



Lives Saved Tool Technical Note

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Understanding how FamPlan calculates the numbers of abortions and their impact on the maternal mortality ratio (MMR) in LiST

This note discusses how increased use of family planning influences the number of abortions which are calculated in FamPlan (the Spectrum Family Planning module) and subsequently impacts the maternal mortality ratio (MMR) in *LiST*. The prevailing wisdom in the community of family planning advocates is that increased use of family planning leads to a decreased number of unintended pregnancies and that this will in turn lead to a decreased number of abortions. To the extent that abortions are unsafe, it is further assumed that maternal mortality will decline as a result of increased family planning use. Unfortunately, this is not the entire story. This note describes how some counter-intuitive results may occur when other factors are included in the calculations. In some cases FamPlan will calculate an increased number of abortions with increasing family planning use and in many cases *LiST* will calculate an increased maternal mortality ratio (MMR).

Basic assumption

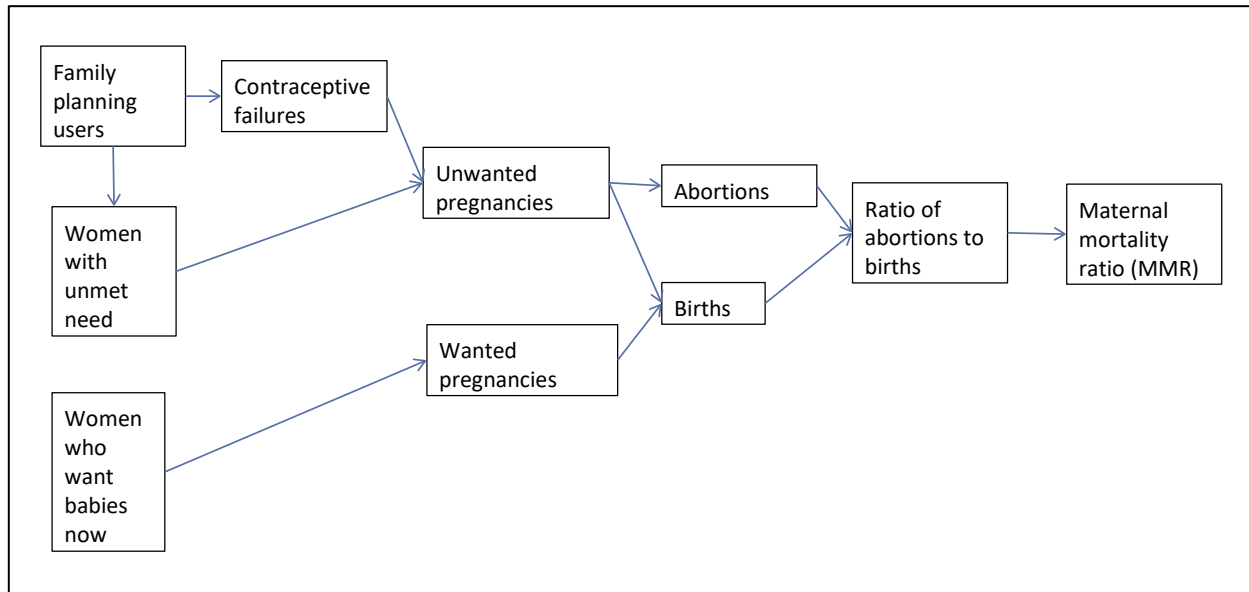
FamPlan assumes that induced abortions only occur from pregnancies that are unintended. In the software, there are two sources for unintended pregnancies: 1) women whose contraceptive method fails and 2) women who want to either space or limit their births, are not using contraception and become pregnant. Not all women who become pregnant under these circumstances have an abortion. It is assumed that a standard proportion of women with an unintended pregnancy will have an abortion. This does not differ by whether the pregnancy is a result of a method failure or from unmet need. To see the estimation of this factor which converts the number of unintended pregnancies into a number of abortions, refer to the final section of this document.

Since abortion is illegal in many countries and is frowned upon in others, it is very difficult to test these assumptions. Thus, there is currently no data with which to confirm these suggestions.

General approach to calculation

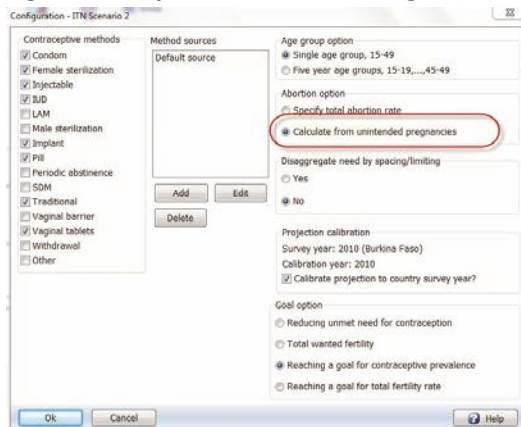
The figure below shows schematically how family planning use is translated into changes in the maternal mortality ratio via changes in the numbers of abortions. First changes in family planning use results in changes in unmet need. Next, women with unmet need and family planning users whose method fails may have an unintended pregnancy. Unintended pregnancies may lead to an abortion or to a birth. In addition women who want to have babies are also giving birth. Next, *LiST* calculates the ratio of abortions to births. If this ratio increases the maternal mortality ratio will increase. If this ratio of abortions to births declines, the maternal mortality ratio will fall.

Figure 1. Links between family planning, abortions and the maternal mortality ratio.



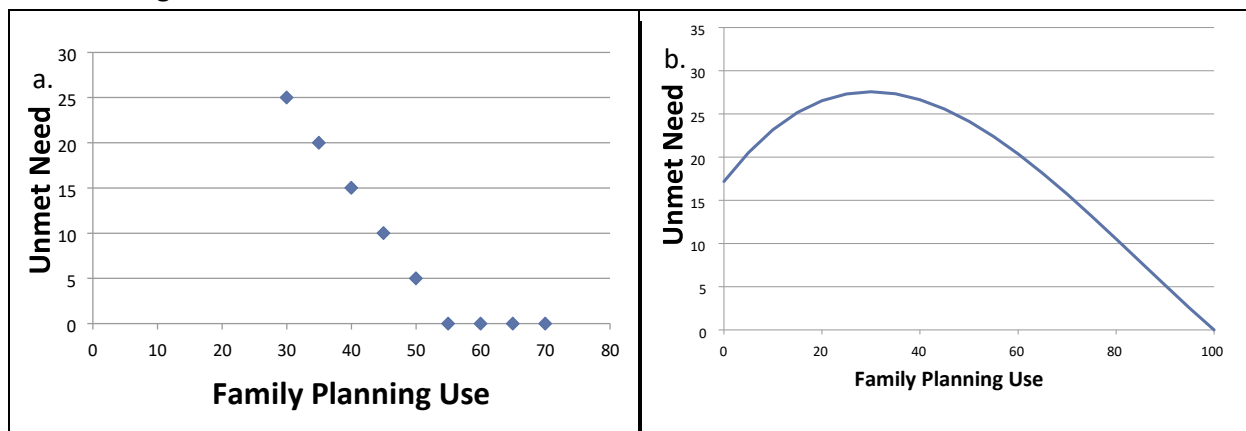
When *LiST* is active in Spectrum, there are three potential combinations of methods for calculating abortions and unmet need in FamPlan. In the first method, abortions are calculated as a percent of unintended pregnancies and unmet need is assumed to fall by one percent for every one percent increase in family planning use. In the second, abortions are calculated as a percent of unintended pregnancies and unmet need is assumed to vary in a parabolic relationship (an upside down “U”) with the contraceptive prevalence rate (see figure 3b below). For the third method, the user can directly enter the total abortion rate manually. The third method, specifying a total abortion rate, is not recommended when *LiST* is active (i.e., the circled item below should always be selected). Thus only the first two methods will be discussed below.

Figure 2. Required FamPlan configuration when using *LiST*.



Calculating abortions from unintended pregnancies

For the first and second methods of calculating abortions, abortions are calculated as a percent of unintended pregnancies. In these methods, unintended pregnancies result from only two sources: 1) method failures; and 2) pregnancies in women with unmet need for family planning. The first method assumes a one-to-one reduction in unmet need with family planning rate increases. This default method is shown in figure 3a below. The alternative method estimates unmet need via a curve resembling an upside down parabola (figure 3b). This curve is based on the observation that initially when family planning increases from low levels (5 to 15 percent) to moderate levels (20 to 30 percent) unmet need will increase as the increase in demand for family planning services expands faster than the increase in usage. Eventually, unmet need will reach a maximum and then will begin to fall as the growth in usage outruns the growth in demand¹. Note that in reality contraceptive use never exceeds about 85 to 90 percent of eligible women. However, users should be aware that the numbers of abortions will increase as family planning use increases from low to moderate levels due to the increase in unmet need. The probability that any individual unintended pregnancy will result in an abortion does not change with unmet need changes or the family planning use changes. **Figure 3. The two methods of calculating unmet need in FamPlan**

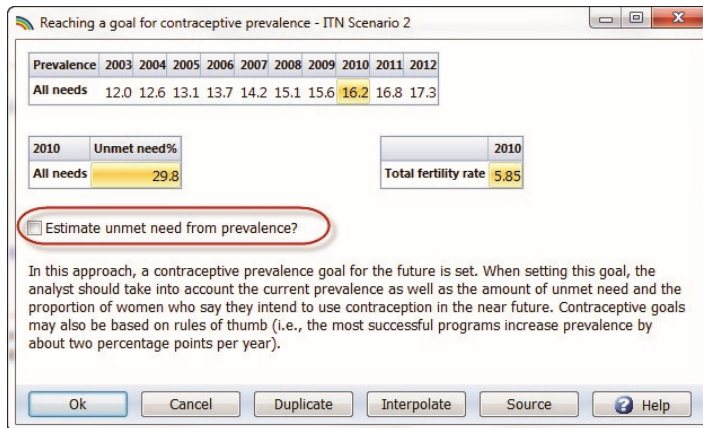


In most circumstances, using either of the above options, abortions will fall if unmet need falls. However, abortions may continue to increase if the family planning methods are skewed toward ineffective methods (such as traditional methods). In this case, the use of ineffective methods can lead to a greater number of method failures which in turn will lead to a greater number of unintended pregnancies than occurred with lower levels of family planning use and higher unmet need. Another example of a situation where family planning increases can result in an increase in abortion occurs after family planning use has reduced unmet need to zero (as shown in figure 3a above). After this point is reached, any increase in family planning use will result in a noticeable increase in the number of unintended pregnancies and thus the number of abortions. In this scenario, there are no counterbalancing reductions in unmet need to offset the increased contraceptive failures. If this occurs,

¹ Futures Institute performed an analysis of 22 countries comparing the evolution of unmet need as contraceptive prevalence increased from low levels to relatively high levels. The parabolic (upside down U shape) made a good fit of the data in almost all cases.

it may be desirable to choose the alternate calculation method shown in figure 3b. In this situation, unmet need does not reach zero until family planning use reaches 100 percent of eligible women (as mentioned previously this never occurs in reality). See the screen below to identify where to choose between these two options within FamPlan.

Figure 4. Choosing the unmet need calculation in FamPlan



Maternal mortality ratio

In *LiST* the maternal mortality ratio (MMR) depends on many factors. Among these factors is the ratio of abortions to births, since the denominator of the MMR is the number of live births. If the ratio of abortions to births declines, the MMR will automatically decline. Similarly, if the ratio of abortions to births increases, the MMR will automatically increase. The impact of family planning on the MMR depends on whether or not the decline in the number of abortions is more or less rapid than the decline in the number of births. If the ratio of the number of abortions to births is increasing as a result of the factors described above, the MMR will increase. On the other hand, if the number of abortions is declining, the ratio of abortions to births may increase or decrease depending on whether the proportional decline in abortions is greater or lesser than the proportional decline in births.

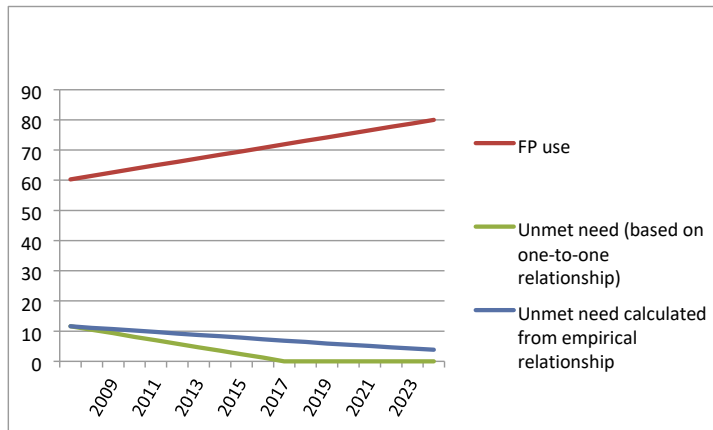
To avoid running into these issues of interpreting the increases and decreases in the MMR, the user may want to refer to the maternal mortality **rate**. The maternal mortality rate is the number of maternal deaths per 100,000 women of reproductive age (15-49). Since the denominator is the number of women, the demographic impact of family planning is considered (as it is not in the MMR) and will have an impact on this indicator. In all but the most extreme cases of ineffective contraceptive method use, the maternal mortality rate will decline as a result of the decline in numbers of pregnancies and births.

Examples showing relationships between unmet need calculations and abortions

Figure 5 shows the potential impact of the two assumptions relating to unmet need. The red line is the overall family planning use in both scenarios. The green line shows that when unmet need is based on a one-to-one relationship with family planning use, unmet need will eventually hit zero. Beyond this point, the number of abortions will increase faster than the reduction in the number of births. Alternatively,

when the parabolic relationship is used, unmet need will decrease, but not hit zero (the blue line). Thus the number of abortions may or may not increase in this scenario, depending on other assumptions.

Figure 5. Comparison of the two methods of calculating unmet need



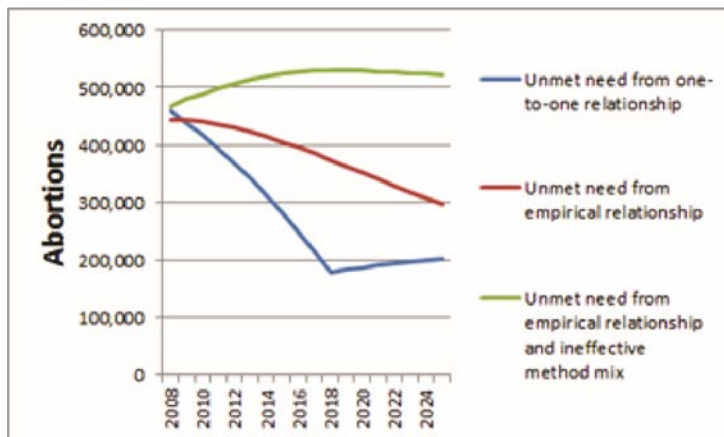
Family planning use and unmet need

The list below shows the three scenarios in figure 6.

1. Unmet need is calculated as falling by one percent for each one percent increase in family planning with an effective family planning mix (default Spectrum assumption) (blue line).
2. Unmet need is calculated based on an empirical relationship (the upside down parabola) with an **effective** family planning mix (red line)
3. Unmet need is calculated based on an empirical relationship (the upside down parabola) with an **ineffective** family planning mix (green line)

The blue line shows that abortion falls until unmet need reaches zero. When unmet need reaches zero, the number of abortions increases because there is no further decrease in abortions because of reduced unmet need; abortions are only increasing as a result of increased method failures. The alternative for calculating unmet need is to use the empirical relationship between unmet need and family planning use (the red line). In this case we see that unmet need gradually declines and that this results in a more modest decline in abortions. However there is no sudden increase such as that seen in the example with the one-to-one relationship (the blue line). The green line below shows an example where the empirical relationship for unmet need is used but there is an ineffective family planning method mix (e.g., 70% traditional methods). Here we see that abortions actually increase as the numbers of method failures swamp the declines in unintended pregnancies due to reduced unmet need. Please note that these examples were chosen to illustrate particular points. **The experience of the user will vary depending on the levels of unmet need, family planning use and contraceptive method mix.**

Figure 6. Comparison of the number of abortions given different unmet need assumptions and different methods of family planning (effective vs. ineffective)



Estimating the percent of unintended pregnancies that end in abortion

This section describes the equations and formulas which are used to calculate the default values of country-specific number of abortions per 100 unintended births that are automatically loaded into a *LIST/FamPlan* projection.

- 1) # of Abortions = Abortions/birth * the number of births

The number of births comes from the State of the World's Children.

The number of abortions per birth is estimated by the Alan Guttmacher Institute. These are regional averages.

- 2) # of unintended pregnancies = ((% of mistimed or unwanted births) * the number of births) + # of abortions

The % of mistimed or unwanted births comes from DHS surveys.

- 3) % of unintended pregnancies that are terminated = (# of abortions) / (# of unintended pregnancies)

The estimated value for the percent of unwanted pregnancies that are terminated ranges from 17% to as high as 84%. This assumption does not change as the number of unintended pregnancies changes. It also assumes that there is no difference in the percent of unintended pregnancies that end in abortion if the unwanted pregnancy is a result of method failure or a result of unmet need. However, note that in *Spectrum*, the default value can be modified if you have better data and can be modified over time if needed. Clearly these additional assumptions also affect the result for the number of abortions that will occur as family planning utilization changes.

The screenshot shows the 'Family planning' menu in the software interface. Below it, the 'Proximate det.' tab is selected, displaying a table of data for various years from 1970 to 2010. The table includes rows for 'Percent of women 15-49 in union', 'Postpartum Insusceptibility (months)', 'Unintended preg. terminated/induced abortion (%)', and 'Sterility (%)'. Red circles and arrows highlight the 'Family planning' menu, the 'Proximate det.' tab, and the 'Unintended preg. terminated/induced abortion (%)' row.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	2010
Percent of women 15-49 in union	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5
Postpartum Insusceptibility (months)	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Unintended preg. terminated/induced abortion (%)	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0
Sterility (%)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8

Proximate determinants are variables which directly impinge on fertility outcomes; these variables include the proportion of women in sexual union, the duration of the period of inability to conceive following a birth, and the level and quality of contraceptive practice and to a lesser degree, the underlying capability to conceive, the level of induced abortion, and the prevalence of pathological sterility.

For additional questions on this topic, please contact Bill Winfrey at bwinfrey@avenirhealth.org.