

# Age disparities in unmet need for contraception among all sexually active women in Colombia: an analysis of the 2015 Demographic Health Survey

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## Research article

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# Abstract

**Background** Unmet need for contraception increases unintended pregnancies and puts the health and reproductive rights of women at risk. Social determinants are associated with unmet need for contraception, but it is unclear if age is a social determinant of disparities in reproductive health-related outcomes in all Colombian women irrespective of marital status. **Methods** This study used the 2015 Colombian Demographic and Health Survey. The outcome of interest was the unmet need for contraception among 24,245 sexually active women aged 13-49. Age was associated with unmet need for contraception in Colombia through multivariate analysis. Absolute and relative inequalities were estimated using prevalence differences and odds ratios, respectively. **Results** The prevalence of unmet need was significantly higher in women in marital union aged 13 to 19 years old (19.8%), than their unmarried counterparts (16.8%), and all older age groups either married or unmarried. Women 13 to 19 years old [OR=2.98 (2.49-3.57)] and 20-29 year old [OR=1.71(1.48-1.97)] are more likely to have an unmet need for contraception than those 40-49-year-old. **Conclusions** Age disparities are barriers to attaining the Sustainable Development Goals for sexual and reproductive health. Cultural, social, and access barriers demand to tailor health care services to meet the needs of younger women to narrow the age gap.

## Background

Women with an unmet need for contraception wish to avoid bearing children. These women are sexually active and in the fertile age group but are not using contraceptives. Unmet need is one indicator of the demand for family planning because it shows the discrepancy between reproductive intentions and the right to the safe and voluntary use of contraceptives to meet fertility preferences (1,2). An unmet need can lead to unintended pregnancies, increase the likelihood of facing unsafe abortion procedures, and jeopardize the health of women, their families, and society (3). Having a population with healthy girls and women is recognized as a cornerstone for the sustainable development of a country (2). Since the unmet need for contraception, at the global level reveals different forms of inequality for women among and within countries, it is a useful indicator for tracking the progress of the Sustainable Development Goals (SDGs) within the Agenda 2030(4).

Unmet need is usually measured among women in a marital union who are between 15 and 49 years of age according to the standardized definition of the indicator proposed by Bradley et al.(1). However, conceptually, the indicator should consider sexually active women as a denominator regardless of their marital status. Besides, the literature has found that the prevalence of unmet need for contraception varies according to marital status(3,5–7). The unmet need can be calculated for sexually active unmarried women when information is available (1,2,6,8,9), such as the case of the Demographic and Health Surveys (DHS) in the Latin American region (9) and in contrast with the situation in national surveys of Asia and North Africa, where surveys do not ask unmarried women about their sexual behavior for cultural reasons(8).

In Colombia and in general, in other countries with available DHS data, the standard measurement for unmet need for contraception is reported restricted to married women and excludes unmarried women, particularly younger adolescents(6). This use of the algorithm is in contrast to the evidence from a study using DHS data from developing countries which identifies striking differences between married and never-married women with regards to unmet need of contraception, and highlights that the youngest (15 to 19 years old) and single have the highest-burden for unmet need (3). Also, a current study in contraceptive behavior among adolescents identifies marital status as a critical factor of contraceptive use (7). Moreover, previous studies estimated that sexually active unmarried women contribute nearly 20% to the overall unmet need in developing countries(5). Among the Latin America and Caribbean countries with data, Colombia has the highest proportion of sexually active never-married women aged 15-49 (34%) (3). Besides, 16.3% of Colombian women aged 15 to 24 reported that their first sexual encounter was under 15 years old, and 35.6% of women in reproductive age are unmarried (10,11).

The exclusion of women who report being unmarried and younger age groups underestimates unmet need figures and in turn, provides limited evidence for strategies and policies that result from the use of this official indicator. In line with a Human Rights approach and the SDG Agenda to improve health and well-being for all and ensure no one is left behind, the present study includes two groups not considered in the official measurement of unmet need in Colombia and other countries: unmarried sexually active women and adolescents between 13 and 14 years of age in Colombia.

The global panorama after the Millennium Development Goals (MDG) reveals that family planning outcomes have improved, but the gaps between subgroups remain (12). Latin America and the Caribbean have the second-highest demand for contraception services, following East Asia (13), and show a prevalence of unplanned births of 46.5%(3). Although the prevalence of unmet needs in Latin America and the Caribbean is 11%, vast inequalities exist among countries. For instance, Haiti reports the highest prevalence (37.3%), whereas Paraguay reports the lowest (4.7%).

The prevalence of unmet need among married women in Colombia is relatively low (6.7%) compared to Latin America and the Caribbean and the rest of the world, although almost five out of 10 births are unwanted or mistimed (11). The prevalence of unmet needs varies when disaggregated according to social determinants, including the household wealth index, achieved level of education, region, and age group (9,11,14). These health-related inequalities within Colombia in the prevalence of unmet need limits universal and egalitarian access to sexual and reproductive health services by social characteristics, which is one of the SDGs (15).

Health inequalities exist within society when the socioeconomic position and the lack of resources and social opportunities prevent people from achieving and maintaining optimal health conditions(12,16). From an equity perspective, health advantages and disadvantages associated with cumulative socioeconomic resources represent inequalities insofar as hierarchies and differences in health service access exist by age group (17–19). On reproductive health outcomes, these differences mainly affect fertility rates in younger women (20). Age barriers related to the provision of reproductive health services

leave behind the poorest, least formally educated, and most vulnerable women, which is disturbing due to the social and economic costs of phenomena such as teenage pregnancy (7,21–23).

The Colombian policy for public health aims to decrease health inequalities by 2021 and establishes the life course as a cross-cutting issue of policy implementation since this approach recognizes the vulnerabilities and opportunities in each stage of human development (24). Currently, the Colombian legal framework is aligned to reach the SDGs, Montevideo's Consensus, and the National Public Health policy (25). Various government sectors have cooperated in planning a national strategy to prevent teenage pregnancy (before 20-years-old) (26,27). Although policy advancements are crucial, the implementation reveals that the youngest women have relatively worse outcomes in sexual and reproductive health. Teenage pregnancy has increased over time, particularly among under 16 years old, and it is related to the socio-economic conditions (21) and social and cultural barriers such as the urban and rural areas of residence, traditional gender stereotypes, and ethnicity (21,28,29). In Colombia, the fertility rate decreased slowly among 15-19 years-old but increased among 10-14 years-old girls (26). In 2014, the specific birth rate was 3.13 per 1000 women 10 to 14 years old (26), which constitutes not only an issue of access to health services but also of sexual abuse against children in Colombia (26).

Previous studies have explored the association between age and contraceptive use. For example, across low- and middle-income countries a negative association between age and an unmet need for contraception has been reported; mainly in Asia and Sub-Saharan Africa(8,30), and Latin America and the Caribbean (8). Similarly to other Latin American Countries, in Colombia, the unmet need among both married and unmarried women is higher among women aged 15-19, and it declined for each subsequent age group(3,9). Also, the literature has addressed adolescent women as a population at risk to understand access barriers to contraceptive services (22).

The literature has demonstrated associations between the unmet need for contraception and several social determinants in diverse countries, including Pakistan, Sudan, Nepal, Egypt, and Sub-Saharan Africa(30–32). In Colombia, recent studies measuring multidimensional household poverty provide evidence that health and education deprivations predict the relatively worse unmet need for contraception(33). Additionally, in multivariate analysis, the literature has found a social gradient in the use of contraceptives in Colombia (28,29). Although the literature has shown social inequalities in the use of contraceptives, there is limited evidence regarding the analysis of age as a social determinant of disparities in the use of contraceptives and unmet needs. The main objective of the study is to measure the inequality in unmet need for contraception by age groups among women of reproductive age (13-49 years) in Colombia. A modified version of the international algorithm for unmet need is applied. We expect to find higher levels of absolute and relative inequality for women in the younger age groups compared to the older women according to previous studies on the association between age and unmet need for contraception in low- and middle-income countries conducted by Wulifan et al. and Westoff (8,30).

## Methods

Descriptive multivariable secondary data analysis of the DHS for Colombia 2015(10,11). The dataset is representative of the urban and rural, region, and sub-regional levels. The DHS for Colombia uses a probabilistic, stratified, and multistage household sampling design. All models were fitted using sampling weights.

The data set contains information from 38,718 women who were randomly selected and agreed on informed consent. The analytical sample comprises 24,245 women between 13 and 49 years of age and includes all women who have reported a marital union and unmarried women who have reported sexual intercourse within the month before the survey. Cases with missing data for some variables were excluded (0.86%).

### ***Variables***

- *Dependent variable*

The outcome of interest of the study was the unmet need for contraception. Defined as the report of non-use of any contraceptives by a sexually active woman of fertile age who wishes to avoid pregnancy. This indicator uses multiple questions included in the DHS, where women respond to questions regarding fertility preferences, fecundity, and contraceptive use (1,2). Therefore, for this study, a woman has an unmet need if: she is married, or unmarried and sexually active, is not using any method of contraception (modern or traditional), is fecund, and does not want to have a birth at all or in the next two years. The measurements were conducted adapting the algorithm proposed by Bradley et al.(1) (Figure 1). The present study included sexually active unmarried women and aged 13 according to the available data in Colombia, which is different from the study conducted by Bradley et al. (2012), who considered only women in a marital union between 15 and 49 years of age (1).

- *Independent variables*

Age was the primary independent variable. Age is an individual characteristic that is used as a criterion of social division when establishing differences in the assignment of roles and access to social opportunities (34). In this study, the age variable was categorized into decades except for the youngest group due to data availability: 13-19 years-old; 20-29 years-old; 30-39 years-old; and 40-49 years-old. This grouping of the age variable has both a policy and theoretical justification. First, the definition of these age groups is consistent with the classification used by the Colombian national health policy and the public policy for adolescent pregnancy prevention (26). We included the whole sample of women available for the 2015 DHS in Colombia (aged 13-49). Second, the psychological development theory by Erikson brings together people who share, in relative terms, cognitive, social, and biological development characteristics (35). This theoretical framework is relevant for the Colombian context because the national public health policy establishes the life cycle as a cross-cutting factor to address socioeconomic

health inequalities (24), based on the WHO framework provided by the Commission on the Social Determinants of Health (12).

- *Proxy variables of social determinants:*

We divided all other independent variables into four groups of covariates.

First, two macro-social variables, including the country region (Atlantic, Eastern, Central, Pacific, Bogota, Orinoquia, and Amazonia) and the area of residence (urban/rural).

Second, a set of five socioeconomic position variables: (i) household wealth index which recodes households into quintiles according to assets and household materials (poorest/poor/medium/rich/richest). (ii) Women's level education classifies based on the highest achieved level of formal education (no formal education/ primary, secondary, and post-secondary). (iii) Women's occupation measured as homemaker occupation (yes/no) if the interviewee reported that her main activity during the previous week was household chores. (iv) Ethnicity measured with the national standardized question for ethnic self-recognition whereby a woman belongs to an ethnic minority (yes/no) if the respondent reported to be indigenous, Afro-descendant, or Gypsy according to the national context. (v) Migration status was established if the respondent reported having lived in more than one region in the previous six years and if the reason for moving was due to violence caused by armed groups, by natural disasters, or because of poverty.

Third, the variables for access to health services included: knowledge of freely provided contraceptive methods by the national health services (yes/no), whether the source of information about family planning was the media (yes/no) or through the health care provider/ (EPS) (yes/no), and affiliation regime divided into three categories (contributory/subsidized, no affiliation). Colombian standards categorized affiliation regime to health insurance into three categories: contributory, subsidized, and no affiliation. The contributory regime relies on the compulsory affiliation of salaried workers and population groups with payment capacity and extends to family members of the affiliated person. The subsidized regimen covers the population without the capacity to pay compulsory premiums, and a socio-economic survey determines selected beneficiaries.

Fourth, the variables regarding the reproductive history of the women included: the ideal number of children and parity. Marital status was included to classify women into married (in a current marital union) or unmarried (without a current marital union).

### ***Data analysis***

The descriptive analysis included a summary of the sample distribution and characterization of unmet need according to the selected variables. The results are shown separately by marital status to facilitate comparison with other studies. We tested the differences by marital status using Chi<sup>2</sup> and mean differences with a 95% confidence level. Additionally, we tested for prevalence differences when

comparing both methods of unmet need estimation, i.e., the algorithm modification proposed in this study vs. the international algorithm as reported with the 2015 Colombian DHS.

We calculated absolute and relative inequalities. Absolute measures reveal the magnitude of difference in health between subgroups(20), we calculated the differences in prevalence and tested for trends between the youngest group (13-19 years old) and the oldest group (40-49 years old) with their estimations of significance at the 95% confidence level. Relative measures reflect the proportional differences in health among subgroups (20), we calculated odds ratios (OR) with a 95% confidence level through simple logistic regression analysis between the age groups and unmet need for contraception (crude analysis).

We next built logistic regression models to estimate the odds ratios (OR) of unmet need for contraception. In order to address potential confounding, we conducted a multivariate analysis by testing three models. First, we adjusted for the effects of the socioeconomic position variables in the model. Second, we further adjusted for the health-service affiliation regime. Third, we adjusted for covariates that were statistically significantly associated with both exposure and outcome. The models were fitted by entering each covariable individually and using a likelihood ratio test. We used Stata statistical package for the analysis (StataCorp, 2015; Stata Statistical Software: Release 14; College Station, TX, USA; StataCorp LP).

## Results

The analytical sample included 24,245 women with an average age of 32.3 ( $\pm$  9.3) years. Most of the women lived in urban areas (78.2%), had secondary-level education (44.6%), and reported the media as their source of information on family planning. Few women reported migrant status (5.7%), identified themselves as belonging to ethnic minorities (14.3%), or had no health service affiliation (4.9%). Table 1 shows the characteristics of the sample.

**Table 1.** Distribution of women (13-49 years old) for each of the variables selected by marital status. DHS 2015, Colombia.

		Currently married	Unmarried	Married vs. Unmarried <sup>¶</sup>	Total
Number (%)		19,607 (79.3)	4,638 (20.7)		24,245 (100.0)
		% (num.)	% (num.)		% (num.)
Prevalence of use of modern contraceptive methods		76.0 (14,572)	77.5 (3,496)		76.3 (18,068)
Prevalence of use of contraceptive methods		81.0 (15,522)	82.4 (3,708)		81.3 (19,230)
Unmet need for contraception	No	93.3 (17,991)	88.2 (4,033)	***	92.3 (22,024)
	Yes	6.7 (1,616)	11.8 (605)		7.7 (2,221)
Age group	13-19 years	4.3 (1,060)	19.1 (1,044)	***	7.4 (2,104)
	20-29 years	31.1 (6,004)	46.4 (2,028)		34.3 (8,032)
	30-39 years	34.8 (6,752)	20.8 (969)		31.9 (7,721)
	40-49 years	29.8 (5,791)	13.6 (597)		26.4 (6,388)
Region	Atlantic	23.1 (5,238)	15.2 (913)	***	21.5 (6,151)
	Eastern	17.6 (2,758)	14.1 (552)		16.9 (3,310)
	Central	23.4 (4,209)	30.4 (1,249)		24.9 (5,458)
	Pacific	16.6 (2,990)	20.4 (872)		17.4 (3,862)
	Bogota	16.6 (1,117)	17.6 (356)		16.8 (1,473)
	Orinoquia and Amazonia	2.7 (3,295)	2.3 (696)		2.6 (3,991)
Area of residence	Urban	75.5 (13,802)	88.3 (4,011)	***	78.2 (17,813)
	Rural	24.5 (5,805)	11.7 (627)		21.8 (6,432)
Wealth index	Poorest	21.0 (5,761)	9.0 (626)	***	18.5 (6,387)
	Poor	20.5 (5,772)	20.1 (1,459)		20.4 (7,231)
	Medium	20.4 (3,815)	23.8 (1,148)		21.1 (4,963)
	Rich	19.6 (2,636)	22.1 (802)		20.1 (3,438)
	Richest	18.5 (1,623)	24.9 (603)		19.9 (2,226)
Education level	No formal education/ primary	23.2 (5,548)	8.0 (448)	***	20.1 (5,996)

	Secondary	45.4 (8,921)	41.6 (2,061)		44.6 (10,982)
	Post-secondary	31.4 (5,138)	50.4 (2,129)		35.3 (7,267)
<b>Homemaker occupation</b>	No	48.1 (8,791)	82.2 (3,746)	***	55.2 (12,537)
	Yes	51.9 (10,816)	17.8 (892)		44.8 (11,708)
<b>Ethnic minority</b>	No	85.5 (15,242)	86.4 (3,664)		85.7 (18,906)
	Yes	14.5 (4,365)	13.6 (974)		14.3 (5,339)
<b>Migratory status</b>	No	94.0 (18,332)	95.7 (4,381)	*	94.3 (22,713)
	Yes	6.0 (1,275)	4.3 (257)		5.7 (1,532)
<b>Affiliation regime</b>	Contributory	49.9 (7,782)	51.9 (2,049)	***	50.32 (9,831)
	Subsidized	45.7 (11,069)	41.1 (2,310)		44.8 (13,379)
	Without affiliation	4.4 (756)	7 (279)		4.9 (1,035)
<b>Knowledge of the FP service</b>	No	35.1 (6,681)	34.9 (1,585)		35.0 (8,266)
	Yes	64.9 (12,926)	65.1 (3,053)		65.0 (15,979)
<b>Ideal number of children</b>	Mean (SD)	2.5 (1.47)	2.0 (1.19)	***	2.42 (1.43)
<b>Parity</b>	Mean (SD)	2.3 (1.52)	1.0 (1.31)	***	2.11 (1.62)
<b>Source on FP, the media</b>	No	17.7 (4,029)	14.9 (726)	*	17.1 (4,755)
	Yes	82.3 (15,578)	85.1 (3,912)		82.9 (19,490)
<b>Source on FP, the EPS</b>	No	55.0 (11,153)	56.0 (2,600)		55.2 (13,753)
	Yes	45.0 (8,454)	44.0 (2,038)		44.8 (10,492)

\*p<0.05; \*\*p<0.01; \*\*\*p<0.001

□ Chi2 for married vs. unmarried

FP: family planning

EPS: *Entidad Promotora de Salud* - Health Promoting Entity (Insurer)

SD: standard deviation

Note: All percentages are weighted. Ns are unweighted.

Most of the women (79.3%) were married. These women presented different characteristics than unmarried women. Most of the married women were over 30 years old (64.6%), whereas most of the unmarried women were younger than 30 years old (65.5%). Compared with married women, the percentage of unmarried women living in urban areas was higher (88.3% vs. 75.5%), and more had at least post-secondary-level education (50.4% vs. 31.4%). Almost 20% of unmarried women reported homemaker as an occupation on the previous week (82.2%). Additionally, fewer unmarried women had living children ( $\bar{x}=1.0$ [SD1.31] vs. 2.3[1.52]) and wished to have fewer children ( $\bar{x}=2.0$  [SD1.19] vs. 2.3[1.52]) than the married women. Moreover, among unmarried women, the distribution of the household wealth index showed that less than 10% are in the most deprived quintile in contrast to 21% of married women (Table 1).

Among all sexually active women, the prevalence of unmet need was 7.7%. Differences in unmet need were found according to the marital status, with unmet need significantly higher ( $p<0.001$ ) for unmarried women (11.8%) than for married women (6.7%). Each selected variable presented a higher prevalence of unmet need in unmarried women than in married women except for the 13-19-year-old age group. Among women 13-19 years old, the unmet need for married women was higher compared to the unmarried (19.8% vs. 16.8%) (Table 2). The estimated unmet need in this study (7.7%) is significantly higher ( $p<0.001$ ) than the unmet need estimated using the international algorithm (6.7%) reported on DHS 2015.

**Table 2.** Prevalence of the unmet need for contraception by selected characteristics and by marital status. DHS 2015, Colombia.

		Currently married (%)	Unmarried (%)	Married vs. Unmarried	Total (%)	Married vs. Total
Number (%)		19,607 (79.3)	4 638 (20.7)		24 245 (100.0)	
<b>All</b>		6.7	11.8	***	7.7	**
<b>Age group</b>	13-19 years	19.8	16.8		18.2	
	20-29 years	8.7	12.5	**	9.8	**
	30-39 years	4.7	8.1	*	5.1	***
	40-49 years	5.1	8.0	*	5.4	
<b>Region</b>	Atlantic	10.0	17.0	***	11.1	
	Eastern	5.8	13.2	***	7.1	*
	Central	6.6	10.1	**	7.5	
	Pacific	5.4	12.7	***	7.2	**
	Bogota	3.7	8.2	*	4.6	
	Orinoquia and Amazonia	10.0	10.3		10.1	
<b>Area of residence</b>	Urban	6.0	11.4	***	7.3	***
	Rural	8.8	14.9	**	9.4	
<b>Wealth index</b>	Poorest	10.0	16.4	**	10.6	
	Poor	7.4	12.9	***	8.5	*
	Medium	7.0	13.6	***	8.5	**
	Rich	4.8	11.5	***	6.3	*
	Richest	3.8	7.8	*	4.8	
<b>Education level</b>	No formal education/ primary	8.3	11.7		8.6	
	Secondary	6.9	13.1	***	8.0	**
	Post-secondary	5.2	10.8	***	6.9	***
<b>Homemaker occupation</b>	No	5.6	10.6	***	7.1	***
	Yes	7.7	17.5	***	8.5	*
<b>Ethnic minority</b>	No	6.2	11.2	***	7.2	***
	Yes	9.6	15.4	**	10.7	
<b>Migratory status</b>	No	6.6	11.4	***	7.6	***
	Yes	7.6	19.8	**	9.5	
<b>Affiliation regime</b>	Contributory	4.9	9.7	***	5.9	**
	Subsidized	8.6	13.7	***	9.6	
	Without	7.6	16.1	*	10.1	

		affiliation				
Knowledge of the FP service	No	6.6	13.9	***	8.1	***
	Yes	6.8	10.7	***	7.6	**
Source on FP, the media	No	8.6	16.7	**	10.1	*
	Yes	6.3	10.9	***	7.3	***
Source on FP, the EPS	No	6.5	12.8	***	7.8	***
	Yes	6.9	10.5	**	7.6	**

\*p<0.05; \*\*p<0.01; \*\*\*p<0.001

□ t-test for married vs. unmarried

FP: family planning

EPS: Entidad Promotora de Salud - Health Promoting Entity (Insurer)

Note: These percentages are weighted

Regarding the set of proxy variables of social determinants of health, a higher prevalence of unmet need was recorded in the poorest women (10.6%) compared with all other household wealth levels. By region, a higher prevalence of unmet need was found in the Atlantic (11.1%) and the Orinoquia-Amazonia (10.1%) regions. Higher unmet need was reported by women who lacked affiliation to health service providers (10.1%) and among women in the subsidized regime (9.6%) compared with women who reported contributory regime affiliation. Women who reported homemakers as the occupation had a relatively higher prevalence of unmet need (8.5%) compared to women who did not report themselves as homemakers (7.1%). Women classified as members of an ethnic minority had a higher unmet need (10.7%) compared with women who did not report to be indigenous, Afro-descendant, or Gipsy. The prevalence of unmet need was lower among women who reported the media as their source of information on family planning (7.3%) compared to women who did not report it (Table 2).

### ***Absolute inequality***

Unmet needs by age group suggested a social gradient, with the highest prevalence found in the 13-19-year-old age group (Table 2). The prevalence of unmet need was significantly higher in women 13-19 years old than in women 40-49-years-old ( $p<0.001$ ), with a difference of 12.8 percentage points. The difference was almost twice as large for married women (14.7%) than among unmarried women (8.7%). The trend test showed a decrease in unmet need for contraception in each age group, with a slope of -0.03 ( $p<0.001$ ).

### ***Relative inequality***

Table 3 shows the association models between unmet need and age. In the crude analysis, adolescents 13-19 years old (OR 3.89) and young women 20-29 years old (OR 1.90) were significantly more likely to present unmet need for contraception than women 40-49 years old.

**Table 3.** Relative inequality (OR) in the unmet need for contraception by age group. DHS 2015, Colombia.

	Crude analysis		Multivariate analysis		
	Prevalence	OR (95% CI)	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR <sup>a</sup> (95% CI)
<b>Age group</b>					
40-49 years	18.2	1	1	1	1
30-39 years	9.8	0.95 (0.82-1.1)	0.96 (0.83-1.12)	0.96 (0.82-1.12)	0.95 (0.82-1.1)
20-29 years	5.1	1.9 (1.66-2.16)***	1.88 (1.64-2.16)***	1.85 (1.61-2.12)***	1.71 (1.48-1.97)***
13-19 years	5.4	3.89 (3.31-4.58)***	3.86 (3.25-4.57)***	3.73 (3.14-4.43)***	2.98 (2.49-3.57)**
<b>Wealth index</b>					
Poorest	10.6	-	1	1	1
Richest	4.8	-	0.52 (0.29-0.62)***	0.60 (0.49-0.73)***	0.61 (0.46-0.79)***
<b>Education level</b>	8.6				
No formal education/ primary	8	-	1	1	1
Secondary	6.9	-	0.81 (0.7-0.93)**	0.83 (0.72-0.95)**	0.81 (0.7-0.93)**
Post-secondary		-	0.87 (0.74-1.03)	0.94 (0.80-1.11)	0.82 (0.69-0.97)*
<b>Affiliation regime</b>					
Contributory	5.9	-	-	1	1
Subsidized	9.6	-	-	1.28 (1.13-1.45)***	1.15 (1.01-1.31)*
Without affiliation	10.1	-	-	1.44 (1.17-1.78)**	1.31 (1.06-1.62)*

\*p<0.05; \*\*p<0.001; \*\*\*p<0.001

<sup>a</sup> Adjusted for the region, area of residence, ethnic minority, knowledge of the family planning service, ideal number of children, marital status, and source of information on family planning (the media). These covariables were significant in bivariate analyses.

An association was found between unmet need for contraception and social determinants. Model 1 indicates an association with household wealth and level of education. Particularly, richer women have a OR 0.52 (0.29-0.62) compared to poorer women. Model 2 shows an association between unmet need and type of affiliation regime. When including education level, household wealth, and affiliation regime, the size of the association between age and unmet need decreased but remained statistically significant

(crude analysis vs. model 2). Women with *post-secondary-level* of education compared to women with *no level of formal or primary* education was significant only when adjusted for each macrosocial variable of the socioeconomic status and access to health services (model 2). The variable homemaker occupation did not contribute to the model according to the likelihood tests; therefore, it was excluded from the analysis.

In the fully adjusted model (model 3), inequality between women 13-19 and 20-29 years old was maintained compared to women aged 40-49 years of age. The youngest women presented higher odds (OR 2.98 [2.49-3.57]) of unmet need than the oldest group. Regarding the household wealth index, the richest women reported 39% lower odds of unmet need than the poorest women. Concerning the health affiliation regime, the subsidized women presented 15% higher odds of having an unmet need; for those without an affiliation, the odds were 31% greater.

## Discussion

This analysis estimates the national prevalence of the unmet need for contraception and identifies inequalities by age group for sexually active women (13-49 years old) in Colombia. The findings show that younger women present significantly more unsatisfactory results than older women in absolute and relative terms. The outcome is consistent with other studies in developing countries where the women's age is associated with unmet need. For instance, Sedgh et al. (2016) found that the prevalence of unmet need is significantly different between age groups in most countries of Latin America and the Caribbean, Africa and Asia(3). Also, Wulifan et al. (2016) reported that as a woman ages, her unmet need decreases based on six national studies in Sub-Saharan Africa and South Asia, out of 11 included countries(30).

We believe that this is the first work that shows absolute and relative inequality measurements for unmet need for contraception using data from Colombia. This study presents a novel approach from the literature in three aspects: (i) it analyzes whether age is a source of disparities in a reproductive health-related outcome based on the WHO model of social determinants. (ii) It uses an adaptation of the international algorithm to include unmarried sexually active women. (iii) It includes women 13-14 years of age and thus acknowledges sexual activity behaviors before the age of 15 years. The findings provide evidence that supports the prevailing arguments in the current national public policy on sexual health and reproductive health and adolescent pregnancy prevention in Colombia. In this model, although age is a biological factor, it also represents one of the sources of inequality by establishing hierarchies of power and differences by age groups in the distribution and exposure to factors that affect health(17,18,36,37).

### ***Measurement implications***

Unmet need estimation for this study (7.7%), using an adapted version of the international algorithm, is significantly higher compared to the DHS 2015 estimation for Colombia (6.7%). Therefore, the prevalence of unmet need increases when sexually active women are included regardless of their marital status and considering the younger women between 13 and 14 years old. Such as Bradley and Casterline suggested, creative adaptations of the DHS algorithm, serve as tools for alternative analysis beyond population-level

estimates of unmet need for contraception(2). Even though women aged 13-15 are only 0.3% of the entire sample, this data is relevant for national public policy on adolescent pregnancy prevention taking into account that the fertility rate among 10-14 years-old women has increased in the last years(26). According to the Colombia DHS in 2015, 6.7% of 13-14-year-old women have had sexual intercourse(11).

Including all sexually active woman, whether married or single, is a more accurate national estimation of unmet need, since it embraces a population group that has been excluded by the international standards of access to contraceptives. This finding is pertinent for monitoring the SDGs agenda. Although the international algorithm allows comparability between countries, continuing to measure unmet need with only this approach (married women between 15 and 49 years old) is contrary to the SDGs since it excludes and hence may leave behind unmarried and younger women (13-15 years old).

Including unmarried and younger women in the algorithm shows that both age and marital status increases unmet need, as said before. Changes in fertility preferences and contraceptive behavior partly explain the differences in unmet need for contraception by age and marital status(7). This finding is especially relevant for Colombia given its undergoing second demographic transition with historically lower fertility levels, a higher proportion of delayed marriage and childbearing, an increase in cohabitation and changes in family composition with non-marital fertility, childlessness, and divorce(38,39).

The results of this study show that the prevalence of unmet need among married women is lower than that among unmarried women, which is consistent with the findings of other studies in Latin America(2,3,5,6). Estimates using the DHS standard algorithm(1) of unmet need among unmarried sexually active women is a pending monitoring task of family planning and sexual and reproductive health programs. However, this approach must assess how to measure sexual behavior, particularly among young women, who could under-report their sexual activity because of social norms(2) and have different contraceptive behaviors(5). Social standards affect access to contraceptive methods given the expectation for maternity in married women and the persistent cultural prohibition of sexual relationships outside marriage (6,22).

The literature also shows that the demand for family planning according to marital status can change with age in some countries (7,22,40) based on the political and cultural contexts of each region (6). Notably, among married women in Latin America and Asia, the unmet need is higher for the youngest in contrast with the oldest women, and it decreases gradually across age. In Africa and the Middle East, the unmet need stays relatively unchanged across the age groups. In some countries of Northern Africa, the percentage of the woman with an unmet need shows an inverted U shape across the age groups (3). In contrast, in almost every country with data for unmarried women (Latin America, Sub-Saharan Africa, and Asia), the youngest and never-married women have an unmet need higher than the oldest or married woman (40).

Specifically, among adolescent girls, this study found that unmet need was higher in married compared to those who were unmarried. The differences in unmet need between age groups are related to the distribution of marital status(40,41) and the increase in the proportion of sexually active women in the

younger groups (3,42). Sexual activity, fertility preferences, and contraceptive use also vary with age (22,42–44). De Vargas Nunes et al. found that marital status and parity affect the contraceptive behavior among women adolescents in low and middle-income countries(7). Identifying the role of marital status in the relationship between unmet need for contraception and the age group will be an essential goal of future research.

### ***Policy implications***

The obstacles in accessing sexual and reproductive health services can explain the inequality in unmet need that affects young women (13-19 and 20-29 years old). The literature has widely reported that young people and adolescents are at a disadvantage compared to adults for obtaining and using contraceptives correctly and continuously (9,22,42,45). Although adults and young women experience health access obstacles such as geographic barriers, the adolescents have specific access barriers to health provision related to cultural norms about age, sexual behavior (22), sexism, and motherhood (44) that may prevent this group from receiving health care such as contraceptive counsel(23). Likewise, young women have less confidence in service providers, a greater need for information on contraceptive methods and services, less empowerment in the use of contraceptives as a couple, and more susceptibility to social pressure(22,44). Additionally, Delston argued that health service providers motivated by sexist and paternalist concerns are potential and critical barriers to access to contraception (46).

The most common obstacles for adolescents are social and cultural factors(22,45), the organization for the provision of services, and political-administrative regulations (45). Also, in developing countries, the most reported reasons for contraceptive nonuse among young women having an unmet need for contraception are infrequent sex, the opposition of women or others (partner, friends or family), and concern about side effects(3). In Colombia, the reasons for the nonuse of contraception are related to marital status. Also, for instance, the most cited reason among married women regards the frequency of sexual activity and opposition by other persons; meanwhile, unmarried women cited reasons about the frequency of sexual activity(3). These reasons reflect cultural norms and information barriers that could change through education programs (5,47). Therefore, the importance of enhancing, increasing, and providing continuity for strategies that adapt health services to the particular needs of the youngest population is highlighted, such as *friendly health services for adolescents and young people* (22,27).

Other authors have reported that social roles, the distribution of opportunities, and access to social resources are unequal by age group(18,34). The youngest have relatively worst working conditions, income, and, social security compared to early-old age(18,48). Although children and elders are more vulnerable to poverty, young people face worse socioeconomic status, which limits their access to health and social resources (18,34,49).

The disadvantaged socioeconomic status of young people adds up to cultural patterns related to sexuality that generate exclusion. Juvenile ageism, ergo prejudices, and institutional discrimination based on age, is figured out when the interest and particular needs of the younger people are ignored within the

health services care offer(19). This study provides evidence that age is an essential social determinant in sexual and reproductive health-related outcomes in Colombia. Previously, Neal et al. found that teenage pregnancy (before aged 20) is related to the household wealth level (21). The social vulnerability of younger women affects not only their ability to exercise their rights in the present but also their futures and those of their families since inequities are cumulative throughout life and generations (12).

In this study, the household wealth index, education level, and health service affiliation regime explain some differences in unmet needs among age groups. These findings are consistent with previous research in which the unmet need and non-use of contraceptives are associated with social determinants as such as education level (6,28,29), the variables of access to health services (30,32), household wealth index (6,28,29), and community-level variables related with social norms, inequalities gender, and economic prosperity(50). In this study, the prevalence of estimated unmet need is higher in the subsidized regime, among those lacking affiliation to the health system, and the Atlantic and Orinoquia-Amazonia regions. These populations also represent the most disadvantaged groups in terms of their socioeconomic characteristics(11).

Therefore, the association with determinants of social position indicates that inequalities exist in access to contraceptive methods. Access to reproductive health services should not vary according to social, economic, or age characteristics, which makes these differences unfair(36,51). Health inequalities due to the free choice of people are acceptable, but when health differences occur due to the unequal distribution of opportunities based on individual attributes, the inequality becomes an issue of social justice(17,52).

The results contribute to the literature by demonstrating the existence of inequalities in access to contraceptive services, since these disparities are challenges faced by the poorest, youngest, and least educated women(6). To advance in the SDGs, the possibility of access to necessary contraception methods must be equal for all women regardless of their social positions.

Consequently, challenges remain for the national provision of family planning services that contribute to the fulfillment of the SDGs, the Montevideo Conference, and national public policies. The provision of services must adjust to the needs and preferences of people according to their present conditions(43) and the cultural and social context(5,42,50). Beyond access to essential services, such as family planning, Colombia, like other countries, requires an approach that promotes equity (i.e., that reaches the most vulnerable populations) and prioritizes and designs policy guidelines with the participation of society. Sexual education should be established throughout life and be articulated with the improvement of the provision of contraception services to make them accessible, varied, permanent, and relevant by prioritizing the most vulnerable populations.

We identified five limitations of the study. Due to lack of data, fitting variables related to the couple and the actual access to health services were not included as potential confounders even though the literature has found a relationship with unmet need for contraception. Measurement of the occupation homemaker (i.e., the main activity in the previous week was household chores) limited the possibility of measuring the

autonomy and economic independence of women. The formal education variable measures the achieved level only; hence, it does not consider completed years of education of women currently enrolled. We included all sexually active women between 13 and 49 years old; however, the inclusion of women between 13 and 14 years old represented 0.3% (75 women) of the sample. Because sexual activity among single women has increased in Colombia and the region, data collection on sexual and reproductive health from adolescents is vital. The cross-sectional nature of data does not allow the attributions of causality between the variables or observation of the dynamics of inequality over time. However, this analysis of unmet need acquires more considerable significance for the country, since it includes sexually active women 13-49 years of age. Forthcoming studies may calculate the unmet need for contraception in men from a Sexual and Reproductive Health Right's framework in Colombia.

## Conclusions

The present study identifies inequalities in unmet need by age group and provides evidence that contributes to elucidate the role of social determinants in public health. Decision-makers can use this information to focus actions that contribute to narrow social gaps in the access to contraceptive services and to include unmet need in the monitoring of universal access to family planning in the national public policy and the post-conflict context. There are multiple cases of displaced women who have not been quantified in household surveys or are invisible to this type of study and official statistics. As new data become available for Colombia, the baseline information provided in this study can be used to determine optimal measures in the context of the Agenda for the SDGs in the country, including guidelines for this region and globally. The results assert the need to include the unmet need for contraception in the monitoring indicators of universal access to family planning and to include sexually active women of reproductive age in these measures regardless of their marital status.

## List Of Abbreviations

SDG: Sustainable development goals

DHS: Demography and Health Survey

WHO: World Health Organization

OR: Odds ratio

## Declarations

### ***Ethics approval and consent to participate:***

This research was approved minimal risk by the Ethics Committee of the School of Government of the University of the Andes at a meeting on 12 December 2016. The study is a secondary data analysis of the Colombian DHS 2015. DHS Program awarded the dataset use permission to the researchers.

***Availability of data and material:***

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request

***Competing Interest:***

The authors declare that they have no competing interests.

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***Consent for publication***

Not applicable.

***Authors' contributions:***

SCSF data analysis and interpretation and wrote the manuscript.

CGU interpreted data and suggested relevant literature and methodological analysis, read, edited, and approved the final manuscript.

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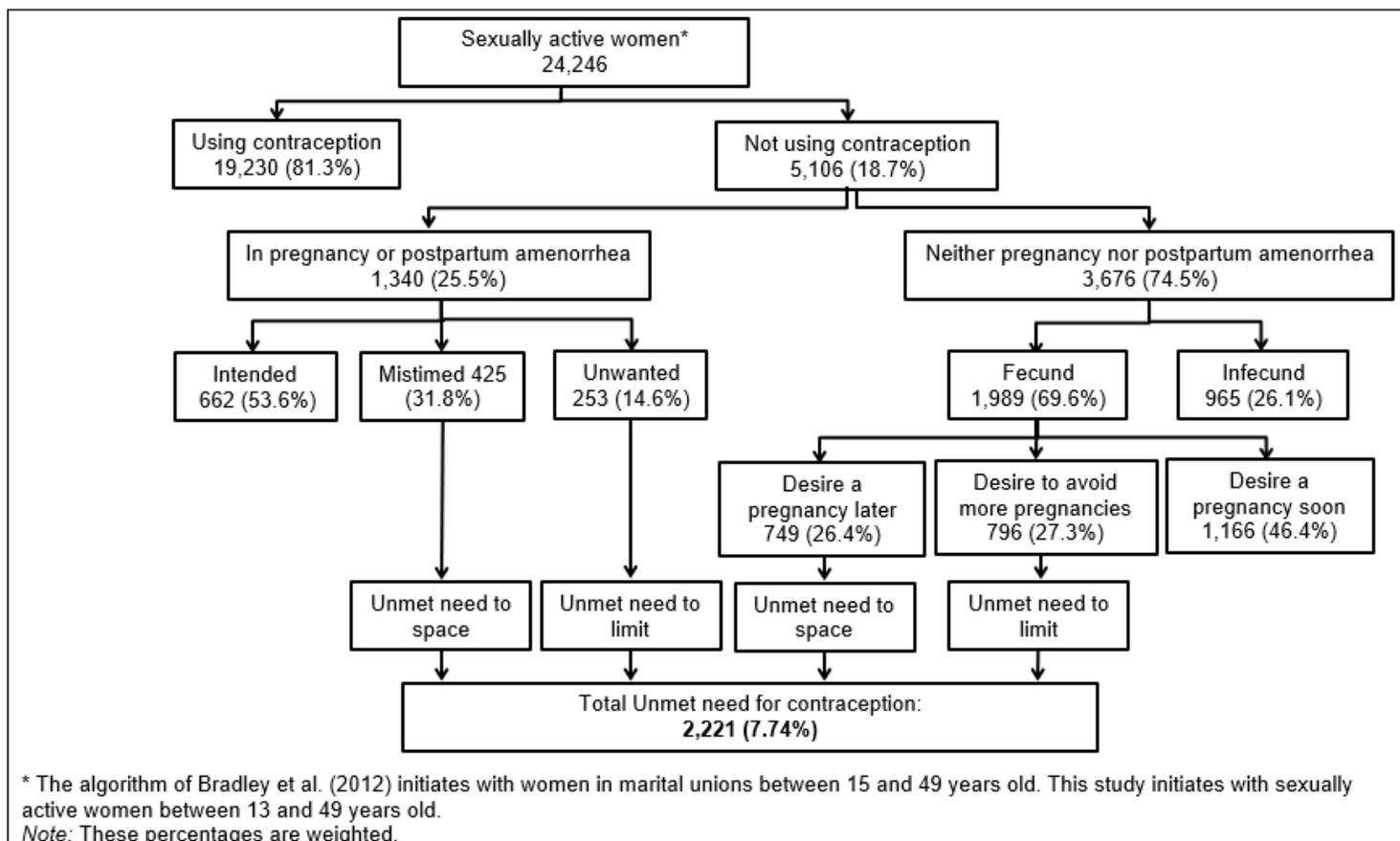
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## Figures



**Figure 1**

Algorithm for the calculation of the unmet need for contraception. DHS 2015, Colombia.