# Association of Topography with Demographic and Socioeconomic Factors to the Compliance and Non-compliance of Mothers to Reproductive Health Services

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RESEARCH ARTICLE

**Abstract**

**Background and Objective:** In order to alleviate the reproductive health status of mothers in the Philippines, there should be a better understanding of the factors influencing their compliance to reproductive health services. The study examined the association of topography with demographic and socioeconomic characteristics on the compliance of reproductive health services.

**Methodology:** This study analyzed survey data collected in 2017 among mothers in the rural community of Maasin, Iloilo, Philippines. The statistical tools Chi-square, T-test and logistic regression were used to determine the factors associated with the likelihood of mothers to comply with prenatal care, family planning and delivery care services.

**Results:** There is no significant difference in the number of mothers who comply with prenatal care services and family planning services between lowland and highland barangays. However, mothers from the highland barangays are more likely to have non facility-based delivery (NFBD). Only educational attainment was found to be significantly associated for prenatal services. Only parity was significantly associated with compliance to family planning services. Age, parity, educational attainment and occupation were significantly associated with compliance to delivery care service. The odds of NFBD in the highland area is 2.44 (95% CI: 1.40 to 4.23) times higher as compared to the mothers residing in the lowland area. The odds of NFBD also increases by 7% (95% CI: 3% to 11%) per year increase in age.

**Conclusion:** There is a great need to restructure the delivery of reproductive health services to accommodate mothers from highland barangays who still opt for NFBD. Topography, demographic and socioeconomic factors should be considered in developing strategies and implementation of reproductive health care services in the Philippines. Furthermore, the researchers recommend to include in future studies other reproductive health services such as postnatal care in order to fully grasp the reproductive health in the country.

**Keywords:** *family planning, prenatal care, facility-based delivery (FBD), reproductive health services; topography, demographic and socioeconomic characteristics*

## Introduction

Within the framework of World Health Organization's (WHO) definition of health as a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity, reproductive health addresses the reproductive processes, functions and systems at all stages of life [1]. Implicit in this are the right of men and women to be informed of and to have access to safe, effective, affordable and acceptable methods of fertility regulation of their choice, and the right access to appropriate health care services that will enable women to go safely through pregnancy and childbirth and provide couples with the best chance of having a healthy infant.

Reproductive health is an important part of general health and human development [2]. It sets the stage for health beyond the reproductive years for both women and men, and affects the health of the next generation. It is important for women, especially during the reproductive years since the mother's health and nutrition, and access to health care would greatly influence the health of the newborn.

Reproductive health is a basic human right and both men and women should have the necessary information and equal access to appropriate health care services that would enable them to improve their reproductive health. Reproductive health services should include interventions on issues of family planning, prevention of sexually transmitted diseases (STDs) and management and prevention of maternal and perinatal mortality and morbidity. These services must be accessible and include information, education, counseling, prevention, detection and management of health problems, care and rehabilitation [2].

Reproductive health care includes methods, techniques and services that contribute to reproductive health and well-being by preventing and solving reproductive health-related problems [3]. The services include Family Planning (FP), Maternal and Child Health and Nutrition (MCHN), Prevention and Management of Abortion and its Complications (PMAC), Prevention and Management of Reproductive Tract Infections (RTIs), education and counseling on sexuality and sexual health, breast and reproductive tract cancers and other gynecological conditions, men's reproductive health, adolescent and youth health, violence against women and children, and prevention and treatment of infertility and sexual dysfunction [3].

Reproductive health care services in the Philippines include but are not limited to family planning, prenatal and post-natal services and delivery services. Despite the presence of these services that aimed to help promote, protect and fulfill women's reproductive rights, the Philippines is still burdened with reproductive health problems, especially among women. According to the 2011 Family Health Survey, unmet need for reproductive health services among married women remains high at 19.3% (10.5% for birth spacing, and 8.8% for limiting births). Moreover, the total unmet need for reproductive health services is substantially greater among women considered poor (25.8%) compared to non-poor women (16.6%) [4].

There are various factors that influence access and utilization of reproductive health care services globally. Maternal education, age, employment and income, socioeconomic status, parity, distance to health facility, media exposure and residence are documented as factors known to affect reproductive health care across the world [5]. In the Philippines, utilization of reproductive health services is still low and several factors such as wealth and religion have already been associated with the utilization of these services [4,6]. Still, there is a limited number of studies on the influence of topography to the compliance and utilization of reproductive health services by mothers.

This paper aims to determine the association of topography to the compliance of reproductive health services. The study also identified sociodemographic factors that would influence the compliance of mothers to reproductive health services, which should be considered in developing strategies and provision of reproductive health care services in the country.

## Methodology

*Study design and target population*

This study is based on an analytical cross-sectional design. Target population are mothers from the highland and lowland areas with at least one child who fulfilled the inclusion criteria. Topographical location of the place of residence was considered as the community level variable where barangays situated in a plain area with an altitude of not more than 100 square meters above sea level were designated as lowland barangays and those situated in an elevated or mountainous area having an altitude of more than 100 square meters above sea level were designated as highland barangays. The related factors that were included in the study were limited to the woman's parity, age, educational attainment, occupation and household asset index. The reproductive health services that were assessed include prenatal care services, family planning services and delivery care services.

*Sample size estimation*

Sample size was calculated based on the comparison of the incidence of non facility-based deliveries (NFBD) from the highland and lowland areas. Assuming that the incidence of NFBD in the highland and lowland areas is 35% and 10%, respectively, with an alpha error of 5%, power of 90%, and a one-tailed alternative hypothesis, the sample size required for this study is 108. Controlling for 5 demographic and socioeconomic variables in the analysis with an additional 20% for each variable, the minimum sample size required is 216 or 108 per group.

*Selection of study site*

The municipality of Maasin, Iloilo was purposively selected by the researchers. According to the municipality's Rural Health Unit (RHU) records, the municipality has low compliance to reproductive health services such as prenatal, family planning and facility-based deliveries (FBD) with 45% incidence of NFBD in 2016. This study was conducted among the 30 highland and 20 lowland barangays in Maasin, Iloilo from April to May 2017. According to the Municipal Planning

and Development Council, Maasin is classified as a third class municipality based on its income and is primarily rural with terrain ranging from the plain to strongly hilly and mountainous. Also, the topography of the municipality is 60% highland and 40% lowland areas.

*Selection of study participants*

The list of all mothers who fulfilled the inclusion criteria was acquired from the Maasin Rural Health Unit. At least eight mothers were surveyed from each of the 30 highland and lowland barangays. The study participants were selected using simple random sampling for each barangay, wherein the master list of all mothers from the rural health unit was used as the sampling frame. Random sampling was implemented using the computer-generated random numbers, where mothers were assigned with unique ID and whichever ID number is selected by the computer program would be included in the study.

*Research Instrumentation*

The demographic and socioeconomic profile of each mother was obtained using a guide questionnaire adapted from the 2005 Multiple Indicator Cluster Survey (MICS) Manual of the UNICEF which was modified to attain the study objectives [7]. The survey tool was translated to Hiligaynon and was initially pretested among 20 mothers of the same characteristics that fulfill the inclusion criteria. The questionnaire was administered to gather primary data on the predisposing factors and the use of reproductive health services.

*Statistical analysis*

Descriptive statistics was used to summarize the demographic and socioeconomic characteristics of the mothers included in the study. Mean and standard deviation were used for scalar variables while frequency and proportion for categorical variables. Differences on the demographic and socioeconomic profile between lowland and highland areas were analyzed using the Chi-square test and two-sample t-test. The Chi-square test of association was also used to analyze the relationship of compliance to reproductive health services and demographic and socioeconomic variables considered in the study. A multiple logistic regression of non-compliance to reproductive health services was utilized to control for the variable topography. The level of significance was set at 0.05 threshold for significance.

Missing data was not replaced nor included in the analysis. All data analysis was performed using STATA 12.

*Ethical Considerations*

Ethical approval to conduct the study was obtained from the ethics committee of the Division of Biological Sciences of the University of the Philippines Visayas. Administrative authorization was obtained from the local government unit (LGU) and the municipal health officer (MHO) of Maasin. All participants provided written informed consent. For each participant younger than age of 18 years old of age, consent was sought from the parent or guardian. The parent or guardian was also present during the interview. Aside from taking the time to answer the questionnaire, participants were not exposed to any undue risk. All information collected from the participants was used only for the purpose of this study.

## Results

The demographic and socioeconomic characteristics of the respondents in the highland barangays and lowland barangays were shown in Table 1. Out of the 356 respondents, 160 (44.9%) were from the lowland barangays and 196 (55.1%) were from the highland barangays. The frequencies were measured and distributed according to age, parity, educational attainment, occupation and household asset index. It was found that parity, educational attainment and household asset index are statistically different between lowland and highland barangays. The table indicates that there was no statistically significant difference between the mean age of mothers in lowland and that of mothers in highland barangays (p=0.074). Majority of the respondents (50%) from the lowland barangays belong to the 21 to 30 age group while majority of the respondents from the highland barangays belong to the 31 to 49 age group (51.5%). Parity or the total number of births delivered by the respondent categorized into 1 to 3 children, 4 to 5 children and 6 or more children. The proportion of mothers with more than six children was higher in the highland barangays (21.4%) than those in the lowland barangays. The mean difference of the number of children between mothers from the lowland barangays 3.2 (1.97) and those from highland barangays 3.8 (2.42) was statistically significant (p=0.018). Educational attainment of the respondents was categorized into two, low educational attainment and high educational attainment where low means no education or only up to elementary level and high means the respondent was able to finish high school or college or higher. The proportion of those who had low educational attainment was higher in highland barangays, while the high educational attainment was higher

**Table 1.** *Distribution of respondents in lowland and highland barangays according to demographic and socioeconomic characteristics (n=356).*

| Demographic and Socioeconomic Characteristics | | Topography | | | | p-value |
|---|---|---|---|---|---|---|
| | | Lowland n=160 | | Highland n=196 | | |
| | | n (%) | Mean (SD) | n (%) | Mean (SD) | |
| Age (in years) | 15 to 20<br>21 to 30<br>31 to 49 | 11 (6.9)<br>80 (50)<br>69 (43.1) | 30 (7.47) | 20 (10.2)<br>75 (38.3)<br>101 (51.5) | 30 (6.25) | 0.074 |
| Parity | 1 to 3<br>4 to 5<br>6 or more | 106 (66.3)<br>37 (23.1)<br>17 (10.6) | 3.2 (1.97) | 108 (55.1)<br>46 (23.5)<br>42 (21.4) | 3.8 (2.42) | 0.018* |
| Educational Attainment | Low<br>High | 8 (5)<br>152 (95) | | 31 (15.8)<br>165 (84.2) | | 0.001* |
| Occupation | Employed<br>Unemployed | 55 (34.4)<br>105 (65.6) | | 75 (38.3)<br>121 (61.7) | | 0.448 |
| Household Asset Index | High<br>Average<br>Low | 72 (45)<br>23 (14.4)<br>65 (40.6) | | 72 (45)<br>23 (14.4)<br>65 (40.6) | | <0.0001* |

* Statistically significant between lowland and highland (p<0.05)

among mothers in lowland barangays. A statistically significant association was found when the proportions of the educational attainment of the mothers in lowland barangays and highland barangays were compared. Results showed a significant association (p=0.001) between educational attainment of mothers and topography. For occupation, respondents were classified as employed or unemployed. Of the 226 respondents who were unemployed, 105 were from the lowland and 121 were from the highland barangays. When comparing the employment status between mothers from lowland and highland barangays, the difference between proportions was not statistically significant, suggesting that there is no significant association between topography and employment status of the mothers (p=0.448). Household asset index was determined depending on the respondent's possession of household items and was correlated to household wealth categorized as high, average or low. Economic characteristic (household asset index) of mothers in lowland barangays is significantly different from those in the highland barangays (p<0.0001). Data showed that more respondents from the highland barangays belong to households with low asset index (58.2%). Among the respondents from lowland barangays, 45% have high household asset index, 14.4% have average and 40.6% have low household asset index. Among the respondents from highland barangays, 24% have high household asset index, 17.3% have average and 58.2% have low household asset index.

The utilization of reproductive health services of mothers is presented in Table 2. There is no significant difference in the proportion of mothers who comply with prenatal care services (p=0.17) and family planning services (p=0.90) between lowland and highland barangays. However, there is a highly significant association (p=0.001) in the utilization of delivery care services between mothers from lowland and highland barangays. Among the mothers who had NFBD, 27 were from lowland barangays while 64 were from highland barangays.

The frequency of respondents who complied with reproductive health services in relation to demographic and socioeconomic characteristics was summarized in Table 3. A significant difference in the compliance to prenatal services was observed between respondents of low and high educational attainment (p=0.003). Among those who comply, 90.4% have high educational attainment. With respect to family planning, significant differences by parity of the respondents was observed. Parity appeared to be strongly associated with compliance to family planning (p=0.036). More mothers (56.2%) with 1 to 3 children comply to family planning

**Table 2.** *Distribution of mothers in lowland and highland barangays according to compliance in reproductive health care services (n=356)*

| Reproductive Health Services | | Topography | | p-value |
|---|---|---|---|---|
| | | Lowland n (%) | Highland n (%) | |
| Prenatal Care Services | Compliance<br>Noncompliance | 146 (91.3)<br>14 (8.7) | 186 (94.9)<br>10 (5.1) | 0.17 |
| Family Planning Services | Compliance<br>Noncompliance | 99 (61.9)<br>61 (38.1) | 120 (61.2)<br>76 (38.8) | 120 (61.2)<br>76 (38.8) |
| Delivery Care Services | Facility-based<br>Non facility-based | 133 (83.1)<br>27 (16.9) | 132 (67.3)<br>64 (32.7) | 0.001* |

*Statistically significant association between lowland and highland barangays (P<0.05).

**Table 3.** *Demographic and socioeconomic characteristics of compliant and noncompliant mothers (n=356)*

| Demographic and Socioeconomic Characteristics | | Prenatal Care Services | | | Family Planning Services | | | Delivery Care Services | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | n (%) | | p-value | n (%) | | p-value | n (%) | | p-value |
| | | C | NC | | C | NC | | FBD | NFBD | |
| Age (in years) | 15 to 20<br>21 to 30<br>31 to 49 | 18 (7.8)<br>103 (44.3)<br>111 (47.9) | 5 (20.8)<br>8 (33.3)<br>11 (45.8) | 0.08 | 18 (8.2)<br>96 (43.8)<br>105 (47.9) | 13 (9.5)<br>59 (43.1)<br>65 (47.4) | 0.92 | 28 (10.6)<br>118 (44.5)<br>119 (44.9) | 3 (3.3)<br>37 (40.7)<br>51 (56.0) | .047* |
| Parity | 1 to 3<br>4 to 5<br>6 or more | 140 (60.2)<br>55 (23.8)<br>37 (16.0) | 14 (58.3)<br>4 (16.7)<br>6 (25.0) | 0.45 | 123 (56.2)<br>61 (27.8)<br>35 (16.0) | 91 (66.4)<br>22 (16.1)<br>24 (17.5) | .036* | 172 (64.9)<br>60 (22.6)<br>33 (12.5) | 42 (46.2)<br>23 (25.3)<br>26 (28.6) | .001* |
| Educational Attainment | Low<br>High | 22 (9.6)<br>210 (90.4) | 7 (29.2)<br>17 (70.8) | 0.003* | 24 (11.0)<br>195 (89.0) | 15 (10.9)<br>122 (89.1) | 0.99 | 21 (7.9)<br>244 (92.1) | 18 (19.8)<br>73 (80.2) | .002* |
| Occupation | Employed<br>Unemployed | 83 (35.8)<br>149 (64.2) | 11 (45.8)<br>13 (54.2) | 0.33 | 85 (38.8)<br>134 (61.2) | 45 (32.8)<br>92 (67.2) | 0.26 | 85 (32.1)<br>180 (67.9) | 45 (49.5)<br>46 (50.5) | .003* |
| Household Asset Index | High | 77 (33.1)<br>38 (16.3)<br>117 (50.6) | 10 (41.7)<br>3 (12.5)<br>11 (45.8) | 0.68 | 69 (31.5)<br>39 (17.8)<br>111 (50.7) | 51 (37.2)<br>18 (13.1)<br>68 (49.6) | 0.37 | 96 (36.2)<br>42 (15.8)<br>127 (47.9) | 24 (26.4)<br>15 (16.5)<br>52 (57.1) | 0.21 |

C – Compliance;
NC – Non Compliance;
FBD – Facility-Based Delivery;
NFBD – Non Facility-Based Delivery
*Statistically significant

services compared to those with 6 or more children (16%). Age (p=0.047), parity (p=0.001), educational attainment (p=0.002) and occupation (p=0.003) were significantly associated with compliance to delivery care service.

Possible predisposing factors including topography, age, occupation, educational attainment, and parity were further examined in relation to NFBD. Table 4 shows that the odds of NFBD in the highland area is 2.44 (95% CI: 1.40 to 4.23) times higher as compared to the mothers residing in the lowland area. The odds of NFBD also increases by 7% (95% CI: 3% to 11%) per years increase in age, which shows that older mothers do not tend to avail the existing reproductive health services. Also, the odds of NFBD among unemployed mothers is almost half of that of employed mothers (95% CI: 0.36 to 1.02). Mothers that did not attend college are 1.75 (95% CI: 0.83 to 3.71) times more likely to disregard the healthcare facility during delivery as compared to mothers with college diploma. When it comes to parity, the odds of NFBD among mothers with six or more children are 1.26 (95% CI: 0.64 to 2.47) times higher as compared to mothers with less than six children. However, occupation, educational attainment, and parity were found statistically insignificant (p-value>0.05).

## Discussion

Reproductive health services aim to help promote, protect and fulfill reproductive rights. Compliance to these services is essential for overall human health and development. Despite the abundance of programs and efforts, noncompliance to reproductive health services is still high especially among women in the Philippines. This study identified factors that would influence the compliance of mothers to reproductive health services.

There is a significant difference between the number of mothers from the highland and lowland barangays in terms of parity, educational attainment and household index. Mothers with more than 3 children are mostly from the highland barangays. Moreover, most of the mothers who have low household asset index are from highland barangays. The low to average household asset indices in mothers who are from the highland barangay could be associated to the increase in parity. Additional children may lead to reduced work participation and income of mothers, decline in household income, and increased number of out-of-school children [8]. There is also a significant difference on educational attainment between mothers in highland and lowland barangays. This could be attributed to the availability of educational facilities near or within the lowland barangays. Mothers from the highland barangays who live further away from school were less likely to be enrolled or finish school [9,10].

It was found that there is a highly significant difference (p=0.001) in the utilization of delivery care services between mothers from highland barangays and mothers from the lowland barangays where mothers from the highland barangays are more likely to have NFBD. NFBD could be related

**Table 4.** *Logistic regressions of non facility-based delivery*

| Factors | Odds ratio | 95% confidence interval | p-value |
|---|---|---|---|
| Topography (Reference: lowland) | 2.44 | 1.40 to 4.23 | 0.002* |
| Age | 1.07 | 1.03 to 1.11 | 0.0001* |
| Occupation (Reference: Employed) | 0.61 | 0.36 to 1.02 | 0.062 |
| Educational attainment (Reference: College level) | 1.75 | 0.83 to 3.71 | 0.142 |
| Parity (Reference: Less than 6 children) | 1.26 | 0.64 to 2.47 | 0.505 |

*Statistically significant

to several reasons such as birth being imminent or inevitable, accessibility of birth attendant, lack of transportation, and unfavorable weather conditions [11]. In this study, most of the highland barangays were located far from the Maasin RHU. The respondents also stated that most of them chose NFBD because of imminent birth due to poor monitoring, and availability of a traditional birth attendant in the barangay. Some of the highland barangays were only accessible using single motorcycles due to the poor quality of the roads, which made it difficult for the mothers to travel to the RHU especially during rainy weather. This is parallel to the findings of Azimi *et al.* (2015) stating that women in the most remote areas are 4.5 times more likely to have NFBD compared to those in the least remote areas [11,12]. Many women choose FBD if they have severe health problems, if their baby is likely to need immediate medical attention after birth or if a cesarean section is required [13,14]. In this study, the mothers from the highland barangays who opted for FBD needed to undergo cesarean section, were keeping track of their pregnancy, or were near the RHU at the time when giving birth was imminent. Most of the mothers from the lowland barangays who chose facility-based births had access to paved roads and were in close proximity to public utility vehicles that can transport them to the RHU or the hospital in a neighboring town.

With regard to socioeconomic and demographic characteristics, compliance to prenatal care and family planning services is influenced by educational attainment and parity, respectively. On the other hand, age, parity, educational attainment and occupation are the factors influencing compliance to delivery care services. According to Abosse *et al.* (2010), age is one of the most common indicators of health and reproductive behavior in women [15]. Also, age serves as a proxy indicator for women's accumulated knowledge of health care utilization where older women are more likely to use maternal health care services than younger women [16]. In this study, mothers in age groups 21-30 and 31-49 years old are more likely to use prenatal and family planning services as compared to the mothers who are 15-20 years old. This agrees with the report of Babalola and Fatusi (2009) that women in the middle childbearing ages are more likely to use maternal services compared to their peers [17]. Most of the mothers in this study who opted for NFBD were 31-49 years old. This result is supported by a previous study wherein age group was a statistically significant variable in relation to having NFBD, with every level of increase in the age group, the chance of NFBD increases [12].

The factors that can significantly influence the compliance of FBD were further examined. It was observed that mothers with 6 or more children are less likely to avail FBD. Previous studies also showed comparable results where women with high parity have lesser frequency in utilizing antenatal care compared to mothers with one to two children [15,16]. A possible explanation for the low compliance of delivery care services among mothers with high parity is that such mothers believe that professionally assisted delivery is not necessary because of the knowledge and experience gained from previous pregnancies [18,19,20]. Moreover, women who are pregnant with their first child are more like to have more difficulties during labor and delivery thus motivating low parity women to have FBD than high parity women [21].

Most of the mothers who opted for FBD have high educational attainment. Results on logistic regression also showed that mothers who did not attend college are more likely to have NFBD. These results are consistent with previous studies showing that higher levels of education have a direct association with FBD [22]. This is in line with a study by Azimi *et al.* (2015) which stated that women with no education were 6.5 times more likely than women with higher or secondary education to have NFBD [12].

Among the factors examined, topography and age are significant predictors of compliance to FBD. Older mothers residing in highland barangays, who are employed, with low educational attainment and who have 6 or more children are more likely to have NFBD. Thus, the RHU of Maasin should take into account these factors in the design and implementation of reproductive health services and programs in the municipality. Immediate actions should be done in order to cater these mothers who are more likely to have a risky delivery. Furthermore, the researchers recommend to include in future studies different target populations, other factors such as sociocultural factors and other reproductive health services such as postnatal care in order to fully grasp the reproductive health in the country.

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