Impact
Goals
Estimation
Model

Panama, November 2021

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Acronyms and Abbreviations

AP: Adolescent pregnancy

CSE: Comprehensive sexuality education

CYP: Couple years of protection

EC: Early childbearing

LAC: Latin America and the Caribbean

MCMEC: Modern contraceptive methods effective coverage

MILENA: Methodology for measuring the economic consequences of adolescent
                pregnancy and childbearing in Latin America and the Caribbean countries.

SAFR: Specific adolescent fertility rate (SAFR)

UAPSR: Unintended adolescent pregnancy specific rate

UNFPA: United Nations Population Fund

UNFPA-LACRO: United Nations Population Fund Latin America and Caribbean Regional Office

UNICEF: United Nations Children's Fund

WHO: World Health Organization

Introduction

When a country or subnational government makes the decision to implement adolescent pregnancy prevention policies, one of the main challenges is that of defining quantitative goals that reflect achievements and advancements made. To address this need, UNFPA-LACRO developed an adolescent pregnancy Impact Goals Estimation Model (IGEM) to estimate the potential impact of policies on the absolute number of adolescent pregnancies and the Specific Adolescent Fertility Rate (SAFR).

Adolescent pregnancy prevention has become a public policy issue in Latin America and the Caribbean (LAC), which is the most unequal region in the world. Adolescent pregnancy in LAC is one of the expressions of this inequality, which is not only a public health, but also a development and human rights issue. Adolescent pregnancy, on the other hand, has significant consequences for development It has been shown to perpetuate the cycle of poverty and has an impact on the economy of individuals, families and societies. For every girl or adolescent who goes through pregnancy and early childbearing, states also lose tax revenue, because adolescent pregnancy affects the participation of these women in the labour market and their tax contributions[1].

Adolescent pregnancy not only reflects major differences in inequality between countries, but also within countries. Adolescent fertility does not have a homogeneous distribution in the population; it shows gradual declines as the level of urbanization and schooling of women increases in countries or subnational regions, especially if we also consider Comprehensive Sexuality Education (CSE), women's increasing participation in the labour market and the implementation of public policies to improve access to health services that address the needs of adolescents, including access to modern contraceptives and gender equality.

The objectives of the Adolescent Pregnancy Impact Goals Estimation Model are the following:

1. Define sexual and reproductive health outcome goals in adolescent pregnancy prevention interventions to be implemented (specific coverage, pregnancies prevented, abortions averted, and maternal deaths and neonatal deaths averted).
2. Build scenarios based on planned interventions for the provision of modern contraceptive methods and comprehensive sexuality education.
3. Estimate the need for modern contraceptive methods and CSE for different scenarios of outcomes to achieve.
4. Assist in the process of costing the different interventions associated with the provision of modern contraceptive methods and access to CSE for the prevention unintended adolescent pregnancies.
5. Assist in the process of calculating the cost-benefit ratio of direct investments in modern contraceptives from a social perspective, considering the outcomes of the model can be linked to those of MILENA.

This document is divided into three sections. The first is an overview of the IGEM, how it works and the levels of information required to use it. The second provides more details about the impact goals estimation methodology to measure changes in adolescent pregnancy and the SAFR in intervention plans and programs for the distribution of modern contraceptive methods to adolescents and the implementation of Comprehensive Sexuality Education (CSE). Finally, the third describes the different IGEM applications and the usefulness of its concepts and indicators as advocacy, outreach and decision-making tools to address the issues of adolescent pregnancy and early childbearing.

Section 1 – The Impact Goals Estimation Model

What is the IGEM?

The IGEM is a quantitative planning tool developed by the United Nations Population Fund Regional Office for Latin America and the Caribbean – UNFPA-LACRO. The IGEM will allow you to: 1) conduct an *ex ante* evaluation of scenarios to estimate the potential impact of adolescent pregnancy prevention interventions to be implemented based on the definition of expected outcome goals; 2) develop a metric for policies on the provision of modern contraceptive methods and CSE for adolescents based on the definition of coverage goals, and 3) monitor the level of performance of those goals *ex post* and facilitate the cost efficiency evaluation of policies.

In summary, the IGEM will allow you to develop a metric of the expected impact of Adolescent Pregnancy prevention policies and analyze the sensitivity of dependent variables to different intervention hypotheses. The model's dependent variables are: effective coverage of adolescents with modern contraceptive methods, Specific Adolescent Fertility Rate, number of unintended pregnancies prevented, abortions averted, maternal deaths averted, and neonatal deaths averted.

How does the IGEM work?

The IGEM is a parametric mathematical model that generates outputs (reports) from a set of linked spreadsheets that must be fed with country baseline information, both on the target population and alternative adolescent pregnancy prevention interventions considered, such as number and range of methods to distribute. and number of adolescents receiving education, which will be generated by the IGEM. This will allow you to know, prior to the intervention, how the model's dependent variables will react to different intervention choices (see Diagram 1). The IGEM also generates reports on the cost for individual variables, such as cost per effectively covered adolescent or cost per pregnancy prevented, in addition to cost-benefit ratios for the different interventions.

Figure 1: Adolescent Pregnancy Impact Goals Estimation Model Logic

If you feed the model with:

IGEM

you will get:

Population data

Quantity and variety of methods to provide

Percentage of adolescents receiving CSE

Modern Contraceptives Effective Coverage

Adolescent pregnancies prevented

SAFR variation

Abortions and maternal and neonatal deaths averted

Information required

To use the IGEM you will need two things: a set of strategic definitions related to the intervention design, and entering baseline information into spreadsheets, including population data related, for example, to the magnitude of the intervention planned for the provision of modern contraceptives and CSE. The following is a more detailed description of these requirements.

a) Strategic definitions for the intervention design

As a parametric model, the IGEM relies on evidence of the outcomes and impacts achieved by interventions. Evidence found in literature allows for the estimation of impact expected through two types of interventions: a) promotion of access to modern contraceptives for the target population, and b) promotion of Comprehensive Sexuality Education that includes contraception contents. The IGEM does not include parameters to assess the possible impact of other types of interventions that are often part of adolescent pregnancy prevention public policies, such as communication campaigns, training of professionals, production and dissemination of guidelines and standards and/or meetings and statements. This does not mean those interventions do not have an impact, but the model has not yet produced sufficient evidence to define parameters for the expected impact of such interventions. To implement the IGEM, national or local authorities in charge of implementing the policy must define the type of intervention whose impact they want to evaluate. To do this, they must answer the questions in Table 1.

Table 1. Strategic definitions for the *ex ante* evaluation of adolescent pregnancy prevention interventions

Strategic definitions
1- What will be the target population's age range?
2- In which territory is the intervention to evaluate being implemented (or will be implemented)?
3- Is the aim to reduce the Specific Adolescent Fertility Rate (SAFR) or only the unintended adolescent pregnancy rate (UAPR)?
4- Are you considering interventions to increase the CSE coverage?
5- What are the information sources available for the previous items? What is their level of disaggregation by territory and population? What is the reporting period for the information and how is it processed?

The IGEM requires a baseline for the intervention to evaluate, which can be that there is simply no intervention (i.e., no adolescents are receiving modern contraceptives or CSE contents) or there are different levels in both types of interventions (with disaggregated data on the delivery and coverage of modern contraceptives for each individual method –mix of methods–). Therefore, the first information requirement has to do with the year of the intervention and the intervention measurements that can be assumed to establish the intervention baseline. The most common is to use the last year for which information is available. The second information requirement has to do with the estimated quantities and types of methods to be provided to calculate the impact goals in different scenarios or multi-year plans.

Table 2 includes a description of the indicators required. There are three important aspects to consider upon defining this information: a) for the target population data, the age range defined for interventions, b) information available for the year(s) to consider in the IGEM, and c) whether a more in-depth analysis will be necessary in case the information required is not available, with more explicit information about assumptions made.

Table 2. Information required by the IGEM

Indicators
Target population information (1)
Population of adolescent women in the age range(s) selected.
Absolute number of adolescent pregnancies in the age range(s) of adolescent women selected.
Absolute number or percentage of sexually active population in the age range(s) of adolescent women selected.
Information about modern contraceptive methods supplied to adolescent women and access to CSE (2)
Number of male condoms supplied.
Total number or combined oral contraceptive cycles supplied.
Total number of monthly injectable contraceptives administered.
Total number of quarterly injectable contraceptives administered.
Total number of IUDs inserted.
Total number of subdermal implants inserted.
Coverage of comprehensive sexuality education including information about modern contraceptive methods.
Pricing information (3)
Price of last purchase of male condoms.
Price of last purchase of oral contraceptive cycles.
Price of last purchase of monthly injectable contraceptives.
Price of last purchase of quarterly injectable contraceptives.
Price of last purchase of IUDs.
Price of last purchase of subdermal implants.
Annual cost per adolescent receiving CSE including information about modern contraceptive methods.

Note:
(1) It is important to consider information for the different years to cover in the IGEM.
(2) Detailed information on the method and its packaging must be included. If you are seeking to measure impact by age range, you must disaggregate the information on the delivery of methods using the same range. Information on the provision or direct insertion/administration in users is preferred; otherwise, information on the distribution of methods will be used; for practical purposes, you must provide information as close to actual consumption as possible.
(3) Provide details on units to consider and the currency used to indicate value.

Section 2 – Methodology

Model design

Rationale:

The model's underlying hypothesis is that expanding the modern contraceptive coverage among adolescents and ensuring the continuity of use will result in a reduction of adolescent pregnancies that can be measured.

Outcomes:

The main outcome the model seeks to measure is the Modern Contraceptive Methods Effective Coverage (MCMEC). The secondary outcome measured are variations in the Specific Adolescent Fertility Rate (SAFR), which is operationally defined as the number of births per 1,000 women aged 15-19. The expected ratio between both variables assumes that the SAFR will be an inverse function of the MCMEC ($SAFR_i = f$ (MCMEC), or the higher the MCMEC the lower the SAFR and vice versa. A variation in the MCMEC will produce a variation in the SAFR ($\Delta MCMEC_i \rightarrow \Delta SAFR_i$).

A third level of outcomes of the IGEM is information on derivative variables to measure secondary outcomes directly related to the MCMEC marginal increase: 1) number of pregnancies prevented, 2) number of abortions averted, 3) number of maternal deaths averted, 4) number of neonatal deaths averted. To this end, the model uses the parameters of *Impact 2*[2] a tool developed by Marie Stopes International to assess the possible impact of contraceptive interventions.

A fourth level of outcomes is that resulting from combining information on sexual and reproductive health impacts with information on the costs of interventions for the provision of modern contraceptive methods and CSE. This will generate economic information on the cost of: 1) each adolescent effectively covered, and 2) each pregnancy prevented.

A fifth level of outcomes is that where the IGEM can be used to combine information about the economic impact of adolescent pregnancy identified by using the methodology Socioeconomic Consequences of Adolescent Pregnancy (MILENA), developed by UNFPA[3]. This allows users to generate outcomes such as the cost-benefit of investments.

Operationalization of the Modern Contraceptive Methods Effective Coverage (MCMEC):

It is assumed that the MCMEC is a proxy based on the target population that received appropriate family planning counseling and is using modern contraceptive methods, adjusted by: a) the duration of the method usage, b) the clinical efficacy of each method, and c) the one-year adherence observed.

Therefore, the MCMEC will be a function of: a) the mix of modern contraceptive methods offered to the target population, b) the specific numbers for the individual types of modern contraceptive methods provided to the target population, c) the clinical efficacy of the different modern contraceptives offered to the target population, d) the duration of protection offered by individual modern contraceptive methods, and e) the one-year adherence to the different modern contraceptive methods. The model comes preloaded with information based on evidence found in international literature. However, that information can be modified with the country's own information or updated information found in international bibliography.

$$MCMEC = \sum (Qi * CPYi * CEi * OAi)$$

| Modern contraceptive methods effective coverage | Quantity of methods | Couple years of protection | Clinical efficacy | One-year adherence observed |

The measurement process is based on the effectiveness equation suggested by Tugwell *et al.*[4], where the effective coverage of a given drug treatment is the result of the coverage reached times clinical efficacy based on adherence observed. As in the case of contraception, the idea is to measure the effect of interventions through the use of different methods. To adapt the equation we used the **Couple Years of Protection** (CYP) variable developed by Wishik and Chen[5], which allows for a single measurement of the duration of usage of different modern contraceptive methods. Each CYP equals a couple protected from unintended pregnancies over a one-year period, and it can be calculated by using different numbers for each contraceptive method.

To estimate the **clinical efficacy** observed for a typical use of modern contraceptive methods, we used the parameters published by Trussel[6] and Singh & Darroch[7].

One-year **adherence observed** is, in turn, a dependent variable of the information the target population has about modern contraceptive methods, their appropriate usage and their side effects. In the case of the adolescent population, we have identified two intervention hypotheses to improve adherence: 1) improve the quality of family planning counseling (for example, through traditional and on-the-job training and supervision of professionals providing counseling, and 2) Comprehensive Sexuality Education for the target population (for example, through the inclusion of contents on modern contraceptive methods in secondary education curricula). Based on evidence found in the literature, we assumed that the one-year adherence observed increases by 20% in the adolescent population that has received comprehensive information about modern contraceptive methods, their particularities and their potential side effects[8].

The one-year adherence parameters by method were extrapolated from population studies conducted in the United States by Trussel and Wynn[9]. It is important to note that, while the model uses parameters described in international literature, these can be updated in the IGEM in response to new publications or information from local studies conducted by departments or countries that need to estimate goals. In Argentina, for example, for the subdermal implant they used data on adherence to implants from the "Study on follow-up on and adherence to subdermal implants in adolescents and young people in Argentina" conducted by the Ministry of Health's Sexual and Reproductive Health Directorate.

Section 3 - Applications

The IGEM can generate a set of outcomes with different information levels:

- For the planning of adolescent pregnancy prevention public policies focusing on the distribution of modern contraceptive methods and CSE implementation. The outcome goals of the model include effective coverage of contraceptive methods in adolescents, and impact goals such as pregnancies prevented and reduction of the Specific Adolescent Fertility Rate (SAFR).
- In the case of advocacy, which is a key element for decision-makers, the visibility of adolescent pregnancy influences a set of indicators linked to maternal and child health. In this regard, it is possible to estimate impact goals such as abortions averted, maternal deaths averted and neonatal deaths averted as a result of access to modern contraceptive methods.
- The IGEM can evaluate the impact of an intervention by defining the cost of effective protection per adolescent, the cost of each pregnancy prevented and the intervention cost benefit ratio if the MILENA results are used. Based on that comparison, the model can determine the efficiency of decisions regarding the provision of modern contraceptive methods and CSE promotion to reduce adolescent pregnancy, with direct impacts not only on the lives of women, but also on the reduction of health indicators such as maternal, pediatric and neonatal deaths.

References

[1] UNFPA (2020). Socioeconomic consequences of adolescent pregnancy in six Latin American countries. Implementation of the MILENA methodology in Argentina, Colombia, Ecuador, Guatemala, Mexico and Paraguay. United Nations Population Fund - Regional Office

[2] Weinberger M; Pozo-Martin F & Hopkins K. Impact 2 (v4), Marie Stopes International, 2016. Available at: http://www.mariestopes.org/what-we-do/our-approach/our-technical-expertise/impact-2/

[3] UNFPA (2019). Consecuencias Socioeconómicas del Embarazo Adolescente en Paraguay. Aplicación de la Metodología Milena. Asunción. December

[4] Tugwell P, Bennet KJ, Sackett DL, Haynes B. The measurement iterative loop: a framework for the critical appraisal of need, benefits and costs of health interventions. J Chronic Dis 1985; 38:339-51.

[5] Couple Years of Protection (CYP). Measure Evaluation. Available at: https://www.measureevaluation.org/prh/rh_indicators/family-planning/fp/cyp

[6] Trussel, J (2007)"Contraceptive efficacy". In: Hacther, R et al. Contraceptive technology, 19th ed. New York. Ardent Media. Chapter 27

[7] Singh S and Darroch J (2012). "Adding It Up: Costs and Benefits of Contraceptive Services. Estimates for 2012". Guttmacher Institute - UNFPA METHODOLOGY pages 12 and 13.

[8] Toledo V., Luengo X., Molina R., Murray N., Molina T. and Villegas R. (1996). Impacto del Programa de Educación Sexual: Adolescencia Tiempo de Decisiones. Centro de Medicina Reproductiva y Desarrollo Integral del Adolescente. Facultad de Medicina – Universidad de Chile.

[9] Trussell, James and Wynn L.L. (2008). "Reducing Unintended Pregnancy in the United States". Contraception. Editorial. January 2008. Available at: http://www.arhp.org/publications-and-resources/contraception-journal/january-2008.