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DỰ ÁN TĂNG CƯỜNG TRÁCH NHIỆM GIẢI TRÌNH TRONG CUNG CẤP DỊCH VỤ CSSKSS-KHHGĐ CHO NGƯỜI DÂN VÙNG KHÓ KHĂN HAI TỈNH LÂM ĐỒNG VÀ QUẢNG BÌNH

ĐƠN VỊ ĐÀO TẠO VÀ TƯ VẤN VỀ ĐÁNH GIÁ KINH TẾ
ĐẠI HỌC Y HÀ NỘI

REPORT

Cost- benefit analysis of providing Family planning services for the vulnerable populations in Lam Dong and Quang Binh Provinces

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ORGANIZATION, RESEARCHERS PARTICIPATING IN THE STUDY

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Abbreviations

CHS	Commune Health station
FP	Family planning
MoH	Ministry of Health
RH	Reproductive Health

Executive Sumary

Introduction

The family planning (FP) program has achieved great success in terms of controlling the population growth rate in Vietnam. The stabilization of the population has undoubtedly contributed to the national economic development and to the improvement in the quality of life of Vietnamese people in the past years. However, these results have not yet been quantified. This study aimed at estimating the net social benefit (NSB) of providing FP services (or contraception services) for vulnerable populations. The findings will be used as evidence for advocacy to improve utilization and accessibility of public family planning (FP) services by inclusion of FP services in the health insurance scheme. This is necessary in the context of the decrease in financial support to the FP program from the government and international donors. The limitation of free FP services will probably affect sustainability of the program, especially in disadvantaged areas of the country, such as the study sites, Dam Rong (Lam Dong) and Minh Hoa (Quang Binh).

Method

A cost- benefit analysis approach, in which we assumed the cost of providing family planning services through the health insurance system, was compared to expenditures which would have occurred as a result of unintended pregnancy in the absence of the program. The study was conducted in Minh Hoa and Dam Rong, two poor mountainous districts of Quang Binh and Lam Dong provinces. Cost of providing FP services was estimated from the perspective of the government. Total annual cost of the program was the number of FP services per year by method provided, multiplied by unit costs. The data on the number of FP services provided was collected at all public health facilities. The unit cost of each method was based either on the listed district hospital fee or the current market price in the year 2013. As the study assumed that the FP services were provided within the health insurance scheme, therefore, 10% of total cost of providing FP services for management and contingency fees was added, according to health insurance laws in Vietnam. The expenditures avoided from the prevention of unintended pregnancies were calculated as the cost savings to households, health insurance and government. Cost saving was estimated by two steps. First of all we used MSI Impact 2 to estimate the number of unintended pregnancies averted and the impact - the number of abortions averted, the number of live births averted and the numbers of DALY averted due to utilization of FP services. Then we estimated the total cost that would have occurred without FP program. These costs included costs of delivery, costs of abortion, costs of child health care to age five and costs of maternal DALY. Both direct medical costs and indirect costs were included in the calculation. Data for the cost saving estimation were collected by interviewing married couples with children aged from 0-5 years, pediatricians

and obstetricians, and by reviewing records kept at the district hospitals. Both the cost of providing FP services and the total cost savings were estimated annually and for 5 years from 2009 to 2013. The 2013 price of family planning services and health care services were used for every year, so that we did not consider discounts and inflation in the study. All costs were calculated in Vietnam dong and US dollar (exchange rate in June 2013 was used; $1US= 21,036 VND). Cost-benefit of the family planning program was measured by three wo criteria: ratio between cost saved and cost invested (B/C) of the FP program; Return on Investment {ROI= (Benefit-cost of progam)/cost of program x100} or net social benefit (NSB) (NSB = cost saved – cost of the FP program). The FP program will be considered to give benefit if B/C>1, ROI>0 or NSB>0. One-way sensitivity analysis was conducted to examine the effect of alternative input assumptions on the net social benefit of the FP program. These assumptions may be expected to be reasonable changes in the coming time. The exclusion of government support in public health facilities will increase hospital fees by 30% of the current fee. Besides, a 10% decrease in the rate of childhood disease when the children's' health situation continues to improved more and more in the study settings and a decrease in the participation rate can occur when the supply of family planning services is no longer free of charge. Commonly, a 10% of the increase in the failure of the FP program has been assumed in earlier studies on the FP program. It is important to note that medical costs from the cost-saving estimated reflected expenditures that government and health insurance would have incurred without FP program in studied districts.

Key findings

1) Total expenditure for FP program during the 5 year study period was 545,159,665 VND ($25,963 US) in Minh Hoa and 745,897,150 VND ($35,458 US) in Dam Rong, even though the number of family planning services used in Minh Hoa was higher than in Dam Rong. The difference between two districts in the types of FP service provided explains these results. Intrauterine devices were used commonly in Minh Hoa, while tubal ligation and vasectomy were more often used in Dam Rong. The price of intrauterine devices was much cheaper than that of tubal ligation or vasectomy. If the management fee for health insurance is included, the total cost of FP program was 600,775,632 VND ($28,559 US) in Minh Hoa and 820,486,865 VND ($39,004 US) in Dam Rong.

2) Within these 5 years, the FP program averted 4,074 unintended pregnancies in Minh Hoa and 1,610 in Dam Rong. By decreasing unwanted pregnancies, the contraceptive services provided through the FP program prevented an estimated 2,322 and 918 abortions; 1,313 and 519 unintended births and 63 and 57 DALYs by maternal mortality and morbidity related to pregnancy in Minh Hoa and Dam Rong, respectively.

3) Through averting above unintended pregnancies and their health impact, over these five years the FP program saved a total cost of 10,789,211,724 VND ($512.893 US) in Minh Hoa and 8,264,536,463 VND ($392.876 US) in Dam Rong, incurred by households and public sector (including health insurance and government). The total public sector cost-

savings was 3,461,337,810 VND ($164,544 US) in Minh Hoa and 5,820,602,449 VND ($276,697 US) in Dam Rong. Total cost saving for public health sector was 3,461,337,810 VND ($164,544 US) in Minh Hoa district and 5,820,602,449 VND ($276,697 US) in DamRong district. By reducing household and public sector expenditure resulting from unintended pregnancy, $1 US spent on the FP program saved $18 US in Minh Hoa and $10.1 US in Dam Rong over these five years. Net social benefit of the program (NSB) was $484,333 US and $353,872 US in Minh Hoa and Dam Rong, respectively. The benefit was therefore higher by 1,695.9% in Minh Hoa and 907.3% in Dam Rong than the costs invested in the program.

4) Sensitivity analysis revealed that alternative assumptions, including increasing total cost of the FP program by 30%, increasing cost of providing hearlth care services by 30%, increasing failure rate of the program by 10%, reducing by 10% the participation rate in the program, reducing by 10% the incidence of children's diseases and exclusion of indirect cost, would affect the cost-benefit findings for the FP program. However, all alternatives showed that cost-savings from households and public sector still greatly exceeded costs invested in the program. Benefit was higher than cost invested in the FP program, accounting for each of the above assumptions respectively for 675%; 737%; 807%; 834%; 892% and 609 % in Dam Rong. Similarly, the results were 1,281%; 1,715%; 1,526%; 1,706%; 1,536% and 476.1%, respectively for the above assumptions in Minh Hoa.

Conclusion

The provision of contraceptive services through the family planning program was revealed to have high cost-benefit results in disadvantaged areas. The benefit was higher by 1,875% in Minh Hoa and by 1,008% in Dam Rong than cost invested. If the program is provided through the health insurance system, benefit was still higher by 1,695.9% in Minh Hoa and by 907.3% in Dam Rong than costs invested in the program. The results demonstrate that the benefits of the family planning still greatly exceed the costs of the program even if it is invested by health insurance system. The prevention of unintended pregnancies results in great cost-savings to households and government as well as to the health insurance system. In addition to the economic benefits, the program contributes to the improvement in women's quality of life, by reducing abortions, unintended births and maternal morbidity and mortality. The findings of this study confirm that investment in the FP program by the health insurance system should be addressed to sustain the success of the program, especially in the context of reduced financial support from international donors.

Recommendations

For the Project "Increasing service performance accountability", MSI

- Use findings of the study as evidences to advocacy for the inclusion of FP services in health insurance scheme.
- Support enhancing communication activities and improving quality of FP service

provision to project communes with the aim at improving awareness, accessability to and utilization of FP services among people.

- Disseminate study's results to related orgnizations and institutes.

For health facilities at provincial, district and commune levels

- Improve health information management system to provide good evidence for health care planning and management in generally and reproductive health care management, in specificaly.

For Ministry of Health and Family Planning & Population Program

- Consider to carry out a comprehensive study on cost- benefit of providing productive health care services. Those findings will be evidences for mobilizing resources to improve the provision and the utilization of family planning.

1. Introduction

In Vietnam, the ethnic minorities make approximately 14.3% of the population (12.25 million of 89 million people) and live mainly in the mountainous and highland regions. Because of poor living conditions as well as the backward traditions alive, their health status is worse than that of other groups; this is particularly true for ethnic minorities in central and highland area. Despite efforts made by the Vietnam Government to improve the situation of vulnerable populations, maternal mortality rates (MMR) vary vastly between the Kinh people and ethnic minorities (81 vs. 289 per 100,000; respectively), even higher in Central Highlands. Among 63 provinces/cities of Vietnam, Lam Dong and Quang Binh provinces are classified as the group with the highest MMR. Lam Dong is located in the highland area with a population of 1,218,619 residents, 49% of population is female and 61% of them live in the rural area. Quang Binh is located in the central of Vietnam with mountainous areas accounting for 85% of the total area. Total population is 849,300 residents; 50.2% of them are female.

According to recent studies, both infant mortality rate (IMR) and under 5 mortality rate of ethnic minority children are three times as likely as Kinh children. The lack of utilization and accessibility to high quality health care services is considered as a main cause of the problem. With the aim of improving the quality of Reproducitve Health (RH) and Family Planning (FP) services for the vulnerable population of Lam Dong and Quang Binh, Marie Stopes International Vietnam conducts a project on "Increasing Service Performance Accountability". The Project has been carried out in Dam Rong district, Lam dong province and Minh Hoa district, Quang Binh province. These are two of the poorest mountainous districts in Vietnam. In 2013, the population of Dam Rong is 43,156. 75% of them are minority people. The population growth rate is 1.82% which is high compared to the whole country of 1.05%. Minh Hoa district has 49,000 persons. 13.3% of them are minority people. The total fertility rate of the district is 2.5 (The whole country is 2.14). One objective of the project is to advocate for improvement in sexual and reproductive health service delivery and for inclusion of Family Planning services in the health insurance scheme

With the aim of providing evidence for advocacy to improve utilization and accessibilty of public family planning (FP) services by inclusion of FP services in the health insurance scheme, the cost-benefit analysis of providing FP services (or contraception services) for vulnerable populations was carried out in Dam Rong (Lam Dong) and Minh hoa (Quang Binh).

2. Objectives

2.1. General objective: To estimate net social benefit of providing family planning services for vulnerable populations in Lam Dong and Quang Binh Provinces

2.2. Specific objectives:

1) To calculate costs of providing FP services for vulnerable populationsớc tính chi phí cung cấp dịch vụ KHHGĐ cho người dân ở khu vực khó khăn
2) To estimate the number of unintended pregnancies adverted the by receiving FP services in study settings
3) To measure cost-saving which would be resulted from preventing unintended pregnancies.
4) To examine cost-benefit ratio of providing FP services for vulnerable populations

3. Method

3.1. Several concepts used in the study

- Family planning & population program: this is a national target program, one of the activities of the program is to provide free contraceptives for married women of reproductive age [11]
- Cost saving by FP program: using family planning serviecs prevented untended pregnancies therefore expenditures which people would have been incurred due to unintended pregnancies were avoided (in this study, it was cost saved for Health Insurance and users). Cost saving is the total benefit of the program that was measured in money value.
- DALY (disability adjusted life year): This is a unit to measure the number of life years lost due to disability and premature death. In this study DALY was the number of life years lost due to disease or maternal death related to pregnancy**.**
- Net social benefit (NSB) is social welfare achieved by the program/intervention. NBS is the difference between total benefit achieved (B- valued by monetary unit) and total cost (C) of the program as following [9]

  NSB = B – C

  Where

  - B: benefit gained and it was measured in money value.
  - C. total costs of the program
- Return on investment (ROI): ROI measures the gain generated on investment relative to the amount of money invested.It is represented as a ratio of expected financial gains (benefit) of the program devided by its total costs.

  The formula for calculation of ROI as following:

ROI = Net benefit/total costs

Where

B-C = Net benefit (NB)

C: total costs

If the ROI is positive, the benefits exceed the costs and the investment should be considered. A negative ROI means that the costs outweigh the benefits. An ROI of 0 means the benefits equal the costs. ROI is often expressed as a percentage**.**

- ❖ Costs/reimbursements related to Health Insurance were calculated basing on viewpoint/assumptions as following: 1) Program management costs of health insurance: According to the revised health insurance law in 2015 for the allocation and use of the health insurance fund, 10 % of health insurance premiums for prevention funds and fund management costs of health insurance, 90 % of health insurance premium amount spent to reimburse the cost of medical examination and treatment of participants [10]; 2) Reimbursements for the poor/ethnic woman was estimated with assumption that HI covered 100% fee for services.

3.2. Study design

- A cost-benefit analysis of the FP program used net social benefit (NSB) criterion for evaluation purposes. NSB is social welfare achieved by the program/intervention in the study. NSB is estimated by the difference between cost- saving in expenditures from unintended pregnancy avoided by providing family planning services and costs providing FP services with the assumption that these services are provided through health insurance scheme.
- Five- year time frame was applied for the evaluation, from 2009 to 2013.

3.3. Study settings and subjects

3.3.1. Study setting: The study was conducted in two mountainous districts Minh Hoa (Quang Binh) and Dam Rong (Lam Dong). They are project areas of MSI Vietnam.

3.3.2. Study subjects

- Married couples of reproductive age with criteria as following
  - + Residents of Minh Hoa and Dam Rong
  - + Having children aged under 5 years
  - + Agreeing to participate in the research
- All public health facilities that provided FP services

3.3.3. Data sources

- All public health facilities that provided FP services
- All public health facilities that provided reproductive health care, including pre- and post- natal care services
- All public health facilities that provided children health care services
- Married couples

3.4. Sampling and sample size

3.4.1. Sampling:

Purposeful convenient sampling

3.4.2. Sample size

Married couples of reproductive age (15-49 years old):

202 married couples of reproductive age with criteria as following were invited for interviewing:

- 120 married women having children aged under 5 years were selected randomly in communes of Yen Hoa, Tan Hoa, Hoa Son (Minh Hoa district, Quang Binh province), with 40 persons per each commune.

- 82 women or their husband having children aged under 5 years were selected randomly in communes of Da K'Nang, Romen and Da Long (Dam Rong district, Lam Dong province), with 32 persons in Da K'Nang nad 25 persons per each left communes.

Public health facilities provided FP services:

- Centre for Reproductive Health of Quang Binh province
- Reproductive Health Care Dept. of preventive medicine center of Minh Hoa
- Reproductive Health Care Dept. of Health center of Dam Rong
- Obstetric Departments of district hospitals of Minh Hoa and Dam Rong
- 17 Commune health centres (CHCs) in Minh Hoa and 8 CHCs in Dam Rong

Public health facilities provided FP services:

- Obstetric Departments of district hospitals of Minh Hoa and Dam Rong
- Pediatric Department of district hospitals of Minh Hoa and Dam Rong
- 17 Commune health centres (CHCs) in Minh Hoa and 8 CHCs in Dam Rong

3.5. Study contents

3.5.1. General information on households and the situation of maternity / family planning, child morbidity of studied couples

- General information on households: age of wife / husband, ethnicity, education level, occupation, income, health insurance coverage.

- The situation of maternity: number of pregnancies, number of children, the situation of the most recent delivery including normal delivery, cesarean section, dystocia, miscarriage), maternity costs, number of off days of women or relatives, maternity benefits.

- The use of family planning services: utilization (yes / no), the type of service used and service provider

- Situation of children morbidity: disease (yes/no), type of disease, times of getting disease, duration of disease, number of off days of mother/father or child care- givers. Children were classified into 5 groups: <1 year old, 1- <2 years old; 2 - <3 years old; 3- <4 years old; 4- 5 years old.

FAMILY PLANNING PROGRAM
(On the basis of perspectives of health care service payer)

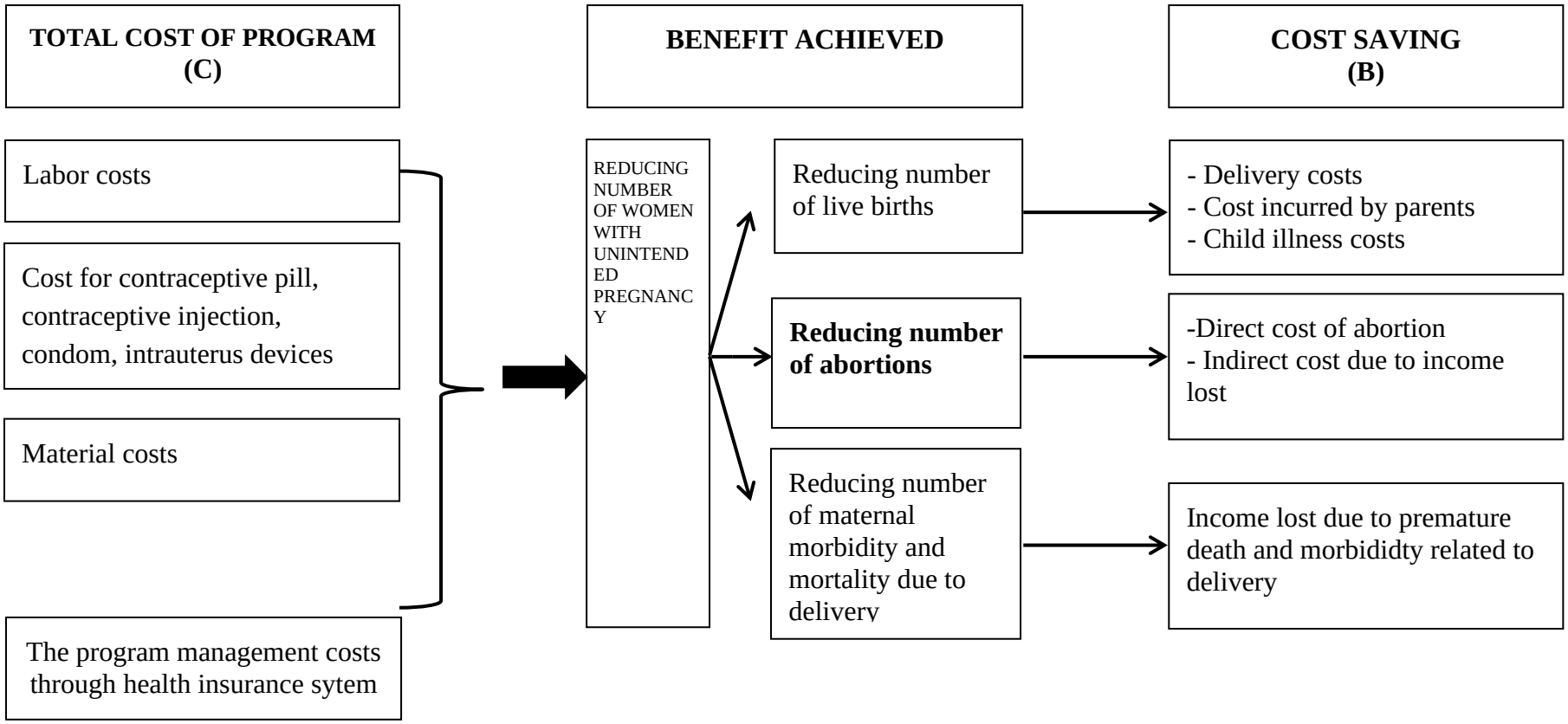


Figure 3.1. Theoretical framework for cost –benefit analysis of FP program

3.5.2. Costs providing family planning services

The study estimated costs providing FP services on the basis of view point of health insurance system, costs investing FP program including

- Cost of labor
- Cost of materials
- Cost of oral contraceptives, injectable contraceptives, condoms, intrauterine devices
- Cost of management and preventive fund, accounted for 10% of the total cost of providing services under the health insurance law amended in 2014 [10]. In this study we did not include cost of media support from population collaborators in the localities.

3.5.3. Estimating the number of unintended pregnancies averted by using FP services and their benefits in study settings.

- Number of unintended pregnancies averted
- Benefits owing to number of unintended pregnancies averted
    + The number of abortions averted
    + The number of unwanted live births averted
    + The number of DALY lost due to death and morbidity related to maternity averted

3.5.4. Cost-savings due to the number of unintended pregnancies averted

The costs were estimated on the basis of perspectives of FP service payers including households or government or health insurance in case of subjects belonging to groups supported by government or covered health insurance scheme. Costs were considered as expenditures averted by using FP services, including

- Cost of delivery
- Cost of abortion (assumption that health insurance reimburses for abortion)
- Cost of children morbidity
- Cost of DALYs

Both direct costs and indirect costs were calculated in the study.

3.5.5. Benefit achieved by providing FP services

Benefit of FP program was evaluated by three criteria

- Ratio of benefit (cost savings by number of unintended pregnancies avoided) and cost providing FP services to exam how much the program achieved for $1 US invested.
- Return on investment (ROI) to assess profit that health insurance gets by investing in providing FP services
- NSB: program was considered economic benefit when benefit of the program exceed its cost

3.6. Data collection and data analysis

3.6.1. Estimate cost providing FP services

Cost of providing FP services was calculated on the basis of perspective of the FP program and health insurance system. Data for cost calculation were collected and used as following:

- Type and number of FP services provided for couples in the communes in Minh Hoa and Dam Rong districts in 5 years from 2009 to 2013 was collected from secondary data of health facilities that offered family planning services. They are included Provincial Center of RH, district hosptials, District Center of Preventive Medicine and Commune Health Centers. FP services were currently used by couples included:

+ Methods of permanent contraception: male or female sterilization

+ Long-term methods: IUDs, implants (Implanon)

+Short-term methods: condoms, oral contraceptives, injectable contraceptives; emergency contraceptive pills

- Unit cost of each method: it was estimated basing on list of hospital fee at district hospital. For contraceptive pills/injection and condom that were provided free, we used current market price in the year 2013.

Total annual cost of the FP program = Σ (the number of FP services per year by method used x Unit cost of each method)

All costs were based on 2013 prices applying for 5 years so we did not consider inflation and discounting in the estimation.

3.6.2. Estimate the number of unintended pregnancies averted by using FP services and its benefits.

To measure the impacts obtained by using family planning services it is necessary to build a model in which many different input data were used to quantify the expected impacts by demographic, economic and health indicators. MSI Impact2 model was designed to quantify the impacts of the reproductive health care program of MSI by the demographic indicators. In this study, we have used the model Impact2 version 3 updated in March 2015 to quantify the impact of using FP services by indicators mentioned in section 3.5.3 year by year.

By design, Impact2 model used many various inputs including national and regional statistical data and primary data. The data model that were defaulted in the model such as national and regional statistical data were derived from regional MSI organizations and Vietnam MSI and other organizations such as WHO, USAID ...

As recommended by the authors of model, the defaulted data may be changed to get better and updated results of which some of them were more priority. Due to the limitation of data availability and study time, we had changed a few of defaulted data, focusing on the types of data to be prioritized as recommended.

The data used in the Impact2 model to estimate the impact of the program including the majority of data defaulted and data collected from the study area are as follows:

❖ The data collected from the study area:

The input data during period of 2009-2013 at each district:

- The number of women of reproductive age (15-49 years old)

- Fertility rate over years

- The type and the number of family planning services used over the years are classified on the basis of the effective time of contraception including short-term contraceptive methods like condoms, pills, injectable contraceptives, pills emergency contraception and permanent and long-term contraceptive methods such as intrauterine devices, implants, male / female sterilization

Input data in the year 2013 in each district

- The percentage of couples using contraceptives

- The percentage of couples using long-term contraceptives

- The percentage of couples using short- term contraceptives

All above information were obtained from secondary data of public health facilities that offered family planning services at study settings for 5 years from 2009 to 2013.

❖ The input data defaulted in the Impact2 model: the data from regional and Vietnam MSI and other organizations that provided activities on reproductive health care

3.6.3. Estimate cost-savings from reduced women with unwanted pregnancies.

As mentioned above, ***the cost savings from reduced women with unwanted pregnancies were expenditures that would have paid for pregnancies and its effects***. These costs were estimated as the (1) total cost of birth plus the (2) total cost of unwanted abortions plus (3) costs of treatment and care for ill children plus (4) the total cost by morbidity and premature death of mother related pregnancy (maternal DALYs)

Total cost of unexpected Pregnancies =

- **Total cost of delivery**
- **+ Total cost of abortion**
- **+ Total cost of *children health care to age five***
- **+ Total cost of *maternal DALY***

The costs were estimated as follows:

(1) Costs of delivery due to unintended pregnancy

Costs of delivery were the sum of costs of vaginal, dystocia and caesarean cases and were calculated as formula:

Cost of delivery = cost of vaginal delivery+cost of dystocia +cost of cesarean
=Σ (the number of live birth by type x unit cost of each type (vaginal, or difficult or cesarean birth).

Costs of delivery due to unintended pregnancy were calculated as following:

❖ Estimate the number of births

The number of births = the number of unintended pregnancy – the number of abortion due to unintended pregnancy

This result was received from Impact2 MSI

❖ Estimate the number of type of birth

The number of type of birth = Total live birth x Percentage of each type

Percentage of each type was estimated by interviewing married couples in study settings

❖ Total cost unit for each type of birth

Unit cost of each type of birth = direct cost for each type of birth + indirect cost

+ Direct cost: Direct costs were expenses which clients or their family or health insurance paid to health facilities. Direct cost of vaginal delivery was received from hospital fee list of CHCs and district hospitals. Because the proportion of delivery was the same between them, cost of vaginal delivery was the average of both types of hospital fees. With cesarean section and abortion because the majority of women used services at district hospitals, only hospital fees at the district

hospital were used in estimation. These expenses included the cost of the delivery (normal delivery, cesarean section or dystocia), the cost of the necessary tests, the cost of the average inpatient days and consumable supplies such as drugs, infusion used for each woman. These costs were estimated on basis of treatment guidelines and hospital fees regulated according to health level.

Information collected from directly interviewing health managers as head of CHCs, head of obstetrics department of the district hospital. Hospital fee for each item and consumable materials used the 2013 price for all years.

+ Indirect cost: Indirect costs were monetary value of working days of clients or their relatives lost due to delivery and post partum (costs were collected from interviewing married couples with reproductive age). With women working in formal sector, indirect cost includes allowance of social insurance during post partum period. Perentage of women working in formal sector and allowance level of social insurance were collected from interviewing households.

(2) Cost of abortion

Cost of abortion was calculated by the number of abortions from unwanted pregnancies multiplied by unit cost per an abortion case

Cost of abortion = the number of abortion case x total unit cost

The number of abortion from unwanted pregnancies was estimated by MSI impact 2 model. The calculation of unit cost for each abortion was similar to the calculation of tunit cost of pregnancies. In addition, because almost of abortion was implemented at district hospital, hospital fee of district hospital was used for direct cost estimation.

Note: the study was assumpted that all abortion from unwanted pregnancies was implemented in district hospitals.

(3) Cost of caring children with disease among live births of unwanted pregnancies

Cost of caring children with disease = Σ (the number of children with disease by age group and type of disease x unit cost by type of disease)

Cost of caring children with disease during 5 years from 2009 to 2013 was estimated as following

<u>Number of children by age group</u>

Number of children by age group was based on the number of children born in the year from the Impact2 model. For the first year, all children were under 1 year old. The second year included children under 1 year old and children between 1 to <2 years old who grew from children of the first year. Similarly, to the 5th year of study, the model contained all children groups from 1 to 5 years old.

Number of children with common diseases by age group

Number of children with disease by each age group = Σ (the number of children having disease by each age group x percentage of common diseases by age group)

The number of children having disease and the incidence of common diseases for each age group were gotten from the household interviews and secondary data from pediatric department of the district hospital. The investigation showed that disease pattern was not different so much between two studied districts. Therefore we used the same disease incidence for two districts.

- Total unit cost by type of disease

Unit cost by type of disease = medical direct cost by type of disease + indirect cost by type of that disease

+ Direct cost by type of disease

Similarly, for direct cost of children health care, we only considered medical direct cost including medications, materials, hospital fee.…Non-medical direct costs such as travel cost, accommodation cost during treatment period were excluded from the estimation. Interviewing pediatricians of district hospitat showed that standard treatment guidelines of Ministry of Health have been used for treatment of children with diseases, therefore, we used them and hospital fee in the year 2013 to estimate cost of type of disease. The study used the same hospital fee levels because the difference was not much between two provinces

+ Indirect cost

Indirect cost was income of caregivers lost. In the study, almost mothers who were responsible for caring their children at home. Therefore, indirect cost was estimated based on daily average income of mothers in two districts.

Indirect cost = Number of working days lost of caregivers due to caring children with disease x average income per day of caregivers

Number of day caring children and average income per day were estimated on the basis of findings from interviewing households.

(4) Monetary valuation of maternal DALYs due to morbidity and/or mortality related to pregnancies/birth

The risks of morbidity and/or mortality related to pregnancies/birth due to unwanted pregnancies would increase maternal DALYs. Monetary valuation of maternal DALYs was income of mothers lost by morbidity and/ or mortality related pregnancy/birth estimated as following

Income lost by morbidity or mortality related pregnancy/birth = annual average income of women by district x the number of DALY estimated

Number of DALYs was received from Impact MSI 2 model. Data of income of women was collected by directly interviewing women in study settings

All costs were calculated in Vietnam dong and US dollar (Exchange rate in June 2013 used; $1US= 21,036 VND).

3.6.4. Cost-benefit analysis of the family planning program

Cost- benefit of family planning program was measured by three criteria:

- Benefit-cost ratio is ratio between averted cost and cost invested in the FP program. The program is considered cost- benefits when this ratio > 1. The greater the ratio is, the larger the economic benefits of the program are.

- Return on investment (ROI): is profit that health insurance achieved by investing FP program for people in disadvantaged areas in the study.

- Net social benefit (NSB) is economic benefit achieved by providing FP services. NSB> 0 proves that program achieved benefit in economics**.**

3.7. Sensitivity analysis

To assess the sustainability of the benefits of family planning programs when the inputs change such as the increase in cost of providing FP services because of the increase in input price; the increase in hospital fee due to cutting financial support of government to public hospitals; or the decrease in the utilization of FP services, we conducted one-way sensitivity analysis to examine the effect of alternative input assumption on cost-benefit results of the FP program. Alternative input assumptions that were used to analyze the sensitivity of the study included increasing program costs by 30%; increasing disease children costs by 30%; increasing the failure rate of the program by 10%, reducing participation rate in the program by 10% and eliminating indirect costs from the total cost savings.

All descriptive statistical tests were conducted in software STATA 10.

All cost-benefit analysis of the program was done in Excel.

4. Result

4.1. General information

4.1.1. Information about population and women of reproductive age in studied districts

Table 4.1. The information about the population and women of reproductive age in the two studied districts period 2009-2013

Indicator	Minh Hoa					Đam Rong				
	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013
Total population	46,851	47,083	47,533	48,116	48,528	37,527	36,372	40,261	42,536	43,123
Number of women of reproductive age (15-49)	13,370 29%	15,900 134%	16,320 34%	16,530 34%	15,370 32%	8,237 22%	9,627 26%	10,493 26%	10,093 24%	11,658 27%
Married women of reproductive age (15-49)	7,861 59%	7,892 50%	8,041 49%	8,349 51%	8,721 57%	6,063 74%	6,538 68%	6,920 66%	7,272 72%	7,738 66%
Total fertility rate (TFR)	1.88	1.52	1.91	2.18	1.85	2.34	2.54	2.48	3.39	2.51
Maternal Mortality Ratio (MMR) per 100,000 live births	0.00	0.01	0.03	0.20	0.20	0.00	0.00	0.00	0.00	0.00

Source: from district preventive medicine center

Population and the number of women of reproductive age in Minh Hoa were higher those in Dam Rong district, but the number of married women and the fertility rate in Minh Hoa district were lower than those in Dam Rong over the years from 2009 to 2013. Maternal mortality rate per 1000 live births in Minh Hoa increased from 2010 to 2013 while there was no any case in Dam Rong in this period.

4.1.2. Social-economic characteristics of studied subjects

Table 4.2. Social-economic characteristics of studied subjects

Characteristic		Minh Hoa		Đam Rong	
		n	%	n	%
Sex	Male	0	0	3	3.8
	Female	120	100	77	96.2
Age (mean ± SD)		28 ± 6		27± 6	
Nation	Kinh	99	82.5	25	31.2
	Ethnic	21	17.5	55	68.8
Religion	Yes	3	2.5	65	81.2
	No	197	97.5	15	18.8

Education	Illiterate	2	1.7	8	10.0
	Primary school	17	14.1	20	25.0
	Secondary school	58	49.3	30	37.5
	High school	38	31.7	15	18.7
	Above high school	5	4,2	7	8.8
Job	House work	0	0.0	6	7.5
	Farmer	117	97.5	62	77.5
	Commercial	1	0.8	0	0.0
	Officer	2	1.7	4	5.0
	Other	0	0,0	8	10.0
Number of family member (TB ± SD)		4 ± 1.7		4± 1.6	
Economic status	Poor	68	56.7	11	13.8
	Nearly poor	50	41.7	14	17.5
	Normal	2	1.6	55	66.7
Monthly Average income (VND)		2,118,408 ± 1,689,160		7,476,220 ± 14,593,713	
Monthly Average income of wife (VND)		764.025 ± 1.057.571		1.587.654 ± 1.499.929	
Having Health Insurance	**Yes**	118	98.3	66	82.5
	No	2	1.7	14	17.5

Sources: from interviewing households

In Dam Rong district, there were 3 male participants while all of them were women in Minh Hoa. The average age of respondents was under 30 years old. In Minh Hoa, the majority of participants were Kinh (82.5%) however most of them were ethnic minority (68.8%). 81.2% of subjects in Dam Rong were Catholic and Protestant. The number of participants who had religion in Minh Hoa was only 2.5%. In both districts, educational level of subjects studied were mainly junior high, representing 49.3% and 37.5% in Minh Hoa and Dam Rong, respectively. The proportion of illiterates in Dam Rong and Minh Hoa was 10% and 1.7%, respectively. Main career of research groups in both districts was farmer. Official civil servants occupied 5% in Minh Hoa and 1.7% in Dam Rong. Although the number of population was higher in Minh Hoa, the average number of household members was similar in both districts, about 4 people per a household. The average income per month of household in Dam Rong was three times higher than that in Minh Hoa. As a result, the average income per women in Dam Rong was also higher (VND 1,587,654 in Dam Rong compared to VND 764 025 in Minh Hoa).

4.1.3. Reproductive health characteristics of women in the study settings

Table 4.3. *Reproductive health characteristics of women in the studied subjects*

Characteristics		Minh Hoa		Đam Rong	
		n	**%**	**n**	**%**
Number of delivery		2.04 ± 1.04		2.06 ± 1.26	
Number of child		2.03 ± 1.02		2.09 ± 1.25	
Number of woman using antanal care services	Yes	118	98.3	78	97.5
	No	2	1.7	2	2.5
Frequency of using antanal care services		2.9 ± 1		2.9 ± 1.3	
Type of delivery	Vaginal delivery	112	93.3	73	91.,3
	Caesarean section	6	5,0	6	7.5
	Complication	2	1,7	1	1.2
Place of delivery	CHC	71	59.2	19	23.8
	Policlinic	0	0	19	23,8
	District hospital	38	31.7	33	41.2
	Provincial hospital	5	4.1	7	8.7
	At home	6	5.0	2	2.5
Average number of hospitalization day		5 ± 15		6 ± 10	
Average number of postpartum care		102 ± 59		76 ± 103	

Source: from interviewing household

There was no much difference in the number of births, the average number of children of couples in the two districts studied. Most women reported that they got antenatal care during pregnancy, accounting for over 95%. The average number of antenatal visits per woman was about 3 times. Vaginal delivery was the most common type of delivery in participants. Caesarean section in Dam Rong was higher than that in Minh Hoa (7.5% vs. 5%). CHCs were mainly chosen for delivery of women in Minh Hoa, representing 59.2% while this rate was only 23.8% in Dam Rong. In this locality, district hospitals were more common option with 41.2% of delivery cases. Especially regional polyclinics were also alternatives of delivery, accounting for 23.8%. It should be noted that there was still delivery that occurred at home, about 5% in Minh Hoa and 2.5% in Dam Rong. The average length of hospital stay at birth was not much different between two districts, but the average postpartum period in Minh Hoa was longer than that in Dam Rong (3 months vs 2 months).

4.1.4. The use of family planning services in study groups Tình hình sử dụng dịch vụ KHHGĐ ở nhóm đối tượng nghiên cứu

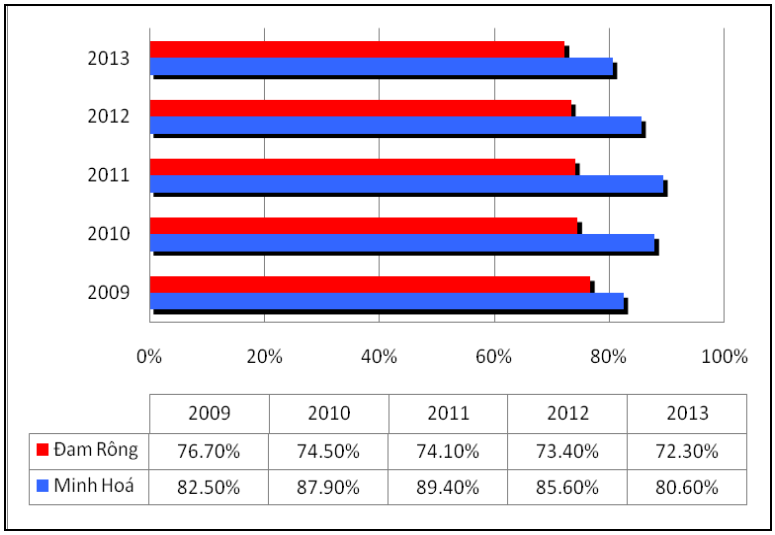
Table 4.4. The use of family planning services in study groups in 2014

Items		Minh Hoa		Đam Rong	
		n	**%**	**n**	**%**
Using FP services	Yes	94	78.3	63	78.8
	No	26	21.7	17	21.2
Type of services	IUD	68	72.3	19	30.2
	Oral contraceptives	13	13.8	22	34.9
	Injectable contraceptive	4	4.3	13	20.6
	Condom	9	9.6	6	9.5
	Female sterilization	0	0	1	1.6
	Contraceptive implants	0	0	2	3.2
Place to provide FP services	CHC	81	85.3	50	80.7
	Disctrict preventive center	8	8.4	2	3.2
	District hosptial	4	4.2	6	9.7
	Provincial hospital	0	0	1	1.6
	Buying themselve	0	0	3	4.8
	Private clinic	2	1.1	0	0

Source : from interviewing household

The rate of use of family planning services among interviewed couples was the same between the two districts, accounting for over 78% of the couples. IUD was chosen commonly in Minh Hoa; representing 72.3% while oral contraceptives, IUD and injectable contraceptive were more popular choices of couples in Dam Rong with 34.9%; 30.2% and 20.6%, respectively. Female sterilization and contraceptive implants were used only among investigated couples in Dam Rong with low rates of 1.6% and 3.2%, respectively. CHCs provided most of FP services for people.

4.1.5. The accumulative proportion of the use of family planning services from 2009 to 2013



	2009	2010	2011	2012	2013
Đam Rông	76.70%	74.50%	74.10%	73.40%	72.30%
Minh Hoá	82.50%	87.90%	89.40%	85.60%	80.60%

Source: reports of preventive medicine centers of districts

Figure 4.2**.** The accumulative proportion of use of family planning services from 2009 to 2013 in Minh Hoa and Dam Rong

Figure 4.2 showed that the cumulative proportion of the use of family planning services over 5 years had reached over 80% among couples of reproductive age in Minh Hoa district that was higher that in Dam Rong, only about 72%.

4.1.6. Morbidity situation for children aged 1 to 5 years in the study groups

Table 4.5. Morbidity situation for children aged 1 to 5 years in the study groups

Age group	**Prevalence rate**	**Common diseases**		
		Lung infection	Diarrhea	Upper infection
Under 1 year	60.3%	56%	24%	20%
1- < 2 years	76.5%	56%	29%	15%
2- < 3 years	66.7%	50%	23%	27%
3- < 4 years	78.3%	50%	22%	28%
4- 5 years	79.2%	39%	10%	51%

Source: from household interview

Data collected from interviewing mothers showed that overall incidence of morbidity was the highest in children between 4 and 5 years old and the lowest among children under 1 year old. Primary data from mother interviews and secondary data collected from medical records of pediatric wards of the district hospital in 2013 indicated that three common diseases in children to 5 years old at study districts were pneumonia, diarrhea and upper respiratory infections in which pneumonia was the highest accounting for 50% among children under 4 years old and the upper respiratory infections were more common in children groups between 4 and 5 years old, representing 51% of cases.

4.2. Cost of providing family planning services to people in study settings

4.2.1. The number of each type of family planning services has been used annually over 5 years in study settings

Table 4.6. The annual number of each type of family planning services has been used from 2009 to 2013

Services	Minh Hoa						Đam Rong					
	2009	**2010**	**2011**	**2012**	**2013**	**TS**	**2009**	**2010**	**2011**	**2012**	**2013**	**TS**
Long-term acting and permanent methods												
Female Sterilisation	5	6	6	17	6	40	8	17	13	5	11	54
Male Sterilisation	0	0	0	0	0	0	0	1	0	0	0	1
Implants	25	15	26	8	17	91	52	53	52	14	82	253
IUD	1.200	1.000	770	775	950	4.695	219	284	381	353	458	1.659
Sub total	*1,230*	*1,021*	*802*	*800*	*973*	*4.826*	*279*	*355*	*446*	*372*	*551*	*2.003*
Short term methods												
Pills	250	329	421	625	730	2.355	304	237	265	315	272	1.393
Injection	148	148	216	180	147	839	104	452	517	425	445	1.943
Condom	702	838	924	856	974	4.294	194	171	314	285	238	1.202
Sub-total	*1.100*	*1.315*	*1.561*	*1.661*	*1.851*	*7.488*	*602*	*860*	*1.096*	*1.025*	*955*	*4.538*
Total	*2,330*	*2,336*	*2,363*	*2,461*	*2,824*	*12,314*	*881*	*1,215*	*1,562*	*1,379*	*1,506*	*6,561*
Rate of the new users/ total woman	*0.296*	*0.296*	*0.294*	*0.295*	*0.324*		*0.145*	*0.186*	*0.226*	*0.190*	*0.195*	

Source: from annual reports of public health facilities providing FP services

Table 4.6 showed the number of family planning services have been used annually from 2009 to 2013 according to reports from CHCs, district health center/ hospital districts; preventive medicine center of district and center for reproductive health care in Minh Hoa province and Dam Rong province. Generally, utilization rate was stable every year in Minh Hoa and always double higher than in Dam Rong over the years. Similar to results from interviewing the couples involved in research, IUDs were main option in Minh Hoa, however it had tended to decrease while the short-term contraceptive methods, especially condoms and contraceptive pills had increased over the years. In Dam Rong, contraceptive injectable drugs were most commonly used. Besides, intrauterine devices had been increasing by year there.

4.2.2. Cost of providing family planning services to people in study districts

Table 4.7. Cost of providing family planning services to people in study districts that

District	Cost (VNĐ)					
	2009	**2010**	**2011**	**2012**	**2013**	**Total**
Minh Hoa	125,930,910	103,887,911	114,871,299	96,249,355	105,220,190	546,159,665
Đam Rong	96,432,316	162,035,943	176,220,297	107,124,002	204,084,592	745,897,150

Table 4.7 presented cost of providing FP services for 5 years from 2009-2013. Generally, cost of providing family planning services in Minh Hoa district had decreased over the years and lower than that in Dam Rong district. Total cost of providing FP services during 5 years in Minh Hoa was 546,159,665 dong and in Dam Rong was 745,897,150 dong.

Table 4.8. The cost of providing family planning services by FP program and Health insurance (including 10% of program management fee of the health insurance system)

District	**Total cost of providing FP services by FP program**		**Total cost of providing FP services by health insurance**	
	VND	**USD**	**VND**	**USD**
Minh Hoa	546,159,665	25,963	600,775,632	28,559.4
Đam Rong	745,897,150	35,458	820,486,865	39,003.9

When the health insurance system would provide family planning services, it was necessary to add 10% of funds for management and contingency expenses beside the budget to provide contraception services to the participants as prescribed by health insurance law [10]. Table 4.8 presented that the cost of the FP program was incurred by the FP program and health insurance system during 5 years from 2009 to 2013. Costs had been increased by 10% as a result of the program covered by health insurance system. Cost of the program in Dam Rong was nearly half times higher than that in Minh Hoa.

4.3. Estimation of the number of unintended pregnancies averted due to using FP services at study setting and benefit gained because of aveting unintended pregnancies.

Table 4.9. Number of unintended pregnancies averted, number of abortion averted, number of live births averted and number of maternal DALY adverted because women are using FP services during period 2009-2013

Indicators	Minh Hoa						Đam Rong					
	2009	2010	2011	2012	2013	TS	2009	2010	2011	2012	2013	TS
Number of unintended pregnancies averted	417	689	851	977	1.141	4,074	104	227	350	409	520	1,610
Number of abortion averted	238	393	485	557	650	2,322	59	130	200	233	297	918
Number of live births averted	134	222	274	315	368	1,313	33	73	113	132	168	519
Number of maternal DALY adverted	7	11	13	15	17	63	6	10	12	14	16	57

Source of data: results estimated software Impact2

Table 4.9. presented results from estimates using software Impact2 of the number of unintended pregnancies averted and the number of abortions, live births and maternal DALYs lost (morbidity and maternal mortality related to pregnancy) adverted because women are using FP services during period 2009-2013. Results of the annual estimates include not only the results of woman are using contraceptive services in that year but also include the impact of women still using a long- acting and permanent conceptive from past years. For 5 years, FP services prevented 4.074 unintended pregnancies in Minh Hoa and 1.610 unintended pregnancies in Damrong. Results from table 4.9 also showed that the number of unintended pregnancies adverted in Minh Hoa 2,5 times higher than that in Dam Rong. The number of unintended pregnancies adverted increased year by year in both studied districts and was different between 2009 and 2013. Comparing to the year 2009, in 2013, the number of unintended pregnancies adverted in Minhhoa increased 174% while it increased 400% in Damrong. These results are similar to the to the differences in the new number of couples using contraception methods, especially the long-acting and permanent contraceptive methods annually through the year from 2009 -2013 between two districts

By averting unintended pregnancies, contraceptive services provided through FP program prevent 2,322 and 918 abortions in Minh Hoa and Dam Rong respectively. Results from table 4.9 also showed that the number of unintended abortions decreased during 5 years and year by year at the same trend of decreasing unintended pregnancies at two districts. Similarly, that more women were prevented unintended pregnancies lead to greater restrictions in the number of live births and number DALY lost due to morbidity and maternal mortality related to pregnancy. The change of these indicators is proportional to the number of unintended pregnancies averted by the years in both districts.

4.4. Cost savings due to reducing number of women with unintended pregnancies through the use of family planning services in the study districts

Table 4.10. Cost savings within 5 years due to reducing number of women with unintended pregnancies

Cost saving (B)	**Minh Hoa**		**Đam Rong**	
	VNĐ	**USD**	**VNĐ**	**USD**
Delivery	7.409.808.249	352.244,2	5.493.755.649	261.159,7
Abortion	950.199.594	45.170,2	451.099.840	21.444,2
Children diseases	1.847.491.911	87.825,2	1.231.756.361	58.554,7
Maternal DALY	581.711.970	27.653,2	1.087.924.612	51.717,3
Total	**10.789.211.724**	**512.893**	**8.264.536.463**	**392.876**

Table 4.10 presented cost-savings due to preventing unintended pregnancies by the use of family planning services. Most of the costs were higher in Minh Hoa, excepting expenses lost due to illness or maternal deaths related to pregnancy. Overall, cost savings in Minh Hoa were 1.5 times higher than that in Dam Rong with 10.789.211.724 VNĐ ($ 512,893 US compared with 8.264.536.463 VNĐ **($ 392,876 US)**

Table 4.11. Direct cost- savings due to reducing unintended pregnancies

Cost saving (B)	**Minh Hoa**		**Đam Rông**	
	VND	**USD**	**VND**	**USD**
Delivery	1,960,107,217	93,178.7	5,253,485,063	249,737.8
Abortion	772,765,448	36,735.4	305,389,153	14,517.5
Children diseases	728,465,145	34,629.5	261,728,233	12,441.9
Total	**3,461,337,810**	**164,544**	**5,820,602,449**	**276,697**

Table 4.11 showed that excluding indirect costs, cost savings due to reducing number of women with unwanted pregnancies in Dam Rong were a half times higher than that in Minh Hoa. This was also cost-savings of health insurance system and government the last 5 years owing to providing FP services to people in two districts.

4.5. Cost-benefit analysis of the use of family planning services in study settings within 5 years

Table 4.12. Cost-benefit analysis of the use of family planning services in study settings within 5 years through health insurance system

District	Benefit (B) (USD)	Cost (C) (USD)	B/C ratio	NSB (USD)	ROI (%)
Minh Hoa	512,892.7	28,559.4	18.0	484,333.3	1695.88
Dam Rong	392,875.9	39,003.9	10.1	353,871.9	907.27

The result from cost-benefit analysis of programs indicated that the benefits in monetary value of program were greater than expenditures spent by the program. Cost savings were 18 times higher than the cost of the program in Minh Hoa and 10.1 times in Dam Rong. Net social benefits in Minh Hoa were greater than that in Dam Rong, with $ 484,333.3 US vs. $ 353,871.9 US. Benefits gained by the program were 1695.88% higher than cost to invest in the program in Minh Hoa and 907.27% in Dam Rong. In other word, $1US invested in FP program generated $17 US in Minh Hoa and $9 US in Dam Rong.

Table 4.13. Cost saving of different payers and net benefit gain for Health Insurance when FP services were provided under Health Insurance Company in study setting

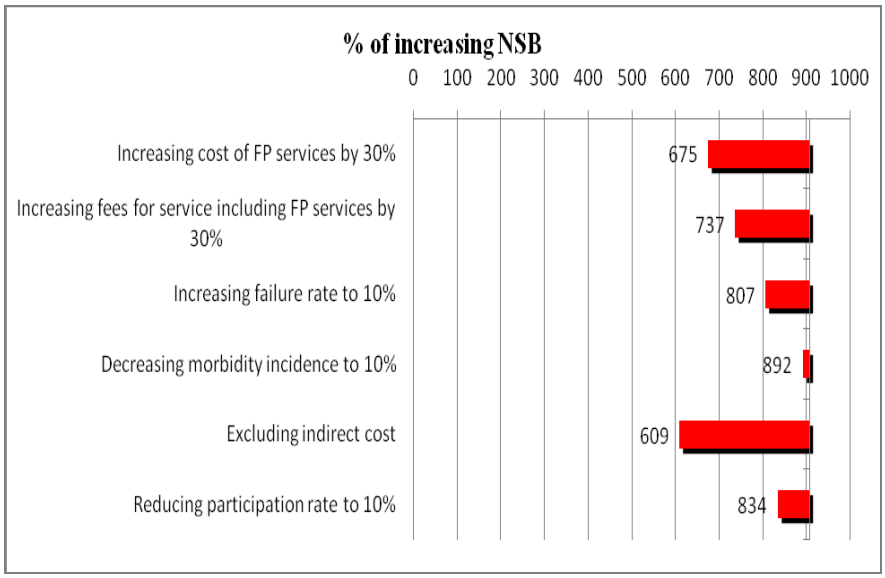
Payer / District	Benefit (B) (USD)		Cost of providing FP services C) (USD)	B/C ratio	Lợi ích ròng (NB) (USD)	Return on In versment (ROI)
	BHYT	Hộ gia đình				
Minh Hoa	164,544	348,348.7	28,559.4	5.8	135,984.6	475%
Đam Rong	276,697	116,178.9	39,003.9	7.1	237,693,1	609%

Results from table 4.13 showed that for 5 years, the provision of FP services has brought a great benefit for Health Insurance Company. The benefit gained for Health Insurance is higher in Dam Rong than Minh Hoa district

Results from table 4.13 also showed that the benefit gained for HI Company exceeded cost of providing FP services. The benefit gained 5.8 times higher than cost of providing FP services in Minh Hoa and 7.1 times higher in Dam Rong. Rate of the net benefit to cost of providing FP service was 475 % in Minh Hoa and 609% in Dam Rong

4.6. Sensitivity analysis

Results of the study depent on input data and assumptions however these data and assumption can be changed. To asset if there is a change of each of input data or assumption has effect on benefit of the program, we conduct sensitivity analysis with the assuption that there is a change of each input data as mentioned in part 3.7. Resutls of sensitivity analysis were presented in the figure 4.3 as following:



Biểu đồ 4.3a. Results of sensitivity analysis on effects of changing each input to the benefit of providing FP services in Dam Rong District

Fifure 4.3a presented results of sensitivity analysis on effects of changing each input to the benefit of providing FP services in Dam Rong District. Result from the figure showed that with reasonable change of each input under above assumption, others remain unchange, benefit generated of the progarm much exceeded the cost of investing the program.

Among alternative assumptions, excluding the indirect costs would be the biggest influence to the net benefit of the program, the profit was 609% compared to cost of the program. Then rising cost of providing FP services to 30% and increasing both cost of the program and cost of child treatment and failure rate of the program to 10% changed the value of NSB to 675%; 737% and 807%, respectively. Reducing the percentage of children with the disease and reducing 10% of participation in the program did not significantly change the NSB of ROI of the program compared to base case result.

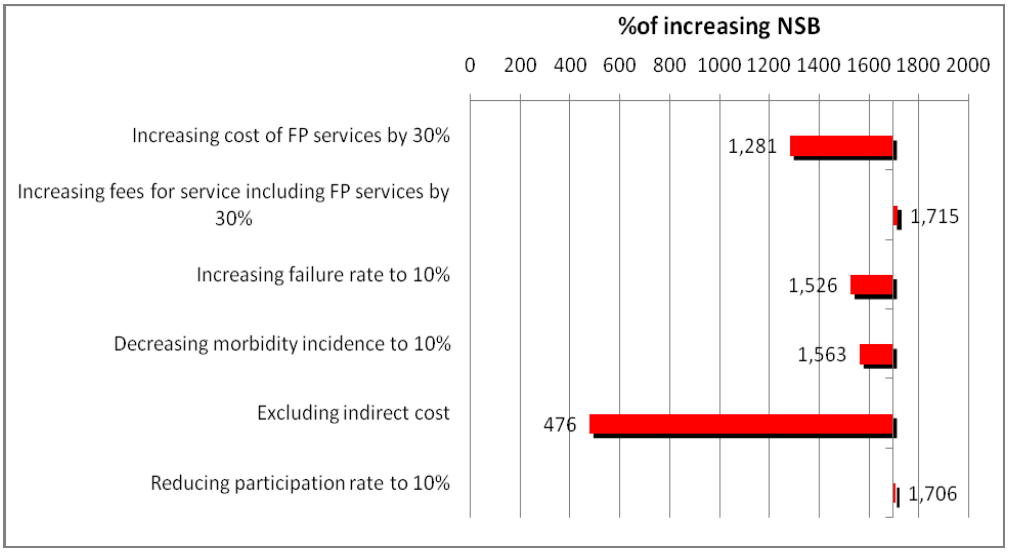


Figure 4.3b. Results of sensitivity analysis on effects of changing each input to the benefit of providing FP services in Minh Hoa District

Fifure 4.3a presented results of sensitivity analysis on effects of changing each input to the benefit of providing FP services in Minh Hoa

Similarly in Dam Rong, when there is the reasonable change of each input under above assumption, others remain unchange, benefit generated of the progarm much exceeded the cost of investing the program (NSB>0) of which excluding the indirect costs were greatest impact on cost-benefit of the program, however benefit was still much higher than cost of the program with ROI of 476%.

Increasing the cost of FP services by 30%, increasing to 10% of failure rate of the program and reducing child morbidity has slighly change the results of the percentage of NSB/cost to 1,281%; and 1,526%, 1,563% respectively. Especially, reducing 10% of participation rate and the increase in cost of providing FP services and cost of children treatment increased the percentage of NSB/cost that was rather higher than that of base case to 1706% and 1715% however with these assumptions, the B/C ratio was lower than the base case (13.8 comparing with 18).

5. Discussion

5.1. Characteristics of study settings

Minh Hoa and Dam Rong are two mountainous districts of Quang Binh and Lam Dong provinces, respectively. Two districts had different characteristics of socio-culture and economics, but both were the most difficult economic areas in the country. All the communes in Dam Rong district and 12 among 15 communes in Minh Hoa were classified to be commune 135 in stage 2. The average income per capita of Minh Hoa in 2013 was 8.3 million VND / person / year ($394. 6 USD) and nearly 20 million VND / person / year ($ 950.7 USD) in Dam Rong. Similarly, number

of poor households accounted for 35.88% in Minh Hoa that was 2 times higher than those in Dam Rong (only 15% in 2013) [1] [2]. Table 4.2 showed that the proportion of ethnicity, poor households, income per capita of study sample were in accordance with reports of districts. This indicated that the sample was representative for target population. Almost all characteristics of the demography, educational level, occupation of sample were the similar between two study districts.

It was important that the majority of respondents in Dam Rong had religion, accounting for 68.8% of the total while this number was only 2.5% in Minh Hoa. Dam Rong people were mainly Catholic, Protestant or Christian. The teaching of the Catholic Church encouraged the faithful persons implementing "periodic abstinence" method rather than the use of contraceptive methods and artificial birth control [3]. This belief might affect the implementation of the population policy in local and explained lower use of FP services in Dam Rong (Figure 4.1) and as a result, the fertility rate of Dam Rong was 1.5 times higher than that in Minh Hoa over years from 2009 to 2013 (Table 4.1). 17.5% of households did not participate in health insurance in Dam Rong that were 10 times higher than those in Minh Hoa although there were more households with better economic condition in Dam Rong. This feature should be considered to advocate FP services provided by the health insurance system.

For characteristics of pregnancy, the fertility rate of Minh Hoa was 1.85 that was lower than the average fertility rate in the country in 2013 (2.10) [4], while this rate of Dam Rong was higher, up to 2.51 (Table 4.1). However, the average number of births per woman and number of children of the couples in the study sample were not different significantly between two districts (Table 4.3). The proportion of women with prenatal care during pregnancy was high and the average number of antenatal visits was 2.9 times per pregnant woman. These indicated that maternal health care was performed well there. Mountainous topography and inconvenient traffic conditions had affected birthplace option of pregnant woman. CHCs were chosen mainly in Minh Hoa while district health center was more common in Dam Rong. Especially, there were 5% of deliveries that were taken place at home in Minh Hoa and 2.5% in Dam Rong.

In Dam Rong, most people in two research communes were ethnic minorities. In consequence, beside general policy was offered to use family planning services, people were also supported the travel and accommodation costs when using these services in district health centers. Furthermore location of study communes was not far from district health center (DHC), this might be the reason why the DHC was selected commonly in Dam Rong. Postpartum period was different between two districts. It was longer in Minh Hoa. This was explained by different traditions in these localities.

Over 78% of couples used the family planning services in the studied communes (Table 4.4). Proportion of types of services used was corresponding to statistical reports of districts (Table 4.6). IUDs were more common in Minh Hoa while injectable drugs were widely used in Dam Rong. CHCs were place that provided the services mainly in Minh Hoa and in Dam Rong. This was consistent with the professional decentralization of health level in lines of the national target program on population and family planning in Vietnam

Disease patterns of children at birth to 5 years old in study settings from investigation of households and from statistics of pediatric wards of district hospital in 2013 were the same. Three diseases were reported the most common such as pneumonia, diarrhea and upper respiratory infection. General incidence rate by age group and by type of disease was calculated for the entire sample that was based on the results of interviews of households including inpatient and outpatient services in public health facilities.

5.2. Cost of providing family planning services to people in study settings

The total cost of providing family planning services through the 5 years was 546,159,665 VND and 745,897,150 VND in Minh Hoa and Dam Rong, respectively. Total cost investing the program in Dam Rong was nearly a half time higher than that in Minh Hoa over the years from 2009 to 2013, although the utilization rate and number of services provided in Dam Rong were lower than those in Minh Hoa. The difference among types of services used in two districts explained the incremental cost. In Dam Rong, male and female sterilization, and implanted contraceptives were used many times higher than those in Minh Hoa (Table 4.6). The unit cost of these types of service were the most expensive in contraceptive services used, with 411,000 VND; 629,000 VND and 1.171 million VND per case of male sterilization, female sterilization and contraceptive implants, respectively (see Appendix). Meanwhile in Minh Hoa, IUDs were preferred the most with only 57,100 VND per case. Besides, it was considered that IUDs might be provided at CHCs while sterilization and implanted contraceptives were conducted at the district health centers.

This study calculated only costs paid to the health facilities, excluding non-medical direct costs including expenses for travel, meals, accommodation that people must incur to receive FP services. If these costs were included in the estimation, total cost the FP program would increase higher.

Because we also assumed that the program would be offered by the health insurance system, the total cost of the program must be plus 10% of the total for management fee [10]. Thus the total cost of implementing the family planning program in Minh Hoa was 600,775,632 VND ($ 28,559.40 US), in Dam Rong was 820,486,865 VND ($39,003.94 US). These results were used to analyze the cost – benefit as base-case.

5.3. Estimate of the number of unintended pregnancies averted because woman were using FP services and the benefits received by preventing of unintended pregnancies

Prevented the number of unintended pregnancies is the initial outcome of the provision/utilization of the FP services. It was calculated as the difference between the number of pregnancies expected among woman who are provided contraceptive services throught FP program and the number of pregnancies they might have experienced in the program's absence.

In 5 years from 2009 to 2013, if the number of couples that have been using long-term contraceptive methods from the past years was not taken into account, 12,314 couples and 6,565 couples in Minh Hoa and in Dam Rong districts using contraceptive services through FP program have aveterted 4,074 uninted pregnancies and 1,610 uninted pregnancies in Minh Hoa and in Dam Rong districts respectively. The number of unintended pregnancies averted in Minh Hoa is 2,5 times higher than that in Dam Rong althought the number of couples who are using contraceptive methods is 2 times higher than that in Dam Rong. As mentioned above the number of unintended pregnancies averted each year included not only the results of woman was using contraceptive services in that year but also included the impact of women still using a LAPM from past years. This difference migh be resulted from the number of couples using long-term contraceptive methods in Minh Hoa was 2,4 times higher than that in Dam Rong: 39.2% of total couples used long-term contraceptives methods in Minh Hoa while 30.6% of total couples in Dam Rong (Table 4.6)

It can be seen from above results that every 100 couples using FP services prevented 33 unintended pregnancies in Minh Hoa and 25 unintended pregnancies in Dam Rong. Research of Antonia Biggs et all in California, United State in 2007 showed that every 100 couples using contraceptive methods of whom 9% using long-term contraceptive methods averted 29 unintended pregnancies. However their result included the impact of women still using a LAPM from past years therefore if only results of using contraceptive services in 2007 was taken into account, the number of unintended pregnancies averted would be lower (6). From results obtained in study districts, it can be said that long-term contraception methods are more effective than short-term contraception methods. This result is similar to finding from the study of Jennifer J.Frost and colleagues in the US in 2010 that using long-term contraception methods are more effective than using short-term contraceptive methods [7]. This issue needs to be paid more attension when conducting communication and counseling on family planning services.

Considering study results year by year, it was found that the number of unintended pregnancies averted increased by year and inceased quickly for three years from 2009-2011 in both Dam Rong and Minh Hoa (table 4.9). This might be the result of promoting annually the use of family planning services of the couples. In Minh Hoa district, for the last two years there were the times when contraceptive materials were not provided enough on actual needs, this might limit the effect of decrease in number of unwanted pregnancies of the program in that time.

Reducing (preventing) the number of unintended pregnancies is very important to the population growth. The results obtained from study were only initial evidence as it was estimated on the basic of data from two hardship districts in Lam Dong and Quang Binh provinces. If this estimation was carried out in all districts of 63 provinces then it can be said that the provision of FP services or in the other words, FP program has contributed significantly in controling population growth.

The utilization of family planning services has averted the large number of unintended pregnancies and thus also preventing the number of abortions due to unintended pregnancies. The study results showed that for 5 years contraceptive service provided throught FP program

prevented an estimated 1,937 and 723 abortions due to unintended pregnancies in Minh Hoa and Dam Rong districts respectively**.** By averting unintended pregnancies, for 5 years it also prevented 1.313 and 519 live births in Minh Hoa and Dam Rong districts respectively (Table 4.9). Although the study was conducted in two districts only but study results have shown that the prevention of unintended pregnancies had significant impact on population growth. Averting uninteded pregnancies not only has the significant impact on demography, study results has shown that averting uninteded pregnancies will restrict the use of resources for delivery, for unwanted abortion, for medical care of unwanted births and thus resources saved will be used for other health care activities. Averting uninteded pregnancies also leads to prevent number of maternal DALY lost due to mobidity and mortality related to delivery and means that it prevents losing working day of mother.

Again study results suggested that using family planning services are not only impact on population growth, on spending resources for health care, but also affects on the economic development of the household and the production of the whole society if it was considered in broader view.

There have been many studies on the success of family planning programs however not many researches using specific indicators to measure the impact of the provision/untilization of family planning services. Several large scale studies on the impact of provision of FP services conducted in the particular year in US have shown that the utilization of family planning services have great impact on population growth, on spending resources for health care, especially it brought great benefit for FP program or health insurance [8].

In conclusion, the results on impact of averting unintended pregnancies due to utilising FP services at study site is very important evidence for the implementation and management of family planning programs. It is necessary to conduct a broader study to determine the effect of FP program in terms of the social impact as it would be important evidence for improving family planning activities to restrict population growth. Impact of using FP services will be considered in more detail when its benefits were converted into currency in later part.

5.4. Benefits in monetary value of social impacts by reducing the number of women with unintended pregnancy

Cost- savings from the prevented impacts by reducing the number of women with unwanted pregnancies were considered benefits in monetary value gained from the family planning program. The impact indicators were higher in Minh Hoa over the years, therefore the cost-savings in Minh Hoa were also greater those in Dam Rong ($ 512,893 US vs. $ 392,876 US). The exclusion of indirect costs had increased the total cost savings in Dam Rong ($ 276,697 vs. $ 164,544), primarily due to higher delivery expenses. Number of women who were supported by maternity policy from social insurance in Dam Rong was two times more than that in Minh Hoa in study area. This explained why excluding indirect costs, total cost- saving from prevented

deliveries in Dam Rong district was nearly 3 times higher than that in the Minh Hoa ($249737.8 US vs. $93,178.70 US). If indirect costs were included, this cost-saving component in Minh Hoa became higher with $322.244,16 US compared to $261.159,71 US in Dam Rong. Among the cost-saving components, averted expenditures for delivery were the highest. Not only because the number of pregnant women decreased the most, but also because the postpartum period was the longest, averaging 76 days and 102 days in Dam Rong and in Minh Hoa, respectively (Table 4.3). The study used the total cost savings including both direct cost and indirect cost to analyze cost-benefit of the FP program.

5.5. Cost-benefit of the family planning program in study settings

Benefits gained from the family planning program were 18 times higher than costs spending for the program in Minh Hoa and 10.1 times in Dam Rong after 5 years of implementation (Table 4.11). Cost savings from the program were higher in Minh Hoa districts while total cost of providing the program was lower in this district that explained this finding. Cost savings from reducing expenditure for delivery, medical care for ill children, abortion and income lost due to illness and maternal mortality related to pregnancy were much higher than the cost of investing in the family planning programs in both districts. When measured by the index of net social benefit, the results showed that monetary values of benefit of the program exceeded cost of implementing the program was $484.3 US in Minh Hoa and $353.87 US in Dam Rong. In term of percentage of ROI, profit rate received from the FP program was 1695.88% and 907.27% in Minh Hoa and and Dam Rong, respectively. It means that $1US invested in the program obtained $17 US in Minh Hoa and $9 US in Dam Rong after 5 years. These findings indicated that economic benefits of the program achieved too large besides reducing fertility rate and population growth.

Cost-benefit analysis of the family planning program in many countries presented similar results although various cost-saving components were used to estimate. A study in Iowa in 1988 estimated benefit-cost ratio of the family planning program following 5 years for ages 20 to 44 to be from 2.11 to 7.46, respectively [5]. In that study, the cost of food was added to user fees for delivery care and acquired diseases in children but excluding the cost of medicines and other health care costs. Other study in California in 2007, all direct costs related to maternity, sick children were included to estimate the cost savings. The findings showed that every $1 US invested in the program after 5 years prevented from $9, 25 US lost due to maternity and sick children [6]. This result was higher than ours when excluding indirect costs. $1 US invested in the program would save $5.8 US in Minh Hoa and $7.1 US in Dam Rong. However our study did not include non- medical direct costs such as expenditure for food, travel, accommodation and other social services during process of treatment at health facilities. Additionally, we also eliminated antenatal care cost of pregnant women in the private health facilities because the survey results showed that a few women used these services in study districts. If these amounts were included, the benefit-cost ratio of the family planning program in two districts would certainly increase.

5.6. Sensitivity analysis

The results in Figure 4.2 a and b showed that increasing the cost of family planning programs, increasing failure rate of the program, reducing morbidity incidence of chidren, excluding indirect cost, and increasing treatment costs reduced NSB of the family planning program in the two districts. However the economic benefits achieved were still much higher than the cost of the program. These results confirmed that the family planning program not only reduced fertility rate, but also saved household expenditures and government spending.

It was interested that the exclusion of indirect costs had the greatest impact on results of estimation of return on investment of the program. However the finding showed that benefits still exceeded program costs. It is important for policy makers to advocate the health insurance system providing family planning services to participants. In this study, the cost savings from the prevention of women with unintended pregnancies were also cost savings to the health insurance system because all the FP services were provided by public health facilities and a high proportion of local people were covered by health insurance system. Therefore the findings of the study were useful evidences to help policy makers to consider family planning service package provided by health insurance system, especially when the program is widely deployed in the country, saved budget of social insurance for maternity period of women in the formal labor sectors will be great.

5.7. Limitation

Some limitations of the study should be considered when interpreting the results of the study:

Firstly, secondary data on number of family planning services collected from provincial and district level in Minh Hoa district was inconsistency. To minimize information bias, we collected data from CHCs, district hospitals and preventive medicine centers of province and districts to calculate number of services used.

Secondly, information on client profie was very important for estimation of unintended pregnancies from Impact2. As this information was not avaiable during the study time then we had to use the defauted data in the model so that the number of unintended pregnancies to be estimated from Impact2 was not accurated

Third, direct cost savings may be lower than actual use because the study did not include the cost of health care primary services at CHCs such as ANC, tetanus vaccination, ... Besides the expenditures of maternity, abortion and child illness were estimated based on standards guidelines for diagnosis and treatment of the Ministry of Health, regardless of complications and additional clinical tests as well as other material consumption. Futhermore, the cost of maternity and child illness were estimated on the basis district hospital fees that were much lower than those in the provincial or higher levels. If these amounts would be considered in the study, economic benefits of the program must be higher. Sensitivity analysis that used input of increasing 30% of healthcare costs have increased profit rate received from the programs (822.2% compared to

609.4 % in Dam Rong and 649.0% compared to 476.1% in Minh Hoa)

Fourthly, the cost of programs that provide family planning services did not include operational costs of the administrative system and the financial support to the collaborators of population program in the districts. However, sensitivity analysis that increased the cost of programs to 30% still showed the high increase in ROI in both districts.

Fifthly, the research offered the hypothesis that the couples had used continuously contraceptives without mentioning their escape from the utilization. However the sensitivity analysis with the input of increasing 10% of failure rate of conceptives did not change much ROI compared to the base case.

Finally, this study covered family planning services providing to couples rather than adolescents and unmarried people. The results of the studies in the world revealed that the cost-benefit of the FP program that provided FP services to these subjects was much higher than that to couples [5],[6].

6. Conclusions

- For 5 years from 2009 to 2013, total cost of providing family planning services under Family planning & population program was 546,159,665 VND in Minh Hoa district, Quang Binh province and 745,897,150 VND in Dam Rong district, Lam Dong province. Assuming cost of providing FP services was covered by Health Insurance, these costs of woulld be 600 775 632 VND ($ 28,559.40 US) and 820,486,865 VND ($39.003,94US) and in Minh Hoa, Quang Binh and Dam Rong, Lam Dong respectively.

- During 5 years from 2009 to 2013, the family planning program prevented 1610 and 4074 women with unwanted pregnancies in Dam Rong district, Lam Dong province, and Minh Hoa, Quang Binh province, respectively. As a consequence, the program prevented 918 and 2,322 abortions due to unwanted pregnancies, 519 and 1,313 unplanned births, 57 and 63 DALY lost due to maternal morbidity and mortality related to maternity in each district, respectively. The results have contributed significantly into reducing population growth, saving resources for maternity care, abortion and child diseases, reducing the disadvantage economic impact of households

- Owing to the provision/utilization of family planning services for couples of reproductive age, the program has saved 8,264,536,463 VND ($392,876 US) in Dam Rong district and 10,789,211,724 VND ($512,893 US) in Minh Hoa district for society and for Health Insurance it has saved l5.253.485.063 VND (276.697 USD) and 1.960.107.217 VND (164.544 USD) in Dam Rong and Minh Hoa districts respectively

- Results of cost-benefit analysis of the FP programs under the asumption of providing through the health insurance system for 5 years from 2009-2013 have shown that: 1) for society, cost savings were 18 times and 10.1 times higher than total cost of the program in

Minh Hoa and in Dam Rong, respectivelyr; This means that 1 VND invested in FP program would gained 18 VND in Minh Hoa and 10 VND in Dam Rong 2) Profit rate obtained from cost inverted in the program was 1695.88% in Minh Hoa and 907.27% in Dam Rong. In the other word, profit gained from program was 17 times and 1.9 times higher program cost in Minh Hoa and Dam Rong; 3) The program gained benefit with net social benefit in Minh Hoa was higher than that in Dam Rong with $ 484,333.3US and $353,871.9 US, respectively.

- Evidences drawn from study have shown that providing FP thought HI will bring profit for Heath Insurance company with benefit rate comparing with investment cost would be 609% in Dam Rong and 476% in Minh Hóa. These results have shown that 1 VND investing for FP services, the HI company will save 5,8 VND in Minh Hoa and 7.1 in Dam Rong and profit gained from program can be stable with any reasonable change of input sucg as increasing 30% cost of proving FP services

7. Recommendation

For the Project "Increasing service performance accountability", MSI

- Use findings of the study as evidences to advocacy for the inclusion of FP services in health insurance scheme.
- Support enhancing communication activities and improving quality of FP service provision to project communes with the aim at improving awareness, accessability to and utilization of FP services among people.
- Disseminate study's results to related orgnizations and institutes.

For health facilities at provincial, district and commune levels

- Improve health information management system to provide good evidence for health care planning and management in generally and reproductive health care management, in specificaly.

For Ministry of Health and Family Planning & Population Program

- Consider to carry out a comprehensive study on cost- benefit of providing productive health care services. Those findings will be evidences for mobilizing resources to improve the provision and the utilization of family planning.

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Appendixes

Appendix 1: COST OF PROVIDING FP SERVICES

Table PL 1: List of fees of FP services at Minh Hoa and Dam Rong

Services	Fee (VND)
Female Sterilisation	629.000
Male Sterilisation	411.000
Implants	1.171.000
IUD	57.000
Pills	4.799
Injection	158.000
Condom	580

Bảng PL 2: Number of customers using FP services during 2009-2013 at two districts

Services	Đam Rong					Minh Haa				
	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013
Female Sterilisation	5	6	6	17	6	8	17	13	5	11
Male Sterilisation	0	0	0	0	0	0	1	0	0	0
Implants	25	15	26	8	17	52	53	52	14	82
IUD	1.200	1.000	770	775	950	219	284	381	353	458
Pills	250	329	421	625	730	304	237	265	315	272
Injection	148	148	216	180	147	104	452	517	425	445
Condom	702	838	924	856	974	194	171	314	285	238

Table PL 3. Cost of providing FP services during 2009-2013

Unit:thousand VNĐ

Services	Đam Rong					Minh Hoa				
	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013
Female Sterilisation	5.032	10.693	8.283	3.105	7.031	3.145	3.774	3.774	10.693	3.774
Male Sterilisation	0	411	0	0	0	0	0	0	0	0
Implants	60.892	62.063	61.682	16.183	97.577	29.275	17.656	30.446	9.368	19.907
IUD	12.505	16.216	22.037	19.897	26.575	68.520	57.100	43.967	44.253	54.245
Pills	1.459	1.137	1.288	1.492	1.327	1.200	1.579	2.020	2.999	3.507
Injection	16,432	71.416	82.745	66.284	71.448	23.384	23.384	34.128	28.440	23.226
Condom	112,5	99,2	184,5	163,2	126,1	407	486	536	496	565
Total	96.432	162.036	176.220	107.124	204.085	125.931	103.888	114.871	96.249	105.220

Appendix 2. DATA FOR IMPACT2 MSI

Table PL4. Number of woman at reproductive age and fertility rate:

Indicator	Đam Rong					Minh Hoa				
	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013
Woman (15-49)	8,237	9,627	10,493	10,093	11,658	14,609	15,372	15,924	16,251	16,754
Fertility rate	2.3	2.5	2.5	3.4	2.5	1.88	1.52	1.91	2.18	1.85

Bảng PL 5. Number of customer using FP services during 2009-2013(As in table PL2)

Bảng PL6. Rare of using FP services in 2007 (defaut in Impact 2) and 2013

	Newest study in LĐ	Newest study in QB	Oldest study
Yesr of the study	(2013)	(2013)	(2007)
Type of study	Huyện (địa phương)	Huyện (địa phương)	Quốc tế
Any methods	72.3%	82.2%	79.0%
LAMP	30.7%	37.8%	48.5%
Short term methods	41.6%	44.5%	19.7%
Traditional and other methods	0.0%	0.0%	10.8%
Rate of maximine increasing CPR in the future	75%		
Rate of annual increasing CPR	3%		

Sourse: from Impact2 and avaiable data at health facilities

Table PL 7. Information on client profile from 2009-2013

Năm	2009	2010	2011	2012	2013
% adoption	37%	37%	37%	31%	31%
% continuer	6%	6%	6%	56%	56%
% change provider	57%	57%	57%	14%	14%

Source: data defauf in Impact2

Appendix 3. COST RELATED TO DELIVERY AND ILL CHILD TREATMENT

Table PL8. Fees of services

Serviecs	Fee (VN Đồng)
Delivery	
- Normal delivery	689.000
- Complicatin	814.844
- Caesarean section	1.732.464
Abortion	332.750
Ill child	
- Respiratory infections	302.106
- Diahrea	392.333
- Upper Respiratory infections	263.630

Sourse :from the list of service fees at Minh Hoa và Đam Rong District

Table PL.9. Number of absented days of woman and parent

Services	Tại cơ sở y tế	Hậu sản	Người chăm sóc
Delivery			
- Normal delivery	5	90	5
- Dystocia	20	90	7
- Caesarean section	7	116	10
- Ectopic pregnancy			
- Miscarriage	3	30	
Abortion	3		
Ill child:	Mother absent from work	Father absent from work	
- 1 year old	24	7	
- 2 years old	13	7	
- 3 years old	11	3	
- 4 years old	8	5	

Table PL 10. Percentage of people using different type of services in Dam Rong and Minh Hoa

Delivery	Percent
- Normal delivery	92,1
- Dystocia	0,5
- Caesarean section	7,4
Abortion	
- Abortion	1
Percentage of children suffer from three commone disease	
- 1 year old	60,3
- 2 years old	76,5
- 3 years old	66,7
- 4 years old	78,3
- 5 years old	79,2

Table PL 10. Percentage of woman who are received pension social insurance according to regulation of Social Insurance

District	Percent of woman receiving pension social insurance *	pension social insurance /time of delivery ** (VNĐ)	Pension for 2 month according to salary *** (VNĐ)	Total (VNĐ)
Đam Rong	0,049	21.000.000	2.100.000	23.100.000
Minh Hoa	0,017	19.000.000	2.100.000	21.100.000

* It is estimated basing on the number of woman receiving pension social insurance/total woman to be interviewed
**Were calculated basing on average of Salary of mother for 4 month (before 2013)
*** According to the regulation, each deliveried woman gets 2 month salary for each time (1.050.000 đ)