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A Partial Least Squares Structural Equation Modeling Analysis of Early Fertility, Knowledge and Behaviors among Indigenous Young Women in Guatemala

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ABSTRACT

Despite that Guatemala has health inequality among non-indigenous and indigenous women, adolescent fertility has been scarcely studied. This study investigates the mechanism of early fertility among indigenous women aged 20-29 using data from the Guatemalan Demographic Health Survey 2014–2015 (N=8,110). Partial least squares structural equation modeling analysis (PLS-SEM) were conducted in among indigenous women in urban area (UI) or rural area (RI) and non-indigenous women in rural area (RN) to examine the associations between socioeconomic variables, mediators (knowledge and attitudes toward early pregnancy prevention) and an outcome (early fertility). Results showed that geographical difference had stronger influence than ethnicity. Early fertility in RI is influenced by more factors than UI and RI, such as media exposure, attitudes and knowledge on pregnancy prevention, contraceptive use, in addition to education and risky sexual behaviors. Having better knowledge on contraceptive methods did not reduce risky sexual behaviors. Further discussion on elaboration of variables measuring the actual decision-making related to risky sexual behaviors are suggested.

1. Introduction

Guatemala has the fifth poorest economy in Latin America and the Caribbean (Pan American Health Organization, 2019), with high rates of inequality among non-indigenous and indigenous people who comprise nearly 45% of the population (Mena-Meléndez 2020). This inequality is due to structural discrimination, social exclusion, and racism (Comisión Interamericana de Derechos Humanos, 2015), all of which disproportionately affect health indices among indigenous people (Pan American Health Organization, 2019). Indigenous people tend to live in geographically isolated places, which made it difficult to access to health and other social services (Ruano et al., 2014). Disproportional health services and geographical difficulty leads to poor adolescent sexual and reproductive health (ASRH) indicators among indigenous young women. Poor ASRH has a long-term adverse impact on the quality of an

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individual's life. Adolescent girls are particularly susceptible to unwanted and premature pregnancy, sexually transmitted diseases, and unsafe abortions due to their vulnerability to sexual abuse and violence. This severely impedes women's educational, economic, and social opportunities (United Nations, 1995).

Although many studies in Guatemala have focused on maternal and/or child health among indigenous women, only a few focused on adolescent fertility. A study using national health surveys from four countries (Guatemala, El Salvador, Honduras and Nicaragua) showed urban residence, education level and socioeconomic status were important predictors of adolescents' sexual and reproductive behavior and outcomes (Samandari & Speizer, 2010). A retrospective cohort study of women who gave birth in a public hospital showed indigenous adolescents were more likely to be single during pregnancy and attend fewer years of school than nonindigenous adolescents and unplanned pregnancies were more common among indigenous adolescents (Gómez et al., 2022). These studies mainly examined the influence of socioeconomic factors and did not consider the knowledge, attitudes, and behaviors that would reduce adolescent fertility. According to health behavior change models and theories, Social Learning Theory proposes that interactions among social demographic characteristics and cognitive factors, such as knowledge and attitudes, influence human learning and behavior (Bandura, 1971). The theory of Planned Behavior suggests that a person's behavior is determined by their intention to perform the behavior (Ajzen, 1991). To provide comprehensive understandings to the mechanism that would influence to early fertility, partial least squares structural equation modeling (PLS-SEM), an extension of multivariate regression analysis, would be a more appropriate approach. In multivariate regression, a variable is either a predictor (an independent variable) or an outcome (a dependent variable); in PLS-SEM analysis, a variable can be an outcome of some variables and a predictor of other variables (Hair Jr. et al., 2021).

Although disparities between indigenous and non-indigenous people have been examined, studies on rural-urban differences within the indigenous population are scarce. Although indigenous people tend to live in rural area, many live in urban area (Ministerio de Salud Pública y Asistencia Social et al., 2017). This implies that young indigenous women who live in urban area have a different lifestyle (Popolo et al., 2007) and their socioeconomic status and behaviors related ASRH can differ from those among young indigenous women in rural area. However, no study was conducted to investigate both rural-urban and ethnic differences related to early fertility in Guatemala.

1.1. Purposes

This study investigates the mechanisms linking socioeconomic status, knowledge, attitudes, and behaviors on early fertility among young indigenous women in Guatemala. This study first conducted a pairwise comparison to examine rural-urban and ethnic disparities. Then PLS-SEM analysis was conducted to examine the direct and mediating associations between socioeconomic status (ex. education level and media exposure), knowledge and attitudes on the prevention of adolescent pregnancy or childbearing, sexual behaviors, and early fertility.

2. Methods

2.1. Data Source

This study used cross-sectional data from the National Survey on Maternal and Child Health (Encuesta Nacional de Salud Materno Infantil, ENSMI) 2014–2015, which was part of the Demographic Health Survey (DHS) Program in Guatemala. ENSMI applied multistage

stratified random sampling to generate nationally representative data on fertility, family planning, maternal and child health, gender issues and HIV/AIDS among women of reproductive age (15–49 years). ENSMI includes three surveys: an individual survey of women aged 15–49 years, an individual survey of men aged 15–59 years and a household survey. Prior to conducting the survey, the questionnaires were field-tested in four municipalities with different socioeconomic and geographic locations to assess their validity and reliability (Ministerio de Salud Pública y Asistencia Social et al., 2017). An individual survey of women aged 15–49 years was conducted in this study. The dataset was obtained from the DHS website (https://dhsprogram.com/data/available-datasets.cfm).

2.2. Samples

For the individual survey of women aged 15–49 years, a two-stage stratified cluster sample design was applied, where the first step of sampling involved the selection of clusters and the second involved the selection of households. A representative sample of 25,914 women was selected using a stratified sample design. Data of women aged 20–24 years were extracted from the sample data. Women aged 15–19 years were not included because the outcome indicators of early fertility were those that had been retrospectively observed (aged 10–19 years of age). Although women aged 15–19 years were not pregnant at the time of the survey, they could have become pregnant and given first birth after the survey period but before turning 20 years old, which would not provide an accurate description of the results of the study. A total of 4,826 women were included in this study, representing 18.6% of the total sample of women aged 15–49 years in Guatemala.

2.3. Model Development

Partial least squares structural equation modeling (PLS-SEM) was used for this study. SEM has two fundamental analytical methods: covariance-based structural equation modeling (CB-SEM) and PLS-SEM. PLS-SEM can obtain results with smaller sample sizes than CB-SEM with high levels of statistical power, does not assume normally distributed data, and is robust to complex models (Hair Jr. et al., 2021). Due to relatively small sample size (n = between 826 to 1,344 per group) considering the model complexity and non-normal distributions of the data, the current study applied PLS-SEM.

A hypothetical model was established for conducting PLS-SEM analysis based on existing health behavior change models and theories, such as Social Learning Theory and Theory of Planned Behavior (Bandura, 1971; Ajzen, 1991). “Highest education level”, “literacy,” “wealth index” and “media exposure” were treated as the exogenous variables. In PLS-SEM, the term “exogenous variable” is used instead of independent variable (Hair Jr. et al., 2021). “Knowledge on pregnancy prevention”, “knowledge on contraceptive methods” and “attitudes toward gender-based violence (GBV)” were treated as the first-level endogenous variables or mediators. Instead of dependent variables, the PLS-SEM analysis uses the term “endogenous variables” (Hair Jr. et al., 2021). “Risky Sexual behavior” and “contraceptive use and intention” were treated as second-level endogenous variables or mediators. “Early fertility” was selected as an outcome. Figure 1 shows the hypothetical model for this study.

2.4. Measures

The variables for the PLS-SEM analysis in this study included both measured and latent variables. A latent variable is a hypothetical construct that consists of multiple measured variables. This study employed six latent variables: “media exposure,” “knowledge on

pregnancy prevention," "knowledge on contraceptive methods," "attitudes toward GBV," "sexual behavior" and "early fertility." The other variables were the measured variables.

Regarding coding, this study employed a reverse coding system, where an indicator was coded with a higher value if the content or phenomenon referred to by the indicator was undesirable. For example, "highest education level" was categorized into five levels, where 5 = no education and 1 = higher (over secondary) education, as a lower education level was considered undesirable.

2.4.1. Exogenous Variables

"Highest education level," "literacy" and "wealth index" were single-measured variables and "media exposure" was a latent variable with three measured variables. Five-level coding was used for "highest education level": 1 = higher education (over secondary), 2 = secondary education, 3 = primary education (grades 4–6), 4 = primary education (grades 1–3), and 5 = no education. "Literacy" was categorized into three levels: 1 = able to read whole sentences, 2 = able to read only parts of a sentence, and 3 = cannot read at all. "Wealth index" was coded as 1 = richest, 2 = richer, 3 = middle, 4 = poorer and 5 = poorest.

"Media exposure" consisted of three measured variables on how often a woman was exposed to specific media on a weekly basis – *newspaper, radio,* and *TV*. Each measured variable coded as 1 = at least once a week, 2 = less than once a week, and 3 = not at all.

2.4.2. First-Level Mediating Variables

"Knowledge on pregnancy prevention," "knowledge on contraceptive methods" and "attitudes toward GBV" were treat as the first-level mediating variables and all were examined as latent variables. "Knowledge on pregnancy prevention" consisted of three measured variables: *to have knowledge on ovulatory cycle, to use condom*, and *to have only one sex partner*. The scoring was "0" for a correct answer and "1" for an incorrect answer.

"Knowledge on contraceptive methods" consisted of four variables: *to know any contraceptive method, can get a condom*, *justified condom use for STI prevention*, and *to know any source for condoms*. The scoring of first three variables was "0" if the response was yes and "1" if the response was no or do not know. The variable *to know any source for condoms* was coded as 1 = source known, 2 = no source known, and 3 = no source known because don't know condom.

"Attitudes toward GBV" consisted of five measured variables - *beating justified if wife goes out without telling husband, beating justified if wife neglects the children, beating justified if wife argues with husband, beating justified if wife refuses to have sex with husband*, and *beating justified if wife burns the food*. The scoring was "0" if the response was no and "1" if the response was yes or do not know.

2.4.3. Second-Level Mediating Variables

"Contraceptive use" was a single-measured variable and "risky sexual behavior" was a latent variable with two measured variables. "Contraceptive use" was coded into five levels: 1 = never had sexual intercourse, 2 = using modern method, 3 = Using traditional method, 4 = non-user, but intends to use later, and 5 = does not intend to use.

"Sexual behavior" consisted of two measured variables: *age at first sexual intercourse* and *number of sexual partners*. *Age of first sexual intercourse* was coded as 1 = 10 to 14 years old, 2 = 15 to 19 years old, 3 = 20 to 24 years old, and 4 = never had sexual intercourse. *Number of sexual partners* was coded as 1 = never had sexual intercourse, 2 = one partner, 3 = two to five partners, and 4 = six or more.

2.4.4. Outcome Variables

"Early fertility" consisted of two measured variables: *age of first parturition* and *total children ever born*. Four-level coding was used: 1 = never been pregnant or had child, 2 = 20 to 24 years old, 3 = 15 to 19 years old, and 4 = 10 to 14 years old.

2.5. Data Analysis

Descriptive statistics are presented according to four groups: non-indigenous women in urban area (UN), indigenous women in urban area (UI), non-indigenous women in rural area (RN) and indigenous women in rural area (RI). Non-indigenous was defined as Ladina (person mixed Spanish and indigenous descent) and other. Kruskal-Wallis H test was conducted for pairwise comparison among four groups. PLS-SEM analysis was separetely performed in UI, RN and RI to investigate the associations among a set of variables of a hypothetical model (Figure 1). UN was not included in PLS-SEM analysis since the study's purpose was to examine rural-urban disparities among indigenous women as well as disparities between indigenous and non-indigenous women in rural area. As the first step of PLS-SEM analysis, model evaluation was conducted in the measurement and structural models. Assessing measurement models included factor loadings, reliability, validity, and indicator collinearity. Factor loading shows the variance explained by the measured variable on that particular factor. Factor loading of each variable should be at least 0.5. The variable less than 0.5 would be removed from the model. For reliability, internal consistency reliability (composite reliability, or CR) was used. Cronbach's alpha is widely used to measure internal consistency reliability, but this is rather conservative and assumes all indicator loadings are the same in the population. Composite reliability is more flexible in terms of loading assumption and therefore fits better in PLS-SEM analysis (Hair Jr. et al., 2021). CR should be 0.70 or higher. The average variance extracted (AVE) was used for validity, where the value should be 0.50 or higher. Indicator collinearity was also assessed using the variance inflation factor (VIF). VIF values of 5 or above indicate collinearity problems. PLS-SEM analysis was then performed to investigate the direct and indirect associations among a set of variables of a hypothetical model.

The present study used SPSS Statistics 27 (IBM Corp., Armonk, N.Y., USA) to perform descriptive statistics and pairwise comparison. R 4.1.1 (The R Foundation for Statistical Computing, Vienna, Austria) with SEMinR package (version 2.0) was used for PLS-SEM analysis. The significance threshold was set at $p < 0.05$.

2.6. Ethics

The relevant authorities approved the study design, and no participant consent was required as this analysis used publicly available data from national surveys with anonymized databases. Therefore, ethical issues were dealt with by the institutions conducting the surveys.

3. Results

3.1. Descriptive Statistics

Table 1 shows all variables for all samples used in this study (N = 4,826). Of the 4,826 women aged 20-24 years old, 1,216 women (25.2%) were non-indigenous women in urban area (UN), 829 women (17.2%) were indigenous women in urban area (UI), 1,437 women (29.8%) were non-indigenous women in rural area (RN) and 1,344 women (27.8%) were indigenous women in rural area (RI).

The results showed women living in rural area, especially indigenous women, had lower education level, wealth index and media exposure. 47.2% of RI and 36.3% of RN did not complete primary education. 38.3% of RI had the lowest wealth quintile. For media exposure, 39.7% and 35.6% of RI did not read newspaper or watch TV, respectively. Between 80% and 90% of UN, UI and RN answered correctly or gave desireble responses to the variables on knowledge on pregnancy prevention and contraceptive except ovulatory cycle, whereas around 60% of RI answered correctly. For ovulatory cycle, only around 20% women in all groups answered correctly on the time of ovulation or the time a woman became most fertile. For sexual behavior and early fertility, around 10% and 50% of women in all groups had sex intercourse for the first time when she was 10-14 and 15-19 years old, respectively. Around 45% of RN and RI and around 28% of UN and UI gave first childbirth, respectively.

Pairwise multiple comparisons among four groups in Table 2 show statistically significant differences in all 23 variables between UI and RI and in all except three variables between UN and RN. Eight and 10 of 23 variables were not significant between UN and UI and between RN and RI, respectively. All pairwise comparisons among four groups show statistically significant differences in education, literacy, wealth index and media exposures, except media exposure of radio. Pairwise comparison between UN and UI and between RN and RI show non-significant differences in variables both on attitudes toward GBV and on early fertility.

3.2. PLS-SEM Analysis

Table 3 shows the values for assessing the hypothesized model. Two measured variables with the loading values less than 0.50 were removed from the model, which were *know any method* under "knowledge on contraceptive methods" in RN and *beating if wife goes out* under "attitudes toward GBV" in UI and RI. Some factor loadings had less than 0.50, but it was acceptable since the value was both more than 0.45 and statistically significant (Hair Jr. et al., 2021). All CR values were within the good range (0.70 or higher). Some AVE values, such as *newspaper* and *age of 1st sex* in UI, were lower than 0.50, but, it was acceptable since CR was more than 0.70 (Lam, 2012). All VIF values were within the good range (less than 5).

3.2.1. Direct Associations

Table 4 shows the path coefficients with p-values for each path in all three groups. Figures 2a-c show the paths that have significant direct associations. "Highest education level" and "sexual behavior" had significant direct associations with all variables with which they shared direct paths in all three groups, except the association between "highest education level" and "attitudes toward GBV" in UI. RI has the biggest number of direct associated paths of the three groups (25 paths in RI out of 35 direct paths, while 15 and 20 paths in UI and RN, respectively). "Knowledge on contraceptive methods" had significant direct associations with "sexual behavior" and/or outcome but with negative coefficients.

3.2.2. Mediating Associations

Table 5a-c list the significant mediating paths between exogenous variables and the outcome. Mediating paths between "highest education level" and outcome via "sexual behavior" are complementary mediation in all three groups. In complementary mediation, the mediating effect and the direct effect point in the same (positive or negative) direction. RI furthermore had complementary mediation between "media exposure" and outcome via "knowledge on pregnancy prevention" and "contraceptive use," and the mediation via "sexual behavior." RI has the biggest number of mediating paths of the three groups (11 paths in RI, while five and six paths in RN in UI, respectively). Paths mediating "knowledge on contraceptive methods" had negative coefficients, leading to competitive mediations. In competitive mediation, the

indirect effect and the direct effect point in opposite directions (one is positive while the other is negative).

4. Discussion

This study was designed to investigate the mechanisms linking socioeconomic status, knowledge, attitudes, and behaviors on early fertility among young indigenous women in Guatemala. Pairwise comparison was conducted to examine rural-urban and ethnic disparities. PLS-SEM analysis was conducted to examine the direct and mediating associations between socioeconomic variables (education, literacy, welath level and media exposure), knowledge on pregnancy prevention, attitudes toward GBV, sexual behaviors, and early fertility.

Four key findings were obtained. First, pairwise comparison showed significant differences in most variables between non-indigenous women in urban area (UN) and those in rural area (RN) and between indigenous women in urban area (UI) and those in rural area (RI), whereas over one-third variables were not significantly different between UN and UI and between RN and RI. This implicated that geographical difference had stronger influence than ethnicity to the factors that would directly and indirectly be related to early fertility. There exists disparities of living conditions between urban and rural areas in most countries, which are wider in low and low middle income countries (LMIC). The results showed the existence of geographical disparities in Guatemala more than ethnic disparities.

Second, the results showed that all three groups (UI, RN and RI) had complementary mediation between "highest education level" and outcome via "sexual behavior." This indicates that young women with low educational attainment tend to have risky sexual behaviors, which leads to a higher chance of early fertility. Previous studies showed significant associations between education level and both health-seeking behaviors and outcome related to reproductive health (Greenway et al., 2012; Lam et al., 2013). This study further shows that reducing risky sexual behaviors functions as a mediator, which is originally influenced from having better educational attainment. The results illustrate that educational attainment and risky sexual behavior play a crucial role in early fertility among both indigenous and non-indigenous women in rural area as well as indigenous women in urban area.

Third, in addition to the path between "highest education level" and outcome via "sexual behavior," RI had complementary mediation between "media exposure" and outcome via "knowledge on pregnancy prevention" and "contraceptive use," as well as the mediation via "sexual behavior" (Table 5c). This indicates more media exposure and better educational attainment would lead to better knowledge on pregnancy prevention, which mediates less risky sexual behavior as well as more contraceptive use, which in turn leads to reducing early fertility. Previous studies showed that having better knowledge on sexual and reproductive health would reduce risk sexual behavior among adolescent women (Champion et al., 2013; Finlay et al., 2020; Magadi et al., 2022). Additionally, studies in sub-Saharan Africa that included media exposure as explanatory variables show association between media exposure and sexual behaviors and outcome on early fertility (Ahinkorah, Ameyaw, et al., 2020). This study further illustrate that media exposure has not only direct association, but also indirect association to early fertility. Additionally, this study illustrates that both knowledge on pregnancy prevention and contraceptive use function as mediators to prevent early fertility among indigenous women in rural area. Since the variables that functioned as either exogenous variable and mediators in RI (education, media exposure, knowledge on pregnancy prevention, contraceptive use and risky sexual behaviors) have significantly low values compared with other three groups according to descriptive statistics (Tables 1, 2), improvement of those factors is recommended to reduce early fertility among indigenous young women in rural area.

Fourth, direct associations between knowledge on contraceptive methods and sexual behavior in all three groups and between knowledge on contraceptive methods and contraceptive use in RI had negative coefficients, which leads to competitive mediation in the paths that mediate knowledge on contraceptive methods (see Table 5a-c). According to suggestions made to the interpretation of competitive mediation (Hair Jr. et al., 2021), it is assumed that having better knowledge and attitudes on contraceptive methods did not reduce sexual behavior or increase contraveptive use. In Latin America "machismo" persists, a set of beliefs that men are superior to women (Pan American Health Organization, 2019), including Guatemala. Due to this "machismo" belief, women cannot make have decision-making power on risky sexual behaviors as well as contraceptive use, which leads early fertility although the women have knowledge of contraceptive methods and have intention to use them. For example, studies in sub-Saharan Africa showed adolescents who had the capacity of decision-making on sexual intercourse and condom use had higher and safer use of contraceptive methods (Ahinkorah, Hagan, et al., 2020). This study used the existing dataset that did not include the data on which (man or women) made an actual decision on contraceptive use, not only the intention. Further study is needed to investigate the gap between knowledge, attitudes, actual decision-making, and risky sexual behaviors in both genders.

4.1. Limitations

This study had some limitations. The analysis used cross-sectional data collected within a specific time frame (2014 and 2015). Thus, only associations were established, and causal inferences or temporal relationships between the studied variables were not established. Furthermore, some questions were answered retrospectively and were susceptible to recall bias and memory lapse.

The study used data from the National Survey on Maternal and Child Health (Encuesta Nacional de Salud Materno Infantil, ENSMI) conducted in 2014 and 2015, which is considered relatively outdated. This especially applies to media exposure since internet and mobile phone usage became dominant tools for fading information. However, it is still the most recent nationally representative surveys focused on adolescent sexual and reproductive health in Guatemala at the time of writing. Therefore, data from ENSMI 2014-2015 are acceptable for this study, even though certain socioeconomic and health indicators have improved in the last ten years (Pan American Health Organization, 2019).

There was a limitation in the selection of indicators related to decision-making power related to risky sexual behaviors. This study used the existing dataset, ENSMI 2014-2015, that did not include the data on who (men or women) made the actual decision related to risky sexual behaviors, not only the attitudes toward decision-making power. Future studies should assess the variables to investigate the gap between knowledge, attitudes, actual decision-making, and risky sexual behaviors in both genders.

4.2. Conclusions

Despite these limitations, this study provides new insights into adolescent pregnancy and childbearing mechanisms in Guatemala by introducing a concept of mediating factors. PLS-SEM analysis showes that educational attainment and risky sexual behavior play a crucial role in early fertility among both indigenous and non-indigenous women in rural area as well as indigenous women in urban area. In addition to education and risky sexual behaviors, the results illustrate that media exposure, knowledge on pregnancy prevention and actual contraceptive use would directly and indirectly influence to early fertility among indigenous young women in rural areas. As implications for implementation, strengthening of those

influencial factors is recommended to reduce early fertility among indigenous young women in rural area since they have significantly low values among them compared with other groups, with addressing geographic barriers. Further discussion on elaboration of variables measuring the actual decision-making related to risky sexual behaviors are suggested.

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Appendix

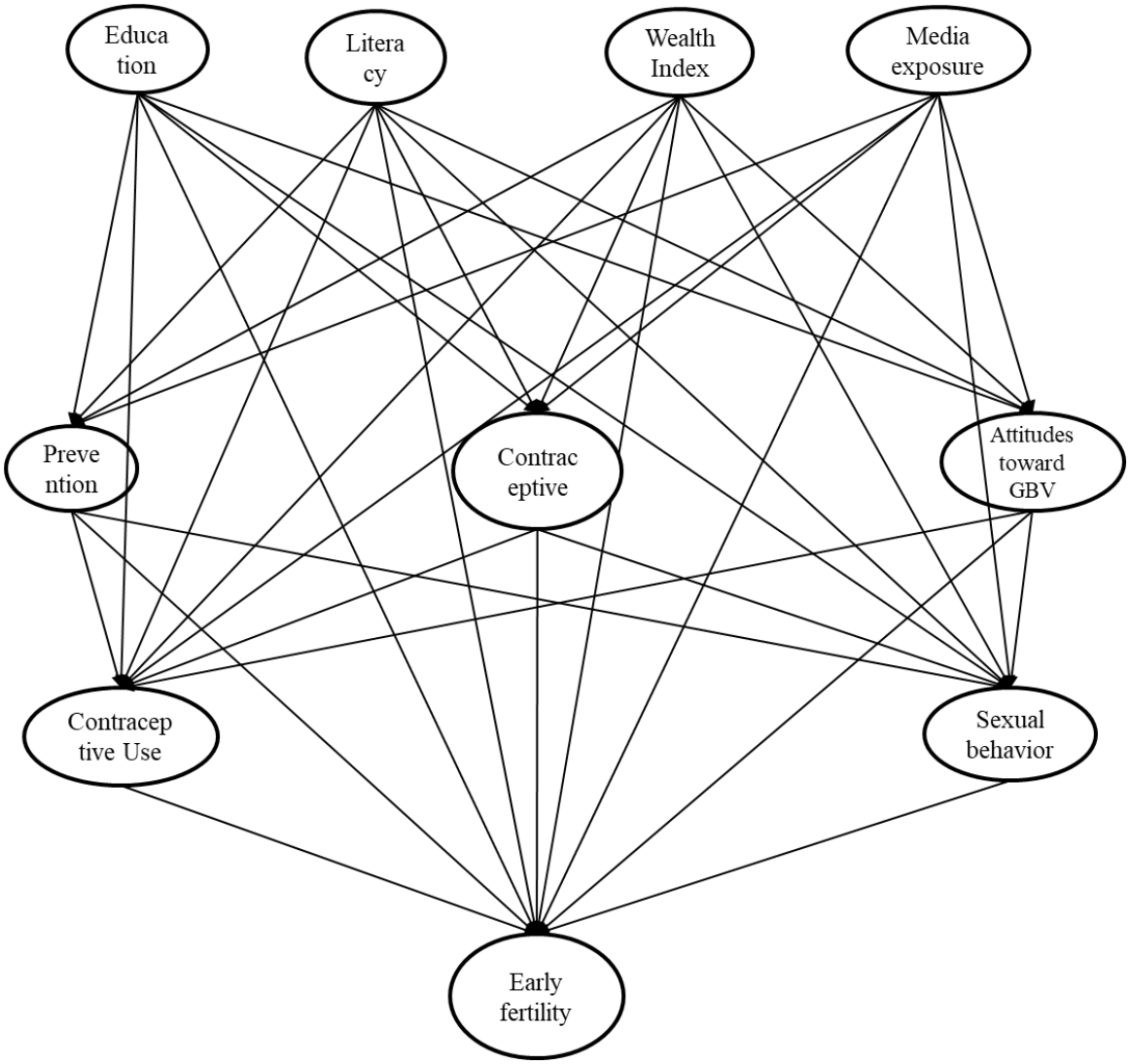
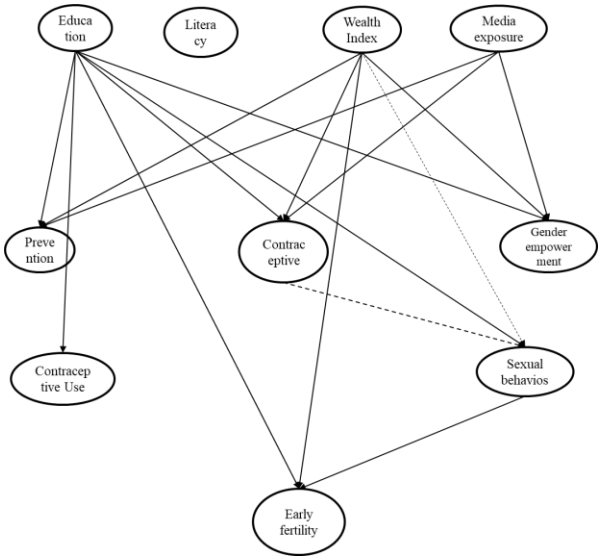
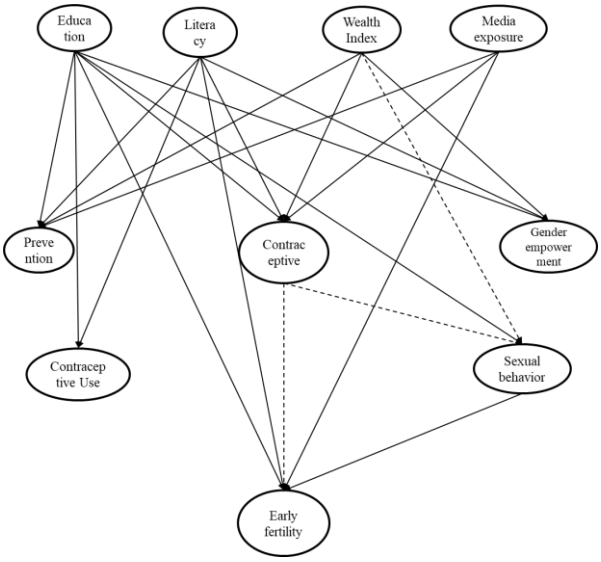


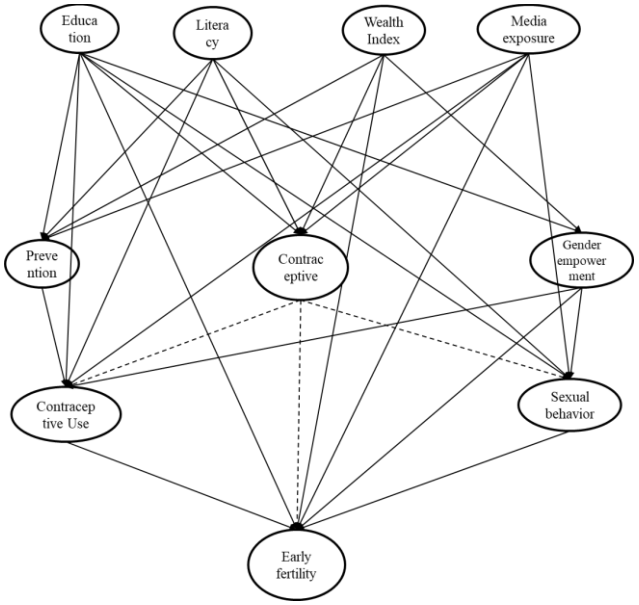
Figure 1. Path diagram of hypothesized model
Note. Prevention: knowledge on pregnancy prevention, Contraceptive: knowledge on contraceptive methods.



a: indigenous women in urban area (UI)



b: non-indigenous women in rural area (RN)



c: indigenous women in rural area (RI)

Figure 2. Significant associations between the variables
Note. Prevention: knowledge on pregnancy prevention, Contraceptive: knowledge on contraceptive methods.

Table 1.
Descriptive characteristics of the participants

Characteristic	UN	UI	RN	RI
Education, n (%)				
no education	23 (1.9%)	41 (4.9%)	105 (7.3%)	148 (11.0%)
incomplete primary	112 (9.2%)	141 (17.0%)	416 (28.9%)	487 (36.2%)
complete primary	118 (9.7%)	117 (14.1%)	308 (21.4%)	322 (24.0%)
incomplete secondary	396 (32.6%)	247 (29.8%)	360 (25.1%)	250 (18.6%)
complete secondary	321 (26.4%)	189 (22.8%)	164 (11.4%)	103 (7.7%)
higher	246 (20.2%)	94 (11.3%)	84 (5.8%)	34 (2.5%)
Literacy, n (%)				
cannot read at all	28 (2.3%)	47 (5.7%)	130 (9.1%)	195 (14.6%)
able to read only parts of sentence	30 (2.5%)	55 (6.7%)	129 (9.0%)	163 (12.2%)
able to read whole sentence	1,158 (95.2%)	725 (87.7%)	1,177 (82.0%)	981 (73.3%)
Wealth Index, n (%)				
poorest	36 (3.0%)	69 (8.3%)	267 (18.6%)	515 (38.3%)
poorer	83 (6.8%)	130 (15.7%)	382 (26.6%)	394 (29.3%)
middle	154 (12.7%)	185 (22.3%)	393 (27.3%)	272 (20.2%)
richer	343 (28.2%)	234 (28.2%)	290 (20.2%)	128 (9.5%)
richest	600 (49.3%)	211 (25.5%)	105 (7.3%)	35 (2.6%)
Media exposure, n (%)				
newspaper				
at least once a week	796 (65.5%)	451 (54.4%)	685 (47.7%)	488 (36.3%)
less than once a week	262 (21.5%)	198 (23.9%)	367 (25.6%)	323 (24.0%)
not at all	158 (13.0%)	180 (21.7%)	384 (26.7%)	533 (39.7%)
radio				
at least once a week	884 (72.7%)	662 (79.9%)	969 (67.4%)	911 (67.8%)
less than once a week	215 (17.7%)	104 (12.5%)	202 (14.1%)	199 (14.8%)
not at all	117 (9.6%)	63 (7.6%)	266 (18.5%)	233 (17.3%)
TV				
at least once a week	1,073 (88.2%)	654 (78.9%)	997 (69.4%)	682 (50.7%)
less than once a week	95 (7.8%)	94 (11.3%)	158 (11.0%)	184 (13.7%)
not at all	48 (3.9%)	81 (9.8%)	282 (19.6%=	478 (35.6%)
Knowledge on pregnancy prevention, n (%)				
ovulatory cycle				
Yes	320 (26.3%)	193 (23.3%)	267 (18.6%)	218 (16.2%)
No	895 (73.7%)	635 (76.7%)	1,169 (81.4%)	1,126 (83.8%)
use condom				
Yes	1,011 (83.1%)	598 (72.1%)	1,128 (78.5%)	762 (56.7%)
No	205 (16.9%)	231 (27.9%)	309 (21.5%)	582 (43.3%)
have only one sex partner				
Yes	1,127 (92.7%)	695 (83.8%)	1,218 (84.8%)	911 (67.8%)
No	89 (7.3%)	134 (16.2%)	219 (15.2%)	433 (32.2%)
Knowledge on contraceptive methods, n (%)				
know any contraceptive method				
Yes	1,214 (99.8%)	810 (97.7%)	1,427 (99.3%)	1,275 (94.9%)
No	2 (0.2%)	19 (2.3%)	10 (0.7%)	69 (5.1%)
know any source for condoms				
source known	1,193 (98.1%)	700 (84.5%)	1,225 (85.2%)	887 (66.0%)
no source known	19 (1.6%)	77 (9.3%)	154 (10.7%)	229 (17.0%)
don't know condom	4 (0.3%)	51 (6.2%)	58 (4.0%)	228 (17.0%)
can get a condom				
Yes	948 (78.1%)	517 (62.4%)	904 (62.9%)	630 (46.9%)
No	266 (21.9%)	312 (37.6%)	533 (37.1%)	712 (53.1%)
justified condom use for STI prevention				
Yes	1,182 (97.2%)	698 (84.2%)	1,298 (90.3%)	915 (68.1%)
No	34 (2.8%)	131 (15.8%)	139 (9.7%)	429 (31.9%)

Characteristic	UN	UI	RN	RI
Attitudes toward GBV, n (%)				
beating wife goes out				
Yes	1,207 (99.3%)	817 (98.6%)	1,373 (95.5%)	1,273 (94.7%)
No	9 (0.7%)	12 (1.4%)	64 (4.5%)	71 (5.3%)
beating negect				
yes	1,180 (97.0%)	791 (95.4%)	1,295 (90.1%)	1,215 (90.4%)
no	36 (3.0%)	38 (4.6%)	142 (9.9%)	129 (9.6%)
beating argue				
yes	1,204 (99.0%)	815 (98.3%)	1,368 (95.2%)	1,296 (96.4%)
no	12 (1.0%)	14 (1.7%)	69 (4.8%)	48 (3.6%)
beating refuse sex				
yes	1,205 (99.1%)	819 (98.8%)	1,398 (97.3%)	1,295 (96.4%)
no	11 (0.9%)	10 (1.2%)	39 (2.7%)	49 (3.6%)
beating burns food				
yes	1,207 (99.3%)	809 (97.6%)	1,362 (94.8%)	1,277 (95.0%)
no	9 (0.7%)	20 (2.4%)	75 (5.2%)	67 (5.0%)
Contraceptive use, n (%)				
using modern method	365 (30.0%)	177 (21.4%)	411 (28.6%)	270 (20.1%)
using traditional method	76 (6.3%)	46 (5.5%)	92 (6.4%)	96 (7.1%)
non-user - intends to use later	346 (28.5%)	227 (27.4%)	467 (32.5%)	432 (32.1%)
does not intend to use	46 (3.8%)	51 (6.2%)	107 (7.4%)	182 (13.5%)
never had sex	383 (31.5%)	328 (39.6%)	360 (25.1%)	364 (27.1%)
Sexual behavior, n (%)				
age 1st sex				
10 to 14	177 (14.6%)	109 (13.2%)	154 (10.8%)	160 (11.9%)
15-19	570 (47.1%)	350 (42.4%)	789 (55.2%)	671 (50.1%)
20-24	80 (6.6%)	38 (4.6%)	126 (8.8%)	144 (10.8%)
never had sex	383 (31.7%)	328 (39.8%)	360 (25.2%)	364 (27.2%)
number of sex partners				
0	385 (31.7%)	328 (39.6%)	360 (25.1%)	364 (27.1%)
1	566 (46.5%)	408 (49.2%)	885 (61.6%)	870 (64.7%)
2 to 5	250 (20.6%)	92 (11.1%)	187 (13.0%)	109 (8.1%)
6 or more	15 (1.2%)	1 (0.1%)	4 (0.3%)	1 (0.1%)
Early fertility, n (%)				
age of first parturition				
10 to 14	17 (1.4%)	7 (0.8%)	32 (2.2%)	30 (2.2%)
15-19	330 (27.1%)	229 (27.6%)	620 (43.1%)	580 (43.2%)
20-24	226 (18.6%)	136 (16.4%)	258 (18.0%)	218 (16.2%)
never given birth	643 (52.9%)	457 (55.1%)	527 (36.7%)	516 (38.4%)
total number of children				
0	643 (52.9 %)	457 (55.1 %)	527 (36.7 %)	516 (38.4 %)
1	365 (30.0 %)	230 (27.7 %)	458 (31.9 %)	372 (27.7 %)
2	165 (13.6 %)	112 (13.5 %)	320 (22.3 %)	290 (21.6 %)
3	39 (3.2 %)	23 (2.8 %)	102 (7.1 %)	137 (10.2 %)
4	4 (0.3 %)	5 (0.6 %)	28 (1.9 %)	25 (1.9 %)
5	0 (0.0 %)	2 (0.2 %)	2 (0.1 %)	4 (0.3 %)

Note. UN : Non-indigenous women in urban area, UI: Indigenous women in urban area, RN: Non-indigenous women in rural area, and RI: Indigenous women in rural area.

Table 2.
Pairwise multiple comparisons of variables among four groups

	UN - UI	**UN - RN**	**UN - RI**	**UI - RN**	**UI - RI**	**RN - RI**
Education	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Literacy	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Wealth Index	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Media exposure						
newspaper	< 0.001	< 0.001	< 0.001	0.001	< 0.001	< 0.001
radio	0.001	< 0.001	< 0.001	< 0.001	< 0.001	*0.697*
TV	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Knowledge on pregnancy prevention						
ovulatory cycle	*0.097*	< 0.001	< 0.001	0.008	< 0.001	*0.123*
use condom	< 0.001	0.008	< 0.001	0.001	< 0.001	< 0.001
have only one sex partner	< 0.001	< 0.001	< 0.001	*0.582*	< 0.001	< 0.001
Knowledge on contraceptive methods						
know any contraceptive method	0.001	*0.338*	< 0.001	0.010	< 0.001	< 0.001
know any source for condoms	< 0.001	< 0.001	< 0.001	*0.537*	< 0.001	< 0.001
can get a condom	< 0.001	< 0.001	< 0.001	*0.797*	< 0.001	< 0.001
justified condom use for STI prevention	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Attitudes toward GBV						
beating wife goes out	*0.375*	< 0.001	< 0.001	< 0.001	< 0.001	*0.217*
beating negect	*0.162*	< 0.001	< 0.001	< 0.001	< 0.001	*0.772*
beating argue	*0.358*	< 0.001	< 0.001	< 0.001	0.012	*0.056*
beating refuse sex	*0.652*	0.002	< 0.001	0.020	< 0.001	*0.098*
beating burns food	0.045	< 0.001	< 0.001	0.001	0.002	*0.739*
Contraceptive use	*0.253*	< 0.001	< 0.001	< 0.001	< 0.001	0.010
Sexual behavior						
age 1st sex	0.002	*0.226*	*0.916*	< 0.001	0.001	*0.257*
number of sex partners	< 0.001	*0.855*	0.005	< 0.001	< 0.001	0.006
Early fertility						
age of first parturition	*0.497*	< 0.001	< 0.001	< 0.001	< 0.001	*0.604*
total number of children	*0.515*	< 0.001	< 0.001	< 0.001	< 0.001	*0.733*

Note. The values shown in the table are p-values. P-values with italicized letters show non-significant differences.

Table 3.
Validity and reliability analysis

	UI				RN				RI			
	loadings	**VIF**	**CR**	**AVE**	**loadings**	**VIF**	**CR**	**AVE**	**loadings**	**VIF**	**CR**	**AVE**
Media exposure			0.727	0.480			0.761	0.522			0.759	0.524
Newspaper	0.798***	1.105			0.761***	1.144			0.836***	1.176		
radio	0.494***	1.084			0.577***	1.204			0.486***	1.176		
TV	0.718***	1.116			0.810***	1.211			0.790***	1.239		
Prevention			0.812	0.603			0.801	0.580			0.877	0.705
ovulatory cycle	0.895***	1.585			0.909***	1.334			0.921***	1.821		
use condom	0.501***	1.303			0.682***	1.251			0.772***	1.589		
have only one sex partner	0.855***	1.509			0.757***	1.368			0.811***	1.850		
Contraceptive			0.820	0.546			0.832	0.626			0.845	0.586
know any method	0.464***	1.280							0.545***	1.190		
know source for condoms	0.902***	2.112			0.902***	1.773			0.922***	1.190		
can get a condom	0.670***	1.347			0.589***	1.251			0.668***	1.190		
condom use for STI prevention	0.811***	1.587			0.747***	1.368			0.848***	1.190		
Attitudes toward GBV			0.776	0.467			0.862	0.557			0.802	0.458
beating if wife goes out					0.723***	1.593				1.222		
beating if she neglects	0.679***	1.121			0.818***	1.532			0.682***	1.396		
beating if she argues	0.609***	1.586			0.741***	1.740			0.650***	1.398		
beating if she refuses sex	0.566***	1.623			0.632***	1.430			0.497**	1.434		
beating if she burns food	0.740***	1.195			0.726***	1.911			0.752***	1.419		
Sexual behavior			0.920	0.852			0.885	0.796			0.844	0.736
age of 1st sex	0.843***	2.717			0.776***	1.962			0.688***	2.162		
number of sex partners	0.995***	2.717			0.992***	1.962			0.997***	2.162		
Early fertility			0.956	0.916			0.948	0.902			0.941	0.890
age of 1st childbirth	0.986***	3.680			0.983***	3.160			0.993***	3.222		
total children ever born	0.926***	3.680			0.915***	3.160			0.891***	3.222		

Note. Prevention: knowledge on pregnancy prevention, Contraceptive: knowledge on contraceptive methods. ** p<0.01, and ***: p<0.001

Table 4.
Direct associations between the variables

Paths			Path coefficient		
			UI	**RN**	**RI**
Education	->	Contraceptive	0.261***	0.080**	0.089**
Education	->	Prevention	0.237***	0.114***	0.139***
Education	->	Attitudes toward GBV	0.070	0.110***	0.110**
Education	->	Sexual behaviors	0.328***	0.302***	0.235***
Education	->	ContraceptiveU	0.306***	0.238***	0.217***
Education	->	Early fertility	0.250***	0.219***	0.184***
Literacy	->	Contraceptive	-0.024	0.158***	0.120**
Literacy	->	Prevention	0.027	0.112**	0.122***
Literacy	->	Attitudes toward GBV	0.016	0.116*	-0.043
Literacy	->	Sexual behaviors	-0.057	-0.042	-0.104**
Literacy	->	ContraceptiveU	-0.070	-0.065*	-0.086*
Literacy	->	Early fertility	0.023	-0.017	0.003
Wealth index	->	Contraceptive	0.175***	0.119***	0.104***
Wealth index	->	Prevention	0.178***	0.028	0.073**
Wealth index	->	Attitudes toward GBV	0.075*	0.106***	0.064*
Wealth index	->	Sexual behaviors	-0.113**	-0.071*	0.010
Wealth index	->	ContraceptiveU	-0.039	0.018	0.040
Wealth index	->	Early fertility	0.072*	0.115***	0.068**
Media	->	Contraceptive	0.179***	0.241***	0.239***
Media	->	Prevention	0.163***	0.208***	0.262***
Media	->	Attitudes toward GBV	0.180**	0.024	0.032
Media	->	Sexual behaviors	0.050	0.043	0.126***
Media	->	ContraceptiveU	0.005	0.044	0.087*
Media	->	Early fertility	0.009	0.068*	0.069*
Contraceptive	->	Sexual behaviors	-0.223***	-0.137***	-0.262***
Contraceptive	->	ContraceptiveU	-0.071	0.025	-0.151***
Contraceptive	->	Early fertility	-0.051	-0.058*	-0.135***
Prevention	->	Sexual behaviors	0.071	-0.035	0.012
Prevention	->	ContraceptiveU	0.047	-0.022	0.107**
Prevention	->	Early fertility	-0.026	-0.028	0.003
Attitudes toward GBV	->	Sexual behaviors	-0.040	-0.018	0.052
Attitudes toward GBV	->	ContraceptiveU	-0.062	-0.021	0.017
Attitudes toward GBV	->	Early fertility	0.007	0.006	-0.006
Sexual behaviors	->	Early fertility	0.547***	0.531***	0.507***
ContraceptiveU	->	Early fertility	-0.029	-0.026	0.083**

Note. Education: highest education level, Media: media exposure, Prevention: knowledge on pregnancy prevention, Contraceptive: knowledge on contraceptive methods, ContraceptiveU: contraceptive use.
*: $p<0.05$, **: $p<0.01$, and ***: $p<0.001$.

Table 5.
List of significant mediating paths

a. Indigenous women in urban area (UI)

Path							Path coefficient
Education	->	Contraceptive	->	Sexual behavior	->	Early fertility	-0.032***
Education	->	Sexual behavior	->	Early fertility			0.179***
Wealth index	->	Contraceptive	->	Sexual behavior	->	Early fertility	-0.021**
Wealth index	->	Sexual behavior	->	Early fertility			-0.062**
Media	->	Contraceptive	->	Sexual behavior	->	Early fertility	-0.022**

b. Non-indigenous women in rural area (RN)

Path							Path coefficient
Education	->	Contraceptive	->	Sexual behavior	->	Early fertility	-0.006*
Education	->	Sexual behavior	->	Early fertility			0.161***
Literacy	->	Contraceptive	->	Sexual behavior	->	Early fertility	-0.012**
Wealth index	->	Contraceptive	->	Sexual behavior	->	Early fertility	-0.009**
Wealth index	->	Sexual behavior	->	Early fertility			-0.038*
Media	->	Contraceptive	->	Sexual behavior	->	Early fertility	-0.017***
Media	->	Contraceptive	->	Early fertility			-0.014*

c. Indigenous women in rural area (RI)

Path							Path coefficient
Education	->	Contraceptive	->	Early fertility			-0.012**
Education	->	Sexual behavior	->	Early fertility			0.119***
Education	->	ContraceptiveU	->	Early fertility			0.018**
Literacy	->	Contraceptive	->	Early fertility			-0.016*
Wealth index	->	Contraceptive	->	Early fertility			-0.014**
Media	->	Contraceptive	->	ContraceptiveU	->	Early fertility	-0.003*
Media	->	Contraceptive	->	Early fertility			-0.032***
Media	->	Prevention	->	ContraceptiveU	->	Early fertility	0.002*
Media	->	Sexual behavior	->	Early fertility			0.064***

Note. Education: highest education level, Media: media exposure, Prevention: knowledge on pregnancy prevention, Contraceptive: knowledge on contraceptive methods, ContraceptiveU: contraceptive use.
*: $p<0.05$, **: $p<0.01$, and ***: $p<0.001$.