# Physical Activity Lifestyles and Associated Factors Among Pregnant Women in Debre Markos Town, Northwest Ethiopia: Institutional-Based Cross-Sectional Study

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# Abstract

**Introduction:** Promoting physical activity lifestyles during pregnancy has significant health benefits for both the mother and the developing baby. However, many pregnant women spend most of their awake time in sedentary behaviors and do not adhere to recommended guidelines for regular physical exercises. Hence, this study aimed to assess the level of self-reported physical activity lifestyle behavior during pregnancy and its associated factors at public health institutions in Debre Markos town, northwest Ethiopia.

**Methods:** An institutional-based cross-sectional study was conducted among 282 pregnant women at public health institutions in Debre Markos town from March 19 to May 30, 2021. Participants were selected using a systematic random sampling technique. Data were collected through a pre-tested, structured, face-to-face interviewer-administered questionnaire. Multivariable binary logistic regression was used to identify factors determining physical activity lifestyle behaviors during pregnancy. Adjusted odds ratios with a 95% confidence interval were used to declare the strength of association, variables with p-value of below 0.05 in the multivariable analysis were considered as statistically significant factors for the outcome variable.

**Results:** The study found that, 15.2% (11.3, 20.0) of pregnant women exhibited a good physical activity lifestyle behaviors during pregnancy. The overall mean score of good physical activity lifestyle behaviors test items was 1.79 (SD = 0.57). Income level [AOR = 0.22; 95% CI = (0.06 – 0.82)] and alcohol use [AOR = 0.28; 95% CI = (0.08 – 0.96)] were identified as associated factors for good physical activity lifestyle behavior.

**Conclusion:** The prevalence of good physical activity lifestyle behaviors among pregnant women was low. To reduce lifestyle-related maternal morbidity and mortality in Ethiopia, promoting physical activity lifestyle behaviors during health education and implementing a care-free physical activity program in antenatal care clinics should be encouraged.

**Keywords:** Physical activity, physical activity lifestyle, Factors, Ethiopia

# Introduction

Physical activity lifestyles are potentially modifiable behaviors that important determinants of health promotion and disease prevention(Brawley, Rejeski, & King, 2003; Owen, Leslie, Salmon, & Fotheringham, 2000). According to Walker and his colleagues, physical activity lifestyle behavior refers to regular participation in light, moderate, and/or vigorous activity that may occur in a planned or incidental manner as part of daily life or leisure activities for the sake of fitness and health (Walker, Sechrist, & Pender, 1995).

Promoting physical activity lifestyle behaviors during pregnancy has significant health benefits for both the mother and the developing fetus (Gebregziabher, Berhe, Kassa, & Berhanie, 2019a). Being physically active is an important component of a healthy lifestyle that improves perinatal health and help with post-delivery maternal weight gain (Fell, Joseph, Armson, & Dodds, 2008). It also reduces the risk of gestational diabetes mellitus (GDM) (Beyene, Shimbre, Ukke, Gebremichael, & Gurara, 2022), type 2 diabetes secondary to GDM (Bertrais et al., 2005; Hu, Li, Colditz, Willett, & Manson, 2003), obesity, pregnancy-induced hypertension, and preterm birth (Fazzi, Saunders, Linton, Norman, & Reynolds, 2017). Additionally, regular participation in exercise can effectively reduce stress during pregnancy. Any type of physical exercise can be beneficial in improving and maintaining an individual’s stress management behavior (Berger, 1994; Jackson, 2013; Wigers, Stiles, & Vogel, 1996). Furthermore, scientific literature has shown that, physical activity increase the likelihood of spontaneous vaginal delivery in primiparous women (Silveira & Segre, 2012).

The College of American Obstetrics and Gynecology (ACOG) recommends that pregnant women engage in at least 150 minutes of moderate to intense aerobic physical exercise per week unless there are severe medical or obstetrical complications, and under the guidance of health care providers (Obstetricians & Gynecologists, 2015).

However, epidemiological studies have shown that physically active lifestyle behaviors are still not widely practiced (Janakiraman, Gebreyesus, Yihunie, & Genet, 2021). Approximately 55 to 60% of adults lead sedentary lifestyles (Spittaels et al., 2012). Most women do not meet the current exercise guidelines; only 10.2%, 17.4%, 20.3%, 47%, and 48% of women fulfilled in Brazil, the United States, Spain, France, and the United Kingdom, respectively, meet the recommendations (AMEZCUA‐PRIETO et al., 2011; Carvalhaes, Martiniano, Malta, Takito, & Benício, 2013; Chandonnet, Saey, Alméras, & Marc, 2012; Liu et al., 2011). During pregnancy, women spend more than 50% of their awake time engaged in sedentary behaviors (Fazzi et al., 2017).

 In Africa, the regular participation of women in physical activity during pregnancy is low. This is also true in Ethiopia, where most women do not follow the recommended guidelines for regular physical exercise during pregnancy (Gebregziabher, Berhe, Kassa, & Berhanie, 2019b; Hjorth et al., 2012). However, there is limited research on physical activity lifestyles among pregnant women in Ethiopia, especially in the study area. Therefore, the researchers argued that it is essential to examine the current levels and associated factors of physical activity lifestyle behavior using tools that was developed by Walker and his colleagues (Walker & Hill-Polerecky, 1996) based on Pender’s health promotion model to develop comprehensive maternal health interventions that address all risks. Therefore, this study aimed to assess the extent of physical activity lifestyle behavior and its associated factors during pregnancy in public health institutions in Debre Markos town, Northwest Ethiopia.

# Methods

## Study Area and Period

The study was conducted from March 19 to May 30, 2021, in public health institutions in Debre Markos town, located in Northwest Ethiopia. Debre Markos serves as the capital city of the East Gojjam Zone, situated within the Amhara regional state in the northwest region of Ethiopia. The town is equipped with one comprehensive specialty hospital, four government health centers, seven health posts, 16 private pharmacies, and 22 private clinics.

## Study Design

Institutional based cross sectional study design was used.

## Source Population

All pregnant women who visited the antenatal care unit at public health institutions in Debre Markos town were considered the source population.

## Study Population

The study population consisted of pregnant women who attended antenatal care during the study period and met the eligibility criteria at public health institutions in Debre Markos town.

##  Inclusion and exclusion criteria

All pregnant women who had visited the antenatal care unit at least once and were available at the time of data collection were included in this study. Participants who were mentally or physically incapable of participating in face-to-face interview were excluded.

## Sample size determination

The sample size for the study was determined using a single population proportion formula based on the following assumptions:

 n = $\frac{(Zα/ 2) 2p (1-p) }{ d2}$

Where: n = the desired sample size;

Zα/2 = the critical value corresponding to 95% confidence interval (Zα/2 = 1.96);

 d = the margin of error (5%);

p = the estimated population proportion, based on a previous study in Mekele, Ethiopia, which found it to be 79.3% (Hailemariam, Gebregiorgis, Gebremeskel, Haile, & Spitznagle, 2020).

 N = $\frac{\left(1.96\right)2× 0.793×(1-0.793) }{ (0.05)2}$= 252.24 ~ 253. And by considering 10% non-response rate,

The final sample size (Nf) = ni $×($1/1- non-response rate), Nf = 253 $×($1/1- 0.1) = 282.

## Sampling Method and Procedure

All public health institutions in Debre Markos town were selected due to the lack of previous research on this topic. The study area includes four health centers and one comprehensive specialized hospital. Each facilities antenatal care registration book was used to proportionally allocate the calculated sample size and getting sampling fraction (k) (calculated using population size divide by sample size. Approximately 1,188 pregnant women were receiving antenatal care follow-up every month across all public health institutions in the town. The first study participant was selected using simple random sampling technique among mothers who had antenatal care follow up on the day of data collection. Then, a systematic random sampling technique was employed until the required sample size was reached.

* 1. **Operational definitions**

The dependent variable in this study was the practice of physical activity lifestyle behavior. Participants’ practice of physical activity lifestyle behavior was measured using six items related to physical activity. Based on the mean score of these items, the practice of physical activity lifestyle behavior was categorized as either poor or good (Bahabadi et al., 2020; Kidanie, Adamek, & Zena, 2019). Women who scored above or equal to the mean were considered to be practicing good physical activity lifestyle behavior, while those who scored below the mean were considered to be practicing poor physical activity lifestyle behavior.

## Data collection tools and procedures

A structured, interviewer-administered questionnaire was utilized to gather data from participants in the study. The questionnaire was adapted from existing literature (Walker & Hill-Polerecky, 1996; Walker et al., 1995) with adjustment made to fit the local context. It included questions about socio-demographic characteristics, obstetrical history, and physical activity lifestyle behaviors tool that was developed by Walker and his colleagues (Walker & Hill-Polerecky, 1996) based on Pender’s health promotion model to measure the frequency of self-reported physical activity lifestyles. Four BSc nurses were enlisted to collect the data, with two MSc midwives overseeing the data collection process.

## Data quality control

To ensure the quality of the data, the questionnaire was first prepared in English, then translated to Amharic (the local language of the study participants), and back translated to English. A one-day training was given for data collectors and supervisors on the study tool before data collection. The pretest was done at Finote Selam General Hospital on 15 pregnant women. During the data collection time, each questionnaire was closely supervised and checked for completeness; incomplete data were discarded.

## Data management and analysis

The collected data were manually cleaned, coded, and entered into Epi-Data TM version 3.1 and exported to SPSS version 25.0 for analysis. Descriptive statistics like frequency, percentage, mean, and standard deviation were computed for independent and dependent variables accordingly. **A binary logistic regression was performed** **to find potential factors of physical activity lifestyle behavior during pregnancy. Variables having a p-value of less than or equal to 0.25 in the bivariable logistic regression model were considered for multivariable logistic regression analysis**. The adjusted odds ratio with 95% CI was used to measure the strength of associations at a p-value of 0.05. The model fitness was checked using the Hosmer and Lemeshow goodness of fit test, and multi-collinearity among independent variables was checked using the variance inflation factors.

# Results

## Socio-demographic characteristics

The mean age of study participants was 27.65 (SD = ±4.65) years. Of the total of 282 participants, 93.3% were married, of those 39 (13.9%) had good physical activity lifestyle behavior. Approximately 95.0% of respondents were orthodox religious followers. Moreover, this study showed that 85% of pregnant women belonged to a nuclear family, 32 (11.3%) of them had good physical activity lifestyle behavior, while the other 43 (15.1%) were from extended families, of which 11 (3.9%) had good a physical activity lifestyle behavior. This finding indicated that 247 (87.6%) of participants were residing in urban areas, of them 14.9% practiced good physical activity lifestyle behavior **(Table 1).**

**Table 1: Socio-demographic characteristics of pregnant women at Debre Markos town public health institutions, Northwest Ethiopia, 2021 (n=282).**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variables** | **Category**  | **Practice of physical activity lifestyle behavior** | **Total n (%)** |
| **Poor n (%)** | **Good n (%)** |
| Age (in years)  | <2525-34>=35 | 58 (20.6)156 (55.3)25 (8.8) | 17 (6.0)23 (8.2)3 (1.1) | 75 (26.6)179 (63.5)28 (9.9) |
| Residency  | Urban Rural  | 205 (72.7)34 (12) | 42 (14.9)1 (0.4) | 247 (87.6)35 (12.4) |
| Marital status  | Married Single/divorced/widow | 224 (79.4)15 (5.3) | 39 (13.9)4 (1.4) | 263 (93.3)19 (6.7) |
| Level of education | No formal education Primary schoolSecondary schoolCollege/above | 56 (19.9)44 (15.6)58 (20.6)81(28.7) | 4 (1.4)5 (1.8)15 (5.2)19 (6.8) | 60 (21.3)49 (17.4)73 (25.8)100 (35.5) |
| Employment status   | Employed Un-employed | 74 (26.6)164 (58.2) | 21 (7.4)22 (7.8) | 95 (34.0)186 (66.0) |
|  Family income/month in Ethiopian birrs  | < 2000 >= 2000  | 73 (25.9)166 (58.8) | 3 (1.1)40 (14.2) | 76 (27.0)266 (73.0) |
| Family size | 1-23-4>=5 | 103 (36.5)109 (38.7)27 (9.6) | 20 (7.1)19 (6.7)4 (1.4) | 123 (43.6)128 (45.4)31 (11.0) |

## Obstetrical characteristics

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

**Table 2:Obstetrical characteristics of pregnant women in Debre Markos town public health institutions, Northwest Ethiopia, 2021 (n=282).**

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

## Practice of physical activity lifestyle behaviors

In this study, the overall prevalence of good physical activity lifestyle behavior among pregnant women who had antenatal care follow-up in Debre Markos town public health institutions was 15.2% with a 95% confidence interval of (11.3, 20.0).

The findings showed that over three-quarters (78.0%) of pregnant women never engaged in planned physical exercise during their pregnancy. Only 86 (30.5%) of the study participants sometimes did light exercise like walking five times a week for 30 to 40 minutes. Additionally, more than four-fifths (81.6%) of pregnant women stated that they never performed body-stretching exercises during their pregnancy. However, 41 (14.5%) of respondents often spent their leisure time engaging in physical activity (**See table** **3**).

**Table 3: Practices of physical activity lifestyles among pregnant women in Debre Markos town public health institutions, Northwest Ethiopia, 2021.**

|  |  |
| --- | --- |
| **Variables**  | **Response n (%)**  |
| **Never**  | **Sometimes**  | **Often**  | **Routinely**  |
| Follow a planned exercise program | 220(78.0) | 34(12.1) | 22(7.8) | 6(2.1) |
| Exercise vigorously for 20 or more minutes at least three times a week | 194(68.8) | 59(20.9) | 18(6.4) | 11(3.9) |
| Take part in light to moderate physical activity (such as sustained walking 30-40 minutes 5 or more times a week). | 91(32.3) | 86(30.5) | 57(20.2) | 48(17.0) |
| Take part in leisure-time (recreational) physical activities (such as brisk walking, relaxation and breathing exercise) | 137(48.6) | 95(33.7) | 41(14.5) | 9(3.2) |
| Do stretching exercises at least 3 times per week | 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 overall mean score of physical activity lifestyle = (1.79 ± 0.57). |

**Note:** *The overall mean score of physical activity lifestyle is the mean of all the test items and it is on a scale ranging between 1-4 response items.*

## Factors associated with physical activity lifestyle behavior

**On a bivariable logistic regression model,** age, residency, level of education, alcohol consumption, occupation, and average monthly income were associated with good physical activity lifestyle behavior at a p-value of less than 0.25 **and were considered for multivariable logistic regression analysis**. The multiple logistic regression model suggested that women with an average monthly income of less than 2000 Ethiopian birrs (ETB) were 78% less likely to practice good physical activity lifestyle behavior than women with more than 2000 ETB [AOR = 0.22; 95 percent CI = (0.06 – 0.82]. The findings also indicated that women who drank alcohol were 72% less likely than nondrinkers to practice a good physical activity lifestyle behavior [AOR = 0.28; 95 percent CI = (0.08 – 0.96) **(Table 4).**

**Table 4: Bivariable and multi variable logistic regression analysis of factors associated with physical activity lifestyle behavior in pregnant women at Debre Markos town, Northwest Ethiopia.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variables** | **Category**  | **Physical activity** **lifestyle behavior** | **Odd Ratio (95%CI)** |
| **Good**  | **Poor**  | **COR** | **AOR** |
| Age (in years)  | <2525-34>=35 | 17233 | 5815625 | 10.50(0.25-1.01)0.41(0.11-1.52) | 10.54(0.26 – 1.12)0.36 (0.09 – 1.43) |
| Residency  | Urban Rural  | 421 | 20534 | 10.14(0.02-1.08) | 10.32 (0.04 – 2.79) |
| Level of education | No formal education Primary schoolSecondary schoolCollege/above | 451519 | 56445881 | 0.31(0.1-0.94)0.48(0.17-1.39)1.10(0.52-2.35)1 | 1.29 (0.32 – 5.22)0.95 (0.28 -3.20)1.53 (0.61 – 3.85)1 |
| Employment status | Employed Un-employed | 2122 | 75164 | 2.09(1.08-4.03)1 | 1.71(0.74 – 3.99) 1 |
| Income/month  | < 2000 ETB>= 2000 ETB | 340 | 73166 | 0.17(0.5-0.57) | 0.22(0.06 – 0.82) \*1 |
| Alcohol use | YesNo  | 340 | 56183 | 0.25(0.07-0.82)1 | 0.28 (0.08 – 0.96) \*1 |

Note: \* = significant at p value < 0.05. 1 = Reference. Hosmer and Lemeshow test for adjusted model: chi-square = 6.196, p = 0.625).

# Discussion

This study was conducted to measure the level of self-reported physical activity lifestyle behaviors and associated factors in pregnant women at Debre Markos town public health institutions in northwest Ethiopia. According to this study’s findings, 15.2% of women practiced good physical activity lifestyle behavior during their pregnancies, with a mean score of physical activity lifestyles of 1.79 (SD = 0.57). This finding was in line 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 et al., 2020). The result of this study was also comparable with studies conducted among reproductive-age women (Gokyildiz et al., 2014; Kidanie et al., 2019; Mirghafourvand et al., 2015). This indicates that levels of physical activity lifestyle behaviors are comparable in pregnant women despite their socio-demographic and socio-cultural differences. These can imply that sedentary lifestyles are not just a challenging issue for pregnant women; they are also the challenge for most reproductive-age women in most countries.

However, the finding of this study was low in comparison with a study finding in Iran (Shaahmadi, Shojaeizadeh, Sadeghi, & Arefi, 2019), Gondar, Northern Ethiopia (Janakiraman et al., 2021), and Arba Minch, Southern Ethiopia (Beyene et al., 2022). The reason behind this difference may be due to variations in physical activity assessment tools and study settings. In this study, we used a physical activity assessment tool that was developed by Walker and his colleagues (Walker & Hill-Polerecky, 1996) based on Pender’s health promotion model to measure the frequency of self-reported physical activity lifestyles. But, those studies conducted in Arba Minch and Gondar, Ethiopia, were done based on American College of Obstetrics and Gynecology’s (ACOG) recommendations of physical exercises.

Moreover, the current study revealed that over three-quarters (78.0%) of study participants never followed a planned physical exercise programme, which is similar to a previous study in Taiwan (Lin et al., 2009) and another study in Ethiopia (Janakiraman et al., 2021), in which 74.42% and 69.1% of the women did not exercise during their pregnancies, respectively. That is why most pregnant women didn’t fulfil the recommended guidelines during their pregnancy (Gebregziabher et al., 2019b; Hjorth et al., 2012; Janakiraman et al., 2021; Okafor & Goon, 2020).

The findings of this study show that average monthly income was a significant factor affecting physical activity lifestyle behaviors in pregnant women. A lower level of average monthly income reduces women’s engagement in good physical activity lifestyles (Ahmadi, Amini, & Haghani, 2020). Women who earn more money may be happier and less concerned about how they will pay for their accommodations, which has a beneficial impact on their physical activity behaviors. They may also be less stressed than people who earn less money (Thaler RH, 2009).

In this study, use of alcohol during pregnancy was negatively associated with good physical activity lifestyle behavior. Women who used alcohol during their pregnancy were less likely to engage in physical activity lifestyle behaviors than women who didn’t use alcohol. Even though daily alcohol consumption is positively associated with levels of physical activity in men, physical activity and alcohol consumption are negatively associated in young and middle-aged adults and women. Alcohol may cause a rise in insulin secretion, which leads to hypoglycemia. Therefore, after alcohol use, blood sugar levels will fall and sports performances won't be as good as usual (Diress & Endalifer, 2022; Werneck, Oyeyemi, Szwarcwald, & Silva, 2019).

# Conclusion

Generally, the current study revealed that the prevalence of good physical activity lifestyle behavior in pregnant women was low. Average monthly income and alcohol use showed significant associations with good physical activity lifestyle behavior during pregnancy. To reduce lifestyle-related maternal morbidity and mortality in Ethiopia, promoting physical activity lifestyle behaviors during health education and implementing a care-free physical exercise program in antenatal care clinics should be encouraged.

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# Availability of data and materials

All relevant data are within the manuscript, and the original data for this study are available from the corresponding author (GTM) upon reasonable request.

# Funding

Debre Markos University was offered the fund for the data collection

# Consent for publication

Not applicable

# Competing interests

The author declares they have no competing interests

# Author contribution statement

GTM played a pivotal role in developing the conception of the research, the study design, and the proposal writing. All the authors (GTM, FB, HA, KSW, ML, GB, and MA) had significant involvement in the data collection, analysis, and interpretation, critically reviewed the final manuscript, and led all edits. All authors read and approved the final manuscript.

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