Estimating Unintended Pregnancies Averted
from Couple-Years of Protection (CYP)

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September 30, 2011

BACKGROUND

One commonly used approach for reporting family planning service levels is to calculate the couple-years of protection (CYP) provided by a program. CYP refers to "the estimated protection provided by contraceptive methods during a one-year period based upon the volume of all contraceptives sold or distributed free of charge to clients during that period…. The term 'CYP' reflects distribution and is a way to estimate coverage and not actual use or impact. The CYP calculation provides an immediate indication of the volume of program activity. CYP can also allow programs to compare the contraceptive coverage provided by different family planning methods."[1] USAID, DFID and many family planning organizations use CYP to measure program performance.[1–6]

In the 2009 *Adding It Up* report,[7–9] we estimated the ratio of unintended pregnancies averted per modern contraceptive user in developing countries. The analysis estimated that in 2008, the average pregnancy rate of the 215 million women in developing countries who wanted to avoid pregnancy but were using either no method or a traditional method was 288 per 1,000, but would have been 39 per 1,000 if they had been using modern contraceptives. Use of modern methods would therefore have averted 249 unintended pregnancies per 1,000 women, or 0.25 per modern contraceptive user.

In response to requests about application of the *Adding It Up* estimates to CYP service statistics, we described the *Adding It Up* methodology, discussed its application to CYP and provided data and recommendations to interested colleagues.[10] Noting the lack of clarity and consistency in treatment of method use-failure in CYP conversion factor calculations, we recommended using a ratio of 0.25 unintended pregnancies averted annually per modern contraceptive user for estimating the average impact of current contraceptive service provision. We provided similar ratios for developing regions and subregions and provided data on outcomes of unintended pregnancies and maternal deaths in these areas.

An extensive review of data and methods for calculating CYP conversion factors has been undertaken by Emily Sonneveldt and colleagues at the Futures Institute, Tulane University and USAID.[11] Conversion factors for many methods will remain the same, but they are being changed for some methods, and factors for new methods are being added. (For

information on current USAID conversion factors and source references, see the USAID website.[1])

In light of this new evidence, we make the following revised recommendations for applying *Adding It Up* findings to estimates of CYP:

- For CYPs calculated using USAID or other conversion factors that take method use-failure into account, use a ratio of 0.288 for estimating unintended pregnancies averted per CYP.
- For CYPs based on conversion factors that do not adjust for use-failure, use a ratio of 0.249.
- In either situation, use the same impact ratio across all developing world regions.

This memo describes the methodological assumptions behind these impact ratios. It also provides information for distributing unintended pregnancies into their components—i.e., unplanned births, induced abortions and unintended pregnancies ending in miscarriages. In addition, it provides estimates of the ratio of maternal deaths averted per 100,000 unintended pregnancies averted. The ratio of unintended pregnancies averted per CYP does not vary across developing countries, since CYP conversion factors are the same across all areas. Estimates of the distribution of unintended pregnancies averted by their outcomes and maternal deaths vary geographically, reflecting differences in women's characteristics (e.g., marital status, intentions to space or limit future births) and the types of contraceptive methods they use.

Applying the ratios of unintended pregnancies and other events averted to CYP estimates—and interpreting the results—is not straightforward, however. This memo also discusses some of the issues and decisions involved in applying these ratios to CYP.

Pregnancy rate estimation
From *Adding It Up*, we took estimates of annual pregnancy rates among women who want to avoid a pregnancy but use no method or a traditional method (i.e., women with unmet need for modern methods), pregnancy rates (also referred to as use-failure rates) among users of modern contraceptive methods, and the estimated pregnancy rate that would occur among women with unmet need for modern methods if all unmet need for modern methods were satisfied.[9]

For *Adding It Up*, we used data from DHS and other country surveys to estimate the number of women in developing countries wanting to avoid a pregnancy, as well as their distribution by contraceptive use.[9] We estimated that in 2008, about 818 million women aged 15–49 in developing countries wanted to avoid a pregnancy—that is, they either were married or were unmarried and had had sex in the last three months; they did not report being infecund; and they did not want to have a child in the next two years. We estimated that 603 million of these women were using a modern contraceptive, of whom 75% wanted no more births and 42% relied on sterilization. The other 215 million women had an unmet need for modern methods, and 53% of them wanted no more births. Most women with unmet need were using no method (140 million), while the others were using traditional methods—periodic abstinence (34 million), withdrawal (33 million) or another nonsupply method (8 million).

We estimated the number of unintended pregnancies as the sum of unplanned births, induced abortions and estimated miscarriages of unintended pregnancies. The number of births in each country in 2008 was taken from the United Nation's World Population Prospects database.[12] For births in countries for which survey data were available, the proportions of births that were unplanned (either mistimed or unwanted) or planned (including cases where the woman did not care about planning births) were applied to the total numbers of births. Survey data on the planning status of births were available for 88% of all births in the developing world in 2008. We assumed that the distribution of births by intention status in countries without available data was similar to the distribution in countries with data in the same subregion. The number of induced abortions in 2008 was based on estimates published in *Abortion Worldwide*.[13] The number of miscarriages was estimated to be to the sum of 20% of pregnancies ending in birth and 10% of those ending in induced abortion. These proportions attempt to account for pregnancies that miscarry after lasting long enough to be noticed by the woman (at least 6–7 weeks after the last menstrual period).[14]

For all developing countries, we estimated that a total of 75 million pregnancies were unintended. To estimate pregnancy rates among women who wanted to avoid pregnancy and were using modern contraceptive methods, traditional methods or no methods, we applied method-specific pregnancy or use-failure rates to numbers of women in each method-use category. The pregnancy rates we used for users of reversible contraceptive methods were the median values of 12-month contraceptive use-failure rates among women in union in 18 developing countries.[15] We specified initial average failure rates for the IUD (1.6%), injectable (2.9%, used for both injection and implant users), pill (6.9%), condom (9.8%), other supply methods (9.8%*), withdrawal (15.1%), periodic abstinence, including lactational amenorrhea method (21.6%) and other nonsupply methods (18.4%†). For female and male sterilization, we used first-year typical-use pregnancy rate estimates from a review of multiple studies of tubal ligation (0.5%) and vasectomy (0.2%).[16] For women who want to avoid pregnancy but are not using a method, we used an annual pregnancy rate of 40%.

The 40% rate among nonusers is lower than the commonly used estimate of 85%. The latter figure represents the estimated pregnancy rate during the first 12 months of frequent sexual activity among fertile couples.[16] The lower pregnancy rate is likely more realistic for a general population of couples who are at risk of unintended pregnancy, but are not using a contraceptive method,[17] because it reflects probable lower levels of sexual activity and fecundity among actual nonusers, many of whom have not become pregnant despite being sexually active and not using a method for more than 12 months. Ideally, estimates of the pregnancy rate among women who are not using any method and are at risk of unintended pregnancy would be available from actual studies; in the absence of such studies, the estimate of 40% is a conservative one and has the strong advantage of being consistent with independently developed global estimates of unintended pregnancies.

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*We assumed the same failure rate as for condoms.

†We assumed a failure rate that was the average of the rates for periodic abstinence and withdrawal.

For most methods we used use-failure rates taken from analyses of data from Demographic and Health Surveys (DHS. The DHS-based rates have the disadvantage that pregnancies ending in induced abortion are often underreported, resulting in underestimation of method use-failure rates. However, since they represent unintended pregnancies in women's first 12 months of method use, they overestimate the use-failure rates of users in the general population, many of whom have used their method successfully for more than 12 months.[18] Nonetheless, we chose to use these rates because they are specific to developing countries, are available for most methods and maintain appropriate relative relationships between the rates of method users and the lower pregnancy rate of 40% we used for nonusers.

We applied these pregnancy rates to the estimated numbers of women in each method-use category for each country. This yielded a total estimate of 85 million unintended pregnancies, a figure 14% higher than the external total of 75 million. We applied the proportion of estimated unintended pregnancies that occurred among those with unmet need for modern methods (82%) to the 75 million total to estimate a pregnancy rate of 288 per 1,000 among those with unmet need for modern methods. Further, we adjusted method-specific use-failure rates downward so that the total estimated number of unintended pregnancies, based on method use and use-failure rates, equaled 75 million instead of 85 million.

Further, in *Adding It Up*, we estimated what the pregnancy rate of women with unmet need for modern methods would be if they all used modern methods. To estimate what methods they would have used if all unmet need for modern methods had been met, we used the current contraceptive method distribution of women in the same country, specific to women's marital status and whether they wanted to space or stop childbearing. Based on this new method distribution and the adjusted method-specific use-failure rates, we estimated that if they all had used modern methods, their pregnancy rate would have been 39 per 1,000 women.

Distribution of Unintended Pregnancies by Outcomes
In the *Adding It Up* project, we made use of available data to estimate outcomes of unintended pregnancies on a subregional level. As noted above, we used survey data to estimate the proportions of total births that were unplanned; from these we estimated numbers of unplanned births in each region. Data on the number of induced abortions were available only at the subregional level.[13] Subregional proportions of abortions that occurred under safe or unsafe conditions were taken from Sedgh et al.[19] The number of miscarriages was estimated to be to the sum of 20% of pregnancies ending in birth and 10% of those ending in induced abortion. Table 1 shows the proportional distribution of unintended pregnancies by outcome, according to region and subregion for developing countries.

Maternal mortality
Our estimates in this report of maternal deaths averted by modern contraceptive use incorporate new 2008 maternal mortality estimates from the World Health Organization (WHO).[8,20] The numbers of maternal deaths averted per modern contraceptive user are based on WHO country maternal mortality estimates and our estimated ratios of

unintended pregnancies that would be averted per modern method user. Table 1 shows the ratio of maternal deaths averted per 100,000 unintended pregnancies averted.

APPLYING *ADDING IT UP* RESULTS TO CYP
We recommend the following:
- For CYPs calculated using USAID or other conversion factors that take method use-failure into account, use the ratio of 0.288 for estimating unintended pregnancies averted per CYP. This is the *Adding It Up* pregnancy rate of women in developing countries with unmet need for modern methods.
- For CYPs based on conversion factors that do not adjust for use-failure, use a ratio of 0.249. This ratio is the difference between the pregnancy rate among women with unmet need for modern methods and the rate they would have if they all used modern methods (0.288 per woman with unmet need – 0.039 per woman if they used modern methods = 0.249 per woman).
- Use the same conversion factors across all developing world regions.

Using these ratios with CYP calculations requires care, for a variety of reasons:

- The assumption that the ratio of unintended pregnancies prevented per modern method user is the same as the ratio of unintended pregnancies prevented per CYP is a rough one. It assumes equivalency between a cross-sectional measure (one woman using contraceptives at a specific time, as measured in surveys such as the DHS) and a measure covering one or more years (CYP).

  The *Adding It Up* ratios are based on actual contraceptive use, as reported by women, while CYP are based on amounts of contraceptive commodities and procedures. The latter may reflect contraceptive methods that are directly provided to users (e.g., IUD insertion or pill provision) or methods provided indirectly (e.g., purchased or distributed to other organizations to provide to clients).

- Comparing unintended pregnancies estimated by applying the *Adding It Up* ratios to CYP from different service organizations is valid only if the estimates are based on the same CYP conversion factors. At a minimum, it would be helpful for any organization estimating impact using the *Adding It Up* ratios to specify the CYP conversion factors they use and the assumptions behind them. Doing so would aid in interpretation of results and, if necessary, allow adjustment of CYP conversion factors for greater comparability of impact results.

- Estimation of pregnancies averted by contraceptive use requires defining an appropriate comparison group. The full impact of method use might best be characterized by assuming a higher nonuser pregnancy rate than that used here, since individuals who become method users may be more sexually active and fecund than current nonusers who want to avoid pregnancy.

  On the other hand, the proposed ratio does not take into account that some women who are newly served by a given provider may not be new users, but may have

switched from another contraceptive method, or that they may be changing their provider, but not their method (a type of substitution effect). For such clients, the population-level or overall impact of service provision would be less than if they were to switch from using traditional or no methods to using modern methods.

- The ratios of pregnancies averted per CYP are specific to contraceptive use and are not appropriate for use with abortion service CYP. Also, maternal mortality ratios include estimates of maternal deaths from both abortion and other maternal causes.

- The contraceptive use data used in calculating the *Adding It Up* ratios include users of short-acting and long-acting methods. Women using long-acting methods include both those who initiated method use in the past year and those who have been using their method for more than a year (often many years, in the case of sterilization). CYP factors for short-acting methods convert commodities provided into single years of use. Long-acting methods provide, and are converted into, multiple years of use.

  A more consistent treatment using the *Adding It Up* impact ratios for multiple-year methods would be to count CYP in the year of initiation for the proportion of the year covered and to include annual CYP from prior service years. At a minimum, impact calculations should specify how multiple-year methods are handled, i.e., whether CYP for these methods are accumulated from past service provision or whether all credit for future CYP is taken in the year of service.

- Estimates of unintended pregnancies and subsequent outcomes calculated from the ratio of unintended pregnancies averted per CYP are not measures of outcomes of specific programs or services. The average ratio of unintended pregnancies prevented combines the differing impacts of specific methods and differing patterns of contraceptive method choice across countries, subregions and regions, across many different service settings, and across women and couples of varied characteristics. Since CYP conversion factors are also based on average and summary data, they also are overall measures; therefore, we recommend using overall ratios of unintended pregnancies averted per CYP as well.

  Programs offering contraceptive services may provide different distributions of methods than exist across the entire country or subregion. User experiences may also be different from the averages used in calculating both CYP conversion factors and *Adding It Up* overall and subregional estimates. Evaluation of the impact of specific programs should be undertaken using more relevant and program-specific measures than are represented by CYP and by the ratio of unintended pregnancies averted per CYP.

  The impact ratio and distribution of unintended pregnancies by outcome were developed from available data. While some of the source data were country-specific, some key measures were estimated at the subregional level because country-specific data are not available. The impact ratios are aggregate measures

for all developing countries, and the distribution of pregnancy outcomes are subregional and regional measures; they should not be interpreted to be accurate for individual countries. Application of these ratios and distributions to country-level CYP should be done with caution; the results should be treated as estimates, and their limitations should be clearly noted.

TABLE 1. Percentage distribution of unintended pregnancies, by outcome, and maternal deaths averted per 100,000 unintended pregnancies averted, 2008—all by region

Region	Unintended pregnancies					Maternal deaths averted per 100,000 unintended pregnancies averted
			Induced abortions			
	Total	Unplanned births	Total	Unsafe	Miscarriages	
All developing countries	100%	41%	46%	28%	13%	176
UN Population Division Regions						
AFRICA	100%	53%	33%	32%	14%	397
Sub-Saharan Africa	100%	55%	31%	31%	14%	430
Eastern Africa	100%	54%	32%	32%	14%	403
Middle Africa	100%	62%	23%	23%	15%	506
Southern Africa	100%	53%	34%	22%	14%	233
Western Africa	100%	54%	32%	32%	14%	496
Northern Africa	100%	41%	47%	47%	13%	154
ASIA	100%	34%	54%	24%	12%	104
Eastern Asia	100%	12%	78%	0%	10%	7
South-central Asia	100%	40%	48%	31%	13%	164
South-eastern Asia	100%	31%	57%	34%	12%	58
Western Asia	100%	54%	32%	11%	14%	50
LATIN AMERICA/CARIBBEAN	100%	48%	39%	37%	13%	49
Caribbean	100%	50%	36%	12%	14%	90
Central America	100%	46%	41%	41%	13%	50
South America	100%	48%	39%	39%	13%	43
UNDP regions						
Arab States	100%	48%	39%	29%	13%	138

Notes: Asia includes the Oceania subregion, which is not shown separately. UN=United Nations. UNDP=United Nations Development Programme.
Sources: **Unintended pregnancy outcomes**—Special tabulations of data from Darroch JE and Singh S, *Adding It Up: The Costs and Benefits of Investing in Family Planning and Maternal and Newborn Health: Estimation Methodology,* New York: Guttmacher Institute, 2011 (forthcoming). **Maternal deaths averted**—Special tabulations of data for Singh S et al., *Adding It Up: The Costs and Benefits of Investing in Family Planning and Maternal and Newborn Health,* New York: Guttmacher Institute and United Nations Population Fund, 2009.

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