of breast cancer screening. Further studies need to take into account factors like culture, attitudes, and beliefs that influence the uptake of health services.

Abbreviations

BRCA	Breast Cancer Gene
BSE	Breast Self-Examination
CBE	Clinical Breast Examination
DHS	Demographic and Health Surveys
GDI	Gender Development Index
GGPI	Global Gender Parity Index
GII	Gender Inequality Index
GLOBOCAN	Global Cancer Observatory
IARC	International Association of Research on Cancer
MRI	Magnetic Resonance Imaging
NCCN	National Comprehensive Cancer Network
RCTs	Randomized Control Trials
SDGs	Sustainable Development Goals
SWPER	Survey-based Women Empowerment Index
TDHS	Tanzania Demographic and Health Surveys
UN	United Nations
UNDP	United Nations Development Program
USAID	United States Agency for International Development
WEI	Women Empowerment Index
WHO	World Health Organization

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Authors' contributions

MTB designed the study, conducted the analysis, interpreted the data, and drafted and revised the manuscript. NEP and LDB contributed to the study design, analysis, and revision of the manuscript. All authors read and approved the final manuscript.

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Availability of data and materials

The dataset used in the analysis is freely available from the Demographic and Health Survey at https://dhsprogram.com/data/dataset/Tanzania_Standard-DHS_2022.cfm?flag=0.

Declarations

Ethics approval and consent to participate

The study is based on secondary data and permission to access and download the data was granted following the submission of a written abstract to the DHS program data Archivist. The study was done in agreement with the Declaration of Helsinki and the dataset used was kept with the researcher only and not shared to ensure confidentiality and usage for its intended purpose only which is this study alone. Approval for the questionnaires and survey protocol including the administration of questionnaires was obtained from the Medical Research Council of Tanzania and reviewed by the ICF's internal review board, and informed consent was taken from the participants [33].

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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