

Undernutrition and associated factors among incarcerated people in Bahir Dar and Finote Selam prison sites, Northwest Ethiopia: a cross-sectional study

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ABSTRACT

Background Prison is designed with punishment, correction and rehabilitation to the community in mind and these goals may conflict with the aims of healthcare. Incarcerated peoples' dependency on the prison-limited food menu, inadequate meal provision and poor-quality food increases the risk of malnutrition.

Objective To assess the magnitude of undernutrition and associated factors among incarcerated people, Northwest Ethiopia, 2019.

Design An institution-based cross-sectional study was conducted in Bahir Dar and Finote Selam prison sites, in Northwest Ethiopia.

Methods This study was conducted from 18 March 2019 to 18 April 2019. 475 systematically selected incarcerated people from each prison site were included in this study. Data were collected using structured interviewer-administered questionnaires. A binary logistic regression model was used to identify the associated factors.

Results The magnitude of undernutrition among incarcerated people was 19.4%. Not getting family support (adjusted OR (AOR)=3.05, 95% CI=(1.56, 5.96)), not involving with income-generating activities (AOR=2.68, 95% CI=(1.33, 5.40)), diarrhoeal disease (AOR=4.60, 95% CI=(2.14, 9.87)), food allergy (AOR=2.83, 95% CI=(1.47, 5.45)) and chewing khat (AOR=2.93, 95% CI=(1.07, 7.99)) were shown to have a statistically significant association with undernutrition among incarcerated people.

Conclusion The burden of undernutrition was high. Various factors contribute to undernutrition such as lack of family support, limited involvement in income-generating activities, diarrhoeal disease, food allergy and a history of chewing khat.

INTRODUCTION

The term 'prisoner' refers to somebody who is currently incarcerated as a result of a court order or other legal obligation to be held in legal custody.¹ Globally, approximately 11 million people are imprisoned, with a significant proportion residing in low-income and middle-income countries. Every decade one million individuals are entered into

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Globally, undernutrition is a significant public health concern, and vulnerable populations, including incarcerated people, are particularly at risk. Previous studies have highlighted the high prevalence of undernutrition among incarcerated people. Prior research has suggested that the prison environment exacerbates nutritional deficiencies, leading to adverse health outcomes.

WHAT THIS STUDY ADDS

⇒ This study provides empirical data on the prevalence of undernutrition and associated factors among incarcerated people in Northwest Ethiopia. It identifies key factors contributing to undernutrition within the prison system of incarcerated people. The study aims to fill gaps in existing literature and provide a clearer understanding of the nutritional status of incarcerated people in Northwest Ethiopia.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The findings of this study could have significant implications for various stakeholders. It may stimulate further investigations into the health and nutritional status of incarcerated people in different contexts and encourage comparative studies across regions. Practically, the results could inform prison management and healthcare providers about the urgent need for nutritional interventions and better resource allocation to improve incarcerated people's health.

prisons.^{2 3} Ethiopia has the second-largest number of jails in Africa.⁴ South Africa has recorded a total of 165 395 incarcerated people, followed by Ethiopia with 93 044 and Morocco with 72 816 incarcerated people. Currently, in Ethiopia, there are around 100 000–120 000 incarcerated people, with approximately 4800 (4%) being female.⁵ According to data from two Ethiopian studies, between 12.9% of the Tigray Alamata prison site,⁶ 17.5% in the South Gondar Zone

and 43% in the Kaliti Prison site⁷ of adult incarcerated people were undernourished.

The Amhara regional state comprises 13 regions within the Federal Democratic Republic of Ethiopia, and there are 30 prisons in the region, with 10 located in Northwest Amhara.⁸ Most incarcerated individuals in this region are males aged 30–40, predominantly from urban backgrounds.⁹

Incarcerated people do not have the freedom to live outside the jail; they are largely reliant on the prison diet, which often lacks adequate quality and quantity, leading to nutritional deficiencies.⁷ In underdeveloped countries, incarcerated populations are particularly vulnerable to conditions such as scurvy, vitamin A deficiency and beriberi, exacerbated by the inadequate nutrition prevalent in many African prisons.¹⁰

Mortality after release from prison was also reported to be higher, particularly during the early period of release.^{11 12} The nutritional status directly impacts incarcerated peoples' physical and mental health development (1%) due to overcrowding caused by the large number of incarcerated people.¹

The Ethiopian prison system is structured into a federal system and 10 regional systems. Despite the presence of this framework, the quality of nutrition and healthcare in prisons remains inadequate¹³ with many facilities facing criticism for being underfunded and understaffed. This situation is particularly concerning for impoverished and marginalised communities, which constitute a significant portion of the incarcerated population and often have higher rates of chronic illnesses and mental health issues.^{6 14}

Incarcerated individuals often exhibit poor self-perceived health status linked to lifestyle and behavioural factors.¹⁵ Comparatively, their physical, mental and social health is worse than that of the general population^{16 17} largely due to reliance on limited food options and possibly inappropriate nutritional behaviours that may arise from both institutional practices and individual choices. This not only heightens the risk of malnutrition but can also lead to aggressive and antisocial behaviours, further complicating their reintegration into society.^{6 18} Infectious diseases, including intestinal parasitic infections, are a significant concern in prison health due to incarcerated people's vulnerability resulting from inadequate nutrition, poor dietary diversity, poor healthcare, infections, prolonged duration of imprisonment and low living standards.^{19 20} Smoking is also a risk factor for adverse health outcomes among incarcerated people.⁶

Incarcerated people possess a unique characteristic as they often present at healthcare facilities with various health and social issues, putting them at risk of malnutrition.^{6 16} Incarcerated people with pre-existing health problems who seek medical attention may not always receive the necessary care and may leave jail in a worse condition than when they entered.¹⁸

There are limited studies on the nutritional status of the prison population especially in Ethiopia. To address

this data gap and give evidence on the nutritional condition of this population segment, this study assesses the prevalence of undernutrition and associated factors among incarcerated people.

METHODS AND MATERIALS

Study setting

This study was conducted at Finote Selam and Bahir Dar prison sites, in Northwest Ethiopia. Finote Selam prison site is located in Finote Selam city, West Gojjam Zone, Ethiopia. Finote Selam Town is located 389 km Northwest of Addis Ababa and 176 km Southeast of Bahir Dar, the city of Amhara Region. The total population size of the town was 25 913 (13 035 males and 12 878 females). Bahir Dar prison site was situated at Bahir Dar city administration, Northwest Ethiopia which is located 565 km away from Addis Ababa, the capital of Ethiopia. It has 221 991 populations, of which 180 174 (81.16%) were urban residents, and the rest of them were living at rural kebeles around the city.²¹ The total incarcerated people of at Finote Selam and Bahir Dar prison sites were 1248 and 1900, respectively. In selected prisons, many incarcerated people report receiving only three meals per day, often lacking in variety and nutritional quality. The food served in prisons usually consists of staple items such as injera with Shiro wet and Kik wet, legumes and occasionally meat or vegetables. However, the meals are often insufficient in calories and essential nutrients, leading to undernutrition among incarcerated people. The limited availability of fresh produce and protein sources exacerbates the problem. In Ethiopia, prison sites severe overcrowding is common.²² Overcrowding is a significant issue in Ethiopian prisons, with facilities often operating beyond their intended capacity. This situation can strain resources, including food and healthcare services, further impacting the nutritional status of incarcerated people. Overcrowding not only affects the quality of food but also increases the risk of communicable diseases. The Ethiopian government is primarily responsible for prison health and food. Each prison site has one clinic which contains nurses, pharmacists and laboratory technicians.

Study design and period

An institutional-based cross-sectional study from 18 March 2019 to 18 April, 2019, at Finote Selam and Bahir Dar prison sites, in Northwest Ethiopia was conducted.

Study population

All incarcerated people found in Bahir Dar and Finote Selam prison sites during the study period were the study population. Incarcerated populations in Northwest Ethiopia are diverse but often share common characteristics such as a high prevalence of poverty, limited access to education, and a history of social marginalisation.

Sample size determination

The sample size was calculated using a formula for a single population proportion estimate. We have calculated the

sample size by considering the following assumptions: a 25.1% prevalence of undernutrition in incarcerated people, a 4% margin of error and a 95% confidence level ($z=1.96$). The proportion (25.2 %) was taken from a study done in the Tigray region, Northern Ethiopia.⁶ The final sample size with a 5% non-response rate was 475 participants, and these were included in the study.

Sampling procedure

The two prison sites such as Finote Selam and Bahir Dar were selected for this study. Of the total 475 respondents, 188 and 287 incarcerated people were selected from Finote Selam and Bahir Dar Prison sites respectively. The sampling frame was obtained from the log book of each prison site after consent from the responsible body. A systematic random sampling technique was used to select the desired respondents. The first prisoner to be included in the sample was chosen randomly by blindly picking one out of six pieces of paper numbered 1–6, then we picked every 6th individual until 475 prisoners were selected.

Incarcerated people found in Bahir Dar and Finote Selam prison sites during the data collection period were included in this study.

Data collection measurement/instruments

In this study, body mass index (BMI) was used to assess the nutritional status of incarcerated people. The questionnaire was first prepared in English and then, translated to Amharic and back-translated to English by fluent speakers of the two languages. The training was given to supervisors and data collectors. The questionnaire was pretested on 5% of the study population before actual data collection.

Data were collected using interviewer-administered structured questionnaire. Seca weight scale and portable anthropometric height measuring scale were used to measure the height and weight of the participants respectively. Participants were required to wear minimal clothing and shoes when measuring their weight, stand erect on the balance and record the weight to the nearest 0.1 kg. The height of the incarcerated people was measured with the incarcerated people standing barefoot, without headgear, knees fully straight and both hands held down to the side, and the height was recorded to the nearest 0.1 cm. Measuring instruments were checked and calibrated before the procedure to make measurements more reliable. Finally, BMI was calculated as weight (kg)/height (m^2) to determine the nutritional status of the incarcerated people.

Operational definition

- **BMI:** BMI is defined as the weight in kilogram of the individual divided by the square of the height in metres and used to determine the nutritional status of adults and classified as follows²³:
 - Undernutrition ($BMI < 18.5 \text{ kg/m}^2$).
 - Normal weight ($BMI = 18.5\text{--}24.99 \text{ kg/m}^2$).

- Overweight ($BMI = 25.0\text{--}29.99 \text{ kg/m}^2$).
- Obesity ($BMI \geq 30.0 \text{ kg/m}^2$).

- **Khat chewer:** *Catha edulis*, commonly known as khat whose leaves are commonly chewed for their stimulating effects due to the presence of psychoactive compounds, primarily cathinone and cathine.²⁴ Khat chewers were considered as if they had been chewing khat for more than 6 months and also chewed it within the last days preceding jail.
- **Cigarette smoker:** Cigarette smokers were considered as if they had been smoking cigarettes for more than 6 months and smoked a minimum of one stick of cigarette per week preceding jail.²⁵
- **Diarrhoeal disease:** Diarrhoeal diseases were considered as the passage of three or more loose or watery stools within a day or unusual frequency of diarrhoea episodes within the recent month.²⁶
- **Food allergy:** It is an abnormal response to food or discomfort that occurs after eating a certain food such as digestive problems, nausea or vomiting, itching, hives or swollen airways.²⁷
- **Family support:** It is defined as providing basic needs like food and clothes to incarcerated people by a family member or friends without characterising how much is intended as support.

Data collection procedure and analysis

Data were collected from 18 March 2019 to 18 April 2019, using interviewer-administered structured questionnaires and anthropometric measurements. The interviews were conducted by trained nurses who had considerable experience in quantitative data collection. Interviews were conducted in a separate room to ensure confidentiality. Before the actual data collection period, the questionnaire was pretested on 5% of incarcerated people in a selected prison site who were not part of the study before the actual data collection period.

The data were coded and entered using Epi-Data V.3.1 and exported to SPSS V.25 for analysis. A binary logistic regression model was fitted to analyse the association. All the variables associated with the outcome variable with a p value less than 0.25 in bivariable analysis were entered into multivariable analysis to control potential confounders. Finally, p values less than 0.05, with 95% CI and adjusted OR (AOR) in multivariable logistic regression, were considered to be significantly associated factors of undernutrition.

RESULTS

Sociodemographic characteristics of the study participants

A total of 463 incarcerated people were included in the analysis. Most, 438 (94.6%) of the respondents were male. The mean age of the respondents was 32.7 (± 13.5 SD) years. More than half of the respondents were in the age range of 18–29 years (51.8%). Of the study participants, 247 (53.3%) lived in urban residences before jail (table 1).

Table 1 Sociodemographic characteristics of incarcerated people in Bahir Dar and Finote Selam prison sites, Northwest Ethiopia, 2019

Variables	Frequency	%
Age		
18–29	240	51.8
30–44	146	31.5
45–59	40	8.6
≥60	37	8.0
Sex		
Male	438	94.6
Female	25	5.4
Religion		
Orthodox	445	96.1
Muslim	15	3.2
Protestant	3	0.6
Marital status		
Single	204	44.1
Married	232	50.1
Divorced	22	4.8
Widowed	5	1.1
Educational status		
Can't read and write	116	25.1
Can read and write	32	6.9
Primary	158	34.1
Secondary	122	26.3
Diploma and above	35	7.6
Occupation before jail		
Employed	60	13.0
Unemployed	81	17.5
Student	76	16.4
Daily labourer	26	5.6
Merchant	31	6.7
Farmer	178	38.4
Residence before jail		
Urban	247	53.3
Rural	216	46.7
Presence of family support		
Yes	216	46.7
No	247	53.3
Involvement with income-generating activities		
Yes	165	35.6
No	298	64.4

The magnitude of undernutrition among incarcerated people

The study showed that the magnitude of undernutrition among incarcerated people in Bahir Dar and Finote

Table 2 Nutritional status of incarcerated people in Bahir Dar and Finote Selam prison sites, Northwest Ethiopia, 2019

	Frequency	%
Nutritional status		
Undernutrition	90	19.4
Normal nutrition	331	71.5
Overnutrition	39	8.4
Obesity	3	0.6

Selam prison sites was 90 (19.4%) (95% CI 15.9%, 22.7%). Furthermore, 331 (71.5%) were normal weight, 39 (8.4%) were overweight and 3 (0.6%) had obesity based on BMI classification (table 2).

Factors associated with undernutrition

In the bivariable analysis of binary logistic regression, family support, involvement with income-generating activities, chronic illness, occurrence of diarrhoeal disease, food allergy, eating problems, history of smoking and chewing khat were identified as potential factors of undernutrition at p value less than or equal to 0.25. Whereas in multivariable logistic regression analysis, presence of family support, involvement with income-generating activities, occurrence of diarrhoeal disease, food allergy and history of chewing khat were statistically significant associated factors for undernutrition among incarcerated people.

This study showed that incarcerated people who had no family support were three times more likely to develop undernutrition compared with those incarcerated people having family support (AOR=3.01, 95% CI=(1.57, 5.80)) and the odds of undernutrition among incarcerated people who had not been involved with income generating activities in prison were 2.68 times higher than incarcerated people who had been involved with income generating activities in prison (AOR=2.68, 95% CI=(1.33, 5.40)). On the other hand, the odds of undernutrition among incarcerated people who had diarrhoeal disease were 4.6 times higher than those who did not have diarrhoeal disease (AOR=4.60, 95% CI=(2.14, 9.87)). Additionally, incarcerated people who had food allergies were 2.8 times more likely to develop undernutrition compared with those who did not have food allergies (AOR=2.83, 95% CI=(1.47, 5.45)). Another finding of this study shows that incarcerated people who had a history of chewing khat were 2.9 times more likely to be undernutrition compared with non-chewers (AOR=2.93, 95% CI=(1.07, 7.99)) (table 3).

DISCUSSION

This study revealed a high magnitude of undernutrition among incarcerated people in Bahir Dar and Finote Selam prison sites. The magnitude of undernutrition was found to be 19.4% (95% CI 15.9%, 22.7%). The findings of this study were consistent with those of the studies

Table 3 Bivariable and multivariable analysis of undernutrition among incarcerated people in Bahir Dar and Finote Selam Prison sites, Northwest Ethiopia, 2019

Variables	Undernutrition		COR (95% CI)	AOR (95% CI)	P value
	Yes (%)	No (%)			
Presence of family support					
Yes	24 (26.7)	192 (51.5)	1	1	0.001*
No	66 (73.3)	181 (48.5)	2.91 (1.75, 4.85)	3.01 (1.57, 5.80)	
Involvement with income-generating activities					
Yes	20 (22.2)	145 (38.9)	1	1	0.006*
No	70 (77.8)	228 (61.1)	2.22 (1.29, 3.81)	2.68 (1.33, 5.40)	
Chronic illness					
Yes	30 (33.3)	27 (7.2)	6.40 (3.56, 11.53)	2.40 (0.86, 6.66)	0.093
No	60 (66.7)	346 (92.8)	1	1	
Diarrhoeal disease					
Yes	21 (23.3)	30 (8.1)	3.48 (1.88, 6.43)	4.60 (2.14, 9.87)	0.000*
No	69 (76.7)	343 (91.9)	1	1	
Presence of food allergy					
Yes	31 (34.4)	59 (15.8)	2.79 (1.66, 4.68)	2.83 (1.47, 5.45)	0.002*
No	59 (65.6)	314 (84.2)	1	1	
Eating difficulties					
Yes	39 (43.3)	64 (17.2)	3.69 (2.24, 6.06)	1.85 (0.96, 3.58)	0.065
No	51 (56.7)	309 (82.8)	1	1	
History of smoking					
Yes	31 (34.4)	36 (9.7)	4.91 (2.82, 8.56)	2.51 (0.93, 6.75)	0.068
No	59 (65.6)	337 (90.3)	1	1	
History of chewing khat					
Yes	28 (31.1)	36 (9.7)	4.22 (2.40, 7.42)	2.93 (1.07, 7.99)	0.036*
No	62 (68.9)	337 (90.3)	1	1	

*Statistically significant variables (p<0.05).
AOR, adjusted OR; COR, crude OR.

conducted in Jimma zone prisons, Ethiopia (19.9%), Mizan prison institute, Ethiopia (18.6%),²⁸ North Shoa, Ethiopia (19.3%),²⁹ Tangail prison in Bangladesh (22.1%)¹ and Accra prison in Ghana (17.7%).³⁰ However, the current finding was higher than that of a study done in Papua New Guinea (5%).¹⁰ The discrepancy might be due to the existence of differences in the socioeconomic status of the study areas, lifestyle and living conditions (such as housing quality, access to clean water, nutrition, health service, environmental conditions, social support and so on), partly due to the country's limited resources and the feeding habits of the study participants. Difference in economic status, lack of variety of food/ monotone's diet and the quality/quantity of food in Ethiopia and other countries might be also reason for variation.

On the contrary, the magnitude of undernutrition found in this study was lower than in a study done in Butajira prison site, Ethiopia (23.2%),³¹ North Shoa zone, Ethiopia (33.8%),³² Adigrat, Tigray, Ethiopia (53.7%)⁶ and Kality prison, Ethiopia (43%),⁷ North Gondar, Ethiopia

(38.8%), Karachi prison in Pakistan (39.7%),³³ Madagascar (38.4%).²⁰ The differences in sociocultural status, country or regional administration rules, regulation, implementation, and care differences for populations in their correctional facilities, study participants, time variation, lifestyle, and feeding patterns of incarcerated people may explain the variation in findings. Moreover, some of those studies conducted in Adigrat and Kality were implemented among incarcerated people who had respiratory tract infections and chronic illnesses like tuberculosis (TB) and HIV/AIDS.^{6,7} However, our findings were implemented for all incarcerated people. Therefore, it is assumed that the findings of Adigrat and Kality cannot be generalised to all other incarcerated people, as the level of underweight may have been overestimated due to weight loss being a typical feature among individuals with respiratory tract infections and chronic illnesses.³⁴ Moreover, this study also identified that the presence of family support, involvement with income-generating activities, the occurrence of diarrhoeal disease, food allergies and

a history of chewing khat were factors significantly associated with undernutrition.

The presence of family support made them less likely to be undernourished compared with those who had no family support. This finding is consistent with a study done in the Tigray region,⁶ North Shoa zone,²⁹ Butajira Ethiopia³¹ and Kality prison sites, in Ethiopia.⁷ This may be because having additional food from relatives might increase the chance for improved dietary diversification and meal frequency in addition to what is served in the prison which may create an opportunity to ensure energy and micronutrient adequacy. Similarly, incarcerated people who had been involved with income-generating activities were less likely to be undernourished compared with those who had not been involved with income-generating activities. This might be because a relatively fixed amount of food and fewer calories were provided to incarcerated people than they needed. Among those who were unable to purchase and get food from outside, they became malnourished. Family support and income generation are critical for the nutritional status of incarcerated individuals in Ethiopia due to the reliance on family members to provide food and other necessities. In the context of Ethiopian prisons, where state provisions may be inadequate, external support becomes vital for maintaining health. In Ethiopian prisons, families are allowed to visit at specific times to bring additional food for incarcerated individuals, but the food must be tasted or inspected by both the family and security personnel before being given.

This study also showed that incarcerated people who had a history of chewing khat were more likely to be undernourished. This finding is consistent with the study conducted in the Tigray region, Ethiopia.⁶ The reason for undernutrition being more rampant among those with a khat chewing history might be due to the stimulating effects of khat can suppress appetite, leading individuals to eat less or skip meals, which may result in inadequate nutrient intake and long-term khat use may lead to gastrointestinal issues and other health problems that can impair nutrient absorption and overall health.^{24 35}

The findings of this study stated that diarrhoeal disease and food allergies were positively associated with undernutrition among incarcerated people. This is consistent with the findings of the study conducted in Kality Prison, Ethiopia.⁷ This might be due to the individuals with food allergies often needing to avoid certain food groups, which can lead to nutritional deficiencies if alternative sources are not available. In institutional settings like prisons, food options can be further restricted, making it challenging for individuals with allergies to maintain a balanced diet. This can result in inadequate intake of essential nutrients, impacting overall health. This is especially true in prison environments where access to fresh, nutritious foods is often limited. In addition to this, diarrhoeal diseases can also lead to significant nutrient loss and malabsorption. Illness often increases metabolic demands, necessitating higher nutrient intake for

recovery. However, during episodes of diarrhoea, individuals may not be able to consume adequate amounts of food, compounding the risk of undernutrition. Also, it leads to dehydration, which affects overall health and may diminish appetite. Incarcerated individuals, who may already have limited access to clean water, face heightened risks during outbreaks of diarrhoeal disease. In settings where hygiene and sanitation are poor, recurrent diarrhoeal diseases can become chronic. This cycle of illness can lead to persistent undernutrition and long-term health issues, particularly in vulnerable populations including incarcerated individuals.³⁶ As a result, the person becomes underweight because body weight and muscles are lost.

Our study provides valuable insights into undernutrition and associated factors among incarcerated people in Bahir Dar and Finote Selam prison sites, supported by using the calibrated and standardised anthropometric instruments used to minimise measurement error. These strengths enhance the reliability of our findings. However, the BMI used to measure undernutrition was one of the limitations since BMI is calculated based on weight and height, but it does not take into account the distribution of muscle and fat in the body and it may not accurately capture the exact nutritional status when used alone. So, we recommend that future researchers consider biochemical nutritional assessments to assess undernutrition among incarcerated people to provide a more comprehensive understanding of undernutrition.

CONCLUSION

One in five incarcerated people were undernourished in Bahir Dar and Finote Selam prison sites. Diarrhoeal disease, food allergy, presence of family support, lack of involvement with income-generating activities and history of chewing khat were predictors of undernutrition among incarcerated people in Bahir Dar and Finote Selam prison sites. The health departments should implement therapeutic feeding programmes for severely or moderately underweight incarcerated people to maintain the incarcerated people's nutritional status. The prison administrative bodies should emphasise increasing diversified food and reforming environmental health conditions to prevent and reduce the impact of undernutrition among incarcerated people.

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Contributors AT accepts full responsibility for the finished work and/or the conduct of the study as guarantor, had access to the data and controlled the decision to publish. Conceptualisation, AT; Formal analysis, AT, MA, HTemesgen and HTesfa; Methodology, AT, MA, HTemesgen and HTesfa; Software, AT and HTemesgen; Supervision, AT, MA and HTesfa; Validation, AT, MA, HTemesgen, HAD and HTesfa; Writing—original draft, AT; Writing—review and editing, AT, MA, HTemesgen, HAD and HTesfa. All authors read and approved the final manuscript.

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Patient consent for publication Not applicable.

Ethics approval This study involves human participants and ethical approval was obtained from the Research Ethics Review Committee of the College of Medicine and Health Sciences of Debre Markos University in 2019 Gregorian Calendar (Ref. No: PH/114/2012). Permission was gained from Finote Selam and Bahir Dar prison sites where the study was conducted. The general purposes of the research were provided to each of the respondents before recruitment into the study with a local language. Each respondent had the right to withdraw from the study without restriction. Respondent's name was not required, instead code was used for identification. Written informed consent was obtained from all study participants during data collection. Willingness to participate in the study was confirmed by signing (or fingerprint for those who could not sign) on the informed consent sheet. Participants gave informed consent to participate in the study before taking part.

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Data availability statement Data are available on reasonable request. The data sets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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