



**Cost-Effective Interventions to
Reduce Maternal Mortality in
Senegal:**

**The Role of Postabortion Care
and Family Planning**

An Application of the Allocate Model

June 2006

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Abbreviations

AIDS	acquired immune deficiency syndrome
ANC	antenatal care
CEFOREP	Center for Reproductive Health Training and Research (Centre de Formation et de Recherche en Santé de la Reproduction)
CFA	common currency for 12 formerly French-ruled African countries
CPR	contraceptive prevalence rate
DHS	Demographic and Health Survey
EMOC	emergency obstetric care
FP	family planning
FRONTIERS	Frontiers in Reproductive Health Program
HIV	human immunodeficiency virus
IEC	information, education, and communication
IUD	intrauterine device
MBP	Mother-Baby Package
M&E	monitoring and evaluation
MMR	maternal mortality ratio
MNPI	Maternal and Neonatal Effort Index
MVA	manual vacuum aspiration
NGO	nongovernmental organization
PAC	postabortion care
PPC	postpartum care
PREMOMA	Safe Motherhood Program (Le Projet Réduction Morbidité et Mortalité Maternelle)
RH	reproductive health
SMM	Safe Motherhood Model
STIs	sexually transmitted infections
TFR	total fertility rate
WHO	World Health Organization
UNFPA	United Nations Population Fund
USAID	United States Agency for International Development

I. INTRODUCTION

National level strategies and implementation plans are routinely created and updated in most countries. The process of selecting priority interventions and creating concrete indicators to measure success has become multisectoral, involving national and decentralized government, nongovernment, and international partners. This process has been both influenced and supported by international movements toward global health goals such as the Millennium Development Goals and the Abuja Declaration.

However, a critical piece of the process is missing—the amount of resources necessary to achieve the stated goals and objectives. Information on the cost of implementing strategies and implementation plans is often left out of these important documents or, if it is included, is based not on the target that have been set but on the amount of money that is expected to be available. The Futures Group designed an Allocate Model to assist countries in creating strategies and implementation plans with realistic targets that are influenced by the level of resources available. The model links the plans to the cost of meeting their specific targets.

This Allocate Model was applied in Senegal from November 2005 to April 2006 to assist the government with developing their new national health strategic plan. As illustrated by the model's application and findings described in this report, Senegal would benefit from an increased effort in meeting unmet need for contraception and an expanded and higher quality postabortion care (PAC) program. This would result in an improved allocation of resources from a reduction in the number of women requiring PAC services and, most importantly, a decrease in maternal mortality.

The following sections discuss the status of maternal health in Senegal, the use of relevant model applications to help inform the development of strategic plans, the central findings from these applications, and recommendations and next steps regarding priority areas for follow-up activities and resource allocation.

II. CONTEXT

Health Status in Senegal

Senegal has a population of 11 million with an estimated 2,737,201 women of reproductive age. Senegal's fertility rate results in approximately 450,000 pregnancies annually, with an under-five mortality rate of 121 per 1,000 and an infant mortality rate of 61 per 1,000 (DHS, 2005). Life expectancy in Senegal has increased from 50 years in 1990 to 52 years in 2001, a figure that is higher than the sub-Saharan average of 46 years (World Bank, 2003). Yet, only 40 percent of the 11 million residents have access to health services, and nearly three quarters of all health care personnel are concentrated in the two largest cities (Dakar and Thiès), leaving the rural population poorly covered (EIU Country Profile, 2003).

Maternal Health

In 2000, Senegal's maternal mortality ratio (MMR) was 690 per 100,000 live births, which is a decrease from 1,200 in 1990 but still high by global standards (WHO, 2000; Millennium Project, 2004). Senegal's MMR is lower than the average MMR for sub-Saharan Africa (920 per 100,000 live births) but it still lags behind some of its neighbors, such as Ghana and Togo (540 and 570, respectively).

The inequitable distribution of health facilities in Senegal prevents easy access to emergency obstetric care (EMOC) and other life-saving measures (Kodio et al., 2002). Hemorrhage is the most common cause of maternal death, accounting for over a third of all maternal deaths (see Figure 1). After hemorrhage, the most common causes are other indirect causes of death (16.7%), sepsis/infection (9.7%), and hypertensive disorders (9.1%). Other direct causes of maternal death account for 4.9 percent of all maternal deaths; obstructed labor accounts for 4.1 percent; and abortion complications account for 3.9 percent. These statistics can be used to identify priority areas for improved services and increased resource allocation.

Figure 1. Causes of Maternal Death in Africa

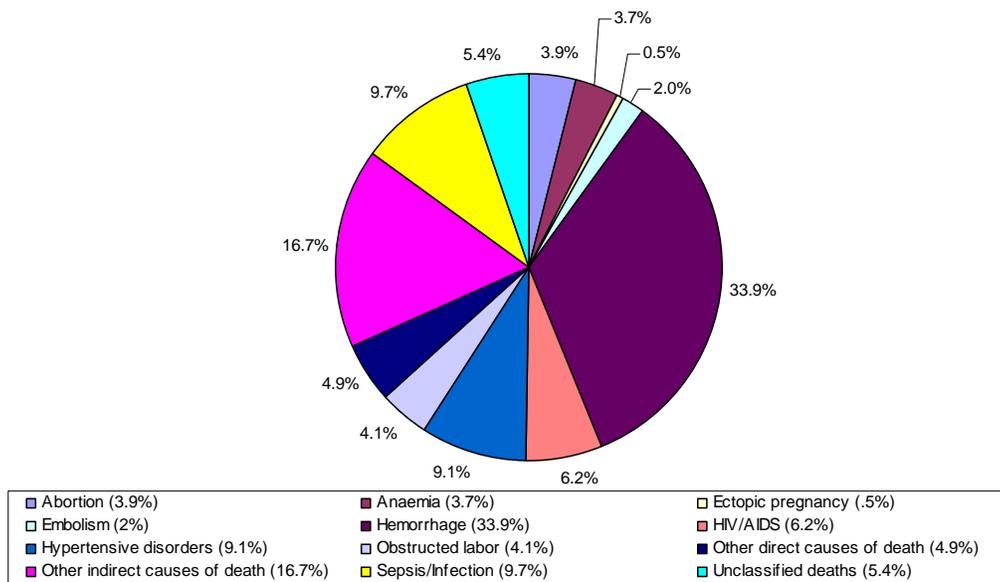
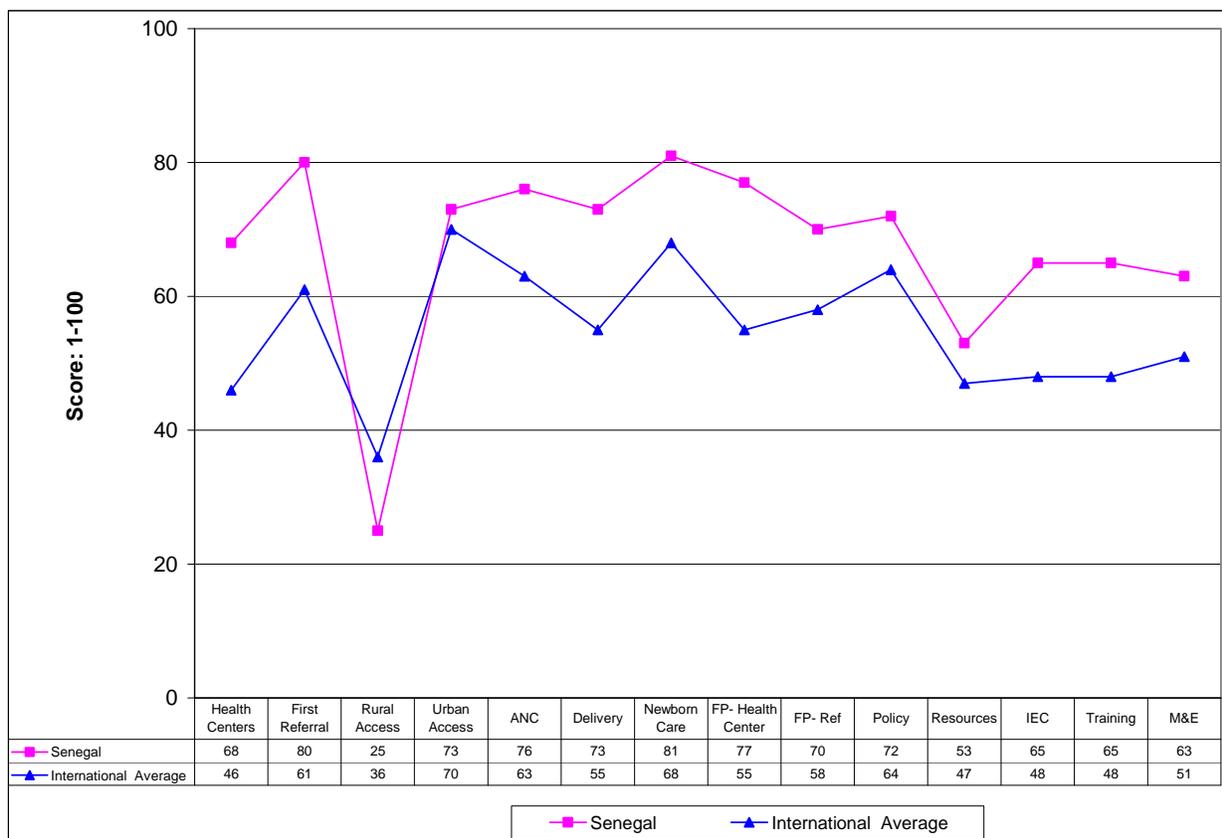


Figure 2 shows the results of the 14 main components from the 2005 Maternal and Neonatal Health Effort Index (MNPI).¹ Senegal’s scores (out of 100 possible points) are represented in the graph below as are the international averages. Senegal’s scores highlight the disparities between rural and urban areas’ access to services (25 and 73, respectively), and the low amount of resources (53) allocated for health. There is also a reduced emphasis on human resource training (65) and program monitoring and evaluation (63), which likely contributes to decreases in the quality of health information and services.

Senegal outcores the international averages in all but two categories—rural and urban access. For rural access, Senegal scored lower than the international average by 11 points. For urban access, Senegal received the same score as the international average, highlighting a need for improvement. Senegal’s average score for all categories is 67.3, which is higher than the international average of 55.0, but lower than desired. The MNPI results emphasize the need for increased financial allocations to the health sector and an increased emphasis on improving access to services among all populations.

Figure 2. MNPI Results for Main Categories



Family Planning

With a total fertility rate (TFR) of 5.3 and a contraceptive prevalence rate (CPR) of 12 percent for all methods (10% modern methods and 2% traditional methods), Senegal faces challenges of high fertility and unmet need for contraception (35%)—both of which are exacerbated by poor access to services in

¹ The MNPI was developed by the POLICY Project and applied in 55 countries in 1999, 2002, and 2005. It is a tool that can be used to assess a country’s maternal and neonatal health situations and is a standard measure of program inputs. The MNPI scores range from 0–100, with 100 being a perfect score. Data is collected from local maternal health experts in each country.

rural areas (DHS, 1997; DHS, 2005). Senegal is considered a low human development country, ranked 157 out of 177 countries in the 2005 Human Development Index (UNDP, 2005). According to estimates by the Ministry of Economy and Finance, the number of people living below the poverty line declined from 68 percent in 1994/1995 to 57 percent in 2001/2002; however, even with a 10 percent decrease, poverty remains high, contributing to poor overall health indicators (Randle, 2004; MOEF, 2004).²

Postabortion Care

Abortion is illegal in Senegal, except to save a woman's life, making it difficult to determine its frequency. Studies suggest that between 17 and 34 percent of complications seen in maternity wards in Senegal result from complications due to abortion, and one in five women admitted to university hospitals are for postabortion care (PAC) services (MSPM, 2005; Goyaux et al., 1998; Thaim, 1998). According to Ministry of Health (MOH) statistics for 1995, 68 percent of abortion complications, including incomplete abortions, were reported at district-level rural facilities, highlighting the need to provide PAC at lower-level health clinics (EngenderHealth, 2003). Two-thirds of the women interviewed for a study about access to PAC services said that they visited two or more hospitals before receiving treatment for abortion complications due to a lack of facilities providing PAC services—delaying care for up to five days after the onset of symptoms (CEFOREP, 1998). With 35 percent of women in Senegal desiring to avoid or delay giving birth through contraceptive use, the situation necessitates innovative approaches to reducing the number and minimizing the consequences of unsafe abortion (DHS, 1997; Corbett and Nelson, 2003).

Until recently, the majority of efforts to expand PAC services have focused primarily on tertiary-level facilities and mostly in urban hospitals. In recognition of the benefits of PAC, the MOH proposed to introduce national standards of care for PAC services, but it was left unclear how these protocols could be applied at lower-level facilities, such as district health centers and health posts (EngenderHealth, 2003). In 2000, the MOH—with support from nongovernmental organizations (NGOs)—began a two-year project to examine the feasibility of introducing integrated PAC services at lower-level health facilities in rural areas of Senegal where the need is greatest (FRONTIERS, 2003). The intervention provided health personnel with training to improve clinical competencies and also counseling, technical assistance and materials, and ongoing monitoring and supervision (EngenderHealth, 2003).

Results revealed that using the decentralized model for PAC—providing services at lower-level health facilities—made it possible to increase the number of patients treated for incomplete abortion by 22 percent (Cisse et al., 2004). Under the new decentralized model, hospitalization lasted on average four hours, compared with 48 hours prior to decentralization, and the proportion of patients referred to the regional hospital for complications fell from 35 percent to 7 percent. The average direct cost fell by 3,500 CFA francs (US\$6.50). The number of patients leaving with contraception before discharge rose from 0 to 20 percent, and 94 percent of the patients questioned were satisfied with the quality of the services they received (Cisse et al., 2004). Six months after the program ended, the level of use of PAC services had increased by 11 percent, and the proportion of women leaving rural health facilities with contraception reached 33 percent. This evaluation highlights that decentralization of PAC treatment in rural areas is possible without a major expense, improves care for women with incomplete abortions, as well as improves uptake of contraception to prevent future unintended pregnancies and pregnancy-related complications (Cisse et al., 2004).

² Percentage of households or individuals living below the absolute poverty threshold, i.e., 2,400 calories per adult equivalent (MOEF, 2004).

III. USING COST INFORMATION IN DEVELOPING NATIONAL STRATEGIC PLANS

Senegal is currently developing a new national health strategic plan as outlined in the September 2005 draft document, “Feuille de route pour accélérer la réduction de la mortalité et de la morbidité maternelles et néonatales au Sénégal” (*Action Plan to Reduce Maternal and Neonatal Morbidity and Mortality in Senegal*). Responding to this policy formulation challenge, the POLICY Project provided a technical assistance package to Senegal between November 2005 and April 2006 and completed this package using PAC Global Leadership Priority funding from the USAID/Washington Postabortion Care Working Group, in collaboration with the Management Science for Health Safe Motherhood Program (Le Projet Réduction Morbidité et Mortalité Maternelle) (PREMOMA) under which Futures Group was a subcontractor.

When designing national reproductive health (RH) action plans, policymakers face several challenges and many questions, including:

- How much funding is required to achieve the goals identified in the plan?
- What goals are feasible for indicators, such as unintended pregnancies, number of abortions, maternal mortality ratio, and method mix?
- How should available resources be allocated to best achieve these goals?

The Allocate Model was designed to help countries answer these questions by linking funding to program activities and linking program activities to outcome indicators. The main objective of the model is to help planners understand the relationship between funding levels and safe motherhood, postabortion care, and family planning programs. In Senegal, POLICY used this model to assist the government with developing its new national health strategic plan. The following is a description of Allocate and its suite of models used for its application.

Allocate Model

This model is intended to improve resource allocation both within and across the components of reproductive health programs by integrating RH models and thereby demonstrating the effects of resource allocation on a variety of national indicators. For example, Allocate can help answer, *what is the likely effect on maternal mortality if funding for family planning is reduced or increased?* The model is an interactive tool that facilitates the development of integrated national plans with realistic budgets.

The models used in the Allocate application include:

- *DemProj Model*—Projects the population for up to 50 years in the future. The program forecasts the population structure for the entire country or a specific region by age and gender, and by rural or urban residence, based on specific fertility, mortality and migration trends. This demographic model serves as the base for most of the other models.
- *FamPlan Model*—Estimates the number of users and acceptors and the cost of providing family planning (FP) services to meet one of the following goals: (1) reducing unmet need for family planning, (2) achieving desired fertility, (3) attaining a specified TFR, (4) attaining a specified CPR, and (5) achieving the maximum possible changes within a specific budget. FamPlan calculates indicators showing the number of users, required costs for commodities, unintended pregnancies and births, and the number of abortions. A new feature of the FamPlan Model, which was not included in this application, shows the impact of the above FP indicators on child survival.
- *PAC Model*—Allows the user to analyze how maternal deaths depend upon certain FP assumptions; disaggregates the deaths according to intended births, unintended births, and

abortions; and shows how the allocation of expenditures can increase treatment of postabortion complications and reduce deaths.

- *Safe Motherhood Model*—Supports priority setting exercises by showing how improvements in program effort can lead to reductions in maternal mortality. The model uses two types of data; the MNPI, as previously described, and the World Health Organization’s (WHO) Mother-Baby Package (MBP).³ It uses the MNPI to show improvements in different support and service areas and shows the effect of different patterns of effort. The MBP contributes the costing component that allows the user to cost out different interventions to aid in the development of national plans, strategies, and budgets.

In conjunction with informing the creation of a national plan, the Allocate Model provides critical information for developing targets and indicators. POLICY provided technical assistance to aid the MOH in providing accurate information to serve as the basis for the development of new goals and indicators. The Allocate Model provides an interactive forum that supplies evidence-based information to better inform RH financial decisionmaking. It creates scenarios highlighting the level of resources necessary to reach targets in national plans.

³ The WHO MBP is a well-documented model that estimates costs for both the current status of service delivery and a standard or ideal delivery of maternal and neonatal health services in a country. The amount currently spent includes consideration of current practices, coverage rates, and unit costs, while the ideal model estimates the amount that should be spent to reach best practices, ideal coverage rates, and appropriate unit costs. The model is available at www.who.int.

IV. IMPLEMENTATION OF THE MODELS

The Center for Reproductive Health Training and Research (Centre de Formation et de Recherche en santé de la Reproduction, or CEFOREP) was contracted to collect data for three models (FamPlan, PAC, and Safe Motherhood). Data collection included field-based questionnaires on the frequency of visits for maternal health interventions as well as the specifics of the visit, including the drugs provided, supplies and materials used, amount of time spent by medical personnel, and hospitalization and emergency transportation.

Selection of Sites

Senegal is divided into three zones with similar socioeconomic characteristics, and these zones are then divided up by regions. They are as follows:

- Southeastern Zone: Ziguinchor, Kolda, and Tambacounda
- Northern Zone: Saint-Louis, Matam, and Louga
- Central Zone: Thies, Kaolack, Diourbel, and Fatick

At least one region from each zone was selected based on the presence of a hospital and high levels of maternal and neonatal morbidity and mortality. From the southeastern and northern zones, one region and two districts each were selected (one urban and one rural or semi-urban). To ensure variability, from the central zone, two regions were chosen; however, due to time and resource constraints, only one district was chosen from each region. In addition to the regional hospital, one health post and one health center were chosen from each selected district. In total, 15 facilities were selected (3 hospitals, 6 health centers, and 6 health posts), representing geographical diversity and the three levels of service (see Table 1).

Table 1. Data Collection Sites

Zones	Regions Selected	Districts Selected	Hospitals Selected	Health Centers and Health Posts Selected
Southeastern	• Tambacounda	• Tambacounda • Kédougou	Tambacounda Hospital	HC Tambacounda HP Koussanar HC Kedougou HP Dindifello
Northern	• Saint-Louis	• Richard Toll • Podor	Saint-Louis Hospital	HC Richard Toll HP Rosso Béthio HC Podor HP Ndiayene
Central	• Kaolack • Fatick	• Koungueul • Guinguinéo	Kaolack Hospital	HC Koungueul HP Lour Escale HC Guinguinéo HP Gagnick
Note : Senegal has 768 health posts, 54 health centers, and 20 hospitals. ⁴				

⁴ Data are accessible at the following MOH website: <http://www.sante.gouv.sn/politiquesanitaire.php>.

Additional Data

Additional sources of data used in the application included:

- Senegal 2005 DHS Preliminary Report.
- Senegal 1993, 1997, and 1999 DHS.
- Draft National Strategic Plan for Reducing Maternal and Neonatal Mortality and Morbidity (*Feuille de route pour accélérer la réduction de la mortalité et de la morbidité maternelles et néonatales au Sénégal*).
- Senegal Safe Motherhood Action Plan, 2000–2007 (*Plan d'action de la maternité à moindre risque dans le cadre de la santé de la reproduction: 2000-2007*).
- WHO, UNICEF, UNFPA. *Maternal Mortality in 2000*.
- WHO. 2004. *Unsafe abortion—Global and Regional Estimates of the Incidence of Unsafe Abortion and Associated Mortality in 2000*, 4th edition.
- Fatim Tall Thiam, MD, MSc. Conseillère clinique MH/FP/PAC. Personal communication to Moussa Ly. Sent via email January 21, 2006.

Validation of Data

The data collected in the field was presented at a meeting in January 2006. The technical advisor for population with the Senegal Ministry of Health presided over the meeting, which consisted of 50 participants including policymakers; representatives from the public and private health sectors; NGOs; civil society; leaders from religious, women's, and youth movements; and journalists. The meeting resulted in participants validating the data to be entered into the models and agreeing that the Allocate Model can provide key information necessary for the development of the new strategy.

V. FINDINGS

Findings from the Mother-Baby Package

The results from the MBP are calculated by applying the averages from the survey data to national-level demographic information and indicators. For example, the average number of client visits for ANC at the six surveyed health posts becomes the national average of antenatal care (ANC) visits for health posts.

General Findings

In Senegal, 79 percent of pregnant women receive ANC and 58 percent deliver with a skilled birth attendant (DHS, 2005). This makes ANC and delivery with a skilled birth attendant two of the top three most commonly used maternal health services—the third being postpartum care (PPC). The prevalence of these services across the facility levels is relatively consistent (see Figure 3). Treatment of sexually transmitted infections (STIs) and family planning are the next most commonly used services, although their frequency is less than that of ANC, skilled birth attendants, and postpartum care.

Figure 3. Number of Clients Treated at Each Level

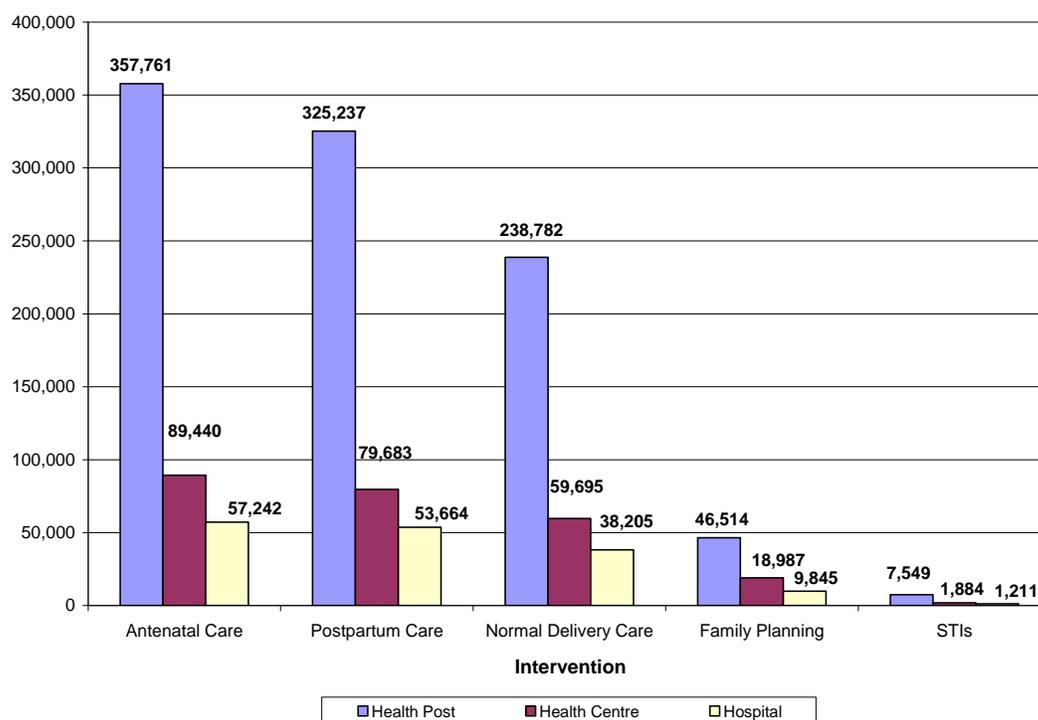
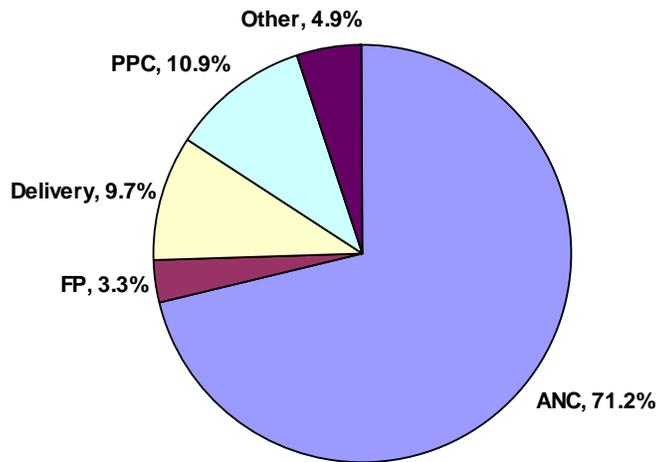


Figure 3 shows the distribution of all maternal health clients that received care over the last year at health facilities. The number of women receiving treatment for EMOC totals less than 5 percent of all maternal health clients. They have been combined in Figure 4 in the “other” category to show the extremely small proportion of maternal visits that fall into this category. The “other” category includes clients who received PAC and treatment for severe anemia, eclampsia, hemorrhage, obstructed labor, and sepsis.

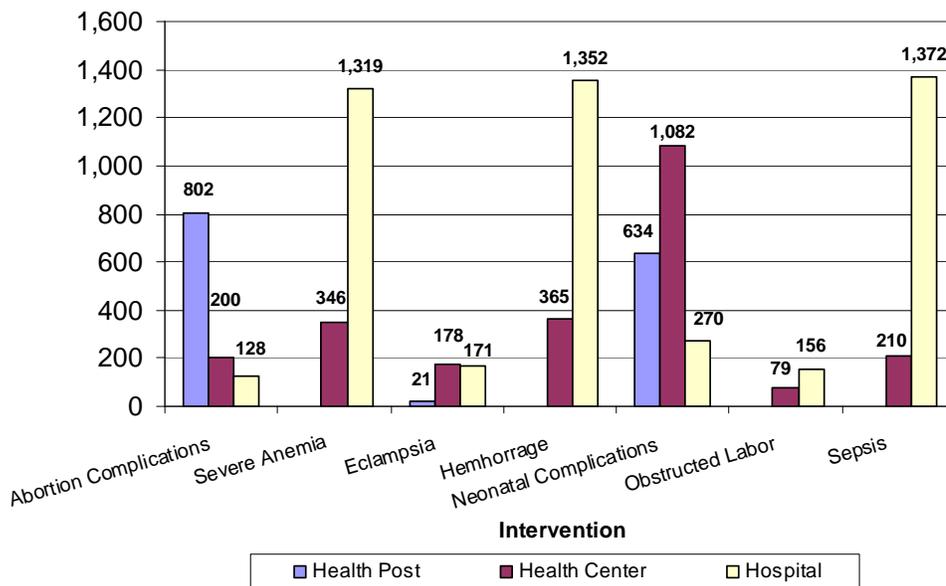
Figure 4. Distribution of Clients



ANC is the most commonly used maternal health intervention, with 71 percent of all maternal health clients receiving this service. Although ANC attendance does not correlate with decreased maternal mortality, ANC visits provide health staff with important opportunities to educate women on birth preparedness and signs and symptoms of obstetric emergencies. It is also an important time to provide prevention interventions, such as tetanus injections and iron supplements. The study showed that 96 percent of women received a tetanus vaccine at health posts, 79 percent at health centers, and 97 percent at hospital accommodations. The study also showed that 91 percent of women received ferrous salt and folic acid supplements at health posts, 100 percent at health centers, and 100 percent at hospitals.

However, the number of women being treated for obstetric emergencies (as included in the “other” category above) is critically low across all facility levels (see Figure 5). Receiving high-quality lifesaving treatment for obstetric emergencies—such as complications resulting from an abortion, severe anemia, eclampsia, hemorrhage, obstructed labor, and sepsis—is vital to reducing maternal mortality. Additionally, prompt recognition and treatment of neonatal complications is important in reducing neonatal mortality. Unfortunately, few women are receiving treatment for these emergencies.

Figure 5. Number of Clients Treated at Each Level



The WHO has developed global expected incidence rates for obstetric complications. These rates allow countries to determine if they are treating all women in need of treatment by comparing them to facility-level user statistics. Table 2 compares the percentage of pregnant women in Senegal that are being treated for complications (based on the data collected with the MBP) and the incidence of these complications that are expected to occur within the population.

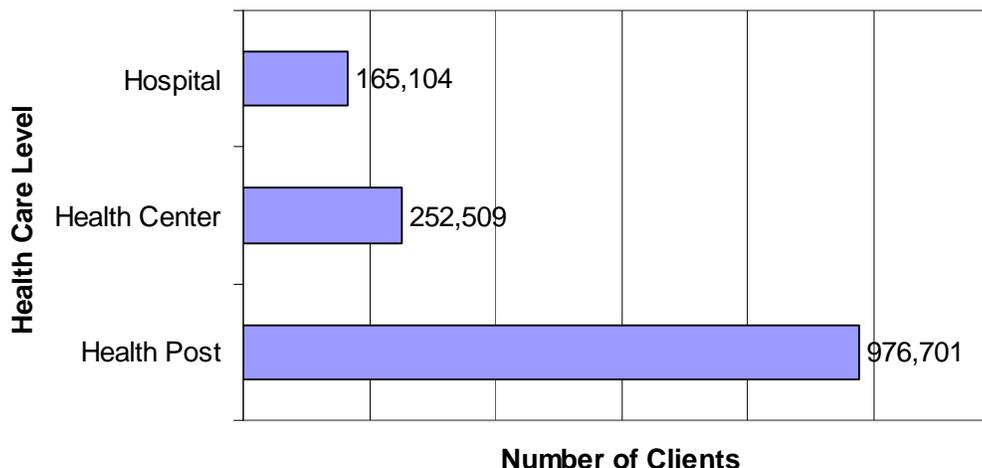
Table 2. Percentage of Pregnant Women Receiving Treatment for Obstetric Emergencies

Intervention	% Treated Senegal	Expected Incidence (%)
PAC	0.2	5
Severe anemia	0.3	2
Eclampsia	0.1	0.5
Hemorrhage	0.5	5
Obstructed labor	0.1	5
Sepsis	0.5	8
NB: The denominator above is the total number of annual pregnancies, not women of reproductive age.		

The small percentage of women being treated for obstetric emergencies in Senegal translates into few women receiving lifesaving care. Based on data collected through the Allocate Model, the top four complications for women who received treatment for obstetric emergencies in Senegal are hemorrhage, sepsis, severe anemia, and abortion complications.

As indicated in Figure 6, more than 70 percent of women in Senegal, or nearly 1 million women, who access health care do so at a health post, highlighting the success of decentralizing health services. It suggests that focusing resources on improving the quality of care, specifically baseline treatment of obstetric emergencies and referral, could offer the greatest improvements in health, since the largest proportion of clients receive care at these facilities.

Figure 6. Clients Accessing Maternal Health Services



With a CPR of only 12 percent for all methods and 21 percent of the population not wanting more children, Senegalese women need increased access to FP services and commodities (DHS, 2005). Based

on data collected through the MBP, Depo-Provera is the favored method of contraception (49%), followed by oral contraceptives (38%), Norplant (7%), and condoms (2%) (see Figure 7). Note that these are all short-term methods aimed more at birth spacing than birth limiting.

Figure 8 shows a slightly different method mix, as it uses data from the 2005 Senegal DHS preliminary report. After removing traditional methods and normalizing the numbers to equal 100 percent, the 2005 DHS cites oral contraception as the primary method of use (35%), followed by Depo-Provera (31%), condoms (14.6%) and other (19.4%) (DHS, 2005). Although the percentages differ from those of the MBP, both data sets indicate that oral contraception and Depo-Provera are the preferred methods. The greatest variation is in condom use which is likely a result of poor record keeping by health facility staff and the belief that condoms alone are not used for family planning, but instead are used for protection against HIV/AIDS. Also, husbands may be accessing condoms at pharmacies or other non-health facility locations.

A key difference in data collection methodology could also explain the overall differences in the method mixes. DHS data is collected directly from the population while the MBP information is collected from service providers. Recall bias would be expected to play a greater role in DHS results, because facility records are consulted during the MBP data collection process. However, desirability bias could affect the results from the MBP because there could be a tendency for providers to respond based on perceived expectation and not actual practice, so as not to be viewed as providing low-quality care.

Figure 7. WHO MBP Method Mix

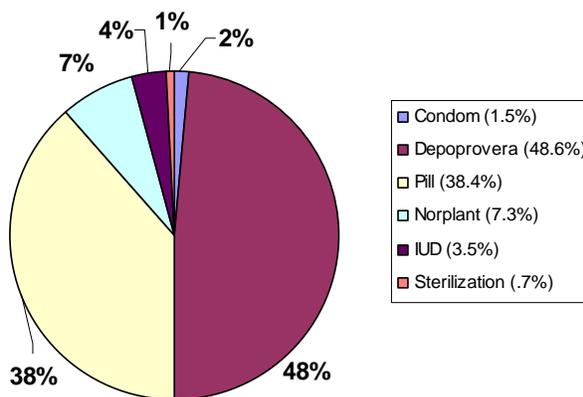
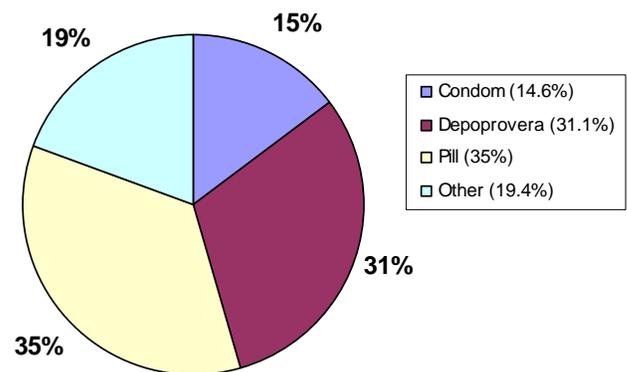


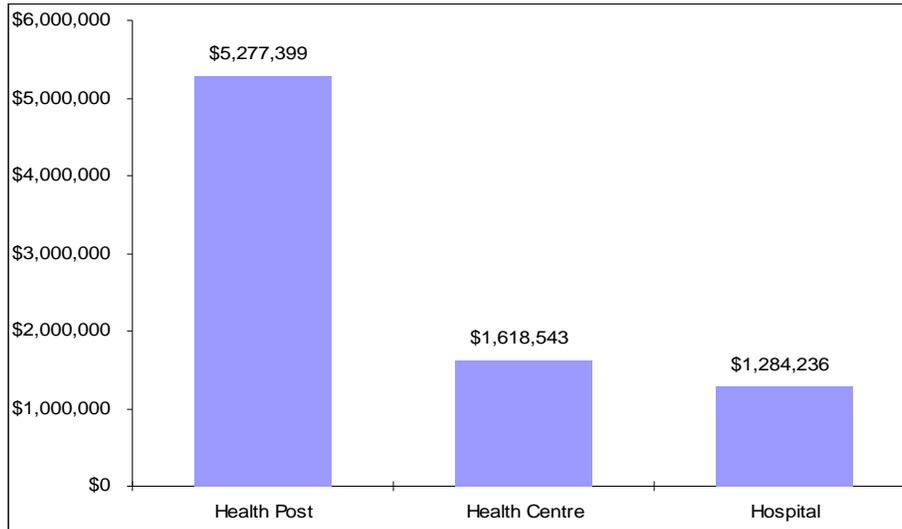
Figure 8. DHS Method Mix



MBP Costing Findings

As described earlier, one of the key components of the Safe Motherhood Model is the WHO’s Mother-Baby Package. The information collected in the MBP revealed that Senegal’s expenditures on maternal health are insufficient to meet targeted goals. The total amount currently being spent is US\$21,324,000 (10,918,400,000 CFA) and the MBP estimates that a total of US\$74,848,000 (38,322,176,000 CFA) is needed to implement the desired maternal health program as specified in national policy and strategy documents. The model shows—consistent with data showing that most women seek care at health posts—that most maternal health expenditures occur at health posts as well (64%), followed by health centers (20%) and hospitals (16%) (see Figure 9).

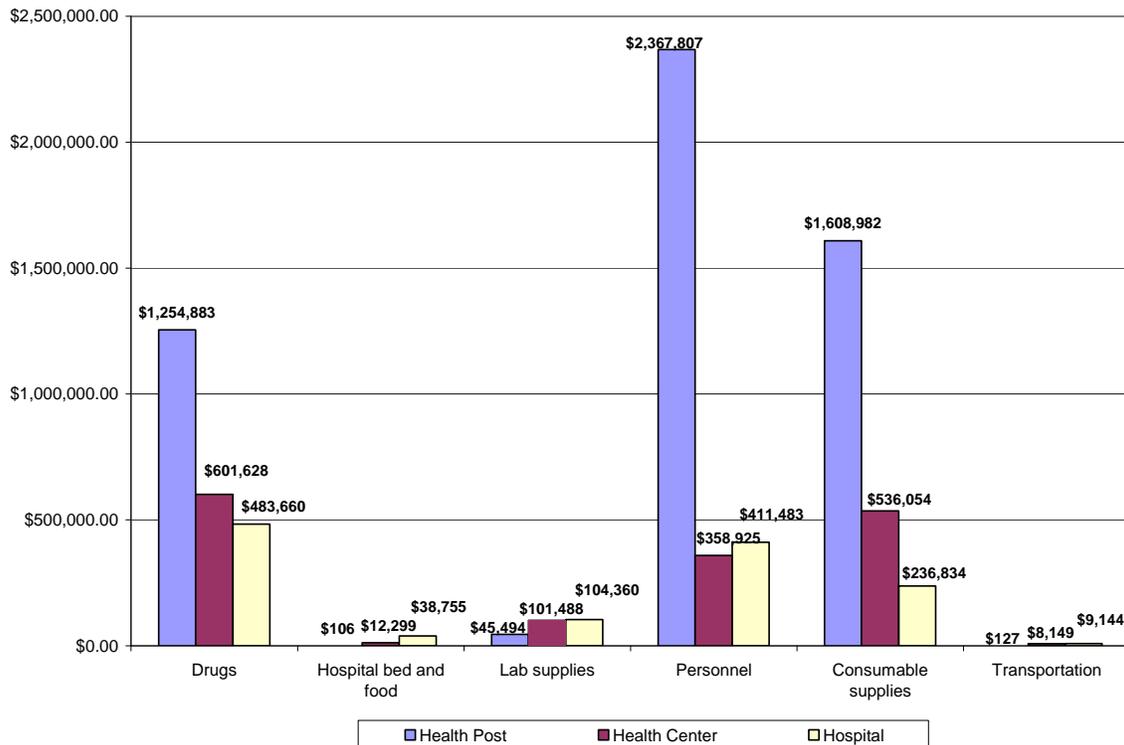
Figure 9. Total Maternal Health Expenditures at Each Health Level



Direct costs of maternal health by service level

The distribution of direct costs (costs that go to direct provision of maternal health services) is generally consistent in each category when looking across the three levels of service. The most expensive categories are drugs, personnel, and consumable supplies, although their hierarchy and expenditures differ by level. Figure 10 shows the distribution of direct costs by category at each service level: health post, health center, and hospital.

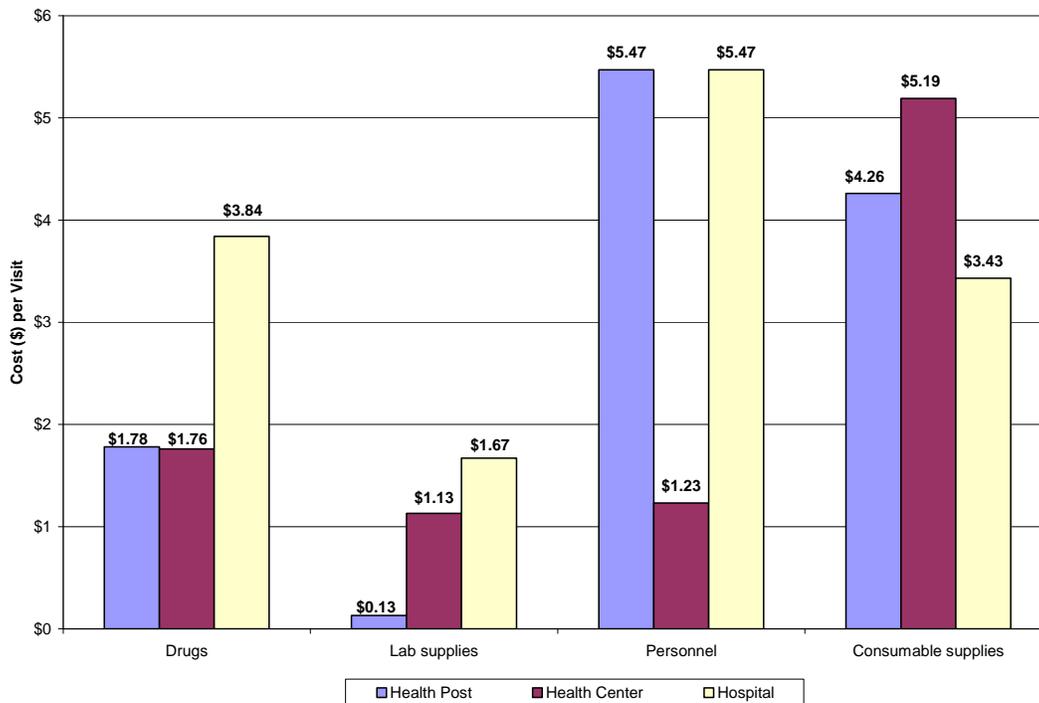
Figure 10. Direct Costs



Note that across all health levels, few resources are used for transportation and hospital beds and food.

In addition to budget breakdowns by categories at the facility level, as seen above, the Allocate Model also provides detailed breakdowns of expenditures for each of the interventions included in the MBP. Comparison of an ANC visit at each health facility reveals variations in quality of care and services provided. For instance, the amount spent on drugs at the health post level is less than both the health center and hospital levels, suggesting that women who seek ANC services at the health post level are not receiving all the necessary drugs and supplements. This is a significant finding because most women receive ANC services at this level. Other data is consistent with differences in availability of services, such as the amount spent on lab supplies, which predictably increases with the level of service. More complex laboratory services are available at health centers and hospitals, thus enabling providers to order a broader range of tests; at the health post level, providers are more dependent on symptomatic diagnosis.

Figure 11. ANC Visit Costs



For ANC, all three levels showed relatively similar trends in the components of a visit (see Figure 11). In comparison, the costs associated with eclampsia visits provide a contrasting scenario that highlights the varying services available at each level (see Figure 12). The overall costs for an eclampsia visit at the health post are low (\$15.80) in comparison to the health center (\$37.11) and hospital (\$31.92). Rather than indicating a lower price for services, the cost differences illustrate the limits of health posts' ability to treat eclampsia and its complications. Also, although the health center appears to spend more than the hospital per eclampsia visit, the difference in price is the cost of transportation from the health center to the hospital, a financial input that the hospital does not incur.

In terms of service provision proficiencies, the hospitals are designed to be fully equipped. However, since the health posts treat more clients than the health centers and hospitals combined, it is important to review the services that the health posts must refer out.

Figure 12. Eclampsia Visit Cost

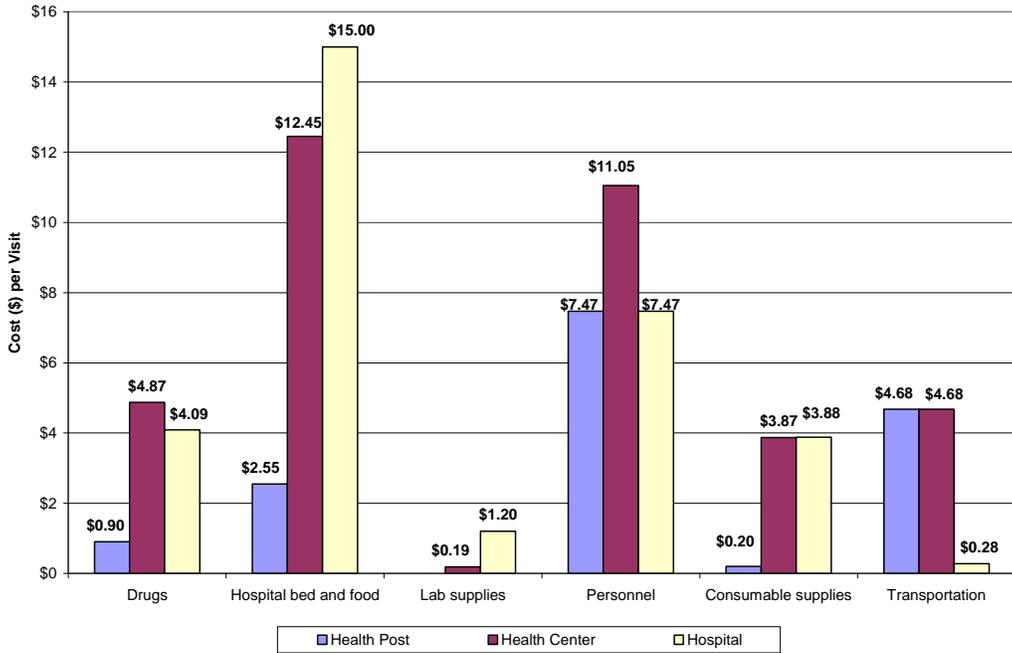
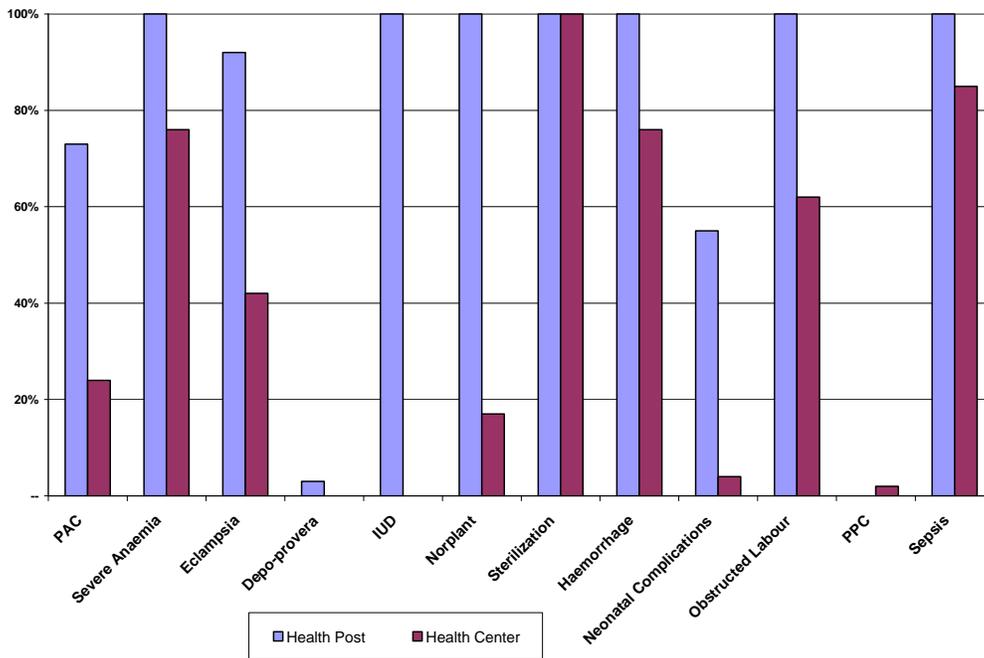


Figure 13 indicates the services that the health posts and health centers cannot treat and therefore refer to a higher facility. Note that health posts refer 100 percent of services related to IUDs, Norplant, sterilizations, hemorrhage, sepsis, severe anemia, and obstructed labors to the health centers. The health centers refer to the hospitals 100 percent of sterilizations and treatment of 85 percent of sepsis, 76 percent of hemorrhage, and 76 percent of severe anemia.

Figure 13. Services Referred



There were no referrals required at any level for antenatal care, oral contraceptives, normal labor and delivery, or STIs.

PAC Findings

PAC has been widely embraced as an important intervention to address complications related to miscarriage and incomplete abortion through improving treatments and linking women to family planning and other RH services (USAID, 2004). Effectively funding PAC programs within the context of comprehensive reproductive health care is important; it saves women's lives, protects women's health, and reduces the need for costly emergency services for abortion complications (FRONTIERS, 2000). This section highlights the findings of PAC services offered at the three facility levels.

Health Post PAC Services

The WHO and USAID PAC standards of care at the health post level suggest that after being triaged and stabilized, all women seeking services related to postabortion complications be referred to a higher level of care (WHO, 2000; USAID, 2004). In Senegal the health posts are doing more than merely recognizing complications and referring them; they are providing both treatment and stabilizing services. Seventy-five percent of the patients treated for PAC receive ampicillin, 67 percent receive metronidazole, 50 percent receive amoxicillin, and 50 percent receive doxycycline. In addition to antibiotics, clients receive ferrous salt and folic acid tablets, and 25 percent receive quinine. No drugs are given for pain management; no uterine evacuations occur; and no oxytocin is available at this level. Twenty-six percent of the women receive emergency transportation to another health facility.

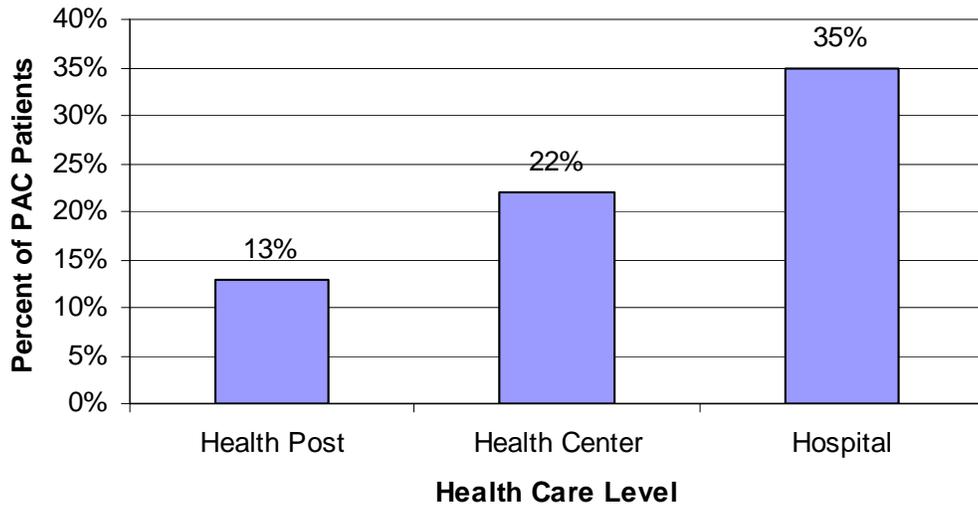
Health Center PAC Services

In Senegal's health centers, only 1 percent of PAC patients received a hemoglobin test, even though guidelines recommend 100 percent coverage. No other standard laboratory tests are provided. Although no STI-specific drugs were reported, both amoxicillin and metronidazole are frequently provided for a range of infections, including STIs. Ampicillin and amoxicillin were the most frequently provided antibiotics at 65 percent and 50 percent respectively, followed by metronidazole at 11 percent, signifying that most patients receive some form of antibiotics as WHO and USAID guidelines suggest. The health centers did not report using any supplies necessary for providing manual removal of the placenta or retained products, missing the desired goal of 100 percent patient coverage for those needing manual vacuum aspiration (MVA). However, 80 percent of PAC clients were given oxytocin.

In addition, health centers were the only facilities in Senegal that provide laminaria,⁵ with 20 percent of clients receiving it. Only 20 percent of women were provided paracetamol for pain management and 29 percent received lidocaine, despite recommendations for 100 percent coverage of both local and general pain control mechanisms. Twenty-two percent of PAC clients required an overnight stay (see Figure 14), and 6 percent needed emergency transportation.

⁵ Laminaria is a seaweed preparation inserted into the cervix to facilitate gentle gradual dilatation over 4 to 12 hours.

Figure 14. PAC Patients Requiring Overnight Stay at each Health Care Level



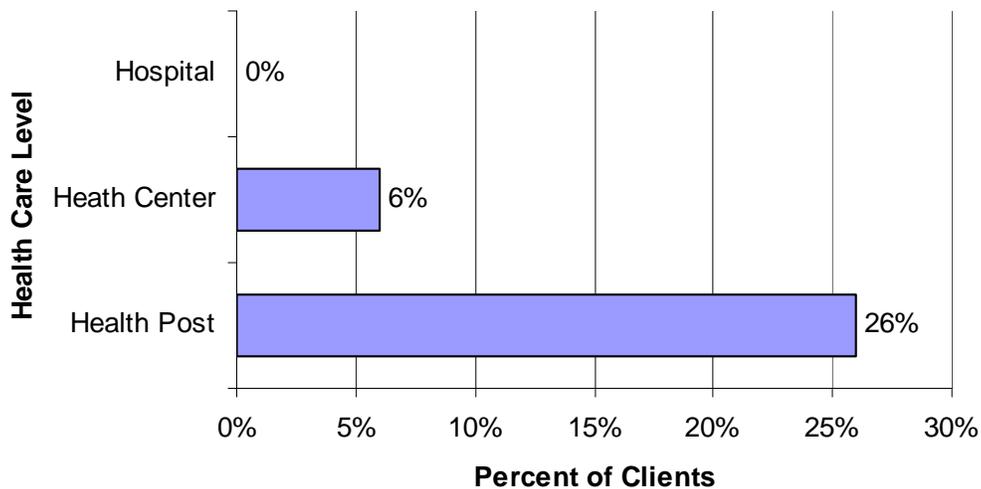
Hospital PAC Services

The range of services available in Senegal’s hospitals do not vary much from PAC services offered at the health centers. Antibiotics are widely available, but tetanus injections are still not provided. Hospitals report not seeing any patients with a need for manual removal of the placenta or retained products. Data shows that only 34 percent of women receive a blood group test and only 4 percent actually receive a blood transfusion.

Provision of drugs for pain management remains low at the hospital level as well. Only 2 percent of PAC patients received diazepam, only 7 percent received lidocaine, and only 33 percent of patients received paracetamol tablets, highlighting low pain control mechanisms. In addition, 33 percent of patients at the hospital level received oxytocin

Across all levels of service, Figure 15 below indicates the low percentage of PAC patients receiving emergency transportation.

Figure 15. PAC Clients Receiving Emergency Transportation

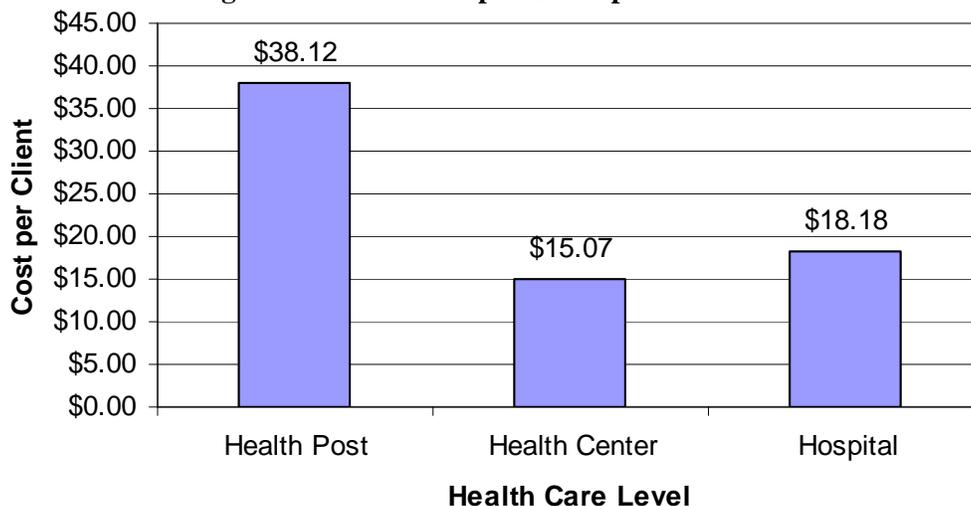


PAC Discussion

Based on the data collected in the field, abortion complications resulted in only 1,060 visits across all three health facility levels, costing them more than \$21,000 to treat. However, WHO estimates that the number of women requiring treatment of abortion complications is approximately 5 percent of all pregnancies, or in Senegal’s case, about 20,379 visits. If the WHO estimates are accurate, the number of women receiving PAC services is far lower than the number expected to need the services, indicating that the existing health services are not meeting the health needs of women. This indicates a need for improved quality and coverage of services or the need to re-evaluate the trends and actual need for PAC

The direct cost per client for treatment of abortion complications ranges from \$38.12 at health posts to \$15.07 at health centers and \$18.18 at hospital levels (see Figure 16).

Figure 16. Direct Cost per Client per PAC Visit



The expected trend of prices for services would increase with the health care level, especially since the type of complication receiving treatment is expected to be more severe at higher levels of care. However, this is not the case. The high cost of PAC services at health posts, relative to health centers and hospitals, is mostly due to the amount of drugs that are being prescribed.

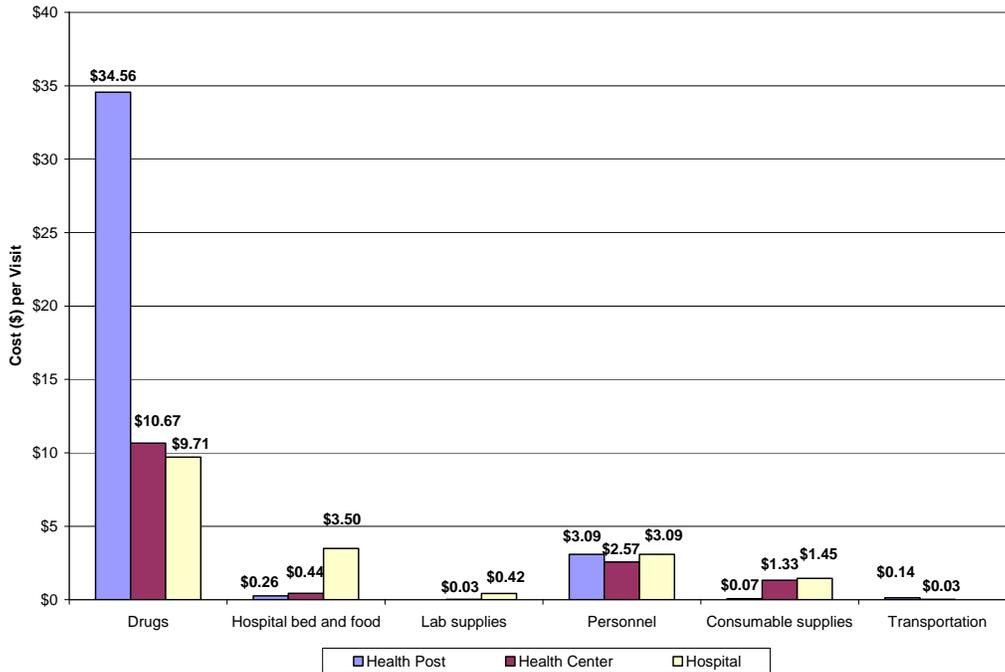
By far the most expensive component of the PAC visit at a health post is the drugs—\$34.56 out of a total price of \$38.12—suggesting possible over medication of clients and inconsistent use. Table 3 below indicates the breakdown of cost per PAC case, per drug. The table highlights that the price of a PAC visit is being driven up by provision of Ampicillin and Metronidazole, neither of which are considered standard antibiotics at health posts, potentially indicating incorrect and/or unnecessary care.

Table 3. Drugs Provided at Health Post per PAC Visit

Drug Provided	% of Women Receiving	Cost per Case
Amoxicilin	50	\$1.44
Ampicillin	83	\$29.16
Ciproflaxin	25	\$7.48
Doxycycline	50	\$0.33
Ferrous salt + folic acid	25	\$0.59
Gentamicin	17	\$1.47
Methergin goutte	25	\$0.65
Metronidazole	67	\$25.72
Quinine	25	\$1.08

In comparison, while drugs remain the most expensive component of a PAC visit across all levels (see Figure 17), the cost of drugs at health posts is disproportionately high, accounting for 91 percent of the total cost of a PAC visit. At the health centers and hospitals, drugs account for 71 percent and 53 percent, respectively.

Figure 17. PAC Visit Cost



Findings from FamPlan and PAC Model Applications

The FamPlan and PAC Models allow the comparison of different scenarios to assist in the preparation of national health strategic plans. By creating and comparing multiple scenarios, it is possible to assess the effect of different strategies (such as increasing the CPR or changing the method mix) on different indicators (such as maternal mortality and the number of abortions).

For the application in Senegal, three scenarios were created through the FamPlan and PAC models (a fourth scenario based on the SMM also emerged and will be discussed later):

- *Scenario #1: Base*—The first scenario is a baseline that serves as a comparison to access change when introducing or improving interventions. This scenario shows what would happen over the next 10 years if all indicators remain constant. High fertility and an expanding population fuels decline in most health indicators in this scenario.
- *Scenario #2: Reduction in Unmet Need*—As discussed previously, Senegal has a low level of contraceptive prevalence (12%) and a high level of unmet need (35%). This scenario was created to assess the effect on various indicators of reducing the unmet need by 50 percent over the next 10 years, from 34.8 percent to 17.4 percent. Application of this scenario reduces the TFR from 4.88 to 3.97.

- Scenario #3: Reduction in Unmet Need and Increase in PAC Resources**—This scenario builds on the previous one by retaining the 50 percent reduction in unmet need and improving the scenario through increased spending on PAC. As previously mentioned, many women in need of PAC services are not receiving them in health facilities. Since abortion complications are a substantial contributor to maternal mortality, increasing the number of women who receive PAC services is essential to reducing the number of maternal deaths. Currently, \$21,577 is being spent on PAC, but \$641,487 is required to treat all women in need of PAC services. This amount takes into account the decreased need for PAC services resulting from the reduction in unmet need from Scenario #2. This third scenario highlights the effects of treating all these women.

The potential effect of implementing the above listed three scenarios can be seen in Figures 18–21.

Figure 18. Number of Abortions

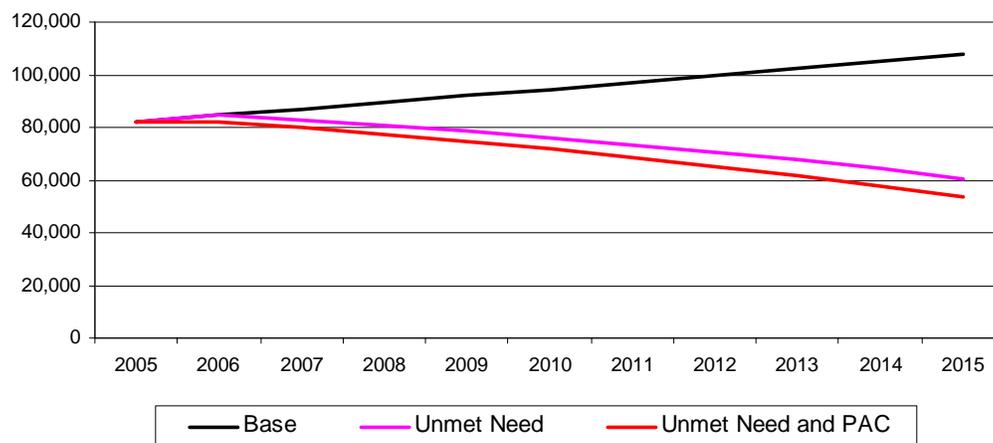


Figure 19. Number of Maternal Deaths

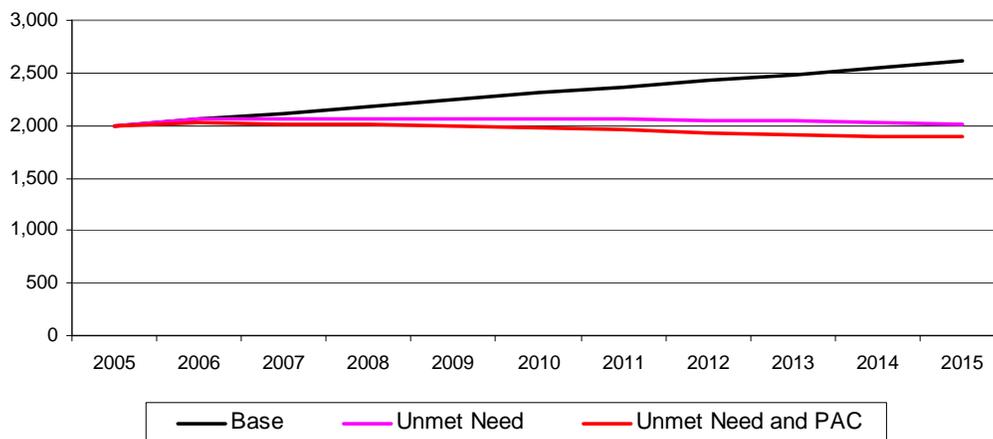


Figure 20. Maternal Deaths from Unintended Pregnancies

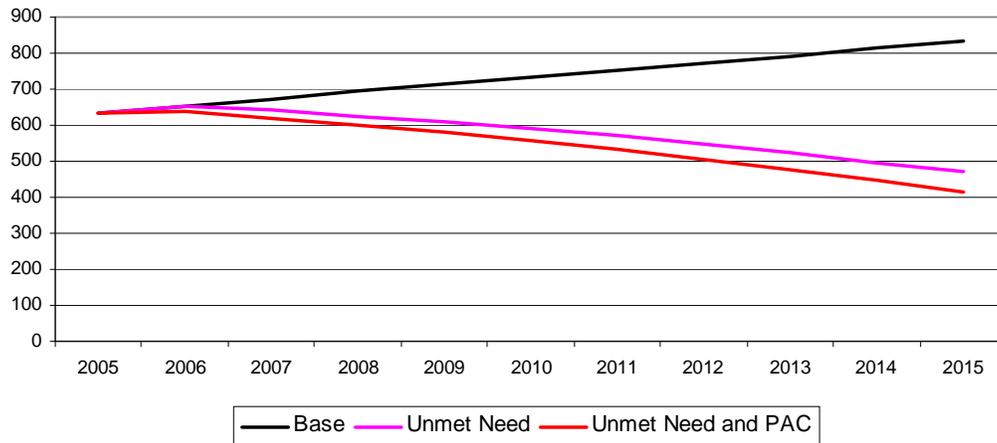
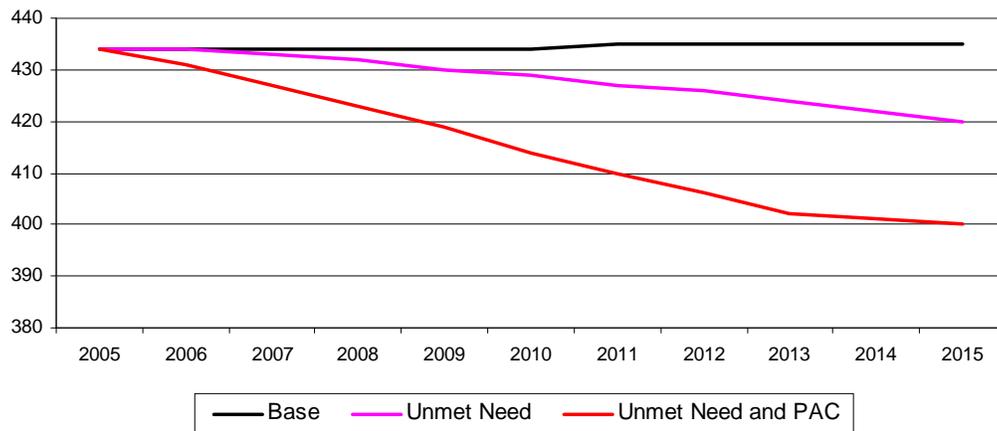


Figure 21. MMR



The figures clearly show that the number of maternal deaths and abortions will continue to increase unless the existing situation is improved. The scenarios also show that a well-supported and strategic program has potential to improve the health of mothers and babies over the next 10 years.

Findings from the Safe Motherhood Model Application

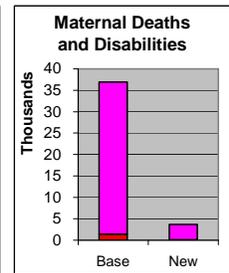
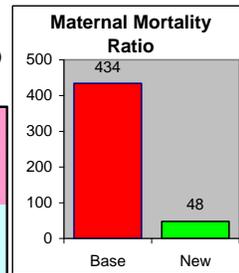
The SMM's full modeling potential emerges when it is used in an interactive session with planners and stakeholders, enabling them to focus their discussions on priority interventions and achievable reductions in maternal mortality. The model allows the user to assess the potential effect of redistributing the current level of funding as well as increasing allocation of resources to maternal health interventions. The current annual budget shown below comes from the MBP; this is the estimated amount currently being spent on maternal health services based on data collected in the field. The ideal annual budget listed below is also estimated using the MBP but is developed using national protocols and guidelines.

The following graphic is the faceplate of the SMM, showing the possible reduction in maternal mortality by fully funding Senegal's maternal health program. This includes 90 percent of women receiving ANC, 90 percent of women delivering with a skilled birth attendant, 100 percent of maternal health complications being treated, and a CPR of 30 percent.

Budget (Thousands)

Program Component	Current Annual Budget	Proposed Annual Budget	Implied Annual Budget	Proposed Annual Budget	Ideal (WHO MBP) (97-01 SP)
Total Budget	\$ 21,324	\$ 74,848	\$ 75,000	\$ 74,848	\$ 74,848
Policy	\$ 176		\$ 512	\$ 512	\$ 512
Monitoring	\$ 176		\$ 512	\$ 512	\$ 512
Training	\$ 706		\$ 2,048	\$ 2,048	\$ 2,048
Health promotion	\$ 353		\$ 1,024	\$ 1,024	\$ 1,024
Private effort	\$ 53		\$ 154	\$ 154	\$ 154
Service delivery					
- Birth spacing	\$ 1,109		\$ 4,498	\$ 4,498	\$ 4,498
- FP for limiting family size	\$ 19		\$ 20	\$ 20	\$ 20
- Antenatal care	\$ 9,326		\$ 15,044	\$ 15,044	\$ 15,044
- Postabortion care	\$ 37		\$ 1,132	\$ 1,132	\$ 1,132
- Delivery with skilled attendance	\$ 1,694		\$ 9,259	\$ 9,259	\$ 9,259
- Postpartum care	\$ 2,733		\$ 5,333	\$ 5,333	\$ 5,333
- Emergency obstetric care					
- Hemorrhage	\$ 53		\$ 1,033	\$ 1,033	\$ 1,033
- Obstructed labor	\$ 7		\$ 968	\$ 968	\$ 968
- Sepsis	\$ 172		\$ 1,431	\$ 1,431	\$ 1,431
- Transport	\$ 8		\$ 265	\$ 284	\$ 284
Infrastructure/access					
- Antenatal care	\$ 2,489		\$ 12,203	\$ 12,203	\$ 12,203
- Postabortion care	\$ 13		\$ 509	\$ 337	\$ 337
- Delivery with skilled attendance	\$ 683		\$ 9,039	\$ 9,039	\$ 9,039
- Postpartum care	\$ 1,398		\$ 5,548	\$ 5,548	\$ 5,548
- Emergency obstetric care	\$ 116		\$ 4,471	\$ 4,471	\$ 4,471

Scenario **Full cost**



Maternal deaths averted = 1,278 Disabilities 31,960
 Cost per death averted = \$ 41,986 % MMR red. 89%

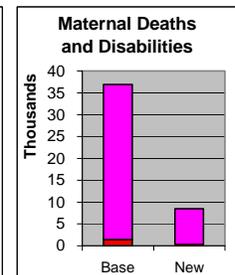
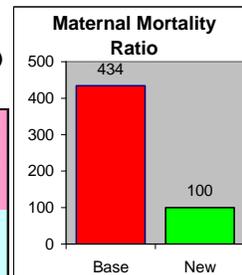


The next screenshot highlights the importance of PAC services and EMOC in reducing maternal mortality. By fully funding these interventions, as well as the necessary support activities listed in the top five lines of the model, there is potential for a 77 percent reduction in the MMR.

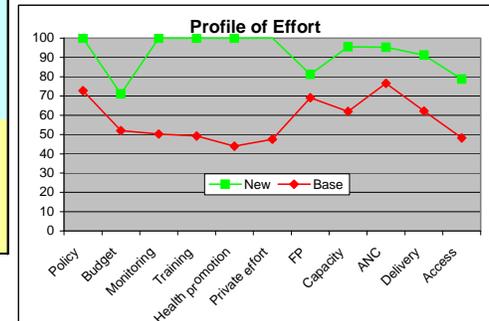
Budget (Thousands)

Program Component	Current Annual Budget	Proposed Annual Budget	Implied Annual Budget	Proposed Annual Budget	Ideal (WHO MBP) (97-01 SP)
Total Budget	\$ 21,324	\$ 33,358	\$ 53,219	\$ 33,358	\$ 74,848
Policy	\$ 176	\$ 512	\$ 512	\$ 512	\$ 512
Monitoring	\$ 176	\$ 512	\$ 512	\$ 512	\$ 512
Training	\$ 706	\$ 2,048	\$ 2,048	\$ 2,048	\$ 2,048
Health promotion	\$ 353	\$ 1,024	\$ 1,024	\$ 1,024	\$ 1,024
Private effort	\$ 53	\$ 154	\$ 154	\$ 154	\$ 154
Service delivery					
- Birth spacing	\$ 1,109		\$ 3,823	\$ 1,109	\$ 4,498
- FP for limiting family size	\$ 19		\$ 19	\$ 19	\$ 20
- Antenatal care	\$ 9,326		\$ 13,896	\$ 9,326	\$ 15,044
- Postabortion care	\$ 37	\$ 1,132	\$ 1,132	\$ 1,132	\$ 1,132
- Delivery with skilled attendance	\$ 1,694		\$ 7,101	\$ 1,694	\$ 9,259
- Postpartum care	\$ 2,733		\$ 3,459	\$ 2,733	\$ 5,333
- Emergency obstetric care					
- Hemorrhage	\$ 53	\$ 1,033	\$ 1,033	\$ 1,033	\$ 1,033
- Obstructed labor	\$ 7	\$ 968	\$ 968	\$ 968	\$ 968
- Sepsis	\$ 172	\$ 1,431	\$ 1,431	\$ 1,431	\$ 1,431
- Transport	\$ 8	\$ 284	\$ 284	\$ 284	\$ 284
Infrastructure/access					
- Antenatal care	\$ 2,489		\$ 4,461	\$ 2,489	\$ 12,203
- Postabortion care	\$ 13	\$ 337	\$ 337	\$ 337	\$ 337
- Delivery with skilled attendance	\$ 683		\$ 2,829	\$ 683	\$ 9,039
- Postpartum care	\$ 1,398		\$ 3,725	\$ 1,398	\$ 5,548
- Emergency obstetric care	\$ 116	\$ 4,471	\$ 4,471	\$ 4,471	\$ 4,471

Scenario **None**



Maternal deaths averted = 1,093 Disabilities 27,328
 Cost per death averted = \$ 29,178 % MMR red. 77%



Findings from the Allocate Model Application

The Allocate Model uses the three scenarios created for the FamPlan and PAC models and adds a fourth scenario focusing on the SMM. The Allocate Model brings all these scenarios together and shows the

cross benefits among the different models. These scenarios are specific to Senegal and show the effect of changes in indicators over the 10 years of the projection. The scenarios can be used as the basis for policy dialogue on possible strategies for improving reproductive health. The model also includes a budget graph, showing both the current budget and the budget of the selected scenario which consists of the cost of implementing different interventions and the effect it has on the total budget.

The model shows the changes on the following select indicators:

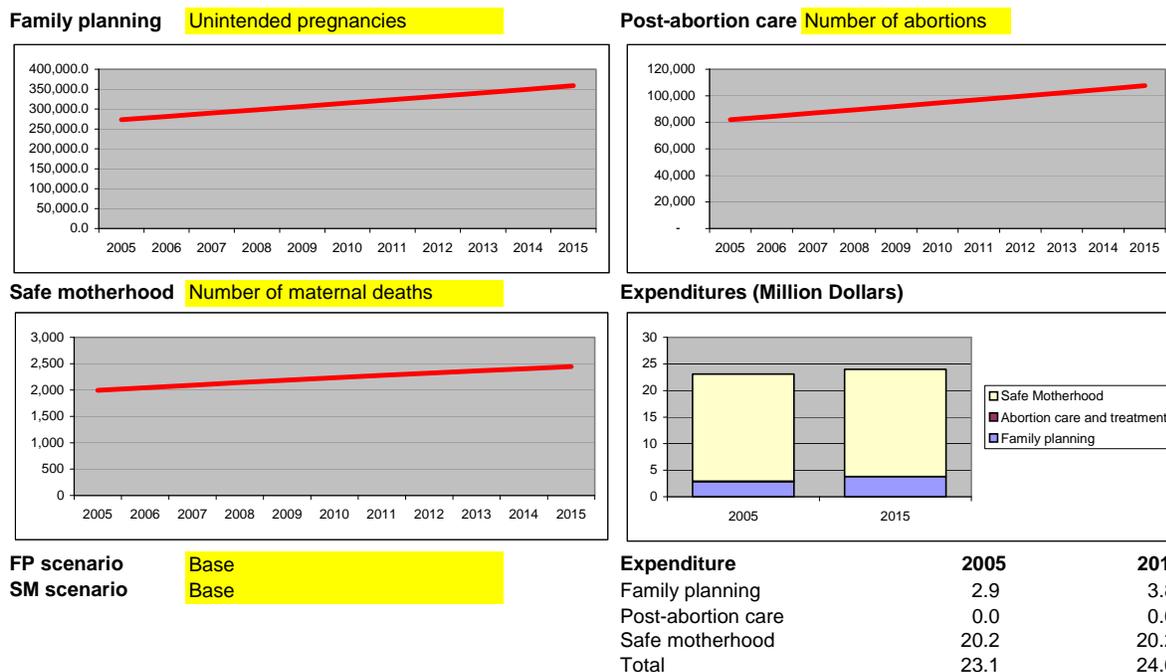
- Family planning: TFR, CPR, and unintended pregnancies
- Postabortion care: number of abortions and abortion-related deaths
- Safe motherhood: MMR and number of maternal deaths

Scenario #1: Base

If the current health situation were to stay the same, what would happen over the next 10 years? This scenario showed that if everything remained the same, there would be an increase in the total number of maternal deaths and the number of abortion-related deaths, mostly due to population growth. This clearly shows that the current situation will continue to deteriorate if there is no improvement in the reproductive health situation.

If the current situation were to stay the same, by the year 2015, there would be a 31 percent increase in unintended pregnancies, from 273,212 to 358,556; a 31 percent increase in the number of abortions from 81,964 to 107,567; and a 23 percent increase in the number of maternal deaths from 1,995 to 2,446, again due to population growth.

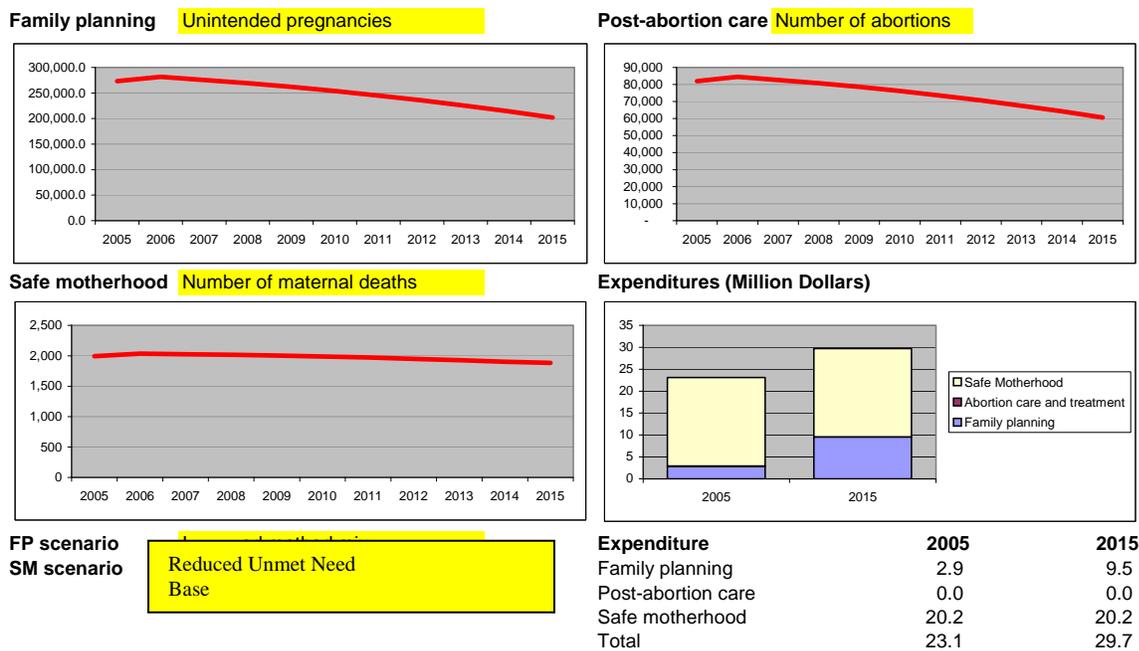
There would be a slight increase in the overall level of funding, from \$23.1 million to \$24 million. Although the CPR remains constant, the actual number of women using contraception increases because of the increase in population size over the 10 years.



Scenario #2: Reduction in Unmet Need

The second scenario assumes a 50 percent reduction of unmet need from 2005 to 2015 (a reduction from 34.8% to 17.4%). This reduces the TFR from 4.88 to 3.97. When comparing this scenario to the Base scenario, an improvement can be seen in all indicators. The number of unintended pregnancies decreases from 273,213 to 201,987 (a 26% reduction compared to the 31% increase seen in the Base scenario). The number of abortions decreases from 81,964 to 60,596, a 26 percent reduction compared with the 31 percent increase seen in the base scenario. As seen below, there is also a slight decrease in the number of maternal deaths.

The overall cost increased slightly from \$23.1 million to \$29.7 million. This shows that by investing small amounts of resources into family planning, real improvements in important RH indicators can be achieved.

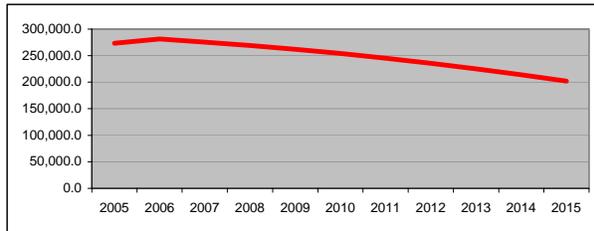


Scenario #3: Reduction in Unmet Need and Increase in PAC Resources

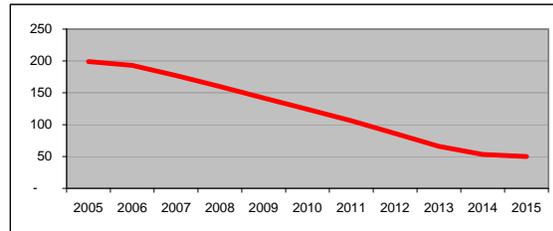
This scenario includes the reduction of unmet need from Scenario #2 plus an increase in PAC resources that assumes all women in need of PAC services receive them. When looking at this scenario, we can see that treating all PAC complications in addition to reducing unmet need by 50 percent leads to greater improvements in key indicators. The number of abortion-related deaths decreases from 199 to 50 (a 75% reduction). The MMR would decrease from 434 to 391 (a 10% reduction).

The overall budget increased from \$23.1 million to \$30.3 million. This shows that relatively small investments in family planning and postabortion care lead to large improvements in key health indicators.

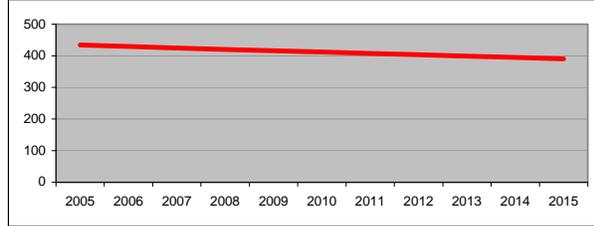
Family planning Unintended pregnancies



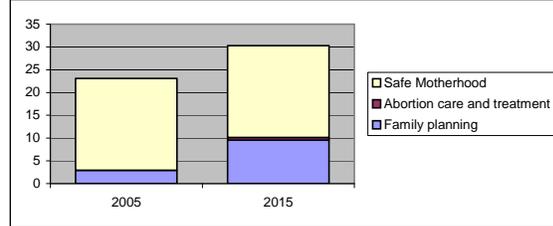
Post-abortion care Abortion-related deaths



Safe motherhood Maternal mortality ratio



Expenditures (Million Dollars)



FP scenario
SM scenario Reduced UMN & Increase in PAC Resources Base

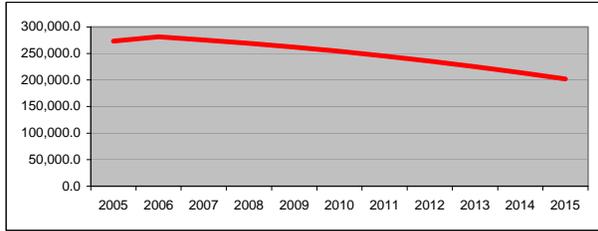
Expenditure	2005	2015
Family planning	2.9	9.5
Post-abortion care	0.0	0.6
Safe motherhood	20.2	20.2
Total	23.1	30.3

Scenario #4: Safe Motherhood (Full Cost)

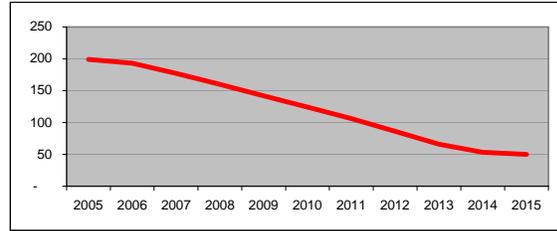
This scenario continues to build on the previous scenarios by adding a safe motherhood component to the reduction in unmet need and increase in PAC funding seen in Scenario #3. The safe motherhood component of the model allows policymakers to look at two situations: continuation of the current safe motherhood program *and* the cost of fully implementing the desired safe motherhood program. However, alternate scenarios can be created using the SMM, as shown previously. The ideal situation includes fully implementing national guidelines and increasing coverage of essential maternal health services, such as family planning, PAC, and EMOC.

Fully implementing the safe motherhood program will reduce the number of maternal deaths to 196 from 1995 (a 90 percent reduction). In this scenario, the total budget increases from \$23.1 million to \$79.4 million.

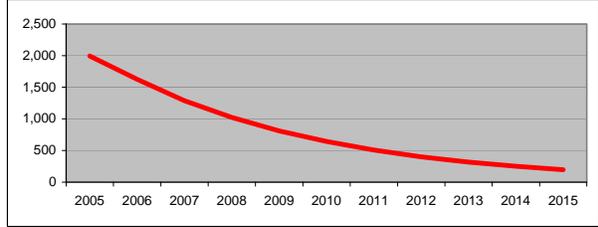
Family planning Unintended pregnancies



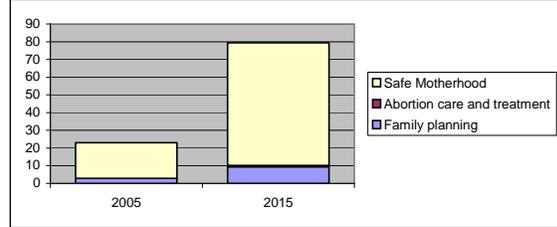
Post-abortion care Abortion-related deaths



Safe motherhood Number of maternal deaths



Expenditures (Million Dollars)



FP scenario
SM scenario **Reduced UMN & Increase in PAC Resources**
 Full Funding

Expenditure	2005	2015
Family planning	2.9	9.5
Post-abortion care	0.0	0.6
Safe motherhood	20.2	69.2
Total	23.1	79.4

VI. Recommendations and Next Steps

As Senegal continues to solidify its national health strategic plan, the following next steps could guide decisionmakers regarding resource allocation in priority areas:

1. Use the model to develop indicators and priority interventions, based on cost effectiveness, for the final version of the plan. The United Nations Population Fund (UNFPA) intends to facilitate the use of the model during the strategic planning process.
2. Draw on evidence from the models to support strategy implementation at the decentralized level.
 - There was great interest in the models at the district level. This interest needs to be built on through the dissemination of results and the creation of advocacy campaigns based on findings. This will help to ensure consistency in messages at all levels as well as aid in the implementation process.
 - PAC services are highly underutilized. Results from the model can be used to highlight the importance of providing these services to district level health personnel. A recent study in Senegal demonstrated that after improved PAC services were introduced, the proportion of patients who were counseled about family planning increased from 18 percent to 34 percent. Furthermore, most patients who received counseling chose to use contraception, increasing uptake from 56 percent to 76 percent (CEFOREP, 1998). The same study also showed that improving PAC services shortened hospital stays by approximately 50 percent, thereby reducing hospital costs per patient by 25 percent from US\$61 to \$46 (CEFOREP, 1998) and highlighting the connection between health and economics in relation to PAC services. Government data also supports the increase in family planning uptake by PAC clients since the decentralization of PAC services in 2004, with 53 percent receiving an FP method prior to leaving the health facility in 2005, compared with 31 percent in 2004 (USAID, 2005).
3. Focus priority attention in future health budgets on underutilized services that contribute to morbidity and mortality, such as EMOC.
4. Use information on quality of care (collected with the MBP) to improve and focus trainings on national protocols to ensure standardization and the provision of high-quality services. This information can also be used with service providers to improve efficiency and effectiveness of key services through in-service trainings and by providing consistent information on content of care.
5. Disseminate results to policymakers and relevant stakeholders, including the MOH, Ministry of Finance, UNFPA, USAID, NGOs, and civil society.

VII. Conclusion

The application of the Allocate Model provides critical information for Senegal as it moves forward in the development of its new national health strategic plan. Senegal now has the information necessary to set achievable and affordable targets while maximizing available resources. This information can also play a key role in discussions with donors to realistically demonstrate what can be achieved with available funds, helping to set practical expectations, while at the same time providing the government with a powerful tool to advocate for increased funding.

Senegal also has the opportunity to build on the momentum from the application by incorporating regional and district-level health personnel in the planning process. While presenting the model to district-level personnel, one participant commented that, “The model would help us understand why certain decisions have been made at the national level,” specifically in reference to priority interventions. This could lead to increased understanding and buy-in at the decentralized level, which could be built on by using the results from the model to create district-level advocacy plans. This would help to ensure consistency of messages and aid in strategy implementation.

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