Reproductive Health

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# Modern contraceptive utilization among street beggar women in the Sidama region of Ethiopia using bayesian model approach

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## Abstract

**Introduction** Contraceptive methods are techniques used to prevent pregnancy during sexual intercourse. The primary goal of contraception is to inhibit the fertilization of an egg by sperm or to prevent the implantation of a fertilized egg in the uterus. Unwanted pregnancy is a major challenge for street beggar women. Due to limited use of modern contraception, unwanted pregnancy and STDs are key issues faced by this population. This study aims to assess modern contraceptive utilization and explore factors influencing contraceptive choices among street beggar women in the Sidama region, Ethiopia by using Bayesian logistic approaches.

**Methods** A cross-sectional quantitative study was conducted on reproductive-aged (15–49) street beggar women in the Sidama Region. Data was collected using a pre-tested, structured interview questionnaire in the local language from each town in the Sidama region. Descriptive and inferential statistics were used to analyze the data using STATA version 17. A Bayesian logistic approach, with Markov Chain Monte Carlo methods, was used to model the association between modern contraceptive utilization and independent variables, allowing for estimation of model parameters and credible intervals.

**Result** The study found that 38.9% of street women in the Sidama region used modern contraceptives, primarily implants and injections. Bayesian logistic regression identified key factors influencing contraceptive use including, women aged 25–34 (AOR: 2.69 (95% CI: 1.57, 4.26)), married women (AOR: 4.91 (95% CI: 2.67, 8.51)), Widowed women (AOR: 2.81 (95% CI: 1.49)) and educated women (AOR: 2.16 (95% CI: 1.48, 3.01)) were more likely to use contraceptives. In contrast, those living on the street (AOR: 0.12 (95% CI: 0.05, 0.27)), with no history of pregnancy (AOR: 0.07 (95% CI: 0.02, 0.16)), and no sexual activity in the last six months (AOR: 0.11 (95% CI: 0.01, 0.03)), had lower usage rates. Additionally, women whose only job was begging (AOR: 0.43 (95% CI: 0.13, 0.92)) and those lacking health advice (AOR: 0.25 (95% CI: 0.07, 0.59)) also showed reduced utilization. Lack of discussion about contraceptives with partners (AOR: 0.18 (95% CI: 0.08, 0.33)) and no women's approval (AOR: 0.18 (95% CI: 0.08, 0.33)) further contributed to lower usage. Conversely, good knowledge of modern contraceptives was positively associated with utilization (AOR: 2.33 (95% CI: 1.44, 3.64)).

**Conclusion** The findings of this study identified several factors significantly associated with modern contraceptive use among street beggar women in the Sidama region, including age, marital status, Education level, disability, Job

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in addition to begging, Current living situation, history of sexual assault/rape, History of pregnancy after street life, discussion of modern contraception with a sexual partner, Advice from a health professional, Sexual activity in the last six months, time taken to arrive at a health facility on foot, approval of modern contraception, and knowledge. The main barriers reported were fear of side effects and lack of knowledge about contraceptive methods. The study suggests that concerned stakeholders should intervene to address these factors and improve modern contraceptive uptake in this vulnerable population.

**Keywords** Modern contraceptive, Utilization, Street beggar women, Bayesian logistic, Posterior distribution

## Introduction

### Background of the study

Contraception plays a crucial role in reproductive health. It refers to methods or devices used to prevent pregnancy by interfering with the process of conception [1]. Contraceptive methods work by preventing the release of an egg, blocking sperm from reaching the egg, or altering the uterine lining to prevent implantation [2]. It provides individuals and couples the ability to make informed decisions about family size, child spacing, and reproductive health. Access to contraception is essential for promoting gender equality, reducing unintended pregnancies, and improving maternal and child health. Contraceptive options include hormonal methods, barrier methods, intrauterine devices, sterilization procedures, and natural family planning methods [3].

Contraception also contributes to broader societal benefits by empowering individuals to pursue education, careers, and economic stability. It can help reduce unplanned pregnancies, maternal mortality, unsafe abortions, and poverty [4, 5]. Some contraceptive methods offer non-contraceptive benefits like managing menstrual issues.

Street beggar women, often homeless and lacking basic necessities, turn to begging as a means of survival. They face unique challenges, including limited access to healthcare, education, and social services, which significantly impact their reproductive health and contraceptive access [6]. Given their marginalized status and the harsh realities of street life, these women may have limited knowledge about contraceptives, face barriers in accessing healthcare, and encounter cultural taboos surrounding reproductive health [7]. Exploring contraceptive utilization among street beggar women is crucial for understanding their needs and developing targeted interventions to improve their reproductive health and overall well-being.

This research on contraceptive utilization among street beggar women can provide valuable insights into the barriers they face and factors influencing their choices. Examining these issues can identify strategies to improve access to reproductive health services, increase awareness about contraceptive options, and address social determinants impacting their decision-making [8]. Supporting street beggar women's access to modern contraceptives can contribute to reducing unintended pregnancies, improving maternal and child health, and empowering them to take control of their reproductive health.

In 2019, 1.1 billion women of reproductive age needed family planning globally, of which 842 million were utilizing contraceptive methods and 270 million had an unmet need [5]. The burden of unwanted pregnancies is significantly higher in underdeveloped nations, with contraceptive use prevalence as low as 17% in Sub-Saharan Africa [6]. Street women, among the most marginalized and impoverished populations, face limited access to healthcare and modern contraception, coupled with heightened risks of sexual exploitation, HIV/AIDS, STDs, and unintended pregnancies [9, 10]. Studies reveal that most homeless women experience unwanted pregnancies and have histories of STDs, with many being sexually active and having multiple pregnancies after entering street life, and a significant proportion experiencing sexual assault[4, 11, 12].

Research reveals that women living on the streets are less likely to benefit from basic reproductive health services since they live in the poorest segment, delivering and caring for their children away from the streets [13]. The majority of homeless females lack access to information about sexual health and safety, with 50% of homeless mothers not thinking birth control is necessary, indicating a profound lack of awareness or interest in reproductive health and birth control [14]. Modern contraception is most important for women of reproductive age, particularly street women, who are vulnerable to sexual exploitation, rape, and prostitution. It is crucial to enable them to use contraceptive methods to avoid unintended pregnancies, STDs, and sexual harassment. In the 2011 Ethiopian Demographic and Health Survey, contraceptive acceptance was 29%. However, there is no study demonstrating its prevalence among female street beggar or what factors affect their utilization in the Sidama region by using Bayesian logistic approaches. Therefore, this study aims to assess the utilization of modern contraceptives method among street beggar women in the Sidama

region and explore the factors that influence their contraceptive choices by using Bayesian logistic approach. Effectively conveys the importance of understanding the factors affecting modern contraceptive utilization among this population for developing targeted interventions to improve their reproductive health.

## Methodology

### Study area

The study was carried out in the Sidama region, a regional state in southern Ethiopia. The Sidama region has a population of around 4.3 million as of 2020 and is known for its verdant landscapes, diverse culture, and historical heritage. Established in 2020, the Sidama region was formed from the Southern Nations, Nationalities, and Peoples' Region (SNNPR) following a referendum.

### Target population

The target population for this study includes women of reproductive age (15–49 years) who are street beggar in the Sidama Region of Ethiopia.

### Study design

The study utilized a cross-sectional design and employed a quantitative research approach. Both descriptive and analytical research methods were extensively utilized to effectively address the research questions.

### Data collection

The study utilized primary data collected through face-to-face interviews with street women in the Sidama region. A structured questionnaire covering various variables. The data collection spanned seven city administrations within the Sidama region. The questionnaire was developed after reviewing existing literature, including the EDHS 2016 [15, 16] Seven data collectors and two supervisors, proficient in the local language (Sidamu Afoo) and experienced in data collection, were engaged after developing and pretesting the data collection instruments. One data collector skilled in sign language gathered information from street women with hearing disabilities. The data collection tool was initially prepared in English, translated into the local language, and then back-translated to English to ensure consistency.

### Sampling technique

We employed a multistage sampling technique to ensure a representative distribution of the sample across the Sidama Region. This process began with selecting seven towns for diverse geographic representation. Within each town, we utilized a probability proportional allocation to size method to determine the number of participants, allowing larger towns to contribute more respondents and enhancing overall representativeness. The stratified the sample to include seven strata among the street beggar women in these towns, ensuring inclusivity and representation across different segments of the population.

### Sample size determination

Determining the sample size is the key step on the overall statistical process. the sample size was calculated by a single population proportion formula [17]. The sample size considering, 95% confidence interval (CI),probability of success (proportion of respondent that use contraceptive), Contraceptive prevalence from previous studies is 37.4% [18], 5% margin of error (d) to optimize the size of the sample, the sample size (n) was computed taking into account a 95% confidence interval (CI) and 1.5 of design impact. The total sample consisted of 536 sample were included in study.

$$n = \frac{(Za/2)^2 * P(1-P)}{(d)^2}$$

where n= sample size, d = margin of error = 0.05, 95% confidence interval (CI), P = probability of success, Z = 1.96, the corresponding Z-score for the 95% CI**.**

### Study variables

#### *Response variable*

The response variable in this study is utilization of modern contraceptive among street women.

$$Y_2 = \begin{cases} 1, \textit{women that use modern contraception} \\ 0, \textit{women that not use modern contraception} \end{cases}$$

#### *Independent variables*

From many literatures the following independent variables which influence utilization of modern contraceptive among street women considered. Age of women (years), Religion, Residence before joining street, Education status of women, Marital status, Sleeping at night, Duration of street life (years), Daily income, Dependent family size, Disability, Types of disability, Distance from the health facility, Modern contraceptives Known by respondents, Source of information, Advice with health professionals, History of pregnancy after joining street life, Number of pregnancies in street life, A place to get modern contraceptives, Discuss with sexual partner, History of rape History of child loss, Desire time to have a child, Number of alive children, History of termination of pregnancy after joining street.

#### *Inclusion and exclusion criteria*

In our study, we focused on women of reproductive age (15–49) who are street beggar in the Sidama region.

*Inclusion criteria*

- Women aged 15 to 49 years, which encompasses the reproductive age range where contraceptive use is most relevant.
- Women who identify as street beggar, actively engaged in collecting and selling recyclable materials or goods on the streets.
- Women residing in the Sidama Region for at least six months to ensure familiarity with local health services and contraceptive options.
- Women who are mentally capable of providing informed consent and coherent responses. This ensures that participants can engage meaningfully in the study.

*Exclusion criteria*

- Pregnant women are excluded because their focus may shift away from contraceptive utilization towards prenatal care
- Women with mental illnesses that prevent them from providing conscious and coherent responses are excluded to ensure the reliability of the data collected. This criterion is essential for maintaining the integrity of the study's findings, as it ensures participants can comprehend questions and provide informed answers.
- Women who do not identify as street beggar are excluded to ensure the study captures the specific experiences and needs of this demographic.

### Methods of data analysis

Descriptive statistics were used to assess the prevalence of modern contraception utilization. This study used Bayesian logistic regression to assess the utilization of modern contraceptives and identify the factors influencing their use among street women in the Sidama region. Bayesian logistic regression is a statistical method that models binary outcomes within a Bayesian framework, allowing for the estimation of parameters and uncertainty. The approach incorporates prior distributions, likelihood functions, and posterior distributions to provide a comprehensive understanding of the relationships between predictors and the binary outcome. Markov Chain Monte Carlo (MCMC) techniques were employed to simulate from the posterior distribution and generate parameter estimates and credible intervals.

Bayesian Inference starts with formulating a prior probability distribution over the unknown parameters $\boldsymbol{\beta}$, which summarizes a set of beliefs of knowledge before us observations the data. The likelihood function is expressed as:

$$l(\beta|y) = \prod_{\mathrm{j}} \pi_{\mathrm{i}}^{\mathrm{Y_i}}(1-\pi_{\mathrm{i}})^{1-\mathrm{Y_i}}$$

where $\pi_i = \frac{e^{\beta_0+\beta_1 x_1+\cdots+\beta_p x_p}}{1+e^{\beta_0+\beta_1 x_1+\cdots+\beta_p x_p}}$Where the contraceptive use for the subject i who has covariate vector xi, yi indicates the women that are use MC ($y_i = 1$), or women not use MC ($y_i = 0$) of the $i^{th}$ subject. In this case we can use a non–informative prior on the parameters of the score-vectors. For this study, the most common priors for logistic regression parameters, which has the form: $\beta_j \sim \mathrm{N}(\mu_j, \sigma_j^2)$ will be used. This implies the normal distribution with mean $\mu_j$, and with variance $\sigma_j^2$. It can be expressed as [Gelman et al. 1995]:

$$f(\beta_j) = \frac{1}{\sqrt{2\pi\sigma_j^2}} exp\left\{-\frac{1}{2}\left(\frac{\beta_j-\mu_j}{\sigma_j}\right)^2\right\}$$

In the case of no available prior knowledge, we consider a normal distribution with mean $\boldsymbol{\mu_j} = 0$ and large variance. The posterior distribution is derived by multiplying the prior distributions of the parameters of the likelihood function given as follows:

$$P(\beta|y) \propto \prod_{ij}\left(\frac{e^{\beta_0+\beta_1 x_1+\cdots+\beta_p x_p}}{1+e^{\beta_0+\beta_1 x_1+\cdots+\beta_p x_p}}\right)^{y_{ij}} \left(1-\frac{e^{\beta_0+\beta_1 x_1+\cdots+\beta_p x_p}}{1+e^{\beta_0+\beta_1 x_1+\cdots+\beta_p x_p}}\right)^{1-y_{ij}} \prod_{j=1}^{p}\frac{1}{\sqrt{2\pi\sigma_j^2}} exp\left\{-\frac{1}{2}\left(\frac{\beta_j-\mu_j}{\sigma_j}\right)^2\right\}$$

To determine the posterior distribution, the researchers used Markov Chain Monte Carlo (MCMC) methods to simulate random numbers following the posterior distribution. MCMC is a general approach that generates estimates of the unknown model parameters β from the appropriate distribution and then refines the values to better approximate the desired posterior distribution n.

## Result

Out of the 536 reproductive-aged street beggar women interviewed, data from 40 participants were excluded from further analysis due to pregnancy. The average age of the women was 29.8 years, with a standard deviation of ± 8.4 years. On average, these women had spent 5.4 years in street life, with a standard deviation of ± 5.5 years. Family sizes varied significantly, ranging

from women living alone to those with a maximum of 12 members; the mean family size was 3.6, with a standard deviation of ± 2.1. Furthermore, the daily income of these street women varied widely, with a minimum of 5 birr and a maximum of 500 birr, resulting in an average daily income of 50.4 birr and a standard deviation of ± 53.4 birr in Ethiopian birr as presented in Table 1.

The study included 496 sexually active beggar women in the Sidama Region of Ethiopia, with the majority aged 25–34 (45.1%) and 35–49 (31.9%). Most participants identified as Protestant (46.4%) or Orthodox (31.9%) and were predominantly married (35.1%). A significant portion (61.5%) had rural backgrounds before engaging in begging, and over half (55%) had no formal education. Many women had large families, with 43.8% having more than three members. Most had been involved in street life for 1–5 years (58.3%), and 16.9% reported disabilities, mainly affecting their hands or legs. Health issues were prevalent, with 32.5% suffering from chronic illnesses, the most common being HIV (32.3%). In terms of modern contraceptive (MC) utilization, only 3.4% of women with a family size of one used MC, while this figure rose to 15.5% for families of two to three and 20% for families with more than three members. Usage was highest among married women (25.6%), followed by divorced (6.8%) and single women (3%). Educated beggar women had a higher utilization of MC (24.6%) compared to non-educated women (14.3%), indicating that educated women are more likely to use MC. In terms of disability, the utilization of MC among disabled beggar women was low (2.4%) compared to non-disabled women (36.5%), suggesting that women without disabilities are more likely to use MC than those with disabilities (Table 2).

### Socio economic characteristics of street women in Sidama region, Ethiopia, 2023

The study on the socio-economic characteristics of street women in the Sidama Region of Ethiopia revealed significant patterns in modern contraceptive use related to daily income, living conditions, reasons for begging, and additional jobs. Among women earning 30 birr or less daily, 19.8% utilized modern contraception, while 35.1% did not. For those earning between 31 and 40 birr, only 2% reported using it, and among those making 41–50 birr, usage increased slightly to 6.3%. Notably, among women earning more than 50 birr daily, 10.89% used modern contraception, indicating a gradual increase in usage with higher income levels. Out of 155 women living in rented houses, 11.7% used modern contraception, while 19.6% did not. In mass living rooms, 6.85% used it compared to 10.3% who did not. Of the 21 women living in churches or mosques, only 1% used modern contraception. Conversely, 12.9% of those living on the street utilized it, and 1.4% of women living near someone else did.

Regarding the reasons for begging, chronic illness was cited by 57 women, of whom only 3% used modern contraception. Among 47 women who cited the death of a supporter, 2.4% used it, while 2.2% of those reporting disabilities did. Notably, of the 180 women who identified poverty as the reason for begging, 14.7% used modern contraception. Additionally, out of 88 unemployed women, 9.7% used it. In terms of jobs in addition, among 119 women working as daily laborers, 24.4% used modern contraception, while 40% did not. Among 51 women working as housewives, 10.1% used modern contraception, and 14% did not. For the 320 women solely relying on begging, 4% used modern contraception, and 6.3% did not. The 6 women engaged in other jobs, 0.4% used modern contraception, and 0.8% did not as presented in Table 3.

As presented in Table 4, a significant majority of the street beggar women (83.7%) had given birth, with 55% experiencing pregnancy after joining street life. Among these pregnancies, a striking 70.7% were unplanned, primarily due to a lack of knowledge about modern contraceptive services (44%) and fears regarding side effects (31%). More than half (58.3%) had at least one child, while 38.5% reported a history of rape after joining street life. In the past 12 months, 36% engaged in sexual intercourse, with 20.7% pregnant, 82.2% of these pregnancies were unintended. This history of rape underscores their vulnerability to sexual violence, contributing to reproductive health challenges.

Additionally, 18.1% of participants had a history of induced abortion, with 44.5% using self-administered drugs, The history of induced abortion, with a significant

**Table 1** Descriptive Statistics for continuous Socio demographic characteristics of street beggar women in sidama region, Ethiopia 2023

| Variable | Minimum | Maximum | Mean | Median | Std. Devation |
|---|---|---|---|---|---|
| Age of women in year | 15 | 49 | 29.8 | 32 | 8.4 |
| Family size | 1 | 12 | 3.6 | 4 | 2.1 |
| Daily income in Ethiopian birr | 5 | 500 | 50.4 | 44 | 53.4 |
| Duration of street life (years) | 1 | 30 | 5.4 | 3.5 | 5.5 |

**Table 2** Descriptive Statistics for categorical Socio demographic characteristics of street beggar women in Sidama region, Ethiopia 2023

| Variable | Frequency | Percent (%) | Use modern contraception | |
|---|---|---|---|---|
| | | | Yes (%) | No (%) |
| Age | | | | |
| 15–24 | 114 | 23 | 41 (8.3) | 73 (14.7) |
| 25–34 | 224 | 45.1 | 119 (24.0) | 105 (21.0) |
| 35–49 | 158 | 31.9 | 33 (6.7) | 125 (25.3) |
| Religion | | | | |
| Orthodox | 158 | 31.9 | 63 (12.7) | 95 (19.1) |
| Protestant | 230 | 46.4 | 95 (19.1) | 135 (27.2) |
| Muslim | 58 | 11.7 | 18 (3.6) | 40 (8.0) |
| Others | 50 | 10.5 | 17 (3.5) | 33 (6.6) |
| Marital status | | | | |
| Single | 89 | 17.9 | 15 (3.0) | 74 (15.0) |
| Married | 174 | 35.1 | 127 (25.6) | 47 (9.2) |
| Divorced | 123 | 24.8 | 34 (6.8) | 89 (18.0) |
| Widowed | 110 | 22.2 | 17 (3.5) | 93 (18.7) |
| Educational status | | | | |
| Non Educated | 273 | 55.0 | 71 (14.3) | 202 (40.7) |
| Educated | 223 | 45.0 | 122 (24.6) | 101 (20.4) |
| Do you have sexual partner | | | | |
| Yes | 194 | 39.1 | 127 (25.6) | 67 (13.5) |
| No | 302 | 60.9 | 66 (13.3) | 236 (47.60) |
| Do you have dependent family | | | | |
| Yes | 358 | 77.6 | 163 (32.9) | 222 (44.7) |
| No | 111 | 22.4 | 30 (6.0) | 81 (16.3) |
| Family size | | | | |
| Alone | 78 | 15.7 | 17 (3.4) | 61 (12.3) |
| 2–3 | 201 | 40.5 | 77 (15.5) | 124 (25.0) |
| > 3 | 217 | 43.8 | 99 (20.0) | 118 (23.8) |
| Residence before street life | | | | |
| Rural | 305 | 61.5 | 109 (22.0) | 197 (39.7) |
| Urban | 191 | 38.5 | 84 (17.0) | 107 (21.3) |
| Do you have disability | | | | |
| Yes | 84 | 16.9 | 12 (2.4) | 72 (14.5) |
| No | 412 | 83.1 | 181 (36.5) | 231 (46.6) |
| Types of disability you have | | | | |
| Problem on hand and leg | 41 | 51.2 | 6 (7.1) | 35 (41.6) |
| Blindness | 18 | 23.8 | 2 (2.4) | 23 (27.4) |
| Difficulty of Hearing | 13 | 17.8 | 1 (1.2) | 12 (14.2) |
| Mental health problem | 5 | 7.2 | 3 (3.6) | 2 (2.4) |
| Do you have chronic illness | | | | |
| Yes | 161 | 32.5 | 50 (10.1) | 111 (22.4) |
| No | 335 | 67.5 | 143 (28.8) | 192 (38.7) |
| Type of chronic illness | | | | |
| HIV | 52 | 32.3 | 13 (8.0) | 39 (24.3) |
| Cardiac illness | 24 | 14.9 | 8 (5.0) | 16 (9.9) |
| Diabetes mellitus | 27 | 16.7 | 10 (6.2) | 17 (10.5) |
| TB | 26 | 16.2 | 7 (4.4) | 19 (11.8) |
| Others* | 32 | 19.9 | 12 (7.5) | 20 (12.4) |

**Table 2** (continued)

| Variable | Frequency | Percent (%) | Use modern contraception | |
|---|---|---|---|---|
| | | | Yes (%) | No (%) |
| Duration of street life | | | | |
| Less than 1 year | 54 | 10.9 | 20 (4.0) | 34 (6.9) |
| 1–5 | 289 | 58.3 | 114 (23.0) | 175 (35.3) |
| 6–10 | 90 | 18.1 | 34 (6.9) | 56 (11.3) |
| 11–15 | 29 | 5.8 | 15 (3.0) | 14 (2.8) |
| Greater than 15 years | 34 | 6.9 | 10 (2.0) | 24 (4.8) |
| Migration status | | | | |
| Migrant | 131 | 26.4 | 46 (9.3) | 85 (17.1) |
| Non-migrant | 365 | 73.6 | 147 (29.6) | 218 (44.0) |

Others* = kidney, Gland, Operation

**Table 3** Socio-economic characteristics of women beggar in Sidama, Ethiopia in 2023, along with the use of modern contraception

| Category variable | Frequency | Percent | Use of modern contraception | |
|---|---|---|---|---|
| | | | Yes | No |
| Daily income | | | | |
| ≤ 30 | 272 | 55.4 | 98 (19.8) | 174 (35.1) |
| 31–40 | 21 | 4.2 | 10 (2.0) | 11 (2.2) |
| 41–50 | 86 | 17.3 | 31 (6.3) | 55 (11.1) |
| > 50 | 117 | 23.6 | 54 (10.9) | 63 (12.7) |
| Currently living | | | | |
| Rented House | 155 | 31.30 | 58 (11.7) | 97 (19.6) |
| Mass Living Room | 85 | 17.10 | 34 (6.9) | 51 (10.3) |
| Church/mosque | 21 | 4.20 | 5 (1.0) | 16 (3.3) |
| On the street | 115 | 23.20 | 64 (12.9) | 51 (10.3) |
| Near to some body | 54 | 10.90 | 7 (1.4) | 47 (9.5) |
| Others* | 66 | 13.30 | 25 (5.0) | 41 (8.2) |
| Reason to be beggar | | | | |
| Chronic Illness | 57 | 11.50 | 15 (3.0) | 42 (8.5) |
| Death of Supporter/Family member | 47 | 9.50 | 12 (2.4) | 34 (6.9) |
| Disability or Impairment | 34 | 6.90 | 11 (2.2) | 23 (4.6) |
| Family rejection | 41 | 8.30 | 12 (2.4) | 29 (5.9) |
| Homelessness | 23 | 4.60 | 13 (2.6) | 10 (2.0) |
| Poverty | 180 | 36.3 | 73 (14.7) | 107 (21.6) |
| Unemployment | 88 | 17.7 | 48 (9.7) | 40 (8.1) |
| Others** | 26 | 5.2 | 8 (1.6) | 18 (3.6) |
| Do you have Jobs in Addition to | | | | |
| Daily Laborer | 119 | 24 | 121 (24.4) | 199 (40.0) |
| House Wife | 51 | 10.3 | 50 (10.2) | 69 (14.0) |
| Only begging | 320 | 64.5 | 20 (4.0) | 31 (6.3) |
| Others*** | 6 | 1.2 | 2 (0.4) | 4 (0.8) |

Others* = Rural house, Keble house, others** = divorce, pregnancy, others*** = student, merchant

proportion resorting to self-administered methods, public health institutions, or untrained/traditional abortionists, highlights the potential risks and lack of access to safe abortion services for these women. While 84.1% had children, 27.6% expressed a desire for more, and 58.5% did not wish to have additional children, reflecting

**Table 4** Reproductive health-related and sexual exposure factors of street women in sidama region, Ethiopia, 2023

| Category | Frequency | Percentage | Use of modern contraception | |
|---|---|---|---|---|
| | | | Yes (%) | No (%) |
| History of giving birth | | | | |
| Yes | 415 | 83.7 | 168 (33.9) | 247 (49.8) |
| No | 81 | 16.3 | 25 (5.0) | 56 (11.3) |
| History of pregnancy after joining street life | | | | |
| Yes | 273 | 55.0 | 160 (32.3) | 17 (3.4) |
| No | 223 | 45.0 | 33 (6.7) | 190 (38.3) |
| Number of pregnancy in street | | | | |
| 1 | 107 | 39.2 | 36 (13.2) | 71 (26.0) |
| 2 | 116 | 42.5 | 80 (29.3) | 36 (13.2) |
| ≥3 | 50 | 18.3 | 44 (16.1) | 6 (2.2) |
| Is Street pregnancy planned | | | | |
| Yes | 80 | 29.3 | 60 (22.0) | 20 (7.4) |
| No | 193 | 70.7 | 100 (36.6) | 93 (34.0) |
| Reason of unplanned birth | | | | |
| Fear of side effect | 85 | 31.0 | 55 (20.0) | 30 (11.0) |
| Desire to have child in the future | 38 | 14.0 | 35 (12.8) | 3 (1.1) |
| Partners of opposition | 16 | 6.0 | 10 (3.7) | 6 (2.2) |
| Lack knowledge modern contraceptive services | 120 | 44.0 | 50 (18.3) | 70 (25.6) |
| Others* | 14 | 5.0 | 10 (3.7) | 4 (1.5) |
| Number of living children | | | | |
| 0 | 79 | 15.9 | 21 (4.2) | 58 (11.7) |
| 1–2 | 206 | 41.5 | 90 (18.1) | 116 (23.3) |
| 3–4 | 145 | 29.2 | 64 (13.0) | 81 (16.3) |
| > 5 | 66 | 13.3 | 18 (3.6) | 48 (9.7) |
| Child with mothers at a time data collection | | | | |
| Yes | 289 | 58.3 | 136 (27.4) | 153 (30.9) |
| No | 207 | 41.7 | 57 (11.5) | 150 (30.2) |
| History of rape after joining street life | | | | |
| Yes | 191 | 38.5 | 130 (26.2) | 61 (12.3) |
| No | 305 | 61.5 | 63 (12.7) | 242 (48.8) |
| History of induced abortion | | | | |
| Yes | 90 | 18.1 | 46 (9.3) | 44 (8.9) |
| No | 406 | 81.9 | 147 (29.6) | 259 (52.2) |
| Place she aborted | | | | |
| Public health institution | 23 | 25.6 | 20 (22.2) | 3 (3.3) |
| Untrained abortionist | 20 | 22.2 | 8 (8.9) | 12 (13.3) |
| Self-taking different methods | 40 | 44.5 | 15 (16.7) | 25 (27.8) |
| Others** | 7 | 7.7 | 3 (3.3) | 4 (4.4) |
| Sexual intercourse in the last 12 months | | | | |
| Yes | 193 | 36.0 | 120 (24.2) | 33 (6.7) |
| No | 343 | 64.0 | 73 (14.7) | 270 (54.4) |
| Currently pregnant | | | | |
| Yes | 40 | 20.7 | 0.0 | 40 (20.0) |
| No | 153 | 79.3 | 120 (62.2) | 33 (17.0) |
| Your current pregnancy | | | | |
| Intended | 7 | 17.5 | 0 | 7 (17.5) |
| Unintended | 33 | 82.2 | 0 | 33 (82.5) |
| Desire to have a child in the future? | | | | |

**Table 4** (continued)

| Category | Frequency | Percentage | Use of modern contraception | |
|---|---|---|---|---|
| | | | Yes (%) | No (%) |
| No | 290 | 58.5 | 57 (11.5) | 80 (16.1) |
| Not decided yet | 69 | 13.9 | 111 (22.4) | 179 (36.0) |
| Yes | 137 | 27.6 | 25 (5.0) | 44 (8.9) |
| Time of a plan to have a child in the future | | | | |
| Within 2 years | 7 | 5.1 | 2 (1.5) | 4 (2.9) |
| After 3–4 years | 47 | 34.3 | 16 (11.7) | 31 (22.6) |
| After 5 years | 83 | 60.6 | 38 (27.7) | 45 (32.9) |
| Why you want children in this situation | | | | |
| Children's are a gift from God | 70 | 51.1 | 24 (17.5) | 46 (16.9) |
| Need help in the future | 26 | 19.0 | 11 (8.0) | 14 (10.2) |
| When we Hold children alms givers increase | 18 | 13.0 | 12 (8.8) | 6 (4.4) |
| Sex preference | 19 | 14.0 | 5 (6.7) | 14 (10.2) |
| Other*** | 4 | 3.0 | 3 (2.2) | 1 (0.7) |

Others*- misperception, others**-private clinic, others***-if our live change

diverse fertility intentions. Utilization of modern contraception was higher among women with a history of rape (26.2%) compared to those without (12.7%). Women planning to have children in the future were more likely to use modern contraception, 27.7% planned to conceive after five years, 11.7% after 3–4 years, and only 1.5% within two years. The utilization of modern contraception varied based on factors such as history of rape and future childbearing plans, indicating the influence of personal experiences and reproductive intentions on contraceptive practices as presented.

The result presented in Table 5 show that approximately 83.4% of street beggar women were aware of modern contraceptive methods, with the majority having information about injectable (62.9%) and implants (28.4%). Friends are the primary source of information for most street beggar women about modern contraceptive use. Around 68.5% of women express approval of modern contraceptive methods, and 66.7% are culturally accepting of their use. However, 76.8% of beggar women do not receive support from their sexual partners in this regard. Additionally, 58.5% of women do not receive advice from healthcare professionals about contraceptive methods. While 63.7% of women have access to modern contraceptive methods, only 59.5% have ever used them. Currently, 38.9% of beggar women use modern contraceptive methods, and 58.7% plan to use them in the future.

Among those using modern contraceptives, 60% do so to limit births, while 40% use them to space births. The utilization of modern contraception was 38.1% among women who have ever used any method of modern contraception, compared to 0.8% among those who have never used any modern contraceptive methods. This indicates that women who have previously used any modern contraceptive method are more likely to currently use contraceptive methods than those who have not used any modern contraceptive methods before, as presented in Table 5.

As presented in Fig. 1, the most commonly used contraceptive method among street beggar women in the Sidama region is the implant, with 48.7% of women using this method, followed by injectable at 35.8% (Fig. 1).

### Bayesian estimation for logistic regression model

The study employed Bayesian analysis to draw conclusions about the parameters of a logistic regression model for women's contraceptive use in the Sidama region of Ethiopia. The Bayesian method provided parameter estimates by sampling from their posterior distributions using Markov Chain Monte Carlo (MCMC) techniques, specifically the Metropolis–Hastings algorithm implemented in Stata software. The MCMC analysis was conducted with 12,500 iterations in two separate chains, discarding the first 2,500 as burn-in, resulting in 10,000 iterations sampled from the posterior distribution. Diagnostic methods were applied to assess the convergence of the Markov chains to the target posterior distribution.

### Model assessment

Before drawing inferences and making predictions about the posterior distribution of the model parameters, the researchers conducted diagnostics to assess whether the Markov chain had reached its stationary or posterior distribution. Using the Metropolis–Hastings algorithm with two simultaneous chains, they generated numeric and graphical summaries of the estimated

**Table 5** Awareness and practice of street beggar women towards modern contraceptive methods in Sidama, Ethiopia, 2023

| Category | Frequency | Percentage | Use of modern contraception | |
|---|---|---|---|---|
| | | | Yes | NO |
| Ever heard about MC | | | | |
| Yes | 418 | 84.3 | 193 (38.9) | 225 (45.4) |
| No | 78 | 15.7 | 0 (0.0) | 78 (15.7) |
| Which method of MC do you know | | | | |
| Pill | 121 | 17.0 | 12 (1.7) | 109 (15.3) |
| Condom | 84 | 11.8 | 26 (3.7) | 58 (8.2) |
| Implant | 152 | 21.4 | 80 (11.3) | 72 (10.1) |
| Injectable | 337 | 47.5 | 150 (21.1) | 187 (26.3) |
| IUCD | 14 | 1.9 | 5 (0.7) | 9 (64.3) |
| Others* (female sterilization) | 3 | 0.5 | 3 (0.4) | 0 (0.0) |
| Source of information (more than one answer are possible) | | | | |
| Family | 207 | 44.0 | 50 (10.6) | 157 (33.4) |
| Friends | 199 | 42.3 | 80 (17.0) | 119 (25.3) |
| Health professional | 43 | 9.2 | 40 (8.5) | 3 (0.6) |
| Media | 21 | 4.2 | 13 (2.8) | 8 (1.7) |
| Place to get MC (more than one answer are possible) | | | | |
| Pharmacy | 63 | 14.9 | 9 (2.1) | 54 (12.8) |
| Health centers | 258 | 61.23 | 100 (23.8) | 158 (37.5) |
| Hospital | 97 | 23.1 | 53 (12.5) | 44 (10.5) |
| Others (NGO) | 3 | 0.7 | 2 (0.5) | 1 (0.2) |
| Advantages of MC (more than one answer are possible) | | | | |
| Spacing birth | 54 | 12.9 | 30 (7.2) | 24 (5.7) |
| Limit family size | 93 | 22.2 | 40 (9.6) | 53 (12.6) |
| Prevent unwanted pregnancy | 234 | 55.9 | 83 (19.8) | 151 (36.1) |
| Prevent STI | 20 | 9.1 | 10 (2.4) | 10 (2.4) |
| Advice from health professionals about MC | | | | |
| Yes | 206 | 41.5 | 132 (26.6) | 74 (15.0) |
| No | 290 | 58.5 | 61 (12.3) | 229 (46.1) |
| Visited by health care provider in the last 12 month | | | | |
| Yes | 149 | 30.0 | 93 (18.7) | 56 (11.3) |
| No | 347 | 70.0 | 100 (20.2) | 247 (49.8) |
| Discuss modern contraceptive utilization with sexual partner | | | | |
| Yes | 119 | 22.2 | 96 (19.4) | 20 (4.0) |
| No | 417 | 77.8 | 97 (19.6) | 283 (57.0) |
| Does your sexual partner support you | | | | |
| Yes | 115 | 23.2 | 92 (19.4) | 23 (4.6) |
| No | 381 | 76.8 | 101 (20.4) | 280 (56.6) |
| Is contraception method culturally accepted in you context | | | | |
| Yes | 331 | 66.7 | 166 (33.5) | 165 (33.3) |
| No | 165 | 33.3 | 27 (5.4) | 138 (27.8) |
| Women approved MC | | | | |
| Yes | 340 | 68.5 | 180 (36.3) | 160 (32.3) |
| No | 156 | 31.5 | 13 (2.6) | 143 (28.8) |
| Accessibility of MC | | | | |
| Yes | 316 | 63.7 | 166 (33.5) | 150 (30.2) |
| No | 180 | 36.3 | 27 (5.4) | 153 (30.8) |
| Knowledge | | | | |

**Table 5** (continued)

| Category | Frequency | Percentage | Use of modern contraception | |
|---|---|---|---|---|
| | | | Yes | NO |
| Poor | 142 | 28.6 | 30 (6.1) | 112 (22.6) |
| Good | 354 | 71.4 | 163 (32.9) | 191 (38.5) |
| Ever use of MC | | | | |
| Yes | 295 | 59.5 | 189 (38.1) | 106 (21.4) |
| No | 201 | 40.5 | 4 (0.8) | 197 (39.7) |
| Current modern contraceptive use | | | | |
| Yes | 193 | 38.9 | 193 (38.9) | 0.0 |
| No | 303 | 61.1 | 0.0 | 303 (61.1) |
| Reason currently contraceptive used | | | | |
| To limit birth | 116 | 60.0 | 116 (60.0) | 0.0 |
| Spacing birth | 77 | 40.0 | 77 (40.0) | 0.0 |
| Future plan to use modern contraceptives | | | | |
| No | 159 | 32.1 | 11 (2.2) | 148 (29.8) |
| Not decided yet | 46 | 9.3 | 12 (2.4) | 34 (6.9) |
| Yes | 291 | 58.7 | 170 (34.3) | 121 (24.4) |

univariate marginal posterior distributions to check for convergence [24–26]. The time series plot showed the two separately generated chains were mixed, indicating convergence. The autocorrelation function for each parameter chain also showed good mixing, with autocorrelation disappearing before 20 lags, suggesting the independence of current values from previous ones and the convergence of the model parameters to their target distributions [27]. Additionally, the Kernel Density plot exhibited unimodal density for the coefficients of all predictors, further confirming that the simulated parameter values had converged to the known target distribution.

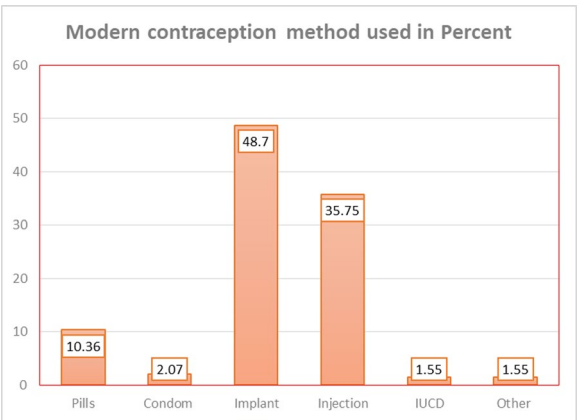


**Fig. 1** Bar graph for currently used MC methods of street beggar women in Sidama region

As depicted in Figs. 2 and 3, the convergence of the Markov chain was initially assessed visually using various plots. In addition to the graphical method, the convergence of the chain to its posterior distribution can be verified using numeric summaries of the estimated univariate marginal posterior distributions of the specified model parameters [26].

The simulation in the study was continued until the Monte Carlo error for each parameter of interest was less than 5% of its corresponding posterior standard error, which validates the convergence and accuracy of posterior estimates [28]. The numeric summary estimates of the MCMC algorithm include Monte Carlo (MC) error, posterior mean, standard error, and a 95% confidence interval for the posterior mean. For ease of presenting the analysis results, the parameter estimates were shown in Table 6 in terms of odds ratio, which is the exponential of the estimates (Exp (Mean)).

The Bayesian analysis results presented in Table 6 indicate that several explanatory variables were significantly associated with modern contraceptive utilization among street beggar women in the Sidama region. These variables include age, marital status, education level, disability, chronic illness, employment (in addition to begging), current living situation, history of sexual assault or rape, history of pregnancy after street life, discussions about modern contraception with sexual partners, advice from health professionals, sexual activity in the last six months, time taken to arrive at a health facility on foot, approval of modern contraception, and knowledge about contraceptive methods.

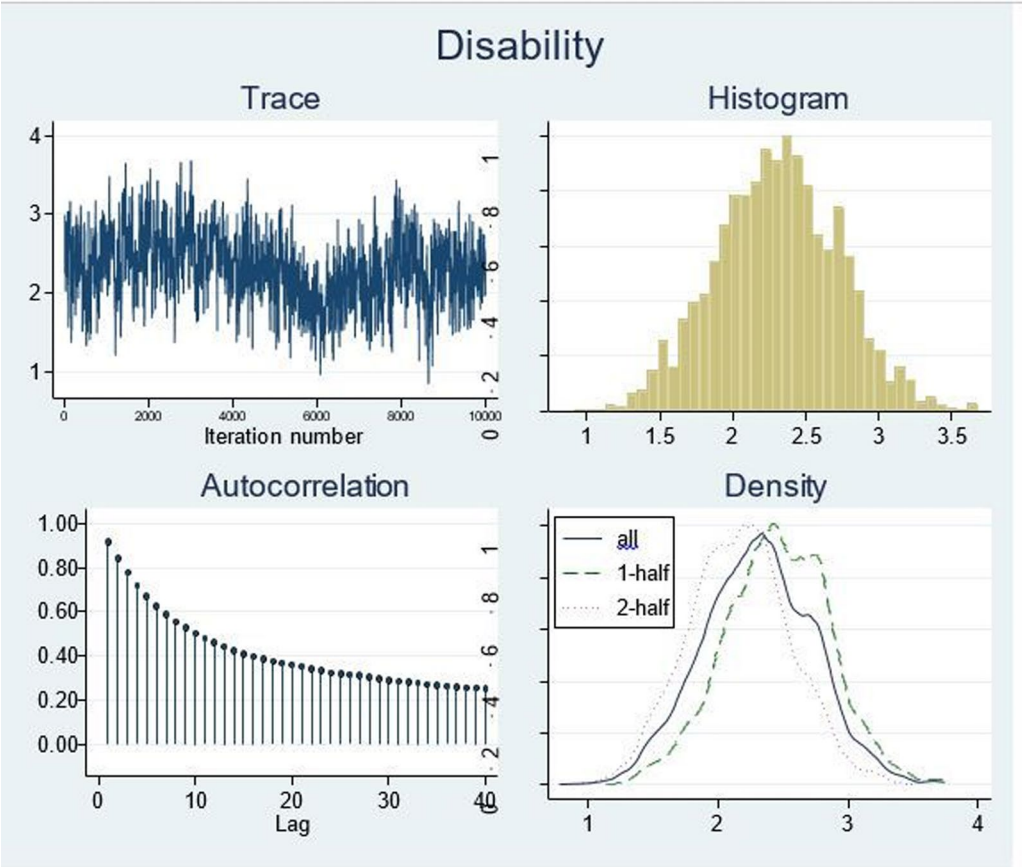


**Fig. 2** Convergence of Time Series, density and autocorrelation plots for the coefficients of disability

### Interpretation of Bayesian logistic regression analysis results

The results of the Bayesian logistic regression analysis indicate that the baseline odds of modern contraception utilization among street beggar women were approximately 0.12. This means that, when holding all other predictors constant, the odds of using modern contraception are about 0.12 times the odds of not using it. For the age group, the odds of modern contraception utilization were approximately 2.69 times higher for women aged 25–34 compared to the reference group of 15–24 years old. In contrast, the odds were approximately 0.59 times lower for women over the age of 34 compared to those in the 15–24 age groups.

Marital status was a significant predictor of modern contraceptive use among street beggar women. The odds ratio for marital status was 4.9, indicating that married women are 4.9 times more likely to use modern contraceptives compared to single women, who serve as the reference category. Similarly, the odds ratio for widowed women was 2.8, suggesting that widowed women are 2.8 times more likely to use modern contraceptives compared to their single counterparts. The odds ratio for the "educated" category was 2.16, meaning that educated women have approximately 2.16 times higher odds of using modern contraceptive services compared to uneducated women, holding all other factors constant.

The odds ratio for the "absence of disability" category was 5.18, indicating that street beggar women without a disability are approximately 5.18 times more likely to use modern contraceptive services compared to those with a disability. Furthermore, a history of sexual assault or rape also emerged as a significant predictor. The odds ratio for the "no history of sexual assault/rape" category was 0.12, suggesting that the odds of using modern contraceptives are approximately 87.8% significantly lower for women with such a history. Sexual activity in the last six months was a significant predictor of modern contraceptive use. The odds ratio for the "not sexually active in the last six months" category was 0.11, indicating that the odds of utilizing modern contraceptives are approximately 89.18% lower for women who were not sexually active compared to those who were, holding other factors

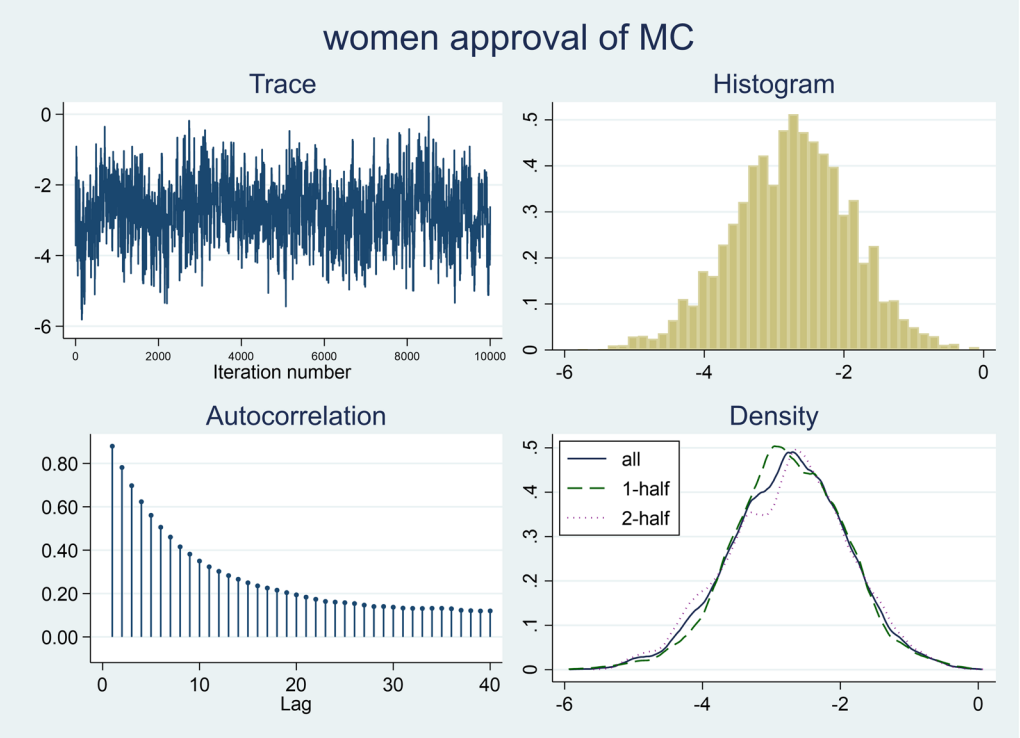


**Fig. 3** Convergence of Time Series, density and autocorrelation plots for the coefficients of women approval of MC

constant. This finding suggests that street beggar women who were not sexually active in the last six months are significantly less likely to use modern contraceptive services.

Women who did not receive advice from health professionals about modern contraceptives were 0.25 times less likely to use them compared to those who did receive advice. Additionally, women who took more than 30 min to reach a nearby health facility on foot were significantly less likely to use modern contraceptives compared to those who took less than 30 min 0.10. The odds of modern contraceptive use among women who took more than 30 min to arrive were 0.10, indicating a 90% decrease compared to those who arrived within 30 min. Furthermore, women who did not approve of modern contraceptives were 0.15 times less likely to use them compared to those who did approve. This means the odds of modern contraceptive use were 15% lower among women who did not approve compared to those who did.

## Discussion

The prevalence of modern contraceptive use among street beggar women was 38.9%, higher than the reported from South Ethiopia, North-West Ethiopia, Bahir Dar Town, and Shamane town, [13, 18–20]. This suggests potential differences in access and utilization influenced by factors like healthcare, education, and socioeconomic status. The study's prevalence was also higher than the national (29%) and regional (25%) contraceptive prevalence in Ethiopia, indicating that street beggar women have a higher contraceptive use than the general population, possibly due to the impact of urban living conditions [21, 22]. Comparisons with other studies in Ethiopia showed both higher and lower prevalence, underscoring the heterogeneous nature of contraceptive utilization across different population groups [13, 18–20]. The higher prevalence compared to the national figure suggests urban areas may provide better access, while the lower prevalence compared to national urban figures indicates socioeconomic factors like economic status also play a significant role [13].

The study found that implants, injectable, and pills were the most commonly used modern contraceptives among street beggar women in Sidama, Ethiopia. This aligns with national trends and can be attributed to the familiarity and widespread use of these methods [13, 19, 21]. Notably, most street beggar women used implants, consistent with studies in the Sidama region but inconsistent with other parts of Ethiopia [23]. This strong preference for long-acting contraceptive methods suggests a desire for sustained protection and deliberate family planning choices. Government and NGO initiatives, such

**Table 6** Posterior distribution parameter estimates of modern contraception utilization of among street beggar women in Sidama region by Bayesian logistic regression model

| Variable | Categories | Mean | Exp (mean) | SD | MC error | 95% C.I. for mean | |
|---|---|---|---|---|---|---|---|
| | | | | | | 2.5% | 97.5% |
| Intercept | | − 1.73 | 0.18 | 0.12 | 0.02 | 0.04 | 0.49 |
| Age | 15–24 (ref.) | | | | | | |
| | 25–34 | 0.99 | 2.69 | 0.69 | 0.04 | 1.57 | 4.26 |
| | > 34 | − 0.54 | 0.59 | 0.18 | 0.02 | 0.31 | 0.99 |
| Marital status | Single (ref.) | | | | | | |
| | Married | 1.59 | 4.91 | 1.52 | 0.05 | 2.67 | 8.51 |
| | Widowed | 1.04 | 2.81 | 0.88 | 0.04 | 1.49 | 4.89 |
| | Divorced | 0.36 | 1.44 | 0.49 | 0.02 | 0.73 | 2.64 |
| Disability | Yes (ref.) | | | | | | |
| | No | 1.65 | 5.18 | 1.87 | 0.05 | 2.61 | 9.92 |
| Chronic illness | Yes (ref.) | | | | | | |
| | No | − 1.02 | 0.36 | 0.12 | 0.02 | 0.19 | 0.65 |
| Education level | Non educated (ref.) | | | | | | |
| | Educated | 0.77 | 2.17 | 0.39 | 0.05 | 1.48 | 3.01 |
| Currently living | Of street (ref.) | | | | | | |
| | On street | − 2.13 | 0.12 | 0.06 | 0.01 | 0.05 | 0.27 |
| History of pregnancy after street life | Yes (ref.) | | | | | | |
| | No | − 2.71 | 0.07 | 0.04 | 0.01 | 0.02 | 0.16 |
| History of rape | Yes (ref.) | | | | | | |
| | No | − 2.11 | 0.12 | 0.03 | 0.01 | 0.08 | 0.19 |
| Sexual ly active in the last six month | Yes (ref.) | | | | | | |
| | No | − 2.22 | 0.11 | 0.01 | 0.01 | 0.01 | 0.03 |
| Job in addition to begging | Had job | | | | | | |
| | Only begging | − 0.85 | 0.43 | 0.23 | 0.05 | 0.13 | 0.92 |
| Advice from health profession | Yes (ref.) | | | | | | |
| | No | − 1.39 | 0.25 | 0.15 | 0.04 | 0.07 | 0.59 |
| Discuss MC with sexual partner | Yes (ref.) | | | | | | |
| | No | − 1.72 | 0.18 | 0.07 | 0.01 | 0.08 | 0.33 |
| Time taken on foot to arrive health facility | ≤30 min (ref.) | | | | | | |
| | > 30 min | − 4.80 | 0.10 | 0.01 | 0.01 | 0.01 | 0.02 |
| Women approval | Yes (ref.) | | | | | | |
| | No | − 1.88 | 0.15 | 0.03 | 0.01 | 0.09 | 0.23 |
| Knowledge | Poor (ref.) | | | | | | |
| | Good | 0.84 | 2.33 | 0.56 | 0.04 | 1.44 | 3.64 |

as the availability of trained professionals for implant insertion/removal and increased advertising, likely contribute to the high acceptance and utilization of implants among this population. The finding that nearly 60% of users aimed to limit their number of children further underscores the appropriateness of long-acting methods to support their reproductive intentions.

The study found that married women were more likely to use modern contraceptives compared to single women. Marriage often signifies a commitment to family planning, leading to greater consideration and use of contraceptives to manage family size and ensure household stability. This positive association between marital status and contraceptive use underscores the importance of tailoring family planning programs and policies to address the specific needs of married and partnered individuals. Targeted interventions considering the dynamics within marital relationships are crucial for promoting and providing access to modern contraceptives. This finding aligns with studies across various settings, further supporting the universal predictive nature of marital status for contraceptive utilization [21, 22]. This result is

consistent with a study conducted in urban slum areas of India, Nigeria, southern Ethiopia and Dembia district of north western Ethiopia [24–27]. The result agrees with the fact that marital status is a universal predictor of contraceptive utilization. As compared to the unmarried, married women had better life styles than the unmarried due to economic support and living conditions.

The study found a consistent association between educational status and the utilization of modern contraceptive methods, aligning supported by findings from other locations such as Bahir Dar town, Wolayta in southern Ethiopia, urban slums, and Mozambique [19, 25, 26, 28], respectively. Higher educational attainment is often linked to increased awareness and knowledge about reproductive health, family planning, and the benefits of modern contraceptives [29]. Educated individuals are more likely to have access to information and resources that enable them to make informed decisions about their reproductive health, leading to a higher likelihood of utilizing modern contraceptives[30, 31]. Education can empower women to take charge of their reproductive health and make autonomous decisions about family planning [32, 33]. Educated women may have greater agency and confidence in discussing and accessing modern contraceptive methods, contributing to higher utilization rates. Education programs can play a crucial role in improving awareness, attitudes, and utilization of modern contraceptives, particularly among underserved populations like street beggar [31, 34].

The study found a positive association between the absence of disability and the utilization of modern contraceptives. Women with disabilities often face significant barriers in accessing healthcare, including family planning services. Marginalization, neglect, and limited access to health facilities can contribute to lower utilization of modern contraceptives among women with disabilities. The lack of awareness of health services and limited access to healthcare for disabled street women can significantly impact their ability to seek and utilize modern contraceptives[35, 36]. The intersection of disability and poverty can further exacerbate the challenges faced by disabled street women, making it difficult for them to access essential healthcare services, including reproductive health and family planning resources[37]. As a result, they may be disproportionately affected by limited access to modern contraceptives. These findings support the findings reported in Sidama regional state, Ethiopia [23].

Having a discussion with a health professional is one of the factors positively associated with the practice of modern contraceptives. In this study, street beggar women who had discussions with a health professional were highly likely to utilize modern contraception. These findings are consistent with reports from Bahir Dar Town, Dire Dawa, and the Bale eco-region in Bale Zone, South East Ethiopia [19, 21, 38], respectively. An explanation for this association could be that participants, through counseling from health professionals, gain a better understanding of modern contraceptive methods, their benefits, potential side effects, and dispelling misconceptions, leading to increased utilization. Street women who have faced sexual assault or rape in their street life were more likely to currently utilize modern contraceptives than their counterparts. This finding is consistent with studies conducted in northwest Ethiopia and Dire Dawa [13, 21], respectively. This is because, having faced many challenges, these women are more vigilant in caring for themselves to avoid complications from unplanned and unwanted pregnancies resulting from unprotected sexual intercourse, which can lead to poor outcomes, including unsafe abortions. This has led to an increased use of modern contraceptives.

In this study, the time taken to arrive at a nearby health facility on foot was identified as another predictor variable. Women who arrived at a nearby health facility on foot within 30 min were more likely to utilize modern contraceptives than those who took more than 30 min. This finding is consistent with a study conducted in Dire Dawa, Ethiopia [21]. The rationale behind this association may be attributed to the impact of distance on healthcare-seeking behavior, particularly among individuals with low socioeconomic status who may face challenges in accessing transportation for reaching health facilities to obtain family planning services.

The reproductive choices of street beggar women cannot be adequately captured by a binary classification of contraceptive use [39]. Various factors influence their decisions, including immediate survival needs, cultural and social influences, and a desire for pregnancy[40]. Many women in this demographic may prioritize basic necessities over long-term family planning, leading to non-use of contraception not necessarily due to a lack of desire to prevent pregnancy, but rather due to practical constraints[41]. Barriers such as limited access to healthcare services, misinformation, and health concerns further complicate their reproductive choices. Additionally, the dynamic and often unstable life circumstances of street beggar women can lead to fluctuating priorities regarding contraception [42].

## Limitation

The mobility of street beggar women complicates consistent access, possibly leading to underrepresentation. Additionally, reliance on self-reported data for

contraceptive utilization may introduce response bias, as participants might underreport or over report their use of modern contraceptives due to social stigma or misunderstanding.

## Conclusion

The current contraceptive use among street beggar women in the Sidama region of Ethiopia is relatively high, with approximately 38.9% utilizing modern contraceptives, primarily implants. A significant majority, approximately 83.4%, are aware of these contraceptives, mainly receiving information from friends or neighbors. However, around 70.7% have experienced unwanted pregnancies, often due to a lack of knowledge about contraceptive options and fear of side effects. The reproductive choices of these women are influenced by immediate survival needs, cultural factors, and sometimes a desire for pregnancy. The finding reveals several significant factors associated with modern contraception utilization among street women beggar. These include age, marital status, education level, disability, employment beyond begging, current living situation, history of sexual assault, previous pregnancies while on the streets, discussions about contraception with partners, advice from health professionals, recent sexual activity, travel time to health facilities, approval of modern contraception, and overall knowledge. These findings highlight the complex interplay of demographic, health, and social factors affecting contraceptive use in this population.

## Policy implementations and recommendations

To address these challenges, targeted education programs should be developed to provide tailored reproductive health initiatives for street beggar women, focusing on dispelling myths about contraceptives and emphasizing the importance of family planning. Improving access to modern contraceptive services through mobile health clinics or outreach programs can bridge the gap between awareness and utilization. Additionally, utilizing trained peer educators can promote understanding and support informed decision-making regarding contraceptive options. Strengthening personalized counseling from health professionals is also crucial, as it can foster trust and facilitates open dialogue about individual needs and concerns. Comprehensive strategies to prevent unwanted pregnancies, including increasing access to emergency contraception and promoting dual protection methods, should be implemented alongside education and counseling. Furthermore, conducting research to explore the underlying social determinants influencing contraceptive use can inform culturally sensitive interventions that address root causes. Future studies should also explore the unique needs and experiences of street beggar women to inform more effective interventions. These actions can significantly reduce unintended pregnancies, promote reproductive autonomy, and improving the overall well-being of street beggar women in the Sidama region, fostering a more equitable and supportive environment for marginalized populations.

### Abbreviations

| | |
|---|---|
| EDHS | Ethiopian Demographic and Health Survey |
| IUDs | Intrauterine Devices |
| MC | Modern Contraception |
| MCMC | Markov Chain Monte Carlo |
| NGO | Non-government organization |

### Author contributions

Buzuneh Tasfa Marine: contributed to data collection, the conceptualization of the article, the article draft, design of the analysis, writing of the article, the critical drafting for significant intellectual interaction and the submission of the work. Mihiret Genene Zewde: contributed to data collection, the conceptualization of the article, participated in the design of the analysis, the thorough writing of the article, and the critical drafting for significant intellectual interaction. The final manuscript was read and approved by all authors.

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### Availability of data and materials

The datasets used and or analyzed during the current study available from the corresponding author on reasonable request.

## Declarations

### Ethical approval and consent to participate

The study was approved by the department review board (DRB) of the Hawassa University department of statistics with reference number (Ref.No. Stat/069/15). Informed written consent was obtained from study participant. The department review board (DRB) of the Hawassa University department of Statistics was approved the written informed consent of study participants. The information gathered from the patient file will be handled with confidence. The programming of data extraction tools avoids the display of names and other private information. The Declaration of Helsinki's guiding principles were followed during the study's execution.

### Consent for publication

Not applicable. No individual person's personal details, images, or videos are being used in this study.

### Competing interests

The authors declare no competing interests.

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