

Incidence of sociodemographic conditions on family planning: An analysis for the Ecuadorian case using cross-sectional micro data

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Abstract:

Background: Family planning is an essential component of primary and reproductive health care, neglected mainly in socially vulnerable populations, since poor family planning leads to scenarios of violence, neglect, and the spread of inequality and poverty. The main objective of our research is to evaluate the main sociodemographic factors of knowledge, access to family planning and its use in women of reproductive age. A country's fertility is one of its key elements for social and economic development. Therefore, analyzing these data contributes to the creation and monitoring of Family Planning Public Policies, which directly affect the population.

Materials and Methods: A nationally representative sample of 20,355 women over 12 years of age from the 2018 National Health and Nutrition Survey (ENSANUT) was used. We used multicollinearity tests to rule out possible statistical modeling problems and a binary logistic linear regression model where Odds Ratio (OR) with their 95% confidence intervals (95% CI) were estimated for each of the independent variables. In addition, we used specificity tests to test the fit between our dependent and independent variables.

Results: Our results show that income, age, ethnicity, level of schooling, number of children and area of residence are important factors explaining knowledge, access and use of family planning methods. Specifically, we found that high income (OR=1.68), being of mixed race (OR=1.43) and a high level of schooling (OR=1.54) positively predict access to family planning methods. While, older age (OR=-1.07), being unemployed (OR=-0.21) and living in rural areas (OR=-1.75) negatively predicted access to family planning methods. These results remained relatively unchanged when we used the dependent variables of knowledge and use of family planning methods.

Conclusion: The level of knowledge of family planning methods is acceptable; however, this is not reflected in their use. The age of early sexual debut is a determining factor of vulnerability, given that it is influenced by the poverty of these women. Another important factor was ethnicity. Therefore, it is fundamental and the duty of the state to have clear family planning policies, to respect the decision of women when they decide to plan their reproductive life, and the right they have not to have interference in their decision, as well as access and availability to the widest range of contraceptive methods. In addition, our results indicate that public health family planning policies should be oriented to expand their scope, taking into account many sociodemographic characteristics of the Ecuadorian population.

Key Word: family planning, women, social vulnerability, social vulnerability

I. Introduction

Reproductive health is a priority in health services, since the provision of family planning services is a preventive health action that allows individuals to exercise their right to freely decide the number and timing of their children.¹ Contraceptive methods are those that prevent or significantly reduce the possibility of fertilization in women. Access to contraceptive methods can contribute to reduce the risk of unwanted pregnancies, to reduce the risk of acquiring sexually transmitted diseases, or to space pregnancies in stable couples, contributing in an important way to improve different aspects of public health, especially in adolescents.²

According to data from the World Health Organization, unplanned pregnancies continue to be a major public health problem worldwide. An estimated 74 million women in low- and middle-income countries have unintended pregnancies each year, resulting in 25 million unsafe abortions and 47,000 maternal deaths annually.³ In this context, special emphasis is placed on the close relationship between poverty, unsafe abortions and high maternal mortality rates, since, as a consequence of the lack of maternal health care and the scarce access to contraceptive methods, women and pregnant women resort to dangerous and clandestine procedures that put their lives at high risk.⁴

The incidence of complications from unsafe abortion can have a substantial impact on the fragile health system in developing countries, with an estimated 4.7% to 13.2% of maternal deaths due to unsafe abortion each year. It is estimated that 30 deaths occur for every 100,000 unsafe abortions in developed regions, while this proportion rises to 220 deaths per 100,000 unsafe abortions in developing regions.⁵ One of the strategies to reduce the number of unintended pregnancies is the use of contraceptive methods, yet their use has been low, as contraceptive use has increased by only 2.1 percentage points, from 55% to 57.1%, worldwide.⁶

The number of studies showing a low use of contraceptive methods in spite of knowing the importance of contraceptive use is striking. So why is the use of contraceptive methods low if the diffusion of knowledge about contraceptive methods is high? The data indicate that the information and education provided on contraceptive methods and sexual and reproductive health have not alleviated the problem, revealing that other variables are involved such as: costs, place of residence, age, level of education, level of knowledge, socioeconomic conditions, sexual and reproductive behaviors, parity, perceptions about contraception, level of satisfaction in relation to visiting the professionals with whom they follow control of these methods, erroneous beliefs such as that using contraceptive methods is synonymous with abortion, guilt, stigma, partner and family, access and availability of methods and reproductive education.⁷ However, other studies show that many women do not use contraceptives, even if they know about them, mainly due to lack of awareness and despite the availability of health services that provide contraceptives to women in urban areas; those who have greater availability of contraceptives showed no differences with women in rural areas.⁸

Cultural barriers are based on beliefs, ideas, values, habits that are transmitted from generation to generation, which make it difficult for people to lack the capacity for intercultural understanding, barriers that probably influence people's attitudes towards developing healthy lifestyles, which will be generators of quality of life, of healthy societies. These are the factors that prevent people from taking responsibility for their own health in an adequate manner and with the same opportunities as others.⁹ Detecting family planning problems in women could help to create more efficient prevention strategies in accordance with women's perceived needs, the large number of unplanned pregnancies and unsafe abortions; the use of contraceptives promotes the right of individuals to decide the number of children they wish to have and the interval between pregnancies.¹⁰

The ideal in contraception is that each woman can choose an appropriate method according to her age, health condition, cohabitation status and desire to become pregnant in the future, even that she will use the method until the risk of unwanted pregnancy disappears or when the circumstances of her life change and at that moment she will choose a different method; the selected method, used correctly, should reduce the risk of unwanted pregnancy to its theoretical minimum.¹¹ In today, is considered as a primary goal of the family planning program, the improvement of the health reproductive health of couples, improve the quality of life and promote the free and well-formed choice of some contraceptive method, según the requirements of each woman.¹² Given the national situation characterized by aspects such as the initiation of sexual relations at early ages, the broad need for sexual and affective education and changes in the experience of sexuality, the objective of this work is to determine the factors that influence the use of contraceptive methods in women of childbearing age, defined by national laws as those in the age range of 10 to 49 years.

II. Material And Methods

Study Design and Population: A cross-sectional study was conducted with data obtained from the 2018 National Health and Nutrition Survey of Ecuador (ENSANUT), whose data were obtained and presented by the National Institute of Statistics and Census (INEC). After cleaning the database, a total of 20355 Ecuadorian women of childbearing age were obtained.

Inclusion and Exclusion Criteria: Data from women between 12 and 49 years of age were included.

Source of Information: ENSANUT 2018 is a survey included in the National Statistical Program that employs probability sampling applied every 5 years and whose target population is all household members in the 24 provinces of Ecuador. The ENSANUT 2018 includes the HOGAR form where all the characteristics of the Ecuadorian population are evidenced in order to make representative estimates at the national level, urban-rural, by geographic domain for the 24 provinces of the country.

Study Variables. Our dependent variable is knowledge, access and use of family planning methods. The information for this variable was obtained by calculating the data provided in the Women of childbearing age form. Our independent variable included all sociodemographic characteristics.

Statistical Analysis. The ENSANUT 2018 survey database was analyzed with the statistical package Stata v15 (Stata Corporation, College Station, Texas, USA). A value of $p < 0.05$ was considered to determine statistical significance between variables. The Chi-square test was used to determine the overall correlation between the variables of interest. The association was evaluated by prevalence ratios with their respective 95% confidence intervals with an analysis for each of the variables included in the study, the independent variable of interest being the sociodemographic conditions of each participant.

Finally, for the determination of the predictor variables, the ROC curve was applied with the probabilities estimated by applying logistic regression under the method of introducing their confidence intervals and their statistical significance $p < 0.05$.

Therefore, in order to estimate a discrete choice model that estimates the probability of knowing, accessing or using family planning methods:

$$FP = \beta_0 + \beta_1 X_i + \sum_{j=2}^{12} \beta_j Z_i + \varepsilon_i \quad (1).$$

Where FP_i represents family planning methods (measured by three variables: knowledge, access and use), X_i represents a set of sociodemographic characteristics, and represents a set of territorial control variables. Z_i represents a set of territorial control variables. Finally, ε_i represents the stochastic error term.

Ethical considerations. The present study did not require the approval of an institutional ethics committee for its execution, since it is an analysis of data freely available to the public and it was not necessary to use informed consent.

III. Result

Table 1 shows the descriptive statistics of the variables. Here we analyze all the variables used in this study. We observed that 28.89% of women have knowledge of family planning methods (CI: 27.02%-29.77%). On the other hand, 13.32% of women have access to contraceptive methods and 19.13% of women reported using family planning methods. This fact shows that there is a large gap between knowledge, access and use of family planning methods. The largest gap that is evident is between knowledge of and access to family planning methods. On the other hand, we observed that the women in our sample are on average 34 years old, have 4 children, an income of \$431 USD, 8 years of schooling, which is relatively low. This fact could explain the wide gaps between knowledge and use of contraceptive methods. In addition, in our sample women are predominantly Catholic, 69.45% are employed and work an average of 42 hours per week. In addition, 17.48% of the women are migrants, 75.61% are of mixed race, and 29.03% are married. Likewise, looking at the territorial variables, we observe that on average there are 151 inhabitants per square kilometer, the average per capita production (GVA) is \$1297 USD and 59.33% live in the urban area.

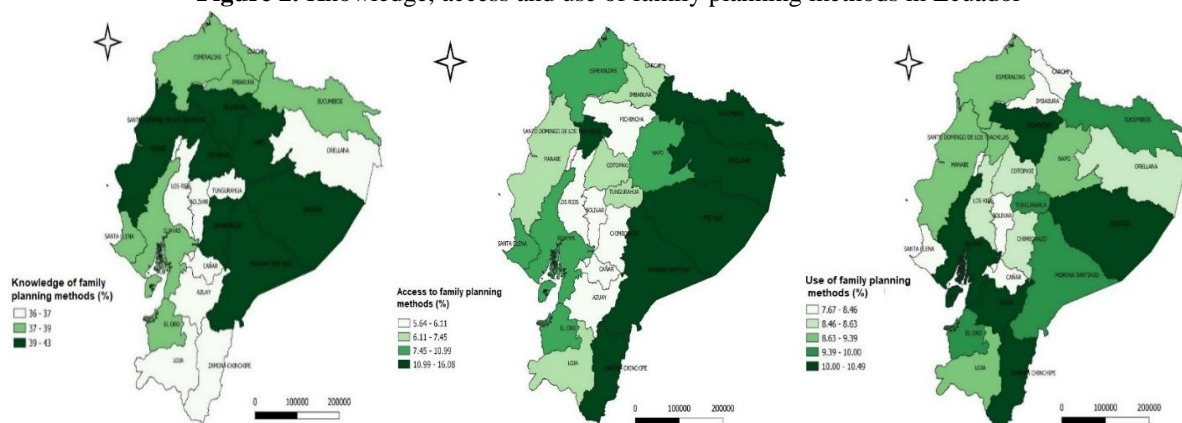
Table 1: Descriptive statistics of the variables used in this study

| Variable | Mean-Percent | SD | Min | Max | 95% CI | |
|--------------------------------------|--------------|------|-----|-----|--------|----------|
| <i>Family planning</i> | | | | | | |
| Knowledge of family planning methods | 28.89% | 0.44 | 0 | 1 | 27.02% | - 29.77% |
| Access to family planning methods | 13.32% | 0.89 | 0 | 1 | 11.17% | - 15.43% |
| Use of family planning methods | 19.13% | 0.44 | 0 | 1 | 17.35% | - 20.89% |
| <i>Age</i> | | | | | | |
| Age in years | 34 | 0.12 | 6 | 24 | 14.13 | - 16.22 |

| | | | | | | |
|---|---------|--------|-----|---------|--------|-----------|
| Number of children | | | | | | |
| Number of children at home | 4.12 | 0.25 | 0 | 8 | 4.01 | - 4.98 |
| Household income | | | | | | |
| Income in dollars | 431.01 | 100 | 0 | 2033 | 441.68 | - 448.49 |
| Years of schooling | | | | | | |
| Years of schooling | 8.012 | 1.77 | 0 | 22 | 6.97 | - 9.96 |
| Religion | | | | | | |
| Protestant | 9.22% | 0.78 | 0 | 1 | 6.36% | - 10.98% |
| Catholic | 72.55% | 0.76 | 0 | 1 | 71.55% | - 73.87% |
| Mormon | 3.55% | 0.26 | 0 | 1 | 2.67% | - 4.77% |
| Work method | | | | | | |
| Employee | 69.45% | 0.66 | 0 | 1 | 66.45% | - 71.45% |
| Unemployed | 30.55% | 0.26 | 0 | 1 | 27.55% | - 32.55% |
| Out of the workforce | 3.55% | 0.26 | 0 | 1 | 2.67% | - 3.77% |
| Working hours | | | | | | |
| Number of working hours per week | 42.78 | 0.55 | 4 | 52 | 41.54 | - 46.86 |
| Are you a migrant? | | | | | | |
| Yes | 17.48% | 0.89 | 0 | 1 | 14.48% | - 19.48% |
| No | 82.52% | 0.67 | 0 | 1 | 79.52% | - 84.52% |
| Ethnicity | | | | | | |
| Indigenous | 14.73% | 0.35 | 0 | 1 | 14.26% | - 15.20% |
| Afro-Ecuadorian | 4.03% | 0.20 | 0 | 1 | 3.77% | - 4.29% |
| Mongrel | 75.61% | 0.43 | 0 | 1 | 75.04% | - 76.18% |
| White | 1.32% | 0.11 | 0 | 1 | 1.17% | - 1.47% |
| Montubio | 4.31% | 0.20 | 0 | 1 | 4.04% | - 4.58% |
| Marital status | | | | | | |
| Single | 11.45% | 0.35 | 0 | 1 | 14.26% | - 15.20% |
| Married | 29.03% | 0.20 | 0 | 1 | 27.77% | - 30.29% |
| Divorced | 19.61% | 0.43 | 0 | 1 | 15.04% | - 20.18% |
| Widow | 1.32% | 0.11 | 0 | 1 | 1.17% | - 1.47% |
| Free union | 22.31% | 0.20 | 0 | 1 | 20.04% | - 23.58% |
| Urban density | | | | | | |
| Inhabitants per square kilometer | 151.01 | 1152.5 | 321 | 2653.12 | 146.32 | - 160.33 |
| Economic development of the province | | | | | | |
| Provincial GVA per capita | 1297.65 | 540.5 | 321 | 2211.13 | 836.43 | - 1456.67 |
| Area | | | | | | |
| Urbana | 59.33% | 0.54 | 0 | 1 | 58.51% | - 59.51% |
| Rural | 44.49% | 0.36 | 0 | 1 | 41.49% | - 46.49% |

In **Figure 2** we observe the spatial distribution of women with knowledge, access and use of family planning methods. In the figure we observe a heterogeneous pattern between knowledge, access and use. The figure shows that knowledge of planning methods is more concentrated in the center of the country, covering the three natural regions: Coast, Highlands and East. On the other hand, access is more concentrated in the eastern region, perhaps this is due to the fact that in recent years there has been an information campaign, especially in the sectors where extractive activities (oil) were stronger. Likewise, we see that use is distributed heterogeneously throughout the country, with the provinces of Zamora, Pastaza, Azuay and Guayas being the provinces where most family planning methods are used.

Figure 2. Knowledge, access and use of family planning methods in Ecuador



We then performed a correlation matrix to perform a detailed analysis of the correlation between the variables and to highlight possible multicollinearity problems. **Table 2** shows significant correlations between our variables. We observe that there is a negative and significant correlation between age and knowledge of family planning methods. On the other hand, there is a negative correlation between the number of children; religion; form of work; marital status, and knowledge of family planning methods. Likewise, we observed a positive correlation between household income; years of schooling; migrant status; ethnicity; urban density; economic development; and knowledge of family planning methods. A similar pattern can be observed when we correlate access to and use of family planning methods. These results can be seen in Table A1 and Table A1 in the appendix. In general, the signs of the correlations are correct.

Table 2: Correlation matrix for the variables

| | Var 1A | Var 2 | Var 3 | Var 4 | Var 5 | Var 6 | Var 7 | Var 8 | Var 9 | Var 10 | Var 11 | Var 12 | Var 13 | Var 14 |
|-------|----------|----------|---------|----------|----------|---------|----------|----------|----------|---------|---------|---------|---------|--------|
| Var1A | 1 | | | | | | | | | | | | | |
| Var2 | -0.7705* | 1 | | | | | | | | | | | | |
| Var3 | -0.045 | 0.0042 | 1 | | | | | | | | | | | |
| Var4 | 0.0827* | 0.0759* | -0.0025 | 1 | | | | | | | | | | |
| Var5 | 0.8502* | 0.0598* | -0.0045 | -0.0227 | 1 | | | | | | | | | |
| Var6 | -0.7540* | 0.0207* | 0.0047 | -0.0229 | 0.7227* | 1 | | | | | | | | |
| Var7 | -0.0225 | 0.0594* | -0.0054 | 0.0024 | 0.0220* | 0.0252* | 1 | | | | | | | |
| Var8 | -0.0277* | 0.2222* | 0.0072 | 0.0227* | 0.0789* | 0.0787* | 0.0489* | 1 | | | | | | |
| Var9 | 0.0578* | 0.0058 | 0.0075 | 0.0000 | 0.0224 | 0.0248* | 0.0547* | -0.0797* | 1 | | | | | |
| Var10 | 0.0727* | 0.4754* | 0.0022 | 0.0529* | -0.0785* | 0.0404* | -0.0472* | 0.2700* | -0.2847* | 1 | | | | |
| Var11 | -0.0595 | -0.0979* | 0.0080 | 0.0074 | -0.0207* | 0.0277* | -0.0782* | -0.0228* | -0.2027* | 0.2259* | 1 | | | |
| Var12 | 0.0098* | 0.0552* | 0.0099 | -0.0440* | 0.0229* | 0.0287* | 0.2295* | 0.2254* | 0.2420* | 0.5042* | 0.2974* | 1 | | |
| Var13 | 0.0087 | 0.0452* | -0.0007 | 0.0025 | -0.0225 | 0.0022 | 0.0529* | 0.0075 | 0.2222* | 0.2598* | 0.2992* | 0.5082* | 1 | |
| Var14 | 0.0098* | 0.0552* | 0.0099 | -0.0440* | 0.0229* | 0.0287* | 0.2295* | 0.2254* | 0.2420* | 0.5042* | 0.2974* | 0.2598* | 0.2254* | 1 |

Note: Var 1A: Knowledge of family planning methods. Var 2: Age. Var 3: Number of children at home. Var 4: Household income. Var 5: Years of schooling. Var 6: Religion. Var 7: Form of work. Var 8: Working hours. Var 9: Migrant? Var 10: Ethnicity. Var 11: Marital status. Var 12: Urban density. Var 13: Economic development of the province. Var 14: Urban area. Asterisks mean: *p < 0.05.

Next, in order to rule out possible correlation problems, we performed a multicollinearity test. In **Table A1** we present this test. We use the Variance Inflation Factor (VIF) test to perform this test. We observe that no variable exceeds the threshold of 5 or 10 which is the threshold at which it is established that there are no multicollinearity or information redundancy problems in linear regressions.

Then, the confusion matrix of the model is shown. In **Table 3** we can see that the models we estimated are correctly specified. In the first model we use knowledge of family planning methods as the dependent variable, which is 69.41% specified by the independent variables. That is, the independent variables predict knowledge of family planning methods in 73.06% of the cases. Next, in the second model we use access to family planning methods as the dependent variable, which is 78.12% specified by the independent variables. Finally, in the third model, we use the use of family planning methods as the dependent variable, which is 81.38% specified by the independent variables. It is worth mentioning that this percentage is relatively high, being an acceptable level higher than 60%.

Table 3: Confusion matrix of the estimated models

| Knowledge of family planning methods | | | |
|---|------|------|--------|
| True | | | |
| Classified | D | ~D | Total |
| | 2873 | 1863 | 4736 |
| | 1415 | 1103 | 2518 |
| Total | 4288 | 2966 | 7254 |
| Correctly classified | | | 69.41% |

| Access to family baking methods | | | |
|--|------|------|--------|
| True | | | |
| Classified | D | ~D | Total |
| | 1281 | 523 | 4736 |
| | 1115 | 2132 | 2518 |
| Total | 4288 | 2966 | 7254 |
| Correctly classified | | | 78.12% |

| Use of family planning methods | | | |
|---------------------------------------|------|------|--------|
| True | | | |
| Classified | D | ~D | Total |
| | 1198 | 763 | 4736 |
| | 1102 | 1344 | 2518 |
| Total | 4288 | 4312 | 7254 |
| Correctly classified | | | 81.38% |

Table 4 below shows a multivariate logistic regression analysis to analyze the impact of sociodemographic factors on knowledge, access and use of family planning methods. Our logistic regression involves 20355 women of childbearing age. Here we observe that the dependent variable is a dichotomous variable that takes the value of 1 if a woman knows, can access or uses a family planning method and 0 otherwise. We find that, as expected, the odd ratio (OR) of many sociodemographic factors are greater than 1. Our results show that age increases the probability of knowing, accessing and using family planning methods. Likewise, we observed that the number of children reduces the probability of knowledge and that of planning methods, while there is a positive probability of access. This is due to the fact that family planning programs have focused more on serving mothers with a greater number of children. We also observe that household income increases knowledge, access and use of planning methods. The values of this variable are larger in magnitude than other coefficients. For example, we see that an increase in income increases 2.98 times (CI= 1.354;3.792) the probability of knowing about family planning methods. Other variables that significantly affect with OR greater than 1 are years of schooling, hours of work, urban density and economic development of the province. An interesting result is that the ORs of the religion variable are significant and greater than 1. That is, people who reported being Catholic or Mormon show a lower probability of knowing about, accessing or using family planning methods. Other variables with negative probabilities are formal work, i.e., unemployed women are less likely to know, access and use family planning methods. Likewise, Afro-Ecuadorian and Montubio ethnicities have negative ORs. Finally, we observed that living in rural areas negatively predicts the probability of knowing, accessing or using family planning methods.

In **Table 4** we also observe that the chi-square and log-likelihood statistics are stable and statistically correct. The chi-square statistic is significant suggesting that, taken together, the independent variables jointly explain the variability of the dependent variable. On the other hand, the log-likelihood statistic collects as much information as possible.

Table 4: Linear regression analysis between family planning and its socioeconomic factors.

| | Model1 | Model2 | Model3 |
|----------|-----------|-----------|-----------|
| | Knowledge | Access | Usage |
| Variable | OR/95% CI | OR/95% CI | OR/95% CI |
| Age | | | |
| Age | 1.285*** | 1.077*** | 1.715*** |

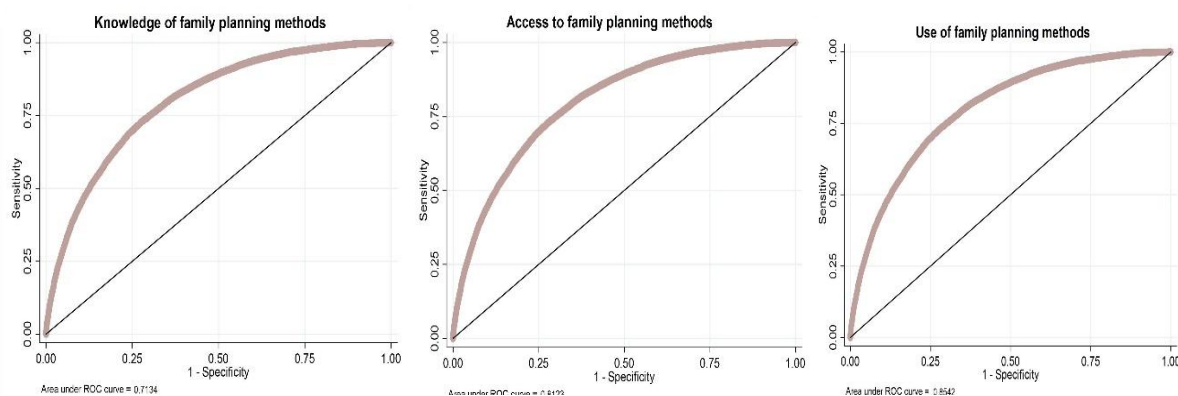
| | | | |
|----------------------------|------------------------------|------------------------------|------------------------------|
| | [1.196,1.374] | [1.014,1.139] | [91.602,1.828] |
| Number of children | | | |
| Number of children at home | -1.032** [-1.787,-1.097] | 1.054* [1.265,1.542] | -1.004*** [-1.807,-1.145] |
| Household income | | | |
| Income in dollars | 2.981** [1.354,3.792] | 1.687 [1.253,3.631] | 1.872 [1.772,3.264] |
| Years of schooling | | | |
| Years of schooling | 1.686*** [1.595,1.184] | 1.542* [1.860,1.409] | 1.001* [1.213,1.836] |
| Religion | | | |
| Protestant | Ref. | Ref. | Ref. |
| Catholic | -1.390*** [1.595,1.184] | -1.634*** [1.860,1.409] | -1.025*** [1.213,1.836] |
| Mormon | -1.581*** [1.536,1.626] | -1.269*** [1.250,1.289] | -1.235*** [1.167,2.303] |
| Work method | | | |
| Employee | Ref. | Ref. | Ref. |
| Unemployed | -1.455* [-1.615,-1.599] | -0.216 [-1.400,-1.459] | -0.032 [-1.413,-1.330] |
| Out of the workforce | -1.032* [1.595,13.184] | -0.321 [0.860,12.409] | -0.021 [0.213,0.836] |
| Working hours | | | |
| Number of working hours | 1.653 [-0.738,-0.693] | 0.654 [-0.833,-0.788] | 0.035 [-0.788,-0.742] |
| Are you a migrant? | | | |
| No | Ref. | Ref. | Ref. |
| Yes | 1.567* [1.640,0.099] | 0.535* [0.940,-4.244] | 0.045* [-3.548,-1.772] |
| Ethnicity | | | |
| Indigenous | Ref. | Ref. | Ref. |
| Afro-Ecuadorian | -1.043 [-1.570,-1.242] | -1.312 [-1.867,-1.522] | -1.067 [-1.255,-1.942] |
| Mongrel | 1.065 [1.817,1.333] | 1.432 [1.811,1.413] | 1.655 [1.658,1.098] |
| White | 1.986 [1.293,1.051] | 1.563 [-1.990,-1.804] | 1.192 [-1.465,-1.174] |
| Montubio | -1.654 [-1.570,1.242] | -0.643 [-1.867,9.122] | -0.431 [-1.255,-1.942] |
| Marital status | | | |
| Single | Ref. | Ref. | Ref. |
| Married | 2.390*** [1.595,2.184] | 1.634*** [1.860,1.409] | 1.025*** [1.213,1.836] |
| Divorced | 1.581*** [1.536,1.626] | 1.269*** [1.250,1.289] | 1.235*** [1.167,2.303] |
| Widow | -1.107*** [-1.615,-1.599] | -1.929*** [-1.400,-1.459] | -1.872*** [-1.413,-1.330] |
| Free union | 1.654 | 0.643 | 0.431 |

| | | | |
|---|-----------------|-----------------|-----------------|
| | [1.570,1.242] | [1.867,1.522] | [1.255,1.942] |
| Urban density | | | |
| Inhabitants per square kilometer | 1.654** | 1.543** | 1.031** |
| | [1.570,7.242] | [1.867,9.522] | [1.255,8.942] |
| Economic development of the province | | | |
| Provincial GVA per capita | 1.032** | 0.054 | 0.004 |
| | [13.787,15.097] | [18.265,19.542] | [15.807,17.145] |
| Area | | | |
| Urbana | Ref. | Ref. | Ref. |
| Rural | -1.456 | -1.753 | -1.912 |
| | [-1.570,-1.242] | [-1.867,-1.522] | [-1.255,-1.942] |
| Observations | 20,355 | 20,355 | 20,355 |
| AIC | 23975.03 | 22112.41 | 21654.98 |
| BIC | 23138.09 | 21148.12 | 22456.32 |
| R ² | 0.023 | 0.045 | 0.049 |
| X ² | 3.956*** | 3.664*** | 3.809*** |
| Log-likelihood | -31461.51 | -31456.12 | -31789.45 |

95% confidence intervals in brackets * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Finally, to determine the fit and explanation of the independent variables, we applied the ROC curve with the probabilities estimated by applying the logistic regression. The ROC curve in **Figure 2** coincides with the probability of correctly distinguishing a knowledge, access or use of planning methods from one that is not, through the significant predictor variables, with the worst scenario being when the area is equal to 0.50. In our case, age, number of children, household income, years of schooling, religion, being employed, being an Afro-Ecuadorian or Montubian migrant, married, living in a province of high urban density and with high economic development represented an area under the curve of the models of knowledge, access and use of methods of 0.71; 0.81 and 0.85 respectively. This indicates that the aforementioned socioeconomic factors adequately predict (positively or negatively) the cases of knowledge, access and use of family planning methods ($p < 0.001$).

Figure 2. ROC curves of estimated models



IV. Discussion

Reproductive health represents a priority for global health services, one of the most salient aspects of which is pregnancies, specifically unplanned pregnancies, as they suggest a problem for women's health worldwide.¹³ This literature review has synthesized and organized women's perceived barriers to contraceptive behavior and found that perceptions of contraceptive acceptance depend on individual, interpersonal and organizational factors such as myths, misconceptions, beliefs and lack of staff training.¹⁴

The total sample of our study was 20355 women aged 12-49 years. It was determined that only 28.89% of women had knowledge of contraceptive methods (CI: 27.02%-29.77%). This fact shows that there is a large gap between knowledge, access and use of family planning methods. The largest gap evident is between

knowledge and access to family planning methods. Our results agree with Mejia et al., where it was observed that students from private universities presented a greater use of the rhythm method and the non-use of at least one of the methods surveyed, which could be related to a scarce or inadequate knowledge of the importance of the use of methods in sexual life.¹⁵ Another study conducted in Spain among 1826 young people aged 15 to 24 years found that 40% of young women do not use any contraceptive method due to lack of knowledge and that 16.3% of males and 11.9% of females have not received information on sexuality and contraception during their schooling. Of those who have received information, 19% consider it insufficient.¹⁶ Other variables that significantly affect the use of contraceptive methods (OR greater than 1) are years of schooling, hours of work, urban density and economic development of the province. Eduardo (2020) mentions that according to the level of education, slightly more women who use contraceptive methods are those who have adequate education, however it is noteworthy that in this group the use decreases by 0.9% in the study period (25.3% to 24.4%), in contrast to the group that does not have an adequate level of education, increasing the use of contraceptive methods by 1.3% (22.2% to 23.5%). A similar situation occurs with the literacy status, women who know how to read and write use more contraceptive methods, but in the course of 5 years it decreased slightly by 0.1 % (24.5 % to 24.4 %), increasing the use in illiterate women by 2.9 % (17 % to 19.9 %).¹⁴

Another important factor is household income in monetary terms, which increases knowledge, access and use of planning methods. The values of this variable are larger in magnitude than other coefficients. For example, we see that an increase in income increases 2.98 times (CI= 1.354;3.792) the probability of knowing about family planning methods. Similar results were observed in Eduardo's study (2020), where women who were in poverty decreased their use of contraceptive methods compared to those who had a stable job.¹⁴ Brugeilles and Rojas (2020) state that the higher social strata do not have the same sexual behavior; there is a high correlation between higher economic income and an early initiation of contraceptive practices in young people, even before their first child and a stable relationship; while the middle and especially the lower strata tend to use contraceptive methods after entering a stable relationship and their first child.¹⁷

Regarding age, our results show that age increases the probability of knowing, accessing and using family planning methods. These results are similar to those found by Cuerdo et al. (2015) where they divided the results of their research into two age groups: youth and adults. The younger the user is (between 15 and 17 years old), the more mistakes she makes when using the methods, for example, she fails to put on the condom and often does not use it during sexual intercourse because she does not have a stable partner.¹⁸

An interesting result is that the ORs of the religion variable are significant and greater than 1. That is, people who reported being Catholic or Mormon show a lower probability of knowing, accessing or using family planning methods, results similar to those found in a study of university students where respondents who professed Christianity and Catholicism used oral contraception to a lesser extent; more research should be done on the reason for this finding, to see if professing a religion has any influence. In scientific literature it has been seen that religion is important in this issue, since some respondents who profess a religion take the teachings given to them in this context (either by parents, relatives or others who also profess the same religion). However, these results should alert that this could be a risk group, knowing that religion is important in some groups because it allows the transfer of values, beliefs, as well as moral and religious issues, all of which influence the decision of prevention and protection of each person.¹⁹ However, Gonzalez and Molina (2017) refer that religion does influence in generating a sense of shame regarding sexuality, but not in the decision to use contraceptives.²⁰

Finally, we observed that living in rural areas negatively predicts the probability of knowing about, accessing or using family planning methods. In Mexico, we were able to determine that the area of residence of individuals can play a very important role in accessing and using contraceptives; however, it is not presented as a significant variable in the literature.²¹

Before concluding, it is important to point out that knowledge about contraceptives does not imply their use. The use of contraceptives is related to years of schooling, gender, age, social class measured by strata or income, gender-based violence, having or not a steady partner, as well as years of relationship, trust with sexual partners (in the case of having more than one), information about methods and the cost of these methods, and the use of contraceptives.

V. Conclusión

Once the scientific evidence regarding perceived barriers to contraceptive use has been synthesized, an important step is taken to identify problems that prevent women from achieving their ideal contraceptive goals through the analysis of these barriers. Barriers to contraceptive use are persistent, it is almost impossible for them to be zero, but it is possible to reduce the level of this perception. Social factors and cultural beliefs are issues that will undoubtedly always be present; however, the lack of sexual and reproductive education among women reflects the intensity with which obstacles are presented, such as the fear that results in the non-acceptance of some method of family planning and this can be reflected with greater intensity in women from

unprotected and developing regions. Health personnel as the first contact and, particularly, as those mostly in charge of counseling family planning services, play an important role in reducing barriers to women's use of contraceptive methods. Most organizational barriers can be resolved with multidisciplinary strategies specific to the region where the gaps related to barriers to contraceptive use are intended to be addressed, once they are identified.

The religious beliefs or personal convictions of health care workers may not interfere with the fulfillment of sexual and reproductive health rights.

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Appendix A

Table A1: Multicollinearity test for variables

| Variable | VIF | SQRT VIF | Tolerance | R-Squared |
|--------------------|------|----------|-----------|-----------|
| Age | 1.65 | 2.21 | 0.9915 | 0.0052 |
| Number of children | 1.55 | 1.26 | 0.6125 | 0.5555 |
| Household income | 1.92 | 1.65 | 0.9262 | 0.0256 |
| Years of schooling | 1.25 | 1.55 | 0.5521 | 0.1129 |
| Religion | 1.92 | 1.65 | 0.9262 | 0.0256 |
| Work method | 1.66 | 1.25 | 0.5512 | 0.1155 |
| Working hours | 1.44 | 1.25 | 0.6510 | 0.5690 |

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|--------------------------------------|------|------|--------|--------|
| Are you a migrant? | 1.12 | 1.56 | 0.9126 | 0.0552 |
| Ethnicity | 1.55 | 1.62 | 0.2226 | 0.2252 |
| Marital status | 1.22 | 1.25 | 0.6510 | 0.5690 |
| Urban density | 1.62 | 1.09 | 0.5555 | 0.1212 |
| Economic development of the province | 1.55 | 1.62 | 0.2226 | 0.2252 |
| Urban area | 1.05 | 1.52 | 0.9552 | 0.0265 |
| Mean VIF | 1.90 | | | |

Table A2: Correlation matrix of the variables

| | Var 1B | Var 2 | Var 3 | Var 4 | Var 5 | Var 6 | Var 7 | Var 8 | Var 9 | Var 10 | Var 11 | Var 12 | Var 13 | Var14 |
|-------|----------|----------|---------|----------|----------|---------|----------|----------|----------|---------|---------|---------|---------|-------|
| Var1B | 1 | | | | | | | | | | | | | |
| Var4 | -0.7705* | 1 | | | | | | | | | | | | |
| Var2 | -0.045 | 0.0013 | 1 | | | | | | | | | | | |
| Var4 | 0.0847* | 0.0759* | 0.0045 | 1 | | | | | | | | | | |
| Var5 | 0.4504* | 0.0598* | -0.0045 | -0.0137 | 1 | | | | | | | | | |
| Var6 | -0.7540* | 0.0407* | 0.0047 | -0.0139 | 0.7137* | 1 | | | | | | | | |
| Var7 | -0.0135 | 0.0594* | -0.0054 | 0.0013 | 0.0130* | 0.0454* | 1 | | | | | | | |
| Var8 | -0.0477* | 0.1313* | 0.0074 | 0.0137* | 0.0789* | 0.0787* | 0.0489* | 1 | | | | | | |
| Var9 | 0.0578* | 0.0058 | 0.0075 | 0.0000 | 0.0134 | 0.0138* | 0.0547* | -0.0797* | 1 | | | | | |
| Var10 | 0.0747* | 0.4754* | 0.0013 | 0.0549* | 0.0785* | 0.0404* | -0.0474* | 0.4700* | -0.4847* | 1 | | | | |
| Var11 | -0.0595 | -0.0979* | 0.0080 | 0.0074 | -0.0407* | 0.0477* | -0.0784* | -0.0138* | -0.4047* | 0.1359* | 1 | | | |
| Var14 | 0.0098* | 0.0554* | 0.0099 | -0.0130* | 0.0139* | 0.0487* | 0.1395* | 0.1354* | 0.1340* | 0.5013* | 0.4974* | 1 | | |
| Var12 | 0.0087 | 0.0454* | -0.0007 | 0.0045 | -0.0135 | 0.0013 | 0.0549* | 0.0075 | 0.1313* | 0.4598* | 0.4994* | 0.5084* | 1 | |
| Var14 | 0.0098* | 0.0554* | 0.0099 | -0.0130* | 0.0139* | 0.0487* | 0.1395* | 0.1354* | 0.1340* | 0.5013* | 0.4974* | 0.4598* | 0.1354* | 1 |

Note: Var 1B: Access to family planning methods. Var 2: Age. Var 3: Number of children at home. Var 4: Household income. Var 5: Years of schooling. Var 6: Religion. Var 7: Form of work. Var 8: Working hours. Var 9: Migrant? Var 10: Ethnicity. Var 11: Marital status. Var 12: Urban density. Var 13: Economic development of the province. Var 14: Urban area. Asterisks mean: *p < 0.05.

Table A3: Correlation matrix of the variables

| | Var 1C | Var 4 | Var 1 | Var 4 | Var 5 | Var 6 | Var 7 | Var 8 | Var 9 | Var 10 | Var 11 | Var 14 | Var 11 | Var14 |
|-------|----------|----------|---------|----------|----------|---------|----------|----------|----------|---------|---------|---------|---------|-------|
| Var1C | 1 | | | | | | | | | | | | | |
| Var4 | -0.505* | 1 | | | | | | | | | | | | |
| Var1 | -0.045 | 0.0044 | 1 | | | | | | | | | | | |
| Var4 | 0.0847* | 0.0759* | -0.0045 | 1 | | | | | | | | | | |
| Var5 | 0.4504* | 0.0598* | -0.0045 | 0.0447 | 1 | | | | | | | | | |
| Var6 | -0.7540* | 0.0407* | 0.0047 | -0.0449 | 0.7447* | 1 | | | | | | | | |
| Var7 | -0.0445 | 0.0594* | -0.0054 | 0.0044 | 0.0440* | 0.0454* | 1 | | | | | | | |
| Var8 | -0.045* | 0.4444* | 0.0074 | 0.0447* | 0.0789* | 0.0787* | 0.0489* | 1 | | | | | | |
| Var9 | 0.0578* | 0.0058 | 0.0075 | 0.0000 | 0.0444 | 0.0448* | 0.0547* | -0.0797* | 1 | | | | | |
| Var10 | 0.0747* | 0.4754* | 0.0044 | 0.0549* | -0.0785* | 0.0404* | -0.0474* | 0.4700* | -0.4847* | 1 | | | | |
| Var11 | -0.0595 | -0.0979* | 0.0080 | 0.0074 | -0.0407* | 0.045* | 0.0784* | -0.0448* | -0.4047* | 0.4459* | 1 | | | |
| Var14 | 0.0098* | 0.0554* | 0.0099 | -0.0440* | 0.0449* | 0.0487* | 0.4495* | 0.4454* | 0.4440* | 0.5044* | 0.4974* | 1 | | |
| Var11 | 0.0087 | 0.0454* | -0.0007 | 0.0045 | -0.0445 | 0.0044 | 0.0549* | 0.0075 | 0.4444* | 0.4598* | 0.4994* | 0.5084* | 1 | |
| Var14 | 0.0098* | 0.0554* | 0.0099 | -0.0440* | 0.0449* | 0.0487* | 0.4495* | 0.4454* | 0.4440* | 0.5044* | 0.4974* | 0.4598* | 0.4454* | 1 |

Note: Var 1C: Use of family planning methods. Var 2: Age. Var 3: Number of children at home. Var 4: Household income. Var 5: Years of schooling. Var 6: Religion. Var 7: Form of work. Var 8: Working hours. Var 9: Migrant? Var 10: Ethnicity. Var 11: Marital status. Var 12: Urban density. Var 13: Economic development of the province. Var 14: Urban area. Asterisks mean: *p < 0.05.