



## Research article

## Prevalence and factors associated with maternal loneliness during the postpartum period in Gondar city



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## ABSTRACT

**Background:** Mental health problems have increased worldwide, particularly in developing countries. Currently, loneliness is widely understood as a painful subjective experience when the social connections a person has do not meet their interpersonal needs in respect to the quality or quantity of friendship or social interaction. It has been linked to unpleasant health consequences for both the mother and child. Therefore, this study aimed to assess maternal loneliness during the postpartum period and associated factors in Gondar city.

**Methods:** A community-based cross-sectional study was conducted from July 1<sup>st</sup> to August 30<sup>th</sup>, 2021 in Gondar city. A cluster sampling technique was employed to select 858 postpartum women. Data were entered into epidemiological data (EPI data) version 4.6 and exported to SPSS 25 for further cleaning and analysis. The multivariable logistic regression analysis was fitted to identify factors associated with maternal loneliness during the postpartum period. The adjusted odds ratio (AOR) with its 95% confidence interval (CI) was performed and the level of significance was claimed based on a p-value of  $\leq 0.05$ .

**Results:** A total of 858 women were included in the analysis, giving a response rate of 98.4%. Two-fifths (40.9%) of the study participants have experienced loneliness during the postpartum period (95% CI: 37.6, 44.2). Low household decision-making power (AOR = 11.2; 95% CI: 7.59, 16.4) and poor social support (AOR = 2.44; 95% CI: 1.58, 3.76) were significantly associated with maternal loneliness.

**Conclusion:** In this study, 4 out of 10 women have experienced loneliness during the postpartum period. Thus, it highlights the potential risks of the mother's loneliness on her postnatal well-being, particularly if the woman has poor social support and low household decision-making power. Encouraging women to be involved in all aspects of the household decision-making and promoting the need for social support for all women during the postpartum period may be optimal initial targets to reduce the impact of loneliness.

## 1. Introduction

Loneliness is a subjective feeling about the gap between a person's expected level of social interaction and the actual level of social relations, which is a major risk factor for both psychological disturbance and poor

health outcomes [1, 2]. It can be normal and transient, but physical, mental, and social problems can unfold over long periods. Loneliness also refers to the quality of people's perception of interpersonal relationships or dealings [3]. Being alone is undesirable and it may take a long time to relieve this state of mind. As a result, it has become today's top public

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health issue worldwide [4]. About 10% of pregnant women and 13% of postpartum women have experienced mental health problems such as depression, anxiety, self-harm, and loneliness [5].

Loneliness and social isolation studies across the lifespan have connected the condition of perceived deficiencies in personal networks (i.e. friends, family members, co-workers, etc.) to far-reaching physical and mental effects [6]. Similarly, there is evidence that the experience of pregnancy and childbirth are also affected by one's social environment, age, and mental state [7, 8].

In resource-limited countries, including Ethiopia, 1 in 5 women and approximately 1 in 10 women in developed countries experience mental health problems during pregnancy and the postpartum period, respectively [5]. If not detected and treated early, women can even commit suicide, which remains one of the leading causes of maternal death within one year following pregnancy [9]. Nowadays, maternal self-harm during the maternal continuum of care, particularly the postnatal period is alarming and even this is the most neglected issue in the continuum of maternal health care that harms the growth and development of children too [10].

The prevention and treatment of loneliness are often challenging because there is no single identified cause for its occurrence. However, it has been evidenced that many of the factors are personal and social related. These factors include health risky behaviors [11], being divorced/widowed [12], low social support [2, 13], and low socioeconomic status [8].

According to evidence starting from pregnancy to the first year after delivery, 34–38% of women feel lonely [7]. This will account for 4–5% of planned self-harm that could lead to death [14]. In the continuum of care given for pregnant women, efforts should be made for this neglected issue. Given that one of the global goals to be achieved by 2030 is to overcome maternal and neonatal deaths caused by different preventable causes, including mental health problems [15]. Despite enormous global and national efforts, little is known (key gaps) about mental health problems focused on loneliness [6, 16]. Therefore, there is a gap in the prevalence and associated risks factors of loneliness in postpartum women.

Literature regarding maternal mental health problems is scarce in Ethiopia, particularly regarding maternal loneliness during pregnancy and the postnatal period. Because of Ethiopia's limited focus on maternal mental health, there is a need to examine maternal loneliness and influencing factors during the postpartum period. Therefore, this study will fill the gaps and assess the maternal feeling of loneliness and identify associated factors in Gondar city, northwest Ethiopia. Besides, doing the research may offer basic evidence for any interventions aimed at preventing the effect of loneliness.

## 2. Methods and materials

### 2.1. Study design, period, and area

A community-based cross-sectional study was conducted in Gondar city from July 1<sup>st</sup> to August 30<sup>th</sup>, 2021. The City is found in Amhara's national regional state, Central Gondar Zone. It is located 750 km Northwest of Addis Ababa (the capital city of Ethiopia). There are 1 governmental referral hospital, 8 governmental health centers, 22 health posts, 1 private primary hospital, and 1 general hospital serving the city. The estimated total population of the city was 432,191, of whom, 224,508 are females. From this, about 133,477 (30.88%) of females are in the reproductive age group (unpublished data by Amhara regional state, 2021). Besides, about 6791 women gave birth in the last one year in Gondar city (unpublished data from Gondar city health bureau).

### 2.2. Study population and eligibility criteria

All women who gave birth in the last 12 months in the selected clusters of Gondar city at the time of the data collection and residing for

at least six months before the data collection period were included in the study.

### 2.3. Sample size determination and sampling procedure

The single population formula was used to calculate the sample size for the current study by considering the following assumptions: the proportion of loneliness-50%, level of confidence-95%, and margin of error-5%. Therefore, the sample size ( $n$ ) =  $\frac{(Z\alpha/2)^2 p(1-p)}{d^2} = \frac{(1.96)^2 \cdot 0.5(1-0.5)}{(0.05)^2} = 384$ . After considering a design effect of 2 (cluster sampling) and a non-response rate of 10 %, we have obtained a total sample size of 845. Gondar city has 22 kebeles. Seven kebeles (30% of the total kebeles) were selected by the lottery method. A house-to-house visit was carried out in the selected kebeles (clusters) to find eligible women for the study. All eligible women in the selected clusters were interviewed. Finally, due to the nature of cluster sampling, 858 women were interviewed (Figure 1).

### 2.4. Variables of the study

Maternal loneliness was the outcome variable whereas maternal age, maternal occupation, monthly income, religion, mother's educational status, marital status, family size, parity, ANC visit, the number of ANC visits, PNC visits, Number of PNC visits, place of the recent delivery, assistant of the delivery, history of neonatal death or congenital anomaly, pregnancy planeness, intimate partner violence, husband educational status, husband occupation, household decision-making power, social support, and partner involvement in maternal, neonatal and child health (MNCH) services were the independent variables.

### 2.5. Operational definitions and measurements

**Loneliness:** The University of California Los Angeles (UCLA-3) 20-item Loneliness Scale (Version 3) was used to measure maternal loneliness during the postpartum period. UCLA-3 is currently the most widely used loneliness measurement tool, with high test-retest reliability, high internal consistency, and validity [17]. The cut-offs for loneliness severity on the UCLA-3 scale were made based on the total score obtained. Thus, a code of "1" was given for women who had loneliness (i.e. total score  $\geq 28$ ) and a code of 0 was given for those women who didn't have loneliness (i.e. total score  $< 28$ ) [17].

**Intimate partner violence:** Intimate partner is considered as a current spouse, co-habited, current boyfriends, former partner, or spouse. If the respondent said "Yes" to any one of the ranges of sexual, psychological, and physical or any combination of the three coercive acts regardless of the legal status of the relationship with current/former intimate partner during pregnancy, it was considered as intimate partner violence [18].

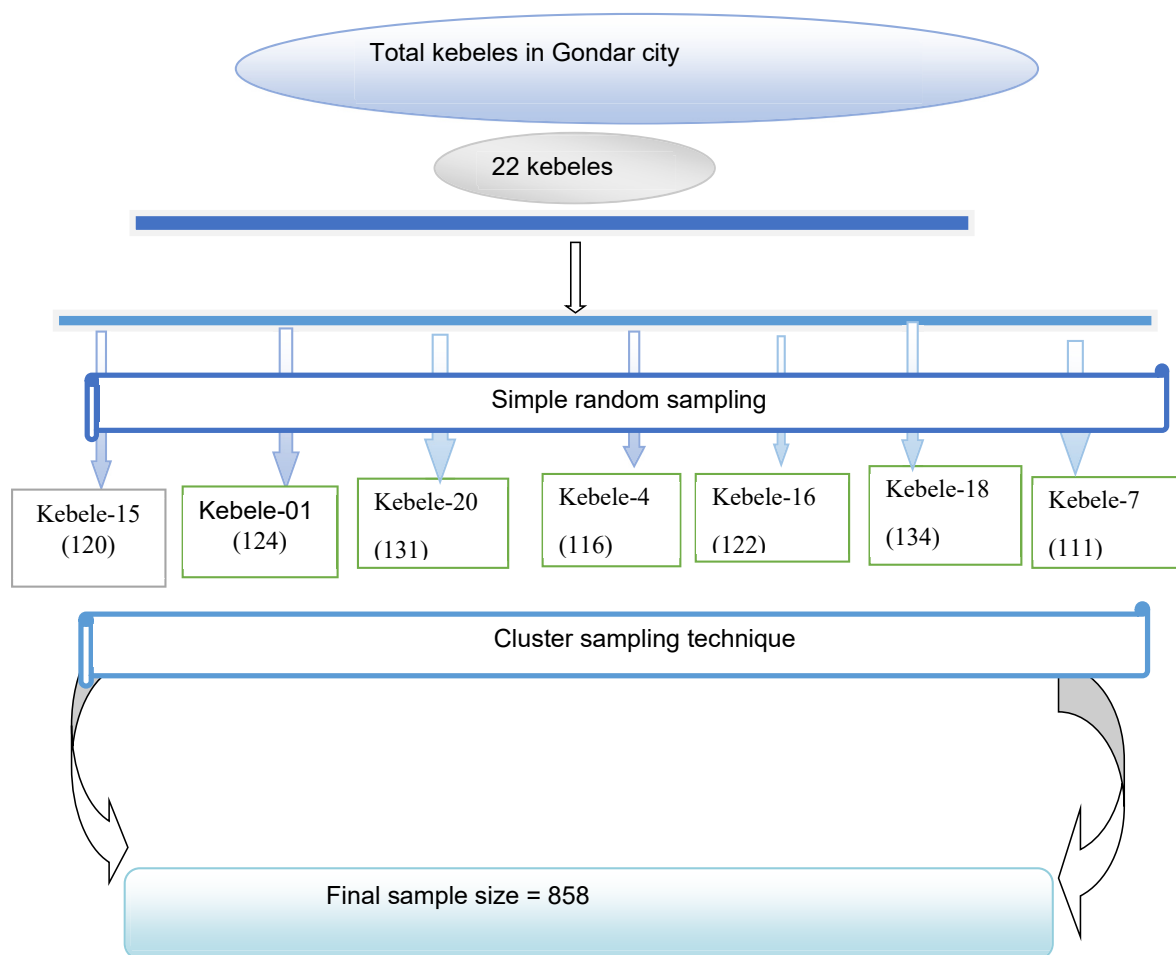
**Household decision-making power:** The ability of women to act independently on the household activities including their health, children's health, freedom of movement, and control over finance without asking permission from another person [19]. Thus, based on the summative score of variables designed to assess household decision-making power, women who were answered above the mean value were considered as having higher decision-making power [19, 20].

**Partner involvement:** A total of nine questions were prepared to assess partner involvement in MNCH services. An individual who was able to score above the mean value was considered as involved in the services [21].

**Social support:** The Oslo-3 Social Support Scale (OSSS-3) scores ranged from 3-14 with a score of 3–8, poor support; 9–11, moderate support; and 12–14, strong support [22].

**Known medical illness:** women who have medical illnesses such as diabetes mellitus, renal disease, liver disease, heart disease, tuberculosis, hypertension, etc. which is confirmed by a medical doctor in health institutions were considered as having a medical illness.

**Known psychiatric problem:** women who have mood disorders including major depressive and bipolar disorders, schizophrenia, anxiety,



**Figure 1.** Schematic presentation of the sampling procedure on the maternal loneliness during the postpartum period and associated factors in Gondar city, northwest Ethiopia, 2021.

etc., which are diagnosed by psychiatrist professionals were considered as having known psychiatric problems.

## 2.6. Data collection tool and quality assurance

Literature review has been done to develop the data collection instrument [13, 23, 24, 25, 26] and the data were collected using a structured questionnaire through face-to-face interviews. Before data collection, the questionnaire was checked by a research experts for further enhancement and possible amendments. Fourteen BSc and 4 MSc in Midwifery graduates, trained about the interview technique, collected and supervise the data, respectively. To ensure the data quality, the English version of the questionnaire was organized and converted to the local Amharic language and back English to possess uniformity. On 5% of the calculated sample size, the pretest was done outside the study area. The language clarity and validity of the tool were checked and required amendments were made after the pretest. Training regarding the overall data collection process was provided for two days. The completeness of the questionnaire was checked by the supervisors daily.

## 2.7. Data processing and analysis

Data were checked, coded, and entered into EPI DATA version 4.6 and exported to SPSS version 25 for further cleaning and analysis. The respondents' information were displayed using frequency, mean, and percentages. Binary logistic regression was performed to ascertain likely independent variables and variables having a p-value of less

than 0.25 in the bivariable logistic regression analysis were included in the multivariable logistic regression analysis for controlling possible confounders. In the multivariable logistic regression analysis, the AOR was used to show the strength of association and a p-value of  $\leq 0.05$  was used to declare the level of significance. Multicollinearity assumption was checked and was acceptable with a variance inflation factor of  $< 10$ . Hosmer Lemeshow goodness of fit was used to ensure the model fitness.

## 2.8. Ethical considerations

Ethical approval was obtained from the Institutional Review Board of the University of Gondar (reference number: V/P/RCS/05/2710/2021). Official organizational authorizations were obtained from each selected kebeles (clusters). After clearly explaining the purpose of the study, each study participant declared their consent in writing.

## 3. Results

### 3.1. Sociodemographic characteristics of respondents

A total of 858 women were interviewed, giving a response rate of 98.4%. The mean age of the women was 29.5 years (SD  $\pm$  4.78) and more than two-thirds (67.7%) of the participants were aged between 26-35 years old. Slightly more than two-fifths (43.3%) of the women had accomplished diploma and above by education. Majorities (90.8%) of the study participants were married and about 44.4% of them were housewives by occupation (Table 1).

**Table 1.** Sociodemographic characteristics of study participants in Gondar city, northwest Ethiopia, 2021 (n = 858).

Characteristics	Frequency	Percentage (%)
<b>Age of women in years</b>		
19–25	183	21.3
26–35	581	67.7
≥36	94	11
<b>Religion</b>		
Orthodox Christian	706	82.3
Muslim	107	12.5
Others <sup>a</sup>	45	5.2
<b>Current marital status</b>		
Married	779	90.83.5
Divorced	30	0.81
Widowed	7	4.99
Single	42	
<b>Educational status of the women</b>		
No formal education	105	12.2
Primary education	140	16.3
Secondary education	242	28.2
Diploma and above	371	43.3
<b>Occupation of the women</b>		
Housewife	381	44.4
Merchant	105	12.2
Self-employed	99	11.5
Daily laborer	34	4.0
Government employee	239	27.9
<b>Husband educational status (n = 779)</b>		
No formal education	59	7.6
Primary	55	7.1
Secondary	156	20
Diploma and above	509	65.4
<b>Husband occupation (n = 779)</b>		
Government employee	353	45.3
Merchant	177	22.7
Self-employed	164	21.1
Daily labor	56	7.2
Student	29	3.7
<b>Access to media</b>		
Yes	802	93.5
No	56	6.5
<b>Average monthly income of the family</b>		
<1500 ETB	63	7.3
1501–5000 ETB	372	43.4
≥5000 ETB	423	49.3
<b>Family size</b>		
<3	53	6.2
3–5	652	76
>5	153	17.8

<sup>a</sup> Protestant and Adventist.

### 3.2. Reproductive, maternity health service, and medical-related characteristics

In this study, slightly more than half (53.9%) of women had a parity of 2–4. Most (97.3%) of the study subjects had at least one ANC in the most recent pregnancy and 68.8% of them gave birth at a governmental hospital. Nearly two-thirds (65.5%) of women got their partner's support in maternal and child health services. About 2.2% of women had known psychiatric problems and nearly half of them had experienced intimate partner violence in the most recent pregnancy (Table 2).

**Table 2.** Reproductive and maternity health service characteristics of study participants in Gondar city, northwest Ethiopia, 2021 (n = 858).

Characteristics	Frequency	Percentage
<b>Parity</b>		
1	364	42.4
2–4	462	53.9
>4	32	3.7
<b>Had ANC</b>		
Yes	835	97.3
No	23	2.7
<b>Number of ANC follow up (n = 835)</b>		
<4	320	38.3
≥4	515	61.7
<b>Place of delivery</b>		
Government hospital	590	68.8
Health center	210	24.5
Private hospital/clinic	26	3
At home	32	3.7
<b>Birth assistant</b>		
Health professionals	828	96.5
Others <sup>b</sup>	30	3.5
<b>Was the most recent pregnancy planned</b>		
Yes	745	86.8
No	113	13.2
<b>Was the most recent pregnancy supported by your husband/partner</b>		
Yes	794	92.5
No	64	7.5
<b>Had PNC</b>		
Yes	450	52.4
No	408	47.6
<b>Number of PNC (n = 450)</b>		
<3	214	47.5
≥3	236	52.5
<b>Husband/partner involvement in MNCH</b>		
Involved	562	65.5
Not involved	296	34.5
<b>Most recent pregnancy outcome</b>		
Healthy alive baby	836	97.4
Neonatal death	22	2.6
<b>Social support</b>		
Poor support	247	28.8
Moderate support	392	45.7
Strong support	219	25.5
<b>Women's household decision making power</b>		
Higher	580	67.6
Lower	278	32.4
<b>Intimate partner violence</b>		
Yes	417	48.6
No	441	51.4
<b>Known medical illness</b>		
Yes	86	10
No	772	90
<b>Known psychiatric problem</b>		
Yes	19	2.2
No	839	97.8

<sup>b</sup> Family and traditional birth attendants.

### 3.3. Maternal loneliness and associated factors during the postpartum period

The prevalence of loneliness among postpartum women was found to be 40.9% (95% CI: 37.6, 44.2). A multivariable logistic regression analysis has been performed to identify significantly associated factors

with maternal loneliness during the postpartum period. Accordingly, having low household decision-making power and low social support was found to be independent predictors of maternal loneliness.

The odds of having loneliness among women who had low household decision-making power was 11 times higher as compared to those women having higher household decision-making power (AOR = 11.2; 95% CI: 7.59, 16.4). Likewise, the odds of having loneliness was 2.44 times higher among women who have had poor social support compared with those women who had strong social support (AOR = 2.44; 95% CI: 1.58, 3.76) (Table 3).

#### 4. Discussion

Mental health problems including loneliness have become one of the global concerns regarding maternal health. Hence, this study assessed maternal loneliness during the postpartum period and associated factors in Gondar city, northwest Ethiopia. Accordingly, this study indicated that two-fifths of women have experienced loneliness during the postpartum

period. In addition, low household decision-making power and low social support were significant predictors of maternal loneliness.

In this study, the prevalence of maternal loneliness was found to be 40.9%, which is lower than a study conducted in the United States of America (USA)-76% [17]. Inconsistencies in the degree of loneliness can be due to differences in time gaps and socio-demographic differences between the study participants. The survey in the USA includes both male and female participants who were aged between 21-100 years, while our study includes women of reproductive age. Empirical evidence shows that being older age is associated with loneliness as compared to younger counterparts [27].

In addition, since the study participants in this study were females, the likelihood of engaging in health risky behaviors like smoking, alcohol drinking, and chat chewing is less likely compared with male counterparts [28]. Literature indicates that smoking and alcohol consumption increase the likelihood of loneliness [29]. Moreover, maternal health becomes one of the current issues globally, in which different strategies have been endorsed to improve maternal and child health compared with

**Table 3.** Bivariable and multivariable logistic regression analysis of factors associated with maternal loneliness during the postpartum period in Gondar city, northwest Ethiopia, 2021 (n = 858).

Variables	Loneliness		COR (95% CI)	AOR (95% CI)	P-value
	High	Low			
<b>Age in years</b>					
19–25	91	92	2.01 (1.19, 3.37)	1.79 (0.94, 3.38)	0.234
25–35	229	352	1.32 (0.83, 2.09)	1.68 (0.96, 2.95)	0.073
≥36	31	63	1	1	
<b>Household decision-making power</b>					
High	138	442	1	1	
Low	213	65	10.5 (7.49, 14.9)	11.2 (7.59, 16.4)**	0.001
<b>Social support</b>					
Poor support	176	71	3.29 (2.24, 4.84)	2.44 (1.58, 3.76)**	0.001
Moderate support	81	311	0.34 (0.24, 4.90)	0.25 (0.16, 3.88)	0.068
Strong support	94	125	1	1	
<b>Women's occupation</b>					
Housewife	167	214	1.38 (0.99, 1.93)	0.64 (0.41, 1.99)	0.120
Merchant	41	64	1.14 (0.71, 1.82)	0.86 (0.47, 1.57)	0.224
Self-employed	37	62	1.06 (0.65, 1.72)	0.78 (0.42, 1.44)	0.086
Daily laborer	20	14	2.54 (1.22, 5.28)	1.68 (0.27, 11.66)	0.456
Government employee	86	153	1	1	
<b>Educational status of the women</b>					
No formal education	53	52	1.8 (1.16, 2.79)	0.88 (0.44, 1.75)	0.069
Primary education	60	80	1.32 (0.89, 1.97)	1.13 (0.61, 2.07)	0.067
Secondary education	104	138	1.33 (0.95, 1.85)	0.97 (0.57, 1.65)	0.094
Diploma and above	134	237	1	1	
<b>Known medical illness</b>					
Yes	26	60	3.2 (1.21, 8.53)	1.09 (0.29, 3.92)	
No	325	447	1	1	0.072
<b>Most recent pregnancy outcome</b>					
Healthy alive baby	337	499	1	1	
Neonatal death/congenital anomaly	14	8	2.59 (1.10, 6.24)	2.08 (0.71, 6.13)	0.381
<b>Birth assistant</b>					
Health professionals	333	495	1	1	0.644
Others <sup>b</sup>	18	12	2.23 (1.06, 4.69)	1.56 (0.63, 3.84)	
<b>Had PNC</b>					
Yes	146	304	1	1	
No	205	203	2.10 (1.59, 2.777)	1.23 (0.85, 1.77)	0.632
<b>Intimate partner violence</b>					
Yes	200	217	1.77 (1.34, 2.33)	1.33 (0.93, 1.88)	
No	151	290	1	1	0.078

AOR = Adjusted odd ratio, COR = Crude odd ratio, CI = Confidence interval, PNC = Post-natal care, 1 Reference category, b = Family members and traditional birth attendants, \*\*P ≤ 0.001.

the previous time. This will have a positive impact on the low proportion of loneliness in this study.

However, the result of this study is higher than studies conducted in Finland-32% [30], Canada-20% [28], and the United Kingdom-27% [12]. The possible explanation for the discrepancy might be due to variations in measuring the outcome variable and participant's characteristics. The United Kingdom and Canada studies used a 3-point loneliness scale and 6 as a cut-off point for measuring the outcome variable. However, the current study uses the 20 item loneliness scales and 28 as a cut-off point to measure the outcome variable as in previous studies [17]. Besides, in the current study, 48.6% of women had intimate partner violence in their last pregnancy. There is evidence that intimate partner violence is associated with mental health problems, including loneliness [31, 32]. Loneliness could be attributed to the study participant's characteristics like parity and occupation (domestic work) [33, 34]. In the current study, 44.4% and 42.4% of women were housewives by occupation and primiparous, respectively.

Regarding the factors affecting maternal loneliness, poor social support was significantly associated in the final model. Thus, the odds of having loneliness was 2.44 times increased among women who have had poor social support as compared to those women who had strong social support. This finding is consistent with a study conducted in the United Kingdom where individuals having higher social support were less likely to experience loneliness [12]. This could be explained by the fact that loneliness is a subjective feeling of being alone or separated, which generates unnecessary psychological problems [7, 16]. Hence, individuals having strong social support will not be victims of subjective feelings of being untreated or stigmatized. Available evidence concluded that strong social support has been associated with mental health problems reduction including loneliness [35, 36]. In this regard, health education and promoting the need for engaging in social support groups and involvement in some local society works will be crucial.

The study also found that women with lower decision-making power were 11.2 times more likely to have a feeling of loneliness compared with those women having higher decision-making power. This can happen if the mother does not decide on her health, her baby's health, and other household purchases; this may make the woman feel despised and subordinate in the household. Eventually, the woman might experience loneliness, thereby manifesting other negative health outcomes. Evidence supports the above finding that lower decision-making power was previously associated with postpartum mental health problems [37]. This signifies that empowering women and encouraging them to be part of a decision will increase the mind of having strong social support, thereby reducing feelings of loneliness.

The authors would like to acknowledge some of the limitations of the current study. First, the cross-sectional nature of the study design might not be a guarantee to infer causality between loneliness and the suggested explanatory variables. Second, recall bias might be introduced since the study includes women in the last 12 months of postpartum. Third, the study answers reflect on a single moment in time that we could not substantiate the true characteristics of participants and may not be generalizable over time variations. Finally, we didn't get enough related articles to compare our results. Despite the above-mentioned limitations, this study sought to assess rarely addressed issues of maternal health and was able to provide important information to health policymakers and other stakeholders.

#### 4.1. Implication for policymakers

This study procures evidence on maternal loneliness and associated factors during the postpartum period. Therefore, the results of this study are looking for relevant stakeholders and health policymakers who pay particular attention to mental health issues, including the use of screening mechanisms for mental health problems throughout the maternal continuum of care. In addition, the findings call for increased education and community promotion as a standard program of

community services, thereby enhancing the decision-making power of women in the household and social support both in the household and in the community.

## 5. Conclusion

In the current study, maternal loneliness was found to be prevalent. In addition, poor social support and low decision-making power were significantly associated factors influencing maternal loneliness. Thus, special attention has to be given to maternal loneliness during the postpartum period for the optimal health of the mother and children. Besides, preventive strategies and interventions centering on the empowerment of women to ensure women's decision-making power in the household and social support groups need to be advocated.

## Declarations

### Author contribution statement

Azmeraw Ambachew Kebede: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

Dereje Nibret Gessesse, Nuhamin Tesfa Tsega, Mastewal Belayneh Aklil, Wubedle Zelalem Temesgan, Marta Yimam Abegaz, Tazeb Alemu Anteneh, Nebiyu Solomon Tibebe, Haymanot Nigatu Alemu, Tsion Tadesse Haile, Asmara Tesfahun Seyoum, Agumas Eskezia Tiguh, Ayenew Engida Yismaw, Muhabaw Shumye Mihret, Goshu Nenko, Kindu Yinges Wondie and Birhan Tsegaw Taye: Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

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### Data availability statement

Data will be made available on request.

### Declaration of interest's statement

The authors declare no conflict of interest.

### Additional information

No additional information is available for this paper.

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## References

- [1] Z.A.K.Ç. Utuk, Emotional expressivity, loneliness and hopelessness relationship in adolescents, *Int. J. Psychol. Educ. Stud* 8 (2) (2021) 51–60.
- [2] S. Khan, A. Ion, A. Alyass, S. Greene, G. Kwaramba, S. Smith, et al., Loneliness and perceived social support in pregnancy and early postpartum of mothers living with HIV in Ontario, Canada, *AIDS Care* 1–8 (2018).
- [3] P. Qualter, J. Vanhalst, R. Harris, E. Van Roekel, G. Lodder, M. Bangee, M. Maes, M. Verhagen, Loneliness across the life span, *Perspect. Psychol. Sci.* 10 (2015) 250–264.
- [4] P.S. O'Suilleabháin, S. Gallagher, A. Steptoe, Loneliness, living alone, and all-cause mortality: the role of emotional and social loneliness in the elderly during 19 years of follow-up, *Psychosom. Med.* 81 (6) (2019) 521–526.
- [5] Maternal mental health and child health and development in low and middle income countries. Report of the WHO Meeting, World Health Organization, Geneva, 2008.

- [6] J. Kent-marvick, S. Simonsen, R. Pentecost, M.M. Mcfarland, Loneliness in Pregnant and Postpartum People and Parents of Children Aged 5 Years or Younger : a Scoping Review Protocol, 2020, pp. 1–5.
- [7] I. Luoma, M. Korhonen, K. Puura, R.K. Salmelin, Maternal loneliness : concurrent and longitudinal associations with depressive symptoms and child adjustment Maternal loneliness : concurrent and longitudinal, *Psychol Health Med* [Internet] (2018) 1–13.
- [8] M. Vakili, M. Mirzaei, M. Modarresi, Loneliness and its related factors among elderly people in yazd, *Elder Heal Journalir Elder Heal J* 3 (31) (2017) 10–15.
- [9] Maternal Suicide Still a Leading Cause of Death in First Postnatal Year. *Maternal Ment Heal Alliance* [Internet], 2019. Available from: <https://maternalmenthalhealthalliance.org/news/maternal-suicide-still-the-leading-cause-of-death-in-first-postnatal-year/>.
- [10] K. Mangla, M.C. Hoffman, C. Trumpff, S.O. Grady, C. Monk, Expert Review Maternal Self-Harm Deaths : an Unrecognized and Preventable Outcome, *Am J Obstet Gynecol*, 2019 [Internet].
- [11] A. Stickley, A. Koyanagi, R. Kopusov, M. Schwab-stone, V. Ruchkin, Loneliness and health risk behaviours among Russian and U . S . adolescents : a cross-sectional study, *BMC Publ. Health* 14 (366) (2014) 1–12.
- [12] E. Id JMG Berry, L. Graham-wisener, -P.E. Mckenna, E. Mcglinchey, C. Armour, Loneliness in the UK during the COVID-19 pandemic : cross-sectional results from the COVID-19 psychological wellbeing study, *PLoS One* 15 (9) (2020) 1–18.
- [13] Q. Yu, S. Mazzoni, M. Lauzon, A. Borgatti, N. Caceres, S. Miller, et al., Associations between social network characteristics and loneliness during pregnancy in a sample of predominantly african American , largely publicly - insured women, *Matern. Child Health J.* (2020), 0123456789.
- [14] R. Giallo, P. Pilkington, M. Seymour, M. Dunning, S. Brown, The Prevalence and Correlates of Self-Harm Ideation 4-years Postpartum Reference, *J Affect Disord* (2018).
- [15] SDG. Final, List of proposed Sustainable Development Goal indicators. Report of the Inter-Agency and Expert Group on Sustainable Development Goal Indicators, 2016. Available from, <https://sustainabledevelopment.un.org/content/documents/11803Official-List-of-Proposed-SDG-Indicators.pdf>.
- [16] R. Nowland, G. Thomson, L. McNally, K.W.T. Smith, Experiencing loneliness in parenthood : a scoping review, *Perspect Public Health* 141 (4) (2021) 3–5.
- [17] E.E. Lee, C. Depp, B.W. Palmer, D. Glorioso, R. Daly, J. Liu, et al., High prevalence and adverse health effects of loneliness in community-dwelling adults across the lifespan: role of wisdom as a protective factor, *Int psychogeriatrics* 31 (10) (2019) 1447–1462.
- [18] Z.N. Azene, H.Y. Yeshita, F.A. Mekonnen, Intimate partner violence and associated factors among pregnant women attending antenatal care service in Debre Markos town health facilities, Northwest Ethiopia, *PLoS One* 14 (7) (2019) 1–17.
- [19] D. Nigatu, A. Gebremariam, M. Abera, T. Setegn, K. Deribe, Factors associated with women ` s autonomy regarding maternal and child health care utilization in Bale Zone : a community based cross-sectional study, *BMC Wom. Health* 14 (79) (2014). Available from: <https://www.biomedcentral.com/1472-6874/14/79%0APage>.
- [20] A.A. Kebede, E.A. Cherkos, E.B. Taye, G.A. Eriku, B.T. Taye, W.F. Chanie, Married women's decision-making autonomy in the household and maternal and neonatal healthcare utilization and associated factors in Debretabor, northwest Ethiopia, *PLoS One* [Internet] 16 (9) (2021), e0255021.
- [21] S. Zaman, R. Bin Gupta, G. Das Muhammed, A. Kibria, N. Hossain, Husband ` s involvement with mother ` s awareness and knowledge of newborn danger signs in facility - based childbirth settings : a cross - sectional study from rural Bangladesh, *BMC Res. Notes* (2018) 4–9.
- [22] T. Abiola, O. Udofia, M. Zakari, Psychometric properties of the 3-item oslo social support scale among clinical students of Bayero University Kano, Nigeria, *Malaysian Journal of Psychiatry* 22 (2) (2013) 32–41.
- [23] T.A. Bisetegn, G. Mihretie, T. Muche, Prevalence and predictors of depression among pregnant women in debretabor, *PLoS One* 11 (9) (2016) 1–10.
- [24] G. Ayano, G. Tesfaw, S. Shumet, Prevalence and determinants of antenatal depression in Ethiopia : a systematic review and meta-analysis, *PLoS One* 14 (2) (2019) 1–17.
- [25] Abel Fekadu Dadi, R. Emma, L.M. Miller, Antenatal depression and its association with adverse birth outcomes in low and middle- income countries : a systematic review and meta-analysis, *PLoS One* [Internet] 15 (1) (2020) 1–23.
- [26] C.L. Taylor, LM Van Ravesteyn, M.P.L. Van, R.J. Stewart, L.M. Howard, C.L. Taylor, The Prevalence and Correlates of Self-Harm in Pregnant Women with Psychotic Disorder and Bipolar Disorder, *Arch Womens Ment Health*, 2016, p. 909, 15.
- [27] K. Chawla, T.P. Kunonga, D. Stow, R. Barker, D. Craig, B. Hanratty, Prevalence of loneliness amongst older people in high-income countries: a systematic review and meta-analysis, *PLoS One* (7 July) (2021) 16 [Internet].
- [28] G. Agarwal, M. Pirrie, A. Gao, R. Angeles, F. Marzanek, Subjective social isolation or loneliness in older adults residing in social housing in Ontario: a cross-sectional study, *C Open* 9 (3) (2021) E915–E925.
- [29] R.E. Wootton, H.S.R. Greenstone, A. Abdellaoui, D. Denys, K.J.H. Verweij, M.R. Munafo, et al., Bidirectional effects between loneliness, smoking and alcohol use: evidence from a Mendelian randomization study, *Addiction* 116 (2) (2021) 400–406.
- [30] I. Luoma, M. Korhonen, R. Salmelin, T. Tamminen, Mothers' feelings of loneliness: prevalence, risk factors and longitudinal associations with depressive symptoms and child adjustment, *Eur Psychiatry* [Internet] 30 (2015) 726.
- [31] R. Yu, A.J. Nevado-Holgado, Y. Molero, B.M. D'Onofrio, H. Larsson, L.M. Howard, et al., Mental disorders and intimate partner violence perpetrated by men towards women: a Swedish population-based longitudinal study, *PLoS Med.* 16 (12) (2019) 1–19.
- [32] A. Kamimura, V. Ganta, K. Myers, T. Thomas, Intimate partner violence and physical and mental health among women utilizing community health services in Gujarat, India, *BMC Wom. Health* 14 (1) (2014) 1–11.
- [33] N.S. Owoo, M.P. Lambon-Quayefio, Mixed methods exploration of Ghanaian women's domestic work, childcare and effects on their mental health, *PLoS One* [Internet] 16 (2 February 2021) (2021) 1–22.
- [34] T. Motegi, Y. Watanabe, N. Fukui, M. Ogawa, K. Hashijiri, R. Tsuboya, et al., Depression, anxiety and primiparity are negatively associated with mother–infant bonding in Japanese mothers, *Neuropsychiatric Dis. Treat.* 16 (2020) 3117–3122.
- [35] T.F. Harandi, M.M. Taghinasab, T.D. Nayeri, The correlation of social support with mental health: a meta-analysis, *Electron. Physician* (2017;9(January) 5212–5222.
- [36] F. Li, S. Luo, W. Mu, Y. Li, L. Ye, X. Zheng, et al., Effects of sources of social support and resilience on the mental health of different age groups during the COVID-19 pandemic, *BMC Psychiatr.* 21 (1) (2021) 1–14.
- [37] L. Chien, C. Tai, M. Yeh, D. Gupta, Domestic decision-making power, social support, and postpartum depression symptoms among immigrant and native women in taiwan, *Nurs. Res.* 61 (2) (2012) 103–110.