Socioeconomic inequalities in teenage motherhood in Ecuador

#NiñasNoMadres

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Back cover illustration

Silvia Perez Balsebre

A mi madre, Norma
por amoblarme la cabeza y el corazón con
su amor incondicional y ternura.

A mis abuelas,
Ana y Teresa,
por haberme heredado la lucha constante
por la dignidad, la autonomía y la libertad.

A todas ellas, por sus maternidades

In appreciation

Tocar el corazón de otra persona es un acto político.
Pilar Aranda, Actriz
El Muégano Teatro

Escribir estos agradecimientos ha sido un acto casi de necesidad corporal y emocional. Mientras escribía cada uno de los capítulos de esta tesis, los afectos, palabras y momentos vividos antes y durante este proceso invadían el espacio del "trabajo intelectual y científico". En parte porque esta tesis ha sido posible gracias al apoyo de muchas personas que se han implicado en este proceso de alguna u otra manera. Pero también, porque durante estos cuatro años ha pasado mucho a nivel personal y lo he compartido y resistido por los afectos y cuidados de muchas personas a las que quiero agradecer.

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Abstract

This PhD dissertation analyses the socioeconomic inequalities in teenage motherhood considering its influencing factors and social determinants. This doctoral thesis is structured in four research papers. In paper I, we analysed how factors related to the first heterosexual experience and sexual education are associated to socioeconomic inequalities in teenage motherhood. We observed that the most important factors influencing the relationship between higher socioeconomic status and teenage motherhood were those related to the first experience of heterosexual intercourse. Paper II analysed the trends in socioeconomic inequalities in teenage motherhood and in the factors related to the first heterosexual intercourse. This study revealed that - in the past 14 years - there has been no changes in the disadvantageous socioeconomic conditions of teenage mothers and in the adverse characteristics of the first experience of heterosexual intercourse in Ecuador. Paper III described the construction of a deprivation index for the study of geographical inequalities in health in Ecuador. This ecological study showed a geographical pattern in which cantons inhabited by historically oppressed ethnic groups have the highest deprivation scores. Paper IV analysed geographical and social inequalities in adolescent birth rates (ABR) in Ecuador. This study showed a geographical pattern of high ABR in cantons from the Coastal and Amazonic region. Furthermore, a strong association was observed between high ABR and cantons with high deprivation, ethnic historical oppression and gender inequality.

Resumen

Esta tesis doctoral analiza las desigualdades socioeconómicas en la maternidad adolescente en Ecuador teniendo en cuenta los factores psicosociales y determinantes sociales que la influyen. Esta tesis se estructura en cuatro trabajos de investigación. En el artículo I, se analiza la influencia de los factores relacionados con la primera experiencia de relaciones heterosexuales y la educación sexual en las desigualdades socioeconómicas en la maternidad adolescente. A partir de este análisis observamos que los factores más importantes que influyen en la relación entre el estatus socioeconómico y la maternidad adolescente fueron los relacionados con la primera experiencia de relaciones sexuales heterosexuales. En el artículo II se analizan las tendencias de las desigualdades socioeconómicas en la maternidad adolescente y los factores relacionados con las primeras relaciones heterosexuales. Este estudio reveló que en los últimos 14 años no ha habido cambios en Ecuador en las condiciones socioeconómicas desventajosas de las madres adolescentes y en las características adversas de la primera experiencia de relaciones sexuales heterosexuales. En el documento III se describe la construcción de un índice de privación para el estudio de las desigualdades geográficas en salud en el Ecuador. Este estudio mostró un patrón geográfico de privación en los cantones habitados por grupos étnicos históricamente oprimidos. En el documento IV se analizan las desigualdades geográficas y sociales en la tasa de fertilidad adolescente (TFA) en Ecuador. Este estudio mostró un patrón geográfico de altas TFA en los cantones de la región costera y amazónica. Además, se observó una fuerte asociación entre la privación, la histórica opresión étnica y la desigualdad de género y la elevada TFA en cantones del país.

Preface

Foreword

"One is not born, but rather becomes, a woman."

Simone de Beauvoir, The Second Sex (1949)

This thesis, besides being a scientific exercise, is rooted in the journey of becoming a woman myself in Ecuador. Over my life-course, I have acknowledged the constrains built around women's bodies in a *"machista"* social context. As a matter of responsible parenthood, I was forewarned by my parents since early childhood to never allow other people, especially men, to unexpectedly touch or "caress" me even if they were part of our family. However, it was during my work with women's groups and feminist organizations that I could fully understand the magnitude of the risk environment created by the patriarchal system. During those years, the support to victims of intimate partner violence and sexual abuse confronted me with the revictimizing process of patriarchal justice institutions. I could witness the practice of "blaming the victim" when victims of rape were asked about a list of behaviours, their clothes or attitudes that could "justify" having been raped. The idealisation of maternity was reflected even when it was the result of rape and influenced the practice of some healthcare personnel to force girls and adolescents to breast-feed new-borns.

I also had the opportunity to meet the other side, that of resistance. The resistance of doctors, midwives, social workers and civil society actors who overcame the adversities of institutions that failed to provide a response to gender-based violence and forced maternities. I also had the opportunity to gain insights into the struggles of feminist groups for the access to safe abortion and a life free of violence. In this context, I learned that the warnings that I received during childhood were the response of my parents to a social and political context that has historically oppressed women. I also understood that this oppression intersects with others that discriminate ethnic minorities and that have created a social stratification grounded on heteropatriarchy and capitalism. Therefore, the research work presented in this dissertation forms part of an imperative need to understand the mechanisms through which the systems of oppression have created larger inequalities in the country, particularly in teenage motherhood.

Thesis structure:

The dissertation is structured by ten chapters. The first chapter introduce the geographical, sociodemographic and political context in which this study take place. The second chapter include a detailed description of the conceptual framework that guided the research process. The third chapter consist of the justification of this dissertation. The fourth and fifth chapter correspond to the former to the objectives and the latter to the methodology of this dissertation. The sixth chapter contains the results of this doctoral thesis presented in four original research papers: one of them has been accepted for publication in Revista de Saúde Pública and has an equally shared first authorship; two are under revision in leading journals, and the last is prepared for submission. Chapter seven contains the discussion of the main results of this dissertation and describe the final version of the conceptual framework adding the factors analysed in the first tow research papers. In Chapter eight, we stablish the limitations and strengths found during the research process, while in chapter nine the implications and recommendations that surge from this thesis are pointed out. Finally, in chapter nine the conclusions of this dissertation are described.

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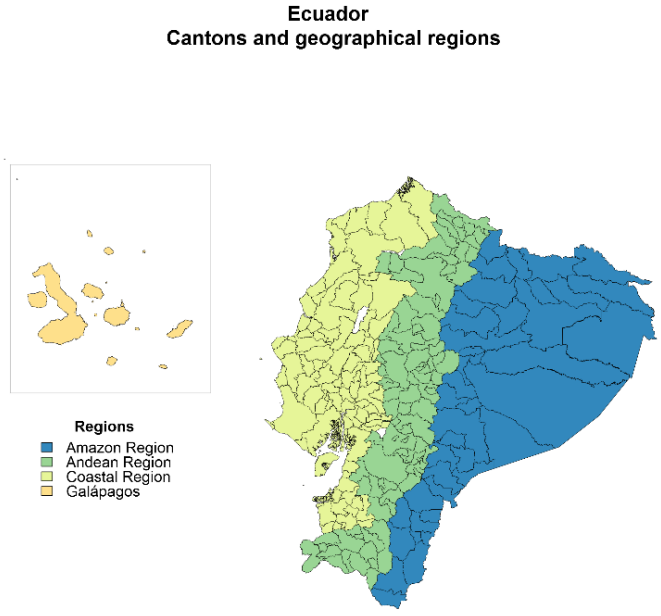
1. CHAPTER I:

PLACING THE DISSERTATION IN CONTEXT

a. Geographical and sociodemographic context

Ecuador is a South American country located in the north-western part of the continent and is divided in four geographical regions (see Figure 1). The Pacific Ocean borders the western Coast and separates it from the Galapagos Islands, located a thousand kilometres to the west. A volcanic section of the Andes mountain range crosses the territory from north to south, leaving on its western flank the Gulf of Guayaquil, and on its eastern flank the Amazonic region. Ecuador has a population of 17,300.546 inhabitants and the population is mostly located in urban areas (63%). The 72% of the population self – identifies as mestizo, while as montubio, Afro-Ecuadorian and indigenous the 7% respectively [1].

Figure 1 Cantons and geographical regions of Ecuador



Ecuador is considered a middle – income country [2] ranking 89 in the Human Development Index (HDI) [3]. The country was considered as one of the fastest growing

economies in Latin America in recent years, which has directly reduced poverty and inequality levels. In 2015 the national Gini coefficient was 0.478. Between 2008 and 2014 the country increased its gross domestic product (GDP) in 4.6 %[4]. However, significant challenges remain in terms of sustainability of these achievements and in ensuring sustainable, inclusive growth [5].

The national poverty is estimated at 25.5% and extreme poverty at 9.5%. In urban areas, poverty reached 16.8% and extreme poverty 5.6%, whereas in rural areas poverty reached 43.8%, while extreme poverty a 17.9%. Gender inequality still an important issue in the country. Women's salaries are between 13-26% lower than their men peers and in 2014 unpaid work by women in Ecuador represented 15% of GDP [6,7]. Moreover, 26% of all women in Ecuador have experienced sexual abuse at some point in their lives, and 11% during childhood and adolescence [8]. The highest rates of intimate partner violence occurred in women from historically oppressed ethnic groups and territories of the Central - Andean high hills and from the Amazonic region [9]. Furthermore, according to a recent study, a total number of 155 feminicides[a] were registered in Ecuador of 36.9% occurred in young women aged 15 to 24 years old [10]. This study also reported that feminicides rates in Ecuador were particularly high in some provinces of the Amazonic region.

Ecuador is the sixth country with the most accelerated aging in Latin America after Costa Rica, Chile, Argentina, Cuba, and Uruguay. The life expectancy at birth is 72 years for men and 77 years for women [1]. In 2014, the maternal mortality ratio was 49.2 per 100,000 live births. The main causes were hypertensive disorders and postpartum haemorrhage [11].

b. Political tradition and social agents influencing sexual and reproductive health and rights fulfilment in Ecuador

i. Neoliberal economic model and deepening inequalities in Ecuador

Neoliberal policies supporting minimal state intervention in the economy were strengthened by right party governments in Ecuador during the 1980 decade [12]. National

[a] Defined as the intentional murder of women because they are women and a continuum expression of gender-based violence to keep control over women.

economic and social policy were determined by structural adjustment policies pressured by international financial institutions and foreign debt [13]. The lack of welfare state policies increased the population dependency in wage earned in a liberal labour market while the burden of care work relayed in family's resources, meaning in women. This social and economic context had a major impact in the country's economy and impoverished already vulnerabilised sectors of the population. Moreover, as in many other countries from the global south, neo-Malthusian population growth discourse (especially excess birth) was adopted in Ecuador as a main cause of global economic and environmental crisis and as a substitute for combating national social and economic inequalities.

ii. Neoliberal adjustment model and privatization of healthcare and sexual and reproductive services in Ecuador

The Ecuadorian health system was affected by 15 years of neoliberal reform and reduced health services utilization due to high levels of out-of-pocket payment of private expenditure on health [14]. Since 1970 the provision of sexual and reproductive health was reduced to family planning services delivered by private clinics financed by international organizations. The focus of the interventions exclusively targeted pregnancy risks and adult women's health with a very limited focus on the sexuality and sexual behaviours. In addition, they left aside the youngest populations. These facilities were financed by not – for – profit international programmes and charged low costs till the decline of funding in late 1990 decade when services fees increased [15]. Although these facilities covered a healthcare demand neglected by the State, most deprived sectors of the population and younger groups had scarce or no access to these services.

iii. Social movements and feminist's advocacy for sexual and reproductive rights in Ecuador.

During the decades of 1980 to 1990 critical voices from feminist groups and social movements claimed for governments' action to reduce long – time socioeconomic inequalities and to tackle the high rates of maternal mortality, intimate partner violence and gender equality in the country. The International Conference on Population and Development (ICPD) conducted in 1994 in Cairo recognized women's reproductive and sexual self-determination as a basic health need and human right, and integrated

principles of gender equality [16]. It recognised reproductive rights, very broadly defined and linked to primary healthcare as a fundament human right.

Despite the ICPD failed in tackling the impact of global neoliberal economy and the pressure of international financial institutions and foreign debt on sustainable development in low and middle – income countries, it had an important contribution to local policy [17]. The ICPD legitimized women's struggle for their right to freely choose over their sexuality and reproduction. As part of its international commitment Ecuador included for the first time sexual and reproductive rights and gender equality through a Constitutional reform in 1998. This reform leaded to the creation of laws that promoted the access of the population, including adolescents, to health services and health promotion based on gender equity. Nevertheless, the reform failed in declaring universal access to education, health services and the redistribution of wealth. Consequently, important barriers in the access to contraception and sexual education for adolescents remained as an issue in the country.

iv. Conservative and religious social groups influencing already traditional right-wing governments in Ecuador.

Different governments in the country had passed laws promoting moral and religious values that have created barriers for the exercise of sexual and reproductive rights for women and adolescent population. For instance, the "Law of educational freedom for the families in Ecuador" promoted by the conservator president Sixto Duran – Ballén (1992 - 1996) established two hours of compulsory religious and moral instruction in all public and private educational centres, whereas sexual education was neglected by the national policy [18]. Similarly, in 2006 the Ecuadorian Constitutional Court made a ruling declaring to suspend the license of a brand of emergency oral contraception pill. This ruling made the sale and consumption of this brand of pill illegal. This decision was based in the idea that the emergency contraception pill was abortive and threatened the right to life, which influenced the public perception of the pill effects [19].

The arise of a social democrat government in 2007 and social movements advocacy opened the opportunity for a constitutional reform. This reform maintained the advances achieved in 1998 and expand sexual and reproductive rights and gender equality. It also

stablished the necessity of wealth redistribution in the country. In this context, social investment increased; moreover, and access to education and health services became universal rights for the entire population. The access to comprehensive sexual education free of prejudice and framed on gender equality and human rights was considered a constitutional right that allowed the design and implementation of forward – thinking policies and strategies. Nevertheless, the pressure of conservative and religious social groups continued influencing the public policy creating opposition and destabilising the implementation of the interventions even during declared left party governments (from 2007 to 2017). A detailed resume of the recent transition of key sexual and reproductive health policies and interventions is presented in table 1.

Regarding access to abortion, the current penal code in Ecuador has two grounds for legal abortion: 1) when the health or life of the women is in danger and cannot be safe by other means; and 2) when a woman with mental health disabilities get pregnant as consequence of rape. In all other circumstances, abortion is criminalized. As a result of social pressures from conservative sectors in the past 4 years, there has been 243 cases processed for abortion under criminal law in Ecuador [20]. The religious burden influencing the social perception of abortion has restrain access to safe pregnancy interruption in Ecuador. Moreover, abortion has been socially penalized under the idea that to terminate a pregnancy is equivalent to committing murder to a child. This idea is shared by some doctors and healthcare personnel that in daily basis guilt and mistreat women that arrive to healthcare facilities with an abortion [21].

Table 1 Description of recent transitions of sexual and reproductive rights and policies in Ecuador

Name	Aims & Scope	Executing organization	Period	In force	Replacement
National Constitution of Ecuador	To guarantee the right to family planning, freedom of choice by means of evidence-based information; the right to decide over the number and birth spacing; and the right to a life free of violence and sexual abuse.	Asamblea Nacional Constituyente	1998-2007	N/A	Constitutional reform 2008
Ley Orgánica de Salud [Health Law]	To guarantee adolescent population has access to healthcare services		1998-2006	N/A	Under revision
Política de Salud y Derechos Sexuales y Reproductivos [Health and Sexual and Reproductive Rights Policy]	To close the gaps between rights statements, especially on sexual and reproductive health and the exercise and enjoyment of rights.	Ministry of Public Health of Ecuador	2007	N/A	
Andean Plan for Adolescent Pregnancy Prevention	To promote adolescents' rights and to improve their access to health care services. This entails integrating adolescent-friendly services within existing health facilities that are expected to adopt certain changes to facilitate adolescents' access, such as differentiated times, alternative entrances and/or separated consultation rooms.	UNFPA-Ministry of Public Health of Ecuador	2007-2012	NO	No replacement
Estrategia Nacional Intersectorial de Planificación Familiar y Prevención del Embarazo Adolescente – ENIPLA [The national intersectoral family planning and adolescent pregnancy prevention strategy]	To ensure permanent and effective access to information, education, counseling, inclusion, protection and health services for free and responsible decisions about sexuality and reproduction, and the full exercise of the sexual and reproductive rights through cross-sectoral synergies.	Multisectoral	2011-2014	NO	Plan Family Ecuador
Plan Nacional de Fortalecimiento a la Familia, Ecuador [National Plan to Strengthen families]	To promote the mobilization of society through multisectoral strategies, programs and activities as its objective to restore the role of the family and contribute to the development of all dimensions of the human being in the life of adolescents to reduce the incidence of teenage pregnancy in the country	Secretary of the Ecuadorian Presidency	2015-2017	NO	Política Intersectorial de Prevención del embarazo en niñas y adolescentes. Ecuador 2018 – 2025
Plan Nacional de Salud Sexual y Salud Reproductiva 2017 – 2021 [National Plan for Sexual and Reproductive Health]	To promote inclusion, equality and respect for human rights in the context of sexual health and reproductive health. The aim of the plan is to reduce pregnancies in adolescents through strengthening friendly health services in the national health services	Ministry of public health	2017-2021	YES	N/A
Política Intersectorial de Prevención del embarazo en niñas y adolescentes. Ecuador [Intersectoral Policy for the prevention of child and adolescent pregnancy]	To contribute to adolescents' universal access to information, education, comprehensive sexuality education and sexual and reproductive health services, to enhance free, responsible and healthy decisions about their sexuality and reproduction, through the full exercise of their sexual and reproductive rights and a life free of violence.	Multisectoral	2018 - 2025	YES	N/A

Source: Prepared by the author based on the reviewed literature and official documents.

c. Teenage pregnancy and motherhood in Ecuador

In Latin America, the study of teenage motherhood has been out of the scope of researchers, who have been interested mainly in capturing the intensity of fertility (i.e. measuring the birth rate in women). Moreover, the nearly universal condition of teenage motherhood in the region till recent decades, diminished demographers' interest in the topic, as it was considered that adolescent fertility had no major distinctions between social or ethnic groups [22].

Ecuador reports since 1990 of the highest teenage fertility rates in the South American region, with 18% of women becoming pregnant between 12 and 19 years of age, despite a global decline in fertility [5]. Even thou an increase in the use of contraception (at any time) from 34% in 2004 to 80% in 2012 [23], Ecuador, unlike in other countries in the region (e.g. Uruguay), has maintained high rates of teenage pregnancy in the last two decades [22].

Teenage motherhood in Ecuador is highly influenced by social gender norms constraining women's agency and control over their sexuality [24–26]. Cultural and social norms grounded in religious and patriarchal views act as barriers to access sexual and reproductive health services in the country [26]. Additionally, power relationships in adolescent women sexual experiences have been reported. Sexual abuse is an important factor for an increased risk of teenage unintended pregnancies [27].

d. The study of social and geographic inequalities in teenage pregnancy and motherhood in Ecuador

Although there is scarce evidence on the social determinants and geographical distribution of teenage motherhood in Ecuador, some important differences have been reported among ethnic groups and territories in the country. For instance, higher rates of adolescent fertility have been reported among women with low educational level, those belonging to historically oppressed groups (indigenous, Afro-Ecuadorian and montubio people), and those living in impoverished rural areas [27–29]. Moreover, the expression and

magnitude of gender based violence is greater for women living in impoverished territories of the country [5].

The highest prevalence of gender-based violence has been registered in provinces (first administrative level of Ecuador) from the Amazonic and Andean regions [30]. It has been observed that women report a slightly higher prevalence of sexual violence in the central Coastal region [9]. Furthermore, the Amazonic region also showed the highest rates of feminicides in women aged 15 years and older [10].

Therefore, teenage motherhood in Ecuador is relevant because it implies disadvantageous social and material circumstances[31–38] for women [39]. What is more, the Ecuadorian State has systematically disowned women from the material and social resources for the fulfilment of their sexual and reproductive rights.

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"Since rising children requires work, and since this work is extorted from women, it can be argued that men are afraid women will try to scape motherhood, or excessive motherhood, by limiting the number of children they bear. Men therefore ensure they always have the means to withdraw control over childbearing from women. Making abortion illegal is one of such means. Putting pressure on women to be heterosexual and, within this sexuality, to 'chose' practices which result in impregnation, is another"

Close to home: A materialist analysis of Women's oppression
Christine Delphy (2016)

2. CHAPTER II:

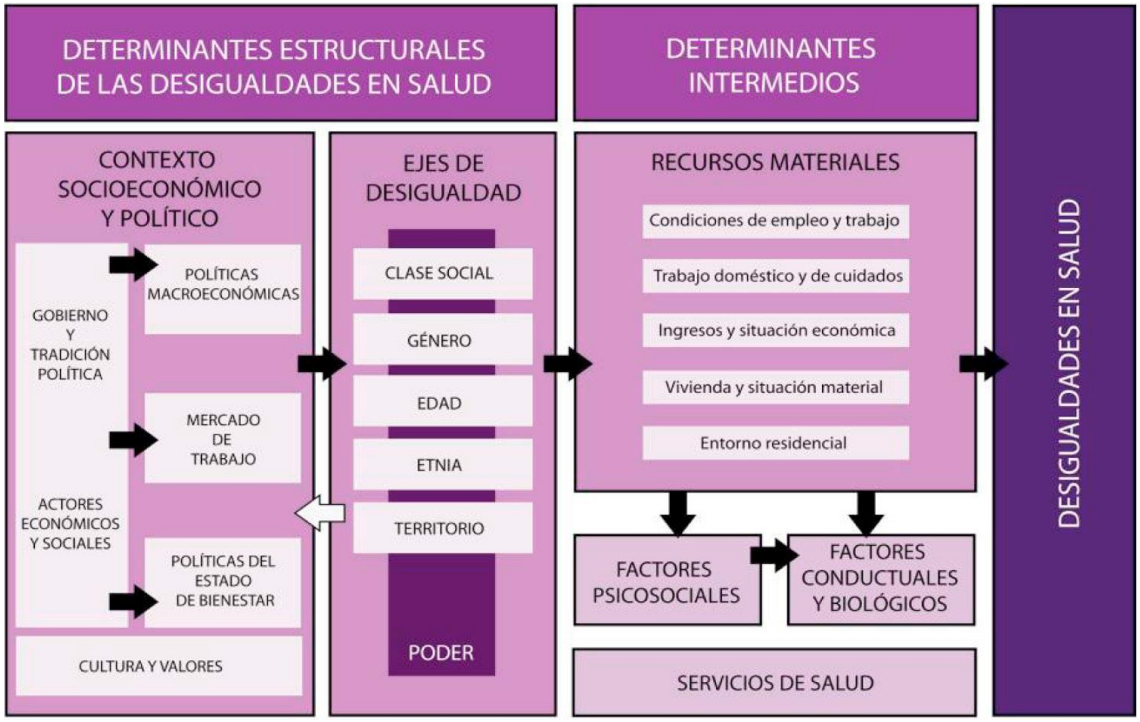
CONCEPTUAL FRAMEWORK

a. Why a conceptual framework for the study of socioeconomic inequalities teenage motherhood in Ecuador?

In Ecuador, cultural values and social meanings regarding sexuality and the idealisation of motherhood intersect with structural violence and power, undermining women's collective and individual agency and auto determination. Ecuador is a country with rooted patriarchal culture and institutions where women are constantly exposed to structural gender violence and sexual abuse. In order to ascertain the complex mechanisms that systematically reduce women's access to means to escape from an early pregnancy in Ecuador, it is vital to consider broader theoretical frameworks.

In this dissertation the conceptual framework of the Commission to Reduce Social Inequalities in Health in Spain [1] (hereafter the Commission) was adapted because it easily guides the comprehension of the structural and intermediate causes of health inequalities. The conceptual framework of the Commission used in this dissertation consists of the following elements: (i) the socioeconomic and political contexts that are fundamental structures that generate social stratification affecting the distribution of power and resources within it; (ii) the social structure that includes the different axes of inequality determining hierarchies of power in society, such as social class, gender, age, ethnicity or race, and territory; (iii) the intermediate determinants which are influenced by cultural, religious, and community factors, as well as by the social structures determining inequalities in material resources [2] which in turn influence psychosocial processes and behaviours that determine health inequalities [1] **(see figure 2).**

Figure 2 The Social Determinants of Health Framework

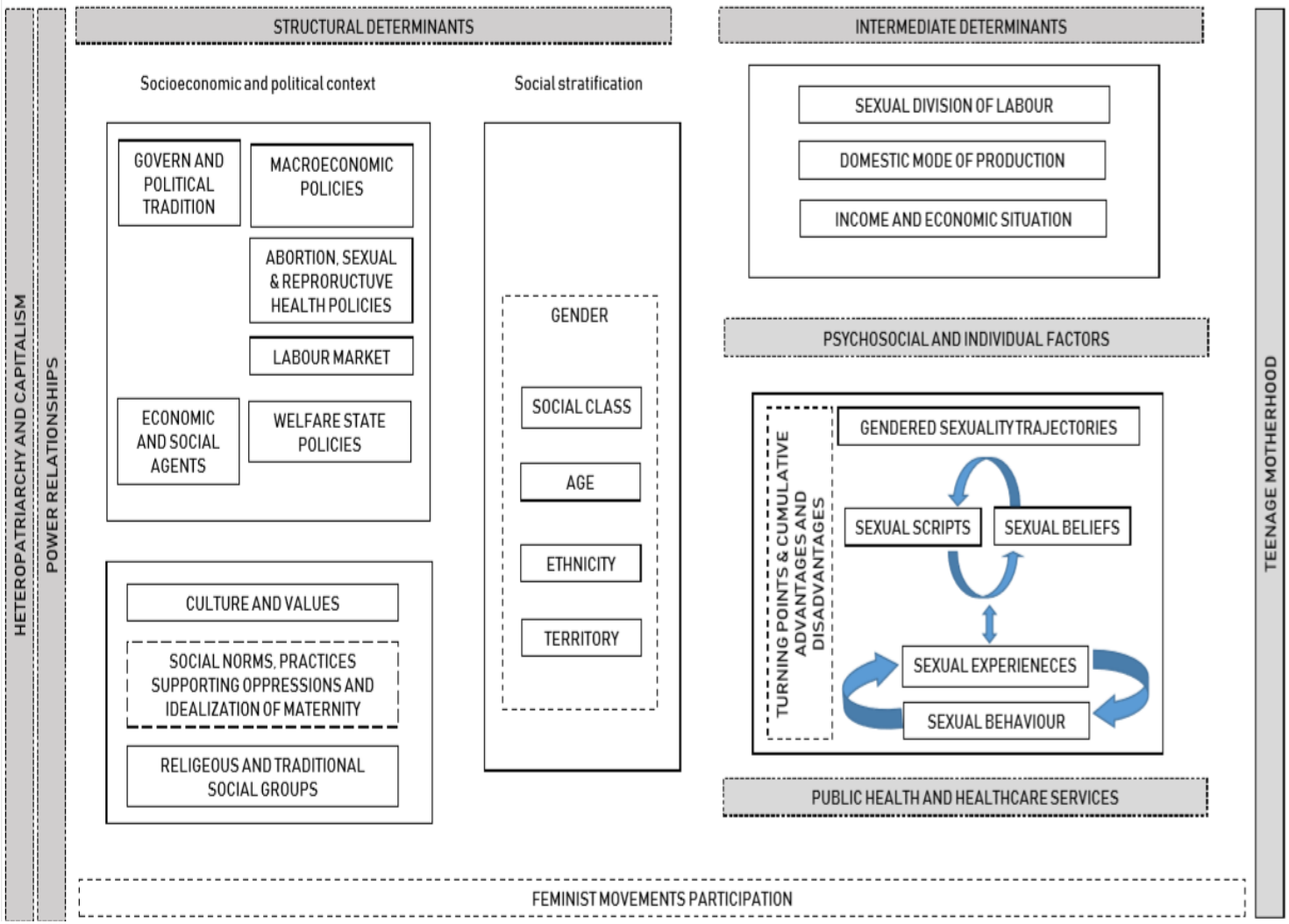


Source: Comisión para Reducir las Desigualdades Sociales en Salud en España. Rev. Gac. Sanit. 2012.

We would like to mention that the adapted conceptual framework that I used in this dissertation, is the result of the reflection on the reviewed literature throughout the study process. Therefore, in no way is either complete or finished and is not a straitjacket for understanding the outcome studied, instead it is a starting point to keep on deepening in the study of teenage motherhood in Ecuador.

The adaptation of the Commission's framework includes structural determinants such as heteropatriarchy, racism, colonialism and capitalist systems, as well as intermediate determinants, such as the sexual division of labour. Additionally, proximal determinants regarding gendered sexuality were incorporated in order to keep in mind possible paths through which gender socialization can influence sexual and reproductive decisions in our context **(See figure 3)**.

Figure 3 Social Determinants of teenage motherhood (work in progress)



Source: Own elaboration based on the reflection on the revised bibliography

b. Systems of oppressions: Heteropatriarchy and Capitalism

As illustrated in the conceptual framework of this dissertation, wider systems of oppressions have historically created power relationships in which the structural social determinants of teenage motherhood are organized. These wider systems interlink and operate through complex mechanism to undermine women capability to decide over their sexuality and reproduction. This section is an attempt to understand the connections between the power relationships exert by the systems of oppression and the widespread occurrence of teenage motherhood.

i. Heteropatriarchy, capitalism and motherhood

Patriarchy has been defined as the system of subordination of women to men, integrated by social mechanisms and powerful institutions such as families, churches, and states that historically and systematically had exert power relationships to control women's bodies and sexuality. Patriarchal oppression is based on socioeconomic, political, social and cultural gendered inequalities, and is determined by sexual division of work, use of social spaces and time [3]. The patriarchal system politically and socially exerts compulsory heterosexuality to women [3] through the social normalisation of *"an obligatory social relationship between man and woman"* [4]. Therefore, to refer to this system of oppression, I will use the term heteropatriarchy to keep in mind this connection.

According to Delphy [5], a heteropatriarchal system has an economic base grounded on domestic mode of production in which women are not paid but rather maintained [5]. In this mode of production women are deprived through the lack of access to means of subsistence and the discrimination faced in the wage-labour market. Importantly, the labour market, one of the institutions of the capitalist mode of production, is in part ruled, or used, by heteropatriarchy to push women to enter domestic relations. This is an important structural factor influencing women's poor participation in the social sphere and the collective experience of women's dependency. The labour market, by pushing women into the domestic space, contributes to the fact that in women's daily life, maternity becomes the obvious and normalized alternative.

- Women's bodies and gendered sexuality

Women's bodies are the arena in which oppression and subordinated condition is structured and in which social mechanisms of control are deployed [3,6–8]. Women's sexuality, as well, is socially constructed "for the others" through the eroticization and objectification of their bodies, or through the idealization of motherhood. As Lagarde has stated, motherhood, considered as a "natural" characteristic of women for care and loving, is socially constructed and lived by many women as an imperative *"a being of duty that cannot be rejected by any woman"*, regardless of age or social class [3].

Socially constructed gender discourse (understood broadly, including language and all other symbolic systems) shapes women subjectivity [3] and constitutes social practices [9]. Gendered social practices are learnt and enacted [9,10] by women since infancy, and one of the most influent idea in women's sexuality is the patriarchal ideal of women being mothers and caregivers [3]. In families, which are one of the most powerful institutions of the heteropatriarchy, girls share the care work role of their siblings, and domestic chores with other adult women. Thus, women are socialized to be mothers since infancy through patriarchal institutions such as mass media, family, school, and State, that impose the idea of what a woman is through education and religion [9].

- Machismo culture and double standard

Heteropatriarchy also determines the constant social construction of what is defined as feminine and masculine and the gender roles that shape society's ideas over the areas and spaces assigned to men and women. The social valuation of the reproductive sphere –assigned to women– and the productive sphere –assigned to men– are the foundation of men socialization grounded on the belief that men are superior than women. Therefore, one of the main characteristics of the heteropatriarchal power is the *machismo* script that is based on discriminating and disempowering women.

Machismo is intrinsically linked to masculinity and power and has been defined as a set of hegemonic masculinities [11]. Although machismo is socially constructed and learnt through gendered socialization, it is assumed to be unavoidable and a natural characteristic of men as a result of "a social order". Machismo is based on the

patriarchal oppression to women and in the irrational idea of women's inferiority. Thus, the machismo culture, which considers that men have unavoidable and natural characteristics, is a discourse based in power that helps to maintain unfair and violent attitudes towards women and other men not following the machismo script.

The machismo culture in the patriarchal system creates a double standard of what society expects that is an appropriate sexual behaviour in men and women. While machismo is related to power, control and initiative, the traditional construction of femininity emphasize women's passivity, compliance, concern for others, and agreeableness [12].

c. Structural determinants of inequalities in teenage motherhood

i. Socioeconomic, politic context, culture and values

The context includes all the social and politic mechanisms that yields form and maintain social hierarchies: macroeconomic policies; labour and family market policies; abortion and sexual and reproductive health policies; and welfare policies [13]. These factors define the individual socioeconomic position within the power hierarchies, access to resources and discrimination.

Culture and values are structural determinants of health. Gender norms and values based on religious moral have a major influence in the risk of teenage motherhood [12,14]. As we have already discussed before, these norms are reflected in gendered hierarchical roles, the double standard of what is expected of women and men sexual behaviours [14], the low social value of women and scant access to social power, and machismo ideas linked to women's domination. These values have been intergenerational transferred through the family, mass media and the school [13]. In Ecuador, maternity is highly valued even during adolescence and shapes the meaning and value of women and femininity.

d. Social stratification and intersectionality †

As in many other Latin American countries, Ecuador inherited a colonialist model rooted in patriarchy, classism and racism that have created a social stratification benefiting social elites that continue to exert strong control over land tenure and wealth. Consequently, women, peasants' communities, indigenous people and Afro-Ecuadorian groups are living in poverty as a collective experience of structural and historical origin [15]. The social stratification refers to the system of "classification" according to population's characteristics such as gender, social class, age, ethnicity and territory. It is influenced by power relationships created by the structural determinants.

This system of stratification determines, in part, which resources and goods are distributed to and accumulated over time by different social groups. Unequal distribution of resources and goods lead to different degrees of economic, political, social and cultural advantage among groups, which may then be translated into differences in health [17]. The production of inequities is also based in the complex interaction of axes in social stratification resulting from different social locations, power relations and experiences [16]. The intersection of these factors has a major influence on women's power and resources acquisition and, therefore, on their material conditions over the life course.

i. *Gender* inequalities are based on patriarchal system of domination of men over women that diminish women's opportunities to participate in and decide in all social levels. Connell refers to gender practice as a reflection of the process of social embodiment. In this regard she argues that *"... gender analysis specify how a society handles sexuality, reproduction, child growth, motherhood, fatherhood"* [9] which is an fundamental approach to understand the processes connected to teenage childbearing.
ii. *Social Class* creates a social stratification that in its interaction with other systems of oppression increase the risk for early motherhood. Capitalism's division between production and reproduction oppress women: 1) by creating an enormous

† Title taken from the "Intimate partner violence from a public health perspective: conceptual framework". See the bibliography of this chapter for the citation of this article.

disadvantage for women's insertion in the former; and 2) by living the exclusive responsibility of the latter to women as a matter of individual bargain. This creates a double or triple oppression – if it is intersected with ethnicity, for example- that exploit women as a subordinated producer of capital and abided to the patriarchy power. This systematically undermines women agency and their life expectations which has been linked to teenage motherhood [3].

iii. *Age*, not only as a biological but as a socially constructed category, can influence how individuals are valued in society and the access that different age groups may have to resources, means and services. The transition from childhood to adolescence is socially and culturally constructed, therefore the conception of the age boundaries to consider one as adolescent is not an unequivocal conception. Furthermore, social taboos related to adolescents' sexuality creates a culture of silence [18] regarding adolescents' sexual and reproductive health needs for information and healthcare services. Moreover, important events may occur in the pass from childhood to adolescence, including the first heterosexual intercourse, which is of paramount importance in the study of teenage motherhood, In this regard, it has been observed that the youngest girls are at first experience of heterosexual intercourse, the highest the risk to experience an early pregnancy [19–21]. Additionally, age differences with the sexual partner creates a power relationship that disempower girls and adolescents during the first experience of heterosexual intercourse and further [19,22].

iv. *Ethnicity* discrimination negatively affects health and is a historical mode of oppression widely recognized [23]. In Ecuador, minoritarian ethnic groups had been systematically oppressed and excluded from the social and political participation in the country. Women from historically oppressed ethnic groups have lesser participation in the political decisions in their communities which is a form of discrimination inherited in colonial and post – colonial processes. Additionally, women from these ethnic groups have also shown the highest prevalence of gender based violence in the country [24,25].

v. *The Territory* where individuals live influences their health. Territories are not "naturally determine" but the result of socioeconomic processes influenced by specific policies [26], culture and traditions. In Ecuador, important inequalities have been observed in the access to health services, education and teenage fertility according to the area of residence [27]. Literature, predominantly from high – income countries, have found that the socioeconomic characteristics of an area influence

teenage motherhood [28,29]. Studies performed in different settings have claimed that impoverished socioeconomic contexts can discourage girls from achieving higher educational attainment or a career capable to diminish the social value of motherhood [30–32].

e. Intermediate determinants of teenage motherhood

i. *Sexual division of work* is based on the ideological separation of the spheres of production, paid and socially recognized and attributed as men's domain, and reproduction into the domestic work and family socially assigned to women. The separation of these two spheres is mediated by wage and the assumed "naturalness" of this division is presented in the contemporary societies as a historical constant. Thus, the sexual division of work determines power inequalities in the access to power and material resources between women and men. Moreover, it has been suggested that during adolescence, domestic housework is a strong gender mechanism of socialization promoting reproduction and maternity [33].

ii. *The domestic mode of production* [5] refers to the specific mode of consumption and circulation of goods within families in which those "exploited" by the domestic mode of production (women) are *not paid* but rather *maintained*. Therefore, women's consumption is not separated of production and the equal sharing of goods is not mediated by money. In this case, maintenance differs from wage and the retribution is given in kind, increasing women's dependency to the domestic sphere and/or the male breadwinner.

iii. *Income and economic situation*. The sexual division of labour and the unpaid domestic labour have impoverished women worldwide. National income inequalities and unequal gender economic development can profoundly influence adolescent birth rates [34].

f. Psychosocial and individual factors

i. *Gendered sexuality* [35] model postulates that sexual beliefs and behaviours result from individuals' lifelong accumulation of advantageous and disadvantageous experiences, and adoption/rejection of *sexual scripts*[*], within socio-historical contexts. Women and men follow distinctive sexual trajectories insofar as they accrue gender-specific experiences and scripts and as their sexuality and gender trajectories intertwine.

g. Public health and health care services

i. *Public health programs* are very important in the development of best evidence-based programs available while also generating new evidence for effective strategies to tackle teenage motherhood [36]. The sexual health education programs that have proven to be effective in reducing teenage pregnancy are those that: 1) give skills to parents in order to talk with their children about pregnancy prevention and other aspects of sexuality and sexual and reproductive health, and 2) promote access to effective and affordable contraception for teens who are sexually active.

ii. *Healthcare services* are important gatekeepers to adolescents' access to information regarding sexual and reproductive health, contraception, including the emergency pill, and safe abortion [37]. Adolescent population in Ecuador have important barriers in seeking for attention and in the access to sexual and reproductive health services because: a) healthcare personnel personal beliefs regarding to adolescent sexuality and sexual behaviours; b) confidentiality in both the access to information and contraception; and c) consciousness objection by doctors to practice legal abortion [38].

[*] *Sexual scripts* refer to socially learned sets of sexual desires and conducts, rather than by biological imperatives. Historically, patriarchy have encouraged women and men follow different scripts, the machismo script grounded on hegemonic masculinity and the passive/submissive to women in sexual life.

In this chapter we have resumed the complex interlinked relationship among wider systems of oppressions creating power relationships in which structural determinants of teenage motherhood are embedded. Also, the intersectional influence of social stratification in which gender plays and important role in the inequalities in teenage motherhood have been explained and contextualized for the Ecuadorian setting. Finally, the intermediate determinants and psychosocial factors that are influenced by the structural determinants have been considered along with the important role of public health and healthcare services. This conceptual framework will be taken up again for the discussion of the results of this dissertation.

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#NiñasNoMadres

3. CHAPTER III: JUSTIFICATION

Despite the efforts made in Ecuador to reduce poverty during the last decade, important geographical, ethnic and gender-based inequalities persist [1]. Women from the most deprived socioeconomic groups, with lower educational level and from historically oppressed ethnic groups have the highest fertility rate compared to those from more privileged social groups [2]. In a context of global fertility decline, teenage motherhood increased in the last two decades [3,4]. In Ecuador, approximately 2,700 girls aged 10 – 14 years give birth every year [5]. However, no population-based research has been performed on the social determination of teenage motherhood and its geographical distribution by specific age groups in Ecuador. This is vital information for public health policy programming and resources allocation to tackle teenage motherhood in the country.

Studies performed in the country have explored the influence of disadvantageous socioeconomic conditions [6,7], social gender norms constraining adolescents' agency and control over their sexuality[8–10], and behavioural factors associated to teenage motherhood, [7,11]. Nevertheless, these evidence is representative for adolescents attended in public facilities in the biggest cities of Ecuador [6,12] and do not explore the influence of power relationships [13–16] to socioeconomic inequalities in teenage motherhood. Other studies assessing the role of contextual level factors had been exclusively centred in a province of the Amazonic region [17], or used adolescent fertility as an indicator to analyse wider sexual and reproductive health inequalities [18] and therefore did not assessed the factors associated with inequalities in teenage motherhood.

Therefore, assessing the distribution of teenage motherhood and its social determination is aim of political and societal activity of vital importance to reduce social inequalities in teenage motherhood. In this regard, it has been well stablished that the measurement of social and material deprivation is of paramount importance to describe the social determinants of teenage motherhood and the influence of the context over its occurrence. In Ecuador, prior attempts at measuring deprivation [1,19–21] present methodological limitations for the study of health inequalities related to: i) lack of

representativeness at smaller geographical units; ii) estimations made in non-comparable geographical units (different administrative levels for urban and rural estimates); and iii) inclusion of limited core deprivation dimensions and indicators. A deprivation index specifically designed for the study of health inequalities has, to our knowledge, never been constructed in Ecuador.

In this thesis we will go one step forward and analyse the factors that influence the high rates of teenage motherhood in the country by means of countrywide surveys that measure relevant indicators of women's socioeconomic characteristics, the first experience of heterosexual intercourse and fertility. We analyse and discuss the factors that have contributed to socioeconomic inequalities in teenage motherhood in recent decades considering power relationships constraining women's agency over their sexual experiences. We develop a deprivation index to study geographical inequalities in health for the cantons of Ecuador. Finally, we explore the social determination of teenage motherhood with data at the smallest area level available stratifying the analysis by age to tackle the most vulnerabilised groups. Therefore, this study can contribute with important evidence for policy decision making to tackle socioeconomic inequalities in teenage motherhood.

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4. CHAPTER IV: HYPOTHESIS AND OBJECTIVES

a. Hypothesis

The hypothesis considered for this dissertation are the following:

- The prevalence of teenage motherhood is higher in women from the most disadvantaged socioeconomic groups comparing to those from most advantaged social class.

- The socioeconomic inequalities in teenage motherhood in Ecuador are partially explained by disadvantageous circumstances related to women's sexuality and access to sexual and affective education.

- The socioeconomic inequalities in teenage motherhood and its associated factor have changed in the last 14 years in the country.

- The risk of being mother during adolescence in Ecuador is higher for women with lower degrees of agency and control over their first experience of heterosexual intercourse.

- The adolescent birth rate in Ecuador is larger in cantons with high material and social deprivation and have an unequal geographical distribution among historically oppressed ethnic groups' territories.

b. Objectives

In order to examine the hypotheses, placed forward above, the main objective of this thesis was to analyse the socioeconomic inequalities in teenage motherhood and its evolution in Ecuador.

Objective 1: To determine the contribution of factors related to women's first heterosexual intercourse and received sexual education to the socioeconomic inequalities in teenage motherhood in Ecuador (Paper 1).

Objective 2: To analyse the changes in the socioeconomic inequalities in teenage motherhood and in the associated factors related to women's experience of first heterosexual intercourse in Ecuador (Paper 2).

Objective 3: To determine the geographical distribution of teenage motherhood among the 221 cantons of Ecuador (Papers 3 and 4).

Objective 4: To analyse the socioeconomic inequalities in the distribution of adolescent birth rate in 211 areas of Ecuador (Papers 3 and 4).

5. CHAPTER V: METHODS

This thesis is based on quantitative data from countrywide surveys: last edition of the National Survey on Health and Nutrition, 2012 (hereafter ENSANUT, the Spanish acronym for the survey) and two editions of the Demographic and Maternal and Child Health Surveys (here after ENDEMAIN), and the National Population Census, 2010. The analysis of the data and the description of the variables are discussed in detail in the methods of each of the research papers and therefore not included in this chapter.

a. Ethical considerations

Considering that this study implied no testing on human subjects, it is exempt of being considered by an ethic panel. Nevertheless, all the surveys used for this dissertation had an informed consent form that was fulfilled, and the participants were informed of the nature of the study. There are no conflict of interest and the data base used in our study is freely available on the web site of the National Institute of Statistics and Census and protected by the data protection law of Ecuador.

6. CHAPTER VI: RESULTS

Paper 1: Verónica Espinel-Flores, Mercè Gotsens, Vanessa Puig-Barrachina, Brenda Biaani León-Gómez, Glòria Pérez. Socioeconomic inequalities in teenage motherhood in Ecuador: Disentangling the contribution of potential mediator factors (Under review – Journal of Women & Health).

Paper 2: Verónica Espinel-Flores, Mercè Gotsens, Vanessa Puig-Barrachina, Brenda Biaani León-Gómez, Andrés Peralta – Chiriboga, Glòria Pérez. Steady trends in socioeconomic inequalities in teenage motherhood in Ecuador (Under review – International Journal of Public Health).

Paper 3: Andrés Peralta – Chiriboga, Verónica Espinel-Flores, Mercè Gotsens, Glòria Pérez, Joan Benach, Marc Marí Dell'Olmo. Developing a deprivation index to study geographical inequalities in Ecuador (In press – Revista de Saúde Pública) - Paper with first shared authorship.

Paper 4: Verónica Espinel-Flores, Mercè Gotsens, Vanessa Puig-Barrachina, Brenda Biaani León-Gómez, Andrés Peralta – Chiriboga, Glòria Pérez. Socioeconomic and geographical inequalities in teenage motherhood in Ecuador: an ecological study (Draft version).

a. Socioeconomic inequalities in teenage motherhood in Ecuador: Disentangling the contribution of potential mediator factors.

Socioeconomic inequalities in teenage motherhood in Ecuador: Disentangling the contribution of potential mediator factors.

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ABSTRACT

In Ecuador, as in many low- to middle-income countries, teenage motherhood is a widespread occurrence resulting from multiple individual, societal and cultural factors that have a major influence over women's life path. The occurrence of teenage motherhood reveals adverse socioeconomic circumstances, as well as girls' and young women's lack of control and agency over their first sexual experience. Drawing from cross-sectional data from the Ecuadorian National Survey of Nutrition and Health (2012), this study analysed whether factors related to women's first heterosexual intercourse could account for socioeconomic inequalities in teenage motherhood in Ecuador. We defined the following potential factors: (i) woman's age at first heterosexual intercourse; (ii) age of woman's first sexual partner; (iii) use of contraception; and (iv) whether sexual education was received. We estimated hazard ratios using multivariate Cox regression models in order to analyse the mediator effect of the independent variables on socioeconomic inequalities related to teenage motherhood. The most important determinants of inequality in teenage motherhood were factors related to the first experience of heterosexual intercourse. This highlights the need for Ecuadorian society to provide health services, affective-sexual education, and free and safe access to abortion, in order to reduce teenage motherhood in the country.

Keywords: social inequalities, teenage pregnancy, sexual and reproductive health, sexual experiences, Ecuador.

INTRODUCTION

Worldwide, almost 95% of adolescents pregnancies occur in middle-income countries (Williamson, 2013). Although global fecundity has declined in Latin America in recent decades, the proportion of women who have their first child before age 20 continues to be high in most countries in the region (Rodríguez-Vignoli, 2014). Empirical studies on the issue have established that most pregnancies among adolescents result not from deliberate choice, but are the consequence of multiple individual, community and societal factors (Darroch et al., 2001; Maness & Buhi, 2016; Singh, 1998; United Nations Population Fund, 2013). Moreover, adolescent pregnancy is often linked to adverse life circumstances, and may be a life-long limiting factor for young women's access to opportunities in modern societies. These adverse life circumstances have been linked to socio-economic inequalities such as living in poverty, being poorly educated and lacking educational or employment opportunities (United Nations Population Fund, 2013).

Studies performed in different socio-economic settings have concluded that education is strongly related to teenage pregnancy (Pradhan, Wynter, & Fisher, 2015) and motherhood (Fagbamigbe & Idemudia, 2016). Educational level has been considered as both a proxy measure of socioeconomic position – and is thus a structural determinant of adolescents' health and well-being (Maness, Buhi, Daley, Baldwin, & Kromrey, 2016; Viner et al., 2012)– and an empowerment factor for girls (Williamson, 2013). In middle- and high-income countries, higher education and socioeconomic position have been found to be associated with various factors: (i) a lower rate of adolescent pregnancy (J. S. Santelli et al., 2017); (ii) greater intergenerational delay in fertility, i.e. women who had been born to an adolescent mother are less likely to become pregnant before age 20 (de Almeida & Aquino, 2009); (iii) increased awareness and use of contraceptive methods from the first sexual intercourse event onwards (K Mmari & Blum, 2009; Kristin Mmari & Sabherwal, 2013; Pradhan et al., 2015).

Sexual initiation is frequently experienced during adolescence or young adulthood and, from a sexual and reproductive health perspective, is an important milestone in a woman's life. The characteristics of the first experience of sexual intercourse have been extensively analyzed to determine how they influence teenage pregnancy; these include age at first sexual experience, degree of control over the first sexual experience, use of contraception, and age of the first sexual partner (Heywood, Patrick, Smith, & Pitts, 2015; Kaestle, Morisky, & Wiley, 2002; Reese, Haydon, Herring, & Halpern, 2013). In this regard, the interplay of individual, interpersonal, societal and cultural factors related to gendered sexuality and sexual scripts (Carpenter, 2010) have a major influence on adolescents' sexual conduct, such as the use of condoms and the level of consensual sex. For example, in terms of education, a study exploring competence as a predictor of sexual and reproductive health outcomes in high-income countries found that academic ability or achievement was associated with delayed sexual initiation, greater use of contraception, and fewer pregnancies (House, Bates, Markham, & Lesesne, 2010). Another study analyzed the degree of control over the first experience of sexual intercourse, and found that having an older sexual partner decreased the probability of using contraception during the first experience of sexual intercourse (Abma et al., 1998). In addition, individuals who had limited or no information on sexual and reproductive health were more likely to have become a mother or father during adolescence (Kristin Mmari & Sabherwal, 2013), while sexual violence and gender norms appear to limit girls' agency and control over their sexual and reproductive choices (Caffe et al., 2017).

Despite declining social and health inequalities in Ecuador, the fertility rate among adolescents continues to be among the highest in South America, with no significant changes since 1990 (SENPLADES, 2013). Unlike in other countries in the region (e.g. Uruguay), Ecuador has experienced an increase in teenage motherhood in the last two decades (Rodríguez-Vignoli, 2014), with 18% of women becoming pregnant between 12 and 19 years of age, despite a global decline in fertility (SENPLADES, 2013). Moreover, inequalities have been reported according to ethnicity, educational level and area of residence, with the highest prevalence of teenage pregnancies observed among women with the lowest educational levels, those belonging to historically oppressed groups (indigenous, Afro-Ecuadorian and montubio people), and those living in impoverished rural areas (Freire et al., 2013). Additionally, an Ecuadorean woman's life

path to teenage pregnancy develops in a cultural and social context that place high values on motherhood (even in the teenage years) and where gender relations are based on a patriarchy culture that disempowers girls' ability to choose how, when and with whom to initiate a safe, voluntary sexual relationships. Despite this situation in Ecuador, relatively little is known about how the context of first sexual intercourse and other factors such as sexual and reproductive education, contribute to social inequalities in teenage motherhood in the country. A specific survey on women's reproductive age provides a unique opportunity to explore several aspects involved in the first heterosexual intercourse and in the association between sexual education and teenage motherhood in the context of a middle-income-country.

Therefore, the aim of this study was to explore whether a series of mediating factors could account for socio-economic inequalities in teenage motherhood in Ecuador in 2012. These factors include age at first heterosexual intercourse, age of first sexual partner, use of contraception during first heterosexual intercourse, and a previous sexual education.

MATERIAL AND METHODS

Design, Study Population and Information Sources

This study draws on cross-sectional, individual-level data from the National Survey on Health and Nutrition, 2012 (hereafter ENSANUT, the Spanish acronym for the survey). ENSANUT is a serial survey conducted periodically (every ~5 years) in a non-institutionalized population sample of individuals aged 0 – 59 years that is representative of the entire population, at both national and provincial level (first administrative level in the country). In the 2012 edition, the participation rate was around 81.8%, and non-respondents were replaced by subjects with the same characteristics. A total of 10,213 women were included in the sample of women of childbearing age (12-49 years old). This study was conducted only in women who were (i) sexually active, (ii) 20-24 years old, and (iii) born and living in Ecuador (n=2,144).

ENSANUT include a special questionnaire for Women of Fertile Age (WFA), which was used to collect information on fertility, reproductive history and preferences in all women of childbearing age. Women aged 12–24 years old at the time of the survey

were retrospectively questioned about their first sexual experience, and about whether they had received any sexual education (questionnaire Section VI "Sexual Activity and Reproductive Health"). Socio-demographic information was collected using the household questionnaire.

The questionnaires were anonymized and administered in person by a team of trained interviewers, and the participants gave written informed consent. The survey was performed by the National Institute of Statistics and Census (INEC according to its acronym in Spanish) and by the Ministry of Public Health. A complete description of the methodology used in the survey, the questionnaires and the databases are available online at the official National Institute of Statistics and Census web page (http://www.ecuadorencifras.gob.ec/institucional/home/).

Measurements and Variables

In this study, teenage motherhood was defined according to the WHO definition of adolescence, 10-19 years of age. The dependent variable in this analysis was the age at which a woman had her first childbirth during her teenage years (uncensored individuals).

As a proxy for socioeconomic position, we used educational attainment because it is considered to reflect the material and social resources available in the family of origin, and to provide reasonable measure of achievements in early life (Galobardes, Shaw, Lawlor, Lynch, & Davey Smith, 2006). Educational attainment was categorized at three levels: (i) no schooling or incomplete primary education; (ii) complete primary education; (iii) complete secondary education or higher. Similarly, in countries with similar socio-economic characteristics to those of Ecuador, ethnicity and area of residence are considered to be important for relationships of power and oppression associated with teenage motherhood (Pradhan et al., 2015; Rodríguez-Vignoli, 2014). Thus, we included both variables to control for their potential effect on inequalities related to teenage motherhood. Ethnicity (a self-identification variable) was dichotomized, and the most privileged ethnic groups was assigned as the reference category: (i) white (including white and mestizo people); (ii) other ethnic groups (including Afro-Ecuadorian, indigenous, and montubio people, all of which are oppressed groups). Rurality was a dichotomous variable (Yes/No) assigned according to

whether the women stated that she was living in a rural area after or during her first pregnancy.

The following potential mediators were included in this study: (i) age at first heterosexual intercourse experience, grouped according to the legal definition for women's consent to sexual intercourse and statutory rape in Ecuador (Asamblea Constituyente, 2008) (10–13 years, 14–16 years, and 17–19 years – data on older ages at first heterosexual intercourse experience were excluded from database); (ii) use of contraceptive methods (Yes/No); (iii) age of first sexual partner (≤17 years or ≥18 years). As a proxy for the sexual education received, we created a dichotomous variable (Yes/No) according to whether the woman had ever received information on the following: first menstrual period (menarche), sexual relationships, contraception methods, pregnancy and childbirth. We excluded individuals with missing data (3%-15% for variables related to first experience of heterosexual intercourse, and < 1% for each of the proxy variables related to sexual education).

Statistical Analysis

Firstly, we performed a univariate analysis to study the distribution of the selected variables in the study population. Second, to compute survival probability until the time of first motherhood, we used Kaplan-Meier survival estimates. To study the mediator effects of the independent variables on the socioeconomic inequalities in teenage motherhood, we computed Hazard Ratios (HR) by fitting nine different multivariate Cox regression models including all independent variables. The baseline model generated using the proxy variable for socioeconomic position variable (educational attainment) was considered the standard model, and various control variables and potential mediators were added (both one by one and in blocks) to this baseline model. The final model (Model 9), was a full multivariate model containing all the independent variables and potential mediators. Finally, for the multivariate models, we estimated the percentage change in the aHR for educational attainment that resulted from adding new variables to the baseline model as follows: (HR baseline-adjusted model – HR mediator-adjusted model) / (HR baseline-adjusted model) × 100. All estimates were weighted to maintain population representativeness. All analyses were performed using Stata 13 (StataCorp, 2013).

RESULTS

The percentage of women who declared having been teenage mothers was higher among those in the most disadvantaged socio-economic group at the time of the interview (no or incomplete primary education, 54.4%) (Table I). Most teenage mothers identified themselves as belonging to the "white" group (85.5%) and reported not living in rural areas at the time of their first childbirth in their teenage years (68.0%). Regarding the variables involved in the first experience of heterosexual intercourse, a high proportion of teenage mothers declared that they had experienced heterosexual intercourse for the first time when they were 14-16 years old (55.3%), had a sexual partner who was ≥18 years (76.0%); and had not used contraception (81.1%). The percentage of women who had received sexual education was high in both groups, although this percentage was lower among women who became mothers in their teenage years than among those who had not become mothers.

Table 1. Weighted frequency distributions of the sample across selected variables, according to teenage motherhood status. Women aged 20 -24 years in Ecuador (2012.)

Variables	Total weighted sample (N= 2,144)	Teenage Motherhood Yes % (n)	No % (n)
Educational attainment	2,144	52.99 (1,136)	47.01 (1,008)
No schooling or incomplete primary education	41.9 (898)	54.4 (618)	27.7 (279)
Complete primary education	38.5 (825)	38.0 (431)	39.0 (393)
Secondary or further	19.7 (421)	7.6 (86)	33.3 (335)
Ethnicity	2,144		
White	87.8 (1,883)	85.5 (972)	90.4 (911)
Other ethnic groups	12.2 (261)	14.5 (164)	9.6 (97)
Rurality	2,144		
No	69.0 (1,479)	68.0 (773)	70.1 (707)
Yes	31.0 (665)	32.0 (363)	29.9 (301)
First heterosexual intercourse variables			
Age at first heterosexual intercourse	2,081		
10 - 13	3.4 (71)	5.7 (63)	0.9 (9)
14 - 16	36.2 (752)	55.3 (607)	14.8 (145)
17 -19	60.4 (1,257)	39.0 (428)	84.3 (829)
Age of first sexual partner	2,031		
≤ 17 years	16.9 (343)	24.0 (255)	9.1 (88)
≥ 18 years	83.2 (1,688)	76.0 (809)	90.9 (879)
Use contraception	2,085		
Yes	29.5 (615)	18.9 (207)	41.2 (408)
No	70.5 (1,470)	81.1 (887)	58.8 (581)
Have ever received information about…			
Menarche…	2,142		
Yes	90.1 (1,929)	85.8 (974)	94.9 (954)
No	9.9 (213)	14.2 (161)	5.1 (51)
Sexual relationships	2,138		
Yes	80.8 (1,728)	74.7 (846)	87.7 (881)
No	19.2 (410)	25.3 (286)	12.4 (124)
Contraception methods	2,138		
Yes	82.1 (1,755)	78.1 (885)	86.6 (870)
No	17.9 (383)	21.9 (248)	13.4 (134)
Pregnancy and birth	2,137		
Yes	83.0 (1,773)	78.8 (891)	87.7 (881)
No	17.0 (364)	21.2 (240)	12.3 (123)

The total of each variable does not coincide because of missing values.

Table 2 shows the changes in HR for educational attainment for the individual and grouped independent variables, as well as the percentage of socioeconomic inequalities in teenage motherhood they explain. After analysing missing values, we exclude the variable for first menstrual period. The greatest changes in inequalities in teenage

motherhood were observed in model 5, which includes mediators related to the first heterosexual relationship: age at first experience of heterosexual intercourse, age of first sexual partner, and use of contraception [no or incomplete primary education, 49.45% of change (aHR: 2.8; CI: 1.9-4.1); incomplete secondary education, 28.7% of change (aHR 2.3; CI:1.5-3.3)]. The models that capture ethnicity, rurality and variables related to sex education were not statistically significant. Almost the same changes in the aHR that were observed in model 5 (adjusted according to the variables related to the first heterosexual relationship) could be seen in the final model. Finally, we would like to highlight that the gradient observed in the aHR for educational attainment in women with no schooling (or incomplete primary education) and complete primary education almost disappeared in the two aforementioned models: model 5 (adjusted for initial educational variables) and the final model [(aHR 2.8, 95% CI 1.9-4.3); (aHR 2.3, 95% CI 1.5-3.4), respectively].

Table 2 Hazard Ratios of teenage motherhood on socioeconomic inequalities adjusting separately by groups of mediating factors. Women aged 20-24. Ecuador, 2012.

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8		Model 9	
	aHR (95% CI)[b]	%	aHR (95% CI)[c]	%	aHR (95% CI)[d]	%	aHR (95% CI)[e]	%	aHR (95% CI)[f]	%	aHR (95% CI)[h]	%	aHR (95% CI)[i]	%	aHR (95% CI)[j]	%	aHR (95% CI)[k]	%
Educational attainment																		
No schooling or incomplete primary education	5.5 (3.7-8.0)	0.6	5.6 (3.8-8.2)	-1.3	3.5 (2.3-5.2)	36.7	3.3 (2.2-4.9)	40.2	2.8 (1.9-4.2)	49.5	5.23 (3.6-7.7)	4.9	5.2 (3.6-7.7)	4.9	5.3 (3.6-7.8)	4.6	2.8 (1.9-4.3)	48.7
Complete primary education	3.2 (2.2-4.6)	0.6	3.2 (2.2-4.7)	0.0	2.5 (1.7-3.8)	20.2	2.5 (1.7-3.6)	22.4	2.3 (1.5-3.3)	28.7	3.14 (2.1-4.6)	1.0	3.1 (2.1-4.6)	1.0	3.2 (2.2-4.6)	0.3	2.3 (1.5-3.4)	28.1
Secondary or further	1		1		1		1		1		1		1		1		1	
Ethnicity																		
White	1		1														1	
Other ethnic groups	1.0 (0.8-1.3)		1.1 (0.9-1.3)														1.0 (0.8-1.3)	
Rurality																		
No			1														1	
Yes			0.9 (0.7-1.1)														0.8 (0.6-1.0)	
First heterosexual intercourse variables																		
Age at first sexual intercourse																		
10 - 13					7.7 (4.1-14.3)		7.1 (3.7-13.6)		6.7 (3.3-13.8)								7.0 (3.6-13.8)	
14 - 16					4.1 (3.4-5.1)		3.94 (3.2-4.9)		4.03 (3.3-5.0)								4.0 (3.3-4.9)	
17 -19					1		1		1								1	
Age of first sexual partner																		
≤ 17 years							1.4 (1.1-1.8)		1.4 (1.1-1.8)								1.4 (1.1-1.8)	
≥ 18 years							1		1								1	
Use contraception																		
Yes									1								1	
No									1.8 (1.4-2.3)								1.8 (1.4-2.4)	
Have ever received information about Sexual relationships																		
Yes											1		1		1		1	
No											1.2 (0.9-1.5)		1.2 (0.9-1.5)		1.1 (0.8-1.5)		1.1 (0.8-1.4)	
Contraception methods																		
Yes													1		1		1	
No													1.0 (0.8-1.4)		1.0 (0.8-1.3)		1.1 (0.8-1.4)	

Pregnancy and birth		
Yes	1	1
No	1.2 (0.8-1.6)	1.1 (0.8-1.5)

** p-value <0.01

HR: Hazard ratio; cHR: Unadjusted/crude Hazard ratio; aHR: Adjusted Hazard ratio; CI95%: Confidence interval at 95 percent; %: percentage of change.

Model 1: aHR considering educational attainment (baseline model) and ethnicity.

Model 2: aHR model 1 and area.

Model 3: aHR baseline model and age at first heterosexual intercourse.

Model 4: aHR considering model 3 and age of first sexual partner.

Model 5: aHR considering model 4 and contraceptive use at first heterosexual intercourse.

Model 6: aHR considering sexual relationships.

Model 7: aHR considering model 6 and contraceptive methods.

Model 8: aHR ratios considering model 7 and pregnancy and birth.

Model 9: aHR considering all variables.

DISCUSSION

Our main finding is that the most important mediators of inequalities in teenage motherhood in Ecuador were factors related to the first experience of heterosexual intercourse. These included age at first heterosexual intercourse, age of the first sexual partner, and whether contraceptive measures were used during intercourse. Furthermore, the relationship between socioeconomic status and risk of teenage motherhood seemed to be explained by these mediator variables (i.e. the differences in the association between teenage motherhood and level of education disappeared after adjusting for these mediator variables). Age at first heterosexual intercourse was the strongest predictor of risk of teenage motherhood. Variables related to sexual education were the least important predictors of socioeconomic inequalities in teenage motherhood.

It is not surprising that the characteristics of the first heterosexual intercourse have a major role in inequalities in teenage motherhood in Ecuador. In high-income countries, socio-economic disadvantage has previously been associated with early sexual initiation and low levels of contraception use at first sexual experience (Hawes et al., 2010). Furthermore, the interaction between social stratification and gendered stereotypes has been found to be of paramount importance in sexual initiation during adolescence. In an ethnographic study of Mexican adolescents with different socioeconomic statuses, Stern observed that adolescent girls from the most deprived groups view teenage motherhood and partnership initiation as a way to escape from emotional and economic deprivation in their families (Stern, 2007).

Our results are alarming because they reveal the low degree of control (Abma et al., 1998) and agency that many young women in Ecuador have over their first experience of heterosexual intercourse. This implies that they have impaired ability to avoid becoming teenage mothers. In our sample, we observed a higher HR for teenage motherhood in women whose first heterosexual intercourse occurred when they were 10-13 years old, and in those who reported that they did not use contraception at that time. Thus, sexual initiation at these ages is indicative of power relationships over women's bodies from infancy. Most importantly, this disempowers girls' and adolescents' capacity to make decisions about their sexual and reproductive health, both

in their present and future circumstances. In Ecuador, 26% of all women have experienced sexual abuse at some point in their lives, and 11% during childhood and adolescence (INEC, 2012b). It has been suggested that many girls and female teenagers' consent to sexual relationships in order to receive affection, rather than for satisfaction. Thus, 'voluntary but unwanted' sexual experiences are a cause for concern and are more common among young women. Moreover, although statutes have been established for legal abortion in Ecuador, access to abortion is restricted such that women in the most deprived socio-economic groups are forced either to continue with unwanted or unplanned pregnancy, or to undergo an unsafe abortion.

Our study shows that the age of the first sexual partner (≤17 years) accounted for inequality and for higher HR for teenage motherhood. In contrast, a previous study of the role of the male partner's age found that having an older partner increased the likelihood of teenage motherhood, arguing that because of the age difference a power relationship may be established, thus reducing the teenage girl's degree of control over her first sexual intercourse, especially when the girl's age at sexual initiation was ≤13 years old. We hypothesized that adolescent couples found it more difficult to freely access contraception methods due to parental and health providers' disapproval of teenagers being involved in sexual relationships; access to contraception methods would be much easier for male adults, given the social acceptance of their being involved in sexual activities and their economic means.

Moreover, the spontaneous nature of many first sexual experiences with a young partner may actually lessen women's ability to plan ahead for the use of contraceptive measures. In addition, it has been argued that in the Ecuadorian context the *machismo* script system is a major influence in subordinating women in their gender relations with men (Goicolea, Wulff, & Öhman, 2010; Varea, 2008). Even if both members of the couple are of the same age when having sex for the first time, power relationships can also be observed in young couples, either in their first sexual intercourse experience or on subsequent occasions. In a qualitative study in Ecuador, many adolescent women declared that they had been mistreated by their male partners when they demanded using contraception during sexual intercourse. As a consequence, they declined to use it to avoid losing affection or suffering violence (Santillana & Castello, 2010). Another study in the Ecuadorian Amazon basin found that romantic love also played an

important role in teenage pregnancy and motherhood, as becoming pregnant or having a child was a way of showing love and commitment to a relationship (Goicolea et al., 2010).

In our sample, variables related to sexual education did not appear to contribute to socioeconomic inequalities in teenage motherhood. This finding could be due to low quality of the sexual education received by people in all socioeconomic groups in Ecuador. In Ecuador, as in other middle-income countries (Santhya & Jejeebhoy, 2015), sexual education is mostly delivered at public schools in isolated talks based on biological terms (SENPLADES, 2013). Therefore, it is not provided within the context of gender-relations and human rights. However, we believe that female teenagers from the most deprived socioeconomic groups are less likely to have access to sexual and reproductive information from sources other than school or family members, such as the internet. To explore this further, we performed a descriptive analysis (not shown) of information sources on sexual and reproductive health accessed by the people in our sample. We found that women in higher socioeconomic groups (as measured by educational attainment) were more likely to access this information via the internet than those from less privileged socioeconomic groups, who mostly obtained this information from schools or from their families.

Moreover, we found that women who had their first experience of heterosexual intercourse before the age of 14 had higher risk of becoming teenage mothers. Consequently, a sexual education based on gender-relations and human rights can no longer be neglected in Ecuador. It should be provided universally at earlier ages in order to increase adolescents' knowledge, and to empower girls in making decisions about sexuality and reproduction to avoid a teenage pregnancy (Bennett & Assefi, 2005; Céspedes & Robles, 2016; Goesling, Colman, Trenholm, Terzian, & Moore, 2014; Kohler, Manhart, & Lafferty, 2008; Oringanje et al., 2009).

Contrary to the expected, in our study rurality and ethnicity did not appear to contribute to socioeconomic inequalities in teenage motherhood. The result for rurality may be due to the urban poverty that characterizes some of the largest cities in Ecuador. Urban poverty leads to exclusion from local health services and creates barriers for teenagers to access them (Malarcher, 2010). The result for ethnicity may be due to some peoples'

tendency not to identify themselves with historically discriminated ethnic groups, which in turn may reflect the political and social pressure in Ecuador to identify with majority groups (Perreira & Telles, 2014).

While our study is an important contribution to the evidence on socio-economic inequalities in teenage motherhood, it has some limitations. In addition to the standard biases of cross-sectional data (including recall bias, desirability bias and causality determination), our proxy indicator of socioeconomic position, educational attainment, is susceptible to reverse causality, i.e. lower educational levels could result from teenage motherhood. However, education is a potentially useful indicator of early life circumstances, thus measuring material and social resources in the family of origin. Therefore, we consider that the differences observed between educational level reflect the women's socio-economic position during their teenage years, essentially because women with higher educational attainment also have better resources and social support and are empowered enough to graduate from high-school and move on to higher educational levels.

Regardless, the limitations mentioned above were unavoidable given the characteristics of our information source. The ENSANUT survey did not include any other socioeconomic indicators for the time at which the events analysed in our study took place. Nonetheless, this survey is unique in collecting information on sexuality, fertility, reproduction and sexual health in the country, taking into account the lack of specific surveys on teenage health or more general longitudinal studies in Ecuador and other middle-income countries. Moreover, we consider that our study provides valuable evidence for policy makers and professionals involved in public health decision making in terms of mediator factors that must be tackled to reduce socio-economic inequalities in teenage motherhood in the country. To our knowledge, this is the first study to comprehensively analyse the contribution of mediating factors to socio-economic inequalities in teenage motherhood in Ecuador.

CONCLUSIONS AND RECOMMENDATIONS

Our study analyses several factors that could have an impact on socio-economic inequalities in teenage motherhood in Ecuador. Our results highlight the important

contribution of factors related to the first experience of heterosexual intercourse, and no contribution by rurality, ethnicity and sexual education. These results highlight the importance of patriarchy-based social and cultural norms in shaping women's sexuality and in shaping inequalities in their sexual and reproductive trajectories. In this sense, supporting teenagers right to enjoy their sexuality and their affective and sexual relationships while remaining free from sexual abuse and gendered stereotypes is a vital commitment for the Ecuadorian society, and is key for advancing towards a more equal society.

Therefore, to tackle socio-economic inequalities in teenage motherhood, we recommend the following: 1) to further develop a policy on compulsory sexual and affective education, which should be based on a gender perspective and provided in a human rights framework, and to make access to this information more democratic and equal; 2) to ensure that women are no longer deprived of their right to access safe and legal abortion in the country; 3) to implement comprehensive sexual and reproductive health policies and services devoted to girls and adolescents who currently have no access to the means necessary to address and empower themselves through knowledge, in order to gain control over their sexuality and reproduction.

Finally, further studies are needed to better understand the relationships between structural factors such as the norms of the patriarchy culture, gendered sexuality and stereotypes, social stratification, and individual and interpersonal factors related to teenage pregnancy and motherhood in Ecuador.

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b. Steady trends in socioeconomic inequalities in teenage motherhood in Ecuador.

Steady trends in socioeconomic inequalities in teenage motherhood in Ecuador

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ABSTRACT

Objective: To describe the trends and changes in inequalities in teenage motherhood and in the association between the factors related to the first experience of heterosexual intercourse and teenage motherhood in Ecuador.

Methods: Data from 4,696 women aged 20-24 years who had given birth as teenagers was obtained from the Ecuadorian Demographic and Health Surveys between 1999 and 2012. Poisson regression models with robust variance were fitted to obtain prevalence ratios (PR) and their confidence intervals (95%CI) to estimate changes in socioeconomic inequalities and factors related to the first heterosexual intercourse.

Results: An increasing pattern was found in the prevalence of teenage motherhood (48% in 1999 and 60% in 2012) among women with complete primary education. Throughout the study period, trends remained stable in the probability of teenage motherhood in women from the most deprived socioeconomic groups and in all behavioural factors associated with teenage motherhood.

Conclusions: Socioeconomic inequalities in teenage motherhood and adverse circumstances at first intercourse remained unchanged for 14 years. Factors vital to reducing teenage motherhood in Ecuador are gender equitable economic development, access to health services, and safe abortion.

Keywords:

Inequalities, socioeconomic factors, sexual behaviour, trends, teenage pregnancy, Ecuador

Introduction

Teenage pregnancy is a longstanding problem for public health and policy makers worldwide. While adolescent fertility has decreased overall, rates of adolescent childbearing–from 15-19 years old–remain persistently high globally (United Nations Population Fund, 2013). According to the World Health Organization, the adolescent fertility rate remained stable from 1990 to 2000, followed by a slow downward trend over the past 15 years (Pan American Health Organisation, 2016). A study performed with demographic and household survey data from low- and middle-income countries found that age-specific births in girls aged 12-15 years old were also high (S. Neal et al., 2012). In Latin America, an estimated 15% of all pregnancies occur among girls younger than 20 years old (United Nations, Department of Economic and Social Affairs, & Division, 2015). Meanwhile, in Western Europe and other high-income countries, adolescent birth rates are now very low, representing 4% of all births (Eurostat, 2017).

Adolescent childbearing is considered a symptom of socioeconomic disadvantage that often leads women into a circle of poverty (United Nations Population Fund, 2013). Teenage motherhood aggravates disadvantageous conditions for women in modern societies and accentuates gender and socioeconomic inequalities (S. E. Neal et al., 2015; Rodríguez-Vignoli, 2014; Singh et al., 2001). These disadvantages are more intense in countries lacking policies for girls and adolescents to overcome the potential effects of early motherhood. Conversely, in contexts with better socioeconomic opportunities for women, adolescent birth rates are lower. The largest regional declines in adolescent birth rates are strongly associated with reduced socioeconomic and gender inequalities (Decker, Kalamar, Tunçalp, & Hindin, 2017b).

Variations in trends of teenage motherhood are also linked to changes in the characteristics of adolescents' first sexual intercourse (Manlove, Ikramullah, Mincieli, Holcombe, & Danish, 2009). As an important turning point in women's life, this experience reveals cumulative lifelong circumstances linked to gender norms and sexual beliefs in a specific sociocultural setting (Carpenter, 2010). Importantly, early first sexual intercourse is less likely to be consensual or to involve the use contraception

(Darroch et al., 2001; Finer & Philbin, 2013). In addition, the age of the first sexual partner is also important to understand women's agency to choose the circumstances related to the first sexual experience (Heywood et al., 2015). Important aspects such as girls' and young women's consent to have sexual intercourse, as well as the use of contraception, have been linked to the age of the first sexual partner (Kaestle et al., 2002). Furthermore, the characteristics of the first sexual experience influence subsequent sexual and reproductive health behaviours.

In Ecuador, a South American country, social and economic inequalities have substantially decreased in recent years. The decline in overall fertility rates in the country was preceded by the progressive incorporation of women into the labour market and greater access to education since the early 1980s (CONAMU, 2014) . These changes are also reflected in women's patterns of contraceptive use over time. According to the last Nutrition and Health Survey, women of reproductive age reported an increase in ever use of contraception from 34% in 2004 to 80% in 2012 (INEC, 2015). Nevertheless, the teenage pregnancy rate is still one of the highest in the region and has shown an increasing trend since 1999. Moreover, the proportion of unplanned childbearing in adolescents aged 15-19 years increased from 13% in 1994 to 23% in 2004 (Ishida, Stupp, & Sotomayor, 2009). The highest fertility rates occur in women from the most deprived socioeconomic groups (Freddy Llerena Pinto, 2012).

Strategies to reduce teenage pregnancy were implemented in the last two decades in Ecuador but were stopped without previous assessment. Although the country has a tradition of conducting demographic and health surveys, little is known about trends in socioeconomic inequalities and the factors related to women's agency at first heterosexual intercourse, which strongly influence teenage motherhood in Ecuador during a period of substantial social and economic changes in the country.

The aims of our study were: (i) to describe the trends in inequalities in teenage motherhood and in the factors related to the first experience of heterosexual intercourse; (ii) to analyse changes in the inequalities in teenage motherhood and in the association between the factors related to the first heterosexual intercourse and teenage motherhood in Ecuador in 1999, 2004, and 2012.

Data and methods

We analysed data from three countrywide surveys performed in 1999, 2004, and 2012. The 1999 and 2004 editions were Demographic and Maternal and Child Health Surveys that collected information on fertility, contraceptive use, infant and child mortality, and sexual and reproductive health, in a representative sample of women of reproductive age (15 – 49 years) in Ecuador. These surveys were conducted by the Centre for Studies on Population and Social Development, while the 2012 National Survey on Health and Nutrition was performed by the National Institute of Statistics and Census of Ecuador and was representative of the Ecuadorian population aged ≤ 69 years. The surveys are representative at the national and provincial levels and the participation rates for the 1999, 2004 and 2012 surveys were 90.9%, 88.7%, and 81.8%, respectively.

The questionnaires were anonymised and administered in face-to-face interviews at the women's homes by a team of trained interviewers. The participants gave written informed consent. The individual questionnaire administered to women of reproductive age was used in the three survey editions to collect information on sociodemographic characteristics, fertility, and reproductive preferences in all women of reproductive age. Only women aged 15–24 years were asked to provide detailed retrospective information about their first experience of heterosexual intercourse (CEPAR, 2000, 2005; INEC, 2015).

The study population consisted of women aged 20- 24 years old who were born and resident in Ecuador, and who reported having ever had sex. We considered women in this age range only because: (i) younger cohorts were still at risk of teenage pregnancy and needed a different assessment of the factors related to their maternity; (ii) to better capture socioeconomic position measured through educational attainment; and (iii) we hypothesised that older cohorts might be less inhibited about answering questions on their sexuality if they were in their homes. The final sample consisted of 1,470 women in 1999, 1,082 in 2004, and 2,144 in 2012.

Measurement and variables

We used data from the History Pregnancies Section of the three surveys to construct the dependent variable, adolescent motherhood. This variable was dichotomised into two categories, "yes/no", using the definition of adolescence of the World Health Organization as persons aged between 10 and 19 years (World Health Organization, 2014). Thus, all women who reported having given birth aged between 10 and 19 years were considered adolescent mothers.

Educational attainment was used to measure socioeconomic position because it is considered to reflect the material and social resources available in the family of origin, and to provide a reasonable measure of achievements in early life (Galobardes et al., 2006). Educational attainment was categorised at three levels: (i) no schooling or incomplete primary education; (ii) complete primary education; (iii) complete secondary education or higher.

The independent variables related to the first experience of heterosexual intercourse were (i) age at first heterosexual intercourse, grouped according to the legal definition for women's consent to sexual intercourse and statutory rape in Ecuador (Ministerio de Justicia Derechos Humanos y Cultos, 2014) (10–13 years, 14–16 years, and 17–19 years); (ii) use of contraceptive methods (Yes/No); (iii) age of the first sexual partner (≤17 years or ≥18 years).

The proportion of missing data was <6% for all the independent variables in the three survey years. An analysis of missing data was carried out and random distribution of the independent variables was observed among women who were teenage mothers and those who were not.

Data analyses

All analyses were weighted to maintain the representativeness of the population. First, we performed a univariate analysis of the distribution of the outcome and explanatory variables. Next, we conducted a descriptive bivariate analysis using the chi-square test to determine variation in the prevalence of teenage motherhood and the factors related to the first heterosexual intercourse over time. Then, crude prevalence ratios (cPR) and

their confidence intervals (95%CI) were obtained from bivariate weighted Poisson regression models with robust variance. Analyses were carried out of the interaction between survey year and each independent variable. Significant interactions indicated that the association between teenage motherhood and each independent variables related to socioeconomic position and the first experience of heterosexual intercourse changed over the study years. Individuals with missing data were removed from the analyses. The analyses were run in Stata 13 (StataCorp, 2013).

Results

The proportion of teenage motherhood in Ecuador was 61.5% in 1999, 57.7% in 2004, and 61.0% 2012. Most of the women in the study sample had low educational attainment. In all three study periods, more than half of the women experienced their first heterosexual intercourse between the age of 17 and 19 years with a sexual partner aged ≥18 years. A total of 90.3% of teenage mothers in the sample made no use of contraception at first sexual intercourse in 1999; this percentage decreased to 88.3% in 2004, and 68.5% in 2012 (Table 1).

Table 1 Weighted distribution of study variables. Women aged 20 -24 years in Ecuador (1999, 2004, and 2012)

Variables	1999 (n = 1,470)		2004 (n = 1,082)		2012 (n = 2,144)	
	n	%	*n*	%	*n*	%
Teenage motherhood						
Yes	904	61.5	624	57.7	1.308	61.0
No	566	38.5	458	42.3	836	39.0
Missing	0	0.0	0	0.0	0	0.0
Educational attainment						
No schooling or incomplete primary education	941	64.0	657	60.7	898	41.9
Complete primary education	436	29.6	332	30.6	825	38.5
Secondary or further	93	6.4	93	8.7	421	19.7
Missing	0	0.0	0	0.0	0	0.0
First heterosexual intercourse variables						
Age at first heterosexual intercourse (years)						
10 – 13	70	4.7	63	5.9	71	3.3
14 – 16	611	41.6	432	39.9	752	35.1
17 – 19	778	52.9	565	52.2	1.258	58.6
Missing	12	0.8	22	2.1	63	3.0
Age of first sexual partner (years)						
≤ 17	198	13.5	168	15.5	343	16.0
≥ 18	1.227	83.5	855	79.0	1.688	78.7
Missing	46	3.1	59	5.5	113	5.3
Use of contraception						
Yes	133	9.1	117	10.8	614	28.7
No	1.327	90.3	955	88.3	1.470	68.5
Missing	10	0.7	10	0.9	60	2.8

Differences between periods were consistently found in the prevalence of teenage motherhood among women from the most disadvantaged socioeconomic groups (no studies and incomplete primary: 1999, 70.9%; 2004, 68.5%; and 2012, 77.0%, p<0.05; and complete primary: 1999, 48.3%; 2004, 44.2%; and 2012, 60.1%, p <0.01). Analysis of the prevalence of teenage motherhood by factors related to the first experiences of heterosexual intercourse revealed that differences between periods were only statistically significant among women who had their first heterosexual intercourse aged 17-19 years (1999, 41.1.0%; 2004, 36.6%, and 2012, 45.6%, p<0.05). However, the prevalence of teenage motherhood was highest in women who reported having had their first experience of heterosexual intercourse aged ≤16 years old. No statistically significant differences were observed by the age of the first sexual partner, while significant differences were found for women not using contraception at first heterosexual intercourse (Table 2).

Table 2 Prevalence of teenage motherhood by variables of interest among women aged 20-24 in Ecuador (1999, 2004, and 2012)

Teenage motherhood	1999 (n = 1,470) 61.5	2004 (n = 1,082) 57.7	2012 (n = 2,144) 61.0	
	% (n)	% (n)	% (n)	p-value
Educational attainment				
No schooling or incomplete primary education	70.9 (668)	68.5 (450)	77.0 (691)	<0.05
Complete primary education	48.3 (210)	44.2 (147)	60.1 (496)	<0.01
Secondary or further	28.2 (26)	29.8 (27)	28.7 (121)	0.98
Age at first heterosexual intercourse (years)				
10 – 13	89.7 (62)	79.0 (50)	89.1 (64)	0.27
14 – 16	84.0 (514)	83.2 (359)	84.0 (631)	0.96
17 – 19	41.1 (320)	36.6 (206)	45.6 (573)	<0.05
Age of first sexual partner (years)				
≤ 17	78.6 (155)	71.5 (120)	80.3 (275)	0,26
≥18	58.5 (717)	54.8 (469)	56.6 (956)	0,48
Use contraception at first sexual intercourse				
Yes	41.0 (55)	38.1 (44)	42.0 (258)	0,82
No	63.6 (843)	60.3 (577)	68.4 (1006)	<0.01

In the bivariate analysis of changes in socioeconomic inequalities and in the association between experiences of the first heterosexual intercourse and teenage motherhood (Table 3), we observed that inequalities in the group of women with no schooling or

incomplete primary education remained almost unchanged in the three studied periods [(from 1999 (cPR=2.5; 95% IC: 1.7-3.6) to 2004 (cPR=2.3; 95% CI: 1.6-3.3) and 2012 (cPR= 2.7; 95%; CI: 2.1-3.5)]; while the probability of teenage motherhood increased from 1999 (aPR= 1.7; 95%; CI: 1.2-2.5) to 2012 (cPR= 2.1; 95%; CI: 1.6-2.8) in those with complete primary education.

Analysis of changes in teenage motherhood by the experiences of first heterosexual intercourse revealed different results between the study periods. Among women who reported having had their first heterosexual intercourse aged 10–13 years, the likelihood of teenage motherhood remained steady between 1999 and 2004, but showed a slight decrease in 2012 (cPR=2.0; 95% CI:1.7-2.3). Among women aged 14- 16 years at first heterosexual intercourse, an increasing trend was observed between the 1999 and 2004 surveys, followed by a decrease in 2012 [((cPR=2.0; 95% IC: 1.8-2.3) (cPR=2.3; 95% CI: 2.0-2.6) (cPR= 1.8; 95%; CI: 1.6-2.1) respectively].

Analysis of the likelihood of teenage motherhood by the age of the first sexual partner slightly decreased from 1999- 2004 but was steady from 1999-2012. Finally, analysis of the probability of teenage motherhood by contraception use showed a steady trend in all three study periods. However, none of these results were statistically significant in the analysis of the interaction with the survey years.

Table 3 Changes in the socioeconomic inequalities and experiences of first heterosexual intercourse associated with teenage motherhood in women aged 20-24 years in Ecuador (1999, 2004 and, 2012)

Survey Year	1999	2004	2012	p-value interactions		
Variables	cPR (95% C.I.)	cPR (95% C.I.)	cPR (95% C.I.)	2004/1999	2012/1999	2012/2004
Educational attainment						
No schooling or incomplete primary education	2.5 (1.7-3.6)	2.3 (1.60-3.3)	2.7 (2.1-3.5)	0.74	0.78	0.96
Complete primary education	1.7 (1.2-2.5)	1.4 (1.00-2.2)	2.1 (1.6-2.8)	0.61	0.40	0.90
Secondary or further	1	1	1			
Age at first sexual intercourse (years)						
10 – 13	2.2 (1.9-2.5)	2.2 (1.8-2.7)	2.0 (1.7-2.3)	0.93	0.27	0.51
14 – 16	2.0 (1.8-2.3)	2.3 (2.0-2.6)	1.8 (1.6-2.1)	0.25	0.19	1.00
17 – 19	1	1	1			
Age first sexual partner (years)						
≤ 17	1.4 (1.2-1.5)	1.3 (1.1-1.5)	1.4 (1.3-1.6)	0.73	0.49	0.88
≥18	1	1	1			
Use contraception at first sexual intercourse						
Yes	1	1	1			
No	1.6 (1.2-2.0)	1.6 (1.2-2.1)	1.6 (1.4-1.9)	0.92	0.75	0.82

cPR: Crude prevalence ratios.

cPR resulting including each independent variable and the interaction with each survey year.

p-values <0.05 reflect significant changes across survey years.

Discussion

We analysed the trends and changes in socioeconomic inequalities and in the behavioural factors related to the first experience of heterosexual intercourse associated with teenage motherhood in women aged 20-24 years in Ecuador in 1999, 2004, and 2012. Although the prevalence of teenage motherhood declined slightly between 1999 and 2004, more than 60% of women aged 20-24 years in Ecuador gave birth during adolescence in 1999 and 2012. Moreover, except for 2004, women from the most deprived socioeconomic groups consistently showed an upward trend in teenage motherhood, with the most striking increase occurring in women with complete primary education in 2012. Furthermore, the prevalence of teenage motherhood increased from 1999- 2012 in women aged 17-19 years at first sexual intercourse and in those not using contraception during the first sexual intercourse. Most importantly, analysis of the interaction showed that there were no changes in the socioeconomic inequalities of teenage motherhood or in the behavioural factors related to the first experience of heterosexual intercourse in the 14-year study period in Ecuador.

Previous studies have reported that the adolescent birth rate declines more slowly in low, middle- and high-income countries (Sedgh, Finer, Bankole, Eilers, & Singh, 2015; Singh et al., 2001) with longstanding socioeconomic inequalities than in those with lower initial inequalities (J. S. Santelli et al., 2017). In this regard, Santelli et al. have suggested that changes in the teen birth rate are associated with the level of national wealth, a leap in socioeconomic status, and lower income inequalities. Moreover, Decker et al. found that unequal gender development is strongly related to early adolescent childbearing in low- and middle-income countries. In Ecuador, a history of long-term and deep-rooted socioeconomic and gender-based inequalities has diminished the potential impact of reduced inequalities among historically oppressed groups (SENPLADES, 2013). Consequently, the economic growth in Ecuador in the last decade may not have been inclusive and has therefore been less likely to reduce the prevalence of teenage motherhood. In contrast, the results of the present study showed that the socioeconomic gradient held steady in all three study periods and increased for women with complete primary education in 2012.

In this regard, we expected a more pronounced reduction in inequalities in teenage motherhood in this period, given the economic growth and the endorsement of international agreements on gender equality and sexual and reproductive rights. As a result of the struggles of feminist organisations and the advocacy of international organisations, favourable national policies and strategies were approved after the Cairo Conference in 1995. However, the effectiveness of these strategies in enhancing girls' and adolescent women's expectations and in challenging the idealisation of motherhood and other gender structures constraining their agency and power was limited by sustained gender inequalities and uneven economic growth in Ecuador.

Teenage motherhood increased in 1999 and 2012 in women aged 17-19 years at first sexual intercourse and in those not using contraception. Moreover, although not statistically significant, changes were observed among the study periods: women who experienced their first sexual intercourse aged 10–13 years and 14–16 years were more likely to have been teenage mothers in the three survey years. This is an outrageous finding that underscores the perpetuation of sexual abuse suffered by girls aged <14 years in Ecuador even though Ecuadorian legislation criminally penalises sexual contact with girls under 14 years old as statutory rape (Ministerio de Justicia Derechos Humanos y Cultos, 2014). Importantly, sex that occurs earlier is less likely to be consensual or wanted or to involve contraception use (House et al., 2010).

Early childbearing is more a result of structural, social and cultural factors than the will of the individual girl (Goicolea, Wulff, Ohman, & San Sebastian, 2009). According to evidence gathered from the country, girls and adolescent women face major barriers to exercising freedom of choice in sexual and reproductive decisions (Goicolea et al., 2010; Santillana & Castello, 2010; Varea, 2008). Important factors are cultural norms and double standards concerning expectations of male and adolescent girls' sexual behaviour, the influence of romantic love on contraception use in young couples, and the reluctance of healthcare personnel to provide counselling and contraception to adolescents. At the macro-level, Ecuador has historically maintained a political tradition based on a conservative perspective on all issues related to sexuality and sexual autonomy (Cifuentes Ruiz, 2016). Even when forward-thinking policies and interventions have been implemented, most of them have been abolished without

previous assessment of their effectiveness or have been substituted by more conservative proposals (Paz, 2018; Ruiz Cifuentes, 2016). Consequently, these policies have not been fully implemented and therefore, in the 14-year study period, their proven effectiveness demonstrated in other countries in enhancing adolescents' ability to achieve better sexual and reproductive health and in reducing rates of teenage pregnancy and motherhood have been diminished in the Ecuadorian context.

Of importance, although there are two grounds for legal abortion in Ecuador (Ministerio de Justicia Derechos Humanos y Cultos, 2014), access to safe and informed procedures to terminate unwanted pregnancies are not currently available. Therefore, women from the most deprived socioeconomic groups have no alternative but to undergo unsafe abortion or to continue with an unplanned or unwanted pregnancy (Gómez & Bustamante, 2011). Furthermore, feminist organisations in Ecuador have drawn attention to the criminalisation of abortion in the country. From 2013 to 2017, 243 women were tried for abortion under criminal law in Ecuador (Zaragocin Sofía et al., 2018). Considering the contextual factors mentioned here, the absence of changes in the circumstances surrounding the first experience of heterosexual intercourse observed in the present study may be considered as a consequence of the discontinuous application of policies and a dominant patriarchal social context with negative attitudes towards adolescent's sexuality and freedom of choice.

Our study has some limitations related to the characteristics of cross-sectional data. Our indicator to measure socioeconomic position, educational attainment, is susceptible to reverse causality, i.e. lower educational levels could result from teenage motherhood. However, we consider women's education to be a potentially useful indicator of early life circumstances, thus measuring material and social resources in the family of origin. Therefore, we believe that the differences observed between educational attainment groups also reflect women's socioeconomic position during their teenage years, essentially because women with higher educational attainment also have better resources and social support and are sufficiently empowered to graduate from high-school and gain access to higher educational levels. The latter is especially accurate for the 1999 and 2004 surveys, considering that access to universal education was not guaranteed during this period. Regardless of this consideration, the above-mentioned

limitations were unavoidable given the characteristics of our information source. The surveys included no other socioeconomic indicators for the time when the events analysed in our study took place. Despite these limitations, we believe that our results are of paramount importance for further policy planning and resource allocation.

Our results reveal that, in the last 14 years, there have been no changes in socioeconomic inequalities in teenage motherhood or in adverse experiences at the time of the first heterosexual intercourse in Ecuador. These results provide meaningful evidence, demonstrating that, despite substantial advances to reduce social inequalities and teenage pregnancy rates in Ecuador, these strategies have not had the expected impact.

This finding provides support for the use of gender-based strategies to improve women's socioeconomic conditions. As observed in other contexts, girls and young women need a sense of better life opportunities other than motherhood in order to decrease the powerful influence of a social context that idealises maternity, even at young ages (Goicolea et al., 2010).

Our findings also provide support for the importance of guaranteeing sustainable programmes and strategies to provide adolescent-friendly health services and guarantee access to affective and sexual education. Importantly, it is vital that future policies and strategies are assessed at each step of the planning and implementation phases. Heavy resources were invested in policies in the 14-year study period that were cancelled without evidence of their success or lack thereof. Also, it is important to allocate resources on the basis of the academic curriculum of the health staff in order to decrease the influence of personal bias and beliefs related to sexuality.

Given the widespread experience of adolescent motherhood in Ecuador, strategies and policies to overcome the possible effects of early motherhood should be implemented in the country. Importantly, legal, informed and safe abortion should be guaranteed to reduce teenage motherhood and to achieve social justice in the country.

Finally, the limitations found in our study highlight the need to enhance the existing surveys in order to collect more accurate information on the context in which women experience their sexual and reproductive trajectories.

Conflict of interest: No potential conflict of interest was reported by the authors.

Ethical statement: Considering that this study implied no testing on human subjects, it is exempt of being considered by an ethic panel. Nevertheless, an informed consent form was fulfilled, and the participants were informed of the nature of the study. Importantly, the data base used in our study is freely available on the web site of the National Institute of Statistics and Census and protected by the data protection law of Ecuador.

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c. Developing a deprivation index to study geographical inequalities in Ecuador.

Developing a deprivation index to study geographical health inequalities in Ecuador

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Short running title: Deprivation index to study health in Ecuador

ABSTRACT

OBJECTIVES: To develop a deprivation index to study health inequalities in 221 areas of Ecuador, to describe the pattern of deprivation in Ecuador, and to explore the applications of the index to study health inequalities by analysing the association between deprivation and mortality in the study areas.

METHODS: We performed principal component analyses of available indicators of the 221 cantons of Ecuador. A set of 41 sociodemographic, social capital, and subjective well-being variables were obtained from the 2010 National Population Census and the National Living Conditions Survey 2013–2014. To explore the application of the index in public health, the association between the index and standardised mortality ratios was estimated through a Poisson regression model.

RESULTS: The final index was constructed with 17 indicators. The first component explained 51.8% of the total variance of the data. A geographic pattern and a positive association of the index with the standardised mortality ratios of the cantons were observed in both men and women.

CONCLUSIONS: We constructed a deprivation index that can identify disadvantaged areas in Ecuador. This index could be a valuable tool for the detection of vulnerabilised populations and the development of interventions and policies adapted to local needs.

INTRODUCTION

Although extreme poverty has been substantially reduced in Ecuador in the last decade, geographical, ethnic and gender-based inequalities persist in the country[1]. As many other Latin American countries, Ecuador inherited a colonialist model grounded in patriarchy, classism and racism that have created a social stratification benefiting social elites that continue to exert strong control over land tenure and wealth[1]. Consequently, women, peasant communities, indigenous people and Afro-Ecuadorian groups are living in poverty as a collective experience of structural and historical origin[2]. Regarding the structural complexity resulting from power relationships, intersectionality analysts and theorists have argued that "inequities are never the result of single, distinct factors. Rather, they are the outcome of intersection of different social locations, power relations and experiences"[3].

Power relationships also determine the distribution of material and social resources needed by individuals to achieve the living standards considered essential by their social and cultural groups. The lack of these resources has been defined in the literature as material and social deprivation[4]. Deprivation is usually considered a collective experience and therefore is often measured in public health and epidemiology as a contextual phenomenon. These measurements have been widely used to describe the social determination of health and the impact of the context on the health of populations. Deprivation is a complex construct with multiple dimensions that can change across contexts and periods. Nevertheless, most efforts to conceptualise and measure material and social deprivation have focused on high-income countries[5]. Few studies have analysed how multiple types of deprivation shape people's health and health inequities in middle- and low-income countries[6].

Health is recognised as being essential to achieve key objectives in life such as educational attainment and adequate employment conditions, and to promote the freedom of individuals and societies[7]. Furthermore, health capability provides individuals and communities with the "opportunity to achieve good health and thus be free from escapable morbidity and mortality"[8]. Therefore, assessing the health status of a population and its distribution is an aim of political and societal activity of crucial

ethical importance to achieve social justice. If deprivation affects health, its measurement is therefore of vital importance to reduce social inequalities and promote social justice.

Deprivation can be measured with simple indicators or indices constructed by merging indicators representing one or multiple dimensions. Indices are used when a single indicator or measurement is insufficient to describe a complex phenomenon such as deprivation[9]. The measurement of deprivation in geographical areas and its relationships with health over time has proven to be useful for health surveillance, inequality analysis, resource allocation, and priority setting[5,9]. In Ecuador, prior attempts at measuring deprivation[1,2,10,11] present methodological limitations for the study of health inequalities related to: i) lack of representativeness at smaller geographical units; ii) estimations made in non-comparable geographical units (different administrative levels for urban and rural estimates); and iii) inclusion of limited core deprivation dimensions and indicators. A deprivation index specifically designed for the study of health inequalities has, to the extent of our knowledge, never been constructed in Ecuador.

Therefore, we sought to develop a deprivation index for the study of health inequalities in 221 cantons of Ecuador, the second administrative level, to describe the geographical pattern of deprivation and to explore an application of the index for the study of health inequalities by analysing the association between deprivation and mortality in the study areas.

METHODS

Study Design and Information Sources

An ecological study was performed using the 221 cantons of Ecuador as units of analysis, according to the last National Population Census 2010. Cantons were selected as area of study for two reasons: i) Cantons are the smallest administrative level with comparable data available. Each canton has a unique history, social and natural environments, and political representation; and ii) Cantons are the smallest administrative level with the capacity to design and implement local policies. Each canton has its own political representation, an elected mayor and local elected council

members; and budget. People living in a canton share a history of common local policies that can affect wealth distribution. Canton size and population present important variations. In 2010, the population of the cantons ranged from 1,760 to 2,350,278 (median 23,820) inhabitants. These 221 areas are geographically located in four different regions: 1) The Galápagos Islands in the Pacific Ocean; 2) The coastal region in the western part of the continental territory; 3) the Amazon region in the eastern portion of the continental territory; and 4) the Andean region in between. Demographic and socioeconomic data were obtained from The National Population Census 2010. Social capital and subjective well-being measures were estimated from the national Living Conditions Survey 2013–2014. Data from the LCS are representative at the provincial level, the first administrative level. Provincial indicators from this source were assigned to all the cantons composing each province. Mortality data were obtained from the Ecuadorian mortality registry for 2009 to 2011. All databases were obtained from Ecuador´s National Institute of Statistics and Censuses (INEC) and are available online (http://www.ecuadorencifras.gob.ec/estadisticas/).

Definition of Deprivation, its Dimensions in the Ecuadorian Context and Selection of Variables

For this study, we first created a definition of deprivation considering the context. This definition was constructed after a literature review that included relevant documents from the Latin American Social Medicine movement[12], official documents from the country, e.g. development plans and the national constitution; and conceptual discussions between the authors. Deprivation was defined as a historically and structurally determined collective phenomenon linked to human rights violations; this creates a social stratification in the country based on power structures and relations that privilege certain social groups by oppressing and exploiting others. This stratification affects the capabilities of certain population segments to achieve decent living standards, which in turn affects their health.

Subsequentially, we performed a comprehensive search for available data in the country to operationalise our definition of deprivation. Then indicators were distributed in seven deprivation dimensions: 1) Education, 2) Information and Communication, 3) Housing and Urban Environment, 4) Work and Social Security, 5) No discrimination, 6) Healthy

Environment, and 7) Social Environment and Social Capital. These dimensions emerged from a comparison of the literature with the available data. A brief definition of each dimension is provided below:

Education: This dimension can influence a person's work and income. It can also be related to a person's ability to acquire the skills and resources necessary in harsh/stressful periods. Therefore, educational deprivation can strongly affect the ability to self-care, health and how people deal with health problems[13].

Information and Communication: It has been argued that, inequalities in access to the internet and the skills needed for its use among the population may exacerbate existing societal and geographical inequalities based on age, gender, educational level and ethnicity[14]. Due to the increasing dependence on internet-based information, we considered access to and use of the web, mobile phones and computers as assets in our study to measure the digital divide[15].

Housing and Urban Environment: Secure and adequate housing is essential not only to protect people from environmental conditions, but also to create social bonds and to establish life projects (ontological security). Moreover, housing is interconnected with the surrounding built and social environment (basic services, amenities, community). Housing deprivation and the lack of an adequate urban environment have diverse and substantial health consequences [16,17].

Work and Social Security: Paid and unpaid work/labour conditions and the protection given to workers are related not only to income and social stratification, but also to health risks and healthcare access. Income reflects access to material resources and can also reflect social standing, which can affect health through psychosocial processes[13]. Moreover, women's integration in the paid workforce depends on the societal norms for women's employment, which can produce multiple problems and ill health by various mechanisms[18].

Historical Discrimination: Historical oppression and discrimination arising from a post-colonial society can greatly impact living conditions and health. Historically,

indigenous and black populations in Ecuador have been oppressed, and politically and economically excluded; while mestizos and especially white populations have enjoyed full participation in the political and economic processes and have had more control over resources and means of production. Therefore, discrimination towards people from minority ethnic groups is an important issue in Ecuador and can intersect with discrimination by gender, health status, age, and rural origin, among others[19,20].

Healthy Environment: A pollution-free environment is an important and often neglected component of the quality of life of inhabitants of an area[21,22]. The Ecuadorian state recognises the importance of the natural environment as a key component of well-being to the extent that it even grants nature basic rights in its Constitution.

Social Environment and Social Capital: Social environment and social support have been proven to be important components of a healthy community and can have considerable health effects[23]. Social deprivation is considered an essential part of multiple deprivation[24]. Thus, variables measuring participation, community work, and quality of relationships with neighbours, and perception of neighbourhood safety were included.

A set of 41 indicators fitting into the above-mentioned deprivation dimensions were selected from our information sources. Indicators were selected or constructed so that higher scores (or percentages) represented less deprivation. The information sources, numerator and denominators of the final variables of the index can be found in the Chart.

Deprivation Index Construction

As the selected indicators had different measurement units and scales, they were first standardised to obtain new variables, *z*, with mean 0 and variance 1 (by subtracting the area value by the mean of the 221 areas and dividing it by the standard deviation). Next, bivariate Spearman correlations were obtained. When the variables showed correlations greater than 0.90, one of them was removed from subsequent analyses. Those more in agreement with our definition of deprivation were retained.

Sequential principal component analyses (PCA) were performed to maximise the first component variance. PCA can be described as "… a multivariate statistical technique used to reduce the number of variables in a data set into a smaller number of dimensions" [25]. PCA has been widely used to construct socioeconomic and deprivation indexes [9,26]. The conditions for applying a PCA were assessed using two criteria: 1) Bartlett's test of Sphericity (statistical significance value set at 5%), and 2) sampling adequacy using the Kaiser-Meyer-Olkin test for the whole dataset and for individual variables. A first PCA was carried out with 36 initial indicators. Then the correlation of each variable with the first component was estimated. Those variables with correlations lower than 0.50 were removed unless they were considered conceptually essential. A final PCA was performed. The final index values are the predicted scores for the 221 areas using the first principal component of the PCA performed with the final variables. To simplify the score interpretation, these values were standardised by subtracting the area value by the mean of the 221 areas and dividing it by the standard deviation to obtain a score z, with mean 0 and variance 1. Finally, the proportion of contribution of each variable to the index was estimated.

A Spearman's correlation was performed to determine the correlation between an index obtained with the variables of the first PCA (36 variables) and the final index to assess whether a more parsimonious index could be created without losing important information.

The geographical distribution of the deprivation index was displayed using choropleth maps representing the deprivation index scores in five categories (quintiles). To assess the existence of a statistically significant geographical pattern in the index scores (spatial autocorrelation), we used Moran's I[27]. Values of this statistic range from -1 to 1. Significant positive values indicate clustering, significant negative values indicate a regular geographical pattern, and values near 0 indicate a random geographical distribution[28].

Use of the Index for Public Health Purposes

We used the population from the 2010 census and all-cause mortality from 2009 to 2011 to assess application and usefulness of the deprivation index for studying

socioeconomic inequalities in health in Ecuador. Standardised mortality ratios (SMR) for men and women were estimated using the indirect method, employing the age–specific mortality rates for all Ecuador in the study period as the reference and correcting the number of deaths for mortality completeness estimates. The SMR geographical distribution was displayed using quintile-based choropleth maps. Poisson regression models were performed to estimate the association between the index and SMR for the cantons of Ecuador (for men and women).

All data were analysed using the statistical packages SPSS and R. All maps were plotted using the R statistical package. The R and SPSS codes used for the analyses can be obtained from the corresponding author upon request.

RESULTS

As shown in Chart 1, the final deprivation index consisted of 17 indicators (out of the 41 initially selected) describing five different socioeconomic deprivation dimensions. Out of the seven initial dimensions, two ("Healthy Environment"/"Social Environment and Social Capital") were excluded after conducting the analyses due to the subsequent elimination of their indicators in the next steps of the index development. The first component of the final PCA explained 51.73% of the total variance in the data.

Table 1 shows the descriptive statistics of the 17 variables composing the deprivation index. These indicators showed wide variation between the study areas. For example, literacy rates ranged from 72.99% to 97.63%, internet access ranged from 2.75% to 44.48%, not overcrowded dwellings ranged from 31.97% to 92.28%, the population with private medical insurance ranged from 1.97% to 27.45%, and the population who self-identified as white or mestizo ranged from 4.08% to 99.45%. These indicators showed differences in their relative contribution to the index scores. Piped dwellings and internet access made the highest contributions to the index scores (9.32% and 8.89%, respectively), whereas the proportion of ethnic minorities contributed only 3.87%.

Chart. Operational definitions of socioeconomic indicators used in the design of a Deprivation Index for Ecuador

Domains/Indicators	Numerator	Denominator	Survey Question
1. Education			
Literacy[a].	Literate population	Population of 5 years or more.	19) Can you (...) read and write?
Educational attainment[a].	Population with secondary or university education (5–10 years).	Population of 24–65 years.	23) What is the highest level of instruction you attend or attended (...)?
2. Information and Comunication			
Mobil phone access[a].	Population that made use of a mobile phone in the last 6 months.	Population of 5 years or more.	20) In the last six months (...) have you used: a mobile phone…
Internet access[a].	Population that made use of the internet in the last six months.	Population of 5 years or more.	20) In the last six months (...) have you used: the internet…
3. Housing and Urban Environment			
Main cooking fuel[a].	Households using adequate fuel for cooking (gas or electricity).	Total of households.	5) Which is the main fuel or energy that this home uses for cooking?
Toilet for household use only[a].	Households with exclusive use of a toillet.	Total of households.	3) The household toilet is of: Exclusive use of the household.
Water Supply[a].	Dwellings with piped water.	Total of households.	V8) Where does the water received in this home come from?
Rubbish collection[a].	Homes that eliminate garbage with a collector car.	Total of households.	V13) Mainly, how do you eliminate the garbage from the home:
Toilet to sewer.	Households with toilet to sewer.	Total of households.	V9) The household toilet is connected to:
Electricity supply[a].	Households with electrical energy (any provider).	Total of households.	V10) The electric light (energy) service of the house comes mainly from:
Dwellings overcrowding[a].	Dwellings not overcrowded (3 or less people per bedroom).	Total of households.	14) Without considering the kitchen, bathroom and office, how many bedrooms does the household has? 16) How many persons (households) sleep and cook food?
Piped into residence/dwelling[a].	Dwellings with piped water inside.	Total of households.	V8) The water received in this house is:
Compound indicator of Dwelling's quality[a]: Walls, Floor, Ceiling	Dwellings in good condition (roof, walls and floors reported as "good").	Total of households.	V2) The condition of the ceiling or covering of the dwelling is: V04) The condition of the walls of the dwelling is: V6) The condition of the floor of the dwelling is:
4. Work and Social Security			
Private insurance[a].	Population with private insurance.	Total of population.	07) (...) has private health insurance?
Women not payed working hours ratio[b].	Weekly not payed work hours.	Total worked hours.	24) How many hours a week do you dedicate to the following home chores: (Total hours).
Poverty perception[b].	Population that considers not being poor.	Total of households.	4) According to your economic condition, do you consider your home to be:
5. Historical Discrimination			
Ethnicity[a].	Population with white or mestizo self-identification	Total of the population.	16) How do you identify (...) according to your culture and customs?

Information Sources: [a] Census 2010; [b] Life Conditions Survey 2013–2014.
All 17 indicators refer to inhabited dwellings. People residing outside the country when the census was performed were excluded.

Table 1. Descriptive statistics of the 17 indicators used for the construction of the index.

Domains	Indicator	Minimum	Median	Maximum	Contribution (%)*
1. Education	1. Literacy.	72.99	89.75	97.63	6.60
	2. Educational attainment.	14.37	39.23	76.82	5.99
2. Information and Communication	3. Mobile phone access.	4.93	40.57	66.54	8.44
	4. Internet access.	2.75	11.59	44.48	8.89
3. Housing and Urban Environment	5. Main cooking fuel.	9.23	88.22	98.39	4.61
	6. Toilet for household use only.	25.07	75.31	94.27	3.58
	7. Water supply.	10.05	58.68	96.03	7.31
	8. Rubbish collection.	5.90	58.79	98.47	7.10
	9. Toilet to sewer.	0.52	32.17	90.91	6.88
	10. Electricity supply.	26.33	92.21	99.58	5.64
	11. Dwelling overcrowding.	31.97	75.78	92,28	6.05
	12. Pipes into residence/dwelling.	5.07	43.98	84.08	9.32
	13. Compound indicator of dwelling quality: walls, floor, ceiling.	7.55	20.17	57.81	6.49
	14. Private insurance.	1.97	4.51	27.46	4.75
4. Work and Social Security	15. Women's unpaid working hours ratio.	38.49	44.76	52.80	1.49
	16. Poverty perception.	4.54	7.97	60.31	2.97
5. Historical Discrimination	17. Ethnicity.	4.08	80.96	99.45	3.87

* Contribution, in percentage, of each variable in the construction of the index.

As observed in Table 2, a negative and statistically significant correlation was observed between all selected indicators and the index, except for paid work hours in women, in which higher index scores represent more deprivation and higher variable scores represent less deprivation. The correlations between material deprivation indicators and the index were consistently higher than those observed for the variable related to historical discrimination (ethnicity). The variable most closely correlated with the deprivation index was the presence of pipes in the dwelling (r = -0.91).

The final index scores were highly correlated with those obtained from the first PCA with 36 variables (rho = 0.98, p > 0.001).

Table 3. Correlation coefficients between socioeconomic indicators used for the construction of the Index.

Correlation	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Index
1	1,00	0,73	0,66	0,62	0,47	0,27	0,61	0,64	0,57	0,42	0,45	0,64	0,55	0,46	-0,09	0,29	0,56	-0,76
2	0,73	1,00	0,62	0,76	0,42	0,22	0,49	0,69	0,56	0,19	0,29	0,60	0,76	0,70	0,01	0,25	0,14	-0,73
3	0,66	0,62	1,00	0,72	0,66	0,59	0,54	0,65	0,56	0,70	0,61	0,71	0,61	0,60	-0,12	0,43	0,53	-0,86
4	0,62	0,76	0,72	1,00	0,38	0,34	0,69	0,64	0,77	0,44	0,57	0,76	0,85	0,70	-0,44	0,55	0,34	-0,88
5	0,47	0,42	0,66	0,38	1,00	0,47	0,42	0,70	0,33	0,65	0,42	0,57	0,31	0,36	0,07	0,15	0,34	-0,64
6	0,27	0,22	0,59	0,34	0,47	1,00	0,33	0,42	0,25	0,69	0,62	0,46	0,27	0,30	-0,02	0,22	0,41	-0,56
7	0,61	0,49	0,54	0,69	0,42	0,33	1,00	0,64	0,73	0,59	0,57	0,83	0,50	0,35	-0,43	0,36	0,49	-0,80
8	0,64	0,69	0,65	0,64	0,70	0,42	0,64	1,00	0,58	0,50	0,37	0,72	0,55	0,53	-0,05	0,25	0,37	-0,79
9	0,57	0,56	0,56	0,77	0,33	0,25	0,73	0,58	1,00	0,45	0,61	0,78	0,57	0,39	-0,45	0,24	0,42	-0,78
10	0,42	0,19	0,70	0,44	0,65	0,69	0,59	0,50	0,45	1,00	0,68	0,66	0,23	0,27	-0,20	0,29	0,63	-0,70
11	0,45	0,29	0,61	0,57	0,42	0,62	0,57	0,37	0,61	0,68	1,00	0,65	0,43	0,27	-0,46	0,34	0,61	-0,73
12	0,64	0,60	0,71	0,76	0,57	0,46	0,83	0,72	0,78	0,66	0,65	1,00	0,66	0,47	-0,37	0,39	0,52	-0,91
13	0,55	0,76	0,61	0,85	0,31	0,27	0,50	0,55	0,57	0,23	0,43	0,66	1,00	0,71	-0,34	0,54	0,16	-0,76
14	0,46	0,70	0,60	0,70	0,36	0,30	0,35	0,53	0,39	0,27	0,27	0,47	0,71	1,00	-0,05	0,40	0,14	-0,65
15	-0,09	0,01	-0,12	-0,44	0,07	-0,02	-0,43	-0,05	-0,45	-0,20	-0,46	-0,37	-0,34	-0,05	1,00	-0,60	-0,27	0,36
16	0,29	0,25	0,43	0,55	0,15	0,22	0,36	0,25	0,24	0,29	0,34	0,39	0,54	0,40	-0,60	1,00	0,25	-0,51
17	0,56	0,14	0,53	0,34	0,34	0,41	0,49	0,37	0,42	0,63	0,61	0,52	0,16	0,14	-0,27	0,25	1,00	-0,58

Indicators: 1. Literacy; 2. Educational attainment; 3. Mobil phone access; 4. Internet access; 5. Main cooking fuel; 6. Toilet for household use only; 7. Water supply; 8. Rubbish collection; 9. Toilet to sewer; 10. Electricity supply; 11. Dwelling overcrowding; 12. Pipes into residence/dwelling; 13. Compound indicator of dwelling quality: walls, floor, ceiling; 14. Private insurance; 15. Women's unpaid working hours ratio; 16. Poverty perception; 17. Ethnicity.

The index values were unequally distributed among the cantons of Ecuador. Figure1 shows a geographical pattern, with the most deprived cantons located in the Amazon, central Andean, and northern and central coastal regions. Taisha, located in the Amazon region, is the most deprived canton, with an index score of 3.09; while Rumiñahui, located in the Andean region bordering Quito, is the least deprived canton, with an index score of -3.13. The estimated Moran's i showed a spatial autocorrelation ($i = 0.30$, $p < 0.001$).

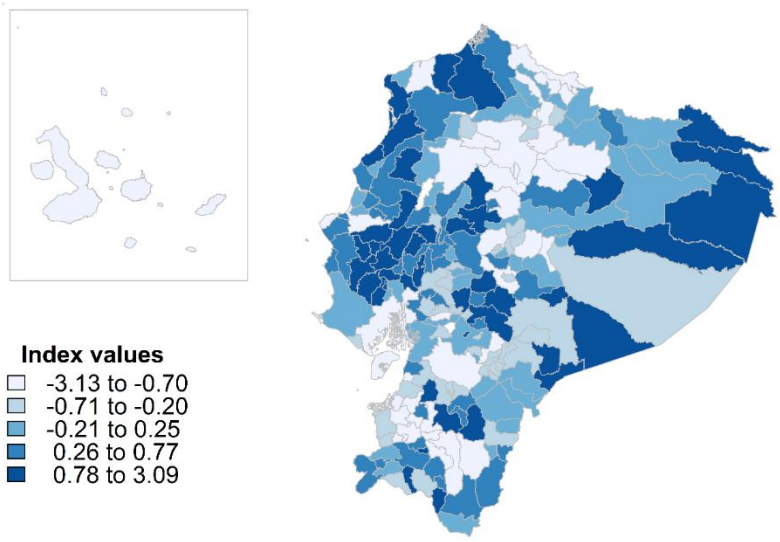

Figure 1. Deprivation Index Scores – Geographical Representation in Quintiles of Deprivation (higher values indicate more deprivation).

Use of the Index for Public Health Purposes

Figure 2 shows the geographical patterns of SMR for men and women in Ecuador (2009–2011). These patterns were similar to the one observed for the index. The Poisson models fitted for this purpose showed that, SMR increased with higher deprivation levels in both women and men. In women, the relative risk (RR) for each standard deviation increment in the index was 1.06 (95%CI 1.06–1.07). In men, the RR for each standard deviation increase in the index was 1.04 (95%CI 1.03–1.04).

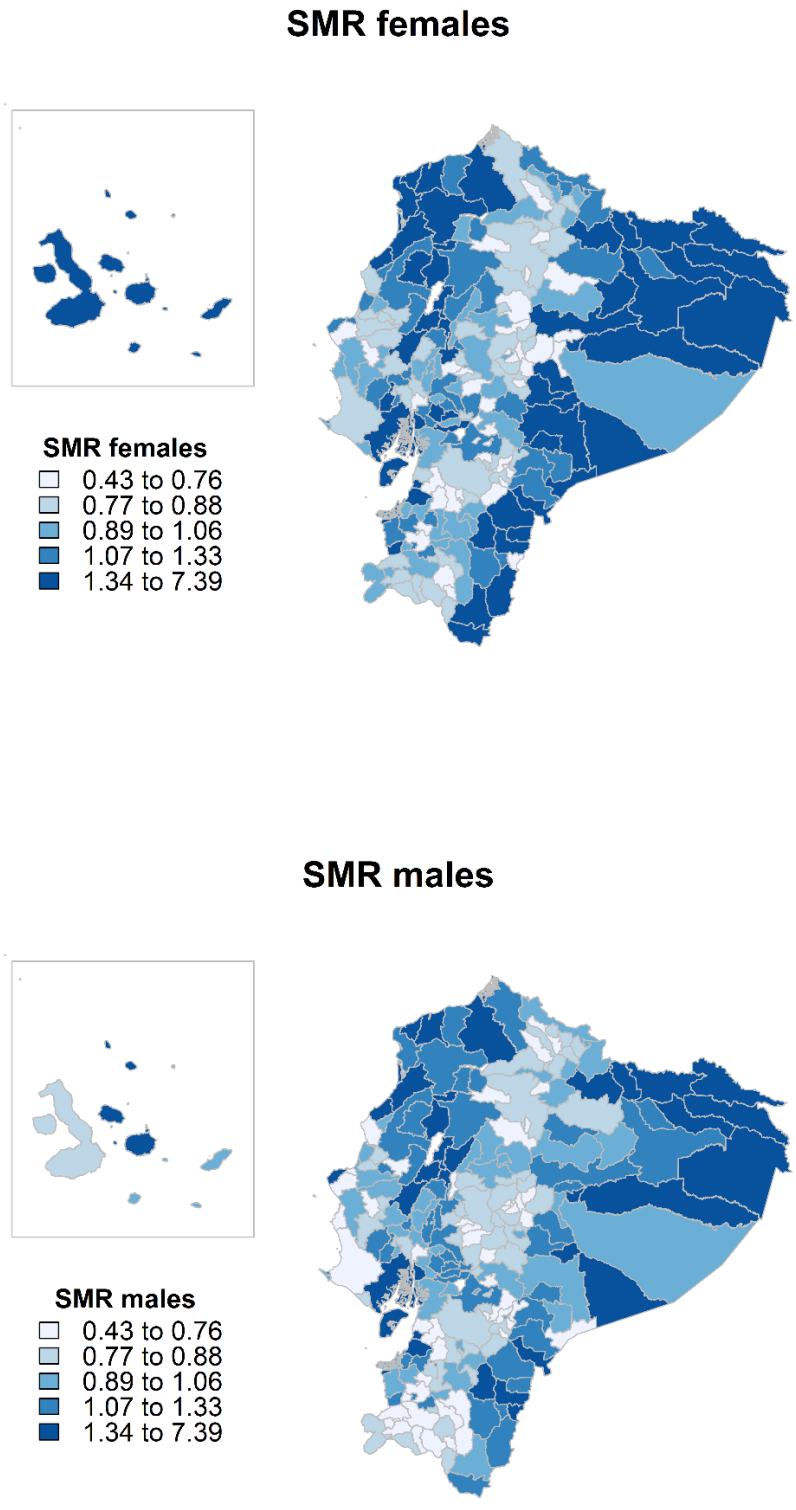

Figure 2. Standardised mortality ratios (SMR) of the cantons by sex.

DISCUSSION

This study shows a deprivation index design for the cantons of Ecuador that captures several deprivation dimensions. The index is composed of 17 variables from public sources. The final index includes indicators related to multiple forms of oppression in a middle-income country with a colonial history such as Ecuador. A geographical pattern of deprivation is evident in the country. The index is positively associated with all-cause mortality in the study areas, demonstrating its potential utility for public health surveillance, studies and public policy planning.

Multidimensional indexes can describe a complex phenomenon such as deprivation with detail and insight. Moreover, the creation of multiple deprivation measures is important to enhance studies on geographical inequalities in health in low- and middle-income countries. In our study, as in other studies that have constructed deprivation indexes in other contexts[26], material deprivation indicators such as education, work and housing were prioritised by the analyses. Furthermore, it is important to observe the relatively large contribution to the index of indicators that have been considered more sensitive in detecting deprivation in low- and middle-income countries such as the presence of pipes in the dwelling, literacy, water supply[6].

Our index also examines the contribution of other possible sources of deprivation in the Ecuadorian context. The relative contribution to the index of indicators of access to mobile phones and particularly to the internet may help to explain an emerging digital divide in the country. Consequently, it is possible that "offline" groups may be marginalised from new forms of political, social and economic participation, thereby reproducing or even accelerating social inequalities[14]. Also, the indicator of poverty perception was retained in the construction of the index. In this regard, subjective well-being measures have proved to be associated with a range of health outcomes in high, low- and middle-income countries[29]. This emphasises the importance of developing a specific methodology to construct deprivation indexes in Latin American contexts.

Although ethnicity is a strong social determinant of health[30] and has been related to socioeconomic inequalities in Ecuador[1], it showed an unexpected low correlation and

contribution to the index, as the geographical pattern of deprivation is similar to the pattern of historically oppressed ethnic groups. A possible explanation is that data were measured by self-identification based on predetermined categories (Ecuadorian census). Possibly, historical discrimination based on race and ethnicity may have resulted in strong pressure to identify with majority or dominant groups (white or mestizo) rather than minority status groups[31].

Women in unpaid work showed a different direction in the correlation with the deprivation index and made the lowest contribution to its construction. Nevertheless, we retained this indicator based on the conceptual premise that it may provide information on gender inequalities based on the sexual division of work. The unequal use of time between men and women in Ecuador could affect health, as in other countries[18]. Women in Ecuador devote considerably more unpaid hours than men to housework, child and elder care, making them dependent in the income of their partner or family[32].

The overall geographical pattern of deprivation observed in Ecuador is highly consistent with the distribution of geographical inequalities in historically discriminated areas and oppressed social groups in the country. This pattern is clearly observed in the Amazon, central Andean highlands and north-central coastal regions of Ecuador, for example, which are predominantly inhabited by indigenous, Afro-Ecuadorian and Montubio[1], historically discriminated ethnical groups.

We used SMR in Ecuador (2009–2011) as a common indicator of health inequalities to illustrate the potential uses of the index in public health. We found that the most deprived cantons were more likely to have higher SMR, showing a gradient. This gradient has been extensively observed in most studies in different countries and settings, but mainly in high-income countries[33,34].

This study has some limitations. First, the index is based on data from the Census and Living Conditions Survey. Although these sources provide many interesting indicators, important information that could be relevant to describe material deprivation such as work and labour conditions, and access to public services are not available in these sources. In addition, the information from the Living Conditions Survey is only

representative at the provincial level. This could mask inequalities between cantons and could thus be responsible for the minor contribution of LCS variables to the final index. Another limitation could be derived from the characteristics of the study areas. Although cantons are the smallest area, in which the index could be estimated, they are still widely heterogeneous in size and population. We believe that, in the future, the National Statistics Institute could collect and disseminate information in more homogeneous and stable areas. Nevertheless, we also believe that the index covers relevant deprivation dimensions, and that using the information from these relevant sources makes it easier to replicate our results and estimate the evolution of deprivation when these periodical sources of information are updated in Ecuador and similar middle-income countries. Our index is, to the extent of our knowledge, the first multiple deprivation measure constructed for public health purposes at a second administrative level in Ecuador. The development of this kind of new social measure is vital for identifying and understanding the role of the context in diverse health outcomes and health inequalities. Moreover, its development can be of paramount importance for local stakeholders that aim to design and implement policies and to allocate material and social resources to tackle the determinants of health inequalities.

Conclusions and Implications

In this study, we constructed a deprivation index to identify disadvantaged areas in Ecuador. From a conceptual perspective, the Ecuadorian index incorporates novel indicators to cover wider aspects of deprivation in the current Latin American context. The index scores could be understood as a representation of multiple oppressions reflected in space. Thus, this measurement allows us to analyse the diverse health effects of contextual multiple injustices at the cantonal level in Ecuador. Consequently, this index can be used for health planning and resource allocation. In addition, it allows policy makers and public health professionals to target strategically vulnerabilised populations, and to prioritise interventions and policies adapted to local needs. For researchers, it is a valuable measure to study socioeconomic inequalities using highly diverse health outcomes, including mortality (all-cause and specific causes related to deprivation), morbidity, and access to healthcare". Finally, we believe that both the methodological and conceptual framework could be useful for future studies in other

middle-income countries in Latin America with similar historical, political and social backgrounds.

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d. Social and geographical inequalities in teenage motherhood in Ecuador: an ecological study

Social and geographical inequalities in teenage motherhood in Ecuador: an ecological study

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1. Introduction

Teenage motherhood is a widespread experience for many girls and adolescents worldwide. It has been estimated that births to adolescents aged 15 – 19 years old are now very high in Latin America (64 births per 1000 women) [1], and that 2.6 million girls aged under 16 in low-income countries give birth each year [2]. In addition to the potential physical and emotional risk of births to young teens (less than 17 years old), teenage motherhood may be a life – long limiting experience for young women's access to opportunities in modern societies [3–5].

Teenage motherhood has been widely associated to social and gender inequalities and as a potential factor to keep women in the poverty cycle. Certainly, it has been well stablished that the social determinants influencing high adolescent birth rates (ABR) are not homogenously distributed across social groups and territories [6,7]. Cross-country studies performed in low and middle-income countries using area – level aggregated data have found a strong association between area poverty [8,9]. Moreover, it has been claimed that in countries and gender inequalities and high ABR.

Deprivation is defined as the lack of access to material and social resources needed by individuals to achieve the living standards considered essential by their social and cultural groups [10]. Ecological studies performed in high – income countries have revealed that living in deprived areas can increase the risk of teenage motherhood [7,11]. Moreover, it has been claimed that social and material deprivation in an area increase adolescent perception of less economic opportunities for adolescent population. Regarding to the latter, some authors have found that living in deprived areas gives the sense that an early motherhood can be a path in absence of better opportunities [12].

It has been well stablished that in societies dominated by a patriarchal system of oppression through gender norms, women's social and economic opportunities are limited, and therefore, their chances to experience good health. Studies performed in low and middle – income countries have found that gender inequality at the contextual level is an important factor influencing unintended pregnancy [13] and early adolescent childbearing [14]. Furthermore, studies performed in different settings have suggested that living in deprived areas with fewer employment opportunities for women and young populations is associated with elevated teenage motherhood [9,15].

In Ecuador, a South American country, teenage motherhood has reached epidemic dimensions with approximately 2,700 girls aged 10 – 14 years-giving birth every year in the country [16]. Moreover, even though the total national fertility rate has decrease in the last two decades, adolescents from deprived socioeconomic [17,18] and historically oppressed ethnic groups have shown the highest rates of teenage motherhood and unintended pregnancies in the country [19]. Furthermore, a study performed in an Amazonic province of the country found that women from oppressen ethnic groups have a higher risk of unintended pregnancies [19]. However, little is known about the influence of contextual factors such as deprivation, ethnicity and gender in geographical areas of the country.

Most of research regarding to the distribution of the determinants of ABRs in geographical areas have been carried out in high – income countries, while existing evidence from middle income countries usually make cross – country comparisons using measures at the national level such as national income, educational expenditure [20], human development indexes (some adjusted by gender) [21]. In this regard, the focus on geographical regions may help to highlight inequalities in sectors of the population in more detail in Ecuador. Additionally, ecological or aggregate-level studies that use indicators capable of detecting vulnerabilised sections of the population are useful to track how their needs may be addressed through policies and programmes.

The 2010's Population Census questionnaire incorporated for the first time a question measuring fertility in women aged ≥12 years, which is a unique opportunity to comprehensively assess social determinants of ABR is the cantons of Ecuador. Thus, we aimed to study the socioeconomic inequalities in the distribution of ABR in 211 areas of Ecuador through: (i) describing the distribution of ABR by deprivation, gender and ethnical inequalities; (ii) describing the geographical pattern of ABR distribution in the cantons, and (iii) the analysis of the association between deprivation, gender and ethnical inequalities and ABR by age groups in the study areas in Ecuador in 2010.

2. Methods

2.1. Study design and unit of analysis

A cross-sectional ecological study was carried - out to analyse social determinants of adolescent birth rate ABR in Ecuador. The units of analysis were the 221 cantons of

Ecuador (second administrative level) according to the last National Population Census 2010. These 221 areas are geographically located in four different regions: 1) The Galápagos Islands in the Pacific Ocean; 2) The Coastal region in the western and central part of the continental territory; 3) the Amazonic region in the eastern portion of the continental territory; and 4) the Andean region between the former two **(see Supplementary figure 1)**. The size of the population of the cantons varies in a range from 1,760 to 2,350,278 (median 23,830). The selection of cantons as units of analysis was based in two main reason: i) *"Cantons were the smallest areas with comparable available data. Also, each canton has a unique history, social and natural environments, and political representation"*; and ii) *"Cantons are the smallest administrative level with the capacity to design and implement local policies. Each canton has its own political representation and budget, thus, people living in a particular canton share a history of common local policies that can affect the distribution of wealth"* [22].

2.2. Study Population and information source

The study population comprises all women aged 12 - 19 that were residing in Ecuador in 2010. The country level data on adolescent birth rate was obtained from the last National Population Census – 2010 through the fertility question asked to women aged 12 or more: ¿A at what age did you have your first live birth child. All databases were acquired from Ecuador´s National Institute of Statistics and Censuses (INEC) and are available online http://www.ecuadorencifras.gob.ec/estadisticas/.

2.4. Variables and Indicators

Adolescent birth rates (ABR) were calculated as the number of live births per 1,000 adolescent women aged 12-19 years for each of the 221 cantons. To analyse how the variables of interest behaved among early and older age groups of adolescents, the age at the time of the census was grouped in three categories: 12 – 14; 15 – 16, 17 – 19 and 12 - 19 years old to calculate age – specific birth rate per 1000 women.

2.4.1. Socioeconomic, gender and ethnic indicators

Our explanatory variables were chosen in order to reflect a range of socioeconomic inequalities: a compound deprivation index, and two simple indicators to measure

gender and ethnicity-based inequalities in the 221 cantons. Both simple indicators were also used in the estimation of the compound deprivation index.

a) Deprivation index

The deprivation index included in this study was calculated for each canton in Ecuador through Principal Component Analysis using indicators corresponding to the National Population Census 2010, representative at the cantonal level, and the National Living Conditions Survey 2014 - 2015 (LCS), representative at the provincial level (first administrative level). Provincial indicators from this source were assigned to all the cantons composing each province. The final 17 indicators included in the index were distributed on five deprivation dimensions: 1) Education; 2) Information and communication; 3) Housing and urban environment; 4) Work and social security; and 5) Historical discrimination. Complete information about the index construction can be found elsewhere [22].

b) Gender inequality indicator:

The percentage of weekly women's dedication to unpaid work in each province was calculated from the LCS and assigned to all the cantons comprising each province. This indicator was used as a proxy to measure gender inequalities because women's integration in the paid workforce depends on the societal norms for women's employment. Therefore, it is an indicator capable to reflect the unequal distribution of time dedicated to remunerated work, as well as a proxy of women's domestic work in a specific territory. This indicator was estimated at the provincial level and obtained from the LCS because the National Census did not include proxy variables to measure gender inequalities.

c) Ethnicity indicator:

Historical oppression and discrimination arising from a post-colonial society in Ecuador had had a great impact in living conditions and health. Historically, indigenous and black populations in Ecuador have been oppressed and excluded economically and politically; while mestizos and especially white populations have enjoyed full

participation in the political and economic processes and have had more control over resources and means of production. Discrimination towards people from oppressed ethnic groups is important in Ecuador and is closely related with discrimination by gender, health status, age, and rural origin, among others [23,24]. Thus, the percentage of oppressed ethnic groups (montubio, Afro Ecuadorian and indigenous) was used as a proxy for ethnical – based inequalities in the cantons.

2.6 Data analysis

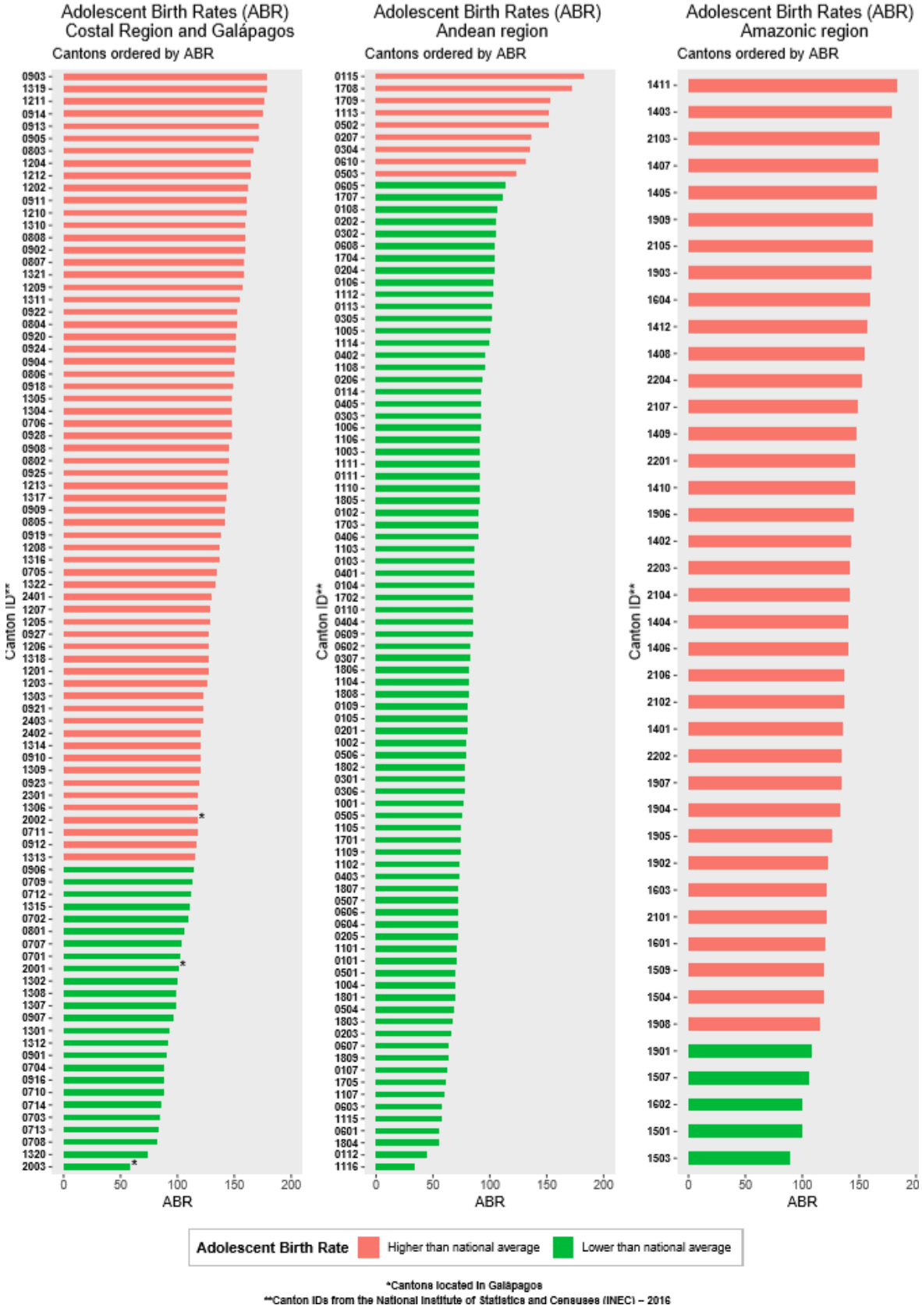
The national average of adolescent birth rate (ABR) was estimated and a ranking of the 221 cantons of Ecuador by geographical regions was displayed to describe the relative position of each canton to the national average of ABR. As the Galapagos Islands has the lowest number of cantons in the country this region was merged to the Coastal region ranking. Then, quartile-based choropleth maps of the distribution of the cantons of Ecuador according to the socioeconomic the deprivation index and the simple index of ethnicity and gender according to quartiles of ABR for the four age groups (12 – 14; 15 – 16, 17 – 19 and 12 - 19 years old) were displayed. The ABR in the canton groups were then calculated according to the socioeconomic deprivation index and the simple indices. Finally, Poisson models were adjusted for the different age groups, taking the ABR as the dependent variable and the socioeconomic deprivation index, the simple index of ethnicity and gender of the cantons as independent variables. These models allowed the estimation of ABR prevalence ratios (PR) by age groups with their 95% confidence interval (CI95%) and the attributable risk (AR) calculated by the difference of the ABRs for the 4 cantonal groupings.

All data were analysed using the statistical packages STATA 15 and R. All maps were plotted using the R statistical package.

3. Results

The national average of ABR was 179. The Coastal and the Amazonic regions showed the greater number of cantons with ABR higher than the national average, being Balao located in the Central Coast, and Pablo Sexto in the Central Amazonia the cantons with the highest ABR **(see Figure 1)**. The Andean region had the lowest number of cantons with ABR higher than the national average, being Camilo Ponce Enríquez the canton with the highest ABR in the region.

Figure 1 Cantons ranking higher and lower position respect to the national average of adolescent birth rates by regions in Ecuador, 2010



Consistently, a marked leap in ABR between the first and second quartile and a gradient across the three socioeconomic indicators was observed in most of the age groups. Thus, the relative risk increased (AR) in the most disadvantage compared to the most advantaged cantons across the socioeconomic indicators and age groups. The highest ABR was observed by the ethnicity indicator in the third and fourth quartiles of most populated historically discriminate ethnicities in the youngest age groups (12 -14 and 15 - 16). For the age group 17 – 19 and in the overall age group of adolescents the highest ABR showed a similar distribution among the deprivation and ethnicity quartiles **(see Table 1)**.

A geographical pattern was observed in the distribution of ABR among historically oppressed territories in the country across age groups **(see Figure 2)**. Importantly, contrary to the expected, the cantons grouped in indigenous territories of the Andean high hills showed the lowest ABR in all age groups. The cantons situated in the North – Coastal (predominantly Afro-Ecuadorian and montubio populated), Central - Coastal and Amazonic (Amazonic - indigenous populated) regions showed the highest ABR in all age groups. The ABR in the group 12 – 14 years followed a consistent pattern in the Coastal and Amazonic regions, very similar to that observed in the 15 – 16 age group although with some differences in the latter: the North Coastal region had lesser cantons with highest ABR while more cantons in the Amazonic region presented highest ABR. In the overall group of adolescents (12 – 19 years) and in those aged 17 – 19 years the pattern of ABR was very similar and cantons of the South – Andean region emerged with highest ABR.

Table 1 Distribution of adolescent birth rates across socioeconomic indicators by age groups in Ecuador, 2010

	12-14				15-16				17 - 19				12-19			
	LB	n	ABR*	AR	LB	n	ABR*	AR	LB	n	ABR*	AR	LB	n	ABR*	AR
Total Ecuador	240	286427	0.8		17363	431932	40.2		96255	419032	229.7		113858	1137391	100.1	
Deprivation																
Q1 (less deprived)	81	174812	0.5	1.0	8369	266724	31.4	26.6	53222	269935	197.2	100.4	61672	711471	86.7	37.8
Q2	52	40768	1.3	0.2	2975	60834	48.9	9.1	15349	56291	272.7	24.9	18376	157893	116.4	8.1
Q3	59	38489	1.5	0.0	3291	57301	57.4	0.6	15447	51686	298.9	-1.3	18797	147476	127.5	-3.0
Q4 (more deprived)	48	32358	1.5		2728	47073	58.0		12237	41120	297.6		15013	120551	124.5	
Unpaid work in women																
Q1 (less unpaid work)	31	98657	0.3	1.1	3279	147173	22.3	35.6	26812	150242	178.5	106.1	30122	396072	76.1	49.3
Q2	36	39735	0.9	0.5	2978	60167	49.5	8.4	15036	54698	274.9	9.7	18050	154600	116.8	8.6
Q3	103	98802	1.0	0.4	6751	149341	45.2	12.7	34419	143863	239.2	45.4	41273	392006	105.3	20.1
Q4 (more unpaid work)	70	49233	1.4		4355	75251	57.9		19988	70229	284.6		24413	194713	125.4	
Ethnicity																
Q1 (more mestizo and white population)	18	34826	0.5	0.8	1360	51577	26.4	26.8	9788	51649	189.5	91.3	11166	138052	80.9	37.8
Q2	92	146474	0.6	0.7	7805	223050	35.0	18.2	47251	223632	211.3	69.5	55148	593156	93.0	25.7
Q3	70	58461	1.2	0.1	4513	88036	51.3	1.9	21854	81914	266.8	14.0	26437	228411	115.7	3.0
Q4 (less mestizo and white population)	60	46666	1.3		3685	69269	53.2		17362	61837	280.8		21107	177772	118.7	

Note: rates calculated over 1,000

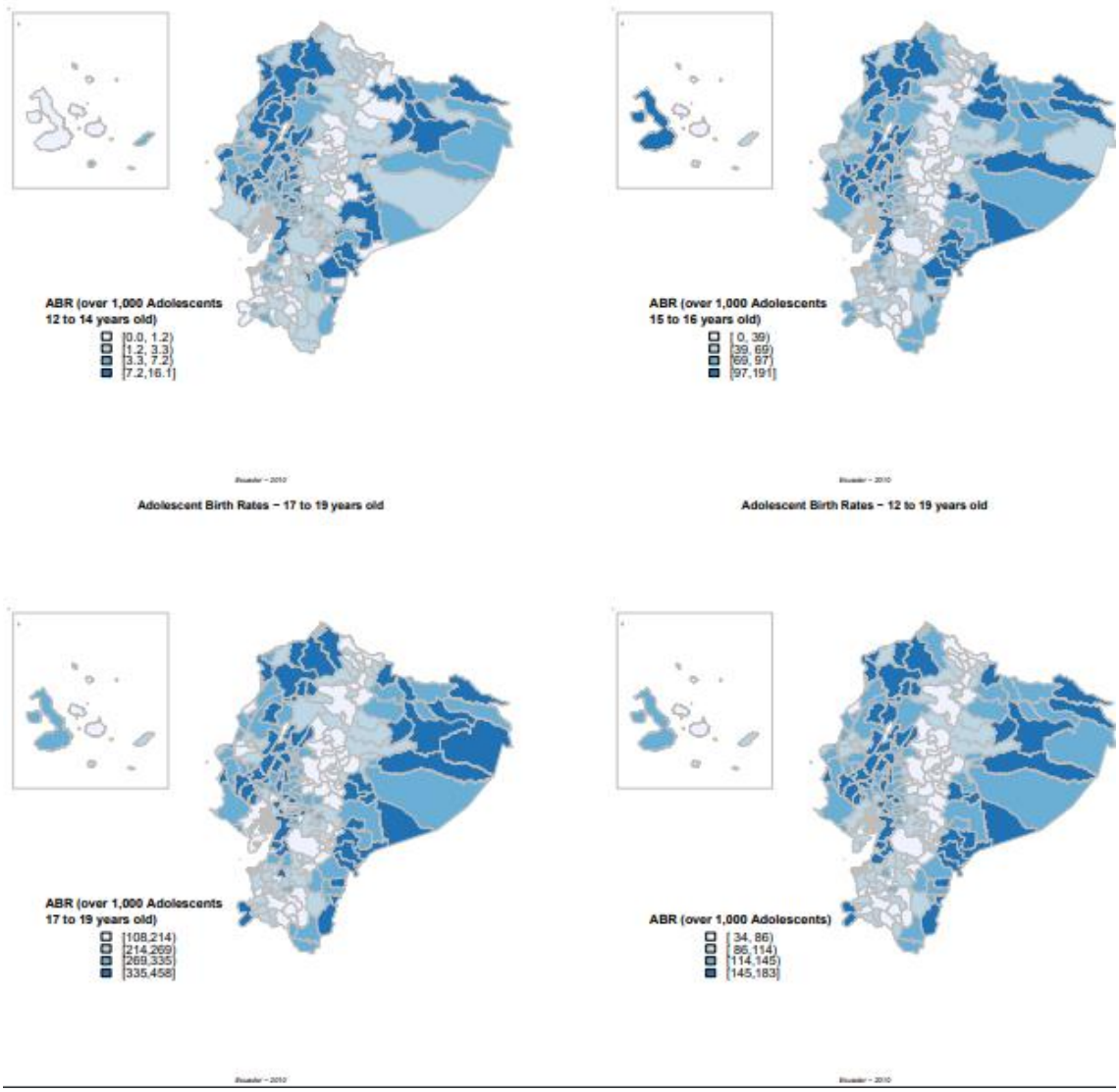
n number of adolescent mothers

LB Number of live births in each age group by indicator

*ABR Adolescent birth rate

AR: Attributable risk

Figure 2 Adolescent birth rates (ABR) of the cantons by age groups



It worth noticing that the geographical pattern of the distribution of deprivation and cantons highly populated by oppressed ethnic groups in Ecuador is very similar **(Figure 3)**. Also, it is important to remark that both patterns also coincide with the concentration of oppress ethnic groups in the country. The pattern of the distribution of deprivation and less privileged ethnic groups **(Figure 3)** is similar to the pattern of high ABR observed in Figure 2 for all age groups only in cantons grouped in the North – Coastal, Central – Coastal and Amazonic regions.

Figure 3 Deprivation Index Scores, rates of unpaid work in women and ethnicity – geographical representation in quartiles of each indicator (higher values indicate more deprivation, gender inequality and ethnical discrimination)

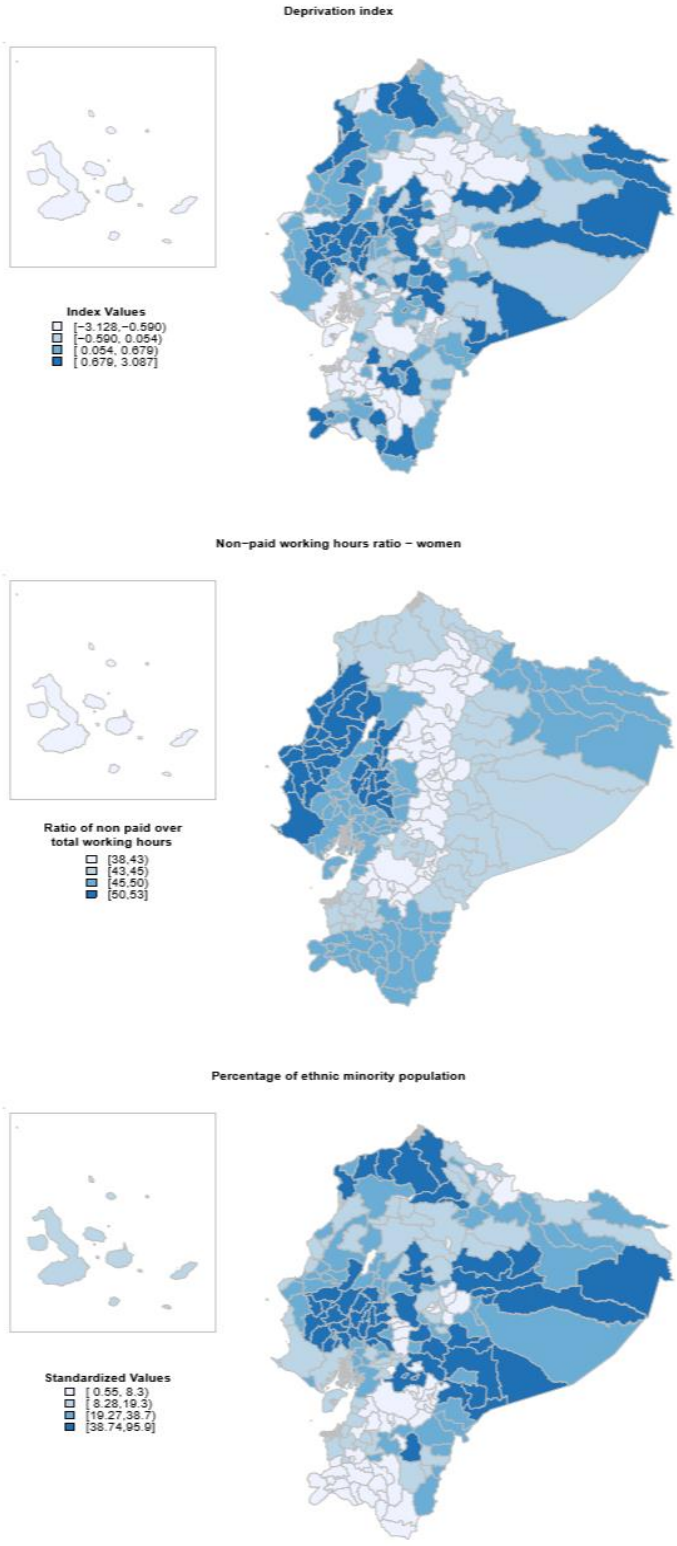


Table 2: Associations between adolescent birth rate and indexes deprivation, unpaid working hours and ethnicity quartiles by age groups. Ecuador 2010

Socioeconomic indicators	12-14			15-16			17-19			12-19		
	*PR (95%C.I)	*PR (95%C.I)	*PR (95%C.I)	*PR (95%C.I)	*PR (95%C.I)	*PR (95%C.I)	*PR (95%C.I)	*PR (95%C.I)	*PR (95%C.I)	*PR (95%C.I)	*PR (95%C.I)	*PR (95%C.I)
Deprivation												
Q1 (less deprived)	1			1			1			1		
Q2	2.0 (1.4-2.9)			1.5 (1.2-1.9)			1.4 (1.2-1.5)			1.3 (1.2-1.5)		
Q3	2.3 (1.6-3.4)			1.8 (1.5-2.2)			1.5 (1.4-1.7)			1.5 (1.3-1.6)		
Q4 (more deprived)	2.4 (1.6-3.6)			1.8 (1.4-2.3)			1.5 (1.3-1.7)			1.4 (1.2-1.6)		
Unpaid work in women												
Q1 (less unpaid work)		1			1			1			1	
Q2		3.0 (2.1-4.2)			2.2 (1.9-2.5)			1.5 (1.4-1.7)			1.5 (1.4-1.7)	
Q3		2.8 (2.0-3.8)			2.0 (1.6-2.5)			1.3 (1.1-1.6)			1.4 (1.2-1.6)	
Q4 (more unpaid work)		3.9 (2.9-5.3)			2.5 (2.2-2.9)			1.6 (1.4-1.7)			1.6 (1.5-1.8)	
Ethnicity												
Q1 (more mestizo and white population)			1			1			1			1
Q2			1.6 (1.1-2.5)			1.3 (1.0-1.7)			1.1 (0.9-1.3)			1.2 (1.0-1.3)
Q3			2.9 (2.1-4.0)			1.9 (1.5-2.3)			1.4 (1.2-1.7)			1.4 (1.2-1.7)
Q4 (less mestizo and white population)			3.0 (2.2-4.3)			2.0 (1.6-2.4)			1.5 (1.3-1.7)			1.5 (1.3-1.7)

* PR Prevalence ratios

In the results of the Poisson regression models, a significant association was observed between the ABR and the deprivation and ethnicity indicator for all age groups, but the second quartile of the ethnicity indicator that was only statistically significant in the 12 – 14 age group (**see Table 2**). Consistently, the most pronounce associations occurred between ABR and the ethnicity indicator in the youngest age groups. The highest PR were observed in the group of adolescents aged 12 – 14 years in the Q4 of the ethnicity indicator (PR: 3.0; 95%CI: 2.2- 4.3). Regarding to the ethnicity indicator and the deprivation index, women aged 15 – 16 years showed the strongest associations with ABR and the Q3 and Q4 of ethnicity [(PR: 1.9; 95%CI: 1.5-2.3); (PR: 2.0; 95%CI: 1.6 - 2.4) respectively] followed by the deprivation index in the third and fourth quartiles [(PR: 1.8; 95%CI: 1.5- 2.2); (PR: 1.8; 95%CI: 1.4- 2.3) respectively]. In the age group 17 – 19 women from the most deprived quartiles and those in the Q4 of the ethnicity indicator showed the higher PR of ABR, in this group of age. Similar results were observed in the overall group of adolescents aged 12 -19 in which high PR were also observed in the third quartile of deprivation (PR: 1.5; 95%CI: 1.3-1.6) and the Q4 ethnicity (PR: 1.5; 95%CI: 1.3-1.7).

Gender indicator

Considering that this indicator is estimated at a different area level (provincial level) and have less of variability, comparisons between indicators is not viable. Nevertheless, this indicator has an important theoretical value to the analysis of ABR in cantons of Ecuador. Therefore, the results are described separately from the rest of indicators to avoid inaccurate comparisons.

Higher rates of unpaid work in women were observed in the fourth quartile across age groups **(see Table 1).** The gender indicator of also followed a very similar pattern to that of the highest ABR, being most evident in Pacific – Coast and Central – Coastal region, also the lowest unpaid working hours in women coincided with lowest ABR observed in the Central – Andean high hills **(see figure 3)**. The results of the Poisson regression models showed a strong association between ABR and high rates of unpaid working hours in women across age groups, which was most accentuated in the group of adolescents aged 12 – 14 years in the Q4 of unpaid working hours in women (PR: 3.9; 95%CI: 2.9-5.3).

4. Discussion

Overall, the results of this study described the disproportional rates of teenage motherhood in Ecuador. The study revealed geographical and social inequalities in the distribution of ABR in the 221 cantons of the country. The highest ABR were registered in most deprived cantons and in those highly populated by historically discriminated ethnic groups of the country. In general, these results are strongly related to multiple social and political traditions that have systematically deprived large areas of the country in which ethnic minorities are located: Afro Ecuadorian in the North Coastal, the montubio in the Central Coast and the Amazonic indigenous groups. The reduction of social and material inequalities had an unequal impact among social groups and regions. Women and indigenous groups consistently showed the lower reduction of poverty and inequalities in the access to education and wage-labour market [25]. Thus, material deprivation could be impacting sexual and reproductive health and adolescent's agency through different mechanisms across regions.

For instance, some of the results mentioned above can be explained by the interlinked relationship of material deprivation and the neo colonization of historically oppressed territories of the country. In the North -Western Amazonic region, a study [26] concluded that the development of oil exploration and extractive industries shaped cultural and traditional patterns of teenage marriage influencing teenage pregnancy in a Waorani community. Before the oil companies, the dependence on a paid work was unexciting and the share tasks of production and reproduction had not gender divide.

Through wage labour, the oil companies introduced the division between public and private, and productive and reproductive into the domestic and economic spheres that did not exist before in this community. Consequently, adolescent women are systematically impoverished through being relegated to the domestic sphere with less or no to access to wage labour market in an area where adolescent marriage and pregnancy are socially normalised. Additionally, the change from productive and reproductive activities that were not dependent on paid work for the wage labour, transformed the meanings of adulthood and patterns of marriage. Thus, adolescent couples started engaging earlier than before oil exploitation in marriage and pregnancy.

Moreover, the study also found that the oil companies' settlement enlarged the presence of male workers increasing the size of women's sexual exploitation and the risk of

teenage motherhood through sexual violence. In this area, material deprivation transformed the vision of girls' bodies as a commodity to access to resources and goods, and the vision of partnership formation with older men out of their communities as a way to improve their social conditions. Therefore, we can hypothesise that our findings can be explained by the contexts systematic vulnerabilisation of girls and adolescents by patriarchal and neo – colonial capitalism that expose them to poverty and violence.

The relationship between teenage motherhood and material deprivation has also been mediated by cultural and gender scripts of romantic love and family formation in different regions of the country. According to qualitative research [27], teenage motherhood is assumed as an option in context of limited material opportunities for women. The latter idea is sustained by the patriarchal construction of romantic love that gives adolescent women the sense of opportunity to escape from poverty through a male a relation with a male.

Limitations:

Our study has some important limitation. Other important contextual social and cultural factors could not be collected to allow as to fully understand or results. In addition, the information from the Living Conditions Survey is only representative at the provincial level. Therefore, we were not able to compare the results emerging from using different indicators because the measures are estimated in different area levels. Another limitation could be derived from the characteristics of the study areas. Although cantons are the smallest area in which the index could be estimated, they are still widely heterogeneous in size and population.

5. Conclusions

The high rates of teenage motherhood in Ecuador are highly associated with high levels of deprivation, ethnic discrimination and gender inequalities. .

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7. CHAPTER VII: DISCUSSION

a. Summary of main findings

This dissertation found that there are socioeconomic inequalities in teenage motherhood in Ecuador. The most important factors influencing the relationship between socioeconomic status and teenage motherhood were those related to the first experience of heterosexual intercourse. These included age at the first heterosexual intercourse, age of the first sexual partner, and whether contraceptive measures were used during intercourse. Sexual education variables were also included in the analyses but showed the lowest contribution to the socioeconomic inequalities in teenage motherhood. No changes in the socioeconomic inequalities in teenage motherhood or in the factors related to the first experience of heterosexual intercourse were observed in the past 14 years in the country (1999, 2004, and 2012). Moreover, an increase was observed in women with complete primary education in 2012. Additionally, through the construction of a material deprivation index, an evident geographical pattern of deprivation in the territories of historically oppressed ethnic groups was observed. Finally, we found that area-level material deprivation and other social factors were related to adolescent birth rates (ABR) in the 221 cantons of Ecuador, evidencing social and geographical inequalities.

The results of the four articles support the hypotheses formulated in this dissertation: 1) the prevalence of teenage motherhood is higher in women from the most disadvantaged socioeconomic groups compared to those from the most advantaged social groups; 2) the socioeconomic inequalities in teenage motherhood are partially explained by disadvantageous circumstances related to women's sexuality and access to sexual and reproductive health information.; 3) the risk of being a teenage mother is higher for women with lower degrees of agency and control over their sexuality and reproduction; 4) the adolescent birth rate is larger in cantons with high material and social deprivation and has an unequal geographical distribution among territories were historically oppressed ethnic groups live.

Disentangling the psychosocial and contextual factors influencing teenage motherhood and its unequal distribution among social groups is of paramount importance for health policy planning, resource allocation, and the design of gendered sensitive and adolescent – friendly programs and services in Ecuador. In the next sections the main results of this dissertation are discussed emphasising some ideas already mentioned in the research papers and providing extended reflection on new ones that emerge from the comprehensive reflection of this work as a whole.

b. There are socioeconomic inequalities in teenage motherhood in Ecuador

In 2012, more than half (53.0%) of women aged 20 – 24 years old reported that they became mothers during adolescence in Ecuador. Moreover, a social gradient was observed in the distribution of teenage motherhood across socioeconomic groups. The higher proportion of teenage mothers (54.4%) was observed in women with no schooling or incomplete primary educational attainment. These findings support those from other study that found important socioeconomic inequalities in teenage motherhood in Ecuador and other countries of the region [1].

i. The factors that contributed to socioeconomic inequalities in teenage motherhood in Ecuador

In this dissertation, the most important mediators of inequalities in teenage motherhood were the factors related to the first experience of heterosexual intercourse. This result is not surprising considering that women reported living disadvantageous circumstances during this experience. The highest risk for teenage motherhood was observed in women that were younger than 14 years old during the first sexual intercourse and in those that made no use of contraception. In this regard, literature from high – income countries has pointed out that first sexual intercourse at younger ages is very likely to be non-consensual or non-voluntary, and with lesser use of contraception [2,3].

Another important factor to consider is that women who experienced first sexual intercourse with a person younger than 17 years old showed the largest risk for teenage motherhood in the country. This result is different to those of some studies performed in North America that have found that first sexual intercourse with an older person exposes adolescent women to power relationships and increases the risk for teenage pregnancy [3–5]. In this regard, qualitative studies performed in Ecuador have revealed that power relationships based on the machismo sexual script are also present in same-age heterosexual relationships [6,7]. According to those studies, adolescent women consistently declared that their male partners violently opposed to the use of contraception. Furthermore, adolescent women mentioned they had sexual intercourse to receive and show affection rather than for sexual satisfaction. Also, beliefs based in romantic love functioned as mechanisms that disempowered girls to negotiate the use of contraception or to refuse to have unwanted sex. Furthermore, other studies carried out in Ecuador have observed that health professionals deny access to contraception and sexual and reproductive health information based on personal beliefs regarding adolescent sexuality [7]. The latter has been widely identified as an important barrier to the access to sexual and reproductive health information and free contraception [8].

Moreover, considering the barriers in the access to contraception for adolescents and, in general, to free and legal abortion in Ecuador, the results of this study make it plausible to hypothesize that older men have the means and social approval to access contraception or to afford an abortion to avoid unwanted pregnancies. Therefore, it is possible that this result could be revealing different mechanisms through which structural gendered power relationships are exerted to women since infancy constraining their agency. These possible mechanisms need to be further studied.

Consequently, the socioeconomic inequalities in teenage motherhood observed in Ecuador can be understood as result of disadvantageous circumstances that systematically disempower girls and reduce their capability to decide over their sexuality and reproduction. Furthermore, the results of this study highlight that women also share the constrains generated by gender roles and power relationships. Women from less advantaged socioeconomic groups have less opportunities to avoid a pregnancy during adolescence, or to terminate one in safe conditions.

ii. Sexual education had a low impact on the observed socioeconomic inequalities in adolescent motherhood in Ecuador

¡Educación sexual para decidir, anticonceptivos para no abortar.
Aborto legal para no morir! [4].

The results of this dissertation showed that over the 70% of women declared having received sexual and reproductive health information about menarche, sexual relationships, contraceptive methods, pregnancy and birth. Nevertheless, the majority of women made no use of contraception during their first heterosexual intercourse (70.5%). This finding contradicted our expectations, considering that sex education has proven to be an important factor in reducing teenage pregnancy by increasing the knowledge and use of contraception [9–12], and empowering adolescents in their sexual and reproductive rights [13,14]. Moreover, former research conducted in Ecuador has concluded that when gender equality norms are reinforced through sexuality education, boys and girls – both, sexually active and not sexually active - are more likely to establish better communication about sex and contraception use, increase the use of contraception and perceive sexual intercourse as positive and pleasurable [15].

Thus, in order to understand this result, it is important to consider that sexual and reproductive health information in Ecuador is mainly delivered in public schools in isolated talks based on biological terms [16]. Therefore, it is no provided within the context of gender – relations and human rights. Moreover, these talks are usually imparted during high school years (15 to 18 years old approximately). Therefore, considering that an important percentage of women in this study had their first heterosexual intercourse younger than 14 years old, the sexual and reproductive health information imparted in high – school years is arriving too late.

Consequently, we can hypothesize that the reductionist frame in which sexual and reproductive health talks are imparted, plus the delay in receiving (or the null access to) gender based sexuality education deny adolescents of an important resource to diminish traditional gender norms and reduce sexual and reproductive health risks.

[4] *"Sexual education to decide, birth control to not abort, legal abortion to not die!"* Slogan of the movement of feminist activists in Latin America for the right to legal and safe abortion in the region.

Thus, it is of paramount importance to make access to sexual education more democratic and equal in Ecuador in order to effectively reduce the high risk of teenage motherhood.

c. Changes in the socioeconomic inequalities in teenage motherhood in Ecuador

In the country, teenage motherhood remained high with a prevalence of 61.5% in 1999, 57.7% in 2004 and 61.0% in 2012. Although differences were observed across years among educational attainment groups, the social gradient persisted during the study period. The pressures exerted by power relations on women during their first sexual intercourse were also sustained in the country. The majority of women declared having a sexual partner older than 18 years old while they were younger than 17 years old during this experience. Although the percentage of women using contraception during the first heterosexual intercourse increased through the three study periods, the percentage of non-use remained extremely high: 90.3% in 1999, 88.3% in 2004 and 68.5% in 2012.

Moreover, the socioeconomic inequalities in teenage motherhood in Ecuador remained unchanged in the last 14 years. Women with no schooling or incomplete primary education consistently showed the highest probability of teenage motherhood. Furthermore, women with complete secondary education were more likely to be teenage mothers in 2012 than women in other survey years. A study performed in the Latin American context in 2014 also observed an increase in teenage motherhood in women with complete primary education in Ecuador [1].

In this study, the steady socioeconomic inequalities in teenage motherhood in Ecuador are associated to the unfavourable characteristics of the first heterosexual intercourse which also remained unchanged in the past 14 years. In relative terms, in the three studied periods, women were more likely to be teenage mothers if they declared having their first heterosexual intercourse being younger than 17 years old, with a person younger than 18 years old and made no use of contraception. These unfavourable

circumstances during women's first heterosexual intercourse are related to deep rooted gender structures that constrain women's agency [17] over their sexuality; and also to barriers in the access to reliable sexuality and sexual and reproductive health information and services - as contraception and safe abortion - that we discussed earlier.

The lack of change in socioeconomic inequalities in teenage motherhood during the study period was not expected considering the economic growth and the reduction of social inequalities achieved in the country in the last decade. Nevertheless, it has been argued that the gains of the social and economic development in Ecuador have been unequally distributed, especially among historically oppressed social groups [16].

Therefore, it is possible that an unequal distribution of the gains of economic development and the long – standing social and gender inequalities existing in the country may have not been enough for reducing the prevalence of teenage motherhood in Ecuador [18,19].

In addition, it is important to consider that Ecuador has historically had prevalent traditional moral and religious social values and a conservative political tradition. These values and political traditions may have constrained the ability of sexual and reproductive health policies and strategies to reduce teenage pregnancy and motherhood [20,21]. As observed in high – income countries, the decrease in adolescent birth requires sustained policies and interventions which guarantee the access to sexual and reproductive health services and contraception; and the continuous allocation of public resources to sexuality education and to free and safe abortion [22]. Therefore, decisions regarding the implementation of policies and programmes to tackle teenage pregnancy and motherhood cannot longer be "lukewarm" and based in traditional and conservative ideologies.

Consequently, teenage motherhood in Ecuador can be understood as a consequence of the neglected application of policies and strategies to make sexual education, contraceptive methods, sexual and reproductive health and safe abortion accessible for adolescents since early ages. Moreover, socioeconomic inequalities in teenage motherhood can be understood as a result of long standing gender inequalities in the

distribution of wealth and power. Thus, these unfavourable contextual factors may give girls and adolescents a lower sense of access (and real access) to social and material opportunities other than motherhood. In these circumstances, being mother during adolescence can create a vicious cycle that makes it harder for many women to overcome poverty. An adverse socioeconomic context can lead to teenage childbearing, which in turn, may result in dropping out of school. Moreover, lack of social support and policies to ameliorate the possible disadvantages produced by an early motherhood and few job opportunities can accentuate existing adverse socioeconomic conditions.

d. The influence of contextual factors in teenage motherhood in Ecuador

i. Constructing a deprivation index for the analysis of health inequalities in Ecuador

The construction of a deprivation index was considered an important step in this dissertation for the measurement of deprivation in geographical areas and its relationship with adolescent birth rates in the country. Most efforts to conceptualize and measure material and social deprivation have focused on high - income countries [23] and may not take into consideration historical oppressions shaping social stratification in countries like Ecuador. Therefore, an index composed of 17 indicators from data available in public sources was constructed following a conceptual framework generated for this purpose.

We have observed a clear geographical pattern of deprivation in the cantons of Ecuador. Deprivation is higher among territories where historically oppressed ethnic groups live. As in other studies that have constructed deprivation indexes in other contexts, material deprivation indicators such as education, work and housing were prioritised by the analyses [24]. Moreover, we could observe a relatively large contribution to the index of indicators that have been considered more sensitive in detecting deprivation in low- and middle -income countries such as the presence of pipes in the dwelling, literacy and water supply [23].

Our index also examined the contribution of indicators that have been considered sources of deprivation in the Ecuadorian context. In this regard, the relative contribution of variables as access to a mobile phone and the internet to the index may be reflecting an emerging digital divide in the country. It is possible that "offline" groups may be marginalized from new forms of political, social and economic participation, thereby, producing or even accelerating social inequalities [25]. Also, a subjective well-being variable was retained in the construction of the index. The perception of poverty, and other similar measures, have proven to be associated with health outcomes in diverse settings [26].

Ethnicity showed a relatively lower correlation and contribution to the index, compared to other material deprivation indicators. This was an unexpected result because this indicator has been largely associated with health inequalities in the country and because the geographical pattern of deprivation is similar to the pattern of historically oppressed ethnic groups. In this regard, it is possible that the self-identification measure of ethnicity based on predetermined categories (Ecuadorian Census) is biased. It is possible that historical discrimination based in race and ethnicity may have resulted in a strong pressure to report a majority or dominant group identity (white or mestizo) rather than manority ethnic groups [27].

The inclusion of a proxy variable for gender inequality (unpaid work) showed a different direction in the correlation with the deprivation index and made the lowest contribution to its construction. Nevertheless, we retained this indicator based on the conceptual premise that it may provide information on gender inequalities based on the sexual division of work. The unequal use of time between men and women in Ecuador could affect health, as in other countries [28,29]. Women in Ecuador devote considerably more unpaid hours than men to housework, child and elder care, making them dependent in the income of their partner or family [30].

Finally, multidimensional indexes can describe a complex phenomenon such as deprivation with detail and insight. Moreover, the creation of multiple deprivation measures is important to enhance studies on geographical inequalities in health in low- and middle-income countries. The development of this kind of indexes is vital for

identifying and understanding the role of the context in diverse health outcomes and health inequalities. Moreover, its development can be of paramount importance for local stakeholders that aim to design and implement policies and to allocate material and social resources to tackle the determinants of health inequalities. This index provided a unique opportunity to analyse the influence of material deprivation on teenage motherhood in the 221 cantons of Ecuador which are the smallest area level where official data was available.

ii. Social and geographical inequalities in adolescent birth rate in Ecuador

In Ecuador, an average of 170 per 1000 adolescents are teenage mothers. The highest adolescent birth rate (ABR) followed a clear geographical pattern, where most of the cantons located in the North and Central – Coastal (predominantly populated by Afro-Ecuadorian and Montubio groups respectively), and Amazonic (populated by Amazonic – indigenous groups). Contrary to the expected, cantons located in the indigenous territories of the Andean high hills showed the lowest ABR in all age groups. Similarities between the geographical patterns of ABR, material deprivation and ethnicity appeared predominantly in cantons located in the North and Central – Coastal, and Amazonic regions.

Moreover, ABR are highly associated with deprivation, gender inequality and ethnical discrimination in the study areas. The association between adolescent birth rates and the three indicators was stronger among girls aged 12 – 14 years old. It is worth noticing that a clear gradient in prevalence ratios was observed in the associations between adolescent birth rates and ethnicity, especially in the younger age groups.

iii. The geographical pattern of adolescent birth rates, material deprivation, ethnical discrimination and social and political oblivion in Ecuador

The results of this study can also be understood as the result of neglected sexual and reproductive health policies in the country. Additionally, they could also be explained by diverse cultural norms regarding sexuality and sexual conduct in different regions of the country. Even thou teenage motherhood is considered a public health problem with negative consequences for women's social and material prospects, there is scarce

evidence regarding its social determination in Ecuador. A qualitative study carried out in the Amazonic region found that material and social deprivation was deeply influenced by the presence of oil companies. According to the author, the introduction of wage labour, which did not exist previously in this community, changed the patterns of adolescent marriage, decreasing the age of childbearing and partnership formation and creating a sexual division of work. Consequently, reproductive work was transformed in a space less valued by the capitalist mode of production and resulted in women being relegated to the domestic sphere. Moreover, since the oil companies' managers interacted exclusively with men when discussing extractive activities in the territory, women were systematically excluded from political and social decisions [31].

Other study in the Ecuadorian setting found that in contexts of material deprivation, motherhood was the only option [6,7]. In this regard, studies performed in Mexico concluded that adolescents (male and women) from deprived social groups repeated patterns of early childbearing and partnership formation as the "logic" option to gain status [32,33]. Studies performed in high-income contexts have also observed the relationship between area deprivation and teenage pregnancy through various mechanisms. For instance, a study found that living in an area with fewer employment opportunities was associated with elevated teenage motherhood risk [34]. Other study using qualitative approach reported that in areas with higher deprivation adolescents perceived a lack of adult role models to give them the sense that education is meaningful and steady employment is a viable alternative to welfare, resulting in young pregnancy viewed as an acceptable and viable path in such areas [35].

Despite the fact that our study did not aimed to explore the mechanisms through which area factors influenced teenage pregnancy leading to motherhood, our findings offer some insights into potential underlying mechanisms. As we have discussed earlier, adolescent women have sexual intercourse initiation at early ages and in disadvantageous conditions. We have also discussed the relationship between socioeconomic inequalities in teenage motherhood and lack of access to affective and sexual education, contraception and safe abortion. Therefore, we hypothesise that a possible mechanism by which area deprivation may incur in additional teenage motherhood risk is through the latter mentioned factors. For instance, a study performed

in Spain reported the association of area level deprivation and lower contraceptive use during first sexual intercourse [36], while the lack of affective and sexual education have been widely considered as a mechanisms to increase contraceptive use and reduce power relationships [13,37]. Finally, the lack of access to safe abortion and its social penalisation is a tremendous barrier to avoid an unexpected and unwanted motherhood when all preventive mechanism fails in the country.

iv. Gender inequalities in unpaid work have the potential to explain high adolescent birth rate in Ecuador

In addition, gender inequality showed a similar pattern to the one of ABR in Ecuador. Areas in the northern and central Coastal region had both high adolescent birth rates and higher unpaid hours in women. On the other hand, areas in the central Andean region had low adolescent birth rates and lower unpaid working hours in women.

Regardless of the limitations in the proxy of gender inequalities (unpaid work), we found a strong association with ABR. This result gives some support to the hypothesis that living in areas with higher exclusion of women from paid labour market may intensify the risk of early childbearing. This is an important finding considering the disproportional number of hours that women dedicate to unpaid domestic work in Ecuador and therefore, the unequal access to wage and to work force for women [38,39]. The strong association between adolescent birth rates and the high percentage of unpaid work in women may be suggestive of gender inequalities that correspond to poor income prospects for women in the study areas [40]. Under these conditions, postponing motherhood to invest in an education and future career may have little perceived value [34].

Consequently, in Ecuador, the increasing social and political concern regarding childbearing during adolescence should parallel the recognition of its complex social and economic implications. In this study, we could observe that the geographic pattern of political oblivion of historically oppressed territories is drawn by the high rates of child and adolescent motherhood in cantons of the country. The highest adolescent motherhood rates in Ecuador are occurring in most deprived and high gender unequal contexts that discriminate ethnic groups. Indeed, there has been policies and

interventions to tackle teenage pregnancy but were withdrawn and/or replaced by conservative interventions that have proven to be ineffective. Importantly, the National Assembly have recently rejected easing law in rape cases while women are criminalized for interrupting pregnancies in unsafe conditions. Certainly, an economic development has been observed in the past decade, but its gains had been unequally distributed among women, ethnic groups and territories of the country. Women from discriminated ethnic groups have been systematically excluded from the politic, economic and social power share. In this social and economic context, maternities are far from being a free choice, and the so-called responsible reproductive decisions to avoid pregnancies are very far from being a possibility in these conditions.

e. A conceptual framework for the study of socioeconomic inequalities in teenage motherhood.

This doctoral thesis analysed teenage motherhood following: 1) a conceptual framework adapted from the Spanish Committee for the reduction of health inequalities; and 2) the Gendered Sexuality over the life course conceptual framework develop [41] (corresponding to the psychosocial and individual factors). This adaptation introduced important conceptual elements from feminist theorists that consider the influence of heteropatriarchal and capitalist systems, that oppress women in different political, cultural and social structures through diverse mechanisms. The framework also incorporated revised literature on gender norms shaping adolescents' sexual and reproductive health in the Latin American and Ecuadorian setting.

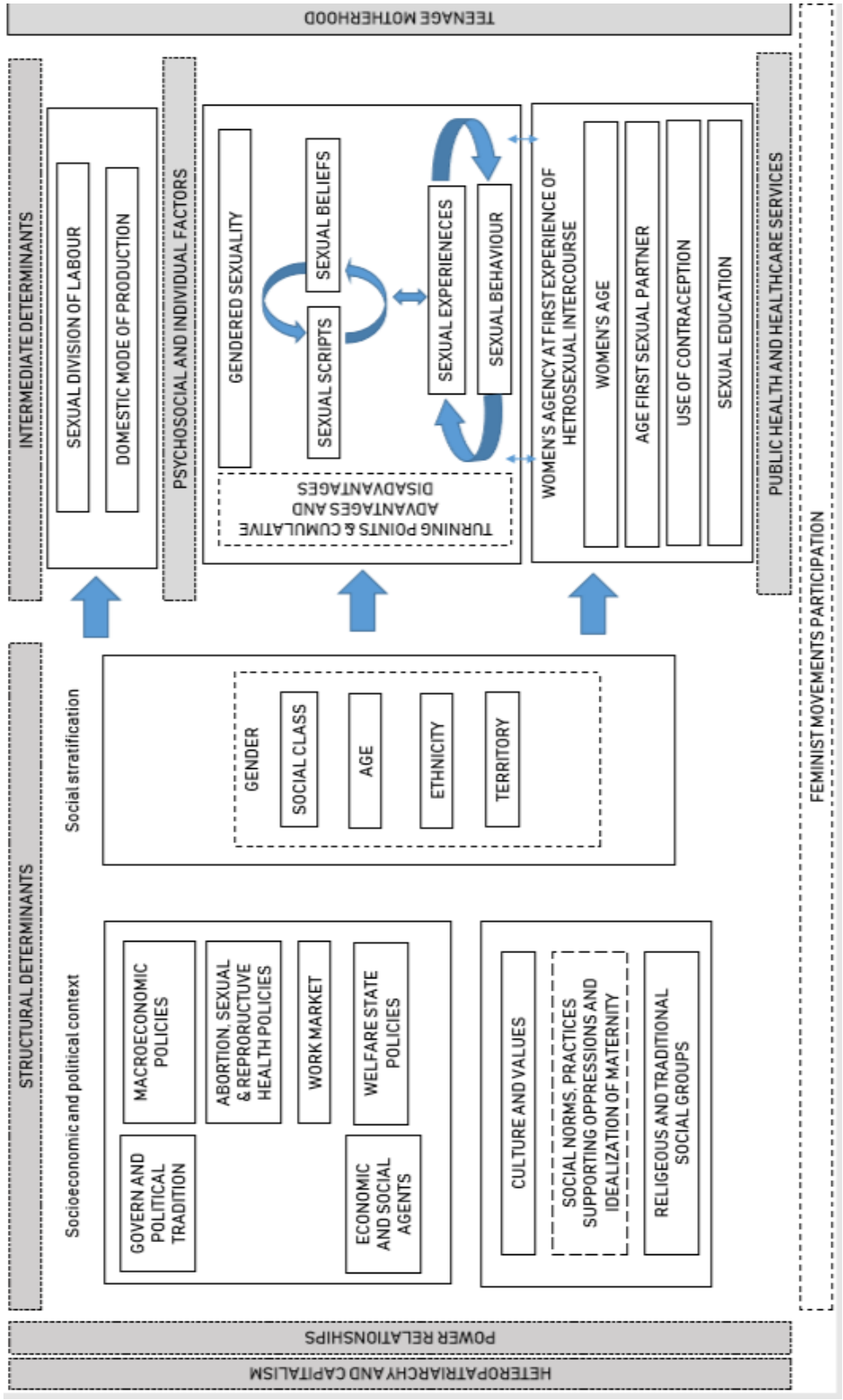
The operationalization of individual and psychosocial factors and its subsequent analysis of their relationship with socio-economic inequalities in adolescent motherhood allowed us to outline possible relationships between the different factors that can measure women's agency levels during first sexual intercourse. Figure 4 shows how these factors are introduced in the conceptual framework as psychosocial and individual factors influencing socioeconomic inequalities in teenage motherhood.

Finally, this theoretical perspective allowed us to have a wider and comprehensive understanding of teenage motherhood by introducing some psychosocial factors

understudied in its relationship with socioeconomic inequalities. The factors related to the first experience of heterosexual intercourse are understood as proxies of women's agency and control. The received sexual and reproductive health information can be understood as a proxy of sexual education that allowed us to critically assess the potential influence of the received information over the socioeconomic inequalities in teenage motherhood.

Much work is still needed to understand the complex relationships among the factors and determinants underlying the occurrence of teenage motherhood in Ecuador. We hope this framework may be a starting point for further theoretical and methodological discussion.

Figure 4 Final version of the conceptual framework for the analysis of socioeconomic inequalities in teenage motherhood in Ecuador



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8. CHAPTER VIII: LIMITATIONS AND STRENGTHS

a. Limitations

- *In individual level studies (paper I and II)*

The main limitations of the first two studies of this doctoral dissertation arise from limitations in the data sources used for the studies. First, the cross-sectional nature of the surveys makes it hard to evaluate causality. The socioeconomic position indicator we used – educational level - is susceptible to reverse causality (a woman could be more susceptible to pregnancy due to an adverse socioeconomic environment, or she could have abandoned studies due to an early pregnancy).

Second, related to the last limitation, the surveys did not include other relevant socioeconomic position measures that could have helped us to avoid the potential bias of reverse causality. Measures of socioeconomic position at the time of the first intercourse and first pregnancy – family income - would be useful to better understand this relationship.

Third, several biases can arise from the data collection process used in the surveys. Interviews conducted on adolescent girls (as young as 12 years old) were performed in the households with other family members present. As part of the survey asked questions on sexual behaviour, the interview may have inhibited younger adolescents from answering these sensitive questions [1,2]. This phenomenon is also known as social desirability bias [3]. In addition, we realized that variables concerning socioeconomic position and the first experience of heterosexual intercourse could not be treated in the same way when interviewing young adults (20 – 24 years old) and when interviewing adolescents (12 to 19 years old and specially the younger ones). Biases in the younger age groups can arise from: (1) in this groups, women still at risk of pregnancy and teenage motherhood; (2) because those aged between 12 – 17 years old had yet the chance to achieve their educational attainment that was so decisive to our individual

analysis of socioeconomic inequalities. For these reasons we decided to exclude women who were younger than 20 years old at the moment the interview from the analyses.

Finally, we think it is important to mention that the data sources used in the studies did not allowed us to analyse experiences regarding the first heterosexual intercourse in men and early fatherhood. This is an important issue to tackle considering, on the one hand, all the implications that an early fatherhood has shown to have for male adolescents in other contexts, and on the other, for a comprehensive understanding of the factors influencing teenage motherhood in the Ecuadorian setting.

- *In ecological studies (paper III and IV)*

In terms of the contextual level variables, another key limitation regards to the area level of disaggregation of the data (studies III and IV). Although cantons are the smallest area in which estimations of adolescent birth rates, deprivation and ethnicity could be done, they are still widely heterogeneous in size and population.

- *Availability of indicators to measure social inequalities*

Although important variables to measure socioeconomic position and deprivation were available, we still had to deal with certain problems. For the construction of our deprivation index, data from the National Census (NC) and Living Conditions Survey (LCS) provided many interesting indicators. Nevertheless, important information that could be relevant to describe material deprivation such as work and labour conditions are not available. In addition, the information from the LCS is only representative at the provincial level. This could mask inequalities between the cantons and could thus be responsible for the minor contribution of LCS variables to the final index, and as consequence, for the analysis to retain social deprivation measures.

For the construction of the deprivation index (paper III) as well as for the analysis of the trends of socioeconomic inequalities in teenage motherhood (paper I and II) the use of the ethnicity indicator was constrained in various ways. In the case of the HNS the ethnicity proxy measure was considered in a different way in each of the survey periods:

in 1999, it was assessed by asking the predominant language used to communicate; in 2004, it was assessed by interviewer observation; and in 2012, it was assessed through self–identification based on predetermined categories (as in the Ecuadorian Census). All these ways of measuring ethnicity have biases and the differences make comparisons difficult. The use of the self-identification question could explain the low correlation and contribution of the ethnicity indicator for the construction of the index (paper III). A possible explanation is that historical discrimination based on race and ethnicity may have resulted in strong pressure to identify with majority or dominant groups (white or mestizo) rather than minority groups [4]. This can also be the case underlying the weak associations between ethnicity and socioeconomic inequalities in teenage motherhood found in the analysis of mediators in paper I.

For the purpose of creating an indicator for gender inequalities the principal limitation lies on the lack of an adequate theoretical gender measure in the National Census. However, we could use a proxy indicator from the LCS that allowed us to observe some important inequalities in adolescent birth rates related to gender inequalities in the country (non-paid working hours in women). The limitation of this proxy indicator is that it was only representative at the provincial level. Consequently, it could have masked inequalities and restricted comparisons with other indicators available at other geographical scales. This limitation made difficult the analyses on the relationships between domestic modes of production and the high adolescent birth rates in Ecuador. As immense gender inequalities related to non-paid care work exist in the country, this can be an important topic that need further explorations.

The lack of evidence on the ethnical differences in the construction of gender sexuality and sexual conducts limited the interpretation of the differences observed in the geographical distribution of ABR among historically oppressed territories of the country. Finally, we think it is important to mention that we were not able to incorporate important decolonial feminist perspectives in both, the conceptual and methodological frameworks of this dissertation. The national surveys and surveillance instruments have a fragmented perspective of health and living conditions of the population; consequently, the instruments do not contain an intersectional view of the inequalities in the country. As Ecuador is a country with a colonialist inheritance and persistent

oppressions to women and ethnic groups, these theoretical frames are vital to understand teenage motherhood and other health inequalities in the country.

b. Strengths

To the best of our knowledge, this is the first attempt to analyse socioeconomic and geographical inequalities in teenage pregnancy in the country; identifying main mediators related to adverse conditions in the first heterosexual intercourse. Moreover, all the results presented are based on population samples, and hence allow generalizability.

As far as we know, there have been no previous attempts to analyse the contribution of indicators of women's agency at first experience of heterosexual intercourse in its relationship to socioeconomic inequalities in teenage motherhood. This field has been strong dominated by research with biologist approach of proximal determinants of fertility [5,6] rather than factors embedded in a social context influencing the social gradient of teenage motherhood.

Regarding the evolution of inequalities in teenage motherhood and the factors influencing its occurrence, this study is the first to comprehensively analyse the changes of this outcomes during a period (1999-2012) of important social and political events that could potentially had a major influence over teenage pregnancy and motherhood. This study allowed us to understand inequalities in teenage motherhood in a wider context of structural determinants such as dominant heteropatriarchal, colonialist and capitalist social and economic policies.

We were able to construct a deprivation index for the study of geographical inequalities in health in Ecuador. This measure is capable to identify disadvantaged areas that could be targeted by policies and interventions. From a conceptual perspective, the Ecuadorian index incorporates novel indicators to cover wider aspects of deprivation in the current Latin American context. Moreover, the index scores can be understood as a representation of multiple oppressions reflected in space. Thus, this measurement

allows us to analyse the diverse health effects of contextual multiple injustices at the cantonal level in Ecuador.

A measure capable of capturing a complex construct such as deprivation at the cantonal level, gave us the unique opportunity to analyse, for the first time, the geographical and social inequalities of high adolescent birth rates in Ecuador. By using the compound index and some of its individual indicators (ethnicity and unpaid work in women), we were able to study more in depth the influence that deprived, ethnical discriminated and gendered unequal contexts have over high adolescent birth rates in the cantons of Ecuador.

The new questions that our results generated allowed us to adapt our conceptual framework, giving us the possibility of interpreting our results in the light of systematic oblivion influenced by wider systems of oppressions that had systematically deprived large territories of the country. This evidence is of vital importance to tackle the widespread and unequal distribution of teenage motherhood in Ecuador.

9. CHAPTER IX: IMPLICATIONS AND RECOMMENDATIONS

a. Implications

Women in Ecuador have impaired ability to avoid becoming teenage mothers due to the power relationships surrounding the first experience of heterosexual intercourse. Although women share constrains generated by gender roles and power relationships, those from the most disadvantaged socioeconomic groups have less opportunities to avoid an early motherhood.

The analysis of the age of the first sexual partner allowed us to recognize some possible mechanisms by which gender norms and power relationships can expose women to an early pregnancy and motherhood:

- The first heterosexual intercourse with an older person reveals power relationships and sexual abuse. However, adult males have the economic means and social acceptance to access emergency contraception and abortion to avoid an unwanted pregnancy.
- The increased risk of teenage motherhood in women who had their first heterosexual intercourse with a younger person may reflect difficulties to freely access contraception methods. The negative social image of teenage involvement in sexual practices is a barrier in the access to means to prevent an early pregnancy. Furthermore, previous research in Ecuador has reported that power relationships can also be observed in same age couples, either in the first sexual intercourse experience or on subsequent occasions.

In this sense, this dissertation highlights the importance of revising the structural sexism influencing the normalization of practices of control over women's sexualities and bodies in Ecuador. Women in the country are exposed since infancy to sexual abuse and early pregnancies. These circumstances diminish girls' and adolescent's capacity to

make decisions about their sexual and reproductive health, both in the present and future circumstances.

The economic growth in Ecuador in the last decade may not have been inclusive and has therefore been less likely to reduce the large socioeconomic inequalities in teenage motherhood in the last 14 years. The sustained gender inequalities and uneven economic growth in the country makes it harsher to challenge the idealisation of motherhood and other gender structures constraining women's agency and power. Moreover, the sustained socioeconomic inequalities in teenage motherhood observed in Ecuador may be considered as a consequence of:

- the historical political tradition based on a conservative - religious perspective that has continuously rejected sexual and reproductive health policies which are common in other countries,
- a dominant heteropatriarchal social context with negative attitudes towards adolescents' sexuality and freedom of choice,
- the lack of access to comprehensive sexual education, contraception and to legal and safe abortion.

This is important in light of the new policies being implemented in Ecuador that aim at preventing girl and adolescent pregnancy through creating access for adolescents to sexual and reproductive health information and services and comprehensive sexuality education. It is also important considering that the National Assembly have recently rejected easing law in rape cases while women are criminalized for interrupting pregnancies unsafe conditions.

The historical oblivion of the Ecuadorian government is reflected in the fact that geographical patterns of material deprivation, ethnic discrimination, gender inequalities and higher adolescent birth rates overlap. The cantons with highest social inequalities were more likely to have higher adolescent birth rates showing a gradient across all age groups. These underlines the importance of area contexts in explaining teenage motherhood in Ecuador:

- Living in areas with high levels of material deprivation in Ecuador may be closely related to poor social and economic expectations other than motherhood.
- The effect of gendered norms based in romantic love may have taken the place of educational, labour and social expectations as consequence of living in a context of material deprivation. Consequently, early family formation and childbearing may be considered a chance to gain affection and social status.
- In colonized territories of the Amazonic region, material deprivation has been related to oil companies extractivist activities that had transformed the logics of reproductive work. The introduction of a capitalist mode of production through precarious male wage – labour have devalued reproductive work. The presence of these activities have also increased the risk for teenage motherhood by depriving women - as a collective - and exposing girls to sexual abuse and exploitation.
- Cantons with higher levels of ethnic discrimination showed the highest probabilities of adolescent maternity, reflecting important exclusion of minority ethnic groups from wealth distribution and access to social and health services.
- High levels of unpaid work in women at the area level can reflect how the domestic mode of production is systematically relegating women since infancy to the domestic sphere. This means that women in these contexts are deprived through the lack of access to means of subsistence and the discrimination faced in the wage – labour market. The labour market, by pushing women into the domestic space, contributes to the fact that in women's daily life, maternity becomes the obvious and normalized alternative regardless of age or social class.

The change of cultural, economic and social patterns grounded on heteropatriarchy, capitalism and racism to make of Ecuador a more equal and safer place for women is a matter of social justice. The transformation of these patterns can take time; however, the State has the opportunity here and now to reduce the unjust and avoidable pain endured by girls and adolescents in the country.

b. Recommendations

i. For future research

The vulnerabilisation of women since infancy may be considered as an important factor to understand inequalities in teenage motherhood.

Future research may contribute with studies to disentangle the mechanisms through which women are vulnerabilised in our context, considering gender norms that disempower girls and reduce their agency. It is vital to understand how gendered sexuality is influencing adolescents' -male and female- sexual scripts and beliefs underlying the sexual experiences and behaviours that in turn affect women's agency during their first and further sexual experiences. These studies should consider ethnic differences regarding the social and cultural meanings on gender, sexuality and motherhood that need to be comparatively studied and understood. By acknowledging these mechanisms, the opportunity to design effective interventions to accurately prevent teenage pregnancy and motherhood at the local level can be increased.

Another important issue to analyse is the interaction between social stratification and gendered stereotypes influencing the occurrence of teenage motherhood. It has been observed that in the view of many adolescents of the country, teenage motherhood and partnership initiation can be considered as an alternative to escape from emotional and economic deprivation in their families. Nevertheless, these studies lack insights on how the social gradient may manifest differently in girls and adolescents, among ethnic groups, and between male and females.

Another research area of importance is related to primary care services and their needs in order to improve the care of adolescents seeking for sexual and reproductive health services. It is imperative to tackle the biases introduced by personal beliefs and the rejection to provide contraception and sexual and reproductive health information to adolescent population by healthcare professionals. It could be interesting to explore participatory action research approaches to improve interventions focused in improving

healthcare for adolescents seeking for sexual and reproductive health services, incorporating the voices of both adolescents and healthcare professionals.
Geographical and social inequalities and its effects in sexual and reproductive health and teenage motherhood should be studied in depth.

The results from this dissertation point out to a relationship between wider systems of oppression (colonialism, capitalism, and heteropatriarchy), material deprivation, and teenage motherhood. Some areas with high proportions of ethnic minority populations have heterogenous adolescent birth rates, having both the highest and lowest adolescent birth rates. For this reason, the different interactions between wider system of oppression, cultures, and deprivation need to be studied more in depth when analysing teenage motherhood.

In future research, it can be important to: 1) analyse the influence of these social determinants and other sexual and reproductive health outcomes associated to teenage motherhood and childbearing at the area level such as access to sexual and reproductive health services, contraception and safe abortion; 2) determine how and to which extent neo – colonial forms of oppression such as large-scale mining and oil extractive settlements in areas located in the Amazonic and North Coastal Regions can be producing a particular system of structural violence and power increasing girls' risk of sexual abuse and teenage motherhood; and 3) analyse the characteristics of the manifestation of gender based violence at the contextual level and its effects on adolescent birth rates.

ii. Enhancing data

This doctoral thesis highlights the need to enhance the existing surveys in order to collect more accurate information on the context in which women experience their sexual and reproductive trajectories.

Considering that sexuality information is very sensitive, the methods and places to collect it must be revised. The information collected by the Health and Nutrition Survey is collected in the home of the adolescents. Therefore, it is possible that pressures to

avoid talking about sexuality in presence of their families may limit their response. The collection of more regular data by surveys centred in adolescent population are highly recommended in both the local and national level.

A gender based – violence survey was performed from the first time in 2012 separately from the National Health and Nutrition Survey. This survey collects information regarding the different manifestations of violence, social support, intergenerational violence, among others [1]. It is recommended that in further editions, the gender-based violence survey also collect other information regarding general health and sexual and reproductive health. Although the decision to separate gender-based violence indicators from the National Health and Nutrition Survey cares for women's confidentiality and safety and contribute to increase the response rates, it makes it difficult to analyse these indicators together with other important health outcomes.

Another important issue to tackle is the level of data disaggregation provided by the National Institute of Statistics and Censuses. Important information regarding social and material deprivation collected in the Living Conditions Survey is only representative at the provincial level and relevant social deprivation dimensions that could be related to teenage motherhood could not be properly analysed. We would recommend that the sample size of the LCS is increased in order for it to be representative at smaller geographical scales.

In order to enhance the methods to measure social inequalities in teenage motherhood, it is vital to count with gender sensitive data to analyse different patriarchy forms of oppression to women. The systematic deprivation to women performing reproductive work can no longer be hidden by the capitalist metrics of economic development.

iii. For laws and policy - design and implementation

This dissertation provides support for the use of gender-based strategies to improve women's socioeconomic conditions. As it has been mentioned before, girls and young women need a sense of better life opportunities other than motherhood in order to

decrease the powerful influence of a social context that idealises maternity, even at young ages [2].

It is vital to implement and give sustainability to comprehensive sexual and reproductive health policies and services devoted to girls and adolescents who currently have no access to the means necessary to address and empower themselves in order to gain control over their sexuality and reproduction. In this sense, two main strategies could be implemented:

1. Ensure that women are no longer deprived of their right to access safe and legal abortion. Legal reforms are vital to provide informed and safe abortion in order to contribute to the reduction of teenage motherhood and to achieve social justice in the country.

2. Further develop policies on compulsory sexual and affective education, which should be based on a gender perspective and provided in a human rights framework, making them more democratic and equal.

Given the widespread experience of adolescent motherhood in Ecuador, strategies and policies to overcome the possible effects of early motherhood should be implemented in the country.

iv. For healthcare services and health programs

This dissertation supports guaranteeing sustainable programmes and strategies to provide adolescent-friendly health services and guaranteeing access to compulsory affective and sexual education in both, private and public schools. Importantly, it is vital that future policies and strategies are assessed at each step of the planning and implementation phases. Heavy resources were invested in policies in the 14-year study period that were cancelled without evidence of their success or lack thereof.

We believe that an important limitation during the implementation of the Integrated Attention Model of care based on primary care [5] in the country, was not considering the necessary steps to effectively integrate adolescent friendly sexual and reproductive health services. As mentioned along this dissertation, some health personnel have reported being against providing sexual and reproductive health information and contraception to adolescents. We have also mentioned that since the political debate of abortion reforms in the Penal Code, doctors are reporting more frequently women's pregnancy interruptions to authorities. Therefore, the number of women criminalized for abortions has increased in the country [3].

Therefore, it is important to consider participatory interventions that include health professionals and adolescents in every step of the process to integrate adolescent-friendly sexual and reproductive health services. These strategies should consider gender and sexual beliefs regarding sexuality and adolescents' involvement in sexual relationships. Also, it is important to allocate resources to support capacity building to improve health staff role in the care of adolescents' sexual and reproductive health.

In conclusion, many legal, cultural, and policy changes need to happen in Ecuador in order to tackle adolescent maternity and its consequences. Intersectoral and intersectional perspectives should be enforced in order to accomplish this goal.

[5] Defined as a network of organisations that provides or arranges to provide a coordinated continuum of services to a defined population and is willing to be held clinically and fiscally accountable for the health status and outcomes of this population [4].

Bibliography chapter 9

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10. CHAPTER X: CONCLUSIONS

The main conclusions resulting from the studies in this dissertation are the following:

- Large socioeconomic inequalities in teenage motherhood exist in the country. These inequalities are profoundly influenced by disadvantageous conditions during women's first heterosexual intercourse:
    - being younger than 16 years old during the first heterosexual intercourse, especially with a larger risk for girls younger than 14 years old,
    - having the first heterosexual intercourse with a person younger than 17 years old,
    - having made no use of contraception

- In the last 14 years there have been no changes in socioeconomic inequalities in teenage motherhood or in adverse experiences during the first heterosexual intercourse in Ecuador.

- The constructed deprivation index is capable to identify disadvantaged areas in Ecuador. From a conceptual perspective the index incorporates novel indicators to cover wider aspects of deprivation in the current Latin American context. It is a valuable measure to study socioeconomic inequalities in teenage motherhood.

- In Ecuador, an average of 170 per 1000 adolescents are teenage mothers. Adolescent birth rates followed a clear geographical pattern, being higher in the cantons located in the Coastal and the Amazonic regions.

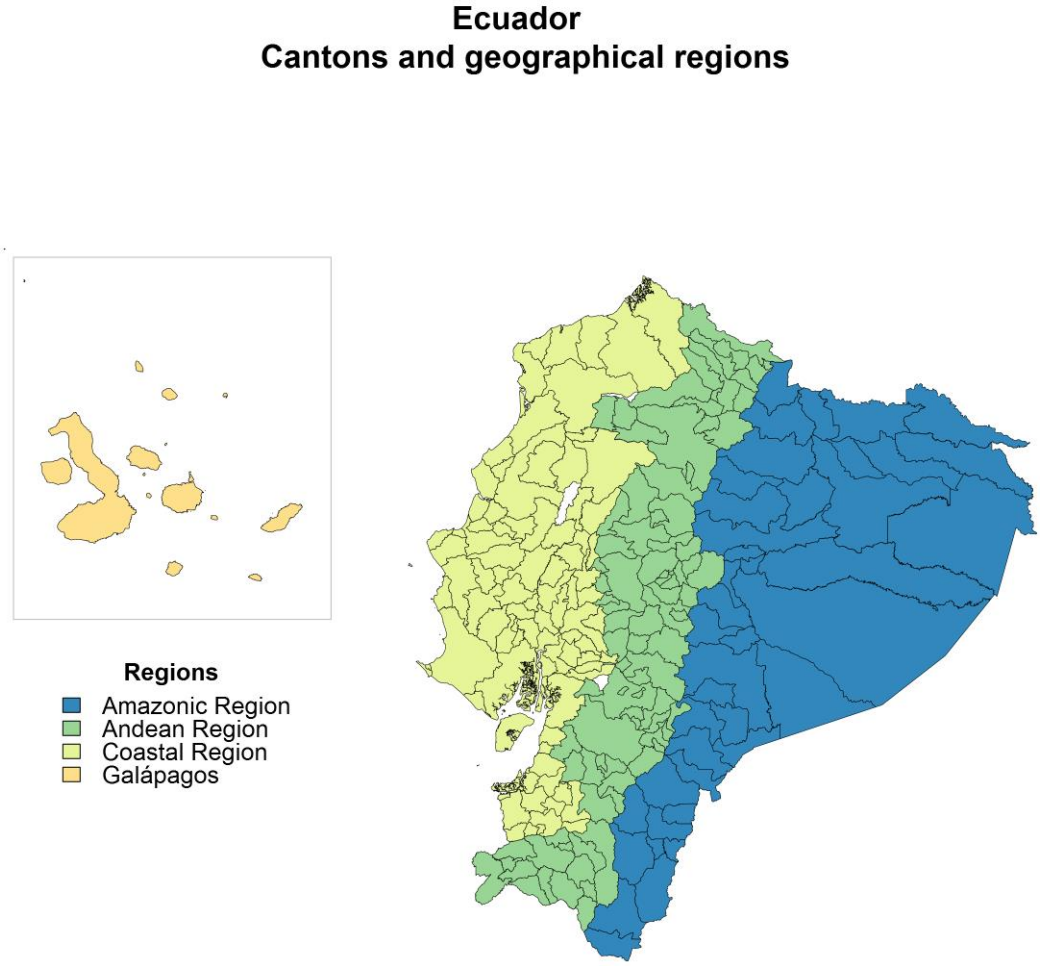
- Adolescent birth rates were higher in areas with higher proportions of historically oppressed populations (Afro-Ecuadorian, montubio and indigenous populations of the Amazonic region). Contrary to the expected, cantons located in the indigenous territories of the Andean high hills showed the lowest adolescent birth rates in all age groups.

- Cantons with highest levels of material deprivation, ethnical discrimination and gender inequalities were more likely to have the highest adolescent birth rates. The association of adolescent birth rates and the three indicators (deprivation, ethnicity and gender inequalities) was stronger among girls aged 12 to 14 years old.

APPENDIX I

Paper 3 and paper 4

Supplementary figure 1 Ecuador cantons and geographical regions



APPENDIX II

Paper 3: Developing a deprivation index to study geographical health inequalities in Ecuador

Supplementary figure 2 Ranking the 221 cantons by deprivation score