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# Physical Activity Lifestyle and Associated Factors Among Pregnant Women in Debre Markos Town, East Gojjam Zone Northwest Ethiopia: An Institutional-Based Cross-Sectional Design.

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## Abstract

*Promoting a physically active lifestyle during pregnancy provides substantial health advantages for both the mother and the growing fetus. Unfortunately, many mothers tend to engage in sedentary activities for most of their waking hours and fail to follow the recommended guidelines for regular physical exercise. Therefore, the objective of this research was to evaluate the self-reported physical activity habits during pregnancy and the factors related to them at public health facilities in Debre Markos town, northwest Ethiopia. A cross-sectional study was conducted on 282 pregnant women at public health institutions in Debre Markos town from April 19 to May 30, 2021. The participants were selected using a systematic random sampling technique. Data were gathered through a pre-tested, structured, face-to-face interviewer-administered questionnaire. Binary logistic regression was utilized to identify the factors determining physical activity lifestyle behaviors during pregnancy. The strength of association was reported using adjusted odds ratios with a 95% confidence interval. Variables with a p-value of less than 0.05 in the multivariable logistic analysis were considered significant factors for the outcome variable. The research revealed that 15.2% (11.3, 20.0) of pregnant women demonstrated good physical activity lifestyle behavior during pregnancy. The average score for the physical activity lifestyle behavior test items was 1.79, with a standard deviation of 0.57. Average monthly income [AOR = 0.22; 95% CI = (0.06–0.82)] and alcohol consumption [AOR = 0.28; 95% CI = (0.08–0.96)] were identified as factors associated with good physical activity lifestyle behavior. This research shows that there is a low prevalence of good physical activity habits among pregnant women, below the recommended level in the country. To decrease lifestyle-related maternal morbidity and mortality among mothers in Ethiopia, it is recommended to promote physical activity habits during health education sessions and to implement a safe exercise program in antenatal care clinics, with emphasis on women with low income levels and alcohol consumption.*

**Keywords:** *Physical activity, Associated Factors, Ethiopia.*

## 1. Introduction

Physical activity lifestyles are potentially modifiable behaviors that are important determinants of health promotion and disease prevention (Brawley, Rejeski, & King, 2003; Owen, Leslie, Salmon, & Fotheringham, 2000). Physical activity lifestyle behavior refers to regular involvement in light, moderate, and/or vigorous exercise that occurs intentionally or incidentally as part of daily life or relaxation activities for the sake of fitness and health (Syed, Slayman, & Thoma, 2021). Physical activity during pregnancy is widely recognized for its significant benefits for maternal health and fetal development (Belachew, Melese, Negese, Abebe, & Kassa, 2023; Gebregziabher, Berhe, Kassa, & Berhanie, 2019a). The American College of Obstetricians and Gynecologists (ACOG) advises that pregnant women should undergo at least 150 minutes of moderate-to-intense aerobic physical exercise per week, under the guidance of their healthcare professionals (Obstetricians & Gynecologists, 2015).

Physical activity is critical for the prevention of chronic diseases such as gestational diabetes mellitus (GDM) (Beyene, Shimbre, Ukke, Gebremichael, & Gurara, 2022), type 2 diabetes following GDM (Bertrais et al., 2005; Hu, Li, Colditz, Willett, & Manson, 2003), obesity, pregnancy-related hypertension, and preterm birth (Fazzi, Saunders, Linton, Norman, & Reynolds, 2017), while also assisting with weight management after delivery and promoting faster postpartum recovery (Fell, Joseph, Armson, & Dodds, 2008). Furthermore, regular antenatal exercise promotes better mental health. Any form of physical activity

is effective in reducing depressive symptoms and enhancing an individual's ability to manage stress during pregnancy (Berger, 1994; Jackson, 2013; Wigers, Stiles, & Vogel, 1996). Moreover, physical activity increases the chances of spontaneous vaginal delivery in first-time mothers (Silveira & Segre, 2012).

Despite the benefits of exercise, physical inactivity remains a significant health concern worldwide. Positive physical activity lifestyle behaviors are still not widely practiced (Janakiraman, Gebreyesus, Yihunie, & Genet, 2021), and approximately 55 to 60% of adults lead sedentary lifestyles (Spittaels et al., 2012). A significant portion of women do not adhere to established exercise. For instance, only 10.2%, 17.4%, 20.3%, 47%, and 48% of women in Brazil, the United States, Spain, France, and the United Kingdom, respectively, meet the recommended guidelines (AMEZCUA-PRIETO et al., 2011; Carvalhaes, Martiniano, Malta, Takito, & Benício, 2013; Chandonnet, Saey, Alméras, & Marc, 2012; Liu et al., 2011).

During pregnancy, women spend over 50% of their active time engaged in sedentary activities (Fazzi et al., 2017). In Ethiopia the pooled prevalence of good antenatal physical exercise was 34.06%, which was below the recommended level in the country (Hailemariam, Gebregiorgis, Gebremeskel, Haile, & Spitznagle, 2020a; Kasahun, Shitu, Mekonnen, Hawlet, & Zewdie, 2023), and the majority of women do not adhere to the suggested guidelines for regular exercise during pregnancy (Gebregziabher, Berhe, Kassa, & Berhanie, 2019c). This issue is compounded by socio-economic, cultural,

and environmental barriers. A study by Janakiraman et al. (2021) found that many Ethiopians still view physical activity as unnecessary during pregnancy, especially in rural areas where agricultural work is the primary form of exercise (Belachew et al., 2023; Janakiraman et al., 2021).

As Ethiopia undergoes significant socio-economic and urban changes, understanding physical activity patterns is crucial for public health improvement. However, there is a scarcity of research on the physical activity habits of pregnant women in Ethiopia, particularly in the Amhara region, located in the northwest part of the country (Kasahun et al., 2023).

Therefore, the researchers argue that it is essential to assess the existing prevalence of and factors related to physical activity lifestyle behavior using tools created by Walker and his colleagues (26), based on Pender's health promotion model. This will help policymakers develop effective strategies to address preventable lifestyle-related feto-maternal morbidities and mortality, ultimately improving the quality of life in society. Thus, the objective of this study was to evaluate physical activity lifestyle behavior and its influencing factors in pregnant women attending public health institutions in Debre Markos, Northwest Ethiopia.

## 2. Methods

### 2.1. Study Setting and Period

The research took place at public health facilities in Debre Markos town, which is located in northwest Ethiopia. Debre Markos is the administrative center of the East Gojjam Zone in the Amhara region. It has one comprehensive specialized hospital, four government health centers, seven health posts, 16 private pharmacies, and 22 private clinics. Based on monthly reports from healthcare facilities, there are 11,000 pregnant women receiving antenatal care. The study was conducted from April 19 to May 30, 2021.

### 2.2. Study Design

A cross sectional study design was employed.

### 2.3. Source Population

The source population for this study included all pregnant women who attended the antenatal care unit at public health facilities in Debre Markos town.

### 2.4. Study Population

The research participants were pregnant individuals who received antenatal care and met the requirements at public health facilities in Debre Markos town during the study period.

### 2.5. Inclusion and exclusion criteria

This study included all pregnant women who had attended the antenatal care unit at least once and were present during the data collection period. Study participants who are mentally and physically incapable of participating in a face-to-face interview should not be considered study respondents from the outset.

### 2.6. Sample size determination

The study sample size was determined using a formula for a single population proportion, with the following assumptions in consideration:

$$n = \frac{(Z\alpha/2)\,2p\,(1-p)}{d2}$$; where n represents the desired sample size, the critical value $Z\alpha/2$ for a 95% confidence interval is 1.96. The margin of error (d) is 5%, and the estimated population proportion (p) is 79.3%, based on a previous study in Mekele, Ethiopia (Gebregziabher, Berhe, Kassa, & Berhanie, 2019b). Applying the formula, the calculated sample size (n) is approximately 253. After adding a 10% non-response rate, the final sample size is adjusted to 282.

## 2.7. Sampling Method and Procedure

All public health institutions in Debre Markos town were included in this study. The research area encompasses four health centers and one comprehensive specialized hospital. Based on six-month records from each public health institution, approximately 1,100 pregnant women attended ANC services each month. Accordingly, the sample sizes were allocated proportionally based on the antenatal care registration books of each facility, using a sampling fraction (k), which was calculated by dividing the population size by the sample size. The first study participant was chosen using a simple random sampling method (lottery method) from mothers undergoing antenatal care on the day of data collection. Subsequently, a systematic random sampling method was employed with sampling fraction intervals of four (1,100/282) until the required sample size was reached.

## 2.8. Operational definitions

Good physical activity lifestyle behavior: A pregnant woman who scored above or equal to the mean was considered to be practicing good physical activity lifestyle behavior (Bahabadi et al., 2020; Kidanie, Adamek, & Zena, 2019).

Poor physical activity lifestyle behavior: A pregnant woman who scored below the mean was considered to be practicing poor physical activity lifestyle behavior (Bahabadi et al., 2020; Kidanie et al., 2019).

Alcohol Consumption: Participants in the study who reported never consuming any alcoholic beverages during their pregnancy were classified as non-drinkers. In contrast, those who consumed any alcoholic beverages during pregnancy were identified as drinkers (Addila, Azale, Gete, & Yitayal, 2021).

## 2.9. Data collection tools and procedures

An organized, interviewer-led questionnaire was used to collect information from the participants in the research. The questionnaire covered topics such as socio-demographic details (age, religion, residence, marital status, educational status, occupational status, type of family, and average monthly income); obstetrical history (pregnancy intention, gravidity, parity, duration of pregnancy, antenatal follow-up, mid-upper arm circumference, history of miscarriage, and alcohol use); and a tool on physical activity lifestyle behaviors created by Walker and his colleagues (29), based on Pender's health promotion model, to measure the frequency of self-reported physical activity lifestyles. The questionnaire was initially created in English, then translated into Amharic (the native language of the participants), and finally back-translated into English. Two items related to "assessing pulse rate and peak pulse rate during physical exercise" were deleted to better suit the local setting, as many Ethiopian mothers may not be

familiar with assessing pulse rate during physical exercise. The face and content validity of the final version were checked by five senior experts. A pilot test was then conducted with 30 pregnant women. Cronbach's alpha (α) was calculated to assess the reliability of the tool, which was found to be 0.70, indicating that the tool had good reliability. Five diploma nurses were recruited to gather the data, with three MSc healthcare professionals supervising the data collection process.

## 2.10. Data quality control

To ensure the accuracy of the information, a one-day training session was conducted for both data collectors and supervisors on how to effectively utilize the survey tool. A pilot test was carried out at Finote Selam General Hospital with 30 pregnant women. Throughout the data collection period, each questionnaire was closely monitored and reviewed for completeness; any incomplete responses were excluded from the dataset.

## 2.11. Data management and analysis

The data gathered underwent manual cleaning, coding, and input into Epi-Data™ version 3.1 before being exported to SPSS version 25.0 for further analysis. Various descriptive statistics, such as frequency, percentage, mean, and standard deviation, were calculated for both independent and dependent variables. A binary logistic regression analysis was conducted to identify potential factors influencing physical activity behavior during pregnancy. Variables with a p-value of less than or equal to 0.25 in the bivariable logistic regression model were selected for the multivariable logistic regression analysis. Odds ratios and their 95% confidence intervals were used to determine the strength of associations at a significance level of 0.05. Model fit was assessed using the Hosmer and Lemeshow goodness-of-fit test, while variance inflation factors were utilized to check for multi-collinearity among the independent variables.

## 3. Results

### 3.1. Socio-demographic characteristics

The mean age of the study participants was 27.65 years (SD = ±4.65). Of the total 282 participants, 93.3% were married; of those, 39 (13.9%) had a good physical activity lifestyle. Approximately 95.0% of the respondents were Orthodox religious followers. Moreover, this study indicates that 85% of the women belonged to nuclear families, and among them, 32 (11.3%) had a good physical activity lifestyle, while 43 (15%) came from extended families, of which 11 (3.9%) had a good physical activity lifestyle. This finding indicates that 247 (87.6%) of the participants resided in urban areas, and among them, 14.9% practiced a good physical activity lifestyle (Table 1).

Table 1. Socio-demographic characteristics of participants at public health institutions in Debre Markos town, Northwest Ethiopia, 2021.

| Variables | Category | Physical activity behavior | | Total n (%) |
|---|---|---|---|---|
| | | Poor n (%) | Good n (%) | |
| **Age (in years)** | <25 | 58 (20.6) | 17 (6.0) | 75 (26.6) |
| | 25-34 | 156 (55.3) | 23 (8.2) | 179 (63.5) |
| | >=35 | 25 (8.8) | 3 (1.1) | 28 (9.9) |
| **Residency** | Urban | 205 (72.7) | 42 (14.9) | 247 (87.6) |
| | Rural | 34 (12) | 1 (0.4) | 35 (12.4) |
| **Marital status** | Married | 224 (79.4) | 39 (13.9) | 263 (93.3) |
| | Single/divorced/widow | 15 (5.3) | 4 (1.4) | 19 (6.7) |
| **Level of education** | No formal education | 56 (19.9) | 4 (1.4) | 60 (21.3) |
| | Primary school | 44 (15.6) | 5 (1.8) | 49 (17.4) |
| | Secondary school | 58 (20.6) | 15 (5.2) | 73 (25.8) |
| | College/above | 81(28.7) | 19 (6.8) | 100 (35.5) |
| **Employment status** | Employed | 74 (26.6) | 21 (7.4) | 95 (34.0) |
| | Un-employed | 164 (58.2) | 22 (7.8) | 186 (66.0) |
| **Average monthly –income** | < 2000 | 73 (25.9) | 3 (1.1) | 76 (27.0) |
| | >= 2000 | 166 (58.8) | 40 (14.2) | 266 (73.0) |
| **Family size** | 1-2 | 103 (36.5) | 20 (7.1) | 123 (43.6) |
| | 3-4 | 109 (38.7) | 19 (6.7) | 128 (45.4) |
| | >=5 | 27 (9.6) | 4 (1.4) | 31 (11.0) |

### 3.2. Obstetrical characteristics

In this study, unintended pregnancy was observed among 12.1% of study participants. Of these, 6 participants (2.1%) had good physical activity lifestyle behaviors. Nearly three-fifths of respondents were multigravida, and from this group, 26 participants (9.2%) engaged in good physical activity lifestyle behaviors. Moreover, the results showed that 55 participants (19.5%) had a history of miscarriage, and of these, 10 participants (3.5%) exhibited good physical activity lifestyle behaviors (Table 2).

Table 2. Obstetrical characteristics of participants.

| Variables | Categories | Physical activity behavior | | Total n (%) |
|---|---|---|---|---|
| | | Poor n (%) | Good n (%) | |
| **Pregnancy intention** | Planned | 211 (74.8) | 37 (13.1) | 248 (87.9) |
| | Un-planned | 28 (10.0) | 6 (2.1) | 34 (12.1) |
| **Gravidity** | Primigravida | 94 (33.3) | 17 (6.1) | 111 (39.4) |
| | Multigravida | 145 (51.4) | 26 (9.2) | 171 (60.6) |
| **Pregnancy period** | First trimester | 35 (12.4) | 8 (2.8) | 43 (15.2) |
| | Second trimester | 91 (32.3) | 18 (6.4) | 109 (38.7) |
| | Third trimester | 113 (40.1) | 17 (6.0) | 130 (46.1) |
| **Antenatal care follow up** | First | 51 (18.1) | 13 (4.6) | 64 (22.7) |
| | Second | 52 (18.5) | 8 (2.8) | 60 (21.3) |
| | Third | 67 (23.8) | 13 (4.5) | 80 (28.3) |
| | Fourth | 69 (24.5) | 9 (3.2) | 78 (27.7) |
| **Miscarriage** | Yes | 45 (16.0) | 10 (3.5) | 55 (19.5) |
| | No | 194 (68.8) | 33 (11.7) | 227 (80.5) |
| **Mid-upper arm-circumference** | <23 cm | 70 (24.8) | 7 (2.5) | 77 (27.3) |
| | >=23cm | 169 (59.9) | 36 (12.8) | 205 (72.7) |
| **Alcohol use** | Yes | 56 (19.9) | 3 (1.1) | 59 (20.9) |
| | No | 183 (64.9) | 40 (14.2) | 223 (79.1) |

### 3.3. Practice of physical activity lifestyle behaviors

The overall prevalence of good physical activity lifestyle among pregnant women receiving antenatal care was 15.2% [95% Cl, 11.3-20.0]. The majority, 78.0%, did not participate in planned physical exercise during pregnancy. While 30.5% reported engaging in light exercises, such as walking occasionally, a significant number still fall short of the recommended activity levels. Moreover, 81.6% of respondents never perform body-stretching exercises, highlighting a lack of flexibility-enhancing activities. On a positive note, 14.5% engage in physical activities during their leisure time, indicating some movement despite the overall low rates of structured exercise (Table 3).

Table 3. Physical activity lifestyles of pregnant women at public health institutions in Debre Markos town, Northwest Ethiopia, 2021.

| Variables | Response n (%) | | | |
| --- | --- | --- | --- | --- |
| | **Never** | **Sometimes** | **Often** | **Routinely** |
| Adhere to a planned exercise program | 220(78.0) | 34(12.1) | 22(7.8) | 6(2.1) |
| Engage in intense physical activity for at least 20 minutes, at least three times a week. | 194(68.8) | 59(20.9) | 18(6.4) | 11(3.9) |
| Engage in gentle to moderate exercise (like walking continuously for 30-40 minutes, 5 days or more per week). | 91(32.3) | 86(30.5) | 57(20.2) | 48(17.0) |
| Participate in recreational physical activities during your free time, such as brisk walking and relaxation exercises including breathing exercises. | 137(48.6) | 95(33.7) | 41(14.5) | 9(3.2) |
| Perform stretching exercises a minimum of three times weekly. | 230(81.6) | 36(12.7) | 8(2.8) | 8(2.8) |
| Get exercise during usual daily activities (like, walk on foot instead of care, walking during lunch). | 61(22.2) | 47(16.5) | 74(26.5) | 100(34.9) |

The average score of physical activity lifestyle behavior was 1.79 with a standard deviation of 0.57.

**Note:** *The average score for physical activity lifestyle is calculated by taking the mean of all test items, with responses ranging from 1 to 4 on a scale.*

### 3.4. Factors associated with physical activity lifestyle behavior

In a bivariable logistic regression model, factors such as age, residency, level of education, alcohol consumption, occupation, and average monthly income were found to be associated with good physical activity lifestyle behavior at a p-value below 0.25 and were selected for further analysis in a multivariable logistic regression. The results of the multivariable logistic regression model revealed that women earning less than 2000 Ethiopian birr (ETB) per month were 78% less likely to engage in good physical activity lifestyle behavior compared to those earning more than 2000 ETB [AOR = 0.22; 95% CI = (0.06 – 0.82)]. Additionally, the study found that women who consumed alcohol were 72% less likely to exhibit good physical activity lifestyle behavior compared to those who did not drink [AOR = 0.28; 95% CI = (0.08 – 0.96)] (Table 4)**.**

Table 4. Analysis of binary logistic regression to determine the factors related to physical activity behavior among pregnant women in Debre Markos town, Northwest Ethiopia.

| Variables | Category | Physical activity lifestyle behavior | | Odd Ratio (95%CI) | |
|---|---|---|---|---|---|
| | | Good | Poor | COR | AOR |
| Age (in years) | <25 | 17 | 58 | 1 | 1 |
| | 25-34 | 23 | 156 | 0.50(0.25-1.01) | 0.54(0.26 – 1.12) |
| | >=35 | 3 | 25 | 0.41(0.11-1.52) | 0.36 (0.09 – 1.43) |
| Residency | Urban | 42 | 205 | 1 | 1 |
| | Rural | 1 | 34 | 0.14(0.02-1.08) | 0.32 (0.04 – 2.79) |
| Level of education | No formal education | 4 | 56 | 0.31(0.1-0.94) | 1.29 (0.32 – 5.22) |
| | Primary school | 5 | 44 | 0.48(0.17-1.39) | 0.95 (0.28 -3.20) |
| | Secondary school | 15 | 58 | 1.10(0.52-2.35) | 1.53 (0.61 – 3.85) |
| | College/above | 19 | 81 | 1 | 1 |
| Employment status | Employed | 21 | 75 | 2.09(1.08-4.03) | 1.71(0.74 – 3.99) |
| | Un-employed | 22 | 164 | 1 | 1 |
| Income/month | < 2000 ETB | 3 | 73 | 0.17(0.5-0.57) | 0.22(0.06 – 0.82) * |
| | >= 2000 ETB | 40 | 166 | | 1 |
| Alcohol use | Yes | 3 | 56 | 0.25(0.07-0.82) | 0.28 (0.08 – 0.96) * |
| | No | 40 | 183 | 1 | 1 |

**Note:** * = *significant at p value < 0.05; COR: Crude odds ratio; AOR: Adjusted odds ratio; 1 = Reference; Hosmer and Lemeshow test was used to evaluate the adjusted model, resulting in a chi-square value of 6.196 with a p-value of 0.625.*

## 4.  Discussion

This research aimed to assess the self-reported physical activity habits of pregnant women and the factors associated with them at public health facilities in Debre Markos town, northwest Ethiopia. The study found that 15.2% of the women exhibited good physical activity behaviors during their pregnancies, with an average score of 1.79 (SD = 0.57). This finding aligns with most previous studies conducted among pregnant women in Taiwan (Lin, Tsai, Chan, Chou, & Lin, 2009), Jordan (Gharaibeh, Al-Ma'aitah, & Al Jada, 2005), Turkey (Gokyildiz, Alan, Elmas, Bostanci, & Kucuk, 2014), Iran (Hamzehgardeshi, Keshvar, & kardan Soraky, 2018), and Mekele, Northern Ethiopia (Hailemariam, Gebregiorgis, Gebremeskel, Haile, & Spitznagle, 2020b). This indicates that physical activity lifestyle behaviors are comparable among pregnant women regardless of their socio-demographic and socio-cultural backgrounds. Additionally, the findings were also consistent with previous research on physical activity behaviors among

women of reproductive age in Iran and Ethiopia (Kidanie et al., 2019; Mirghafourvand et al., 2015). These can imply that sedentary lifestyles are not only a concern for pregnant women; but also for women of reproductive age women in many countries.

However, the results of this research were lower compared to findings from studies conducted in Iran (Shaahmadi, Shojaeizadeh, Sadeghi, & Arefi, 2019), Gondar, Northern Ethiopia (Janakiraman et al., 2021), and Arba Minch, Southern Ethiopia (Beyene et al., 2022). This difference could be attributed to variations in the tools used to assess physical activity and the settings of the studies. In our study, we utilized a physical activity assessment tool created by Walker and his colleagues (Walker & Hill-Polerecky, 1996), which was based on Pender's health promotion model, to determine the frequency of self-reported physical activity behaviors. On the other hand, the studies in Arba Minch and Gondar, Ethiopia, followed the recommendations of the American College of Obstetrics and Gynecology (ACOG) for physical exercises.

Furthermore, this research showed that a large majority (78.0%) of participants did not adhere to a planned physical exercise program, which is consistent with findings from similar studies conducted in Taiwan (Lin et al., 2009) and another study in Ethiopia (Janakiraman et al., 2021). In these previous studies, a high percentage of women did not engage in physical activity while pregnant. As a result, many pregnant women failed to meet the recommended guidelines for exercise during their

pregnancies (Gebregziabher et al., 2019c; Hjorth et al., 2012; Janakiraman et al., 2021; Okafor & Goon, 2020).

The results of this research demonstrate that average monthly income plays a crucial role in influencing the physical activity behaviors of pregnant women. A decrease in average monthly income leads to a decline in women's participation in healthy physical activity lifestyles. Women with higher incomes tend to experience greater satisfaction and less worry about their financial obligations, which positively impacts their physical activity habits. Additionally, they may experience less stress compared to individuals with lower incomes (Thaler RH, 2009).

The consumption of alcohol during pregnancy was found to have a negative impact on physical activity lifestyle behaviors in this research. Women who consumed alcohol while pregnant were less inclined to participate in physical activities compared to those who did not consume alcohol. Although daily alcohol intake is linked to higher levels of physical activity in men, there is a negative association between physical activity and alcohol consumption in young and middle-aged adults, as well as women. Alcohol consumption may result in an increase in insulin secretion, leading to hypoglycemia. As a result, blood sugar levels may decrease after consuming alcohol, leading to a decline in sports performance compared to normal levels (Diress & Endalifer, 2022; Werneck, Oyeyemi, Szwarcwald, & Silva, 2019).

Generally, the relationship between alcohol consumption and physical activity in pregnant women is an important area of

study, particularly concerning maternal and fetal health. Alcohol consumption can negatively affect physical health, leading to fatigue, dehydration, and reduced motivation for physical activity. Pregnant women who consume alcohol may also experience greater barriers to engaging in regular exercise. Women who are physically active may be more health-conscious and less likely to consume alcohol (Addila et al., 2021; Kingsland et al., 2018; Syed et al., 2021).

## 5. Conclusion

Overall, this research shows that there is a low prevalence of good physical activity habits among pregnant women. Average monthly income less than 2000 Ethiopian birrs and alcohol use showed significant associations with good physical activity lifestyle behavior during pregnancy. To decrease lifestyle-related maternal morbidity and mortality among mothers in Ethiopia, it is recommended to promote physical activity habits during health education sessions and to implement a safe exercise program in antenatal care clinics, with emphasis on women with low income levels and alcohol consumer.

### Availability of data and materials

The manuscript includes all relevant data, and the original dataset for this study can be available from the corresponding author (GTM).

### Consent for publication

Not applicable

### Competing interests

The author declares they have no competing interests

### Author contribution statement

GTM was crucial in shaping the research concept, designing the study, and drafting the proposal. The authors (GTM, FB, HA, KSW, ML, GB, and MA) all played important roles in collecting, analyzing, and interpreting the data, thoroughly reviewed the completed manuscript, and oversaw all revisions. Each author read and agreed to the final version of the manuscript.

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