

Methodology Appendix

to

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The estimates of the costs and benefits of contraception in Uganda cover many variables derived from multiple sources. They draw from the most recent available data, projected to 2008. The following outline covers the variables used, their sources and the analyses we performed.

1. Numbers of women in each region aged 15–49, by marital status

a. Total population of Uganda, 2008

- Sources: UBOS 2002 and UBOS 2008
- *2008 Statistical Abstract*, “Table 2.1B: Census population (1991 and 2002) by region and district and projected 2008 mid-year population.”

b. Population for each region, 2008

The statistical abstract provides data according to districts. The Uganda Bureau of Statistics (UBOS) has information on how districts are distributed within regions. This information is reported in the 2006 Uganda Demographic and Health Survey. The following is the distribution:

Central 1:	Kalangala, Masaka, Mpigi, Rakai, Lyantonde, Sembabule, and Wakiso
Central 2:	Kayunga, Kiboga, Luwero, Nakaseke, Mubende, Mityana, Mukono, and Nakasongola
Kampala:	Kampala
East Central:	Bugiri, Busia, Iganga, Namutumba, Jinja, Kamuli, Kaliro, and Mayuge
Eastern:	Kaberamaido, Kapchorwa, Bukwa, Katakwi, Amuria, Kumi, Bukedea, Mbale, Bududa, Manafwa, Pallisa, Budaka, Sironko, Soroti, Tororo, and Butaleja
North:	Apac, Oyam, Gulu, Amuru, Kitgum, Lira, Amolatar, Dokolo, Pader, Kotido, Abim, Kaabong, Moroto, and Nakapiripirit Karamoja area: Kotido, Abim, Kaabong, Moroto, and Nakapiripirit
West Nile:	Adjumani, Arua, Koboko, Nyadri, Nebbi, and Yumbe
Western:	Bundibugyo, Hoima, Kabarole, Kamwenge, Kasese, Kibaale, Kyenjojo, Masindi, and Buliisa
Southwest:	Bushenyi, Kabale, Kanungu, Kisoro, Mbarara, Ibanda, Isingiro, Kiruhura, Ntungamo, and Rukungiri

- Note: In this and subsequent calculations, when regional data or estimates were available, the national number was computed as the sum of regional numbers.

c. Women aged 15–49 and 15–44, by region, 2008

These numbers are based on the 2002 census report. Women 15–49 constitute 22.43% of the total population. We made the assumption that this percent applies to all nine regions. Women 15–44 are 21.26% of the total population.

d. Women aged 15–49 in each region, by marital and household wealth status, 2008

We applied the 2006 Uganda Demographic and Health Survey (DHS) distribution of women aged 15–49 in each region by marital status and by household wealth quintile to the estimated numbers of women aged 15–49 in each region in 2008.

- Source: Audam S, Guttmacher Institute, special tabulations of data from the 2006 DHS.
- Note: In the DHS, women are categorized according to the wealth of their household relative to other households in Uganda. Wealth quintiles divide the total household population into fifths (Rutstein and Johnson 2004). However, women aged 15–49 make up smaller proportions of the household population in poorer wealth quintiles and larger proportions in rich households (see table below).

	Marital status			Percent in quintile
	Total	Not in union	In union	
Q1- poorest	1,199,141	438,347	760,794	18.1%
Q2	1,272,709	465,240	807,469	19.2%
Q3	1,256,521	459,322	797,199	18.9%
Q4	1,261,568	461,167	800,401	19.0%
Q5 - wealthiest	1,647,703	602,319	1,045,384	24.8%
All quintiles	6,637,643	2,426,396	4,211,247	100.0%

- Note: When possible, subsequent regional calculations were carried out for marital- and wealth-status subgroups in each region and then summed to regional totals.

2. Risk for unintended pregnancy and contraceptive use status

a. Current (2008) risk for unintended pregnancy and method use

Percentage distributions of women aged 15–49, by risk for unintended pregnancy and contraceptive use, were tabulated according to marital status, by region and household wealth quintile from the 2006 DHS.

- Source: Audam S, Guttmacher Institute, special tabulations of data from the 2006 DHS.
- Women aged 15–49 in each regional, marital-status and wealth-quintile subgroup were classified as being:
 - 1) not at risk for unintended pregnancy (not sexually active or infecund or wanting a child within the next two years);
 - 2) at risk for unintended pregnancy and seeking to space future births (married or unmarried and sexually active, fecund and wanting a(nother) child, but not within the next two years); or
 - 3) at risk for unintended pregnancy and seeking to limit future births (married or unmarried and sexually active, fecund and not wanting a(nother) child).
- Definition of risk for unintended pregnancy (standard DHS definition):
 - 1) All currently married women were assumed to be sexually active. Women who were not married were classified as sexually active if they reported having had intercourse in the last three months. Because of stigma attached to nonmarital sex, the level of sexual activity—and therefore risk for unintended pregnancy—is likely to be underestimated among unmarried women.
 - 2) Sexually active women were classified as infecund based on self-reporting.
 - 3) Intention for future childbearing was defined according to women’s desire for a(nother) child. Among pregnant women, intention was based on whether their current pregnancy was wanted at that time or earlier, mistimed (too early) or unwanted (women already had all the children they had wanted).
 - 4) Women who were amenorrheic were classified according to the intention status of their last birth.
- Women at risk who were spacing or limiting births were further classified according to contraceptive use status, as follows:
 - 1) Modern method users
 - Limiters only: tubal ligation (among women) and vasectomy (among male partners)

- Spacers and limiters: IUD, injectable, pill, condom and other supply methods
- 2) Traditional method users: periodic abstinence, withdrawal and other non-supply methods
- 3) At risk but using no contraceptive method.

b. Alternative contraceptive use scenarios

We examined four alternative contraceptive-use scenarios for women at risk of unintended pregnancy. All of these scenarios assume that other variables are unchanged, including the number of women aged 15–49 and their distributions by region, marital status, household wealth, fecundity, intention to space or limit births, and sexual activity (among unmarried women).

- *Scenario 1 -- Zero contraceptive use.* This scenario assumes that none of the women at risk for unintended pregnancy are able to practice contraception. In other words, all current contraceptive users become non-users. All such women are assumed to have unmet need for family planning.
- *Scenario 2 – Current contraceptive situation.* This scenario represents the actual situation of contraceptive use in Uganda as measured by the 2006 DHS results.
- *Scenario 3 – Zero unmet need.* All women at risk of unintended pregnancies but currently non-users become users of modern methods. All women at risk who currently use traditional methods become users of modern methods. The method mix among modern methods is assumed to remain as it currently is. Unmet need for contraception is reduced to zero in this scenario.
- *Scenario 4 – Half of unmet need met.* 50% of at-risk women who are currently non-users become users of modern methods and 50% of current users of traditional methods become modern-method users. Although the overall method mix changes from Scenario 2, the method mix among modern methods remains unchanged and the method mix among traditional methods also remains unchanged. Scenario 4 more closely corresponds to government policy which foresees a rise in contraceptive prevalence during the current health plan without anticipating that all unmet need will be satisfied. The following table illustrates how women at risk of unintended pregnancy in Uganda are distributed in the four scenarios:

	Scenario 1: Zero Contraception	Scenario 2: Current Behavior	Scenario 3: Zero Unmet Need	Scenario 4: Half of Unmet Need Met
Number of women at risk of unintended pregnancy				

Users of modern methods	0	995,916	3,244,669	2,120,292
Users of trad. methods	270,081	270,081	0	135,041
Non-users at risk	2,974,589	1,978,673	0	989,336
All women at risk	3,244,669	3,244,669	3,244,669	3,244,669

3. Current numbers and intention status of births, and outcomes of pregnancy

a. Total pregnancies: The sum of conceptions ending in birth, induced abortion and miscarriage.

b. Numbers of births, by region, 2008

We applied regional general fertility rates from the 2006 DHS to the 2008 numbers of women aged 15–44 in each region to estimate number of births in 2008 by region.

- The general fertility rate is the number of births in each region in the three years preceding the 2006 DHS per 1,000 women aged 15–44.
- Source: Audam S, Guttmacher Institute, special tabulations of data from the 2006 DHS.

c. Intention status of births

We distributed the estimated numbers of births in each region in 2008 according to the intention-status distribution of births reported in the 2006 DHS.

- Source: Audam S, Guttmacher Institute, special tabulations of data from the 2006 DHS.
- The fertility planning status variable categorizes births according to whether women reported wanting a pregnancy then, wanting a pregnancy later, not wanting any (more) births or being unsure. Births to women who had wanted the pregnancy later are called “mistimed.” Births that resulted from pregnancies that were not wanted at all are called “unwanted.” All other births are called “intended.”

d. Numbers of induced abortions by region, 2008

We applied the regional number of induced abortions per 1,000 women aged 15–49 in 2003 (the most recent data available) to the numbers of women aged 15–49 in 2008.

- Sources: Singh *et al.*, 2003; and Alan Guttmacher Institute, 1999.
- We assumed that all pregnancies ending in induced abortion had been unintended.
- As estimates by wealth quintile are not available, all quintiles were assigned the national average abortion rate. This is an unavoidable but weak assumption since abortion rates likely vary among income groups.

e. Numbers of miscarriages

Miscarriages are estimated to be equivalent to 20% of pregnancies ending in birth plus 10% of those ending in induced abortion. These proportions attempt to account for pregnancies that miscarry after lasting long enough to be noted by the woman (6–7 weeks after the last menstrual period).

- Source: Leridon, 1977, Table 4.20.

f. Intended pregnancies

Intended pregnancies are the sum of intended births and estimated miscarriages of intended conceptions.

g. Unintended pregnancies

Unintended pregnancies are the sum of unintended births, induced abortions and estimated miscarriages following unintended conceptions.

4. Unintended pregnancies among women at risk for unintended pregnancy

Annual pregnancy rates among women using contraceptive methods and among women at risk for unintended pregnancy who were using no method were multiplied by the estimated numbers of women in Uganda in 2008 (according to current contraceptive use patterns) to estimate the current number of unintended pregnancies. This is an alternative method of estimating unintended pregnancies using contraceptive method failure rates. The reason for making this alternative estimate is to develop adjusted failure rates (see below) which are needed to estimated unintended pregnancies in Scenarios 3 and 4.

a. Initial pregnancy rates

The table below gives the initial failure rates used in the study.

Female sterilization	Male sterilization	Pill	IUD	Injection Implant	Condom	Other supply	Periodic abstinence	Withdrawal	Other non-supply	No protection
0.50%	0.15%	6.50%	1.70%	2.40%	10.30%	15.00%	24.30%	20.90%	22.60%	40.00%

- Source: Cleland and Ali, 2004; and Trusell *et al.*, 1990.
- For women at risk for unintended pregnancy using no method, we assumed an annual pregnancy rate of 40%. Sources: Singh *et al.*, 2003; and Vlassoff *et al.*, 2004.

- The 40% estimate is much lower than the 85% annual pregnancy rate that Trussell *et al.* estimate for couples who are continually sexually active. Some studies have suggested, however, that couples at risk for unintended pregnancy who are using no contraceptive method are not continually sexually active (Blanc and Grey, 2002; and Grady, Hayward and Yagi, 1986).

b. Failure rate adjustment

The number of pregnancies based on current contraceptive use among women at risk for unintended pregnancy and the initial failure rates for each method differed in all regions from the number of unintended pregnancies estimated by use of the DHS intention status variable (see section 3). This is likely due, in part, to the fact that many unintended pregnancies that end in induced abortion are not reported in the DHS or other surveys of women. Therefore, the initial failure rates for each method were adjusted so that the number of unintended pregnancies calculated in each region equaled the number estimated from intention status.

- The same regional adjustment was applied to the initial use–failure rates for all methods and the nonuse pregnancy rate used for all women in the same region, regardless of their marital status or household wealth. The adjustment ratio ranged from 1.195 to 1.606 across the regions and averaged 1.370.

c. Outcomes of unintended pregnancies

Unintended pregnancies were distributed according to outcome (birth, induced abortion or miscarriage) based on the regional distributions estimated from the 2006 DHS birth rates and intention status information, 2003 induced abortion rates and model-based miscarriage rates.

5. Pregnancy-related mortality and morbidity

a. Pregnancy-related deaths among women, by outcome

The WHO estimate of the national maternal mortality ratio (MMR) was used for all regions and all wealth quintiles. Ministry of Health statistics on maternal deaths were examined but judged to be unusable since only deaths recorded at health facilities were included. The assumptions of equal maternal mortality in all regions and wealth groups is unavoidable, but weak in that urban areas and rich women most likely have lower mortality than their counterparts.

- Source: Hill *et al.*, 2007.
- Deaths per 100,000 induced abortions: We applied the number of deaths per 100,000 induced abortions in Uganda in 2003 to the total number of induced abortions in 2008 in each region.

b. Pregnancy-related infant deaths and neo-natal deaths

We applied regional infant and neonatal mortality rates from the 2006 DHS to the regional numbers of births in 2008.

c. Pregnancy-related disability-adjusted life years (DALYs) incurred by pregnant women and perinatal infants, 2008

We combined WHO estimates of 2004 DALYs for Uganda with regional (Sub-Saharan Africa) projected estimates for 2008 (WHO 2008; WHO 2009). Both sources were used because the country-specific estimates do not have condition-specific DALYs, while the regional ones do (as well as being more recent).

d. Regional and wealth quintile rates of pregnancy-related DALYs in Uganda in 2008

- We assumed that national rates of nonabortion- and abortion-related maternal and perinatal DALYs applied across all regions and wealth groups of women. Again, this is an unavoidable, but weak assumption since the rates of DALYs most likely vary by rural/urban residence and by income group.

6. Costs of providing contraceptive and pregnancy-related care

a. Cost per user (per year) adjustments – contraceptive services

1. Weissman *et al.* (1998) and Singh *et al.* (forthcoming), using results from UNFPA (2009), were the two sources used for estimates of contraceptive costs per user per year.
2. Weissman *et al.* (1998) raw data were adjusted as follows: (a) the cost for the DHS “injection/implant” category is a weighted average of cost of injection (75%) and Norplant (25%), assuming that those are the proportions of users of the two methods in Uganda; and (b) the sterilization costs are multiplied by 9.5 on the assumption that they were divided by that factor (i.e., the average number of years of protection)—the text of the report is silent on this point.
3. UNFPA (2009) costs include provision of 120 condoms for dual protection (against STIs). This cost was removed so that unit costs would reflect only contraceptive costs.
4. For both data sources: (a) the cost of implants is divided by 3 to get the cost on a per year basis, assuming three years of use before removal; (b) the costs of female and male sterilization are divided by 9.5, assuming an average of 9.5 years of protection from the age at the time of the procedure (35.5 years) until the end of the reproductive period (age 45); and (c) the cost of IUDs is divided by 3 to get the cost on a per year basis, assuming three years of use before removal.
5. Costs were inflated from the year of the study to 2008 using World Bank GDP deflators for the United States (since all costs are expressed in US dollars).
6. Simple averages and weighted averages were calculated from the two sources. Weights are based on the age of the study, the more recent studies having greater

- weight. A study done in 1995 is assigned a weight of 1 and a study done in 2008 a weight of 2. Study dates in between those two years have computed values between 1 and 2. The weight is computed according to the following equation:

$$\text{WEIGHT} = (-1982 / 13) + (1 / 13) \times \text{YEAR}.$$
7. It was decided to use the weighted averages rather than the simple ones, as older studies were judged to have less certainty of results.
 8. Since none of the sources included indirect costs, the UNFPA (2009) estimate of the ratio of indirect costs (program and system costs) to direct costs for the Sub-Saharan Africa region are used to inflate all costs. The final per-user costs thus include both direct and indirect costs.
 9. The indirect costs include investments in physical infrastructure (maintenance of existing facilities and construction of new facilities); support programs (such as information, education and communication activities); systems for supplying commodities; and management systems improvements (UNFPA 2009).

b. Cost per user (per year) adjustments – MNH care services

1. Bollinger *et al.* (2004), Kitatta (1997), Weissman *et al.* (1998) and Singh *et al.* (forthcoming) [using UNFPA (2009)] were the four sources used for estimates of costs per client of mother and newborn health (MNH) interventions.
2. Weissman *et al.* (1998) raw data were adjusted as follows: the costs per client are weighted averages of costs at health centers and costs at hospitals. The weights are the proportions of total clients attending each type of health facility.
3. Costs per client from Bollinger *et al.* (2004) are similarly weighted averages. In this case costs from two classes of health centers and from hospitals are weighted by share of client attendance at each type of facility. Costs from Kitatta (1997) are similarly weighted.
4. Costs were inflated from the year of the study to 2008 using GDP deflators for the United States (since all costs are expressed in US dollars) from the World Bank.
5. Simple averages and weighted averages were calculated from the two sources. Weights were based on age of the study, the more recent studies having greater weight. A study in 1995 was assigned a weight of 1 and a study in 2008 a weight of 2. Study dates in between those two years have a computed value between 1 and 2. This scheme gives less weight to Kitatta data (from three purposively selected health facilities in Kampala) and Weissman *et al.* (from one selected district).
6. It was decided to use weighted averages, as older studies have less certainty of results.
7. Since none of the sources included indirect costs, the UNFPA (2009) estimate of the ratio of indirect costs (program and system costs) to direct costs for the Sub-Saharan Africa region were used to inflate all costs. The final per-user costs thus include both direct and indirect costs.

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