Adding It Up:
Costs and Benefits of Meeting the Contraceptive and Maternal and Newborn Health Needs of Women in Nepal

Methodology Appendix

Acknowledgments

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Methodology Appendix

Introduction

This report provides the methodology used to estimate the values presented in the report *Adding It Up: Costs and Benefits of Meeting the Contraceptive and Maternal and Newborn Health Needs of Women in Nepal,* 2019.[1] The report adds to the ongoing Guttmacher Institute effort to estimate the costs and benefits of expanding contraceptive use in specific developing countries. Similar reports have been produced for the Philippines, Uganda, Ethiopia, Burkina Faso, Malawi and the Cameroon.[2–7]

All country-level Adding It Up reports have estimated the costs of meeting all women's needs for modern contraceptives, and they have estimated the benefits of expanded contraceptive services in terms of the number of pregnancies, births, abortions, and maternal and infant deaths averted and disability-adjusted life years (DALYs) saved, as well as the reduction in the number of children losing their mother from maternal mortality.[2–7]

The country-level reports have drawn heavily on the methods and approaches used in the global Adding It Up series of reports, which have estimated the need for and the use, costs and impacts of various sexual and reproductive health services for the major regions and subregions of the developing world. While the basic approach for the Adding It Up analysis has remained unchanged over the years, some country-specific changes to the methodology have been unavoidable based on data availability in the country.

This report describes the analytic framework, sources and calculations underlying the Adding It Up estimates for Nepal. Our objective is to enable users to better understand the results and the limitations of the estimates.

In this report, we estimated the **health impacts** for four scenarios:

1) *Zero modern contraceptive use*. This scenario assumes that none of the women wanting to avoid pregnancy* use a modern contraceptive method. In other words, all current modern method users become nonusers, and the only users of contraception are the current

*We consider the terms "wanting to avoid pregnancy" and "at risk of unintended pregnancy" to be equivalent and use them interchangeably; we abbreviate this term to "@risk" and "not@risk" in our equations.

traditional method users. All of these women (the nonusers and the traditional method users) are assumed to have an unmet need for modern contraceptive methods.

2) *Current contraceptive situation*. This scenario represents actual levels of contraceptive use in Nepal as obtained from the 2016 Nepal Demographic and Health Survey (NDHS).

3) *All unmet need for modern methods met*. In this scenario, all women wanting to avoid pregnancy—including current nonusers and those who currently use traditional methods—become users of modern methods. The proportions of women using each type of modern method are based on the mix of modern methods used currently. Unmet need for modern contraception is reduced to zero in this scenario.

4) *Half of unmet need for modern methods met*. In this scenario, 50% of women wanting to avoid pregnancy who are currently nonusers become users of modern methods, and 50% of current users of traditional methods become modern method users. Although the overall method mix changes from the current-use scenario, the method mix among users of modern methods and among users of traditional methods remains unchanged.

In these scenarios, we assumed that the level of use of maternal and newborn health care would remain constant at current levels.

In addition, in this report, we estimated the **financial costs and savings** for four scenarios, where we assumed that MNH coverage would be extended to all women in need:

1) Coverage of MNH care and of modern contraception is at current levels (this is the baseline scenario);
2) MNH care is provided to all women who need them, while current level of modern contraceptive use is maintained;
3) Both MNH care and modern contraceptives is provided to all women who need them (that is, all unmet need for modern contraception is met); and
4) MNH care is provided to all women who need them, but modern contraceptive coverage is provided to half of women in need of modern contraception.

We recognize that the necessary increases in coverage cannot be achieved immediately, especially because many of them depend on improvements in health service infrastructure. However, we use the same year for all scenarios to demonstrate the changes needed, compared with the current situation.

Another way to interpret the differences between the full-needs-met and current scenario

estimates for 2017 is that they reflect the effects of lack of progress in terms of unintended pregnancies, maternal and newborn deaths and disability, and adoption of modern contraceptive services.

We conducted all analyses on the costs of care in the public sector under the assumption that it is the government's mandate to provide these services. In reality, the costs could be higher if a large proportion of women sought these services in the private sector, where costs are quite variable. The costs presented in this report could therefore be considered to be at the lower end or a minimum; they represent what it would cost the government to provide the additional services.

Data Sources

The estimates of the costs and benefits of contraceptive use in Nepal draw from multiple data sources. Numbers of women in each province and development region in 2017 by marital status, desire to avoid pregnancy and contraceptive use were calculated using data from the 2016 NDHS.[8] The estimates of women aged 15–49 in 2017 were projections of data from the 2011 Nepal National Population and Housing Census[9] and the 2014 estimates calculated by the International Institute for Applied Systems Analysis (IIASA).[10]

We calculated numbers of unintended pregnancies at current levels of contraceptive use, as well as for the other scenarios, using contraceptive use failure rates and pregnancy rates for nonusers from the 2016 NDHS and other sources,[8,11–15] adjusted to the estimated number of unintended pregnancies in each province/development region in 2017. Pregnancy intendedness and pregnancy outcomes were estimated from provincial and regional data on the planning status of recent births from the 2016 NDHS,[8] estimates of unsafe induced abortion rates in 2014[16] and estimates of the number of miscarriages. We calculated the number of pregnancy-related deaths using the maternal mortality ratio estimated in the 2016 NDHS.[8]

Estimates of unsafe abortions are based on regional estimates of the abortion rate published jointly by researchers at the Center for Research on Environment Health and Population Activities (CREHPA) and the Guttmacher Institute.[16] Because the abortion incidence estimates had been calculated for the five development regions, we created proxies for the seven provinces by examining the overlap between the districts in the development regions and in the provinces.

National-level estimates of 2017 pregnancy-related deaths and DALYs among women were obtained from the Institute for Health Metrics and Evaluation.[17]

We estimated the costs of contraceptive and maternal and newborn care using an ingredients-based costing method as follows: For each contraceptive method or health care intervention, we combined the direct costs (in 2017 U.S. dollars) of drugs, supplies, materials, labor and hospitalization with the indirect costs associated with programs and systems to arrive at an annual cost of protection against unintended pregnancy for each woman receiving pregnancy-related medical care. Indirect costs (e.g., overhead and capital expenditure) were based on estimates provided by the United Nations Fund for Population Activities (UNFPA).[11]

We obtained the direct costs of drugs, supplies, materials and labor used for family planning and mother and newborn health care interventions from the following sources: the Nepal Ministry of Health and Population/Department of Health Services/Logistics Management Divisions (LMD) 2014, 2015, 2016; the Nepal Ministry of Health and Population/Department of Drug Administration (DDA) 2016; the Nepal Ministry of Health and Population/Social Health Security Development Committee (SHSDC) 2017; the Nepal Ministry of Health and Population/Department of Health Services/National Public Health Laboratory (NPHL) 2017; the Nepal Ministry of Health and Population/Department of Health Services/Epidemiology and Disease Control Division (EDCD) 2017; the Nepal Ministry of Finance 2017; the Nepal Ministry of Home Affairs 2017; Management Sciences for Health (MSH); the Nepal Ministry of Health/National Center for AIDS and STD Control (NCASC); United Nations Children's Fund (UNICEF, 2016); and the Alibaba website (for a list of all sources and expansion of abbreviations see **Tables 4–6**).

We used the most recently available data, either for 2017, which is the reference year for the analysis, or from the most recently available data projected to 2017. Cost figures are expressed in 2017 U.S. dollars, and all scenarios are calculated as of 2017.

All data used in this project came from publicly available sources and did not contain any individual's identifying information. Consent was therefore not required for these analyses.

Demographic Estimates

1. Population Size and Composition

a. Total population for Nepal and for each region and province, 2017

The total population numbers for each region were obtained by projecting numbers from the 2011 Nepal Population and Housing Census,[9] and the 2014 projections for each region estimated by the International Institute for Applied Systems Analysis (IIASA).[10]

All five regions and seven provinces of Nepal were included in the analysis. In this and

subsequent calculations, when regional data or estimates were available, we computed the national number as the sum of the regional or provincial numbers.

b. Women aged 15–44 and 15–49 by region and province, 2017

1b1.The region level numbers obtained from the 2011 census report[9] were projected to 2017, using the following formula:[18]

Female population of reproductive age, in 2011: P_{2011}
Female population of reproductive age, in 2014: P_{2014}
Number of years between 2011 and 2014: n_0
Number of years between 2011 and 2017: n
Exponential growth rate: r

$$r = \frac{\ln\left(\frac{P_{2011}}{P_{2014}}\right)}{n_0}$$

Female population of reproductive age in 2017 (projected): P_{2017}

$$P_{2017} = P_{2011}e^{rn}$$

That is, for each region, the number of women of reproductive age would be:

$$\#♀(15-49)^{2017}_{\text{region(i)}} = \#♀(15-49)^{2011}_{\text{region}(i)}e^{rn}$$

To obtain the numbers of women of reproductive age by **province**, we used the region level numbers to approximate for the different provinces as follows:

For Province 1, we used the population for the Eastern development region.

For Province 2, we used the average of Eastern and Central development regions.

For Province 3, we used the population of the Central development region.

For Province 4, we used the population of the Western development region.

For Province 5, we used the average of Western and Midwestern development regions.

For Province 6, we used the population of the Midwestern development region.

For Province 7, we used the population of the Far-western development region.

1b2. National numbers were computed as the sum of regional or provincial numbers.

$$\#♀(15–49)^{2017}_{Nepal} = \sum \#♀(15–49)^{2017}_{province(i)}$$

c. Women aged 15–49 in each region/province, by marital and household wealth status, 2017

1c1. We obtained the numbers of women of reproductive age by marital status in each region and province using the following calculation:

$$\#\text{women } (15–49)^{\text{union status}}_{\text{province(i)}} = \#\text{women } (15–49)_{\text{province (i)}} * \%\text{women}^{\text{union status}}_{\text{province(i)}}$$

Data:

1. The percentages of women in union and not in union for each region and province were obtained from the 2016 Nepal Demographic and Health Survey.[8]
2. The number of women of reproductive age in each region or province for 2017 was obtained by projecting the 2011 census data for this group,[9] as described above in **1b1**.

1c2. The sum of the region or province numbers was the total number of women in and not-in union for the country:

$$\#♀(15–49)^{\text{union status}}_{\text{Nepal}} = \sum (\#♀(15–49)_{\text{province (i)}} * \%♀^{\text{union status}}_{\text{province(i)}})$$

1c3. In the DHS, women are categorized according to the wealth of their household relative to other households in the country. Wealth quintiles divide the total household population into fifths (Table 1).

Table 1. Distribution of Nepalese women aged 15–49 by wealth status

Wealth status (quintile)	% of women aged 15–49
First (poorest)	16.9
Second	19.6
Third	20.2
Fourth	21.5
Fifth (wealthiest)	21.8

Source: reference 8.

We obtained the numbers of women married/in union and not in union, by wealth status, using the following calculation:

$$\#♀(15\text{-}49)^{\text{union status}}_{\text{wealth status(i)}} = \#♀(15\text{-}49)^{\text{union status}}_{\text{Nepal}} * \%♀^{\text{union status}}_{\text{wealth status(i)}}$$

Data:

1. We obtained the percentages of women by union and wealth status from the 2016 NDHS.[8]
2. The number of women by union status for all of Nepal was obtained from the calculations outlined in part 1c2.

2. Risk for unintended pregnancy and contraceptive use status

a. Definition of key concepts

Risk for unintended pregnancy is defined as follows:

1) Women not at risk for unintended pregnancy: Those who were not sexually active, who were infecund or who wanted a child within the next two years.
2) Women at risk for unintended pregnancy and seeking to *space* future births: Those who were fecund and either married or unmarried and sexually active, and who did not want a/another child within the next two years. For the purposes of this analysis, we call these women **spacers**.
3) Women at risk for unintended pregnancy and seeking to *limit* future births: Those who were married or unmarried and sexually active, who were fecund and who did not want another child. For the purposes of this analysis, we call these women **limiters**.
4) Risk status of women who were pregnant or amenorrheic[†]: Women were considered to be **at risk** for unintended pregnancy if their current pregnancy or most recent birth was mistimed (i.e., women seeking to **space** births) or unwanted (i.e., women seeking to **limit** births).

The concepts used to determine risk for unintended pregnancy outlined above, were defined as follows:

1) Sexual activity*:* 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 prior 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) Fecundity*:* Sexually active women were classified as infecund if they reported being so at the time of the survey, had had a hysterectomy, or were menopausal. We also considered to be infecund those women who were neither pregnant nor in postpartum amenorrhea but who had not had a menstrual period for six or more months, as well as those who were married

[†]This refers to the number of months after childbirth in which women are protected against pregnancy. In Nepal the median number of months for postpartum amenorrhea is six months.[8]

and not using a contraceptive method during the past five years, but had not had a birth and were not currently pregnant.
3) Childbearing intentions*:* Intention for future childbearing was defined according to women's desire for a child (or another child). Among pregnant women, intention was based on whether their current pregnancy was wanted at that time or earlier, mistimed or unwanted.
4) Amenorrhea*:* Women who were amenorrheic were classified according to the intention status of their last birth.

Contraceptive use status for women at risk is defined as follows:

1) Modern method users: This included women who reported using tubal ligation, vasectomy, IUD, injectable, implant, pill, condom, standard days methods (SDM), and other supply methods. Modern method users could be **spacers** or **limiters**. If they were using tubal ligation or vasectomy, they were always considered limiters.
2) Traditional method users: This included women who reported using periodic abstinence, withdrawal and other non-supply methods. Traditional method users could be **spacers** or **limiters**.
3) Nonusers: Those women who were at risk but using no contraceptive method. Such women were considered to have an unmet need for **spacing** or for **limiting**, depending on their childbearing intentions.

b. Risk for unintended pregnancy and contraceptive use status by scenario:

1. Current (2017) scenario (scenario 2):
We grouped women of reproductive age in each marital status group, by risk of unintended pregnancy and contraceptive use. Each subgroup was further categorized according to province/region and household wealth quintiles.

The calculations to compute the numbers of women by each of these subgroups were set up as follows:

<u>2b1a</u>. Women **not at risk** by union status and region/province:

$$\#\varphi^{\text{not@risk, union status}}_{\text{province (i)}} = \#\varphi^{\text{union status}}_{\text{province (i)}} * \%\varphi^{\text{not@risk, union status}}_{\text{province (i)}}$$

Data:

1. The number of women by union status and province, was obtained from the calculations outlined above in **part 1c1**.
2. The percentages in each subgroup were obtained from the 2016 NDHS.[8]

2b1b. For women **at risk** by union status and region/province, we grouped them by whether they were spacers or limiters:

$$\#♀^{\text{@risk, union status, spacers}}_{\text{province (i)}} = \#♀^{\text{union status}}_{\text{province (i)}} * \%♀^{\text{@risk, union status, spacers}}_{\text{province (i)}}$$

$$\#♀^{\text{@risk, union status, limiters}}_{\text{province (i)}} = \#♀^{\text{union status}}_{\text{province (i)}} * \%♀^{\text{@risk, union status, limiters}}_{\text{province (i)}}$$

Data:

1. The number of women by union status and province/region, was obtained from the calculations outlined above in **part 1c1**.
2. The percentages in each subgroup were obtained from the 2016 NDHS.[8]

2b1b1. We further grouped women at risk as those who have an unmet need for modern contraception, and those who were at risk, but were using modern contraception.

$$\#♀ \text{ met need for modern contraception}^{\text{union status, sp/lt}}_{\text{province (i)}} = \#♀^{\text{union status}}_{\text{province (i)}} * \%♀\text{modern method users}^{\text{union status, sp/lt}}_{\text{province (i)}}$$

$$\#♀ \text{ unmet need for modern contraception}^{\text{union status, sp/lt}}_{\text{province (i)}} = \#♀^{\text{union status}}_{\text{province (i)}} * \%♀ \text{ non-user/trad. users}^{\text{union status, sp/lt}}_{\text{province (i)}}$$

Data:

1. The number of women by union status and province/region, was obtained from the calculations outlined above in **part 1c1**.
2. The percentages in each subgroup were obtained from the 2016 NDHS.[8]

2b1c. Women **not at risk** by union status and wealth status

$$\#♀^{\text{not@risk, union status}}_{\text{wealth status (i)}} = \#♀^{\text{union status}}_{\text{wealth status (i)}} * \%♀^{\text{not@risk, union status}}_{\text{wealth status (i)}}$$

Data:

1. The number of women by union status and wealth status, was obtained from the calculations outlined above in **part 1c3**.
2. The percentages in each subgroup were obtained from the 2016 NDHS.[8]

2b1d. For women **at risk** by union status and wealth status, we grouped them by whether they were spacers or limiters:

$$\#♀^{\text{@risk, union status, spacers}}_{\text{wealth status (i)}} = \#♀^{\text{union status}}_{\text{wealth status (i)}} * \%♀^{\text{@risk, union status, spacers}}_{\text{wealth status (i)}}$$

$$\#♀^{\text{@risk, union status, limiters}}_{\text{wealth status (i)}} = \#♀^{\text{union status}}_{\text{wealth status (i)}} * \%♀^{\text{@risk, union status, limiters}}_{\text{wealth status (i)}}$$

Data:

1. The number of women by union status and wealth status, was obtained from the calculations outlined above in **part 1c3**.
2. The percentages in each subgroup were obtained from the 2016 NDHS.[8]

2b1d1. We further grouped women at risk as those who have an unmet need for modern contraception, and those who were at risk, but were using modern contraception.

$$\#\text{♀ met need for modern contraception}^{\text{union status, sp/lt}}_{\text{WQ (i)}} = \#\text{♀}^{\text{union status}}_{\text{WQ (i)}} * \%\text{♀modern method users}^{\text{union status, sp/lt}}_{\text{WQ (i)}}$$

$$\#\text{♀ unmet need for modern contraception}^{\text{union status, sp/lt}}_{\text{WQ (i)}} = \#\text{♀}^{\text{union status}}_{\text{WQ (i)}} * \%\text{♀ non-user/trad. users}^{\text{union status, sp/lt}}_{\text{WQ (i)}}$$

Data:

1. The number of women by union status and wealth status was obtained from the calculations outlined above in **part 1c1**.
2. The percentages in each subgroup were obtained from the 2016 NDHS.[8]

Adjustments to values:

The wealth quintiles totals by risk did not match the totals by risk for the regions/provinces, due to differences in data. The differences range from 0.05% to 0.2%. Therefore we adjusted the values in the final tables for wealth status to align them with the region/province totals. In order to do this, we first divided provinces/regions totals (by risk status) by the wealth quintile totals (also by risk status). The result of this division was multiplied by the result obtained above (**2b1c** and **2b1d**) in each category.

$$\text{final } \#\text{♀}^{\text{risk\&union status,space/limit}}_{\text{wealth status (i)}} = \text{Result of 2b1c \& 2b1d} * \frac{\text{total } \#\text{♀}^{\text{province}}_{\text{Nepal}}}{\text{total } \#\text{♀}^{\text{wealth status}}_{\text{Nepal}}}$$

<u>2b1e</u>. Contraceptive use status by union status among all women at risk for unintended pregnancy by provinces:

$$\#\text{ ♀ with met need}^{\text{union status, spacers, method type}}_{\text{province (i)}} = \#\text{ all ♀}^{\text{@risk, union status}}_{\text{province (i)}} * \%\text{ all ♀}^{\text{union status, spacers, method type}}_{\text{province (i)}}$$

$$\#\text{ ♀with met need}^{\text{union status, limiters, method type}}_{\text{province (i)}} = \#\text{ all ♀}^{\text{@risk, union status}}_{\text{province (i)}} * \%\text{ all ♀}^{\text{union status, limiters, method type}}_{\text{province (i)}}$$

<u>2b1f</u>. Contraceptive use status by union status among all women at risk for unintended pregnancy for wealth quintiles:

$$\#\text{ ♀ with met need}^{\text{union status, spacers, method type}}_{\text{wealth status } (i)} = \#\text{ all ♀}^{\text{@risk, union status}}_{\text{wealth status } (i)} * \%\text{ all ♀}^{\text{union status, spacers, method type}}_{\text{wealth status } (i)}$$

$$\#\,\text{♀ with met need}^{\text{union status, limiters, method category}}_{\text{wealth status (i)}} = \#\,\text{all ♀}^{\text{@risk, union status}}_{\text{wealth status (i)}} * \%\,\text{all ♀}^{\text{union status, limiters, method category}}_{\text{wealth status (i)}}$$

Data:

1. The number of women at risk by union status and province was obtained from the calculations outlined in part **2b1b** above.
2. The number of women at risk by union status and province was obtained from the calculations outlined in part **2b1d** above.
3. The percent of women by province, union status and method category who were spacers/limiters was obtained from the 2016 NDHS.
4. The method types for spacers were pill, IUD, injectable, implant, condom, other modern methods, periodic abstinence, withdrawal and other traditional methods.
5. The method types for limiters included all the methods listed for spacers, plus male and female sterilization.

Adjustments to values for wealth quintiles:

The wealth quintile totals of women at risk by method categories did not match the totals for the regions/provinces. Therefore, we adjusted the values in the final tables for wealth status. In order to do this, we first divided provinces/regions totals for women at risk (by each method category) by the wealth quintile totals for women at risk (also by method categories). The result of this division was multiplied by the result obtained above in **2b1f** in each category.

$$\text{final}\ \#\text{♀@risk}^{\text{union status,space/limit,method}}_{\text{wealth status (i)}} = \text{Result of 2b1f} * \frac{\text{total}\ \#\text{♀@risk}^{\text{province,method}}_{\text{Nepal}}}{\text{total}\ \#\text{♀@risk}^{\text{wealth status,method}}_{\text{Nepal}}}$$

2. Risk for unintended pregnancy in alternative contraceptive-use scenarios

The introduction of this report outlined the alternative hypothetical use scenarios. All of them assume that other variables are unchanged, including the number of women aged 15–49 and their distribution by region, marital status, household wealth, fecundity, intention to space or limit births and sexual activity (among unmarried women).

We computed the contraceptive use status by union status among all women at risk for unintended pregnancy for each of the hypothetical use scenarios. These are discussed below.

Zero modern contraceptive use (scenario 1):

In this scenario, all women at risk for unintended pregnancy either have an unmet need for modern methods or are traditional method users. To calculate the number of women at risk for unintended pregnancy who had an unmet need for modern methods, we added the number of women in the current scenario who were at risk and had an unmet need for a modern method to the number of women in the current scenario who were using modern

methods. The number of women using traditional methods was equal to the number of women using traditional methods in the current scenario.

2b2a. By province:

$$\#\text{♀ unmet need}^{\text{union status, spacers}}_{\text{prov(i),scen 1}} = \#\text{♀ unmet need}^{\text{union status, spacers}}_{\text{prov(i), scen2}} + \#\text{♀ mod. methods}^{\text{union status,spacers}}_{\text{prov (i),scen 2}}$$

$$\#\text{♀ unmet need}^{\text{union status, limiters}}_{\text{prov(i),scen 1}} = \#\text{♀ unmet need}^{\text{union status, limiters}}_{\text{prov(i), scen2}} + \#\text{♀ mod. methods}^{\text{union status,limiters}}_{\text{prov (i),scen 2}}$$

$$\#\text{♀ unmet need}^{\text{union status, spacers+limiters}}_{\text{prov(i),scen 1}} = \#\text{♀ unmet need}^{\text{union status, spacers}}_{\text{prov(i), scen1}} + \#\text{♀ mod. methods}^{\text{union status,limiters}}_{\text{prov (i),scen 1}}$$

2b2b. By wealth status:

$$\#\text{♀ unmet need}^{\text{union status, spacers}}_{\text{WQ(i),scen 1}} = \#\text{♀ unmet need}^{\text{union status, spacers}}_{\text{WQ(i), scen2}} + \#\text{♀ mod. methods}^{\text{union status,spacers}}_{\text{WQ (i),scen 2}}$$

$$\#\text{♀ unmet need}^{\text{union status, limiters}}_{\text{WQ(i),scen 1}} = \#\text{♀ unmet need}^{\text{union status, limiters}}_{\text{WQ(i), scen2}} + \#\text{♀ mod. methods}^{\text{union status,limiters}}_{\text{WQ (i),scen 2}}$$

$$\#\text{♀ unmet need}^{\text{union status, spacers+limiters}}_{\text{WQ(i),scen 1}} = \#\text{♀ unmet need}^{\text{union status, spacers}}_{\text{WQ(i), scen1}} + \#\text{♀ mod. methods}^{\text{union status,limiters}}_{\text{WQ (i),scen 1}}$$

Data:

1. The data for the province level calculations come from part **2b1b1**.
2. The data for the wealth status calculations come from part **2b1d1**. Additional adjustments to the wealth status estimates were not required for this scenario.

All unmet need met scenario (scenario 3):

In this scenario, all women at risk of an unintended pregnancy are using a modern method, including women who were traditional method users in the current scenario. To calculate the number of women who were modern method users, we summed the total number of method users (modern and traditional) in the current scenario with the total number of women with an unmet need for a modern method in the current scenario.

2b2c. By province:

$$\#\text{♀ modern method users}_{\text{scen3, prov(i)}} = \#\text{all ♀ method users(trad+modern)}_{\text{scen2, prov(i)}} + \text{all♀ non-users}_{\text{scen2, prov(i)}}$$

$$\#\text{♀modern method users}^{\text{method type}}_{\text{scen3,prov(i)}} = \#\text{♀modern method users}_{scen3,prov(i)} * \frac{\%\text{users among all ♀}^{\text{method type}}_{\text{scen2,prov(i)}}}{\Sigma\%\text{♀ mod meth users of all ♀}^{\text{all mod meth types}}_{\text{scen2, prov(i)}}}$$

2b2d. By wealth status:

$$\#\text{♀ modern method users}_{scen3,WQ(i)} = \#\text{all ♀ method users(trad+modern)}_{\text{scen2, WQ(i)}} + \text{all♀ with unmet need}_{\text{scen2, WQ(i)}}$$

$$\#\text{♀modern method users}^{\text{union status, method type}}_{\text{scen3,WQ(i)}} = \#\text{♀modern method users}^{\text{union status}}_{\text{scen3, WQ(i)}} * \left(\frac{\#\text{♀modern method user}^{\text{method type}}_{\text{scen2 WQ(i)}}}{\#\text{♀modern method users}_{\text{scen2, WQ(i)}}}\right)$$

Adjustments to values for wealth quintiles:

The wealth quintile totals of women at risk by method categories did not match the totals for the regions/provinces. Therefore, we adjusted the values in the final tables for wealth status. In order to do this, we first divided provinces/regions totals for women at risk (by each method category) by the wealth quintile totals for women at risk (also by method categories). The result of this division was multiplied by the result obtained above in **2b2d** in each category. The calculation followed the same template as laid out in **2b1f** above.

Half unmet need is met (Scenario 4):

In this scenario, half of women at risk for an unintended pregnancy are considered to be using a modern method, while the other half are considered to have an unmet need. We assume that exactly half of all women at risk who were using a modern or traditional method or those who had an unmet need in scenario 2, were using a modern method in scenario 4, while the other half from scenario 2 had an unmet need.

<u>2b2e</u>. By province:

$$\#\text{♀ trad. method users}^{\text{method type, space/lt.}}_{\text{scen4, prov(i)}} = \#\text{♀ trad. method users}^{\text{method type, space/lt}}_{\text{scen2, prov(i)}} * 50\%$$

$$\#\text{♀users all methods}^{\text{method type, space/lt}}_{\text{scen4, prov(i)}} = (\#\text{♀with unmet need}^{\text{space/lt}}_{\text{scen2, prov(i)}} + \#\text{♀users all method(trad+mod)}^{\text{space/lt}}_{\text{scen2,prov(i)}} * 50\%$$

$$\#\text{♀ modern method users}^{\text{space/lt}}_{\text{scen4,prov(i)}} = \#\text{all ♀ method users(trad+mod)}^{\text{space/lt}}_{scen4,prov(i)} - \#\text{♀ trad method users}^{\text{space/lt}}_{\text{scen4, prov(i)}}$$

$$\#\text{♀modern method users}^{\text{method type}}_{\text{scen4,prov(i)}} = \#\text{♀modern method users}^{space/lt}_{scen4,prov(i)} * \frac{\%\text{♀users of all ♀}^{method\ type}_{scen2,prov(i)}}{\Sigma\%\text{♀ mod meth users of all ♀}_{scen2,prov(i)}}$$

<u>2b2f</u>. By wealth status:

$$\#\text{♀with unmet need}^{\text{union status}}_{\text{WQ, scen4}} = \#\text{♀with unmet need}^{\text{union status}}_{\text{WQ, scen2}} * 50\%$$

$$\#\text{♀using traditional methods}^{\text{union status}}_{\text{WQ, scen4}} = \#\text{♀using traditional methods}^{\text{union status}}_{\text{WQ, scen2}} * 50\%$$

$$\#\text{♀ mod meth users}^{\text{union status,method type}}_{scen4,WQ(i)} = ((\#\text{all ♀ meth users (trad+modern)+ \#♀ unmet need})*50\%)_{\ scen2,WQ(i)} + \text{all♀ unmet need}_{scen2,WQ(i)}$$

$$\#\text{♀modern method users}^{\text{method type}}_{\text{scen4,WQ(i)}} = \#\text{♀modern method users}^{\text{union status,}}_{scen4,WQ(i)} * \left(\frac{\#\text{♀modern method user}^{method\ type}_{scen2\ WQ(i)}}{\#\text{♀modern method users}_{scen2,WQ(i)}}\right)$$

Adjustments to values for wealth quintiles:

The wealth quintile totals of women at risk by method categories did not match the totals for the regions/provinces. Therefore, we adjusted the values in the final tables for wealth status. In order to do this, we first divided provinces/regions totals for women at risk (by each method category) by the wealth quintile totals for women at risk (also by method categories). The result of this division was multiplied by the result obtained above in **2b2f** in each category. The calculation followed the same template as laid out in **2b1f** above.

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

a. Total pregnancies

This is the sum of conceptions ending in birth, induced abortion and miscarriage. The calculations for obtaining the numbers of each are provided below.

Scenario 2. Current contraceptive use

b. Numbers of births, by province and wealth, 2017

We applied regional general fertility rates from the 2016 NDHS[8] to the 2017 numbers of women aged 15–44 in each region to estimate the number of births, by province, in 2017. The general fertility rate (GFR) is the number of births in each province in the three years preceding the 2016 DHS per 1,000 women aged 15–44.

<u>3b1</u>. By province:

$$\#\text{Births}^{\text{all }\female}_{\text{prov(i)}} = \#\female^{15-44}_{\text{prov(i)}} * \frac{GFR^{15-44}_{\text{prov(i)}}}{1000}$$

Data:

1. The data on the number of women 15-44 by province was obtained from the projections to the 2011 census data.
2. The general fertility rate was obtained from the 2016 NDHS.[8]

<u>3b2</u>. By wealth status:

$$\#\text{Births}^{\text{all }\female}_{\text{WQ(i)}} = \#\female^{15-49}_{\text{WQ(i)}} * \frac{GFR^{15-44}_{\text{prov(i)}}}{1000} * \frac{\#\text{all}\female^{15-44}_{Nepal}}{\#\text{all }\female^{15-49}_{Nepal}}$$

Adjustments to values for wealth quintiles:

The wealth quintile totals of births by wealth quintile categories did not match the birth totals for the regions/provinces. Therefore, we adjusted the values in the final tables for wealth status. In order to do this, we first divided provinces/regions totals by the wealth quintile totals. The result of this division was multiplied by the result obtained above in **3b2** in each category. The calculation followed the same template as laid out in **2b1f** above.

c. Planning status of births by province, union status and wealth

We distributed the estimated numbers of births in each region in 2017 according to the planning-status distribution of births reported in the 2016 NDHS.[8] To construct this variable, we considered all births in the last three years. This is unlike the DHS which considers all births in the last five years.

The planning status of births variable categorizes births according to whether women reported wanting a pregnancy then, wanting a pregnancy later, or not wanting any (additional) births. Births among 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 "planned" or "wanted".

This variable does not include current pregnancies and pregnancies where there is missing data on intention status. This is a departure from the manner in which the NDHS constructs this variable.

We calculated the number of births by intention status as follows:

<u>3c1</u>. By province:

$$\#\text{Wanted births}^{\text{all ♀}}_{\text{prov(i)}} = \#\text{Births}^{\text{all ♀}}_{\text{prov(i)}} * \%\text{Wanted births}^{\text{all ♀}}_{\text{prov(i)}}$$

$$\#\text{Births mistimed}^{\text{all ♀}}_{\text{prov(i)=}} \#\text{Births}^{\text{all ♀}}_{\text{prov(i)}} * \%\text{Births mistimed}^{\text{all ♀}}_{\text{prov (i)}}$$

$$\#\text{Births unwanted}^{\text{all ♀}}_{\text{prov(i)=}} \#\text{Births}^{\text{all ♀}}_{\text{prov(i)}} * \%\text{Births unwanted}^{\text{all ♀}}_{\text{prov (i)}}$$

Data:

1. The data on the number of births to all women by province was obtained from **3b1** above.
2. The percent of births by intention status was obtained from the 2016 NDHS.[8]

d. Number of induced abortions, 2014[16]

We obtained the annual national and regional rate of induced abortions from the Puri et al (2016) publication.[16] The rate of abortions was assumed to be constant for all categories of household wealth status. The number of abortions was obtained by multiplying the abortion rate by the number of women of reproductive age obtained from the census projections.

<u>3d1</u>. Scenario 2 by region and province:

$$\#\text{induced abortions}^{\text{all ♀}}_{\text{region(i)}} = \frac{\text{induced abortion rate}^{\text{all ♀}}_{\text{region(i)}}}{1000} * \#♀^{\text{15-49}}_{\text{region(i)}}$$

Data:

1. We obtained the induced abortion rate from the Puri et al. (2016) paper.[16] This provides the abortion rates for the five development regions. Since we did not have the

rates by province, we approximated them using the rates for the development regions. This was done as follows:

For Province 1, we used the rate estimated for the Eastern region, since 14 districts out of 16 districts between the two units match.

For Province 2, we took the average of the rates estimates for Eastern and Central development regions, since its districts are divided between these two development regions.

For Province 3, we used the rate estimated for the Central development region, since 13 out of 19 districts between the two units match.

For Province 4, we used the rate estimated for the Western development region, since 10 out of 16 districts between the two units match.

For Province 5, we took the average of the rates estimated for the Western and Midwestern regions, since the districts for Province 5 are divided between these two provinces.

For Province 6, we used the rate estimated for the Midwestern development region, since 9 out of 15 districts between the two units match.

For Province 7, we used the rate estimated for the Far-western development region since 9 out of 9 districts between the two units match.

2. We obtained the number of women of reproductive age from the projections of the 2011 census data (specified in **1b1** above).

<u>3d2</u>. Scenario 2 by wealth quintile:

$$\#\text{induced abortions}^{\text{all }\♀}_{\text{WQ(i)}} = \frac{\text{induced abortion rate}^{\text{all }\♀}_{\text{Nepal}}}{1000} * \#\♀^{\text{15-49}}_{\text{WQ(i)}}$$

Data:

1. We obtained the induced abortion rate for all women in Nepal from the Puri et al. (2016) paper.[16]
2. The number of women of reproductive age by wealth quintile is obtained from calculations shown in **1c3** above.

Adjustments to values for wealth quintiles:

The wealth quintile totals of induced abortion by wealth quintile categories did not match the induced abortion totals for the regions/provinces. Therefore, we adjusted the values in the

final tables for wealth status. In order to do this, we first divided provinces/regions totals by the wealth quintile totals. The result of this division was multiplied by the result obtained above in **3d2** in each category. The calculation followed the same template as laid out in **2b1f** above.

e. Number of miscarriages[19]

Miscarriages resulting from unintended pregnancies are estimated to be equivalent to 20% of pregnancies ending in unintended birth plus 10% of those ending in induced abortion (all of which are assumed to be unintended). These proportions attempt to account for pregnancies that end in miscarriage late enough to be noted by the woman (6–7 weeks after the last menstrual period).

<u>3e1</u>. Miscarriages resulting from unintended pregnancies by province:

$$\#\text{miscarriages}^{\text{unwanted conceptions}}_{\text{prov(i)}} = \#\text{induced abortions}^{\text{all ♀}}_{\text{prov(i)}} * 0.1 + (\#\text{births mistimed}^{\text{all ♀}}_{\text{prov (i)}} + \#\text{births unwanted}^{\text{all ♀}}_{\text{prov (i)}}) * 0.2$$

Data:

1. The numbers of induced abortions are obtained from calculations shown in **3d1**.
2. The numbers of births wanted later and never wanted are obtained from calculations shown in **3c1** above.

<u>3e2</u>. Miscarriages resulting from intended pregnancies by province:

$$\#\text{miscarriage}^{\text{wanted conceptions}}_{\text{prov(i)}} = \#\text{wanted births}^{\text{all ♀}}_{\text{prov(i)}} * 0.2$$

Data:

1. The numbers of wanted births were obtained from calculations shown in **3c1** above.

<u>3e3</u>. Miscarriages resulting from unintended pregnancies by wealth quintiles:

$$\#\text{miscarriage}^{\text{unwanted conceptions}}_{\text{WQ(i)}} =$$
$$\#\text{induced abortions}^{\text{all ♀}}_{\text{WQ(i)}} * 0.1 + (\#\text{births wanted later}^{\text{all ♀}}_{\text{WQ (i)}} + \#\text{births never wanted}^{\text{all ♀}}_{\text{WQ (i)}}) * 0.2$$

Data:

1. The number of induced abortions by wealth quintile was obtained from calculations shown in **3d2** above.
2. The number of births wanted later or never was obtained from calculations shown in **3c3** above.

<u>3e4</u>. Miscarriages resulting from intended pregnancies by wealth quintile:

$$\#\text{miscarriages}_{\text{WQ(i)}}^{\text{wanted conceptions}} = \#\text{wanted births}_{\text{WQ(i)}}^{\text{all ♀}} * 0.2$$

Data:

1. The number of wanted births were obtained from calculations shown in **3c3** above.

Adjustments to values for wealth quintiles:

The wealth quintile totals of miscarriages by wealth quintile categories did not match the miscarriage totals for the regions/provinces. Therefore, we adjusted the values in the final tables for wealth status. In order to do this, we first divided provinces/regions totals by the wealth quintile totals. The result of this division was multiplied by the result obtained above in **3e4** in each category. The calculation followed the same template as laid out in **2b1f** above.

f. Intended pregnancies

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

<u>3f1</u>: By province:

$$\#\text{intended pregnancies}_{\text{prov(i)}}^{\text{all ♀}} = \#\text{wanted births}_{\text{prov(i)}}^{\text{all ♀}} + \text{miscarriages}_{\text{prov(i)}}^{\text{wanted conceptions}}$$

Data:

1. All components on the right-hand-side of the equation were obtained from **3c1** and **3e2**.

3f2: By wealth quintile:

$$\#\text{intended pregnancies}_{\text{WQ(i)}}^{\text{all ♀}} = \#\text{wanted births}_{\text{WQ(i)}}^{\text{all ♀}} + \text{miscarriages}_{\text{WQ(i)}}^{\text{wanted conceptions}}$$

Data:

1. All components on the right-hand-side of the equation were obtained from **3c3** and **3e4**.

g. Unintended pregnancies

Unintended pregnancies are the sum of unplanned births, induced abortions and estimated miscarriages following unintended conceptions. The calculation is set up as follows:

<u>3g1</u>. By province:

$$\#\text{unintended pregnancies}_{\text{prov (i)}}^{\text{all ♀}} =$$
$$\#\text{induced abortions}_{\text{prov(i)}}^{\text{all ♀}} + \text{miscarriages}_{\text{prov(i)}}^{\text{all ♀}} + \text{births wanted later}_{\text{prov(i)}}^{\text{all ♀}} + \text{births never wanted}_{\text{prov(i)}}^{\text{all ♀}}$$

Data:

1. The components for the right-hand-side of the equation shown above were obtained from **3c1**, **3d1**, and **3e1**.

<u>3g2</u>. By wealth quintile:

$$\#\text{unintended pregnancies}^{\text{all }\♀}_{\text{WQ (i)}} = \#\text{induced abortions}^{\text{all }\♀}_{\text{WQ(i)}} + \text{miscarriages}^{\text{all }\♀}_{\text{WQ(i)}} + \text{births wanted later}^{\text{all }\♀}_{\text{WQ(i)}} + \text{births never wanted}^{\text{all }\♀}_{\text{WQ(i)}}$$

Data:

1. The components for the right-hand-side of the equation shown above were obtained from **3c3**, **3d2**, and **3e3**.

h. Outcomes of unintended pregnancies

Unintended pregnancies were distributed according to outcome (birth, induced abortion or miscarriage), based on the regional and provincial distributions estimated from the 2016 NDHS birth rates and intention status information, 2014 induced abortion rates and model-based miscarriage rates [8,16]. The calculations are as described above.

i. Pregnancy intentions and outcomes for alternate scenarios of modern contraceptive use

The estimates of pregnancy intentions and outcomes for scenarios 1, 3, and 4 were calculated using formulas provided in the next section.

4. Unintended pregnancies among women at risk by method and unmet need (using contraceptive failure rates)

In addition to computing the number of unintended pregnancies among women at risk, using a combination of NDHS and census data (see section 3 above), we also computed the numbers of unintended pregnancies among women at risk, using contraceptive failure rates data. This is an alternative method of estimating unintended pregnancies, and the reason for making this alternative estimate is to develop adjusted failure rates (see below) which are needed to estimate unintended pregnancies in the scenarios in which all or half of current unmet need is met.

We multiplied the annual pregnancy rates among a) women using contraceptive methods, and b) among women at risk for unintended pregnancy who were using no method, by the estimated numbers of women in Nepal in 2016, to estimate the current number of unintended pregnancies. The calculations used the current contraceptive mix.

a. Initial/unadjusted failure rates

Table 2 shows the initial or unadjusted failure rates used in the study. These were obtained from special tabulations of data for Darroch (2018).[20]

Table 2. Unadjusted contraceptive failure rates, Nepal 2017

Contraceptive method	Failure rate
Female sterilization	0.5
Male sterilization	0.2
Pill	5.5
IUD	0.9
Injectable	1.7
Implant	0.4
Condom	8.0
Other supply	5.5
Periodic abstinence	19.3
Withdrawal	14.6
Other nonsupply	18.2
No protection/nonuse of method	40.0

Note: These are typical use failure rates and refer to the percentage of women experiencing an unintended pregnancy during the first year of typical use of contraception.

For women at risk for unintended pregnancy using no method, we assumed an annual pregnancy rate of 40%.[20] The 40% estimate is much lower than the 85% annual pregnancy rate that Trussell et al. (2018) estimate for couples who are continually sexually active.[13] Some studies have suggested however, that couples at risk for unintended pregnancy who are using no contraceptive method are not continually sexually active.[21]

4a1. The unadjusted unintended pregnancy numbers from the contraceptive failure rates data were obtained as follows:

$$\#\text{UIP due to cp failure}_{\text{prov(i)}}^{\text{union status,spacer,limiters.nonuse}} = \sum (\#\text{♀}_{\text{prov(i)}}^{\text{method type, union status, sp/lt,nonuse}} * \text{unadj. cp failure rate}_{\text{prov(i)}}^{\text{method type}})$$

Data:

1. The number of women at risk who are using specific methods/not using any method by union status and region/province was obtained from calculations shown in **2b1c** and **2b1d** above.
2. The unadjusted contraceptive failure rate for each method was obtained from the values shown in **table 2**.

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 and provinces from the number of unintended pregnancies estimated using the NDHS intention

status variable (discussed in section 3 above). This is likely due, in part, to the fact that many unintended pregnancies that end in induced abortion are not reported in the NDHS 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 and province equaled the number estimated from intention status.

The same regional and provincial adjustments were applied to the initial typical use failure rates for all methods and the nonuse pregnancy rate used for all women in the same region/province, regardless of women's marital status or household wealth.

4b1. The adjustment factor was calculated as follows:

$$\text{Adjustment factor}_{\text{prov(i)}} = \frac{\#\text{UIP (abortions + miscarriages from UIP + mistimed+unwanted births)}_{\text{prov(i)}}}{\#\text{UIP due to method failure}^{\text{sp,lt,non use}}_{\text{prov (i)}}}$$

Data:

1. The number unintended pregnancies from summing the abortions, unwanted births and miscarriages from UIP was obtained from **3g1** above.
2. The number of unintended pregnancies from failure rates was obtained from **4a1** above.

4b2. The adjusted contraceptive failure rates were computed as follows:

$$\text{Adjusted failure rate}^{\text{method type}}_{\text{prov(i)}} = \text{Unadjusted cp failure rate}^{\text{method type}}_{\text{prov(i)}} * \text{Adjustment factor}$$

Data:

1. The unadjusted contraceptive failure rate was obtained from **table 2** above.
2. The adjustment factor was obtained from calculations shown in **4b1** above.

4b3. Revised unintended pregnancy numbers using adjusted failure rates:

$$\#\text{UIP due to cp failure}^{\text{union status, method type}}_{\text{prov(i)}} = \#\text{♀ at risk}^{\text{union status, method type, sp,lt,nonuse}}_{\text{prov(i)}} * \text{adjusted failure rates}$$

Data:

1. The number of women at risk using contraceptives or those not using, by union status, method type, and by spacing and limiting was obtained from the calculations shown in **2b1e**.
2. The adjusted failure rates for each method were obtained from **4b2**.

c. Unintended pregnancies by wealth quintile:

4c1. Unintended pregnancies from unadjusted failure rates by wealth quintile

$$\#\text{unadj. UIP from method failure}_{\text{WQ(i)}}^{\text{union status method type or unmet need}} = \Sigma\#\text{♀}_{\text{WQ(i)}}^{\text{union status, method type, sp, lt, unmet need}} * \text{unadj. failure rate}$$

Data:

1. The number of women by union status and method type in each wealth quintile is obtained from calculations shown in **2b1f** above.
2. The unadjusted failure rate for each method is obtained from table 2 shown above.

4c2. Adjustment factor:

$$\text{Adjustment factor}_{\text{WQ(i)}} = \frac{\#\text{unadj.UIP (abortions+miscarriages from UIP+mistimed+unwanted births)}_{\text{WQ(i)}}}{\Sigma\#\text{unadj.UIP from method failure}_{\text{WQ(i)}}^{\text{method type or unmet need}}}$$

Data:

1. The unadjusted UIP numbers computed as a sum of abortions, unintended births and unintended miscarriages is obtained from **3g2** above.
2. The denominator is obtained from **4c1** above.

4c3. Adjusted failure rate:

$$\text{Adjusted failure rate}_{\text{WQ(i)}}^{\text{method type or unmet need}} = \text{Unadjusted failure rate}_{\text{WQ(i)}}^{\text{method type or unmet need}} * \text{Adjustment rate}$$

Data:

1. The unadjusted failure rate by wealth quintile was obtained from **4c1** above.
2. The adjustment rate was obtained from **4c2** above.

4c4. Adjusted number of unintended pregnancies by wealth quintile using adjusted failure rates:

$$\#\text{UIP from method failure}_{\text{WQ(i)}}^{\text{union status, method type or nonuse}} = \#\text{♀ at risk}_{\text{WQ(i)}}^{\text{union status, method type or nonuse}} * \text{adj. failure rate}$$

Data:

1. The number of women at risk using contraceptives or those not using, by union status, method type, and by spacing and limiting was obtained from the calculations shown in **2b1f**.
2. The adjusted failure rates for each method were obtained from **4c3**.

d. Pregnancy outcomes by type of method use

1. Scenario 2: Current contraceptive use:

4d1a. Unintended pregnancies

$$\#\ \text{UIP}^{\text{nonuse/method use by type}}_{\text{prov(i), scen2}} = \#\,♀^{\text{nonuse/meth users by type}}_{\text{prov(i), scen 2}} * \text{adjusted cp failure rate}^{\text{nonuse/method type}}_{\text{prov (i)}}$$

Data:

1. The number of women modern/traditional method users by type and nonusers is obtained from calculations shown in 2b1c and 2b1d above.
2. The adjusted contraceptive failure rate is obtained from calculations shown in **4b2** above.

2. Scenario 1. Zero contraceptive use:

<u>4d2a</u>. For scenario 1, all users of modern method in scenario 2 and those with unmet need in scenario 2 are considered as having an unmet need.

$$\#\ ♀^{\text{unmet need}}_{\text{scen 1, prov(i)}} = \#\ ♀^{\text{unmet need}}_{\text{prov(i), scen2}} + \#♀^{\text{modern method users}}_{\text{prov(i), scen 2}}$$

Data:

1. The data for numbers of women with unmet need by province was obtained from the calculations shown in 2b1b1 above.

<u>4d2</u>. Number of unintended pregnancies in scenario 1:

$$\#\ \text{UIP}^{\text{nonuse of mod cp}}_{\text{prov(i), scen1}} = \#♀^{\text{unmet need}}_{\text{prov(i), scen 1}} * \text{adjusted contraceptive failure for ♀ with unmet need}$$

Data:

1. The number of women with unmet need by province in scenario is obtained from **4d1**.
2. The adjusted contraceptive failure rate for women with unmet need is obtained from **4b2** above.

<u>4d3</u>. Number of induced abortions in scenario 1.

$$\#\ \text{induced abortions}^{\text{nonuse of mod cp}}_{\text{prov (i), scen1}} = \#\ \text{UIP}^{\text{non use of mod cp}}_{\text{prov (i), scen1}} * \frac{\#\ \text{induced abortions}^{\text{scen 2}}_{\text{prov (i)}}}{\#\ \text{UIP}^{\text{scen 2}}_{\text{prov (i)}}}$$

Data:

1. The numbers of unintended pregnancies for nonuse of contraception by province for scenario 1, was obtained from **4d2** above.
2. The number of induced abortions and unintended pregnancies in scenario 2 was obtained from **3d1** and **3g1** above.

<u>4d4</u>. The number of unplanned births in scenario 1:

$$\#\ \text{unplanned births}^{\text{nonuse of mod cp}}_{\text{prov (i), scen (1)}} =$$

$$\#\ \text{UIP}^{\text{nonuse of mod cp}}_{\text{prov (i), scen1}} - \#\ \text{induced abortions}^{\text{nonuse of cp}}_{\text{prov(i), scen1}} * \frac{1+\text{ratio of miscarriages to induced abortions}}{1+\text{ratio of miscarriages to births}}$$

Data:

1. The number of unintended pregnancies for nonuse of contraception by province in scenario 1 is obtained from **4d2** above.
2. The number of induced abortions by province in scenario 1 is obtained from **4d3** above.
3. The ratio of miscarriages to induced abortions is a model based estimate, computed to be 0.1, while the ratio of miscarriages to births is also a model based estimate, computed to be 0.2.[19]

Scenario 3. Full unmet need for modern contraception is met:

4d4. Number of women who are modern method users in scenario 3:

$$\#\text{♀all modern method users}^{\text{union status}}_{\text{scen3, prov(i)}} =$$
$$\#\text{♀ with unmet need}^{\text{union status}}_{\text{scen 2, prov(i)}} + \#\text{♀modern method users}^{\text{union status}}_{\text{scen 2, prov(i)}}$$

Data:

1. The components on the right hand side of the equation were obtained from calculations shown in **2b1e** above.

4d5. Number of women users by modern method type in scenario 3:

$$\#\text{♀ mod meth users}^{\text{method type, union status,sp or lt.}}_{\text{scen 3, prov(i)}} = \#\text{♀all users of mod meth}^{\text{union status}}_{\text{scen 3, prov(i)}} * \frac{\%\text{♀users}^{\text{method type}}_{\text{scen 2, prov(i)}}}{\%\text{♀all modern meth users}^{\text{union status}}_{\text{scen 2, prov(i)}}}$$

Data:

1. The total number of women who used modern methods in scenario 3, by union status and province was obtained from **4d4** above.
2. The percent of women who used each method in scenario 2 and the total percent of all modern method users in scenario 2 was obtained from the 2016 NDHS.

4d6. Number of unintended pregnancies in scenario 3:

$$\#\text{UIP}^{\text{modern use failures}}_{\text{prov(i), scen3}} = \#\text{♀mod meth users}^{\text{method type, union status, sp or lt.}}_{\text{scen 3, prov (i)}} * \text{contraceptive failure}^{\text{method type}}_{\text{prov(i)}}$$

Data:

1. The number of women who were modern method users by method type, union status, and province was obtained from **4d5** above.
2. The contraceptive failure rate by method type was obtained from **4b2** above.

4d7. Number of induced abortions in scenario 3:

$$\#\text{induced abortions}^{\text{modern use failures}}_{\text{scen3,prov(i)}} = \#\text{UIP}^{\text{modern use failures}}_{\text{scen 3, prov(i)}} * \frac{\#\text{induced abortions}_{\text{scen 2, prov(i)}}}{\#\text{UIP}_{\text{scen 2, prov(i)}}}$$

Data:

1. The number of unintended pregnancies in scenario 3 for each province comes from **4d6** above.
2. The numbers of induced abortions and the numbers of unintended pregnancies by province are obtained from **3d1** and **3g1** above.

4d8. Number of unplanned births in scenario 3.

$$\#\text{ unint. births}^{\text{modern use failures}}_{\text{prov (i), scen (3)}} =$$
$$\#\text{ UIP}^{\text{modern use failures}}_{\text{prov (i), scen3}} - \#\text{ induced abortions}^{\text{modern use failures}}_{\text{prov(i), scen3}} * \frac{1+\text{ratio of miscarriages to induced abortions}}{1+\text{ratio of miscarriages to births}}$$

Scenario 4. Half of unmet need for modern contraception is met.

4d9. Number of women with unmet need in scenario 4:

$$\#\ ♀\text{ with unmet need}^{\text{union status}}_{\text{scen4, prov(i)}} = (\sum \#\ ♀^{\text{union status}}_{\text{scen 2, prov(i)}} * \%\ ♀\text{ unmet need}^{\text{union status, spacers/lt}}_{\text{scen 2, prov(i)}}) * 0.5$$

4d10. Number of women with unmet need who are traditional method users in scenario 4:

$$\#♀\text{all trad method users}^{\text{union status}}_{\text{scen4, prov(i)}} =$$
$$(\ \Sigma\#♀^{\text{union status}}_{\text{scen 2, prov(i)}} * \%♀\text{trad method users}^{\text{union status, method type, sp/lt}}_{\text{scen 2, prov(i)}}) * 0.5$$

4d11. Number of women who are modern method users in scenario 4:

$$\#♀\text{all modern method users}^{\text{union status}}_{\text{scen4, prov(i)}} =$$
$$(\ \Sigma\#♀^{\text{union status}}_{\text{scen 2, prov(i)}} * \%♀\text{modern method users}^{\text{union status, method type, sp/lt}}_{\text{scen 2, prov(i)}}) + \#\ ♀\text{ with unmet need}^{\text{union status}}_{\text{scen4, prov(i)}} +$$
$$\#♀\text{all trad method users}^{\text{union status}}_{\text{scen4, prov(i)}}$$

Data:

1. The number of modern method users in scenario 2 is obtained from calculations shown in **2b1d1** above.
2. The number of non-users in scenario 4 is the remainder from **4d9** above.
3. The number of traditional method users in scenario4 is the remainder from **4d10** above.

4d12. Number of unintended pregnancies in scenario 4:

$$\#\text{ UIP}^{\text{nonuse of cp}}_{\text{prov(i), scen4}} = \sum \#♀^{\text{non use}}_{\text{prov(i), scen 4}} * \text{adjusted contraceptive failure for } ♀\text{ not using}$$

$$\#\text{UIP}^{\text{modern use failures}}_{\text{prov(i), scen4}} = \sum \#\text{♀mod meth users}^{\text{method type, union status, sp or lt.}}_{\text{scen 4, prov (i)}} * \text{contraceptive failure}^{\text{method type}}_{\text{prov(i)}}$$

$$\#\text{UIP}^{\text{trad use failures}}_{\text{prov(i), scen4}} = \sum \#\text{♀trad meth users}^{\text{method type, union status, sp or lt.}}_{\text{scen 4, prov (i)}} * \text{contraceptive failure}^{\text{method type}}_{\text{prov(i)}}$$

$$\#\text{Total UIP}^{\text{non use, mod use, trad use}}_{\text{scen 4}} = \#\text{ UIP}^{\text{nonuse of cp}}_{\text{prov(i), scen4}} + \#\text{UIP}^{\text{modern use failures}}_{\text{prov(i), scen4}} + \#\text{UIP}^{\text{trad use failures}}_{\text{prov(i), scen4}}$$

Data:

1. The number of women who were modern method users by method type, union status, and province was obtained from **4d5** above.
2. The contraceptive failure rate by method type was obtained from **4b2** above.

<u>4d13</u>. Number of induced abortions in scenario 4:

$$\#\text{ induced abortions}^{\text{nonuse of cp}}_{\text{prov (i), scen4}} = \#\text{ UIP}^{\text{non use of cp}}_{\text{prov (i), scen4}} * \frac{\#\text{ induced abortions}^{\text{scen 2}}_{\text{prov (i)}}}{\#\text{ UIP}^{\text{scen 2}}_{\text{prov (i)}}}$$

$$\#\text{induced abortions}^{\text{modern use failures}}_{\text{scen4,prov(i)}} = \#\text{UIP}^{\text{modern use failures}}_{\text{scen 4, prov(i)}} * \frac{\#\text{induced abortions}_{\text{scen 2, prov(i)}}}{\#\text{UIP}_{\text{scen 2, prov(i)}}}$$

$$\#\text{induced abortions}^{\text{trad use failures}}_{\text{scen4,prov(i)}} = \#\text{UIP}^{\text{trad use failures}}_{\text{scen 4, prov(i)}} * \frac{\#\text{induced abortions}_{\text{scen 2, prov(i)}}}{\#\text{UIP}_{\text{scen 2, prov(i)}}}$$

$$\#\text{Total induced abortions}^{\text{non use, trad use, mod use}}_{\text{scen4,prov(i)}} = \#\text{ induced abortions}^{\text{nonuse of cp}}_{\text{prov (i), scen4}} + \#\text{induced abortions}^{\text{modern use failures}}_{\text{scen4,prov(i)}} + \#\text{induced abortions}^{\text{trad use failures}}_{\text{scen4,prov(i)}}$$

Data:

1. The number of unintended pregnancies in scenario 3 for each province comes from **4d6** above.
2. The numbers of induced abortions and the numbers of unintended pregnancies by province are obtained from **3d1** and **3g1** above.

<u>4d14</u>. Number of unplanned births in scenario 4.

$$\#\text{ unplan births}^{\text{nonuse of cp}}_{\text{prov (i), scen 4}} = \#\text{ UIP}^{\text{nonuse of cp}}_{\text{prov (i), scen4}} - \#\text{ induced abortions}^{\text{nonuse of cp}}_{\text{prov(i), scen4}} * \frac{1+\text{ratio of miscarriages to induced abortions}}{1+\text{ratio of miscarriages to births}}$$

$$\#\text{ unplan births}^{\text{modern use failures}}_{\text{prov (i), scen 4}} = \#\text{ UIP}^{\text{modern use failures}}_{\text{prov (i), scen4}} - \#\text{ induced abortions}^{\text{modern use failures}}_{\text{prov(i), scen4}} * \frac{1+\text{ratio of miscarriages to induced abortions}}{1+\text{ratio of miscarriages to births}}$$

$$\#\text{ unplan births}^{\text{trad use failures}}_{\text{prov (i), scen 4}} = \#\text{ UIP}^{\text{trad use failures}}_{\text{prov (i), scen4}} - \#\text{ induced abortions}^{\text{trad use failures}}_{\text{prov(i), scen4}} * \frac{1+\text{ratio of miscarriages to induced abortions}}{1+\text{ratio of miscarriages to births}}$$

Data:

1. The number of unintended pregnancies for nonuse of contraception by province in scenario 4 is obtained from **4d12** above.
2. The number of induced abortions by province in scenario 4 is obtained from **4d13** above.
3. The ratio of miscarriages to induced abortions is a model based estimate, computed to be 0.1, while the ratio of miscarriages to births is also a model based estimate, computed to be 0.2.[19]

5. Pregnancy-related mortality and morbidity

a. Pregnancy-related deaths among women, by outcome[8]

The 2016 NDHS estimate of the national maternal mortality ratio (MMR) was used for all regions/provinces and all wealth quintiles. The 2015 World Health Organization (WHO) MMR estimate was examined but judged to be less desirable because it was older data. The assumption that maternal mortality is equal among women in all regions/provinces and wealth groups and by intention status of the pregnancy is likely inaccurate (in that wealthy and urban women most likely have lower mortality than their poor and rural counterparts), but unavoidable, since we don't have data on maternal mortality by subgroups.

The calculations were set up as follows:

Scenario 2 by province:

5a1. Number of maternal deaths among wanted births:

$$\#\text{Maternal deaths}_{\text{prov(i)}}^{\text{wanted births}} = \frac{\text{Maternal mortality ratio}_{\text{DHS}} * \ \#\text{ wanted births}_{\text{prov (i)}}}{100{,}000}$$

Data:

1. The maternal mortality ratio was obtained from the 2016 NDHS and is the most recent estimate of this indicator.
2. The number of unwanted births was obtained from calculations shown in **3c1** above.

5a2. Number of maternal deaths among unwanted births:

$$\#\text{Maternal deaths}_{\text{prov(i)}}^{\text{unwanted births}} = \frac{\text{Maternal mortality ratio}_{\text{DHS}} * \ \#\text{ unwanted births}_{\text{prov (i)}}}{100{,}000}$$

Data:

1. The maternal mortality ratio was obtained from the 2016 NDHS[8] and is the most recent estimate of this indicator.

2. The number of unwanted births was obtained from calculations shown in **3c1** above.

5a3. Total number of maternal deaths among all births:

$$\#\text{Maternal deaths}_{\text{prov(i)}}^{\text{all births}} = \#\text{Maternal deaths}_{\text{prov(i)}}^{\text{wanted births}} + \#\text{Maternal deaths}_{\text{prov(i)}}^{\text{unwanted births}}$$

Data:

1. The right hand side of the equation is obtained from **5a1** and **5a2** above.

5a4. Total number of maternal deaths across all provinces:

$$\#\text{ Maternal deaths }_{\text{Nepal}}^{\text{all births}} = \sum \#\text{maternal deaths}_{\text{prov(i)}}^{\text{all births}}$$

5a5. Maternal deaths by alternate use scenarios:

We made similar calculations for alternative scenarios of modern contraceptive use. The calculations for wanted and unwanted births by scenario are shown above in section **3c1**.

b. Disability-adjusted life years (DALYs) incurred by pregnant women, 2017[17]

We obtained the number of DALYs related to maternal conditions from the Institute for Health Metrics and Evaluation Global Burden of Disease Tool, 2017.[17] We assumed that rates of maternal DALYs for Nepal as a whole applied across all regions/provinces of the country and wealth quintiles. Again, this is a weak assumption because rates of DALYs most likely vary by rural-urban residence and by income group, but it is unavoidable, since the DALYs by subgroups are not available.

5b1. The DALYs for all scenarios were computed as follows:

$$\text{DALYS}_{\text{prov (i)}}^{\text{scenario (j)}} = \frac{\#\text{Pregnancies}_{\text{prov(i)}}^{\text{intention status, scenario (j)}}}{\#\text{ All pregnancies}_{\text{prov (i)}}^{\text{scenario (j)}}} * \text{Total DALYS from maternal conditions}$$

Data:

1. The total number of pregnancies and pregnancies by intention status and scenario was obtained from calculations shown in sections **3f1** and **3g1** above.

6. Maternal and newborn health care interventions

We obtained the list of interventions, the percentage of women in need of the interventions and the percentage of women currently covered by each intervention from Darroch (2018),[20] with the exception of the following interventions, where the percentage of women currently covered was obtained from the 2016 NDHS.[8]

a. Basic antenatal care
b. Tetanus toxoid
c. Hookworm treatment
d. Pre-eclampsia case management
e. Daily iron and folic acid supplementation
f. Essential care for all women with routine vaginal delivery (we used the NDHS values for "delivery by a skilled birth attendant").
g. Essential care for all newborns (we used the NDHS values for "delivery by a skilled birth attendant").
h. C-section
i. Preventive postpartum care

Not all pregnant women need each intervention. For those interventions not required by all pregnant women, the value for the percentage covered was divided by the percentage of women who require such care, in order to estimate the percentage covered only among those who need the care.

For the interventions listed above, the 2016 NDHS also provides coverage percentages by each province and region of Nepal. For the interventions not covered by the DHS, we adjusted the coverage percentages of "Basic antenatal care," "C-section" and "Delivery in a health facility" (not listed above) to obtain regional and province-level percentages, since the other interventions are linked to these key interventions. For example, to get coverage percentages at the subnational level for syphilis screening and treatment as well as hypertensive disease care management, we adjusted the numbers for basic antenatal care. For interventions such as pre-eclampsia case management, antenatal hemorrhage management and prolonged labor, we adjusted the numbers for C-section to obtain subnational estimates. We adjusted the values for delivery in a health facility for interventions such as active management of third stage labor, pre-referral management of labor complications and induction of labor (for a full list of interventions, see **table 3**).

6a. The percentage of women in each region/province covered by each intervention not included in the 2016 NDHS, was estimated as follows:

$$\%\text{♀covered}^{\text{scen 2, intervention type}}_{\text{prov(i)}} = \%\text{♀covered for intervention}^{\text{scenario 2, intervention type}}_{\text{Nepal, Darroch}} * \frac{\%\text{♀covered for intervention}^{\text{scenario 2, intervention type}}_{\text{prov (i), NDHS}}}{\%\text{♀covered for intervention}^{\text{scenario 2, intervention type}}_{\text{Nepal, NDHS}}}$$

Data:

1. The percentage of women at the country level who were covered for an intervention not included in the DHS, was obtained from Darroch (2018).[20]
2. The percentage of women covered at the province level, for an intervention included in the NDHS, was obtained from the NDHS (2017).[8]
3. Percentage of women covered at the country level, for an intervention included in the NDHS, was obtained from the NDHS (2017).[8]

6b. The number of women and newborns requiring MNH care by intervention type and scenario and by province was calculated as follows:

$$\#\,\text{♀ and newborns requiring MNH care}^{\text{scen(j)}}_{\text{prov(i),intervention type}} =$$
$$(\#\,\text{births}^{\text{intention status}}_{\text{prov(i), scen (j)}} + 50\%\big(\#\,\text{abortions}_{\text{prov(i), scen (j)}}\big))r\%\text{requiring intervention}_{\text{intervention type}}$$

Data:

4. Number of births by province, intention status and scenario was computed using the calculations shown in **3c1**.
5. Number of abortions by scenario and province was computed using calculations shown in **3c3**.
6. Percent requiring the intervention was obtained from calculations shown in **6a**.

6c. The number of women and newborns requiring MNH care by intervention type, scenario and wealth status was calculated as follows:

$$\#\,\text{♀ and newborns requiring MNH care}^{\text{scen (j)}}_{\text{WQ(i),intervention}}$$
$$= (\#\,\text{births}\text{WQ (i), scen (j)}\text{intention status}$$
$$+ 50\%\#\,\textit{abortions}\text{WQ(i), scen (j))}Q\%\text{requiring intervention}\text{intervention type}$$

Data:

1. Number of births by province, intention status and scenario was computed using the calculations shown in **3c1**.
2. Number of abortions by scenario and province was computed using calculations shown in **3c3**.
3. Percent requiring the intervention was obtained from calculations shown in **6a**.

7. Cost of providing contraceptive care and maternal and newborn healthcare

For this analysis, we estimated costs separately for each contraceptive commodity and for each maternal and newborn health intervention. For each, we estimated total direct costs as well as indirect costs. The direct costs, which include cost of contraceptive commodities, drugs and supplies, and labor (see **tables 4 and 5** for full list of ingredients that were included in direct costs) and indirect costs, which include management, infrastructure, transport, and other overheads were computed using the methods outlined in Darroch (2018).[20] All costs were estimated in 2017 US dollars.

The costs of the various ingredients needed to compute province/regional and national costs were obtained from various sources in Nepal (see **table 5** for the ingredients and **table 6** for expansion of abbreviations):

- We obtained average unit costs for contraceptives from LMD, 2016; CRS Company, 2017; FHD, 2017.
- The 2017 average salary data for medical personnel were obtained from the Nepal Ministry of Finance and Ministry of Home Affairs.
- The average unit costs for the drugs and supplies were obtained from DDA, 2016; SHSDC, 2017; LMD, 2014; LMD, 2015; LMD, 2016; LMD, 2017; EDCD, 2017; NPHL, 2017; NCASC: National Center for AIDS and STD Control, MoH.
- Where pricing data was unavailable, we used UNICEF, 2016.
- Flat shipping and wastage rates of 15% and 30%, respectively, were added to all drugs and supply unit costs.

7a. The total cost of a contraceptive commodity by each scenario and by region/province was estimated as follows:

$$\$\ \text{cost for all users}^{\text{method type}}_{\text{scenario (j), prov(i)}} = \#\text{♀ method users}^{\text{method type}}_{\text{scenario (j), prov (i)}} * \text{total unit \$ cost}^{\text{method type}}_{\text{scenario (j), prov (i)}}$$

Data:

1. The number of women using each method by scenario and province was obtained from calculations shown in **2b1e** above.
2. The total unit cost per contraceptive commodity was obtained by using methods shown in Darroch (2017).

7b. The total cost of an MNH intervention by each scenario and by region/province was estimated as follows:

$$\$\ \text{cost for all users}^{\text{intervention type}}_{\text{scenario (i), prov(i)}} = \#\text{♀ and newborns requiring care}^{\text{intervention type}}_{\text{scenario (i), prov (i)}} * \text{total unit \$ cost}^{\text{intervention type}}_{\text{scenario (i), prov (i)}}$$

Data:

1. The number of women requiring each intervention by scenario and province was obtained from calculations shown in **6b** above.
2. The total unit cost per MNH intervention was obtained by using methods shown in Darroch (2018).[20]

Table 3. List of MNH interventions and the DHS interventions used as proxies for obtaining distribution of women covered by province and region

MNH Intervention	DHS intervention
Antenatal care	
1. Basic Antenatal Care	from DHS data
2. Tetanus toxoid	from DHS data
3. Syphilis screening	Basic antenatal care
4. Syphilis treatment for seropositive women	Basic antenatal care
5. Hypertensive disease care management	Basic antenatal care
6. Pre-Eclampsia case management - Mild cases < 37 weeks	C-Section (C-Section (EmOC)
7. Pre-Eclampsia case management - Mild cases > 37 weeks	C-Section (C-Section (EmOC)
8. Pre-Eclampsia case management - Severe Cases	C-Section (C-Section (EmOC)
9. Hookworm treatment	from DHS data
10. Malaria prevention--Insecticide treated bed nets	Basic antenatal care
11. Malaria prevention--Intermittant preventative treatment in pregnancy (IPT)	Basic antenatal care
12. Malaria screening and treatment	Basic antenatal care
13. Anemia Screening	Basic antenatal care
14. Daily Iron and Folic Acid Supplementation (anemic pregnant women)	from DHS data
15. Intermittent Iron and Folic Acid Supplementation (Nonanemic pregnant women - 1 month care)	Basic antenatal care
16. Urinary Tract Infection	Basic antenatal care
17. Ectopic pregnancy case management	C-Section (EmOC)

Labor, delivery and postpartum care	
18. Antenatal Corticosteroids for Preterm Labor	Institutional delivery
19. Antibiotics for Premature Rupture of Membranes (pPROM)	Institutional delivery
20. Induction of Labor (>41 weeks)	Institutional delivery
21. Essential care for all women with routine vaginal delivery	from DHS data
22. Essential care for all newborns	from DHS data
23. Active Management of Third Stage of Labor	Institutional delivery
24. Prereferral Management of Labor Complications	Institutional delivery
25. Antepartum Hemorrhage Management	C-Section (EmOC)
26. Prolonged Labor	C-Section (EmOC)
27. C-section	from DHS data
28. Assisted Vaginal Delivery	C-Section (EmOC)
29. Management of Eclampsia	C-Section (EmOC)
30. Maternal Sepsis case management	C-Section (EmOC)
31. Postpartum Hemorrhage	C-Section (EmOC)
32. Preventive postnatal care	from DHS data
33. Mastitis Care	C-Section (EmOC)
34. Obstetric Fistula	C-Section (EmOC)
35. Counseling and Support for Breast-Feeding	Institutional delivery
Newborn care	
36. Newborn Resuscitation (Institutional Deliveries)	Institutional delivery
37. Newborn Local Infections	Institutional delivery
38. Management of Newborn Syphilis	Institutional delivery
39. Kangaroo Mother Care	Institutional delivery
40. Treatment of Low Birth Weight	Institutional delivery
41. Management of Severe Infection for Neonates—Injectable Antibiotics	Institutional delivery
42. Management of Severe Infection for Neonates—Full Supportive Care	Institutional delivery
43. Newborn Vaccines - BCG Vaccine	Institutional delivery
44. Newborn Vaccines - Hepatitis B Vaccine	Institutional delivery
45. Newborn Vaccines - Polio Vaccine	Institutional delivery
Postabortion care (PAC)	
46. PAC - Incomplete abortion	C-Section (EmOC)
47. PAC - Shock	C-Section (EmOC)
48. PAC - Uterine perforation/cervical laceration	C-Section (EmOC)
49. PAC - Sepsis	C-Section (EmOC)

HIV care	
50. Voluntary Counseling and Testing for HIV	Basic antenatal care
51. Counseling for Women Testing HIV+	Basic antenatal care
52. Antiretroviral Therapy for Women - New Cases (weekly requirements)	Basic antenatal care
53. Antiretroviral Therapy for Women - Established Cases (weekly requirements)	Basic antenatal care
54. HIV Testing of Newborns—Mother HIV+, Infant found HIV-	Institutional delivery
55. HIV Testing of Newborns—Mother HIV+, Infant found HIV+	Institutional delivery
56. HIV Testing of Newborns—Mother not known to be HIV+, Infant found to be HIV-	Institutional delivery
57. HIV Testing of Newborns—Mother not known to be HIV+, Infant found to be HIV+	Institutional delivery
58. Antiretroviral Therapy for Newborns—Breast-feeding, weekly	Institutional delivery
59. Antiretroviral Therapy for Newborns—Not breast-feeding, weekly	Institutional delivery

Table 4. List of personnel used for calculating direct costs

Personnel	Source
Obstetrician	MOF, 2017; MoHA, 2017
General physician	MOF, 2017; MoHA, 2017
Nurse/Midwife	MOF, 2017; MoHA, 2017
Auxiliary/Attendant	MOF, 2017; MoHA, 2017

Table 5. List of drugs and supplies included in cost estimates

Drug /Supply Name	Source
Acetylsalicylic acid, tab, 75mg	DDA, 2016
Albendazole, tablet, 400mg	SHSDC, 2017; DDA, 2016; LMD, 2015
Amoxicillin, caplet, 250 mg	SHSDC, 2017; DDA, 2016; LMD 2016
Amoxicillin, powder/oral suspension, 125mg/5ml	SHSDC, 2017; DDA, 2016; LMD 2016
Ampicillin, powder for injection, 500mg, vial	SHSDC, 2017; DDA, 2016; LMD 2015
Antenatal care record	UNICEF, 2016
Artemether + Lumefantrine, tablets, 20+120mg, 6x1 blister	EDCD supported by Global fund, 2017
Artesunate + Amodiaquine, tablets, 50mg+135mg, 3+3 blister	UNICEF, 2016
Artesunate + SP, tablets, 50mg+500mg+25mg, 3+1 blister	UNICEF, 2016

Artesunate, vial, 60mg	EDCD supported by Global fund, 2017
Atropine sulphate, injection, 1 mg in 1-ml ampoule	SHSDC, 2017; DDA, 2016
AZT solution 10mg/ml	DDA, 2016
Bag, urine, collecting, 2000ml	UNICEF, 2016
BCG vaccine	DDA, 2016; LMD 2016
Benzathine benzylpenicillin, powder for injection, 2.4 million IU	UNICEF, 2016
Betamethasone, 12mg injection	http://mnhtech.org/technology/technology-briefs/corticosteroids/ Accessed Dec 20, 2016
Blade, surgical, no. 22, sterile, disposable	UNICEF, 2016
Blood collecting tube, 5ml	UNICEF, 2016
Blood culture	SHSDC, 2017; NPHL, 2017
Blood type and cross-match	SHSDC, 2017
Calcium carbonate, tablet, 600mg	SHSDC, 2017; DDA, 2016
Cannula, IV, 18G, sterile, disposable	LMD, 2015
Cefazolin, ampoule, 500 mg	SHSDC, 2017; DDA, 2016
Ceftriaxone, powder for injection, 250 mg vial	SHSDC, 2017; DDA, 2016
Chest X-ray	SHSDC, 2017
Chlorhexidine surgical scrub, 5ml	MSH, 200ml bottle
Ciprofloxacin, tablet, 250mg	SHSDC, 2017; DDA, 2016; LMD 2017
Clean delivery kit	LMD, 2012
Clindamycin, tab, 300mg	SHSDC, 2017; DDA, 2016
Complete blood count	SHSDC, 2017; NPHL, 2017
Condom, male	LMD, 2016
Cotton swab	UNICEF, 2016
Delivery record	UNICEF, 2016
Diazepam, injection, 5mg/ml in 2-ml ampoule	SHSDC, 2017; LMD, 2016
Doxycycline, tablet, 100mg	SHSDC, 2017; LMD, 2015
Drawsheet, plastic, 90x180cm	UNICEF, 2016
Epinephrine, ampoule, 1mg/ml	UNICEF, 2016
Erythromycin, tablet, 250 mg	SHSDC, 2017; DDA, 2016; LMD 2015
Erythromycin estolate 125 mg base/5 ml oral suspension, 100 ml	SHSDC, 2017; DDA, 2016
Ferrous Salt + Folic Acid, tablet, 200+0.4mg (60mg iron)	LMD, 2013
Foley catheter	UNICEF, 2016
Folic acid, tablet, 5mg	SHSDC, 2017; DDA, 2016; LMD 2017
Gauze pad, 10 x 10cm, sterile	LMD, 2015
Gentamicin, injection, 40 mg/ml in 2ml vial	SHSDC, 2017; LMD, 2015

Gentian violet, powder 25mg	SHSDC, 2017; LMD, 2016
Gloves, exam, latex, disposable, pair	UNICEF, 2016
Gloves, surgeon's, latex, disposable, sterile, pair	LMD, 2014
Glucose injection 5%, 500ml with giving set	SHSDC, 2017
Hemoglobin test strip	UNICEF, 2016
Hep B vaccine	SHSDC, 2017
Hib vaccine	SHSDC, 2017
HIV EID (Early Infant Diagnosis Test) Assay Renewables	NCASC, 2017
HIV EID Dry Blood Spot (DBS) Collection kit	NCASC, 2017
HIV Rapid Detection Test (STAT-PAK HIV1/2,dipstick)	SHSDC, 2017; NPHL, 2017
HIV Confirmatory test (MP Biomedical HIV BLOT 2.2)	NPHL, 2017
HPV vaccine	UNICEF, 2016
Hydralazine, powder for injection, 20mg ampoule	SHSDC, 2017
Insecticide-Treated Net	UNICEF, 2016
IV giving/infusion set, with needle	LMD, 2014
Ketamine, 10ml vial, 50mg/ml	SHSDC, 2017; DDA, 2016
Lancet, blood, disposable	UNICEF, 2016
Lidocaine HCl (in dextrose 7.5%), ampoule 2ml	UNICEF, 2016
Lidocaine, injection, 1% in 20 ml vial	SHSDC, 2017
Magnesium sulfate, injection, 500 mg/ml in 10-ml ampoule	SHSDC, 2017; DDA, 2016
Malaria test kit (RDT)	EDCD supported by Global fund, 2017
Mebendazole, chewable tablet, 500 mg	DDA, 2016
Metronidazole, injection, 500 mg in 100 ml vial	SHSDC, 2017; DDA, 2016; LMD 2015
Metronidazole, tablet, 500mg	SHSDC, 2017; DDA, 2016; LMD 2017
Mifepristine, tablet, 200mg	DDA, 2016
Misoprostol, tablet, 200mcg	DDA, 2016; LMD 2016
Nevirapine, oral solution, 10mg/ml	NCASC, 2017
Nifedipine, tab-cap, 10mg	SHSDC, 2017; DDA, 2017
Oxygen, 1000 liters, primarily with oxygen cylinders	LMD, 2017
Oxytocin, injection, 10 IU in 1 ml ampoule	SHSDC, 2017; DDA, 2016; LMD 2014
Paracetamol, tablet, 500 mg	SHSDC, 2017; DDA, 2016; LMD 2017
Partograph	UNICEF, 2016
Pethidine, 50 mg/ml, 2ml ampoule	SHSDC, 2017; DDA, 2016

Polio vaccine	LMD, 2015
Pregnancy test	SHSDC, 2017; NPHL, 2017
Procaine benzylpenicillin, powder for injection, 1 g (= 1 million IU) in vial	MSH, 2017
Quinine, injection, 300mg/ml, 2ml ampoule	SHSDC, 2017
Quinine sulphate, tab, 300 mg	DDA, 2016; LMD 2015
Razor blade, stainless steel	Alibaba website, Chinese supplier
Resuscitator,hand-operated,infant/child,set	UNICEF, 2016
Safety box for used syringes/needles, 5 liter	UNICEF, 2016
Sodium chloride, injectable solution, 0,9%, 500ml	SHSDC, 2017; DDA, 2016; LMD 2017
Sodium lactate injection (Ringer's), 500ml, with giving set	SHSDC, 2017; DDA, 2016; LMD 2017
Sulfadoxine + pyrimethamine, tablet 500mg + 25mg	UNICEF, 2016
Suture, absorbable, synthetic, 2/0, curved needle	UNICEF, 2016
Suture, catgut, chromic, 0, needle	Alibaba website, Chinese supplier
Suture, non-absorbable, synthetic, 2/0, needle	UNICEF, 2016
Suture, non-absorbable, synthetic, 3/0, curved needle	UNICEF, 2016
Syringe, auto-disable, 0.5ml, with needle	LMD, 2015
Syringe, auto-disable, BCG, 0.1ml, with needle	LMD, 2017
Syringe, needle+ swab	UNICEF, 2016
TDF + 3TC + EFV	NCASC, 2017
TDF + FTC + EFV	NCASC, 2017
Test strips, urine analysis	LMD, 2017
Test, blood glucose	SHSDC, 2017; NPHL, 2017
Test, blood group, anti A + B, 10 ml	UNICEF, 2016
Test, hemoglobin	SHSDC, 2017; NPHL, 2017
Test, Rapid plasma reagin (RPR)	SHSDC, 2017; NPHL, 2017
Tetanus toxoid, injection	SHSDC, 2017; DDA, 2016; LMD 2012
Tetracycline eye ointment, 1%, tube 5mg	SHSDC, 2017; DDA, 2016; LMD 2014
Tetracycline, tablet, 250mg	SHSDC, 2017; LMD, 2016
Umbilical cord clamp, sterile	UNICEF, 2016
Water for injection, 10 ml ampoule	UNICEF, 2016
Water for injection, 5 ml ampoule	DDA, 2016
Contraceptives	**Source**
Condom, Male	LMD, 2016; CRS Company, 2017; FHD, 2017
Implant - Jadelle	LMD 2016; CRS company, 2017; FHD, 2017

Injectable, 3-monthly	LMD, 2016; CRS company, 2017
IUD - Copper	FHD, 2017; CRS company, 2017
Pill - Combined	LMD, 2013; CRS Company, 2017; FHD, 2017

Table 6. List of abbreviations

DDA:	Nepal Ministry of Health/Department of Drug Administration
EDCD:	Nepal Ministry of Health/Epidemiology and Disease Control Division
LMD:	Nepal Ministry of Health/Department of Health Services/Logistics Management Division
MoF:	Nepal Ministry of Finance
MoHA:	Nepal Ministry of Home Affairs
MSH:	Management Science for Health
NPHL:	Nepal Ministry of Health and Population/Department of Health Services/National Public Health Laboratory
NCASC:	Nepal Ministry of Health/National Center for AIDS and STD Control
SHSDC:	Nepal Health Insurance Board/Social Health Security Development Committee

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