

Prevalence and Correlates of Suicide Ideation and Attempt among Pregnant Women Attending Antenatal Care Services at Public Hospitals in Southern Ethiopia

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Background: Suicide ideation and attempt are common among pregnant women, risk factors for completed suicide, and associated adverse maternal and fetal outcomes. It is under-recognized and has not been investigated well in low-income countries like Ethiopia. This study aimed to assess the prevalence and factors associated with suicide ideation and attempt among pregnant women attending antenatal care services at public hospitals in southern Ethiopia.

Methods: A group of 762 pregnant women who were attending the antenatal service at public hospitals in Hawassa, southern Ethiopia, selected by a systematic random sampling technique, took part in an interview. A Composite International Diagnostic Interview (CIDI) was used to measure suicide ideation and attempt. Chi-square and binary logistic regression analyses were performed to identify the associated factors. An adjusted odds ratio with a 95% confidence interval was used for reporting the result with a p -value<0.05 statistical significance level.

Results: The prevalence of suicide ideation and attempt among pregnant women was 11.8% and 2.7%, respectively. Unplanned pregnancy (AOR=2.01, 95% CI=1.04–3.88), poor social support (AOR=3.29, 95% CI=1.62–6.68), common mental disorders (AOR=2.77, 95% CI=1.50–5.09), and lifetime suicide ideation (AOR=4.63, 95% CI=2.63–8.16) were factors significantly associated with suicide ideation. Social support was the only correlated factor with suicide attempt among pregnant mothers.

Conclusion: The prevalence of suicide ideation and attempt among pregnant women was found to be high. Intervention strategies towards suicidal ideation and attempt should consider improving social support and antenatal related common mental disorders with a primary focus on women with unplanned pregnancy and prior history of suicide ideation.

Keywords: antenatal care, pregnant women, suicide, suicide ideation, suicide attempt, Ethiopia

Introduction

The term suicide is defined as a deliberate act of ending one's own life. Suicide ideation is the thought of ending one's own life or the thought of finishing life; while suicide attempt is one of self-destructive behavior that refers to the act or the behavior of attempting to finish one's life, and the outcome is non-fatal.^{1,2} Pregnancy is a major and complex occasion in a woman's life that is related to significant physiological, social, and mental changes.^{3,4} One of the important

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contributors to pregnancy-related mortality is suicide, and one-third of all female patients hospitalized following suicide attempt were pregnant.^{5–7} Literature suggested that 1.0–1.7% of pregnancy-related mortality in developing countries is attributed by suicide.⁸ Women who have attempted suicide during pregnancy have a high rate of abortion, miscarriage, preterm delivery, and hospitalization.^{9,10} It may also lead to mental retardation of the infant, low birth weight, respiratory syndrome, and congenital anomalies.^{11,12} Similarly, suicide ideation is also associated with adverse maternal and fetal outcomes, such as preterm delivery, and low infant birth weight.^{13–15}

According to the low and middle-income countries studies, the prevalence of antenatal suicide ideation and attempt in pregnancy ranged from 5–20%¹³ and 1.7–12.55%,^{16–18} respectively. Although there is a dearth of prevalence studies in Sub-Saharan Africa countries, the existing literature has noted high rates of suicide ideation and attempt. For example, studies done in South Africa and Egypt showed that 27.5% and 3.3%¹⁹ and 20.4% and 1.8%²⁰ of the pregnant mothers had suicide ideation and attempt, respectively. Researchers reported that unemployment, low socioeconomic status,^{19,21} single parenting status, less educated,^{18,22} unwanted and unplanned pregnancy,⁷ previous suicide ideation and attempt, family history of suicide,^{10,13,23} presence of co-morbid mental disorder, and co-morbid chronic physical illness^{21,23,24} are the main factors that increase the likelihood of suicide ideation and attempt among pregnant women in developing countries. Having poor social support,^{21,24–26} intimate partner violence,^{18,22} and use of psychoactive substances¹⁷ are also important contributing factors to suicide ideation and attempt among pregnant women.

Studying suicide ideation and attempt among pregnant women is important to identify mothers who are at the risk of suicide and help in developing intervention programs to reduce maternal mortality and morbidity. Despite the multiple complications of suicide ideation and attempt, there has been no published study on the prevalence and correlates of suicide ideation and attempt among pregnant women in Ethiopia. Therefore, this study was intended to assess the prevalence and correlates of suicidal ideation and attempt among pregnant women attending antenatal care services at public hospitals in Hawassa, southern Ethiopia. The result of the study will be used to deliver strong health information, contribute to early intervention, and therefore a decrease in the burden of suicide ideation and attempt.

The hypothesis of the study: there is a higher prevalence of suicide ideation and attempt among pregnant women in Ethiopia than other countries. Even if the health care system in Ethiopia is improving, the integration of mental health services for pregnant women is too weak as a result of the non-random health care distribution. The prevalence rate of suicidal behavior becomes increased when mental disorders detection and intervention during ANC service is delayed.^{27,28} Additionally, most of the pregnant women in our country live in a low socio-economic status that exposes the mothers to have suicide ideation and attempt in their pregnancy.

Methods and Materials

Study Setting and Population

An institution-based cross-sectional study was conducted on pregnant women who attended antenatal care (ANC) follow-up in Hawassa city public hospitals, southern Ethiopia, from March 20 to July 3, 2020. Hawassa is located 275 km south of Addis Ababa, the capital city of Ethiopia. There are three public hospitals in the city, which are Hawassa University Comprehensive Specialized Hospital, Adare General Hospital, and Tulla Primary Hospital, which provide different clinical services for inhabitants from Hawassa, Sidama Region, and some parts of the Oromia Region.

In Ethiopia, antenatal care (ANC) follow-up is administered in health centers, public hospitals, as well as private healthcare institutions as the individuals preferred based on the distance of the institutions, the interest, and capacity to cover the cost of the care. Pregnant mothers who lived in urban areas preferred public hospitals over health centers because of the need of qualified and specialized health services. Some women who have high wealth index are attending private health institutions for the utilization of ANC as they have the capacity to cover the cost of the care. Unfortunately, the distribution of the prenatal care system in Ethiopia is quite different across the country (non-random). All pregnant mothers aged 15–49 years who were attending ANC service at public hospitals in Hawassa city were included. While those who were too ill to communicate as well as mothers who have been re-visiting the health facilities after they were once included in the study in their previous visit were excluded.

Sample Size Determination and Sampling Procedure

The sample size was estimated by using a single population proportion formula considering the following

assumption. Because the study was intended to estimate the prevalence rate of suicide ideation and/attempt among pregnant women.

$$n = \frac{\left(\frac{Z\alpha}{2}\right)^2 p(1-p)}{d^2}$$

where

n is the minimum sample size required for the study.

Z is the standard normal distribution ($Z=1.96$) with confidence interval of 95% and $\alpha=0.05$.

P is the prevalence of suicide ideation and attempt taken from previous study which was conducted in Egypt: 20.4%.²⁰

d is the absolute precision or tolerable margin of error (3%).

$$n = \frac{(1.96)^2 0.204(0.796)}{(0.03)^2} = 693$$

A 10% non-response was added ($693 \times 0.1 = 69.3$) and $693 + 69 = 762$, so the final higher calculated sample size for this study was 762.

Of the three hospitals, two hospitals, namely Hawassa University Comprehensive Specialized Hospital (HUCSH) and Adare General Hospital (AGH), were selected in the study by lottery method. On average, there had been an estimated 1,650 (550 at HUCSH and 1,100 at AGH) pregnant mothers attending ANC services at these hospitals in a month. Then, the number of participants in each hospital was determined by proportional allocation based on the average load of ANC clients. A group of 762 (254 at HUCSH and 508 at AGH) pregnant women aged 15–49 years attending ANC follow-up were invited to take part in the study by a systematic random sampling technique. The sampling fraction (k) was calculated to be $1650/762 \approx 2$. The first participant in each hospital was chosen randomly by a lottery method from numbers 1 and 2. Then, every second pregnant mother was interviewed and the chart was reviewed regularly in each follow-up day. The recruitment and selection of the participants was without considering the stage in pregnancy. Because of that the pregnant women who were on first, second and third trimester at the time of data collection have been invited to take part in the study. From those, 738 pregnant women (245 at HUCSH and 493 at AGH) agreed and completed the questionnaire; while 24 women (nine at HUCSH and 15 at AGH) refused to participate in the study due to the shortage of time and fear and risk perception of the Coronavirus disease pandemic.

Data Collection Instruments

Suicide ideation and attempt were assessed using the World Mental Health (WMH) Survey Initiative Version of the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI).²⁹ It is a standard tool and used in different studies in Ethiopia to assess suicide ideation and attempt in different population groups and settings including both clinical and community levels. Based on this tool, current suicide ideation is defined as if the respondents answer “YES” for the question “Have you seriously thought about committing suicide during the current pregnancy?”, and current suicide attempt defined if the respondents answer “YES” for the question “Have you attempted committing suicide during the current pregnancy?” The Amharic version of the tool was evaluated and found to be feasible, reliable, and acceptable to use in Ethiopia to study mental health problems.³⁰

The presence of antenatal common mental disorders was assessed using a self-reporting questionnaire (SRQ-20) which consists of 20 yes or no questions. It is valid and recommended by WHO to assess the presence of common mental disorders such as depression, anxiety-related disorders, somatoform and other neurotic disorders with a sensitivity of 62.8–90% and specificity ranging between 44–95.2%, respectively.³¹ SRQ is a very useful tool to screen psychiatric morbidity in different groups of population and can be used with minimal training. It is very easy to administer and interpret than other tools. This tool is needed and frequently used in developing nations like Ethiopia's to screen more of the population and improve mental health. Based on the total score cut-off point of SRQ-20, the participants who scored 6 or more were considered as having antenatal common mental disorder.²⁷ Social support was measured by using the Oslo social support measuring tool. It is a 3-item questionnaire that is used to assess social support. It has a total score of 3–14 with three categories. Poor “3–8”, moderate “9–11”, and strong social support “12–14”.³²

Physical violence was assessed using the WHO violence measure tool that is used to assess intimate partner violence. It is a 13-item tool that is recommended by WHO to assess physical, sexual, and emotional violence.³³ Different studies were conducted by using this screening tool in different population groups and also in pregnant mothers. The physical violence assessment section has six questions that measure the presence

of physical violence in a lifetime, during the current pregnancy, and who the perpetrator is. Based on this, at least one YES response from the scale among six items qualifies the respondent for being faced with physical violence.³⁴

Those pregnant women who use at least one of the specified substances (alcohol, Khat, tobacco, cannabis and shisha) for non-medical purposes in the last 3 months were considered positive for current substance use.³⁵ In this study, antenatal care (ANC) is defined as care that is provided for pregnant women at the time of pregnancy.³⁶ A pregnancy that is unintended at the time of conception is termed as unplanned pregnancy,³⁶ whereas unwanted pregnancy is a pregnancy that is either mistimed or unintended whether it is planned or not.³⁶ Gestational age/stage is the pregnancy stage that is categorized as first, second, and third trimester if the duration of pregnancy was 1–3 months, 4–6 months, and 7 months and more, respectively. Monthly income was the participants income level in a month, which was measured by the Ethiopian currency and categorized as lower, medium and higher if the individuals income was <750, 750–1,200, and >1,200 Ethiopian birr, respectively. Items on socio-demographic, obstetric, and clinical factors such as having diagnosed mental disorder and chronic medical illnesses (hypertension, diabetes, HIV/AIDS), substance use behavior, and family-related conditions were adopted from different articles.^{16,17,22,27}

Data Collection Procedures

A structured and pre-tested interviewer-administered questionnaire was used. The data was collected by interview and review of medical records. The questionnaire for interview contained socio-demographic characteristics, obstetric related conditions, psychosocial factors, substance use condition, and suicide ideation and attempt questions of the pregnant mothers. In addition, data were extracted from the medical records to obtain some clinical-related information such as having diagnoses of mental disorder and chronic medical illnesses (hypertension, diabetes, HIV/AIDS). All the participant women were alone during the interview to ensure their privacy and help the participants to provide information openly. The researchers were also striving to protect the wellbeing of the mothers. Data collectors were wearing face masks and maintained a physical distance between the participant and the data collector, which was actually being practiced by health professionals in the health care setting as a safety measure.

The questionnaire was first prepared in English and translated to Amharic and Sidamic language, the working language of Ethiopia and Sidama region, respectively, which was also back-translated to English to check its consistency.

Data were collected by four trained bachelor's midwife nurses working in the ANC clinic by using the Amharic and/Sidamic version of the questionnaire for 4 months. Initially, we started the data collection in March; unfortunately, the Coronavirus disease 2019 (COVID-19) pandemic was reported and the government of Ethiopia took restrictive measures. Due to the restrictive measures, anxiety and fear over possible exposure to coronavirus, the number of pregnant mothers attending ANC services was reduced. We then prolonged the period of data collection until the estimated sample size fulfilled. A pre-test was done on 38 pregnant women at Yirgalem hospital found in Sidama region 1 week before the actual data collection period. Vague terms, phrases, and questions identified during the pre-test were modified. Additionally the logical sequence and skipping patterns of the questions were corrected. Furthermore, the overall data collection process was closely supervised by a supervisor and the principal investigator.

Data Processing and Analysis

Data were checked for completeness and consistency. Missing data was checked before performing analysis and there was no missing data in the study. Statistical Package for Social Sciences (SPSS) version-20 was used for data analysis. Descriptive and bivariable binary logistic regression analyses were used to see the frequency distribution and assess the correlation between independent variables and suicide ideation, respectively. Variables with a p -value ≤ 0.2 during the bivariable logistic regression were selected for the multivariable binary logistic regression. All the candidate variables were retained and included in the final model. The Adjusted odds ratio with a 95% confidence interval was employed to report the results of factors associated with suicide ideation, and a p -value of < 0.05 was considered as statistically significant. The model goodness of fit was assessed by Hosmer and Lemeshow test as taken as a p -value greater than 0.05 was considered as statistically fit of the model. The model goodness test was well-fitted for suicide ideation, while the test p -value result was below 0.05, which is not well-fitted for suicide attempt. As a result a Chi-square test was

employed to examine the correlation between each independent variable and suicide attempt.

Results

Socio-Demographic and Obstetric Characteristics of the Respondents

A total of 762 pregnant women were invited for interviews, and 738 took part in the study with a 96.8% response rate. The mean age of the respondents was 25.54, with 4.12 years of standard deviation. From the total respondents, 302 (40.9%) were between 20 and 24 years of age. Most (88.5%) of the participants were married and 654 (88.6%) were from the urban residence. Of the respondents, half (51.6%) of the mothers were Protestant Christians and 666 (90.2%) were living with their partner and/children (Table 1).

Table 2 indicated that nearly two thirds (62.1%) of the mothers were in their third trimester; more than three-quarters (81.4%) were multigravida, and one-quarter (24.3%) of them reported that the current pregnancy was unplanned.

Clinical, Substance Use, and Psychosocial Characteristics of the Participant Women

Of the respondents, eight (1.1%) had a history of diagnosed mental disorder and of them, six (75%) had a history of major depressive disorder, one had a history of schizophrenia, and one had a history of anxiety disorder. Nearly one-fifth (19%) of the pregnant women had an antenatal common mental disorder, 51 (6.9%) of the participants had a known chronic medical illness specifically, 15 (29.4%), six (11.8%), and 20 (39.2%) had hypertension, diabetes, and HIV/AIDS, respectively.

At the time of interview, 59 (8%) were taking at least one psychoactive substance. Of them, 49 (83.1%) had drunk alcohol, and 10 (16.9%) chewed chat in the last 3 months. Twenty-four (3.3%) of the pregnant women reported a family history of suicide and 49 (6.6%) reported a family history of mental illness. One hundred and fourteen (15.4%) of the pregnant women experienced physical violence in their lifetime, while 100 (13.6%) experienced physical violence during the current pregnancy. From those who had current physical violence, most of the violence (82%) was perpetrated by husband/boyfriend, and the others (18%) were by others (family members, other relatives, and strangers).

Table 1 Socio-Demographic Characteristics of the Respondents Attending ANC Service at Public Hospitals in Hawassa, Southern Ethiopia, 2020 (n=738)

Variables	Category	Frequency (n)	Percent (%)
Age (years)	15–19	28	3.8
	20–24	302	40.9
	25–29	268	36.3
	≥30	140	19.0
Marital status	Married	653	88.5
	Single (unmarried, separated, divorced, widowed)	85	11.5
Religion	Protestant	381	51.6
	Orthodox	225	30.5
	Muslim	119	16.1
	Catholic	13	1.8
Residence	Urban	654	88.6
	Rural	84	11.4
Educational level	No formal education	101	13.7
	Primary	273	37.0
	Secondary	206	27.9
	Above secondary	158	21.4
Partner's educational level	No formal education	86	11.7
	Primary	147	19.9
	Secondary	171	23.2
	Above secondary	334	45.3
Employment status	Unemployed (housewife, unemployed)	361	48.9
	Employed	298	40.4
	Student	79	10.7
Partner's employment status	Unemployed (retired, unemployed)	14	1.9
	Employed	713	96.6
	Student	11	1.5
Monthly income	<750 ETB	310	42.0
	750–1200 ETB	167	22.6
	>1200 ETB	261	35.4
Living arrangement	Living with partner/children	666	90.2
	Others	72	9.8

Note: Others, living with partner's family, alone, family, friends; ETB, Ethiopian Birr.

Table 2 Obstetric Characteristics of the Pregnant Women Attending ANC Service at Public Hospitals in Hawassa, 2020 (n=738)

Variables	Category	Frequency (n)	Percent (%)
Gestational age	1st trimester	91	12.3
	2nd trimester	189	25.6
	3rd trimester	458	62.1
Gravidity	Primigravida	137	18.6
	Multigravida	601	81.4
Number of alive children	No alive children	142	19.2
	One	226	30.6
	Two	206	27.9
	Three or more	164	22.2
Planned pregnancy	Yes	559	75.7
	No	179	24.3
Wanted pregnancy	Yes	286	38.8
	No	452	61.2
History of miscarriage	Yes	111	15.0
	No	627	85.0
History of abortion	Yes	87	11.8
	No	651	88.2

NoteAbbreviation: HX= history.

Related to social support, 44.6% had moderate, 34% had strong, and 21.4% had poor social support.

The Prevalence of Suicide Ideation and Attempt among the Pregnant Women

Among the total respondents, 87 (11.8%; (95% CI=9.6–14.1) of the pregnant women reported suicide ideation during the current pregnancy, and 151 (20.5%) reported a lifetime history of suicide ideation. The prevalence of suicide attempts in the current pregnancy was 2.7% (95% CI=1.6–3.9). Twenty-nine (3.9%) of the respondents had attempted suicide in their lifetime. Among those who attempted suicide during the current pregnancy, the commonest method used for the attempt was poisoning (14; 70%). The majority of the respondents (82.8%) who attempted suicide in their lifetime had one attempt, whereas 17.2% of the respondents attempted suicide twice in their lifetime (Table 3).

Factors Associated with Suicide Ideation among Pregnant Women

As indicated in Table 4, the bivariable binary logistic regression analyses showed that age, marital status,

Table 3 The Distribution of Suicide Ideation and Attempt Among Pregnant Women Attending ANC Service at Public Hospitals in Hawassa, 2020 (n=738)

Variables	Frequency (n)	Percent (%)
Lifetime suicide ideation	Yes	151
	No	587
Lifetime suicide attempt	Yes	29
	No	709
Frequency of lifetime suicide attempt	Once	24
	Twice	5
Suicide ideation during the current pregnancy	Yes	87
	No	651
Suicide attempt during the current pregnancy	Yes	20
	No	718
Method of current suicide attempt	Hanging	6
	Poisoning	14

monthly income, gestational age, gravidity, unwanted pregnancy, unplanned pregnancy, lifetime suicide ideation, social support, current alcohol use, common mental disorders, past history of physical violence, and current physical violence had a p -value<0.2. Out of those variables treated under multivariable logistic regression analysis, unplanned pregnancy, lifetime suicide ideation, poor social support, and antenatal common mental disorders were significantly associated with suicide ideation during the current pregnancy at a p -value<0.05. The Hosmer and Lemeshow test p -value result for the model goodness of fit was found to be 0.207, which revealed the model was well-fitted.

Pregnant women who had unplanned pregnancy were 2-times (AOR=2.01, 95% CI=1.04–3.88) more likely to develop suicide ideation than those who planned their current pregnancy. The odds of having suicide ideation was about 4.6-times (AOR=4.63, 95% CI=.63–8.16) higher among those who had lifetime suicide ideation than their counterparts. Pregnant women who have poor social support were about 3.3-times (AOR=3.29, 95% CI=1.62–6.68) more

Table 4 Bivariable and Multivariable Binary Logistic Regression of Factors Associated with Suicide Ideation among Pregnant Women Attending ANC Service at Public Hospitals in Hawassa, 2020 (n=738)

Variables	Current Suicide Ideation		COR (95% CI)	AOR (95% CI)
	No, n (%)	Yes, n (%)		
Age in years				
15–19	24 (85.7)	4 (14.3)	1.78 (0.53–5.98)	1.23 (0.25–6.03)
20–24	260 (86.1)	42 (13.9)	1.72 (0.88–3.39)	1.37 (0.58–3.28)
29–30	239 (89.2)	29 (10.8)	1.29 (0.64–2.62)	1.70 (0.73–3.93)
≥30	128 (91.4)	12 (8.6)	1	1
Marital status				
Married	590 (90.4)	63 (9.6)	1	1
Unmarried	61 (71.8)	24 (28.2)	3.69 (2.15–6.32)	0.89 (0.39–2.00)
Monthly income				
<750 ETB	263 (84.8)	47 (15.2)	1.85 (1.09–3.14)	1.75 (0.93–3.29)
750–1200 ETB	150 (89.8)	17 (10.2)	1.17 (0.61–2.27)	1.22 (0.56–2.65)
>1200 ETB	238 (91.2)	23 (8.8)	1	1
Gestational age				
1st trimester	79 (86.8)	12 (13.2)	1.33 (0.67–2.62)	0.48 (0.20–1.14)
2nd trimester	161 (85.2)	28 (14.8)	1.52 (0.92–2.51)	1.00 (0.54–1.85)
3rd trimester	411 (89.7)	47 (10.3)	1	1
Gravidity				
Primigravida	108 (78.8)	29 (21.2)	1	1
Multigravida	543 (90.3)	58 (9.7)	0.40 (0.24–0.65)	0.92 (0.45–1.89)
Wanted pregnancy				
Yes	268 (93.7)	18 (6.3)	1	1
No	383 (84.7)	69 (15.3)	2.68 (1.68–4.61)	1.44 (0.74–2.81)
Planned pregnancy				
Yes	515 (92.1)	44 (7.9)	1	1
No	136 (76.0)	43 (24.0)	3.70 (2.33–5.87)	2.01 (1.04–3.88)*
Lifetime suicide ideation				
Yes	100 (66.2)	51 (33.8)	7.81 (4.85–12.58)	4.63 (2.63–8.16)**
No	551 (93.9)	36 (6.1)	1	1
Social support				
Poor	110 (69.6)	48 (30.4)	6.41 (3.48–11.79)	3.29 (1.62–6.68)**
Moderate	306 (93)	23 (7)	1.10 (0.57–2.14)	1.05 (0.52–2.13)
Strong	235 (93.6)	16 (6.4)	1	1
Alcohol use				
Yes	33 (67.3)	16 (32.7)	4.22 (2.21–8.05)	1.20 (0.48–2.99)
No	618 (89.7)	71 (10.3)	1	1
Antenatal common mental disorders				
Yes	104 (74.3)	36 (25.7)	3.71 (2.31–5.97)	2.77 (1.50–5.09)**
No	547 (91.5)	51 (8.5)	1	1

(Continued)

Table 4 (Continued).

Variables	Current Suicide Ideation		COR (95% CI)	AOR (95% CI)
	No, n (%)	Yes, n (%)		
Past physical violence				
Yes	84 (73.7)	30 (26.3)	3.55 (2.16–5.85)	1.88 (0.99–3.56)
No	567 (90.9)	57 (9.1)	1	1
Current physical violence				
Yes	72 (72)	28 (28)	3.82 (2.29–6.37)	1.78 (0.91–3.45)
No	579 (90.8)	59 (9.2)	1	1

Note: 1= reference category. * $p < 0.05$; ** $p \leq 0.001$; Hosmer and Lemeshow goodness of fit test (p -value=0.207).

Abbreviations: COR, crude odds ratio; AOR, adjusted odds ratio; CI, confidence interval.

likely to report suicide ideation than those who have strong social support. Pregnant women with common mental disorders were about 3-times (AOR=2.77, 95% CI=1.50–5.09) more likely to report suicide ideation compared to those who had no antenatal common mental disorders.

The Factors Correlated with Suicide Attempt

A Chi-square test was conducted to identify the factors correlated with the current suicide attempt. Based on this, the respondent's employment, gestational age, the pattern of pregnancy (wanted/unwanted pregnancy), and social support has fulfilled the chi-square assumptions. But the other variables have violated one of the assumptions of chi-square concerning the "minimum expected cell frequency", which should be 5 or greater. For these variables which violated this assumption, we have considered using and running Fisher's exact probability test. But there appears to be no association between suicide attempt and these factors. Because of this we simply wrote about the variables which fulfilled the chi-square assumption. From the variables which fulfill the assumptions, social support ($p < 0.001$) was found to be significantly correlated with suicide attempt but respondent's employment, gestational age, and pattern of pregnancy (wanted/unwanted pregnancy) had no correlation with suicide attempt among pregnant women (Table 5).

Discussion

This study attempted to assess the prevalence and factors associated with suicide ideation and attempt among pregnant women who were attending ANC services at public hospitals in southern Ethiopia. This study reported 11.8% of the pregnant women had suicide ideation in the current pregnancy. This finding is consistent with studies done in South Africa

(12%),¹⁹ Pakistan (11%),²² and an epidemiological review study estimated the prevalence range of 13.1–33%.³⁷

This proportion of pregnant women who had suicide ideation was found to be higher compared to studies held in Iran,²⁶ India,²⁵ Brazil,^{16,17} and the USA.²⁴ The discrepancy might be due to the difference in the type of screening tools used, the participants' period of pregnancy (trimester), and socioeconomic status variation. The current study used the WHO CIDI suicidal behavior part to screen suicide ideation and attempt among pregnant women who were on antenatal care attended at public hospitals, while previous studies used Beck Depression Inventory (BDI), SRQ-20, Primary Care Evaluation of

Table 5 Chi-Square Result of Suicide Attempt among Pregnant Women Attending ANC Service at Public Hospitals in Hawassa, Southern Ethiopia, 2020 (n=738)

Variables	Current Suicide Attempt		p-value
	No, n (%)	Yes, n (%)	
Employment status			0.221
Unemployed	350 (97.0)	11 (3.0)	
Employed	293 (98.3)	5 (1.7)	
Student	75 (94.9)	4 (5.1)	
Gestational age			0.819
1st trimester	88 (96.7)	3 (3.3)	
2nd trimester	185 (97.7)	4 (2.1)	
3rd trimester	445 (97.2)	13 (2.8)	
Wanted pregnancy			0.908
Yes	278 (97.2)	8 (2.8)	
No	440 (97.3)	12 (2.7)	
Social support			0.001*
Poor	145 (91.8)	13 (8.2)	
Moderate	324 (98.5)	5 (1.5)	
Strong	249 (99.2)	2 (0.8)	

Note: *Statistically significant.

Mental Disorders, and Patient Health Questionnaire (PHQ-9) which measure suicide ideation of 1 week, 30 days, and 15 days, respectively. This might contribute to the low prevalence in the previous studies. In the Indian study the pregnant mothers with major mental illness and substance use were excluded, but not in the current study. Additionally, in the Brazilian study only pregnant women between gestational weeks 20 and 30 were included. The first and third trimester of pregnancy is associated with a high risk of depression and anxiety; these conditions may lead pregnant women to suicide ideation,^{11,38} exclusion of those pregnant women could be the reason for the variation. On top of that, socioeconomic status variation may additionally attribute to the difference in the prevalence of suicide ideation between the current study and study in the USA.

To date, it is a fact that antenatal care services important in reducing maternal morbidity, and in Ethiopia, implementing and insuring utilization of maternal health care system including antenatal care is in improvement.^{39,40} While the antenatal care service is crucial, providing an integrated mental health service for pregnant women is too weak^{28,41} as a result of the non-random distribution of prenatal care system in the country. This study had shown that many pregnant mothers are suffering from suicidal behavior and its negative health effects in Ethiopia. So, providing integrated mental health services during ANC is needed to reduce mental disorders including suicide and understand why the women have suicidal behavior in pregnancy.

On the other hand, our finding was lower than the studies done in Egypt,²⁰ South Africa,¹⁹ Peru,¹⁸ and the USA.⁹ The discrepancy might be due to most of the indicated studies being assessed by different tools like Structured Clinical Interview for Depression, Mini International Neuropsychiatric Interview (M.I.N.I), Beck Depression Inventory, and Hamilton Rating Scale for Depression. In the current study, CIDI was used to assess suicide ideation, and all of them have different accuracy levels in assessing suicide ideation. The study was undertaken in an area with high poverty and prevalence of HIV/AIDS in the South African study that might have contributed to the very high prevalence of suicide ideation. Besides, socio-demographic and cultural differences might be another reason for the discrepancy of this finding with that of the findings of other studies. Furthermore, due to the COVID-19 pandemic, the health service including ANC service was disrupted because of restrictions,

anxiety, and fear over possibly being exposed to coronavirus. Mothers who had not attended ANC services might be underreported. Many pregnant women were not attended for ANC follow-up in the health facilities as the study was undertaken during the pandemic period.

This study also reported 2.7% of the pregnant women attempted to harm themselves in the current pregnancy. This result is in line with the studies held in Egypt,²⁰ India,²⁵ and Iran.²⁶ However, this finding was lower compared to the studies conducted in South Africa,⁷ Pakistan,²² Peru,¹⁸ and Brazil.²³ The variation in the finding might be due to the difference in sample size, study design, and measurement instrument used. In the current study, the WHO CIDI tool was utilized to assess suicide attempt whereas M.I.N.I. plus and Aga Khan university anxiety/depression scale were used in the previous studies. This could be considered as a source of discrepancy. Furthermore, studies from Pakistan and Peru were conducted in a much larger sample of pregnant women than the sample of the current study; and a prospective cohort study design was employed in Pakistan that might account for the variation.

Most of the factors associated with self-reported depressive symptoms in this study were similar with those of previous studies in different population groups. In this study, we observed that mothers with unplanned pregnancy are more likely to have suicide ideation in the current pregnancy than those in which the pregnancy was planned. This report is consistent with studies done in Iran,²⁶ the USA,⁹ and an Epidemiological review from developed and developing countries which showed that mothers with unplanned pregnancy were more likely to have suicide ideation.^{13,37} This might be due to the mothers with an unplanned pregnancy may not be ready to take maternal responsibilities, and they may feel inadequate which causes fear and stress that may lead the women to have the thought of killing oneself. The other explanation might be that the pregnancy also may not be approved and supported by a partner; this could cause stress and conflict that increases suicidal thought.

Social support is a factor for suicide ideation in which pregnant mothers who had poor social support were more likely to have thought of suicide compared to those who had strong social support. This finding was similar with those of studies conducted in South Africa²¹ and India²⁵ which showed that strong social support decreases the odds of suicide ideation and to be protective against suicide ideation. This could be due to the lack of social support, which might

result in psychological distress, feelings of loneliness, and helplessness that in turn lead to suicide ideation.

The third important finding in this study is the role of common mental disorders (antenatal depression/anxiety) in which pregnant mothers who had common mental disorders were about three times more likely to report suicide ideation as compared to those who had no common mental disorders. The finding is in agreement with the previous studies done in South Africa, Brazil, and the USA.^{17,19,21} It is also supported by the finding from an epidemiological review.¹³ This might be because of the effect of serotonin neurotransmission that is found to be impaired and dysregulated in a person with depression/anxiety, and its effect may increase suicide risk.⁴² Furthermore the presence of antenatal common mental disorders affects the decision-making capacity of the women and they consider this as suffering. As a result the mothers may consider suicide as a means to escape from suffering from depression/anxiety.⁴³

In this study, pregnant mothers who had a past history of suicide ideation in their lifetime were more likely to report suicide ideation in the current pregnancy than those who had not. This result is in agreement with the studies held in India²⁵ and Japan⁴⁴ that found a significant association between past history of suicide ideation and current suicide ideation. This might be due to prior suicidal behavior (past history of suicide thought and attempt) with no professional help and intervention increases the likelihood of developing suicide ideation in the future when the mothers are in the period of significant physiological, social, and mental changes.

Furthermore, in this study social support was correlated with suicide attempt. The possible explanation might be that those pregnant women who had poor social support could feel disconnected and detached from their community. This might cause a feeling of helplessness that increases the chance of suicide thought and attempt.^{21,25} Having social support may increase the feeling of belonging and increase the coping of pregnant women, thus protecting women from attempting suicide.

The limitations of this work are the following. Mothers who had not attended ANC follow-up due to the restrictive measures, anxiety, and fear over possibly being exposed to coronavirus might be underreported. This limits the generalizability of the result because many pregnant women were not attending the health facilities for ANC service. Secondly, this study only generates associations between suicide ideation and attempt and socio-economic,

obstetric, and clinical related factors that could not show the cause-effect relationships between the outcome of interest and these important independent variables. Thirdly, under-reporting and providing socially palatable face-to-face interview questions relating to suicide is common because of social desirability bias which makes it difficult to determine the accurate magnitude of suicide ideation and attempt. The issue of multiplicity is also a concern in the study since logistic regression analysis has been conducted for exploratory purposes. Furthermore, it is difficult to evaluate if there are any changes in suicidal behavior in different stages of pregnancy since it was a cross-sectional study.

The strength of the study was including a relatively large sample size, sampling methods and used standardized tools. Those are crucial to get a reliable estimation of suicidal behavior and detect the affecting factors suicide ideation, which is important to design effective public health programs.

Conclusion

The prevalence of suicide ideation and attempt was high among pregnant women in Ethiopia. Unplanned pregnancy, poor social support, the presence of antenatal common mental disorders, and lifetime history of suicide ideation were the factors associated with current suicide ideation, whereas social support was the only correlated factor with current suicide attempt. Early intervention and integrating treatment services for co-existing mental disorders and antenatal care is important, since suicidal behavior is common among pregnant women. Interventions targeted among the pregnant women who had a previous history of suicide ideation, symptoms of common mental disorders and mothers with unplanned pregnancy, the special treatment, where it is offered and provide proper antenatal care are recommended to reduce suicide ideation and to prevent completed suicide and adverse maternal and fetal health outcomes. Moreover, it is better to encourage the pregnant women to increase their social network by establishing a self-help group, and strengthening early detection of common mental disorders, suicide ideation and attempt throughout their routine ANC follow-up. For the researchers, it is better to conduct a longitudinal and community-based study to examine the changes of suicidal behavior and stage of pregnancy, and get a more representative result, respectively.

Abbreviations

ANC, antenatal care; BDI, Beck Depression Inventory; CIDI, Composite International Diagnostic Interview; COVID-19, coronavirus disease 2019; HIV/AIDS, human immunodeficiency virus/acquired immune deficiency syndrome; HRSD, Hamilton Rating Scale for Depression; M. I.N.I, Mini International Neuropsychiatric Interview; PHQ, Patient Health Questionnaire; SRQ-20, Self-Report Questionnaire-20; USA, United States of America; WHO, World Health Organization.

Data Sharing Statement

All the datasets used to the study are available within the manuscript.

Ethics Approval and Consent to Participate

Ethical approval and clearance were obtained from the Ethical review board of the University of Gondar, College of medicine and health sciences. The ethical committee had also understood and approved the ethics that the participants under 18 years of age (15–18 years of age) can provide informed consent on their own behalf. This study was conducted in accordance with the Declaration of Helsinki. Before data collection, the participants who were unable to read and write, the consent form was read by the data collectors and if they are interested a fingerprint was obtained and for those who can read and write, written consent was obtained. So an informed written consent was obtained from the participants and confidentiality was maintained by omitting their identification. The information of the participants was recorded anonymously by using codes instead of collecting their names. All the participant women were alone during the interview to keep their privacy. The researchers were also striving to protect the wellbeing of the mothers with these conditions. All pregnant women reporting suicide ideation and attempt were linked to the psychiatry unit for further evaluation and professional support.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no conflicts of interest in this work.

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