

Cost-effectiveness of Family Planning and Maternal and Child Health Alternative Service-Delivery Strategies in Rural Bangladesh

**Ann Levin
Ahsanul Amin
Rumana A. Saifi
M. Anisur Rahman
Barkat-e-Khuda
Khorshed A. Mozumder**

International Centre for Diarrhoeal Disease Research, Bangladesh
Mohakhali, Dhaka 1212, Bangladesh

1997

ICDDR,B Working Paper No. 82

Editing: M. Shamsul Islam Khan

Layout Design and Desktop Publishing: Jatindra Nath Sarker
S.M. Faruque Ahmed
Subash Chandra Saha

Cover Design: Asem Ansari

ISBN: 984-551-105-8

© 1997. International Centre for Diarrhoeal Disease Research, Bangladesh

MCH-FP Extension Project (Rural) Working Paper No. 134
ICDDR,B Working Paper No. 82

Published by:

International Centre for Diarrhoeal Disease Research, Bangladesh

GPO Box 128, Dhaka 1000, Bangladesh

Telephone: (880-2) 871751-60 (10 lines); Cable: CHOLERA DHAKA; Telex: 675612 ICDDBJ

Fax: (880-2) 871568 and (880-2) 883116

E-mail: barkat@icddr.org

Printed by Adprint, Dhaka

Acknowledgement

The MCH-FP Extension Project (Rural) is a collaborative effort of the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) and the Ministry of Health and Family Welfare (MOHFW), Government of the People's Republic of Bangladesh, supported by The Population Council. Its purpose is to improve the delivery of maternal and child health and family planning services through the MOHFW programme.

ICDDR,B is supported by the aid agencies of the governments of Australia, Bangladesh, Belgium, Canada, Japan, the Netherlands, Norway, Saudi Arabia, Sri Lanka, Sweden, Switzerland, the United Kingdom, and the United States; international organizations, including Arab Gulf Fund, European Union, the United Nations Children's Fund (UNICEF), the United Nations Development Programme (UNDP), and the World Health Organization (WHO); private foundations, including Aga Khan Foundation, Child Health Foundation (CHF), Ford Foundation, Population Council, Rockefeller Foundation, Thrasher Research Foundation, and the George Mason Foundation; and private organizations, including East West Center, Helen Keller International, International Atomic Energy Agency, International Centre for Research on Women, International Development Research Centre, International Life Sciences Institute, Karlinska Institute, London School of Hygiene and Tropical Medicine, Lederle Praxis, National Institute of Health (NIH), New England Medical Centre, Procter & Gamble, RAND Corporation, Social Development Center of Philippines, Swiss Red Cross, the Johns Hopkins University, the University of Alabama at Birmingham, the University of Iowa, University of Göteborg, UCB Osmotics Ltd., Wander A.G., and others.

Contents

	Page
<i>Abstract</i>	v
<i>Introduction</i>	1
<i>Background</i>	1
<i>Objective</i>	2
<i>Conceptual Framework</i>	3
<i>Literature Review</i>	7
<i>Description of Alternative Service-delivery Intervention</i>	9
<i>Data</i>	11
<i>Methods of Analysis</i>	13
<i>Costs</i>	13
<i>Measures of Effectiveness</i>	14
<i>Results</i>	16
<i>The Cluster Approach</i>	16
<i>Cost-effectiveness of the Increased Frequency of Satellite</i>	
<i>Clinics combined with EPI spots.</i>	21
<i>Cost-effectiveness of Service Delivery at SCs</i>	22
<i>Cost-effectiveness of Service Delivery at the H&FWC</i>	25
<i>Discussion and Policy Implications</i>	29
<i>References</i>	32

Figure 1: Average and marginal costs	4
Figure 2: Contraceptive prevalence at cluster unions, August 1995 and February 1997	10
Figure 3: Percent of MWRA's visited or represented at Satellite Clinic combined with EPI	10
Table 1: Percentage of time spent on activities on cluster and home visit days of FWA	17
Table 2: Monthly costs of services provided at the cluster and doorstep (in Taka)	19
Table 3: Average monthly services provided at cluster and doorstep delivery	20
Table 4: Cost per birth averted at the cluster and home delivery unions (in Taka)	20
Table 5: Percentage of time spent on activities at Satellite Clinic by the FWV	23
Table 6: Total monthly costs of services provided at the SC (in Taka)	24
Table 7: Average monthly family planning and ANC services provided at the SC	24
Table 8: Cost per birth averted or additional quality of life year gained (in Taka)	25
Table 9: Percentage of time spent on activities at the H&FWC by the FWV	27
Table 10: Total costs of services provided at the H&FWC (in Taka)	28

When the cost-effectiveness of increasing the frequency of SC + EPI services was examined, the service delivery was found to be more cost-effective for all services in the low-performing thana - Mirsarai, and for two out of three services in the high-performing thana - Abhoynagar. It is likely that this increase in cost-effectiveness is associated with a higher demand for services at the SC when their accessibility and/or frequency was improved. This implies that the provision of a wider range of services is improving overall cost-effectiveness.

Because increasing the frequency of SCs was found to be cost-effective, policymakers should consider scaling-up the intervention to other areas. Findings also suggest that alternative service delivery strategies may take longer to introduce and require additional refinements in high-performing areas, than in low-performing areas. On the other hand, the early results suggest that contraceptive prevalence will not be adversely affected by introducing these strategies.

Introduction

The MCH-FP Extension Project (Rural) of the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) has been testing two alternative service-delivery strategies to improve the effectiveness and efficiency of the national family planning and maternal and child health programme in two field sites: (i) service delivery at the cluster spots, a centrally-located neighbourhood spot, rather than at the client's home, and (ii) the increased frequency of the outreach clinics merged with immunization spots. The cost-effectiveness of these strategies has been compared with those of existing service-delivery strategies to determine which was the least cost-intensive mechanism of providing family planning and maternal and child health services.

Background

The national family planning programme has been highly successful, with the contraceptive prevalence rate increasing from 7% in 1975 to 49% in 1996 [1]. However, this success has been reached with a highly labour-intensive service-delivery strategy through the use of field workers (family welfare assistants) who provide short- and medium-term family planning methods directly to clients at their homes. While heavy investment of resources is necessary during the early stages of a programme, the later stages require attempting to minimize per output cost and improved cost-effectiveness.

Not only does the programme have a labour-intensive service-delivery strategy, it also is highly dependent on external funding to finance its activities. Over 60 percent of the total funds in the population sector come from external resources [2]. With external funding expected to decline during the next decade and the costs being increased with additional

acceptance of family planning methods, the family planning programme will be required to reduce costs while increasing its level of output (i.e. increase contraceptive prevalence).

One mechanism to reduce total costs and increase the cost-effectiveness of service delivery is to use alternative service-delivery strategies. Cluster service delivery is being tested in two ICDDR,B field sites in collaboration with the Ministry of Health and Family Welfare, Government of Bangladesh. This strategy involves service delivery by the family welfare assistant (FWA) at the centrally-located neighbourhood sites rather than at the clients' homes. Since less travel time is required to reach a fixed site than to the clients' homes, this strategy will allow the FWA to provide more services during the same amount of time.

The second alternative service-delivery strategy that is being tested is to increase the frequency of satellite clinics offered by the family welfare visitor (paramedic who provides a range of family planning and maternal and child health services) from 8 sessions a month to twenty to 20-24 a month.

In addition, the outreach sessions (SCs) are combined with immunization services for children and women, to facilitate additional services for the clients.

Objective

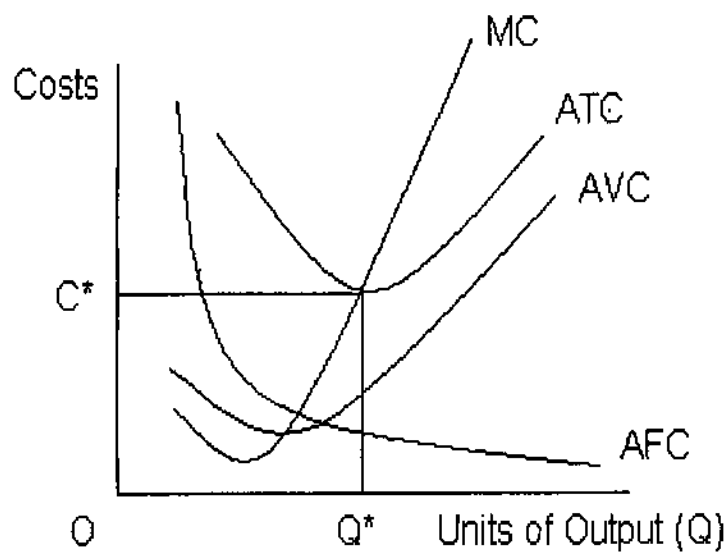
The objective of the study is to determine if the two alternative service-delivery strategies being tested by the ICDDR,B's MCH-FP Extension Project (Rural), in collaboration with the GoB MOHFW, are more cost-effective than the existing service delivery, so that policy-makers can make informed decisions about whether to replicate them.

Conceptual Framework

Cost-effectiveness analysis is a method “of organizing information, so that the costs of alternatives and their relative effectiveness in meeting a given objective can be compared systematically” [3]. This information can then be used by policy-makers to make choices between alternatives.

In the provision of services, such as health and family planning services, resource allocation is most efficient when the average cost is minimum level (Fig. 1). To achieve minimum cost, the level of output, Q , should be produced at the lowest point of the average total cost curve. The average total cost comprises two components: average fixed costs (AFC) that do not change as the level of output changes in the short run, and average variable costs (AVC) that change in response to changes at the output level. The average fixed costs usually decline since the fixed costs are spread out over more output, while the average variable cost is initially lower at the higher levels output due to the increased productivity at the low output levels.

Marginal cost, or the additional cost incurred by producing one more unit of output, is related to the average cost. As long as the marginal cost is below ATC, the average cost falls, but when the marginal cost is greater than ATC, the average cost increases. When the marginal cost equals ATC, the average cost reaches its minimum point.



ATC = Average total Cost
MC = Marginal Cost
AVC = Average Variable Cost
AFC = Average Fixed Cost

Fig. 1. Average and marginal costs

As part of the analysis, the costs and measures of effectiveness of alternatives are compared through cost-effectiveness ratios. This ratio is calculated by dividing the cost of an alternative, expressed in monetary terms, by the effectiveness of that alternative, expressed in non-monetary terms.

The cost-effectiveness ratio is the following:

$$C_{i,t}^a = C_i / N_{i,t}^a \quad (\text{total cost per activity } i + \text{total services per activity } i)$$

$$= \frac{W_i \times H_i + T_i + S_i + F_i + TC_i}{N_i^s}$$

where, W_i = wage rate for activity i ;

H_i = number of hours worked for activity i ;

T_i = cost of transportation for activity i ;

S_i = cost of supplies for activity i ;

F_i = other provider costs for activity i ;

TC_i = travel costs of client; and

N_i^s = number of services achieved through activity i .

[Source: (4)]

The resources used in the provision of services include personnel time, supplies, transport and other provider costs, such as rent. An additional cost that is added is the cost to the client of obtaining the services. These expenditures include the cost of travelling to and from the service outlet, the opportunity cost of the time required for travelling, and the waiting time at the service outlet as well as any psychological costs involved with using the service.

When comparing more than one alternative, the concept of Pareto optimality is applied in testing whether a resource allocation or a particular service-delivery strategy will be more desirable. To apply this concept, the general rule is the following: If the reallocation of resources makes at least one person better off, and no one is worse off, there is said to be a Pareto improvement.¹ To apply the concepts of Pareto optimality in the analysis, the costs to clients as well as those of services will be taken into account. Thus the travel and time costs of clients will also be added as monetary costs.²

Two important concepts that should be defined for this analysis are effectiveness and efficiency. Effectiveness is the degree to which the programme objectives are achieved. For example, one measure of effectiveness is the number of births averted, a measure of the impact of the distribution of family planning methods to clients. Efficiency is the achievement of objectives without wasting resources, or the relationship of output to input. For example, if the same amount of resources, e.g. personnel time and supplies, can produce more services through using another service-delivery strategy, efficiency has been improved.

¹ A similar and more attainable criterion is the potential Pareto improvement in which a programme is said to be welfare-enhancing if the gainers are willing to pay enough for their gains to compensate the losers.

² There is some debate over whether the time costs should be included as monetary costs (in the numerator as part of the costs) or as decrements to utility (in the denominator, subtracted from the effectiveness). In this analysis, the decision was to include them as monetary costs since they are being valued in terms of money values rather than utility.

Literature Review

Few studies have evaluated the cost-effectiveness of health and family planning services in Bangladesh. The study by Balk and her colleagues [5] evaluated whether the labour-intensive service-delivery strategy being tested in Matlab, Bangladesh was more cost-effective than the programme found in the comparison areas. They found that the average annual cost per birth prevented by the operations research project in Matlab, Bangladesh was lower than the cost per birth prevented in the comparison area. However, one criticism of the study was that it did not include the cost of GoB field workers in the intervention area when the cost analysis of the services was made.

More recently, four studies have examined the costs of GoB and NGO family planning services using two types of methodologies. The FHI study of GoB and NGO services used a bottom-up approach that based unit costs upon time and productivity measures, salaries, and other elements of costs [6]. The service delivery at static clinics (H&FWCs and SCs) was found to be more cost-intensive due to the dual systems of provision of both home delivery and clinic service delivery. Other factors that affected the cost of service delivery at H&FWCs were low use and limited hours of service provision at the clinics. The problem with this methodology is that the results are, of necessity, based on sample data.

The JSI/TAF [7], FPMD/LIP [8], and JHU/CCP [9] studies used a “modified step-down approach” that focused on line item expenditures. Each study specifically costed project activities. The limitation to this methodology is that it focuses more on administrative costs and less on differences in productivity of differing service-delivery strategies.

While these studies have evaluated existing service-delivery strategies or project service delivery, they have not, however, attempted to evaluate alternative service-delivery strategies to improve the cost-effectiveness of the Bangladesh family planning programme.

Although cost-effectiveness analysis is being used more and more frequently to determine the least costly way to deliver health and family planning services, considerable literature is available on the limitations of this technique [10]. These include the difficulty in controlling for quality in the analysis, putting a value on non-traceable costs, the issue of measuring demand, and the importance of the scale of operation. It is usually difficult to control for quality of care of services (e.g. adequacy of counseling and interpersonal relations) in an analysis of costs. However, a higher quality service, although costing more in many cases, may be more cost-effective in the long-run because of its long-term effect on compliance with and use-effectiveness of contraceptives/drugs.

In addition, many costs are difficult to quantify or the information is difficult to obtain. For example, there are often psychic costs associated with using one alternative over another, such as the cost to a woman of leaving her home to seek contraceptive methods rather than receiving them at home. These social costs should be included in the analysis. However, it is difficult to put a value on them.

Other limitations include the problems inherent to differences in level of demand for services. Because average costs are affected by the level of demand for services in an area, a bias may be created if demand varies substantially from one area to another. It is possible that a good alternative would appear costly in one area due to low demand for these services, while another alternative might seem highly cost-effective because of high demand. Similarly, the scale of operation may affect cost. Thus even though two alternatives may be operating efficiently, they may have different unit costs due to the differences at the output levels.

Description of Alternative Service-delivery Interventions

Two interventions to increase the financial sustainability of MCH-FP service delivery are being tested jointly by the GoB MOHFW and ICDDR,B since early 1995. They are cluster service delivery and increasing the frequency of SCs combined with EPI. There are two rationale for a cluster service-delivery approach: (i) Despite the posting of 40,000 government and NGO field workers by the GoB, the percentage of MWRA's who are visited regularly by these workers is low, and (ii) Due to the costly nature of the field worker service delivery, the ratio of MWRA's per field worker is expected to increase over time as the population size increases. In the cluster approach, services are provided by the FWA to a group of approximately 50 women at a centrally-located house in the neighbourhood, rather than at the homes of individual clients. The services include distribution of oral pills and condoms, and administering of injectables. The advantages to the cluster approach over home delivery of services are that (i) a larger proportion of the FWA's time is available for service delivery since visits to clients' homes are not required, and (ii) with more time freed for service delivery, the field worker can spend more time with each client and offer services to more clients. Another benefit of this approach is that peer counselling can take place as clients come to obtain services.

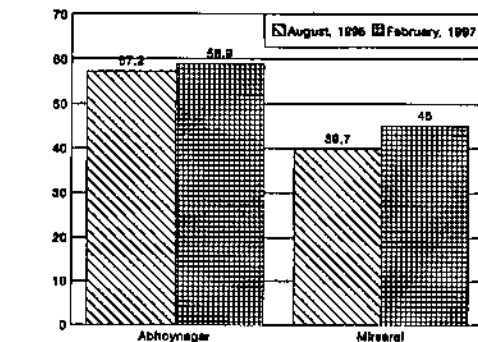
Different strategies are being tested for informing the clients of the date of intervention. At present, the FWAs visit *baris*³ before the cluster is held to remind MWRA of the timing and venue of the service provision. However, other strategies will be tried to determine which one is the most cost-effective method of informing clients of the services.

The second intervention's goal is to increase the effectiveness of SC service delivery through increasing the number of SCs held each month from the existing mandated 8 sessions to 20-24 sessions. In addition, it aims to

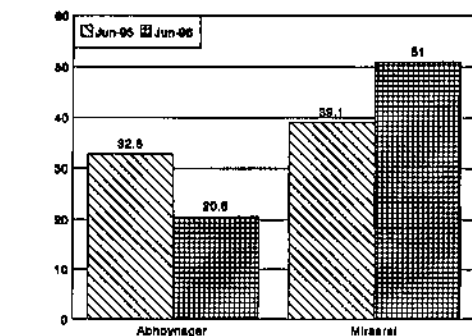
³ *Baris* are groups of households found in neighborhoods of rural Bangladesh.

tap missed opportunities by combining the outreach clinic service delivery with EPI services, since clients are more likely to seek out family planning and MCH services if they are already at the outlet obtaining one type of service.

In order for an FWV to provide services at the 20 rather than 8 SCs, a second FWV and aya (aide/cleaner) have been posted to each of the intervention sites. Because of these additional staff resources, the H&FWC can be kept open six days a week, rather than the four days that services are provided while also providing twenty to 20-24 SCs each month. The additional resources that are required for the intervention are added to the cost of service delivery in the analysis of cost-effectiveness.



Source: BR5



Source: BR5

Fig. 2: Contraceptive prevalence at cluster unions, August 1995 and February 1997

Fig. 3: Percent visited or represented* at Satellite Clinic combined with EPI

* Often women send their husband or a relative to obtain health or family planning services rather than go themselves.

In the two unions where cluster service delivery is being tested, data from the MCH-FP Extension Project's surveillance system (SRS) indicate that the contraceptive prevalence has not been adversely affected by the introduction of alternative service-delivery strategies. Instead, the prevalence has continued to rise in both areas (Fig. 2). Similarly, the observational data collected by the MCH-FP Extension Project (Rural) indicate that the use of SCs has increased in the intervention unions (Fig. 3). This study will, however, examine the issue of cost in addition to effectiveness of these alternative service-delivery strategies.

Data

The data were collected in August 1996 in two rural sites: Mirsarai Thana of Chittagong and Abhoynagar Thana of Jessore. The two areas are very different from each other. Mirsarai Thana is considered a low-performing thana since its indicators, such as contraceptive prevalence, are low (38%) than the rest of the country. Abhoynagar Thana, on the other is considered a high-performing thana, and has a contraceptive prevalence of approximately 62%. In addition, comparison data were collected from two neighbouring thanas in August 1996. The collection of data took place in six unions: two intervention unions in each of the field sites and in one comparison union of each neighbouring thana.

For the purpose of collecting data to investigate differences in the productivity of alternative service-delivery strategies, the methods of data collection known as the "bottom-up approach" used by Janowitz [6] and Reinke [11] were considered to be more appropriate than the "modified step-down approach" used by Fiedler and Day [7], Stover [8], and Barkat [9]. The methods of data collection used in this study included randomized intermittent instantaneous observation of service providers, abstracting of logbooks, and compilation of cost data on commodities, supplies, and other costs. Randomized intermittent instantaneous observation technique is a

technique where observations of worker activity are made at specified intervals, such as each five minutes. The advantages to this technique are that observations are statistically independent, and data collection is usually more accurate than that of continuous observation [11].

Three types of service providers were observed: (i) the FWV, a clinic-based paramedic, (ii) the aya, the clinic-based cleaner/assistant, and (iii) the FWA, a field worker. In addition, the supervisor of the FWA, the FPI, was observed for one day in each union. Random observations were made at four minute intervals for the service providers in the H&FWCs and SCs, with the number of observations of each worker weighted by overall time spent in service provision; observations were made at five-minute intervals for the field workers (FWAs).

In each union where observation took place, three FWAs were observed for two days each. In the non-satellite clinic intervention unions, the FWV and aya were observed for six days, i.e. four days at the H&FWC and two days at SCs. At the SC intervention union, the two FWVs and ayas were observed as well: six days at the H&FWC and six days at the SC. The supervisors of the FWAs, the Family Planning Inspectors (FPIs), were observed for one day in each union.⁴

Data were collected on the tasks conducted by the service providers using a pre-structured form that contains a checklist of functions and activity categories within functions. A separate form was used by the interviewers to record the number of services performed by each provider on the days of observation.

Other forms were used for collecting information on the time spent by supervisory staff, use of supplies, building expenses, and furniture and instruments.

⁴ The FPIs were only observed for one day, because this information was considered to be less useful to the analysis than observation of service providers.

Methods of Analysis

To calculate the cost-effectiveness ratios of each alternative, the costs and effectiveness measures of services delivered in the intervention and comparison unions were calculated, using the methodologies discussed in the following sections.

Costs

To calculate the costs, the cost centres, or outputs around which costs are associated, were designated. The cost centres included: oral pill, condom, injectable, IUD, and antenatal care. The family planning cost centres were further disaggregated by new and continuing users. Although data were also collected on curative care for women and children, since information was not available on diagnosis and drug distribution, these were not costed.

The next step was to calculate the cost of personnel time associated with each service. The percentage of total time spent on each type of service at each point of service delivery for each personnel was calculated and multiplied by their salaries (inclusive of benefits). Other overhead costs of providing services, such as record-keeping, preparation, unoccupied time, travel time, meetings/trainings, and personnel holidays, were also apportioned to the costs centres, according to the percent of service time spent on each type of service by each personnel, so that the total cost of personnel for each service could be included.

Other recurrent costs, were allocated to each cost centre, included supervisory and support personnel time, supplies, building maintenance, drugs, and contraceptives. For the H&FWC and SC services, the costs in the clinic and SC were allocated according to the percentage of service time spent on each type of service by the FWV and the percent of total time spent

at each outlet. For services delivered in the field, the additional costs were allocated according to the percentage of total service time spent on each type of service by the FWA.

Although data on capital costs of H&FWCs were available, they were not apportioned to the cost centres since it was assumed that similar equipment and facilities were available at these clinics.

The other cost that was apportioned to the cost centres was the cost to the client of obtaining the service. The average travel cost⁵ of the client was multiplied by the number of services provided, and added to the cost centres. The estimates of client cost were taken from a contraceptive demand survey that collected data on travel and waiting costs in June 1996.

Measures of Effectiveness

The numerator of the cost-effectiveness ratio is the measure of the effectiveness of the service delivery in the intervention and comparison unions. Possible indicators of effectiveness include end results of the evaluated interventions ranging from process outcomes, such as services provided to more long-term health effects, such as births averted or quality-adjusted additional years of life. The latter measures of effectiveness are preferred, since they examine the impact of interventions on health and fertility. The difficulty in determining an appropriate measure of health impact is in correctly estimating the effect of an intervention upon the health status of a person.

⁵ The cost of travel and waiting time to the clients was not added to the cost centres due to the difficulty in estimating the shadow prices of client's time.

Effectiveness of family planning services is measured by the number of births averted, an indicator of the impact of a programme on fertility. To obtain the number of births averted, the number of services provided per day was multiplied by the number of days that the service provider worked on average during the month⁶. Since it was not possible to use the prevalence method for the calculation of births averted⁷, the number of births averted was estimated from the number of couple-years of protection (CYPs) divided by the mean birth interval for each union, according to the method used by Cakir *et al.* [12]. The standard conversion rates for CYPs for Bangladesh were used, and the rates are given in Appendix A-1.

Effectiveness for antenatal health care services is measured by quality-adjusted life years added. Some antenatal interventions that have been shown to be effective in preventing and identifying conditions in pregnant women that can lead to serious morbidity or mortality include iron supplementation, detection and treatment of hypertensive diseases, and primary prevention of infection, such as tetanus immunization [13]. If the assumption is made that 10% of pregnant women will develop anaemia or high blood pressure, then antenatal care will reduce their morbidity during and after pregnancy. Using the table of health state utilities shown in Drummond *et al.* [14], the number of quality-adjusted life years gained by preventing (or treating at an early stage) anaemia and hypertension is 0.09.⁸

⁶ It was assumed that the service providers distribute, on an average, two cycles of pills and two dozen condoms during each visit.

⁷ The age-specific fertility rates were not available for the comparison unions.

⁸ The assumptions made were that the health state utility for a pregnant or postnatal woman with anaemia or hypertension would be 0.82, and the pregnancy-induced illness would have lasted six months.

Results

In this section, the results of the analysis are presented. The first section presents the findings on the analysis of the cost-effectiveness of the cluster approach, and the second section presents that of the SC intervention. The results include discussion of the time allocation of the service personnel on service delivery days since it heavily influences the outcome of the cost-effectiveness analysis.

The Cluster Approach

The first part of the analysis was to compare the allocation of the field worker's time under the cluster approach to that of doorstep delivery (Table 1).⁹ When the service delivery in cluster unions was compared with that of home delivery, the FWAs at cluster unions spent less time on non-family planning services, such as antenatal care referral and health education.

In the cluster unions, the service providers spent less time on service delivery than did those who were providing services at the doorstep. The percentage of total time spent on services was approximately 20% in the cluster unions and approximately 30% in unions with home delivery. Less time was probably spent on service delivery since fewer clients came to the cluster spot to be motivated for family planning, and this service requires more time than do other services, such as distribution of resupply methods.¹⁰

⁹ The disaggregation of the time spent on service and non-service activities during the month of the FWAs is shown in Appendix A-2.

¹⁰ There may also have been an observation effect due to the likelihood that FWAs in home-delivery unions visited more than their usual number of clients when they were being observed, while the FWAs in the cluster unions were unable to increase the number of clients that came to this outlet.

Table 1. Percentage of time spent on activities on cluster and home visit days of FWA

Activity	Mirsarai Thana		Abhoynagar Thana	
	Cluster Service Delivery	Home Delivery	Cluster Service Delivery	Home Delivery
Service				
Family	16.8	17.3	10.5	24.5
ANC & PNC	1.9	4.0	1.1	3.7
Health	1.8	2.2	4.1	7.2
Health	0.8	2.2	0.7	1.8
Total service	21.3	25.7	16.4	37.2
Administrative				
Record-keeping	16.3	17.0	24.3	13.6
Preparation	40.9	14.9	21.9	5.7
Travel	17.0	30.9	22.7	21.4
Total administrative	74.2	62.8	68.9	40.7
Personal overhead	4.5	11.5	14.7	22.1
TOTAL	100.0	100.0	100.0	100.0

The FWAs spent a smaller percentage of their time on travelling in the cluster union than in the home delivery union in the low-performing thana, Mirsarai, although there was no significant difference between the unions in the high-performing area. The travel time continued to be above 15% even in the cluster unions due to the time spent informing the clients about the timing of the service delivery. This finding suggests that if another way was found to inform the clients about the date of the clusters, more time would be available for service delivery, and the intervention could be more cost-effective.

Using the data on FWA time allocation, the total costs of services delivered at the cluster and doorstep were calculated (Table 2). These include the cost of personnel time, supervisory time of the FPI, family planning commodities, and stationeries. There is a wide variation in costs among different services. For example, the service that was the most costly was resupplying continuing pill users, followed by services for family planning motivation. The costs of services differ due to differences in the time required per service and variation in demand for particular methods.

Table 3 shows the average monthly services provided at the cluster and home-delivery unions. Fewer services were delivered at the cluster unions than in the comparison unions, and this difference appears to be due to the greater number of family planning motivation services provided at the home.¹¹ Another observation that can be made is that more clients came to the clusters in the low-performing area than the high-performing area. Consequently, there was a larger gap between the number of services provided at the cluster spots and through home delivery in Abhoynagar than in Mirsarai.

Using the data on the costs and the number of services provided at the two service outlets, the cost-effectiveness ratios were calculated (Table 4). At Mirsarai, the cost per birth averted in the cluster union was lower for injectable services but higher for the pill and condom services, while at Abhoynagar, the cost per birth averted was lower for the pill but higher for the condom and injectable services.

¹¹ Clients are less likely to go to the cluster to be motivated for family planning than to be resupplied.

Table 2. Monthly costs of services provided at the cluster and doorstep (in Taka)

Services provided	Mirsarai Thana		Abhoynagar Thana	
	Cluster Service Delivery	Home Delivery	Cluster Service Delivery	Home Delivery
Family planning	481.2	538.6	283.9	153.3
Pill new acceptor	82.5	57.7	124.2	107.3
Pill continuing user	563.6	116.5	319.4	559.6
Condom new acceptor	24.7	19.4	35.5	14.3
Condom continuing user	44.0	58.3	35.5	14.3
Injectable continuing user	178.7	174.9	257.4	99.7
Other family planning	41.2	38.9	88.7	84.5
ANC referral	151.2	252.7	128.8	191.6

Notes:

1. Costs in this table do not include commodity costs.
2. Forty taka is approximately equal to US\$ 1.00

Table 3. Average monthly services provided at cluster and doorstep delivery

Services provided	Mirsarai Thana		Abhoynagar Thana	
	Cluster Service Delivery	Home Delivery	Cluster Service Delivery	Home Delivery
Family planning	39.1	108.0	10.1	83.0
Pill new acceptor	5.9	2.6	12.5	8.3
Pill continuing user	81.0	59.9	77.4	118.3
Condom new acceptor	5.9	3.1	2.6	3.3
Condom continuing user	3.1	9.0	2.6	6.6
Injectable continuing user	21.1	14.9	57.5	33.3
Other family planning	11.9	12.1	2.6	36.6
ANC referral	14.9	4.1	5.0	18.3
Total no. of services	182.8	213.7	170.0	307.7

Table 4. Cost per birth averted at the cluster and home delivery unions (in Taka)

Method	Mirsarai Thana		Abhoynagar Thana	
	Cluster Service Delivery	Home Delivery	Cluster Service Delivery	Home Delivery
Pill	390.3	340.8	337.0	354.4
Condom	666.8	552.6	686.6	500.0
Injectable	497.3	534.7	454.7	433.8

Note: Cost per birth averted includes cost of family planning commodities.

It is likely that the cost per birth averted in the cluster unions was higher than that for home delivery in two of the three cases due to the low attendance at the cluster spots. In addition, the demand for condoms was low at the cluster unions and drove up the cost per birth averted.

Since more time is made available for service delivery through the cluster approach, but fewer services are being provided, the use of the FWA continues to be inefficient. Another explanation is that the present method of informing clients about the services, through visits to the *baris*, is not an efficient use of the FWA's time.

To test whether varying some of these parameters would make the intervention more cost-effective, some simulations were run varying assumptions about the number of services provided, the time spent on service delivery, and the percent of total time spent on travel in the cluster unions. These simulations are shown in the Appendix A-3. The results indicated that increasing the attendance at the cluster spots would be the most effective mechanism of increasing the cost-effectiveness of the intervention.

Cost-Effectiveness of the Increased Frequency of Satellite Clinics combined with EPI spots

To evaluate the cost-effectiveness of the SC intervention, both the costs of providing services (and/or CYP) at the SC and the H&FWC were investigated, since the effectiveness and costs of both should have been affected by the intervention. In the next section, the results of the analysis on cost-effectiveness of SC service delivery are presented, and after that, the results of the cost-effectiveness at the H&FWC are presented.

Cost-effectiveness of Service Delivery at SCs

Table 5 shows the time allocation of the FWV at the SC¹². A greater percentage of the FWV's time was spent on services in the intervention unions. The composition of the service mix also differed, and the FWV spent more time providing preventive services, such as antenatal and postnatal care in the intervention unions.

The monthly costs of services provided at the SC are shown in Table 6. In addition to the cost of personnel time spent on services, other costs were also added, such as time spent on record-keeping, preparation, travel, and personal overhead, as well as meetings, trainings/workshops, and holidays. The monthly costs are highest for injectable services and lowest for IUD services, due to differences in commodity cost and length of effectiveness of the contraceptive.

The number of family planning and antenatal care services provided at the SC is shown in Table 7. More family planning services were provided at the intervention union than at the comparison union in Mirsarai, although this relationship did not hold at Abhoynagar. However, the number of antenatal care services provided was greater in the intervention unions than comparison unions in both thanas.

¹² The disaggregation of the time spent on service and non-service activities during the month of the FWVs is shown in Appendix A-4.

Table 5. Percentage of time spent on activities at the Satellite Clinic by the FWV

Activity	Mirsarai Thana		Abhoynagar Thana	
	SC Intervention union	Comparison	SC Intervention union	Comparison union
Service				
Family Planning	15.4	8.8	7.1	13.4
ANC & PNC	6.7	0.0	11.1	6.2
Health	18.2	6.6	19.9	9.9
Health Education	1.0	1.1	3.0	4.0
Total service	41.3	16.5	41.0	33.5
Administrative/overhead				
Record-keeping	12.9	19.9	16.8	30.3
Preparation	7.2	7.7	18.4	18.1
Travel	12.7	7.4	7.5	7.5
Total administrative	32.8	35.0	42.7	55.9
Personal overhead/ Unoccupied	25.9	48.5	16.2	10.6
TOTAL	100.0	100.0	100.0	100.0

Table 6. Total monthly costs of services provided at the SC (in Taka)

Activity	Mirsarai Thana		Abhoynagar Thana	
	SC Intervention union	Comparison union	SC Intervention union	Comparison union
Pill continuing user	698.7	253.4	52.8	514.35
Injectable new acceptor	851.5	215.1	948.6	1885.2
Injectable continuing	2174.94	820.0	626.84	358.5
IUD new acceptor	NA*	NA*	134.0	458.63
IUD continuing user	34.12	110.2	130.9	41.87
ANC service	339.55	45.4**	783.17	382.66

* No personnel time was spent on this activity during the observation.

** Because there were no data given for the comparison union, the costs for services at another comparison union were used.

Table 7. Average monthly family planning and ANC services provided at the SC

Activity	Mirsarai Thana		Abhoynagar Thana	
	SC Intervention union	Comparison union	SC Intervention union	Comparison union
Pill continuing user	32.4	10.5	4.0	72.0
Injectable new acceptor	21.6	3.5	25.0	52.0
Injectable continuing user	82.8	17.5	41.8	52.0
IUD new acceptor	NA*	NA*	4.2	4.0
IUD continuing user	3.6	7.0	8.3	4.0
ANC service	46.8	10.5	120.8	48.0
Total no. of services	187.2	49.0	204.1	232.0

* No services of this type were provided during days of observation.

Based on the information presented in the two tables, the cost-effectiveness of the services delivered at the SC was calculated (Table 8). The results indicate that the cost per birth averted for all of the services offered in the Mirsarai intervention union was lower than for the services provided in the comparison unions. In Abhoynagar, the cost per birth averted was lower for two out of three services.

Table 8. Cost per birth averted or additional quality of life year gained (in Taka)

Activity	Mirsarai Thana		Abhoynagar Thana	
	SC Intervention union	Comparison union	SC Intervention union	Comparison union
Pill	394.4	605.5	NA*	NA*
Injectable	433.9	513.4	421.7	196.7
IUD	NA*	NA*	154.3	196.7
ANC service	726.7	3569.4	686.1	870.0

*Insufficient data were available to calculate the cost per birth averted.

Cost-Effectiveness of Service Delivery at the H&FWC

The next step in the analysis is to calculate the cost-effectiveness of services provided at the H&FWC. When the time allocation of the FWV at the H&FWC was examined (Table 9), about a quarter of their time was spent on service delivery. In the comparison unions, however, the time ranged from a tenth to a third. Of the time spent on services in the intervention and comparison unions, half was spent on curative health care and a fifth to a third on family planning. Only a small proportion of time was spent on antenatal and postnatal services (1-5%) and on health education (<3%), reflecting the low level of demand for these services.

If the time of the FWV spent in service provision at the H&FWC is compared to her time spent at the SC, it is observed that less of the FWV's time was spent on service provision than in the SC. Less of her time was spent on preventive MCH activities, such as antenatal and postnatal care and health education at the H&FWC than at the SC, and relatively more time was spent on record-keeping.

Table 10 shows the total costs of the services provided at the H&FWC. The relative cost of the services was similar to that at the SC. The costliest service again was the injectable, while the least costly service was the IUD.

The number of services provided at the H&FWC is shown in Table 11. More services are provided in the intervention unions than in the comparison unions, as expected, because of the additional two days per week spent by the FWV at the clinic. When service volumes at the intervention unions in Mirsarai and Abhoynagar thanas were compared for different methods, more pill resupply and IUD follow-up services were provided in the latter union than in the former.

With the information from the two tables, the cost-effectiveness of the services delivered at the H&FWC was calculated (Table 12). The service delivery at the intervention union was cost-effective for the four services at the Mirsarai union. However, at the Abhoynagar union, the costs per birth averted were about the same as those in the comparison union. The cost per quality-adjusted life year was slightly lower, however.

Table 9. Percentage of time spent on activities at the H&FWC by the FWV

Activity	Mirsarai Thana		Abhoynagar Thana	
	SC Intervention	Comparison union	SC Intervention union	Comparison union
<i>Service</i>				
Family planning	7.3	11.7	8.3	12.5
ANC & PNC	1.8	0.4	4.0	5.5
Health	16.8	5.9	16.6	15.0
Health education	2.2	0.0	0.0	1.0
Total service	28.1	18.0	28.9	34.0
<i>Administrative</i>				
Record-keeping	26.5	31.6	26.0	18.5
Preparation	17.8	27.3	12.8	18.5
Total Administrative	44.3	58.9	38.8	37.0
Personal overhead/ unoccupied	27.6	23.1	32.3	29.0
TOTAL	100.0	100.0	100.0	100.0

Table 10. Total costs of services provided at the H&FWC (in taka)

Activity	Mirsarai Thana		Abhoynagar Thana	
	SC Intervention union	Comparison union	SC Intervention union	Comparison union
Pill continuing	536.4	446.8	582.8	309.2
Injectable new acceptor	622.0	184.6	678.0	1629.1
Injectable continuing user	1320.7	703.0	1171.9	1162.8
IUD new acceptor	NA	NA	412.1	168.5
IUD continuing user	52.6	450.8	309.6	128.3
ANC service	208.4	81.4	451.4	422.7
PNC service	14.1*	35.3	31.4	28.9

* Includes only travel cost of users, since no service time was observed for personnel.

Table 11. Average monthly FP and antenatal services provided at the H&FWC

Activity	Mirsarai Thana		Abhoynagar Thana	
	SC Intervention union	Comparison union	SC Intervention union	Comparison union
Pill continuing	19.9	15.0	36.6	19.5
Injectable new acceptor	16.0	3.0	13.4	39.0
Injectable continuing user	36.0	18.0	36.6	29.3
IUD new acceptor	NA	NA	6.6	3.3
IUD continuing user	4.8	12.0	33.4	9.8
ANC service	7.8	3.0	43.4	39.0
Total no. of services	84.5	51.0	173.4	139.9

Table 12. Cost per birth averted or quality-adjusted year of life gained at the H&FWC (in Taka)

Activity	Mirsarai Thana		Abhoynagar Thana	
	SC Intervention	Comparison union	SC Intervention union	Comparison union
Pill continuing user	448.2	489.4	288.3	287.2
Injectable	533.4	618.2	501.9	475.4
IUD	70.8	91.4	94.0	90.3
ANC service	2954.8	3012.9	1155.5	1204.2

Discussion and Policy Implications

In discussing the results of the cost-effectiveness analysis, it is important to note that the cluster approach is a radical departure from the doorstep delivery that has been in existence in Bangladesh for the last two decades. This strategy is designed to be a transitional mode of service delivery during the gradual shift from doorstep delivery to the fixed sites. The monitoring of the demographic indicators in unions where the cluster approach is being implemented indicates that the contraceptive prevalence has not been affected by the introduction of the cluster approach, suggesting that when individuals become habituated to the use of contraceptives, they will continue to seek use of methods even when service delivery modes change.

However, the results of this analysis indicate that cluster service delivery of contraceptives in its present form is no more cost-effective than home-delivery services. The cost per birth averted was lower in only one of three services in each of the field sites, probably due to the insufficient attendance at the cluster spots, service mix, and a lower percentage of the total time spent on service delivery. The results suggest that while customers

are still using contraceptives in unions where the cluster approach is being tested, they are obtaining their methods from other places, such as the FWA's home as well as cluster spots.

Since the attendance at the cluster spots was low and fewer family planning motivation services were provided, a smaller percentage of the FWA's time was spent on service delivery. Thus, instead of more time being spent on service delivery with less travel time, the percentage of time spent on service delivery declined.

The policy implications of these findings for the cluster approach suggest that the strategy needs to be refined further to make it more effective. There are several strategies that could be tried to increase the cost-effectiveness of the cluster approach: (i) increase the use of services through the use of IEC (information, education, and communication), (ii) decrease travel time required to inform clients of the timing of the cluster,¹³ (iii) increase the catchment area for services, and (iv) offer additional services at the cluster spot, such as treatment of scabies and deworming, since clients would be more willing to visit an outlet that provides an array of services.

When the cost-effectiveness of service delivery with an increased frequency of SCs combined with EPI services was examined, service delivery in the intervention unions was found to be more cost-effective for all services in the low-performing thana, Mirsarai, and for two of three services - IUD and antenatal care services - in the high-performing thana, Abhoynagar. It is likely that this is associated with higher demand for services at the SC when their accessibility and/or frequency was improved. This implies that the provision of a wider range of services is improving overall cost-effectiveness.

The services at the H&FWC were more cost-effective in the intervention union than in the comparison union in the intervention union at Mirsarai, but cost about the same per birth averted and quality-adjusted

¹³ At present, before she begins providing services at the cluster, the FWA visit the neighbourhoods near the cluster to inform them of the timing of the cluster.

life year as that of the comparison union in Abhoynagar. However, since the intervention in Abhoynagar was found to more cost-effective at the SC and as cost-effective at the H&FWC as existing service delivery, it can still be considered to be more cost-effective.¹⁴

Since the increase in the frequency of SCs from 8 to 22-24 was found to be more cost-effective than the existing service delivery strategy, the results should be disseminated to policy-makers, so that they can consider scaling-up the intervention to other areas.

An interesting finding was that the SC interventions were more cost-effective in the site with lower contraceptive prevalence, Mirsarai, than in the other field site with higher contraceptive prevalence, Abhoynagar. The attendance at the cluster spots were also higher in Mirsarai than in Abhoynagar. It is likely that this differential is due to the greater dependency of the clients in Abhoynagar on doorstep delivery for family planning supplies. It may also be an indication that the field worker system is working more efficiently in the high-performing thana. This finding suggests that alternative service-delivery strategies may take longer to introduce, and may require additional refinements in high-performing areas than in low-performing areas. On the other hand, preliminary results suggest that contraceptive prevalence will not be significantly affected by introducing these strategies.

¹⁴ Combining SCs with EPI spots has already been replicated in the National Family Planning Program since October 1995, but increasing the frequency of SC from 8 to 20-24 has not.

References

1. NIPOORT, Mitra, and Macro International. Bangladesh Demographic and Health Survey: 1996-97, Dhaka, Bangladesh. 1997.
2. Kawnine N, Killingsworth J, Thomas S. "A Public Expenditure Review Of The Health And Population Sectors", Working paper No:1, Health Economics Unit, Ministry of Health and Family Welfare, Government of the People's Republic of Bangladesh. Sept. 1995.
3. Reynolds J, Gaspari KC. Cost- Effectiveness Analysis, Primary Health Care Operations Research (PRICOR). 1985.
4. Yinger N, Osborn R, Salkever D, and Sirageldin I. "Third World Family Planning Programs: Measuring the Costs," Population Bulletin, Volume 38, No.1, Population Reference Bureau, Inc. 1983.
5. Balk D, Faiz KK, Rob U, Chakrobarty J, Simmons G. "An Analysis Of Costs And Cost Effectiveness Of The Family Planning Health Services Project In Matlab, Bangladesh," International Centre For Diarrhoeal Disease Research, Bangladesh. 1988.
6. Janowitz et al. "Costs of Family Planning Service Delivery in Bangladesh", PDEU, FHI, ACPR. 1995.
7. Fiedler JH, Day LM. Costs and efficiencies of NGO family planning services in Bangladesh: The Asia Foundation Portfolio. 1996.
8. Stover CC, Ahmed K, et al. "Cost Study," Local Initiatives Program, Family Planning Management Development Bangladesh, Draft Final Report. March 1997

9. Barkat A, and Howlader SR. Cost Analysis Study of Jiggasha, University Research Corporation, Prepared for Johns Hopkins University Center for Communications Programmes. 1996.
10. Barkat A, and Barkat-e-Khuda. Cost-Effectiveness Analysis of Primary Health Care Programmes: Some Methodological Considerations, *Social Science Review*, Volume IX, No.1. 1992.
11. Reinke, WA. Editor. Health Planning For Effective Management, Chapter19, pp.248-260, New York Oxford University Press. 1988.
12. Cakir HV, Fabricant SJ, and Kircalioglu FN. "Comparative Costs Of Family Planning Services And Hospital Based Maternity Care In Turkey," *Studies In Family Planning*, Volume 27, Number 5, pp. 269-276. Sept/Oct. 1996.
13. Rooney C. "Antenatal Care and Maternal Health: How Effective Is It?" WHO, Geneva. 1992.
14. Drummond MF, Stoddart, and Torrance GW. Methods for the economic evaluation of health care programmes. Oxford: Oxford University Press. 1987.

APPENDIX

A-1. Couple years of protection conversions

Method	Unit	Units required annually
Pill	Cycle	13
Condom	Piece	120
Injectable	Vial(1ml)	4.00
IUD	Unit	0.40

A-2. Number of days and percent of total time spent on activities by the FWA during the month

Activity	Mirsarai Thana		Abhoynagar Thana	
	Interven- tion union	Comparison union	Interven- tion union	Comparison union
Home visits	-	18 (59)	-	10 (33)
Cluster spots	18 (58)	-	15 (48)	-
Satellite clinic	1 (3)	3 (9)	0 (0)	3 (10)
Workshops/meeting	6 (19)	4 (13)	5 (16)	9 (30)
Holidays	6 (19)	6 (19)	11 (35)	8 (27)
Total	31(100)	31(100)	31(100)	30*(100)

* Data were collected in this union in November rather than October.

APPENDIX

A-3. Simulation of cost per birth averted if attendance at cluster spots is doubled (in Taka)

Method	Mirsarai Thana		Abhoynagar Thana	
	Cluster union	Home delivery union	Cluster union	Home delivery union
Pill	319.6	293.2	341.4	354.9
Condom	558.9	567.7	561.0	500.5
Injectable	448.2	427.7	535.2	433.8

A-4. Number of days and percent of total time spent on activities by the FWV during the month

Activity	Mirsarai Thana		Abhoynagar Thana	
	Intervention union	Comparison union	Intervention union	Comparison union
H&FWC	14 (44)	12 (39)	10 (32)	13 (42)
Satellite clinic	9 (29)	7 (23)	12.5 (40)	8 (26)
Meeting and training days	2 (6)	4 (13)	1.5 (5)	5 (16)
Holidays	6 (19)	8 (25)	7 (23)	5 (16)
Total	31 (100)	31 (100)	31 (100)	31 (100)