METHODOLOGY FOR ASSESSING THE ECONOMIC IMPACT OF ADOLESCENT PREGNANCY AND EARLY MOTHERHOOD IN LATIN AMERICAN AND CARIBBEAN COUNTRIES (MILENA 1.0)

165 millones de razones
Un llamado a la acción para la inversión en adolescentes y jóvenes en América Latina y el Caribe

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Authors and acknowledgments

This study has been made in the frame of the regional initiative of United Nation Population Fund, Latin American and the Caribbean Regional Office-LACO) "Investing in adolescent and Youth" under the coordination of Neus Bernabeu and Federico Tobar.
The design of the Methodology for assessing the Economic Impact of Adolescent Pregnancy and Early Motherhood in Latin American and Caribbean Countries (Milena 1.0) has been developed by Iván Rodriguez Bernate with the collaboration of Federico Tobar and supervised by Neus Bernabeu and Federico Tobar. Authors recognize the relevant development of the Study made in El Salvador led by Hugo Gonzalez which has settled the basis for this methodology.

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The design of this methodology was carried out by Iván Rodríguez Bernate and Federico Tobar.

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ÍNDICE

ACRONYMS AND ABBREVIATIONS

LA&C: Latin America and the Caribbean
YPLL: Years of Potential Life Lost
YPPLL: Years of Potential Productive Life Lost
ICD: International Classification of Diseases
ISCED: International Standard Classification of Education
OC: Opportunity Cost
AP: Adolescent Pregnancy
CHS: Continuous Household Survey
ENI: Unintended Pregnancies
GII: Gender Inequality Index
HDI: Human Development Index
MPI: Multidimensional Poverty Index
VIP: Voluntary Interruption of Pregnancy
WMA: Women who have been Mothers since Adolescence
WCA: Women who had their first Child in Adolescence
EM: Early Motherhood
MDG: Millenium Development Goals
ILO: International Labour Organization
EAP: Economically Active Population
EIP: Economically Inactive Population
PWA: Population of Working Age
UNDP: United Nations Development Programme
SRHR: Sexual and Reproductive Health and Rights
SRH: Sexual and Reproductive Health
UCDW: Unpaid Care and Domestic Work
SAFR: Specific Adolescent Fertility Rate
MMRA: Maternal Mortality Rate in Adolescents
UW: Unpaid Work
UNFPA: United Nations Population Fund
UNESCO: United Nations Educational, Scientific and Cultural Organization

Presentation

"The real measure of progress is people themselves: especially the well-being of women and girls, their enjoyment of their rights and full equality, and the life choices that they are free to make."

Dr. Natalia Kanem,
State of the World Population, 2018

Adolescent pregnancy and early motherhood have consequences on the health, human development and the possibilities for economic and social progress of the adolescent; consequences that can be expanded, in turn, to the child, to the father and even to the maternal or paternal family. These impacts at the level of mothers, children and families can reach such a magnitude that they become significant at the level of society and the State.

Of the health outcomes, the most critical is maternal mortality due to complications of pregnancy and childbirth "According to the World Health Organization, pregnancy complications –such as hemorrhage, sepsis and obstructed labour– and complications from unsafe abortions are the top causes of death among girls aged 15–19." (UNFPA, 2018, p. 42) "Unsafe abortions cause 8–11% of global maternal deaths and occur predominantly in low-income and middle-income countries where the most restrictive access policies are concentrated and socioeconomic factors further affect access." (The Lancet, 2018, p. 1)

As regards socioeconomic dimensions, early motherhood often causes early school drop-out, limits the future career possibilities of adolescents and raises the income gap and labor participation of women who were mothers in adolescence. At an aggregate level, for countries, adolescent motherhood represents a loss of the opportunity to benefit from the demographic bonus or dividend, that is, the boost to economic productivity that results from a larger population of working age, as compared to the dependent population. When a country goes through a demographic dividend phase, the dependency ratio (number of dependents –or passive persons– for every active worker) is low, which improves the potential production of the country. However, when an increasing proportion of women become mothers, as girls with their childhood not yet behind them, the dependency ratio increases more rapidly. Additionally, by failing to take advantage of the demographic bonus and its effect on national production, the potential tax revenues and contributions to the social security systems in health and pensions decrease.

In the present work we document the design and construction of *MILENA (Version 1.0) - Methodology to Assess the Impact of Adolescent Pregnancy in Latin America and the Caribbean*, proposal to measure in a homogeneous way the socioeconomic effects of adolescent pregnancy and

early motherhood in countries of the region, so that their results are comparable. The dimensions of education, income, labor participation and, at an aggregate level, tax revenues forgone are the effects contemplated by MILENA (Version 1.0).

In Latin America and the Caribbean -henceforth LA&C- the evolution of adolescent fertility during the last decade has been characterized by a slow decline, not only in comparison to the decrease recorded by global fertility in the same region, but also, in comparison to the decline in adolescent fertility in the rest of the world. The State of World Population 2018 Report states that "fertility rates among adolescents aged 15-19 and young people aged 20-24 are higher than rates for these age groups in other parts of the world with similar total fertility rates. Additionally, adolescent fertility compared with total fertility is higher in Latin American countries than in other countries" (UNFPA, 2018, p. 81). Thus, the main features of the problem of adolescent pregnancy and early motherhood are reaffirmed and made visible, which has been described in preliminary works (Rodríguez-Vignoli & Cavenaghi, 2014; Starrs et al., 2018; Tobar, 2015). In 2016, 74% of adolescent pregnancies in the region were unplanned, a warning about the lack of social investment in girls and adolescents providing them with criteria to make decisions concerning their reproduction in an educated, informed, free and timely manner (Starrs *et al.*, 2018). Additionally, that of the 777,000 pregnancies in adolescents under 15 years old in developing regions in 2016, 14% have occurred in Latin America and the Caribbean, is a fact that should alert as to the public policies in childhood and early adolescence. It is for this reason that this work seeks to contribute to dimensioning the adverse consequences of adolescent pregnancy and early motherhood.

Just as they are analyzed in terms of their consequences, these phenomena must be analyzed for their causes or determinants, among which are socioeconomic factors as well as conditioning factors on health and on the validity of sexual and reproductive rights, that is, aspects such as access to contraception from adolescence, access to sex education and the right to voluntary interruption of pregnancy. In turn, socioeconomic determinants include proximal, distal and structural factors, including child marriage and early unions, educational attainment, poverty and gender inequalities –such as gaps in income and labor force participation– that affect the perception of opportunities in the adolescents' life project. The complexity of these socioeconomic factors is that their concomitance reinforces and reproduces them, both in the life trajectory of the woman, as well as that of the child.

Here we will concentrate on measuring and assessing the consequences to estimate the economic impact of adolescent pregnancy (AP) and early motherhood (EM) in countries of LA&C, allowing us to define the magnitude of the problem in its multiple dimensions and aspects. The ultimate purpose of this methodology is that, through its implementation, the countries of the region generate relevant evidence on the adverse consequences of AP and EM and, in turn, improve understanding of the economic, social and health benefits of public investment in the prevention of AP and in mitigating the undesired effects of EM, which in other words, means investing socially in girls and adolescents to help them move on to the path that allows them to achieve their greatest human potential. "Reducing the stigma, minimizing the social and economic consequences of unintended pregnancies, improving access to highly effective modern contraception, and ensuring legal and safe abortions would generate

tangible improvements to health. Those with real motivation to protect and support women and children should look to research, not misconceptions, to inform decision making." (The Lancet, 2018, p.1).

The document is organized in three sections. The first presents the theoretical framework and the methodological focus of reference, which highlights key concepts such as human capital, opportunity costs, the economy of caregiving, unpaid work, maternal mortality and years of potential life lost. In the second section, the methodology for measuring the impact AP and EM is divided into two parts, socioeconomic costs and health costs. Finally, in the third section, the final recommendations for the implementation of the methodology are made, concluding with the usefulness of the concepts and indicators that it brings to light, such as inputs for advocacy, outreach and decision making on AP and EM.

1 Theoretical Framework and Methodological Approach

"Many of us are doing it. But few of us understand why we are doing it".

Goethe

Among the multiple studies that address the problem of AP and EM in Latin America and the Caribbean in recent years, those that consider economic variables including cost analysis, investments and even the perspective of opportunity cost have begun to gain prominence. Starting by reviewing these is essential in order to maximize the design of new research, sparing efforts to reach findings that are already available, as well as avoiding backsliding into unsuccessful paths. It is also necessary to begin identifying and classifying explanatory models, understanding that it is the theoretical frameworks that illuminate the exploration. But, above all, they lay out hypotheses that facilitate the interpretation, appropriation and use of the data resulting from investigations.

It is possible to classify international literature investigating the economic impact of adolescent pregnancy and motherhood based on the units of analysis that are the central focus of the studies, as well as on the type of consequences that are sought to be measured. Regarding the units of analysis, research has begun focusing on the adolescent mother and, eventually, on her family group; to then incorporate as a unit of analysis the State and society as a whole.

With respect to the consequences of AP and EM analyzed in the literature that includes an economic perspective, we propose here to distinguish between two large segments that complement each other: the socioeconomic dimensions and the public health dimension. The socioeconomic dimensions consider the impacts of AP and EM on the education of women who became mothers during adolescence (hereinafter, MA), their income, their participation in the labor market and, additionally, the fiscal consequences of these impacts, which refers specifically to tax revenue forgone due to the reduction of income and unemployment among MA. On the other hand, the health dimension includes pregnancy care and two fatal public health outcomes: maternal mortality in adolescents (related to unsafe abortions and complications associated with pregnancy) and years of potential life lost. Ssegmentation into these two groups is due to the fact that their theoretical foundations, methodological approaches and lines of research are clearly distinct. Hereunder, both dimensions are analyzed in greater depth.

1.1 On the socioeconomic dimensions

The effects of AP and EM on education have been widely addressed from the perspective of sociology and the economy of human capital in their theoretical and empirical aspects. The most influential author developing a hypothesis about motherhood and its effect, both in the formation of human capital, and in the labor market, is Gary Becker who, in his *Treaty on the Family* (1987) proposes motherhood as an opportunity cost. From this perspective, motherhood in an adolescent limits the ability to invest in human capital formation and to join the labor market, due to the care and attention that the child requires during the dependent stage.

Becker's contribution has been so significant that most research on the economic effects of AP and EM, establishes its theoretical framework based on the approaches of this author. Although, Becker's focus is not the phenomenon of AP and EM, rather his unit of analysis is the family, he provides useful hypotheses in Chapter 5 of his treatise where he explains the demands of children and their opportunity costs.

The analysis framework proposed by Becker is focused on identifying maximizing behaviors, stability of preferences and market balance, and builds its explanation on three axioms: 1) when people have some freedom of action, their actions should be interpreted as the best option that could be developed in those certain circumstances; 2) the different behaviors of actors are explained by the different restrictions, not by their preferences; 3) individual choices are reconciled in explicit or implicit markets.

Among the lines of enquiry that are influenced by Becker's approach, it is possible to distinguish two. The first of these focuses on analyzing the restrictions that AP and EM generate on the labor market. Whereas, the second line focuses on explaining the phenomenon as maximizing behavior. In the first group it is worth mentioning (Anderson, Binder, & Krause, 2003) and (Waldfogel, 1997), who have empirically explored Gary Becker's propositions giving rise to the concept of *motherhood penalty* and, more recently, (Chaaban & Cunningham, 2011) who define the *income gap for early motherhood* and calculate the opportunity costs of unemployment and the decrease in income due to EM. The concepts of motherhood penalty and income gap are key because not only do they combine the effects of EM on school dropout and its effect, in turn, on income; but because they also capture its effect on the less time allocated to the labor market, either because (i) the MA is willing to look for a paid job, but faces time restrictions due to the work related to motherhood; or (ii) the MA loses interest and willingness to enter the labor market; this situation is reinforced by national environments with low labor incomes, low level of employment and gender income gaps. These two factors, related to the time allocated to the labor market, result in less experience of MA compared to women who postponed the decision to have a child until adulthood.

In the second line of research, which explains AP and EM as maximizing behavior, the term "unintentional" or "unplanned" often attributed to EP, has been questioned. The argument is that

in contexts of high unemployment and environments in which a teenager has no other prospect for obtaining adult credentials and forming stable emotional relationships, becoming a mother is a maximizing alternative (Coleman & Cater, 2006). In this same explanatory line Wilkinson and Pickett (2010) incorporate as an intervening variable the levels of social equality postulating that adolescent fertility rates are conditioned by the levels of social cohesion, civic commitment, and mutual trust.

On the other hand, it is relevant to mention that there is also a critical view of both the theory of human capital in general, and Gary Becker's approach in particular, and the application of their consequences to the foundation and design of social policies. By distinguishing two types of work assigned through the family: the market-oriented one and the one of caring for the family, it has been argued that Becker naturalizes the sexual division of labor along with unequal pay for both genders (Anzorena, 2009).

Studies focused on measuring socioeconomic consequences at the aggregate level and at the level of the public sector find in the compilation prepared by Rebeca Maynard (1997) a seminal contribution. In particular, chapter 10 estimates the costs to American society in terms of loss of national productivity, avoidable spending on social service resources, and the public spending associated with EM. A decade later, the study by Saul Hoffman (Hoffman, 2006) is based in large part on the methods used in (Maynard, 1997) to estimate the costs of EM for the US public sector in 2004 at the federal, state and local levels; which include costs for (i) lost tax revenue, (ii) public aid for mothers, (iii) health care for children, (iv) child welfare programs and (v) costs for state prison systems.

In Latin America and the Caribbean, the fact that the last three decades have been marked by a steady rise in the adolescent fertility rate despite a decline in the global fertility rate, has aroused interest from the perspective of demography, sociology and the economy. Based on analysis of the determinants, the works of (Pantelides, 2004) and (Rodríguez-Vignoli & Cavenaghi, 2014) are worth highlighting for their regional scope. In turn, (Tobar, 2015) identifies a second anomaly of adolescent pregnancy in the region, its evolutionary curve departs from what is expected based on economic growth. In other words, although there seems to be evidence of a clear relationship between economic and social development and reduction of AP and EM, the cases of Latin America and the Caribbean represent atypical cases. On the other hand, at the national levels the works of (Petito & Fostik, 2015), (Binstock & Näslund-Hadley, 2013) and (Profamilia & Fundación PLAN, 2018) stand out. For a review of the literature on adolescent pregnancy in Latin America and the Caribbean see (Tobar, 2014).

As of 2013, the relevance of the issue led to the introduction of studies on the economic impact of AP and EM in the countries of Latin America and the Caribbean. In particular, four of them promoted or supported by the United Nations Population Fund in Ecuador, were surveyed and analyzed in depth (Ministry of Public Health of Ecuador, Senplades, UNFPA, & SENDAS, 2017), El Salvador (UNFPA, 2017), Nicaragua (Altamirano, Pacheco, Huelva, Sáenz, & López, 2016) and the Dominican Republic (UNFPA & Technological Institute of Santo Domingo, 2013).

These are relevant studies not only for their contribution to defining the dimensions of the phenomenon in the region, but also because they arise from cases involving critical situations. As it is

in 2016 these countries registered a specific rate of adolescent fertility (SAFR)[1] higher than the regional average: Ecuador (74.60), El Salvador (70.27), Nicaragua (86.87) and the Dominican Republic (96.10); according to data from the United Nations Population Division. These four studies have the common aim of estimating impacts at the aggregate level, but each formulates its own objectives and estimates the corresponding dimensions to achieve them. The studies from El Salvador and Nicaragua present similar designs to the extent that both seek to estimate the socioeconomic impact of AP and EM in their country. To do this, they quantify impacts on educational attainment, income, employment, and health expenditure. They are different in that the El Salvador study also estimates tax revenue forgone. The study of Ecuador estimates the costs of not fully satisfying the needs of the population in terms of sexual and reproductive health (SRH), for which it evaluates the effects on education and expenditure on health. For its part, the study from the Dominican Republic estimates the cost of AP care on the health system.

These works show that the region faces broader and more comprehensive questions about the impacts of AP and EM; moving from questions strictly related to health spending to questions concerning the effects on economic, social and even fiscal dimensions. Between 2013 -the year in which the study of the Dominican Republic was conducted- and 2017 –the year in which the studies were carried out for Ecuador, El Salvador and Nicaragua– we can observe a jump from an economic evaluation of health to socioeconomic evaluations, including the impact on education, unemployment, income, and the fiscal benefits of a demographic dividend phase.

An important finding resulting from the systematic review carried out in the framework of this project is that the contribution of economic studies on AP and EM is not only restricted to their ability to quantify costs and investments, rather it may be broader by providing an analytical and explanatory framework for the problem under study. In other words, the more explicit the theoretical framework and the hypotheses that support it, the easier it will be to present its results in an articulated, comprehensive manner and, at the same time, facilitate interpretation for decision-makers and advocacy work. In this regard, the studies carried out in El Salvador (UNFPA, 2017) and Nicaragua (Altamirano *et al.*, 2016) deserve special mention[2]. In both cases, the investigation was not restricted to generating data but was enriched with theoretical frameworks and methodological approaches that are well coordinated with the theoretical propositions of the seminal work of Gary Becker and the subsequent research lines (Chaaban & Cunningham, 2011). Thus, the methodology proposed in this document is enriched by several of the contributions of these two studies.

On a parallel path, but which meets and intercepts several propositions based on the research lines described above, is feminist economics with its conceptual contributions concerning the care economy and unpaid work. Although, from this branch we do not find a specific approach to motherhood in its early or adolescent phase, it does broaden the understanding of the role of motherhood, from a

1 The Specific Adolescent Fertility Rate (SAFR) is defined as the number of births per 1000 women aged 15-19.

2 This study is supported on the methodology proposed by (Chaaban & Cunningham, 2011)

coherent and comprehensive perspective.[3] According to (Rodríguez Enríquez, 2005) and (Rodriguez Enríquez, 2015), care refers to those activities or practices necessary for the daily survival of people and, as such, to meeting the needs of dependent people, due to their age or their condition. The care economy refers to the space where the labor force is reproduced and maintained, including all those activities that involve the upbringing of children, cooking and cleaning tasks, the general maintenance of the home and caring for the sick or disabled. (Rodríguez Enríquez, 2005, p.2)

The most widespread version of the care economy is unpaid work (UW), that is, the unpaid care work of household chores performed in homes. Without this daily work which provides capital with workers in a condition to be employed every day, the system simply could not reproduce itself. The point is that, in conventional economic analysis, this work is invisible whereas labor supply is understood as the result of a rational choice by people (economic individuals) between work and leisure (not work), determined by personal preferences and labor market conditions (basically, the level of employment income). In this way, it neither takes into account the work that the labor force has incorporated (being cared for, sanitized, fed, rested), nor the work from which it is freed by exempting it from care responsibilities of those with whom it cohabits. (Rodriguez Enríquez, 2015, p. 36)

The widespread dissemination of the concept of UW has led to its incorporation into the measurements and surveys of the statistical departments and offices in Latin America and the Caribbean (LA&C) over the last decade. Thus, from a practical perspective focused on its measurement, it is defined as the set of unpaid activities, carried out with the objective of providing goods and services for family members and the community. It includes activities such as: support services, production of goods and services for own final use, supplying water and fuel, self-construction and home repair, and care for child, elderly or sick services, at home or in other homes without receiving any payment (DANE, 2011).

Following (Salvador, 2009), the measurement and assessment of UW can be approached from two methodological approaches, the replacement cost or the opportunity cost. The cost of replacement refers to the cost that the household would have to incur to acquire the care services on the market, that is, the price that the household would have to pay in case this service was not provided in the household by UW. In the opportunity cost approach, work is valued according to the potential income that the person doing the UW would obtain on the labor market.

The methodology for the measurement of economic and social effects that we propose here, is powered especially by the studies of El Salvador (UNFPA, 2017), Nicaragua (Altamirano *et al.*, 2016) and its benchmark research (Chaaban & Cunningham, 2011) and, by being approached from an opportunity costs perspective it maintains a link with the research line of UW.

There are other types of socioeconomic consequences of AP and EM at the level of the family and child that will not be addressed in this methodology, but that deserve to be mentioned: consequences on the child –like the intergenerational transmission of social disadvantages–, on the couple, and

3 In the literature search conducted for this research, no studies focusing on early motherhood carried out from the perspective of the care economy, were found.

on the parental household of the adolescent mother or of her partner. In terms of intergenerational transmissions, from an economic perspective the relevance of the transfer of assets has been analyzed and has identified that when this is insufficient successive generations remain subjected to restrictive conditions called "poverty traps". Both the income levels and the levels of education attained by the parents are predictive of the achievements that their children will attain. In this regard, (Gale & Scholz, 1994) observe that in the United States family transfers and inheritance account for 51% of wealth, while an additional 12% results from the payment of university expenses by parents. Therefore, about two-thirds of the wealth of individuals in that country comes from family transfers.

Giving continuity to the research line of sociological studies by (Bourdieu & Passeron, 2001), which early on showed that parents' cultural capital determines children's school success, (Hochschild & Scovronick, 2004) showed that wealth inequality of households is one of the main causes of educational inequality and, in turn, this inequality in the schooling of children reinforces the inequality of wealth in the households of the next generation. A recent report by (UNDP, 2010) highlights that the transmission of relative achievements from one generation to another also impacts the ability of the latter to access quality public services and fully exercise their rights. Thus, in an AP preceded by limitations of human development, these conditions are usually transmitted to the child.

In terms of other types of socioeconomic consequences that have been explored less or even forgotten in the literature, such as the quality of employment –of the mother and her partner–, conjugal instability and intrafamily violence, the contribution of (Urdinola & Ospino, 2015) is to be highlighted. The methodology proposed here does not intend to analyze these factors, given that the units of analysis are mothers and the State: Mothers and the dimensions of their educational attainment, income, unemployment and economic inactivity; and the State, in terms of the impact of these dimensions on a loss of tax revenue.

1.2 On the public health dimensions

Unlike the study of socioeconomic effects, the study of health impacts has required less theorizing, since health impacts are proximal or, if you wish, they are direct and the verifiability of their association with the preexisting phenomenon –in this case AP– is factual. Therefore, this section, rather than addressing a theoretical framework, develops the methodological approach from the techniques of economic evaluation of health care.

The book that constitutes the most widespread reference for economic evaluation of health care (Drummond M, O'Brien B, Stoddart G, 2001) classifies hospital costs into different levels of precision or disaggregation, of which two are worth mentioning: micro-costing and costing by categories or case-mixing. In the first, each component of resources is estimated, i.e., diagnostic tests, medication, days in hospital; etc. In costing by category the types of health care may be added, without detailing

the medication or services that comprise it (idem, p.77). Rather than threatening the comparability of results between studies, the level of disaggregation requires that information sources be available, such as disaggregated data or the micro-data in health records.

There are different possible approaches to AP from the economic evaluation of health care. A common one is the estimation of the impact of sexual and reproductive health programs, for example, with a cost-benefit analysis, from which to identify wether their benefits exceed their costs. The methodology proposed here does not adopt this approach for two reasons: (i) its objective is to estimate the effects of AP and EM on adolescent health, and not the effects of a SRH program on avoided AP; (ii) given its regional scope and the purpose of generating comparable results, a cost-benefit analysis would not be appropriate, given that health services and technologies guaranteed among LA&C countries are very heterogeneous -e. g., the net benefits of a SRH program in Uruguay result from a context that is very different from those of a program in Mexico, Honduras or Guatemala.

In the dimension of health, the proposed methodology aims to measure the effects on two components: expenditure and frequency of health care for AP and, on the other hand, public health outcomes with high social relevance. The Reproductive Health (RH) Costing Model, developed by (Weissman, Saltner, & Friedman, 2008) for UNFPA, will be used for the standardized costing of health care of a pregnancy, which has been validated and applied in several countries of the world among which we highlight the case of El Salvador study (UNFPA, 2017). As an outcome of public health with social relevance, maternal mortality in adolescents is taken, related to goal 3.1 of the Sustainable Development Goals and the subsequent years of potential life lost (YPLL), years of potential productive life lost (YPPLL) and associated to these the social or productive loss due to maternal mortality in adolescents (SLMMA).

1.3 Concepts and premises of the methodology

1.3.1 Adolescent pregnancy and early motherhood

Pregnancy, in its most basic definition, refers to the period of approximately nine months, during which the fetus develops in the womb of the woman. Therefore, being limited to a relatively short period, pregnancy does not have a permanent and sustained impact on distal dimensions –such as socioeconomic ones–; its direct impact is recorded on proximal dimensions, such as adolescent health related to pregnancy, childbirth and abortion. On the other hand, motherhood refers to the care and attention that the mother provides the child during the period of dependence, which may include breastfeeding the child (ages 6-24 months), the infant and toddler years (ages 2-9), up to early adolescence (ages 10-14), or even until late adolescence (ages 15-19). Being a prolonged period -and in

some cases, not delimited- in which the woman can remain, maternity can impact her socioeconomic dimensions and affect her throughout her life trajectory. This allows us to establish the following premises concerning the socioeconomic consequences of AP and EM:

- More than the AP itself, it is mainly the EM that implicitly transfers to a woman the burden of the alternatives of human capital formation that she would not perform during the period of motherhood, i.e., a period that may go from 6 months to 19 years.
- AP can bring about the interruption (temporary suspension) of schooling, but it is EM that usually generates school abandonment (permanent and final suspension) and, in turn, this can affect income and labor participation.

This basic distinction helps to better understand the phenomena of AP and EM and understand how strong or weak the relationship is with its respective proximal and distal effects. Additionally, it is the preliminary step in identifying public policy measures to prevent AP and mitigate the undesired socioeconomic effects of EM, since measures are complementary and must go hand in hand with the design of a comprehensive public policy: (i) To prevent AP, there are measures such as providing quality sex education, coverage of effective family planning methods, guaranteeing the right to voluntary interruption of pregnancy in a safe manner and, from a broader perspective, reducing gender inequalities. (ii) To mitigate the undesirable socioeconomic effects of EM, there are measures such as the promotion and accompaniment of the return to school of adolescent mothers, the provision of *daycare centers* for children of adolescent mothers and the reduction of stigma towards mothers in schools; among other.

1.3.2 Opportunity costs

As mentioned above, the valuation method that is used here to estimate the socioeconomic effects of AP and EM, is the opportunity cost (OC), a concept that refers to the *value of the unrealized alternative or the value of the options of which a person deprives himself when he makes a choice or a decision*. While this concept has its origin in orthodox economics, which assumes that the individual has full knowledge of the costs of the alternatives in their rational exercise of the choice made, this can be rethought in light of *the capability-based approach* developed by Amartya Sen and Martha Nussbaum. See (Nussbaum, 2011).

From this perspective, a person immersed in a context of a democratic system that does not support the development of their capacities may have restricted freedom of choice and limited opportunities. Thus, filtered through the capability-based approach, OC can be used without the assumption of rational choice assumed by orthodox economy. It is in this sense that the opportunity cost is used here, which is understood as the *value of the options that a person is deprived of when making a choice*, made in a more or less rational and more or less emotional process, where their capacities are decisive, such as their freedom of choice and their spectrum of opportunities.

This *capability-based approach* has influenced the construction of indexes such as the Human Development Index (HDI), the Gender Inequality Index (GII) and the Multidimensional Poverty Index (MPI), prepared by the United Nations Development Program (UNDP). Therefore, the levels of these indexes for each country can shed light on whether the environment supports reproductive and maternity decisions made with freedom of choice and a broad spectrum of opportunities.

As is developed later on, this methodology will quantify the OC of education (as a basic element of human capital formation), income and labor participation, due to AP and EM. This method of valuation from the perspective of OC guarantees a reading of the results obtained as the social losses in the respective dimensions, associated with AP and EM.

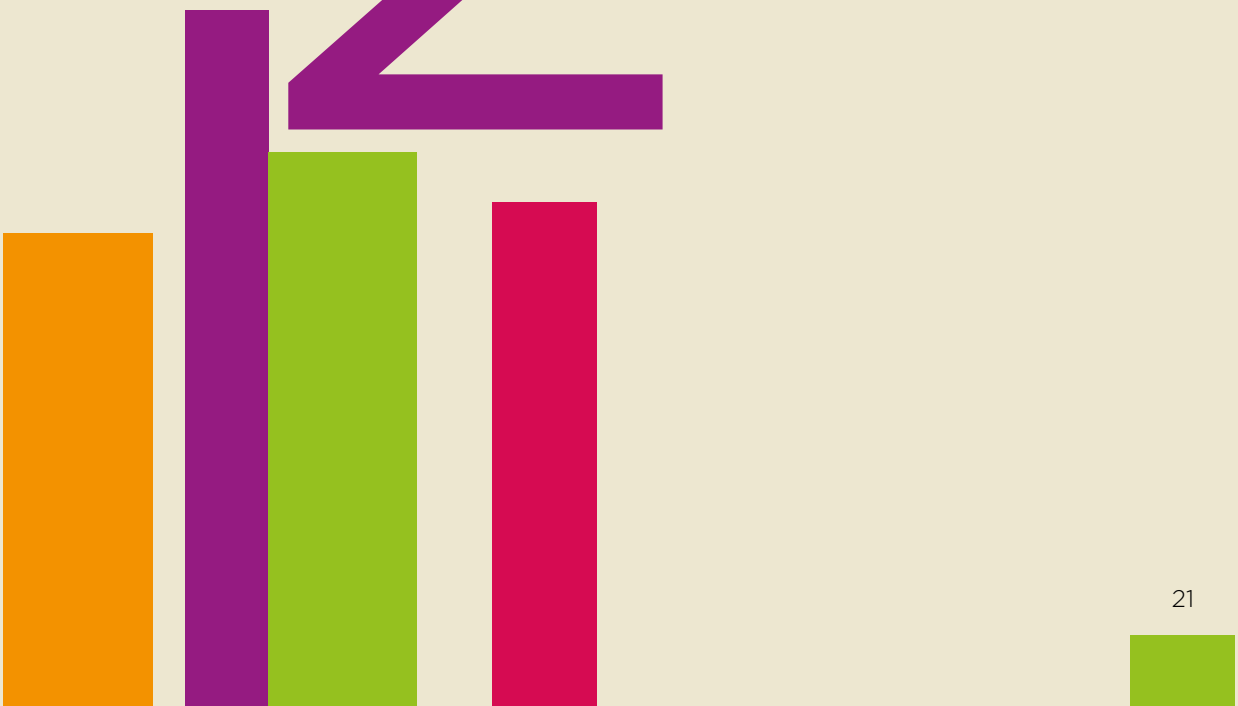
1.3.3 Study Population

Although there is no single universally accepted definition of the age range associated with the adolescent population, the United Nations definition referring to people aged between 10 and 19 years is assumed here. Since the information for the application of the methodology would be collected from surveys –e. g., household, demographic and health surveys or specific sexual and reproductive health surveys–, the target population corresponds specifically to women of an adult age range (20 years and older) who had their first child in adolescence (aged 10-19). In turn, as a comparison population are women in the same adult age range as the target population (20 years and older), but who had their first child in the first decade of adulthood (aged 20-29). In the construction and implementation of the methodology, the women identified above as WMA will be considered as women who had their first child in adolescence (hereinafter, WCA).

To control the influence of confounding factors, mothers whose children are under 18 years old should be included in the analysis, since children over 18 constitute an additional human resource for the household and, as such, could enter the labor market and contribute to the WMA household, reducing its disadvantages or, on the other hand, could maintain or increase the disadvantages of WMA, in the cases where that child does not contribute to the household.

Between countries there are slight variations among the specific survey designs, so certain decisions will come up on the specific demarcation of the population –in terms of age, for example–, which will be resolved with the researcher of each country.

2 Methodology to estimate the socioeconomic impact of adolescent pregnancy and early motherhood



To construct the methodology, criteria followed were: (i) conceptual relevance for understanding and visibility of AP and EM, (ii) feasibility and non-ambiguity in its future implementation and (iii) comparability of results across countries.

- Its relevance is achieved by contemplating the largest possible number of dimensions of the problem and by providing multiple concepts, indicators and statistics, within each of these dimensions, making the different facets of the problem of AP and EM visible.
- Its viability and non-ambiguity were sought by generating variables, indicators and statistics that can be obtained in different countries, either: (i) from surveys –household, demographic and health surveys or specific ones on sexual and reproductive health and rights–, (ii) from international databases, from both organizations and agencies of the United Nations –e.g., United Nations Population Fund (UNFPA); International Labor Organization (ILO), World Health Organization (WHO), United Nations Educational, Scientific and Cultural Organization (UNESCO), Economic Commission for Latin America and the Caribbean (ECLAC)–, as well as the World Bank; and (iii) from secondary sources, such as studies conducted for the country in particular.
- For the comparability of results across countries, it is proposed to express the costs of AP and EM –and the most relevant variables that compose them– as basic points of the Gross Domestic Product (GDP) of the country under study. Given that GDP is the macroeconomic indicator that expresses the monetary value of the production of goods and services throughout the country, any magnitude that is compared with it usually seems small, therefore, it is recommended to express as a proportion of GDP only those monetary impacts that exceed 1 basic point (BP); where *1BP of GDP = 0.01% of GDP*. This allows for (i) the generation of calculations in local currency, (ii) expressing the result in terms of the size of the country's economy and (iii) maintaining the ex post comparability of results, without the need for additional adjustments.

The methodology aims to quantify five dimensions, where one of them contains two sections:

Dimension 1. Consequences of AP and EM on participation in the labor market. Based on the hypothesis that AP and EM affect the labor participation of women who had their first child in adolescence (WCA), this dimension measures and values their participation differential with respect to those who postponed their decision to have a child to adulthood; which it does from two specific dimensions: activity (**dimension 1.1**) and employment (**dimension 1.2**).

Dimension 2. Consequences of AP and EM on labor income. Supported on the income gaps of WCA versus women who postponed their decision to reproduce for an adult age, this dimension measures and estimates this gap.

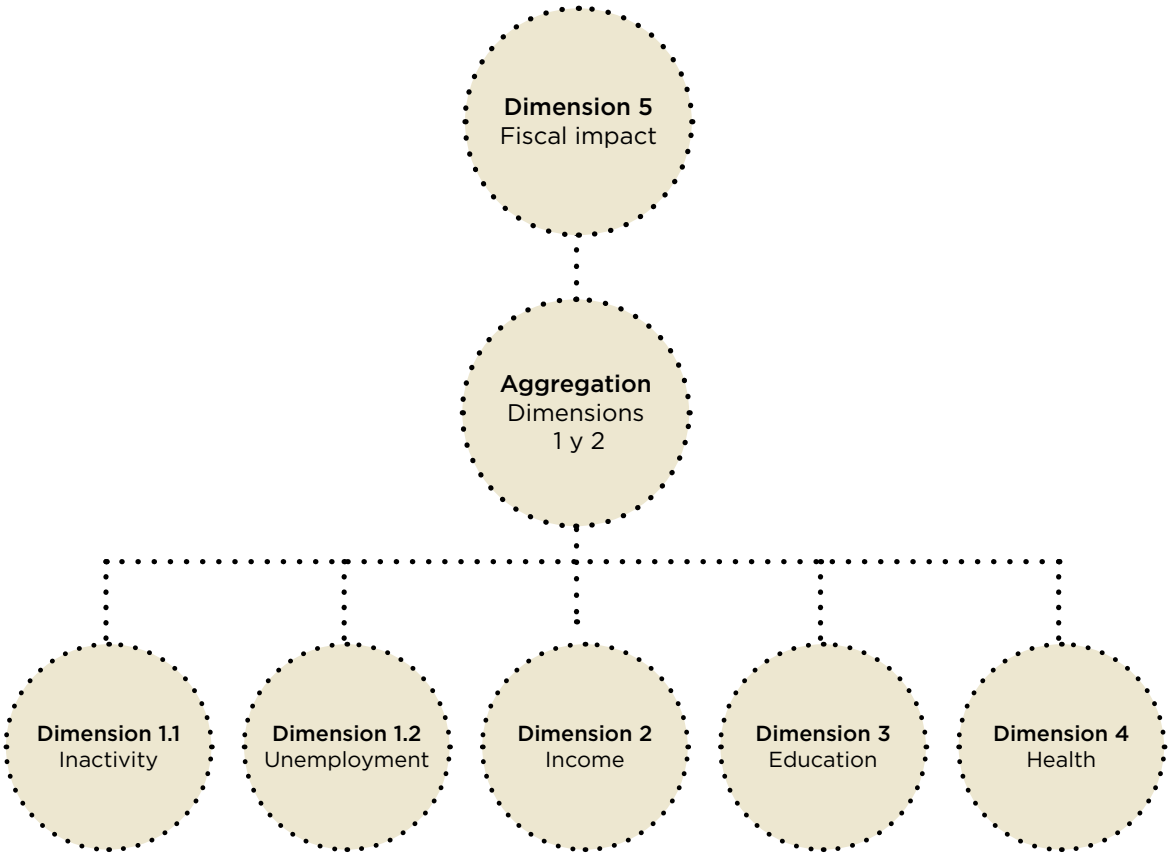
Dimension 3. Consequences of AP and EM on the level of educational attainment. Part of the hypothesis that WCA have limited availability and ability to invest in their human capital formation, specifically their formal education process, because of the time and effort devoted to care and UW implied by motherhood.

Dimension 4. Impacts on health. Composed of care and attention to adolescent pregnancies, maternal mortality in adolescents and the corresponding years of potential life lost.

Dimension 5. Tax revenue forgone, due to labor participation and decreased income. Constructed based on dimensions 1 and 2, it is the fiscal consequence of the undesired effects of AP and EM on women.

The following illustration summarizes the estimation dimensions and their articulation.

Illustration 1.
Estimation dimensions of the methodology



2.1.
The socioeconomic opportunity costs of adolescent pregnancy and early motherhood

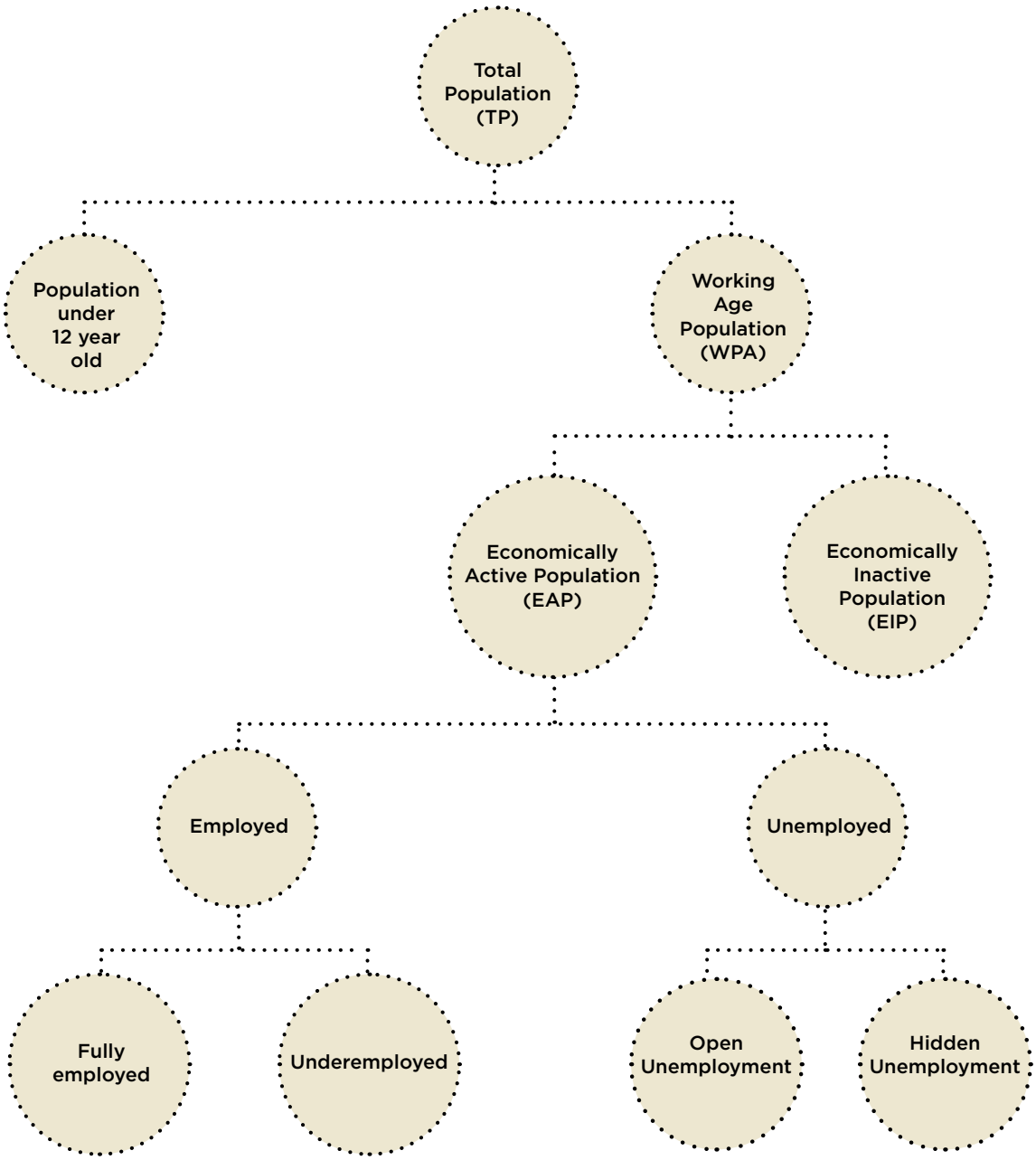
This section of the methodology quantifies the opportunity costs of education –as a basic element of human capital formation–, income, labor participation and the consequent estimated loss of tax revenue due to AP and EM. This method of valuation from the opportunity costs viewpoint, allows the results obtained to be read as the social losses in the respective dimensions, associated to AP and EM.

2.1.1 The opportunity cost of participation in the labor market

The reason for measuring the consequences of AP and EM on participation in the labor market according to the two specific dimensions of activity (**dimension 1.1**) and employment (**dimension 1.2**), is the classification of the population and its measurements by national statistics systems. See illustration 2.

Traditional statistics measuring of labor force identifies as unemployed that population of WCA who, being willing and able to work, have not obtained paid employment in the reference period. Therefore, the quantification is complemented by WCA classified as *economically inactive population* –or inactive population–, which includes those WCA that, being of working age, consider that they cannot, do not need to or are not interested in holding a paid job in the labor market. If only unemployment is taken, part of the effect of AP and EM on labor participation is not visible, given that the classification of 'inactive' may include those women who are not willing to enter the labor market for different reasons. For identification of the structure of the population classified as '*inactive*', see (Hincapié & Parra, 2015).

Illustration 2.
Occupational classification of the population, according to the national statistics systems



Source: Prepared by the authors based on (Lora et al., 2016). The EIP is also known as inactive population or simply: inactive. The EAP is also known as the active population. The WAP is also known as the population of working age and generally in Latin America it refers to the population over 12 years old.

Thus, the following relevant rates are available:

- Inactivity rate (*ir*) = EIP/WAP.
- Occupational rate (*or*) = Employed/WAP. Also known as employment rate.
- Unemployment rate (*ur*) = Unemployed/EAP. Also known as the employment rate.

The opportunity cost of availability for the labor market

Let,

$\boldsymbol{tif_t^{ma}}$: specific inactivity rate of women who had their first child in adolescence (WCA).

$\boldsymbol{tif_t^{*}}$: specific inactivity rate of women who had their first child in adulthood.[4]

$\boldsymbol{tof_t}$: specific occupational rate for women.

$\boldsymbol{PET_t^{ma}}$ women who had their first child in adolescence (WCA) and are of working age.

$\boldsymbol{Sf_t}$: annual labor income for women.

The activity gap between WCA and women who had their first child in adulthood $(\boldsymbol{\beta a_t})$ is given by:

$$\boldsymbol{\beta a_t} = (tif_t^{ma} - tif_t^{*})/tif_t^{*}$$

This gap indicates that WCA women have an inactivity rate βa_t percent higher than women who were mothers in adulthood or, in other words, they have βa_t percent less availability for work. If there is investment in AP prevention and avoiding the adverse consequences of AP and EM on employment (labor availability), inactivity in WCA could be reduced:

$$-\beta a_t/(1+\beta a_t) = (tif_t^{*} - tif_t^{ma})/tif_t^{ma}$$

Thus, the opportunity cost of being ready for the labor market, due to AP and EM (COD_t) is given by:[5]

$$\boldsymbol{COD_t} = (tif_t^{ma} - tif_t^{*}) * PET_t^{ma} * tof_f * Sf_t$$

4 For the specific definition of these two populations, see section 1.3.3. *Study population*.

5 According to traditional labor classification, we would be talking about the opportunity cost of being 'economically active'.

This opportunity cost indicates the estimated loss of income due to women's non-availability for work due to AP and, mainly, to the domestic tasks associated with EM.

Methodological Recommendation

National statistical systems of LA&C, include in the Economically Inactive Population (EIP), students, housewives, pensioners, retirees, rentiers, people with disabilities and those who are not interested in the labor market. Given that the identification of the population that is carried out here automatically excludes students, pensioners and retirees, researchers from each country will have two alternatives to control the rentier and disabled population: (i) apply specific adjustment factors for WCA and for the population of comparison women, which subtract the rentiers and 'disabled' from each population; (ii) assume that the proportion of women with disabilities and rentiers is similar in both population groups and equally affects them, in which case they will not have to apply adjustment factors.

The opportunity cost of employment

As shown in Figure 2, the WAP is made up of the EIP –which was addressed in the previous dimension– plus its complement the EAP, which, in turn, includes both those who have a paid job and those who are looking for a job. In other words, the EAP reflects the supply or availability of work force for the economy. To measure the opportunity cost of employment, in this dimension we focus on the EAP and its unemployed segment.

Let,

$\boldsymbol{tdf_t^{ma}}$: specific unemployment rate of women who had their first child in adolescence (WCA).

$\boldsymbol{tdf_t^{*}}$: specific unemployment rate of women who had their first child in adulthood.

$\boldsymbol{PEA_t^{ma}}$: economically active population of WCA.

The employment gap between WCA and women who postponed their first pregnancy to adulthood ($\boldsymbol{\beta e_t}$) is given by:

$$\boldsymbol{\beta e_t} = \left(tdf_t^{ma} - tdf_t^{*}\right)/tdf_t^{*}$$

This gap indicates that WCA women have an unemployment rate βe_t percent higher than women who were mothers in adulthood. If there is investment in AP prevention and avoiding the adverse consequences of AP and EM on employment, unemployment in WCA could be reduced up to:

$$-\beta e_t/(1+\beta e_t) = (tdf_t^* - tdf_t^{ma})/tdf_t^{ma}$$

The latter also shows the potential number of women who could be employed if there were investment in AP prevention or in avoiding the effects of EM, such that WCA could achieve higher educational levels and more work experience which, in turn, would enable them to reach better employment levels. Thus, the opportunity cost of paid employment is given by:

$$\boldsymbol{COE_t} = (tdf_t^{ma} - tdf_t^*) * PEA_t^{ma} * Sf_t$$

This opportunity cost shows the estimated loss of income as a result of the employment gap for WCA, due to AP and, mainly, to the unpaid work associated with EM.

Reading indicators as public policy inputs

(Participation in the labor market dimension)

- The gap in activity between WCA and women who had their first child in adulthood shows the «*estimated percentage of women who could be available for the labor market if there were investment in the prevention of AP or in avoiding the adverse socioeconomic consequences of EM*
- The opportunity cost of being ready for the labor market, due to AP and EM shows the «*estimated loss of income resulting from women's non-availability for work, due to AP and, mainly, domestic work associated with EM*»
- The employment gap between WCA and women who postponed their first pregnancy to adulthood shows the «*potential number of women who could be employed if there were investment in AP prevention or in avoiding the adverse socioeconomic consequences of EM*»
- The opportunity cost of paid employment due to AP and EM shows the «*estimated loss of income due to the employment gap for WCA*»

2.1.2 The opportunity cost of labor income

This opportunity cost is supported in the hypothesis of the income gap between WCA and women who had their first child at an adult age, which, in turn, is underpinned by the socioeconomic effects of AP and EM on the educational level achieved and work experience gained.

Let $\boldsymbol{Sf_t^{ma}}$: average annual labor income of WCA women.

The labor income gap between WCA and women who had their first child at an adult age is given by:

$$\boldsymbol{\beta S_t^{ma}} = 1 - (Sf_t^{ma}/Sf_t^{*})$$

This gap shows that the income of WCA is βS_t^{ma} percent lower than that of women who had their first child in adulthood. If there were investment in AP prevention and in avoiding the unintended consequences of EM, there could be an increase in income of up to:

$$\beta S_t^{ma}/(\beta S_t^{ma} - 1) = (Sf_t^{*}/Sf_t^{ma}) - 1$$

Thus, the opportunity cost of labor income due to AP and EM is given by:

$$\boldsymbol{COS_t} = \beta S_t^{ma} * Sf_t^{*} * PET_t^{ma} * tof_t$$

Which is the same as saying:

$$\boldsymbol{COS_t} = (Sf_t^{*} - Sf_t^{ma}) * PET_t^{ma} * tof_t$$

This opportunity cost shows the loss of income resulting from the labor income gap for WCA women.

Methodological Recommendation

The variable of average labor income of WCA women can be demanding during data collection, since it is probably not found in the international databases previously mentioned. The data, which is more relevant, can be found in previous studies or in certain specific international databases and, if not found in these sources, the data can be found in the surveys.

Reading of indicators as public policy inputs

(Labor income dimension)

- The estimated labor income gap for adolescent pregnancy and adolescent motherhood is, in itself, far reaching in terms of the visibility of this phenomenon.
- The opportunity cost of labor income represents the «loss of income due to the labor income gap for WCA».

2.1.3 The opportunity cost of education

This dimension is supported by the hypothesis that WCA are constrained in their availability and capacity to invest in their human capital formation -more specifically to invest in their formal education process-, on account of the time and effort devoted to care and the unpaid work of motherhood. Given that education levels and their classification is not completely homogeneous in the countries of Latin America and the Caribbean (LA&C), and in order to guarantee standardized construction allowing for the comparability of results, we propose adopting the education levels of UNESCO's International Standard Classification of Education (ISCED). The ISCED 2011 groups educational levels into the following 9 categories, from which we propose taking 7 and regrouping them into 5 categories:

ISCED 2011	DESCRIPTION	CHARACTERISTICS
0	Preschool education	Initial stage for children up to 3 years old.
1	Primary education or first cycle of basic education	Usually starts between ages 5 and 7, designed to give a solid basic education in reading, writing and mathematics, along with elementary knowledge in other subjects.
2	First cycle of secondary or second cycle of basic education	It is intended to complete basic education, generally more oriented towards patterns.
3	Second cycle of secondary	More specialized. It usually begins at age 15 or 16, or at the end of compulsory education.
4	Non-tertiary post-secondary	Educational programs usually intended to prepare for professional practice. It can give access to tertiary education.
5	Short cycle tertiary education	Tertiary programs oriented towards professional practice. It can give access to other tertiary programs.
6	Degree, undergraduate, baccalaureate, bachelor, first cycle of degree or equivalent	Tertiary programs that offer a first academic qualification.
7	Master's, postgraduate, second cycle of degree or equivalent	Postgraduate tertiary programs, which offer an advanced academic or professional qualification.
8	PhD or equivalent	Tertiary programs leading to obtaining an advanced research qualification that certifies the scientific maturity of the interested party.

Here we propose to exclude category 0 and regroup the categories as follows:

ISCED	Recategorización
2011	Recategorization
2	2
3	
4	3
5	
6	4
7	5
8	

According to the data available for each country, categories 4 and 5 may be available, which would enrich the analysis.

Let,

$\boldsymbol{M_k} = Number\ of\ women\ with\ a\ level\ of\ education\ K;$ $\forall k = \{1,2,3,4,5\}$

$\boldsymbol{MA_k} = Number\ of\ WMA\ with\ a\ level\ of\ education\ k$

The rate of women with a level of education k is $m_k = M_k/M$ and the rate of WCA women with a level of education k is $ma_k = MA_k/MA$. Thus, the educational gaps for WCA women are given by:

$$\boldsymbol{\beta_k^{edu}} = m_k - ma_k$$

According to the levels of education recategorized, with $k = 2$ we get the schooling or secondary education gap $\left(\beta_2^{edu}\right)$ for WCA and with $k = 4$ we get the professionalization gap or gap in the first academic qualification at the tertiary level $\left(\beta_4^{edu}\right)$. It is in these two levels and above where it is expected *a priori* that there be gaps in the educational levels reached, because at the age range defining adolescents, a good part of them will already have completed primary education.

Given that educational levels do not report a monetary value in themselves, to assess them, income by education levels for the two female population groups is used. The total income of WCA according to their different educational levels are given by:

$$IEDf^{ma} = \sum_{k=1}^{5} ma_k * MA * Sf_k * tof$$

The potential income that WCA could obtain if they had attained the same educational levels of women whose first child was in adulthood, are given by:

$$IEDf = \sum_{k=1}^{5} m_k * MA * Sf_k * tof$$

Thus, the opportunity cost of education due to AP and EM is estimated as:

$$\boldsymbol{COEdu} = IEDf - IEDf^{ma}$$

$$\boldsymbol{COEdu} = \left[\sum_{k=1}^{5} (m_k - ma_k) * Sf_k\right] * MA * tof$$

This opportunity cost represents the estimated loss of income of WCA due to their educational gaps.

Reading of indicators as public policy inputs
(Educational level dimension)

- The educational gaps of women who have been mothers since adolescence, especially the gap in secondary education and the professionalization gap, are important in giving visibility to the effects of AP and EM on the educational levels achieved.
- The opportunity cost of education represents the «estimated loss of income due to the educational gaps of women who have been mothers since adolescence» and, in turn, represents the «potential benefit of investing in AP prevention and of avoiding the adverse effects of EM on the level of education attained, that is, investing in avoiding the early dropout rates of WCA».

2.1.4 The total economic opportunity cost and its fiscal impact

As a total economic opportunity cost, the aggregation of the two opportunity costs of labor participation (labor availability and employment) and the opportunity cost of labor income is taken, because it is here that converge many of the economic consequences of AP and EM. The opportunity cost of education $(COEdu)$ is not included, since, as previously mentioned, this cost is measured from the labor income by educational level and this effect is captured in a general way in the opportunity cost of income (COS).

$$\boldsymbol{COTotal_t} = COD_t + COE_t + COS_t$$

Expressed as a proportion of the Gross Domestic Product (GDP), the total annual opportunity cost is:

$$COTotal_t/PIB_t$$

The estimation of tax revenues forgone from consumption taxes (VAT) is given by:

$$\boldsymbol{IFIVA_t} = COTotal_t * (C_{iva} * iva).$$

Where,

isr: % de impuesto sobre la renta aplicable desde el nivel de ingresos definido.

it: % income tax applicable from the specified level of income.

iva: % de impuesto al valor agregado (impuesto al consumo).

vat: % of value added tax (consumption tax).

C_{iva}: % de los ingresos que se gasta en consumos gravables con IVA.

Cvat: % of income spent on taxable consumption through VAT.

For the estimation of tax revenues from income tax (IT), it will be necessary to consider income levels with respect to the taxable base income (IT floor), therefore, the variable is created $COTotal_t^{\pi}$ such that:

$$\boldsymbol{IFISR_t} = COTotal_t^{\pi} * isr$$

Where,

$$COTotal_t^{\pi} = COD_t + COE_t + COS_t^{\pi}$$

The COD_t y COE_t variables have already been defined in section 2.1.1, but now the opportunity cost of income will depend on the income levels of the groups of women with respect to the taxable base income with IT (IT floor), such that:

$$\boldsymbol{COS_t^{\pi}} = \pi * PET_t^{ma} * tof_t$$

With:

$$\pi = (Sf_t^m - Sf_t^{ma}) \quad if \quad Sf_t^m \geq P \ \ and \ Sf_t^{ma} \geq P$$

$$\pi = (Sf_t^m - P) \quad if \quad Sf_t^m \geq P \ \ and \ \ Sf_t^{ma} < P$$

$$\pi = 0 \quad if \quad Sf_t^m < P \ \ and \ \ Sf_t^{ma} < P$$

$F: PTaxable\ incomre\ floor\ with\ IT.$

Thus, tax revenues forgone are given by:

$$\boldsymbol{IFNPI = IFIVA_t + IFISR_t}$$

The IT and VAT impact does not represent the totality of a fiscal impact. For practical reasons applying the methodology, it does not include taxes on profits or taxes on wealth, nor taxes on movements or financial transactions that, although they are part of State revenues, would significantly increase the effort and complexity of applying the methodology, as this would require other sources of information different from the household or demographic and health surveys, which can usually be found in the ministries of economy.

Reading of indicators as public policy inputs

The total opportunity cost represents the «estimated loss of income from the economic (wage and employment) gaps for women who have been mothers since adolescence» and, in turn, represents the «potential benefit of investing in AP prevention and in avoiding the adverse effects of EM on the economic conditions of WMA».

2.2. The health impacts and costs associated with adolescent pregnancy

Health care for adolescent pregnancies

Based on the RH Costing Model, which is a cost estimation model of sexual and reproductive health developed by (Weissman et al., 2008) for UNFPA and applied in El Salvador study (UNFPA, 2017), we propose taking adolescent pregnancy care activities in line with this latter study:

- Prenatal, during delivery and postpartum care
- Obstetric complications and other maternal health conditions
- Interventions for newborns

This care is composed of the activities described in the following table.

Prenatal and during delivery care	Prenatal care
	Treatment for acute anemia
	Hypertension during pregnancy
	Malaria prevention during prenatal care
	Malaria treatment during prenatal care
	Care during childbirth
	Postpartum care

Obstetric complications	Emergency care prior to referral
	Membrane rupture before delivery
	Prolonged labor (>18 hours)
	Assisted birth by forceps or vacuum extractor
	Caesarian section
	Antepartum haemorrhage
	Postpartum haemorrhage
	Puerperal sepsis
	Eclampsia / severe pre-eclampsia
	Treatment of complications after an abortion
Other maternal conditions	Obstetric fistula
	Urinary tract infection
	Mastitis
Newborn care interventions	Routine newborn care
	Sepsis / newborn infections
	Asphyxia / breathing difficulties at birth
	Low birth weight

Public health outcomes with social relevance

According to (Conde-Agudelo, Belizán, & Lammers, 2005), in LA&C adolescents and especially those under 15 years of age have the highest risks of maternal mortality, associated with the complications of pregnancy and childbirth, which are the main causes of death. Consistent with this, in the *Global Strategy for Women´s, Children´s, and Adolescent´s Health 2016-2030,* the WHO proposes actions aimed at reducing preventable mortality.

In line with this evidence and action strategies of the Sustainable Development Goals, the main indicator proposed here is the maternal mortality rate in adolescents (MMRA), which inform the years of potential life lost (YPLL), the years of potential productive life lost (YPPLL) and the social or productive loss due to maternal mortality in adolescents (SLMMA).

The maternal mortality rate in adolescents (MMRA) is an important indicator of human development, since many of the complications of pregnancy are preventable with quality care.

$$MMRA = \frac{Number\ of\ deaths\ of\ women\ (10-19) due\ to\ pregnancy\ related\ causes}{Number\ of\ births} \times 100.000$$

Of these deaths, some could have been avoided with effective health interventions. According to (WHO, 2015), the main avoidable causes of maternal mortality are:

- Safe abortion
- Eclampsia
- Postpartum haemorrhage
- Puerperal sepsis

In the application of the methodology for each country, if health records provide access to disaggregated information or microdata, cases of these preventable maternal deaths can be obtained.

The years of potential life lost (YPLL) from maternal mortality in adolescents for a person are calculated as the difference between life expectancy and age at the time of death. This can be calculated in two ways according to data available for each country. If the age of each adolescent who died due to maternal mortality is available, the YPLL will be given by:

$$YPLL = \sum_{i}^{n} (Life\ expectancy - Ef_i)$$

Where Ef_i is the age at the time of death. In case the age at death of each one of the adolescents is not available, the YPLL will be given by:

$$YPLL = N * \left(Life\ expectancy\ - \bar{Ef}\right)$$

Where $\bar{Ef}$ is the average age of death and N the number of adolescents who died due to pregnancy-related causes.

In turn, the years of potential productive life lost (YPPLL) are given by the difference between the retirement age and the age of labor market entry (ALE):

$$YPPLL_1 = N * (Retirement\ age - EIL) \quad if \quad \bar{Ef} < EIL$$

$$YPPLL_2 = N * \left(Retitement\ age - \bar{Ef}\right) if \quad \bar{Ef} \geq EIL$$

Assuming that $\bar{Ef} \geq EIL$, valuation of the social or productive loss due to maternal mortality in adolescents (SLMMA) is given by:

$$PLMMA = (YPLL_2) * Sf_t^{ma}$$

3 Final recommendations

Why measure the economic impact of AP and EM?

More than numbers, inputs for public policy and visibility of the problem. The results from application of this methodology would converge in a single objective, that of quantifying and making visible the cost of adolescent motherhood for women and for society. The opportunity costs of education, income, job availability and employment are the consequence of the hardships faced by adolescents who became pregnant and had a child, this being the only possible choice in several Latin American countries, due to restrictions of access, limitations on rights, beliefs of the family environment, gender subordination or domination by their partners or lack of reasons for a personal life project. Therefore, the results of the methodology should generate evidence to persuade decision makers, legislators and opinion leaders to reconsider the current underinvestment in the prevention of adolescent pregnancy and mitigating the adverse consequences of early motherhood; with the purpose of:

- Avoiding maternal-related deaths in adolescents.
- Closing the educational gap of female adolescent mothers, which could generate the estimated potential benefit in dimension 3.
- Closing the income gap of adolescent mothers, which could generate the estimated potential benefit in dimension 2.
- Closing the labor participation gap of adolescent mothers, which could generate the estimated potential benefit in dimension 1.

Studies on the economic impact of AP and EM do not prevent pregnancies or save lives. But their adequate political use could contribute to this. The implementation of national case studies using the methodology proposed here should help decision-makers understand that postponing pregnancy to an adult age (20 years or more) is desirable, not only for the health of the mother and the child, but also for their human development and for that of the country as a whole.

How to use the results?

If it cannot be explained in a simple way, it has not been understood well. Assertive communication and dissemination of the results of this methodology can extend its reach to the general public, especially to groups with a susceptible population of adolescent pregnancies such as schools, parent and student groups, rural areas and groups of vulnerable populations; in general.

The name chosen for this methodology *MILENA - Impact Methodology of Adolescent Pregnancy in Latin America* has the intention of: facilitating the design of effective communication campaigns and dissemination of results that, in addition to addressing the policy decision-making bodies, can be

extended to the public in general. Thus, the output indicators that the methodology yields will allow the construction of messages for the public, which will be articulated with prevention campaigns and the use of contraception methods. Therefore, the output indicators that the methodology yields will allow the construction of messages for the public, coordinated with prevention campaigns and the use of contraception methods. For example, educational, employment and income gaps will help construct the following messages:

"Did you know that becoming pregnant and being a mother before turning 20 could affect your human development and your chances of social and economic progress? …" (See column 3 of the following table)

Output indicator	Message for policy makers and legislators	Message for policy makers and legislators
Professionalization gap	It is estimated that the probability of completing university training increases X% for those women who had their pregnancy in adulthood, compared to WCA.	*"Did you know that women who DO NOT have a child before the age of 20 are more likely to finish their university education and have a profession?"*
Education gap	It is estimated that the probability of completing schooling increases X% for those women who had their first pregnancy in adulthood, compared to WCA.	*"Did you know that women who become mothers before the age of 20 can see the completion of their schooling fail?"*
Employment gap	If there were investment in preventing AP and avoiding the unintended consequences of EM on employment, unemployment in mothers could be reduced by up to …	*"Did you know that women who are mothers after the age of 20 tend to have X% more opportunities of being employed, compared to women who have been mothers since adolescence?"*
Labor income gap	If there were investment in preventing AP and avoiding the unintended consequences of EM on labor income, the income gap of mothers could be reduced by up to …	*"Did you know that women who become mothers after their 20s tend to earn X% more income than women who become mothers during adolescence?"*

Messages that can be coordinated with prevention ones: "... that's why, it's better with a condom", "... that's why, if you have a stable relationship, plan with your partner", "... if you think you're pregnant, do not hesitate to look for help and advice."

These are just some examples of the messages that could be constructed and, within the framework of a comprehensive campaign, for which life stories and persuasive data for adolescents supported by infographics and other communication and dissemination materials could be created.

What other evidence could we generate?

Moving forward it will be pertinent to progress through other lines of research, such as that of the care economy and unpaid work (UW) and articulate the results from different perspectives. The main care economy approach constructs measurements and valuations of unpaid domestic and care work (UDCW) from the replacement cost method, based on time use surveys –which have been progressively incorporated in national accounting systems in the last decade–, it assesses how much UDCW would cost if it had to be paid for. Thus, the opportunity costs that are construed here and the replacement costs, construed from the care economy, would complement each other. On the one hand, opportunity costs make visible the losses that early motherhood generates for adolescents in terms of their educational achievements, their labor participation, their employment and their income. On the other hand, replacement costs would make visible the value of UDCW provided by an adolescent mother –which is currently unknown–, and who reproduces and maintains the labor force for the productive system.

Thus, these two approaches could be articulated with the purpose of dimensioning the problem of AP and EM from different angles. Everything, with the ultimate goal of generating evidence and visualizing the multiple facets of the problem.

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