The Dimensions and Determinants of Health-promoting Behavior among Postpartum Women in Bahir Dar City, Ethiopia

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Abstract

Background The postpartum period, known as Aras bét in Amharic, has been given little research, practice, and policy attention in Ethiopia. This study examined the dimensions and determinants of postpartum women health-promoting behaviors in Bahir Dar city, Ethiopia.

Objective This study examined the dimensions and determinants of postpartum women health-promoting behaviors in Bahir Dar city, Ethiopia.

Method A facility-based cross-sectional study design was employed. Using the Health Promoting Life Profile (HPLP) Questionnaire, quantitative data were drawn from 178 randomly selected mothers who had attended at least one postnatal care visit. Data was analyzed using descriptive and inferential statistics.

Results Postpartum women reported moderate levels of overall health-promoting behavior (M=141.62; SD=22.44). Across the subscales, spiritual growth (M=28.81; SD, 5.35) and physical activity (M=18.16; SD=4.49) showed the highest and the lowest average HPLP score respectively. The t-test and ANOVA results showed that health-promoting behaviors varied across various sociodemographic variables such as religion groups, educational level, number of pregnancies, family type, employment status, monthly income, delivery place, delivery type, ANC and PNC attendance (p<0.05). In the binary logistic regression model, postpartum women who had no schooling were 16% less likely to have “better” overall HPLP-II score as compared to their college/university graduated counterparts (p <0.05).

Implications and Conclusion This study differentiated the dimensions and determinants of postpartum health-promoting behaviors. The study offers implications for social and health service providers and future researchers to consider the holistic dimensions of health promotion during the continuum of care for pregnancy.

Background Of The Study

The socio-cultural determinants of women's health during the postpartum period have been given little attention in research, policy, and practice in Ethiopia. The maternal mortality ratio in Ethiopia has steadily dropped from 871 deaths per 100,000 live births in 2000 to 412 deaths in 2016. Many other long-term conditions also disable women who survive delivery-related complications. Despite the potential long-term impact of compromised maternal health, the postpartum period has the least coverage in the course of the pregnancy continuum care. The great majority of women (83%) with a live birth do not receive a postnatal checkup [1]. The sixth week postpartum care package which has been documented as an important health preventive strategy has not been fully practiced in Ethiopia [2,3].

Traditionally, the first forty to eighty days after delivery are known as Aras bét (infant house) or yä-aras gojjo (hut of birth) [4]. The mother and the newborn are expected to stay in home confinement and adhere to religious and traditional rituals such as Thanksgiving Day to St. Mary ceremony (Yemaryam Meshegna), sprinkled with holy water (Tsebel Merechet), taking newborns to Holy Communion or the Lord's Supper (Qurban) are among the culturally recognized and valued components of postpartum period, particularly among Orthodox Christians. During this time postpartum women prefers to be cared by known and trusted relatives or neighbors that are familiar with the cultural context which minimizing contacts with neighbors and colleagues [5].

Home confinement and related traditional beliefs during the postpartum period may lead mothers to avoid healthy living styles such as taking health responsibility, taking healthy and balanced nutrition, and engaging in physical exercise [6]. The value and belief that society holds during the seclusion period may contribute to the lack of access to postnatal health services [7]. These in turn may affect the health-promoting behaviors of postpartum women in Ethiopia.

Therefore, this study was built around a postpartum women health-promoting behavior and its determinants. Health-promoting behaviors are multidimensional and include taking responsibility for one's health, physical activity, proper nutrition patterns, good interpersonal relationship, stress management techniques, and spiritual growth can be effective in reducing mortality and morbidity [8].

Studies in the area of health-promoting behaviors of reproductive age women are generally rare. Few studies have been exhibited from Iran [9; 10]; India [11]; Korea [12], and Taiwan [13]. Health-promoting behaviors and their determinants in women differ across different sociodemographic characteristics [14, 15]. Previous studies elsewhere showed that health-promoting behaviors correlates with marital status [16], employment status [17], family size [18], and education [19].

To date, few studies have documented the social and cultural factors that promote mothers' health and well-being during the postpartum period in Ethiopia [20-23]. Therefore, it was worthwhile to study the dimensions and determinants of health-promoting behaviors among postpartum women in Ethiopia. A better understanding of health-promoting behavior dimensions during postpartum period may lead to the design of more effective strategies that maximize the health living standard of postpartum women in Ethiopia.

The research questions were:

- What are the dimensions and level of health-promoting behaviors experienced by postpartum women?
- Are there significant associations between postpartum women's socio-demographic characteristics and dimensions of health-promoting behaviors?

Research Methods

Study Setting
The study setting was Bahir Dar city—the capital of Amhara Region, Ethiopia. The city was purposively selected as a study site hence Amhara region is still beset by high maternal mortality and morbidity rates even higher than the national average [1]. Study participants were purposively selected from the Bahir Dar City Administration Health Centre and the Family Planning and Guidance Centre in the urban area and from Tis Abay Zuriya Health Centre and Zenezelema Health Centre were located in the rural-urban periphery of the city.

Study population and Sample Size Determination

Mothers who gave birth within four months prior to the data collection and visited health institutions for postnatal care at least once were designated as the sampling frame. The sample size for this study was determined using a single population proportion formula. Taking the national postnatal care service coverage (12%) (p=0.12) [1], q (1-0.12)=0.88 with a level of significance of5% (a=0.05), \( Z(\frac{a}{2})=1.96 \) and margin of error to be 5% (e= 0.05), and adding a non-response rate of 10%, a total sample size of 178 postnatal service attending mothers were recruited to complete the questionnaire. The sample size was allocated proportionally among four selected health centers.

Instruments for Data Collection

The health-promoting life profile (HPLP-II) questionnaire was developed by Walker and his colleagues [24] based on Pender's health promotion model to measure health-promoting behaviors and the improvement of health and quality of life. Health-promoting behavior was operationalized as postpartum women practices of self-care to maintain healthy life style after delivery. This questionnaire consists of 52 items on the six sub-scales of health-promoting behaviors. Health responsibility (9 items): referred to postpartum women's activities related to adopting health-seeking behavior. Physical activity (8 items): referred to postpartum women's engagement in daily routines and formal exercises to maintain the balance of their body's weight. Nutritional management (9 items): referred to postpartum women eating pattern for promoting healing and recovery, and for the sufficiency of breastfeeding. Interpersonal relationship (9 items): referred to postpartum women's relationship with family members and significant others. Spiritual growth (9 items): referred to postpartum women's optimistic views to find meaning in their life after delivery and their practices of religious and traditional rituals. Stress management (8 items): referred to postpartum women's strategies to respond or cope with stressful life events as a result of the demands of self-care needs, child-care, and parenting roles. HPLP-II has four Likert-type scales with responses ranging from Never (1) to Routinely (4).

Moreover, a personal information form that contained 12 variables was used to explore socio-demographic characteristics of postpartum women. Data were collected about the mothers' age, religion, marital status, educational background, income source, family income level, employment status, family type, number of pregnancies, place of delivery, nature of delivery, antenatal care, and postnatal care attendance. Variables were measured categorically and coded accordingly.

Data Collection Procedure

Four health extension workers were recruited and oriented about the data collection procedure. Most of the questionnaires were filled out in the waiting rooms in the health centers while mothers came for postnatal visits or babies' vaccination. From the randomly selected respondents, those who did not come to the health center were reached through home visits.

Reliability and Validity Testing

In this study, the Cronbach Alpha coefficient for the HPLP II total scale was 0.94 and had high reliability. Alpha coefficients for the subscales ranged from 0.72 to 0.90. So far, there has been no published data on the validity of the instrument in an Ethiopian postpartum mother's context. Hence, to control for the threats to validity of the data by the proposed instruments, content validity of the instrument was assessed by a health extension worker and a social worker who had experience of working with postpartum women. Based on the practitioners' suggestion, the translation of postpartum support questionnaire from English to Amharic was carefully constructed.

Data Analysis

Data were analyzed using both descriptive and inferential statistics using the Statistical Package for Social Science (SPSS-PC version 20.0) program. Frequencies, percentages, means, and standard deviations were used to describe the sociodemographic characteristics and to determine the levels of health-promoting behavior.

The statistical differences between the groups of independent variables with that of HPLP profile scores were analyzed using independent samples t-tests and one-way analysis of variance (ANOVA). Binary logistic regression was used to predict the effect of each of the independent variables on the dependent variable (HPLP and its subscales). The overall PSQ and its subscales score were dichotomized into better and lower using the median scores as a reference. A p-value of 0.05 was considered to be statistically significant.

Results And Discussion

Characteristics of Postpartum Women
The socio-demographic characteristics of 178 postpartum women respondents are presented in Table 1. The mean age of the study sample was 28.7 (SD 4.95). Religiously, 145 (81.5%) respondents were Christians and 33 (18.5%) were Muslims. More than half of postpartum women (58.4%) lived with their nuclear family; whereas 41.6% lived in extended families. Over one-quarter (27%) of respondents were first time mothers and the remaining 73% were experienced mothers. The mean family income of the respondents was $71 per month.

Table 1 about here

Descriptions of Postpartum Health-promoting Behaviors

The overall obtained score for HPLP-II for the study sample ranged from 71 to 185 (M=141.62; SD=22.44). The majority of respondents (53.4%) had an overall HPLP-II score equal to or greater than the average. With regard to the subscales, postpartum women in this study showed the highest mean score in spiritual growth (SG) (28.81±5.35) followed by nutritional management (NU) (27.59±4.68), interpersonal relationships (IR) (25.26±4.49), health responsibility (HR) (21.91±6.71), and stress management (SM) (19.89±4.91). Physical activity (PA) showed the least average score (18.16±4.49).

Similar result of moderate level of HPLP score was obtained among Turkish worker women [25; 26]; Taiwan pregnant women [13]. This means that health-promoting lifestyle behavior can reach up to the moderate level of awareness despite differences in women's cultural and economic status. A study in Turkey reported highest mean score was found for interpersonal support (74.3±14.1), followed by nutrition (73.6±12.6), spiritual growth (70.6±11.9), stress management (63.4±13.0), health responsibility (61.2±13.2), and exercise (47.1±15.0) [26]. Mirghafourvand et al. [10] conducted a cross-sectional study with 1359 Iranian women of reproductive age. The participants scored highest in interpersonal relations (3.08±0.51), nutrition (3.07±0.53) and spiritual growth (3.04±0.58); lowest in physical activity (2.04±0.64); and average in stress management (2.72±0.56) and health responsibility (2.62±0.58).

Table 2 about here

Factors related to Postpartum Women's Health-promoting Behavior

The relationship between respondents' personal characteristics and postpartum women health-promoting behavior are presented in Table 3. The t-test and ANOVA results showed that overall HPLP-II scores varied across different religion groups (t=-2.11, p=0.04), educational level (F=30.75, p=0.00), number of pregnancies (t=-2.44, p=0.02), family type (t=2.68, p=0.01), employment status (F=6.38, p=0.00), monthly income (t=-5.13, p=0.00), delivery place (t=5.55, p=0.00), delivery type (t=-4.58, p=0.00), ANC attendance (t=-3.35, p=0.00), and PNC attendance (t=-3.52, p=0.00).

Table 3 about here

Moreover, the binary logistic regression showed that educational background was the only variable which had a statistically significant association with overall HPLP-II score. Postpartum women who had no schooling were 16 % less likely than college/university graduated mothers to have "better" overall HPLP-II score (p<0.05).

The binary logistic regression model across the subscales showed that marital status, marital status, educational background, number of pregnancies, and PNC attendance showed a statistically significant relationship (p<0.05) with postpartum women's spiritual growth and nutritional management.

A study by Ahmadi and Roosta [9] determined the correlates of health-promoting behavior among reproductive age women in Iran. The results indicated a significant association between women's education, husbands' education, socio-economic class, and health-promoting lifestyle.

Mirghafourvand et al. [10] evaluated health-promoting behaviors among women of reproductive age in Iran. A statistically significant relationship was found between health responsibility and age, primary support source, marital status, education, spouse's education and a crowding index (p<0.05). A statistically significant relationship was found between stress management and social support, education, occupation, marital status, spouse's education and body-mass index (p<0.05). The study also found a statistically significant relationship between physical activity and social support, age, marital status, education, occupation, and spouse's occupation.

Table 4 about her

Limitations of the Study

Ethiopia is a home for more than 80 culturally diverse ethnic groups. This study explored health-promoting behavior in Amhara ethnic group residing in Bahir Dar city and might not reflect the beliefs and practices of postpartum women in the entire country. Study participants were drawn from postpartum women who had attended PNC at least once. Hence, the findings cannot be generalized to postpartum women who had no visit to a health center. Moreover, the findings are relevant to the situation of postpartum women who were in their first four months after delivery. Conceptually, the proposed study employed an instrument which was developed in the western context. The researchers took caution to consider culturally relevant concepts during translating the
instruments into Amharic based on pilot tests and feedback from experts. However, the modified instrument might not convey the same message as the original scales.

**Implications**

Understanding postpartum women's health-promoting behaviors and its determinants could help interdisciplinary approach between health and social service providers to design comprehensive and culturally-sensitive strategies to promote postpartum women's health. Taking into account the scarcity of research in the area of maternal health promotion in Ethiopia, possible future qualitative research could be generated to explore mothers' unique experiences, to identify opportunities and challenges, and roles of the informal and formal social networks in promoting maternal health during postpartum period.

**Conclusion**

This study is one of the few to bring an insight to those sociodemographic factors that carry significant weight in promoting mothers' health during postpartum period. The dimensions of health-promoting behaviors found to vary across different sociodemographic context in which women are immersed. For the promotion of women's health, it is necessary to consider the factors influencing health-promoting behaviors and create favorable changes in lifestyle by removing barriers and fostering facilitating factors.

**Declarations**

**List of Abbreviations:** ANC: Antenatal Care; PNC: Postnatal Care; HPB: Health-Promoting Behavior; HPLP: Health Promoting Life Profile;

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**Availability of data and materials:** All data generated or analysed during this study are included in this published article.

**Authors' contributions:** KS has developed the idea for the paper. AM was the supervisor and SZ drafted the initial version and critically reviewed the draft and provided additional content. All authors approved the final version.

**Ethics approval and consent to participate:** Study participants were recruited voluntarily. Maximum care was taken to safeguard the confidentiality of participants' personal information. Verbal consent was sought and documented by the respondents. Ethical clearance was obtained from the Institutional Review Boards of Amhara Regional Health Bureau and research ethics review committee at Bahir Dar University.

**Consent for publication:** This manuscript does not contain data from any individual person.

**Competing interests:** The authors declare that they have no competing interests

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Tables

Table 1: Socio-demographic characteristics of study respondents (n=178)
Variables & Frequency & %

Age Category
Mean: 28.72 (SD 4.95)
Age Range: 19-41
<29 & 94 & 52.8
≥29 & 84 & 47.2

Place of Living
Urban & 123 & 69.1
Rural & 55 & 30.9

Religion
Christian (Orthodox and Protestant) & 145 & 81.5
Muslim & 33 & 18.5

Marital status
Single & 17 & 9.6
Married & 159 & 89.3
Divorced & 2 & 1.1

Educational Background
No schooling & 43 & 24.2
Elementary or high school & 98 & 55.1
College or University Graduate & 37 & 20.8

Employment status
Unemployed & 78 & 43.8
Employed (Gov or NGO) & 41 & 23.0
Business & 37 & 20.8
Agriculture & 22 & 12.4

Family type
Nuclear family & 104 & 58.4
Extended family & 74 & 41.6

Family income per month (m=$71)
≤$71 & 98 & 55.1
>$71 & 80 & 44.9

Number of pregnancies
1st pregnancy & 48 & 27.0
2nd or above pregnancy & 130 & 73.0

Place of delivery
Health Centre & 164 & 90.4
Home & 17 & 9.6

Type of Delivery
Labor Delivery & 134 & 75.3
C-section Delivery & 44 & 24.7

Number of antenatal checkups
One & 22 & 12.4
More than once & 156 & 87.6

Number of postnatal checkups
One & 82 & 46.1
More than once & 96 & 53.9

| Variables | Min. – Max. | M  | SD |
|-----------|-------------|----|----|
| Overall HPLP-II score | 71 – 185 | 141.62 | 22.44 |
| - Health responsibility | 9 – 36 | 21.91 | 6.71 |
| - Physical activity | 8 – 26 | 18.16 | 4.49 |
| - Nutritional management | 13 – 36 | 27.59 | 4.68 |
| - Spiritual growth | 13 – 36 | 28.81 | 5.35 |
| - Interpersonal relationship | 13 – 36 | 25.26 | 4.49 |
| - Stress management | 8 – 28 | 19.89 | 4.91 |

Table 2: Minimum–Maximum, Mean, Standard Deviation of HPLP-II (N = 178)

Table 3: Independent T-test and one-way ANOVA comparison of sociodemographic variables with HPLP-II (N=178)
|                  | Health Responsibility | Nutrition Management | Physical Activity | Interpersonal Relationship | Spiritual Growth | Stress Management |
|------------------|-----------------------|----------------------|------------------|---------------------------|-----------------|-------------------|
|                  | Total Mean ± SD       | Test                 | Total Mean ± SD  | Test                      | Total Mean ± SD | Test              |
|                  | 21.91±6.71            |                      | 27.59±4.68      | 18.16±4.49                | 25.26±4.49      | 28.81±5.35        |
|                  | 21.94±6.47            | t=0.05               | df=176          | p=0.96                    | t=0.29          | df=176            |
|                  | 21.88±6.99            | df=176               | p=0.77          | 18.61±4.28                | df=176          | p=0.16            |
|                  | 27.69±4.32            | t=1.40               | df=176          | 25.10±4.55                | df=176          | p=0.62            |
|                  | 27.49±5.08            | t=0.50               | df=176          | 28.62±5.32                | df=176          | p=0.63            |
|                  | 18.76±4.69            | df=176               | p=0.11          | 24.92±4.68                | df=176          | p=0.04            |
|                  | 18.24±4.74            | t=2.11               | df=176          | 28.21±4.54                | df=176          | p=0.00            |
|                  | 26.73±3.17            | t=3.23               | df=176          | 19.54±5.07                | df=176          | p=0.05            |
|                  | 21.97±3.79            | t=1.97               | df=176          | 18.94±4.11                | df=176          | p=0.98            |
|                  | 23.05±5.88            | t=1.37               | df=176          | 20.81±4.99                | df=176          | p=0.33            |
|                  | 23.89±6.03            | t=2.05               | df=176          | 18.33±4.66                | df=176          | p=0.01            |
|                  | 25.53±3.31            | t=1.47               | df=176          | 18.60±4.05                | df=176          | p=0.00            |
|                  | 27.84±4.77            | t=0.80               | df=176          | 26.65±4.10                | df=176          | p=0.00            |
|                  | 20.63±3.85            | t=2.57               | df=176          | 25.39±4.51                | df=176          | p=0.00            |
|                  | 17.87±4.48            | t=1.13               | df=176          | 25.26±4.07                | df=176          | p=0.00            |
|                  | 18.94±4.11            | t=3.13               | df=176          | 18.84±4.11                | df=176          | p=0.00            |
|                  | 23.03±5.88            | t=0.33               | df=176          | 20.14±4.99                | df=176          | p=0.00            |
|                  | 22.81±6.36            | t=1.09               | df=176          | 22.84±4.54                | df=176          | p=0.00            |
|                  | 21.58±6.83            | t=1.47               | df=176          | 28.97±4.81                | df=176          | p=0.00            |
|                  | 29.30±4.67            | t=0.43               | df=176          | 21.08±4.99                | df=176          | p=0.01            |
|                  | 26.43±4.92            | t=0.58               | df=176          | 23.81±4.23                | df=176          | p=0.00            |
|                  | 18.33±4.46            | t=1.95               | df=176          | 29.56±5.08                | df=176          | p=0.00            |
|                  | 17.93±4.55            | t=2.24               | df=176          | 20.75±4.52                | df=176          | p=0.00            |
|                  | 24.49±4.79            | t=3.97               | df=176          | 19.00±4.75                | df=176          | p=0.01            |
|                  | 23.01±5.93            | t=2.72               | df=176          | 20.98±4.90                | df=176          | p=0.00            |

|                  | Monthly Income        | Test                 | Total Mean ± SD  | Test                      | Total Mean ± SD | Test              | Overall HPLF |
|------------------|-----------------------|----------------------|------------------|---------------------------|-----------------|-------------------|
|                  | ≤ 2000                | t=4.58               | df=176          | 25.10±4.99                | df=176          | p=0.00            | 144.42±20.20 |
|                  | ≥ 2000                | t=2.27               | df=176          | 24.34±5.93                | df=176          | p=0.00            | 115.06±25.71 |

|                  | Delivery place        | Test                 | Total Mean ± SD  | Test                      | Total Mean ± SD | Test              | Overall HPLF |
|------------------|-----------------------|----------------------|------------------|---------------------------|-----------------|-------------------|
|                  | Health center         | t=3.44               | df=176          | 20.95±4.18                | df=176          | p=0.00            | 144.42±20.20 |
|                  | Home                  | t=1.50               | df=176          | 19.91±4.77                | df=176          | p=0.14            | 115.06±25.71 |
|                  | Labor                 | t=0.76               | df=176          | 21.50±4.09                | df=176          | p=0.00            | 144.42±20.20 |

|                  | ANC attendance        | Test                 | Total Mean ± SD  | Test                      | Total Mean ± SD | Test              | Overall HPLF |
|------------------|-----------------------|----------------------|------------------|---------------------------|-----------------|-------------------|
|                  | Once                  | t=4.06               | df=176          | 20.91±4.18                | df=176          | p=0.00            | 144.42±20.20 |
|                  | More than once        | t=0.43               | df=176          | 19.22±4.68                | df=176          | p=0.67            | 115.06±25.71 |

|                  | PNC attendance        | Test                 | Total Mean ± SD  | Test                      | Total Mean ± SD | Test              | Overall HPLF |
|------------------|-----------------------|----------------------|------------------|---------------------------|-----------------|-------------------|
|                  | Once                  | t=5.49               | df=176          | 21.50±4.09                | df=176          | p=0.00            | 144.42±20.20 |
|                  | More than once        | t=2.26               | df=176          | 19.22±4.68                | df=176          | p=0.67            | 115.06±25.71 |
| Variables          | Health Responsibility | Nutrition Management | Physical Activity | Interpersonal Relationship | Spiritual Growth | Stress Management | Overall HPLP |
|--------------------|-----------------------|----------------------|------------------|---------------------------|-----------------|------------------|--------------|
|                    | B                     | Ad.OR (95% CI)       | B                | Ad.OR (95% CI)            | B               | Ad.OR (95% CI)   | B            | Ad.OR (95% CI) | B               | Ad.OR (95% CI) |
| Religion           |                       |                      |                  |                           |                 |                  |              |                |                 |                |
| Christian          | -0.47                 | 0.63 (0.19-2.03)     | -0.48            | 0.62 (0.26-1.51)          | -0.67           | 0.51 (0.17-1.55) | -0.94        | 0.39 (0.14-1.07) | -0.38           | 0.68 (0.27-1.72) |
| Muslim (r)         |                       |                      |                  |                           |                 |                  |              |                |                 |                |
| Marital status     |                       |                      |                  |                           |                 |                  |              |                |                 |                |
| Single             | -0.13                 | -1.37 (0.07-0.97)    | 0.49             | 1.63 (0.54-4.93)          |                 |                  |              |                |                 |                |
| Married (r)        | 1.39                  | 4.00* (1.20-13.39)   |                  |                           |                 |                  | -1.43        | 0.24 (0.06-0.97) |                 |                |
| Education          |                       |                      |                  |                           |                 |                  |              |                |                 |                |
| No schooling       | -0.45                 | 0.64 (0.21-1.94)     | -0.27            | 0.07*** (0.02-0.30)       | -0.99           | 0.37 (1.2-1.12)  | -1.52        | 0.22 (0.05-0.90) | -1.38           | 0.25 (0.06-1.00) |
| Primary/Secondary  |                       |                      |                  |                           |                 |                  |              |                |                 |                |
| College/university | -0.625                | 0.54 (0.22-1.28)     | 0.12             | 1.13 (0.4-3.22)           | -0.025          | 0.98 (0.42-2.28) | 0.25         | 1.28 (0.47-3.51) | 0.47            | 1.60 (0.25-1.67) |
| Family Type        |                       |                      |                  |                           |                 |                  |              |                |                 |                |
| Nuclear            | -0.99                 | 0.37* (0.14-1.00)    | 0.48             | 1.62 (0.79-3.32)          | -0.43           | 0.65 (0.25-1.68) | 0.58         | 1.79 (0.74-4.33) |                 |                |
| Extended (r)       |                       |                      |                  |                           |                 |                  |              |                |                 |                |

*P<0.05, ** p<0.01, *** p<0.001
| Variables                  | Employment | GO/NGO | Business | Agriculture (r) | Monthly income | Delivery place | Delivery type | ANC attendance | PNC attendance |
|----------------------------|------------|--------|----------|-----------------|---------------|---------------|---------------|----------------|----------------|
|                            |            |        |          |                 | <71           | Health center | Labor C-section | Once           | One           |
|                            |            |        |          |                 | ≥71 (r)       | Home (r)      |               | More than Once | More than Once |
| B Ad.OR (95% CI)           | -.11 .89 (.22-3.70) | .001 1.00 (.19-5.37) | -.091 .91 (.17-4.83) | -.27 .76 (.16-3.62) | -.15 .86 (.37-1.99) | -.47 .62 (.33-1.19) | -.15 .88 (.38-1.95) | -.26 .77 (.36-1.65) | -.65 .52 (.26-1.08) |
| B Ad.OR (95% CI)           | .30 1.35 (.39-4.65) | .69 1.99 (.45-8.67) | .89 2.43 (1.26-4.68) | .40* .51 (.18-91) | .68 .51 (.20-1.29) | .91 .47 (.17-1.28) | .77 .47 (.17-1.28) | .91 .47 (.17-1.28) | .77 .47 (.17-1.28) |
| B Ad.OR (95% CI)           | 1.46* 1.50 (1.1-18.46) | 1.97 7.15* (1.42-30.1) | 1.19 3.28 (1.69-15.53) | 1.50 4.46* (1.1-16.33) | 1.58 1.50 (1.36-6.17) | 1.00 1.00 (1.1-18.46) | 1.00 1.00 (1.1-18.46) | 1.00 1.00 (1.1-18.46) | 1.00 1.00 (1.1-18.46) |
| B Ad.OR (95% CI)           | .46 1.58 (1.48-5.17) | .402 1.50 (1.36-6.17) | .52 1.67 (1.43-6.53) | .46 1.58 (1.48-5.17) | .402 1.50 (1.36-6.17) | .46 1.58 (1.48-5.17) | .46 1.58 (1.48-5.17) | .46 1.58 (1.48-5.17) | .46 1.58 (1.48-5.17) |
| Employment Unemployed GO/NGO Employed Business Agriculture (r) | 1.50 4.46* (1.1-16.33) | 1.58 1.50 (1.36-6.17) | 1.67 1.67 (1.43-6.53) | 1.58 1.50 (1.36-6.17) | 1.67 1.67 (1.43-6.53) | 1.58 1.50 (1.36-6.17) | 1.67 1.67 (1.43-6.53) | 1.58 1.50 (1.36-6.17) | 1.67 1.67 (1.43-6.53) |
| Monthly income <71 ≥71 (r) | -.15 .86 (.37-1.99) | .62 .62 (.33-1.19) | -.15 .88 (.38-1.95) | -.26 .77 (.36-1.65) | -.65 .52 (.26-1.08) | .93 2.54 (.69-9.44) | -.77 .47 (.17-1.28) | .77 .47 (.17-1.28) | .77 .47 (.17-1.28) |
| Delivery place Health center Home (r) | .93 2.54 (.69-9.44) | -.23 .80 (.14-4.54) | .69 1.99 (.45-8.67) | .48 1.62 (.15-17.16) | .65 1.92 (.32-11.36) | -.12 .86 (.37-1.99) | -.91 .47 (.17-1.28) | -.91 .47 (.17-1.28) | -.91 .47 (.17-1.28) |
| Delivery type Labor C-section (r) | -.77 .47 (.17-1.28) | -.91 .47 (.17-1.28) | -.68 .51 (.20-1.29) | .61 .61 (.25-1.45) | -.70 .50 (.22-1.15) | -.87 .42* (.19-0.93) | -.87 .42* (.19-0.93) | -.87 .42* (.19-0.93) | -.87 .42* (.19-0.93) |
| ANC attendance Once More than Once (r) | 1.24 3.46 (.65-18.39) | .30 1.35 (.39-4.65) | -.99 .37 (.05-2.54) | 1.59 4.92 (.96-25.29) | .46 1.46* (1.1-18.46) | -.87 .42* (.19-0.93) | -.87 .42* (.19-0.93) | -.87 .42* (.19-0.93) | -.87 .42* (.19-0.93) |
| PNC attendance Once More than Once | -.87 .42* (.19-0.93) | .89 2.43 (1.26-4.68) | .21 1.24 (.62-2.48) | -1.13 .32* (.15-0.69) | -.12 .89 (.42-1.87) | -.87 .42* (.19-0.93) | -.87 .42* (.19-0.93) | -.87 .42* (.19-0.93) | -.87 .42* (.19-0.93) |

*P<0.05, ** p<0.01, *** p<0.001