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Prevalence and determinants of pregnancy termination for childbearing women using the modified Poisson regression model: a cross-sectional study of the Tanzania Demographic and Health Survey (TDHS) 2022

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Abstract

Background Termination of pregnancy continues to be one of the major public health problems. The prevalence and determinants associated with pregnancy termination among women from low-middle income countries such as Tanzania have previously not been thoroughly investigated. Therefore, this study aims to explore the prevalence and determinants associated with pregnancy termination among Tanzanian women.

Methods Data for this study was extracted from the 2022 Tanzania Demographic and Health Survey (TDHS). A total of 15,254 women aged 15–49 years, clustered in selected enumerated areas, participated in the survey. A modified Poisson regression model with sampling weights was used to find the factors that are associated with pregnancy termination.

Results The prevalence of pregnancy termination was 14.3% (95% CI: 13.81–14.75%). Our findings reveal that several factors are significantly associated with pregnancy termination. In particular, women's age, level of education, marital status, history of pregnancy losses, wealth status, attempt to delay or avoid getting pregnant outside the ideal birth spacing, and recent internet use, total children ever born, desire for more children, were significantly associated with pregnancy termination. Women who reside in rural areas, those covered by health insurance and those using contraceptives had a significantly lower likelihood of terminating pregnancy compared to their counterparts.

Conclusions The findings highlighted that the prevalence of terminating pregnancy is alarming in Tanzania, signaling a significant public health challenge. To address the concerning rates of pregnancy termination, the government of Tanzania and other institutions are advised to enhance the accessibility and quality of healthcare services for women, particularly in rural and underserved areas. Bridging socio-economic inequalities and removing geographic barriers to healthcare access will ensure women receive timely and adequate support.

Keywords Modified Poisson regression, Pregnancy termination, Prevalence, Tanzania

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Background

Pregnancy termination, which is either due to induced abortion, miscarriage, or stillbirth is a serious public and social concern because of its serious consequences on the well-being and health of women, especially those in resource-constrained settings [1–3]. The term “miscarriage”, also known as “spontaneous abortion”, refers to the loss of pregnancy before 20 weeks [4]. Pregnancy termination is defined as the removal of products of conception or the fetus, placenta from the uterus and pregnancy tissue [5]. Unsafe abortion, regardless of the method used, may cause serious conditions in a woman’s life, for example, it may trigger anxiety, depression and concerns about fertility [6]. It can generate a sense of shame and can give rise to challenges in the family due to societal disapproval [7]. According to Megersa et al. [8], in countries with restrictive government regulations on pregnancy termination or access to safe pregnancy termination, women may turn to unsafe methods, which may result in health problems and even result in death. In Africa, pregnancy termination is underreported due to cultural laws and society norms which may put health and well-being of women at risk [9]. Unsafe abortions are associated with a higher risk of maternal mortality and morbidity rates, thus posing a financial strain on health care systems, negatively impacting a country’s labour force and, in general, poses a significant cost on families and the wider society [10].

According to Bearak et al. [11], about 121 million unwanted pregnancies per year occurred, globally, between 2015 and 2019, and 61% of these ended in abortion. Previous research findings indicate that, approximately 25 million unsafe abortions occur every year, of which 97% occur in developing countries and approximately 67% of maternal deaths were linked to abortion [12]. The World Health Organization reported that about 45% of pregnancy termination are considered unsafe, of which 95% take place in low-and middle-income countries. In 2020, maternal death occurred almost in every two minutes globally of which around 70% of these are from sub-Saharan Africa [13]. In Tanzania, every year approximately one million women and girls are faced with unintended pregnancies, 39% of which result in abortions [14]. This has led to Tanzania’s unacceptable high rate of 454 maternal deaths for every 100,000 live births [15]. Furthermore, maternal deaths may be unconsciously exacerbated by attempts at birth control using traditional methods. A study by Newman [16], found that women in cultures that used traditional methods to control fertility and abortion relied heavily on a variety of plant specimens to do so, but the herbal substances’ effects and side effects are rarely reported on.

Violence by an intimate partner was observed to be an important influence on levels of induced abortion and pregnancy loss in Tanzania [17]. Unsafe abortion is said to be the second largest cause of maternal fatalities in Tanzania [18]. This has led to Tanzania’s unacceptably high rate of 454 maternal deaths for every 100,000 live births [15].

Understanding the underlying factors associated with pregnancy termination is crucial in order to identify appropriate interventions which will lead in improving health outcomes and to meet reproductive goals of women. Therefore, this study aims to explore the prevalence and determinants associated with pregnancy termination among women aged 15–49 years in Tanzania by applying the modified Poisson regression model. The objectives of this study are to examine the prevalence of pregnancy termination and identify key determinants of pregnancy termination among Tanzanian women. In this study, we used secondary data extracted from the 2022 Tanzania Demographic and Health Survey. The findings of this study will enable public health policy-makers and other stakeholders to make informed decisions that will help in reducing the prevalence of pregnancy termination in Tanzania.

Methods

Data source, sampling, and data collection

The study used secondary data of the most recent TDHS (<http://www.dhsprogram.com>) conducted in Tanzania that provided information on pregnancy terminated. The study design for the 2022 TDHS was carried out in two stages and was intended to provide the estimates for the entire country, for urban and rural areas, and for the mainland and Zanzibar. The sampling frame excluded institutional populations, such as persons in hospitals, hotels, barracks, camps, hostels and prisons. The first stage involved the selection of sampling points (clusters) comprising 629 enumeration areas (EAs), 211 of which were from urban areas and 418 from rural areas. The EAs were selected with a probability proportional to their size within each sampling stratum. In the second stage, 26 households were selected systematically from each cluster, for a total expected sample size of 16,354 households in the 2022 TDHS [19].

In the TDHS, women aged 15–49 years who were either usual residents or visitors in the household on the night before the survey interview were included in the study and were eligible to be interviewed. In households, 15,699 women were identified as eligible for individual interviews.

Dependent variable

Termination of pregnancy was used as our dependent variable of interest in this study, which was measured using a self-reported questionnaire such as: “have you ever had a pregnancy terminated?”. The pregnancy termination question in the DHS data included induced abortions, miscarriage, and stillbirth. This outcome variable was a binary response outcome coded as (yes/no) [20–22].

Independent variables

The independent variables of this study included individual and community level factors as shown in Table 1. The independent variables were age in years, place of residence (urban, rural), highest education level (no education, primary, secondary, tertiary), sex of household head (male, female), self-reported health status (very good, good, moderate, bad, very bad), smokes cigarettes (no, yes), covered by health insurance (no, yes), marital status (single, married, living with partner, widowed, divorced, no longer living together/separated), history of pregnancy losses (none, one, more than one), ever tried to delay or avoid getting pregnant (no, yes, used outside calendar year, yes, used in calendar year), use of internet (never, yes, last 12 months, yes, before last 12 months), wealth status (poorest, poor, middle, richer, richest), use of contraceptive method (no, yes), currently abstaining (no, yes), number of sex partners, excluding spouse, in last 12 months (0, 1, 2, 3), total children ever born, desire for more children (wants no more, sterilized, wants within 2 years, wants after 2+ years, wants, unsure timing, undecided, declared infecund). We recategorized the age of participants from a continuous scale into three groups for this study (15–24, 24–34, and 35–49 years old) [23]. We also recategorized total children ever born into three groups (0, 1–5, and 6 and more). Moreover, we recategorized wealth status from 5 to 3 categories combining poorest and poorer as ‘poor’, middle wealth as ‘middle’ and richer and richest as ‘rich’ [24–27]. Furthermore, self-reported health status was recategorized from 5 to 3 categories combining very good and good as ‘good’, moderate health as ‘moderate’ and bad and very bad as ‘bad’. These variables were selected based on their theoretical relevance and availability in the data set. Some of these variables were reported as significant factors of pregnancy termination [23].

Model formulation

In the literature of statistical models where the outcome variable of interest is binary, some models were suggested including binary logistic regression model, log-binomial regression model and modified Poisson regression model

[28–30]. Each of these models are used based on some definitive features of the outcome variable [31]. Modified Poisson regression, which combines a log-Poisson regression model with reliable variance estimation, is a helpful substitute for log-binomial regression. Modified Poisson regression is usually regarded as an appropriate approach for analyzing rare events. When Poisson regression is applied to binomial data, the error for the estimated relative risk will be overestimated [32]. However, this problem may be rectified by using a robust error variance procedure known as sandwich estimation [33], thus leading to a technique that is called a modified Poisson regression, which was applied in this study [30, 34].

The most common of these regression models is binary logistic regression model. The logistic regression model is a member of the generalized linear models (GLMs) class and it is an appropriate model for studying the relationship between a binary response variable with a value of 1 (if subject i have ever had a pregnancy terminated) and 0 (if subject i have never had a pregnancy terminated) ($i = 1, 2, \dots, n$), and a set of predictor variables. Assuming a Bernoulli distribution for the response variable, the model can be written as:

$$\text{logit}(\pi_i) = \log\left(\frac{\pi_i}{1 - \pi_i}\right) = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \dots + \beta_n x_{ni}$$

where $x_{1i}, x_{2i}, \dots, x_{ni}$ are predictor variables, β 's are the unknown regression parameters to be estimated and π_i is the probability of experiencing the outcome (success). The odds ratio (OR) is then given by $\exp(\beta)$. The link function for logistic model is the logit link function. The major weakness of the binary logistic regression is that it overestimates the risk if the outcome of interest is rare [31, 35, 36]. The model that can be used to solve this problem to better approximate the risk ratios or relative ratios better than binary logistic regression model when the outcome of interest is rare is the modified Poisson regression model. This model is the Poisson regression of binomial data using robust error variance method. The link function of modified Poisson regression model is log link. Its functional form is:

$$\log(\pi_i) = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \dots + \beta_n x_{ni}$$

where π_i is the probability of experiencing the outcome of interest for subject i , β 's is the mean of the i th subject and approximates relative ratios as $\exp(\beta)$.

Statistical analysis

The data used in this study was edited using SPSS, and analyzed by using R4.4.1 software. The analyses were conducted by using appropriate sampling weights, clustering, and stratification to account for the complex

Table 1 Demographic information of the participants and proportion of pregnancy termination ($n = 15,254$)

Variables	Categories	Unweighted n (%)	Weighted n (%)	p-value
Ever had terminated pregnancy	No	13,075 (85.7)	13,102 (85.9)	
	Yes	2,179 (14.3)	2,152 (14.1)	
Age (years); mean (SD)		29 (9.85)		
Age group (years)	15 - 24	5,852 (38.4)	5,810 (38.1)	<0.001*
	25 - 34	4,541 (29.8)	4,609 (30.2)	
	35 - 49	4,861 (31.9)	4,835 (31.7)	
Place of residence	Urban	5,441 (35.7)	5,446 (35.7)	0.018*
	Rural	9,813 (64.3)	9,808 (64.3)	
Highest education level	No education	2,387 (15.6)	2,450 (16.1)	<0.001*
	Primary	7,413 (48.6)	8,123 (53.3)	
	Secondary	5,235 (34.3)	4,467 (29.3)	
	Tertiary	219 (1.4)	213 (1.4)	
Sex of household head	Male	10,997 (72.1)	10,918 (71.6)	0.133
	Female	4,257 (27.9)	4,336 (28.4)	
Self-reported health status	Good	11,147 (73.1)	10,980 (72.0)	<0.001*
	Moderate	3,956 (25.9)	4,101 (26.9)	
	Bad	151 (1.0)	173 (1.1)	
Smokes cigarettes	No	15,185 (99.5)	15,188 (99.6)	0.278
	Yes	69 (0.5)	66 (0.4)	
Covered by health insurance	No	14,386 (94.3)	14,366 (94.2)	0.368
	Yes	868 (5.7)	888 (5.8)	
Marital status	Single	4,232 (27.7)	4,047 (26.5)	<0.001*
	Married	6,751 (44.3)	6,630 (43.5)	
	Living with partner	2,400 (15.7)	2,622 (17.2)	
	Widowed	357 (2.3)	370 (2.4)	
	Divorced	953 (6.2)	988 (6.5)	
	No longer living together/separated	561 (3.7)	597 (3.9)	
History of pregnancy losses	None	13,075 (85.7)	13,102 (85.9)	<0.001*
	One	1,599 (10.5)	1,612 (10.6)	
	More than one	580 (3.8)	541 (3.5)	
Ever tried to delay or avoid getting pregnant	No	8,112 (53.2)	7,711 (50.5)	<0.001*
	Yes, used outside calendar year	895 (5.9)	906 (5.9)	
	Yes, used in calendar year	6,247 (41.0)	6,637 (43.5)	
Use of internet	Never	12,885 (84.5)	13,072 (85.7)	<0.001*
	Yes, last 12 months	2,137 (14.0)	1,950 (12.8)	
	Yes, before last 12 months	232 (1.5)	232 (1.5)	
Wealth status	Poor	4,769 (31.3)	5,044 (33.1)	<0.001*
	Middle	3,063 (20.1)	2,880 (18.9)	
	Rich	7,422 (48.7)	7,330 (48.1)	
Use of contraceptive method	No	10,835 (71.0)	10,536 (69.1)	<0.001*
	Yes	4,419 (29.0)	4,718 (30.9)	
Currently abstaining	No	14,127 (92.6)	14,111 (92.5)	0.006*
	Yes	1,127 (7.4)	1,143 (7.5)	
Number of sex partners, excluding spouse, in last 12 months	0	12,441 (81.6)	12,108 (79.4)	0.002*
	1	2,505 (16.4)	2,774 (18.2)	
	2	246 (1.6)	296 (1.9)	
	3	62 (0.4)	76 (0.5)	

Table 1 (continued)

Variables	Categories	Unweighted n (%)	Weighted n (%)	p-value
Total children ever born	0	4,138 (27.1)	3,874 (25.4)	<0.001*
	1 – 5	8,878 (58.2)	9,255 (60.7)	
	6	2,238 (14.7)	2,126 (13.9)	
Desire for more children	Wants no more	2,507 (16.4)	2,584 (16.9)	<0.001*
	Sterilized (respondent or partner)	333 (2.2)	340 (2.2)	
	Wants within 2 years	2,856 (18.7)	2,924 (19.2)	
	Wants after 2+ years	4,301 (28.2)	4,515 (29.6)	
	Wants, unsure timing	2,258 (14.8)	1,727 (11.3)	
	Undecided	2,587 (17.0)	2,742 (18.0)	
	Declared infecund	412 (2.7)	423 (2.8)	

sampling design as described in the DHS guidelines for analysing DHS data [37]. Demographic information and responses to questions related to the outcome variable (ever had pregnancy terminated or not), were summarized by frequencies and percentages. Chi-square tests were performed (with a two-tailed significance level set at p -value < 0.05) to examine the bivariate relationship between the explanatory variables (as shown in Table 1) and the outcome variable. Furthermore, Pearson's correlation was performed to examine the relationship between two continuous variables (age of the respondents who had terminated pregnancy and age of their husband/partners). All factors that showed significant relationship with the outcome variable were included in the final model (bivariate modified Poisson analysis).

Ethics consideration

The authors requested data from the Demographic and Health Survey (DHS) program and permission was granted to download from http://www.dhsprogram.com/data/dataset_admin/login_main.cfm. Since the study used a secondary data of publicly available survey data, ethical approval and participant consent were not necessary for this study. All DHS surveys are approved by Inner City Fund (ICF) international as well as an Institutional Review Board (IRB) in the host country to make sure that the protocols are following the U.S. Department of Health and Human Services regulations for the protection of human subjects.

Results

A total of 15,254 women aged 15–49 years were included in this study. Table 1 shows the distribution of the demographic information of the participants. The mean (\pm SD) age of the participants was 29 (\pm 9.85) years. We observed that, of the women who participated in the study, 14.3%

had ever had their pregnancies terminated. We further observed that 38.4% of the women were younger between ages 15–24 years, followed by those who were between 35 and 49 years (31.9%) and 25–34 years (29.8%). More than half (64.3%) of the women were from rural areas and 35.7% of them were from urban areas. Nearly half (48.6%) of the women reported that they have primary level of education, 15.6% did not go to school and only 34.3% had secondary or tertiary. Women from households with male heads were 10,997 (72.1%). Most (73.1%) women reported their health status as good and only 151 (1.0%) had bad health status. The vast majority reported as non-smokers and were not covered by health insurance (99.5% and 94.3%, respectively). Furthermore, about 44.3% of the women were married, while 27.7% reported as being single. Most (85.7%) women reported that they had never had pregnancy losses, with 10.5% reported to had one pregnancy loss, followed by smaller percentages (3.8%) for those who had more than 1 pregnancy losses. The researchers further observed that 8,112 (53.2%) of women participated in the study never tried to delay or avoid getting pregnant, whereas 41% once used something (in a calendar year) to avoid or delay getting pregnant and 5.9% of the women indicated that they used something outside a calendar. The vast majority (84.5%) of the women participated reported that they never used the internet. Nearly half (48.7%) of women were from rich households, followed by those who were from poor households (31.3%), and middle (20.1%). We observed that most of the women were in the categories: not using a contraceptive method (71.0%), not abstaining (92.6%), and never had a sex partners, excluding spouse, in last 12 months (81.6%). Furthermore, more than half of women (58.2%) had between 1 and 5 children. Most women (29.6%) wanted to have a child after 2+ years, while 16.9% wanted no more children.

The results from bivariate analysis of the association between the outcome variable (ever had a terminated pregnancy) and the explanatory variables are also presented in Table 1.

Table 2 present results obtained from a multivariable modified Poisson regression analysis. Women aged 35–49 years, followed by women aged 25–34 years had the highest prevalence of pregnancy termination. Women from rural areas had the higher prevalence of pregnancy termination as compared to those staying in urban areas. Furthermore, women with primary level of education had the highest prevalence on pregnancy termination compared to other education categories. Additionally, women with good health status, not smoking, married, had one pregnancy loss, tried to delay or avoid getting pregnant in calendar year, never used internet, from households with rich wealth quintile, not using contraceptives, not abstaining and had no sex partners, excluding spouse, in last 12 months, had children between 1 and 5, wanted another child within 2 years, had the highest prevalence of pregnancy termination in these categories (Table 2). The results from multivariable modified Poisson regression model (also presented in Table 2) indicates association between different predictors and pregnancy termination. The results reveal that age of the woman is significantly associated with likelihood of pregnancy termination with [RR=1.47; 95% CI: 1.29–1.70%] for those aged 25–34 years, and [RR=2.24; 95% CI: 1.94–2.60%] for those aged 35–49 years, as compared to those aged 15–24 years. This significant association we observed in this study between age of the women and the likelihood of pregnancy termination reveal that pregnancy termination increases with age given the upward trend in the age related-prevalence ratios. Women staying in rural areas showed a low likelihood of terminating pregnancy as compared to women residing in urban areas [RR=0.90; 95% CI: 0.83–0.98%]. The likelihood of pregnancy termination among women who had secondary level of education was high [RR=1.16; 95% CI: 1.01–1.33%] in comparison to those who had no education. Furthermore, women who reported moderate health status showed a high likelihood of terminating pregnancy as compared to women with good health status [RR=1.11; 95% CI: 1.02–1.20%].

Women who were covered by health insurance, the likelihood of pregnancy termination was 15% less compared to those who were not covered by health insurance [RR=0.85; 95% CI: 0.72–0.98%]. The results displayed that married women had the strongest association with pregnancy termination [RR=4.86; 95% CI: 3.70–6.39%] compared to single women. Moreover, women who had more than one pregnancy losses had high likelihood of terminating pregnancy compared to those without

pregnancy loss [RR=1.36; 95% CI: 1.22–1.59%]. Regarding the question ‘ever used anything or tried to delay or avoid getting pregnant’, the likelihood of pregnancy termination for women who answered ‘yes, used outside calendar’ was 14% higher as compared to those who never used anything [RR=1.14; 95% CI: 1.03–1.34%]. With regards to the use of internet, the study found that the likelihood of pregnancy termination was 21% higher among women who used internet in the last 12 months [RR=1.21; 95% CI: 1.08–1.36%] than those who never used internet.

The results show that wealth status is significantly associated with likelihood of pregnancy termination with [RR=1.27; 95% CI: 1.13–1.42%] for women from households with middle wealth quintile, and [RR=1.50; 95% CI: 1.34–1.69%] for women from households with rich wealth quintile, as compared to those coming poor households. Women using contraceptives had lower likelihood of pregnancy termination [RR=0.84; 95% CI: 0.75–0.95%] compared to those who did not use contraceptive methods. Additionally, women who had sex partner(s), excluding spouse, in last 12 months had higher likelihood of pregnancy termination compared to those who had no sex partner except spouse. The results reveal that ‘total children ever born’ by the woman is significantly associated with likelihood of pregnancy termination with [RR=1.38; 95% CI: 1.12–1.70%] for those with children between 1 and 5, and [RR=1.58; 95% CI: 1.25–1.99%] for those with six and more children, as compared to those who had no children. The results displayed that women wanted a child within 2 years had the strongest association with pregnancy termination [RR=1.34; 95% CI: 1.20–1.51%] compared to women who wanted no more children.

Discussion

The main aim of this study was to explore the prevalence and determinants associated with pregnancy termination among women, aged 15–49 years, using data collected under Tanzania DHS 2022. A multivariable modified Poisson model was fitted to the data. Based on the findings of this study, the overall prevalence of pregnancy termination among women in Tanzania was 14.3% (95% CI: 13.81–14.75%). This finding is in line with previous findings [38, 39] who all found a slightly high prevalence level. Other researchers found a slightly lower (less than 10%) prevalence of pregnancy termination among women [40]. The burden of health care providers might be a factor which may increase the rate of pregnancy termination among women in Tanzania. Another factor contributing to the high rate of pregnancy termination among Tanzanian women may be the lack of national

Table 2 Bivariate and modified Poisson regression analysis examining the prevalence and determinants associated with pregnancy termination in Tanzania, using 2022 TDHS data ($n = 2,179$ for women terminated pregnancy)

Variables		Pregnancy terminated	Crude	Adjusted
		% (95% CI)	RR (95% CI)	RR (95% CI)
Age group (years)	15 – 24^R	14.1 (12.87 - 15.33)		
	25 - 34	31.9 (30.21 - 33.49)	2.91 (2.56 - 3.31)*	1.47 (1.29 - 1.70)*
	35 - 49	54.1 (52.30 - 55.82)	4.62 (4.10 - 5.21)*	2.24 (1.94 - 2.60)*
Place of residence	Urban^R	37.9 (36.20 - 39.62)		
	Rural	62.1 (60.38 - 63.80)	0.91 (0.84 - 0.98)*	0.09 (0.83 - 0.98)*
Highest education level	No education^R	16.8 (15.48 - 18.12)		
	Primary	53.1 (51.34 - 54.86)	1.02 (0.91 - 1.13)	1.05 (0.94 - 1.17)
	Secondary	28.9 (27.27 - 30.47)	0.78 (0.70 - 0.88)*	1.16 (1.01 - 1.33)*
Sex of household head				
	Tertiary	1.2 (0.85 - 1.63)	0.80 (0.56 - 1.16)	0.98 (0.68 - 1.42)
	Male^R	73.4 (71.87 - 74.99)		
Self-reported health status				
	Female	26.6 (25.01 - 28.13)	0.93 (0.86 - 1.02)	1.05 (0.95 - 1.16)
	Good^R	69.8 (68.18 - 71.42)		
Smokes cigarettes				
	Moderate	28.7 (27.09 - 30.27)	1.16 (1.06 - 1.26)*	1.11 (1.02 - 1.20)*
	Bad	1.5 (1.08 - 1.94)	1.60 (1.18 - 2.17)*	1.36 (0.99 - 1.85)
Covered by health insurance				
	Yes	0.6 (0.33 - 0.87)	1.32 (0.81 - 2.16)	1.08 (0.65 - 1.81)
	No^R	93.9 (93.06 - 94.74)		
Marital status				
	Yes	6.1 (5.26 - 6.94)	1.08 (0.92 - 1.27)	0.85 (0.72 - 0.98)*
	Single^R	4.5 (3.77 - 5.23)		
	Married	60.9 (59.18 - 62.62)	8.49 (6.94 - 10.38)*	4.86 (3.70 - 6.39)*
	Living with partner	18.5 (17.17 - 19.91)	7.27 (5.86 - 9.01)*	4.83 (3.65 - 6.39)*
	Widowed	3.4 (2.80 - 4.08)	9.07 (6.85 - 12.01)*	3.95 (2.80 - 5.58)*
	Divorced	8.5 (7.56 - 9.52)	8.43 (6.67 - 10.65)*	4.07 (3.00 - 5.51)*
	No longer living together/ separated	4.1 (3.38 - 4.78)	6.85 (5.21 - 9.00)*	3.23 (2.32 - 4.51)*
History of pregnancy losses				
	None	-		
	One	73.4 (71.82 - 74.94)	1.33 (0.89 - 1.88)	1.24 (0.91 - 1.78)
Ever tried to delay or avoid getting pregnant				
	More than one	26.6 (25.06 - 28.18)	1.35 (1.29 - 1.63)*	1.36 (1.22 - 1.59)*
	No^R	41.0 (39.25 - 42.71)		
Use of internet				
	Yes, used outside calendar year	9.6 (8.55 - 10.63)	2.12 (1.86 - 2.43)*	1.14 (1.03 - 1.34)*
	Yes, used in calendar year	49.4 (47.67 - 51.19)	1.57 (1.44 - 1.70)*	1.05 (0.94 - 1.18)
Wealth status				
	Never^R	81.5 (80.09 - 82.83)		
	Yes, last 12 months	16.8 (15.48 - 18.12)	1.24 (1.12 - 1.38)*	1.21 (1.08 - 1.36)*
Use of contraceptive method				
	Yes, before last 12 months	1.7 (1.28 - 2.20)	1.19 (0.89 - 1.60)	1.20 (0.92 - 1.61)
	Poor^R	25.3 (23.76 - 26.82)		
Currently abstaining				
	Middle	20.0 (18.55 - 21.37)	1.23 (1.09 - 1.38)*	1.27 (1.13 - 1.42)*
	Rich	54.8 (53.00 - 56.50)	1.39 (1.27 - 1.53)*	1.50 (1.34 - 1.69)*
Number of sex partners, excluding spouse, in last 12 months				
	No^R	66.7 (65.07 - 68.39)		
	Yes	33.3 (31.61 - 34.93)	1.22 (1.13 - 1.33)*	0.84 (0.75 - 0.95)*
Number of sex partners, excluding spouse, in last 12 months				
	No^R	94.0 (93.20 - 94.86)		
	Yes	6.0 (5.14 - 6.80)	0.80 (0.67 - 0.94)*	0.89 (0.75 - 1.05)
	0^R	83.1 (81.79 - 84.43)		
Number of sex partners, excluding spouse, in last 12 months				
	1	14.2 (12.95 - 15.41)	0.85 (0.76 - 0.95)*	1.29 (1.12 - 1.48)*
	2	2.2 (1.68 - 2.72)	1.34 (1.04 - 1.73)*	1.81 (1.37 - 2.40)*
	3	0.5 (0.25 - 0.75)	1.22 (0.71 - 2.09)	2.25 (1.33 - 3.81)*

Table 2 (continued)

Variables		Pregnancy terminated	Crude	Adjusted
		% (95% CI)	RR (95% CI)	RR (95% CI)
Total children ever born	0^R	7.1 (6.20 - 8.02)		
	1 – 5	69.3 (67.67 - 70.93)	4.54 (3.86 - 5.33)*	1.38 (1.12 - 1.70)*
	6	23.6 (22.09 - 25.09)	6.13 (5.16 - 7.28)*	1.58 (1.25 - 1.99)*
Desire for more children	Wants no more^R	23.5 (22.01 - 24.99)		
	Sterilized (respondent or partner)	4.1 (3.43 - 4.83)	1.32 (1.09 - 1.60)*	1.24 (1.02 - 1.52)*
	Wants within 2 years	28.1 (26.51 - 29.67)	1.05 (0.95 - 1.16)	1.34 (1.20 - 1.51)*
	Wants after 2+ years	26.6 (25.06 - 28.18)	0.66 (0.59 - 0.74)*	1.13 (1.01 - 1.28)*
	Wants, unsure timing	5.8 (4.96 - 6.60)	0.27 (0.23 - 0.33)*	1.04 (0.85 - 1.27)
	Undecided	7.9 (6.99 - 8.89)	0.33 (0.28 - 0.39)*	0.65 (0.55 - 0.77)*
	Declared infecund	3.9 (3.26 - 4.64)	1.02 (0.83 - 1.25)	0.96 (0.79 - 1.18)

S. E, Standard error, RR Risk ratios, CI Confidence interval, R Reference category, * *p*-value <0.05

screening programs and insufficient funding to screen all eligible women [41].

In our study higher prevalence of pregnancy termination was reported in older women. We found that women between the ages 25–34 years and those who were between 35 and 49 years were more likely to terminate pregnancy as compared to younger women (15–24 years). This finding is consistent with previous studies [22, 23, 31, 42, 43]. The increase in pregnancy termination that is associated with aging of women may result to a negative reproductive outcome such as stillbirths or miscarriages [44].

Women from rural areas had a significantly lower likelihood of terminating pregnancies as compared to their counterparts from urban areas. This could be explained by the easy access to public health facilities to those women from urban areas. Women with secondary level of education were found to be significantly associated with pregnancy termination as compared to women with no education. This is consistent with previous studies [20, 22, 45]. One possible reason for women with a secondary level of education wanting to terminate a pregnancy could be due to they not wanting to hinder any higher education or employment opportunities that may arise from their having secondary schooling by having a baby and being tied down to the responsibilities of motherhood at an early age.

In our study higher prevalence of pregnancy termination was significantly associated with married women (including those living with partner, widowed, divorced, no longer living together/separated) compared to single women. This agreed with the studies done by [42, 45]. However, our findings were not in line with the findings by [46]. The low prevalence of pregnancy in single

women could be the culture which encourages women not to get pregnant if they are not yet married. The likelihood of terminating pregnancies was higher in women with more than one pregnancy loss compared to those women who had no pregnancy loss. This disagreed to the reports from study previously conducted by [23] using 2016 Sri Lanka Demographic and Health Survey (DHS) data.

The likelihood of pregnancy termination was high among women who once tried to delay or avoid getting pregnant. This could be attributed to the contraceptives' failure or lack of contraceptive use [22, 47]. The other reason that could be that women from low socio-economic status may not have the financial means to pay for contraceptives, which may result in an increased likelihood of pregnancy termination due to unintended pregnancies [48]. The current study also touched upon the use of internet. Women who used internet in the last 12 months were more likely to terminate pregnancies compared to those women who never used internet. The reasons behind the higher rates of pregnancy termination which is significantly associated with the use of internet could be that women learn through social media some methods of terminating pregnancy. The use of the internet is could be associated with level of education so once again this would tie in with the higher likelihood of women with secondary schooling getting a pregnancy terminated.

Regarding the wealth status, women from rich households had a high likelihood of pregnancy termination compared to women from poor households. The findings are consistent with findings from other studies [20, 38, 39]. One of the reasons could be that women from rich households can easily access to safe pregnancy termination services which could

contribute to the higher pregnancy termination [20]. Just like in other sub-Saharan African countries, Tanzania has not fully legalized pregnancy termination [49]. It can only be accessed in limited clinics [50].

In this study, we found that the likelihood of pregnancy termination was low among women who have used contraceptives compared to those who have never, which is consistent with previous studies [22, 51]. The use of contraceptive methods, especially oral contraceptive pills, can cause hormonal disruptions, and these disruptions have been found to increase the risk of pregnancy complications that can lead to terminations, such as stillbirths, miscarriages, or abortions [52].

The likelihood of pregnancy termination was low among women who had no children compared to those women who had children. We also observed higher likelihood of pregnancy termination with increasing parity. However, other studies conducted in Sub-Saharan Africa found lower odds of pregnancy termination with increasing parity [20, 23, 53]. The reasons behind the high likelihood of pregnancy termination with increasing parity could be that when women have achieved desired number of children, they may not want to have another child and may want to have abortion.

Strengths and limitations

Our study used the most recent TDHS data with large sample size of 15,254 to determine the proportion and the factors associated with pregnancy termination. The study included diverse demographic characteristics. The response rate was high. There are also limitations of this study. First, the study used secondary data of a cross-sectional study which limited us to consider causal inferences between the predictor variables and pregnancy termination. Second, the conditions upon which these pregnancies were terminated are not covered in this study and whether terminated pregnancies were safe or unsafe are also not known. We also do not know whether the methods to terminate pregnancy were legal or illegal. Our data does not indicate when the terminated pregnancy occurred – before or after the pregnancy loss. If the terminated pregnancy affected future pregnancies in these women, then that would explain the higher likelihood between pregnancy loss and terminated pregnancy. Lastly, the pregnancy termination questionnaire was self-reported and that could make some women to keep secret information related to their pregnancy termination in the past to preserve their social image, which may under-represent the true pregnancy termination rate [22, 54].

Conclusions

The prevalence of terminating pregnancy is alarming in Tanzania signaling a significant public health challenge. Our findings reveal that women's age, level of education, marital status, history of pregnancy losses, wealth status, attempt to delay or avoid getting pregnant outside the ideal birth spacing, recent internet use, total children ever born, and desire for more children were identified as critical determinants associated with pregnancy termination. These factors underscore the complex interactions between individual, social, and technological influences on reproductive health decisions.

To address the concerning rates of pregnancy termination, the government of Tanzania and other institutions are advised to enhance the accessibility and quality of healthcare services for women, particularly in rural and underserved areas. Bridging socio-economic inequalities and removing geographic barriers to healthcare access will ensure women receive timely, adequate support. Moreover, ensuring equitable access to a full range of contraceptive methods is critical for preventing unintended pregnancies and reducing the reliance on unsafe abortion practices. Additionally, promoting education and raising awareness about reproductive health and family planning, among young women and those with limited education, is essential in empowering women to make informed reproductive choices.

Future research could explore the distinct prevalence and determinants of legal versus illegal pregnancy terminations, which would further inform targeted interventions and policies aimed at reducing unsafe abortion practices in Tanzania.

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Author contributions

Sizwe Vincent Mbona thought about the study, participated in its design and coordination, and critically revised the manuscript. Sizwe Vincent Mbona and Anisha Ananth drafted the manuscript. Retius Chifurira and Bonginkosi Duncan Ndlovu had full access to the data, analysis, and interpretation of results. All authors review and edited the manuscript. All authors approved the final manuscript. All authors had full access to all the data in the study, and the corresponding authors had final responsibility for the decision to submit for publication. The corresponding author (Sizwe Vincent Mbona) witness that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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Data availability

The dataset generated and analysed during the current study are publicly available from the DHS team <https://dhsprogram.com/> upon request.

Declarations

Ethics approval and consent to participate

All methods concerning human participants in our study were conducted in accordance with the ethical standards laid out in the 1964 Declaration of Helsinki and its subsequent amendments. This study does not involve any experiment or interaction with human or animal subjects. The study uses secondary data from 2022 TDHS. The TDHS was reviewed and approved by the International Consulting and Fulfillment (ICF's Inc.) Ethical Review Board. Researchers in this study obtained written permission from ICF to download and use the data. The dataset used in this study was anonymous.

Consent for publication

Not applicable.

Competing of interests

The authors declare no competing interests.

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