

An Economic Appraisal of Alternative Strategies for Delivery of MCH-FP Services in Urban Dhaka, Bangladesh

**Subrata Routh
Barkat-e-Khuda**



**ICDDR,B: Centre for Health and Population Research
Mohakhali, Dhaka 1212, Bangladesh**

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Abstract

The "door-step" distribution of contraceptives in Bangladesh, through bimonthly visits to the homes of all eligible couples by trained fieldworkers, has been instrumental in increasing the contraceptive prevalence rate (CPR) and reducing fertility. The door-step delivery strategy, however, appears labour-intensive and costly. With the maturity of the programme, priorities have shifted to a stage that calls for more cost-effective service-delivery strategies, not only for family planning services, but also for a broader package of reproductive and other essential health services.

An operations research intervention was conducted by the MCH-FP Extension Project of ICDDR,B, the predecessor of the Operations Research Project (ORP), from January 1996 to May 1997. This was done in collaboration with relevant government agencies and a leading national NGO, Concerned Women for Family Planning (CWFP), and was aimed at developing alternative (to door-step distribution) strategies for cost-effective delivery of health and family planning services in urban areas. Two alternative strategies featuring withdrawal of home-based distribution were tested in two areas of Dhaka City: at Hazaribag of Ward 58, a range of MCH-FP services was delivered including distribution of contraceptives from the static Primary Health Care Clinic (PHCC); and at Gandaria of Ward 80, a transitional arrangement was made to provide pills and condoms to a group of clients at common sites, known as Community Service Points (CSPs). Both strategies were complemented with targeted (selective) home visits by the fieldworkers to non-users of modern family planning methods.

The main objective of the present study was to examine the cost and effectiveness implications of the two alternative strategies in comparison to the conventional (existing) door-step distribution system. Three types of data were collected: (a) a time allocation study through direct observation of service providers, (b) an assessment of the operating costs, and (c) the identification of outputs (cost centres) of the strategies. Joint costs were apportioned through a step-down allocation principle, based on time allocations and volume of outputs.

The effectiveness measures included births averted for family planning services and additional quality-adjusted life-years (QALYs) gained through the delivery of mother and child health services. Number of births averted was calculated by estimating couple years of protection (CYP) divided by the mean birth interval. QALYs gained were estimated on the basis of utility values derived from the health state classification system.

The major findings of the economic appraisal of the alternative strategies were:

- i. Transition from the door-step to the clinic-based service-delivery strategy initially increased programme operating costs because of the required strengthening of the clinic facility. Enhanced capacity utilization of clinic services was critical to decreasing unit costs for services within the clinic-based alternative.
- ii. Both cost per birth averted and cost per QALY gained were lowest for the static-clinic-based strategy.

The findings indicated that delivery of health and family planning services from static (fixed) clinics, complemented with a reduced system of outreach workers to inform and target the hard-to-reach clients, was the most cost-effective service-delivery alternative in urban Dhaka.

Introduction

With a view to develop alternative strategies (to the door-step distribution) for cost-effective delivery of maternal and child health and family planning (MCH-FP) services in urban areas, the former MCH-FP Extension Project of the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) conducted an operations research intervention in urban Dhaka.

The experiment to develop alternative service-delivery strategies was undertaken in partnership with relevant government agencies and a national non-governmental organization (NGO), Concerned Women for Family Planning (CWFP). The study was initiated in January 1996 and continued through May 1997. Two alternative strategies featured with the withdrawal of home-based distribution were tested in two areas of Dhaka city. At Hazaribag of Ward 58, a range of MCH-FP services, including distribution of contraceptives, was delivered from the static Primary Health Care Clinic (PHCC). At Gandaria of Ward 80, a transitional arrangement was made to provide pills and condoms to a group of clients at common sites known as Community Service Points (CSPs), which were an adaptation of the "cluster visitation" approach tested in the Project's rural areas. Both strategies were complemented by targeted (selective) home visits by fieldworkers to non-users of modern family planning (FP) methods.

The present study has compared the cost and effectiveness implications of the alternative strategies with those of the conventional (existing) door-step service-delivery strategy. The national health and family planning programme is currently undergoing major changes with regard to its service-delivery strategies. Findings from this study are likely to provide valuable insights into the selection of an optimally cost-effective alternative option and making necessary refinements in the existing government and NGO service-delivery strategies.

Background: The Conventional MCH-FP Service-delivery Strategy

As an effective strategy to reduce the alarming rate of population growth, since the mid-1970s, extending family planning services to married women of reproductive age (15-49 years) on the basis of door-to-door community-based distribution (CBD)-- through distribution of contraceptive methods at the homes of the clients-- became a national movement in Bangladesh. The sociocultural environment was such that in a relatively conservative and largely rural population, most women were confined to their homes and were unable to seek services for themselves. Therefore, the family planning programme adopted the supply-led strategy to ensure effective motivation and easy access of fecund women to the FP methods and services.

Until the recent changes made in the service-delivery systems of the government and NGOs, the conventional strategy was as follows. A vast contingent of about 23,000 female fieldworkers (Family Welfare Assistants) of the government programme, and another about 12,000 fieldworkers (FWs) by the NGOs were employed to counsel, motivate and provide contraceptive services to the eligible couples (ELCOs) of the country. Within the conventional service-delivery strategy, these FWs were employed to visit routinely (once every two months) all the eligible women within their specified catchment areas (on average, 700-800 eligible women per FW). During the home visits to the clients, the FWs were mandated to collect specific information on demographic (e.g., age of women, number of living children, births and deaths) and contraception status of the respective households; provide information, motivation, commodities (pills, condoms, etc.); and counselling for FP services and selective mother and child health (MCH) care, like woman and child immunization, antenatal care, safe delivery, postnatal care, nutrition and hygiene. Women motivated to seek clinical FP methods or MCH services were referred to the clinics. The field workers were overseen by some 4,500 male supervisors (Family Planning Inspectors) in the government programme, and 1,500 (mostly female) supervisors in the NGO programmes. The usual supervisor-supervisee ratio was 1:5.

The above community-based outreach services were complemented with about 4,000 government and 200 NGO static clinics that delivered clinical and non-clinical FP services, antenatal care, postnatal care, EPI services, and sick child and sick mother treatment by paramedics and health workers (Family Welfare Visitor and Medical Assistant in the government system, respectively). Many of these clinics were also attended by doctor. With a view to enhance the accessibility of services to clients living farther away from the fixed-site (static) clinics, the satellite (outreach) clinic concept was introduced in the 1980s. The Satellite Clinic or sub-centre is an outreach facility organized at a fixed day of the week or month at some specific site/sites, relatively distant from the fixed-site clinic. Some 30,000 Satellite Clinics are organized every month within the government service-delivery system. The NGOs arranged Satellite Clinics in similar fashion. According to the existing demarcation of areas between the government and NGO programmes, the NGOs, as a complement and supplement to the government programme, predominantly operate in urban areas, and in some cases, under special consideration of the government, in selected rural areas having low FP performances.

Door-step delivery has served as the core strategy for providing MCH-FP services in the country. The role of the door-step service-delivery strategy is widely recognized as the key factor in the attainment of the remarkable success by the FP programme of Bangladesh. Due to the strategy, contraceptive prevalence rate (CPR) rose from seven percent in the mid-seventies to its present level of 49 percent. During the same time period, the total fertility rate

declined from seven to 3.3 (BDHS, 1996-97). The investment in such a large-scale national programme was also considerable. With the maturity of the MCH-FP programme, however, priorities were considered to have evolved to a stage that emphasized consolidation and continuation of the programme performance under increasing resource constraints. The required direction was, therefore, to develop new service-delivery strategies that enhanced cost-effectiveness by producing maximum output with minimum costs. The door-step distribution strategy, once deemed radical, had, thus, become a conventional approach, not conducive to the overall sustainability of the national MCH-FP programme for the two basic reasons discussed below:

Increasing Programme Costs

With the increase in the population size, health and family planning services will also have to be expanded. For example, to achieve the national goal of replacement level fertility, i.e., a total fertility rate (TFR) of 2.2, FP services will have to be extended from the current level of 27 million families to 40 million; contraceptive users will need to be increased from 12 to 28 million; and the contraceptive prevalence rate (CPR) must be raised to 70 percent. Similarly, to attain an infant mortality rate (IMR) of 50 per 1,000 live births by the year 2005, the immunization coverage of infants has to be raised from the current rate of 4.2 million infants to approximately 6.3 million infants per year. Keeping the present service-delivery strategies unchanged, the above expansions will require an incremental increase of US\$ 10 million every year in the country's MCH-FP programme costs alone, and amount to US\$ 220 million in 2005 from the present level of US\$ 120 million (Cunnane, 1995).

As of now, the national MCH-FP programme is heavily dependent upon donor contributions (GoB share around 37%). In all likelihood, donor support will hardly rise in the future to meet the increasing funding needs. Even if the external contributions remain the same, they will certainly be inadequate in the face of the growing demands. Therefore, the need to develop cost-effective and sustainable service-delivery alternatives has become crucial.

Analysis of the CWFP's expenditures showed that the share of the labour costs as part of the total programme costs ranged between 70 and 80 percent. The door-step delivery system (salary of the fieldworkers) absorbed the major share (60 - 65%) of the programme costs. The corresponding cost breaks-up are, more or less, same for the government and other NGO programmes as well. Therefore, any fund shrinkage is expected to affect the door-step system the most. The door-step distribution strategy had, therefore, evolved into an unaffordable approach to which alternatives that reduced costs and maximized outputs became necessary.

Decreasing Effectiveness of the System

The conventional strategy required that fieldworkers visit each eligible couple once every two months, provided information, education and referral, supply pills and condoms to those who wanted them, and record demographic and contraception information in couple registers. This made it mandatory for the FWs to visit each and every couple routinely (once every two months), even if such a visit was not needed. As a consequence, the FW system had less scope for focussed attention toward 'special' segments of clients, such as non-users.

An analysis of the fieldworkers' observations conducted within the Needs Assessment Studies by the Extension Project of the ICDDR,B showed that in urban areas most FWs were responsible for 800 or more ELCOs. The mean number of visits undertaken daily by each fieldworker was observed to be 25. The average duration of the visits was about nine minutes. Half of the visits, however, were of five minutes' or lower duration. Sixty percent of the time spent in home visitation was involved with FP activity, mostly with the re-supply of pills and condoms (Arifeen and Mookherji, 1995). The caseload analysis, done as part of the baseline survey of the intervention on the alternative service-delivery strategies, showed that the women the fieldworkers predominantly served (pill/condom users who depended on the FWs for home supplies) accounted for only 20 percent or less of all of the ELCOs and only one-quarter of the current users. Alarming, it was found that the FWs visited non-users-- particularly couples who had never used a modern contraceptive method-- and women with no children least frequently. The FWs, thus, became predisposed to function as re-supply agents to pill and condom users, and had less time to recruit new acceptors.

Despite the overall success in contraceptive use in general, the door-step service-delivery strategy proved to be detrimental to the potential switching of pill and condom users to longer-acting or permanent clinical methods. It also failed to encourage clients to switch to commercial sources, like pharmacies and shops, for supply replenishment. Analyses of the 1985 Contraceptive Prevalence Survey, the 1989 Bangladesh Fertility Survey, and the 1996-97 Bangladesh Demographic Health Survey showed that by 1996-97, the use of pills and condoms rose to 24.7 percent from 6.9 percent in 1983. The use of longer-acting and permanent clinical methods, however, did not show a similar increase. The proportion of pill and condom users obtaining methods at homes from the FWs also increased-- from 42 percent in 1989 to 57 percent in 1996-97. The home-based distribution strategy is also considered to deter the prospects of addressing the broader reproductive health needs of the clients. As a result being home-fed by the FWs, instead of coming out to the outside (clinic) facilities, many of these clients (women) continued to remain as 'passive users' of only family planning methods.

Against the above backdrop, the main goal of the intervention on Alternative Service-delivery Strategies (ASDS) was to develop cost-effective ways of providing essential health and family planning services among the country's urban population.

Objective

The government and NGO programmes are now shifting their focus from the community-based outreach delivery of MCH-FP services--based on door-step distribution of services by FWs-- to delivery of a package of health and family planning services from static clinics.

The former MCH-FP Extension Project of ICDDR,B experimented various alternative service-delivery strategies during 1995-1997. The findings from these operations research interventions were documented and disseminated. Much of the present changes in the service-delivery strategies within the government and NGO programmes were built on the experiences of these interventions. It is also essential to document and understand the cost and effectiveness implications of the alternative service-delivery strategies field-tested so far.

The present study, thus, aims at economic appraisal of the alternative strategies tested for the delivery of MCH-FP services in urban Dhaka. The process and findings of such an economic evaluation are expected to help in the appraisal of the economic aspects of the service-delivery strategies introduced recently within the government and NGO programmes.

Description of the Alternative Service-delivery Strategies¹

In Bangladesh, the urban setting differs from the rural setting in having numerous facilities that provide contraceptives, by and large, within easy reach of most couples. Private sources--such as pharmacies and shops--that sell pills and condoms are also abundant. In fact, according to the baseline survey, the majority (56%) of the urban pill and condom users obtained their supplies from 'outside' sources, such as pharmacies, shops or clinics (Routh et al., 1997). The baseline survey also found that the majority of the clients receiving home-based replenishment from the FWs stated that in the event that FWs ceased to supply pills and condoms at their door-steps, they would either go out themselves or send someone else to get their contraceptive supplies. Thus, traditional barriers to women leaving their homes to seek services from clinics appear to be less of a problem in urban areas.

¹ For details of the intervention, refer to ICDDR,B working paper no.106, "Developing alternative service-delivery strategies for MCH-FP services in urban areas: findings from an experiment" by S. Routh *et al.*, 1997.

The current door-step service-delivery strategy has been in place for the past two decades. Both the clients and service providers have grown accustomed to, and comfortable with, the system. While recognizing the existence of an environment conducive to changes in the service-delivery system in the urban areas, it was also widely believed by many programme managers and policy makers that a sudden withdrawal of the door-step distribution strategy might affect the CPR and other performance indicators. The consensus was to implement the changes in the conventional community-based distribution (CBD) strategy in a gradual manner.

The explicit goal of the national primary health care programme, in line with the ICPD recommendations, has evolved to ensure broader reproductive health services to the population. It is hoped that this goal can be achieved in a cost-effective way by offering a wide range of essential health services from fixed-site (static) clinics.

For urban areas, the possible alternatives could be to strengthen clinic services as the main hub of MCH-FP activities. This would include the delivery of a package of essential health and family planning services through a network of static clinics used by clients who are informed, educated and motivated by a reduced system of field/extension workers undertaking targeted (selective) home visits as per requirement of the programmes, and performing promotional and community mobilization activities.

With the above considerations in mind, two alternative strategies were designed and tested:

Static Clinic (Primary Health Care Clinic): The PHCC Strategy

This PHCC strategy was tested in one programme area (population: approximately 25,000) of the Lalbag Branch of CWFP in Ward 58 (northern part of the ward) at Hazaribag of Dhaka City. With respect to outreach services, this area was served solely by CWFP's five FWs. Among other government and NGO static clinics situated in the area, CWFP has been running a regular clinic at some distance from this site. Responding to the local needs of Hazaribag, CWFP opened a sub-centre (outreach clinic) at the Hazaribag Community Centre.

The sub-centre provided the same MCH and FP services as the regular static clinic (with the exception of EPI) one day per week. EPI was available from a Dhaka City Corporation (DCC) centre located in the same building.

Within the intervention strategy, the Hazaribag Community Centre was developed into a regular clinic in January 1996, which functioned six days a week, providing the same range of MCH-FP services. The upgraded sub-centre was referred to as the Primary Health Care Centre (PHCC). The PHCC was served by a paramedic, a health assistant and an aya (clinic aide). Provisions were also made for evening sessions (three days a week) attended by a medical doctor.

Community Service Points: The CSP (Cluster Visitation) Strategy

This CSP strategy was tested in one programme area (population: approximately 20,000) in Ward 80 under CWFP's Gandaria branch, which was also entirely served by the CWFP FWs.

This strategy was considered a transitional service-delivery alternative, where in due course, the service would shift toward a static clinic-based approach that would provide a comprehensive range of essential health and FP services.

Location, timing and schedule of the CSPs were determined by the corresponding FWs, the Field Supervisor and the Branch Coordinator, based on mapping of the catchment area and the requirements of the locality assessed through the baseline survey. Three CSPs (located in easily accessible and convenient spots in the community) were initially organized in each FW's catchment area in March 1996. Each of these was envisioned to serve around 250-300 ELCOs. Each FW attended each of her three CSPs once a week. In this way, a CSP operated four days a month, with the FWs working three days a week at the CSPs. During the remaining days, the FWs were responsible for making selective home visits to the 'target' ELCOs, and to those clients who did not attend the CSPs as scheduled. Then, the CSPs would gradually phase out, based on the periodic reviews of their utilization by the clients, along with an assessment of clients' needs.

Registration of the attending clients, resupply of pills and condoms, motivation for FP, health education, follow-up of side effects, counselling and referral were the functions being carried out by the designated FWs in the CSPs.

Targeted Home Visits

Both the above described alternative service-delivery strategies were supplemented with targeted home visits by the FWs. The ultimate intent was to completely stop the distribution of pills and condoms at the homes of the clients by the FWs and shift away from the normal routine home visits to eligible women. In this intervention, the focus was concentrated on FP performance. However, a similar exercise of targeting for MCH performance is also possible with the corresponding information from the couple registration books.

Based on the information of the non-users about their main reason for not using a modern FP method, home visits were made to them for focused motivation. Door-step supply of commodities, however, was discontinued. Selective home visits to only targeted clients allowed a 40 percent reduction in the number of FWs. To assess the immediate effects of the changes in service-delivery strategy with regard to the FP practices, the FWs visited all of the ELCOs of their respective catchment areas every six-months.

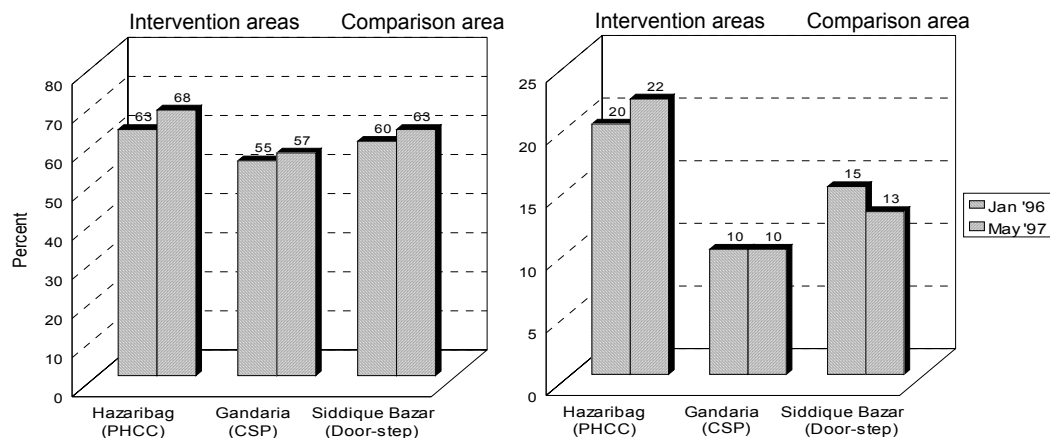
Salient Outcomes of the Intervention

The intervention followed a quasi-experimental nonequivalent control group design with pre- and post-test measurements. A programme site of CWFP at Siddique Bazar of Dhaka City served as control area for the study. The effects of the alternative strategies were assessed through periodic community-based surveys and analyses of service statistics. Two evaluations were conducted: one in August 1996 and the other in May 1997.

The key results of the intervention were as follows:

- i. Contrary to the initial fear that the shift away from door-step delivery system would result in a decrease in the CPR, the CPR considerably increased in both the intervention sites.
- ii. The PHCC-based strategy produced a remarkable increase in the CPR, especially in the use of clinical methods (see Figures 1 and 2).

Fig.1. Contraceptive prevalence rate in intervention and comparison areas **Fig.2.** Relative share of non-permanent clinical FP methods in intervention and comparison areas



- iii. In both the alternatives, there was increased use of commercial sources, like pharmacies and shops, and other static sites, like Government and NGO clinics. In the PHCC-based strategy, from the pre-intervention level of 42 percent this figure rose to 50 percent. In the CSP-based strategy, it increased from 38 to 64 percent.
- iv. Utilization of static clinic as a source of FP methods and for other health needs gradually increased within the PHCC-based strategy.
- v. Without a range of essential health services to be obtained, mere replenishment of pills and condoms wasn't adequate enough incentive for the women to attend the CSPs.

Methods of Analysis

The economic appraisal, in this study, included cost analysis and a cost-utility analysis of the various service-delivery options. To conduct the cost analysis of the alternative strategies and their cost-utility, three types of data were collected. These were a compilation of the programme costs done on the basis of the book of records, a time allocation study of service providers conducted through direct observation of the service providers (e.g., fieldworkers, health workers, paramedics) under the various alternatives, and productivity measures, i.e., a measurement of the actual services delivered under each of the options.

The three options that were considered in the economic appraisal were: the conventional door-step service-delivery strategy in the control area, the CSP-based (cluster) strategy field-tested at the Gandaria intervention site, and the PHCC-based (static clinic) strategy field-tested at the Hazaribag intervention site.

Data were collected in August 1996, and in May 1997. To calculate the costs, the costs centres or outputs around which costs are associated, were ascertained. The following cost centres were considered:

- Family planning services provided by the fieldworker at the door-step that included supply of pills and condoms and referral for clinical services;
- Family planning services provided by the health worker and the paramedic at the static clinic that included supply of pills and condoms, administration of injectable contraceptive, insertion and removal of IUD, follow-up and side-effect management;
- Maternal health services that included antenatal care, postnatal care and limited curative care;
- Child health services that included management of childhood illness like diarrhoea and acute respiratory infection and limited curative care; and
- Pathological tests and other services (limited curative services provided to clients other than mothers and children under five years of age).

Cost

The cost analysis has been done with respect to the changes in the total recurrent costs of the CWFP programmes. The study could not consider the capital costs (equipment, furniture and facilities) because adequate information was not available for the Gandaria and Siddique Bazar clinics which have been functioning for a long time. Many of the capital items in these two clinics were received as grants during the past 5-6 or more years and, as such, no monetary value had been attached to them. It was, therefore, not possible to assess their initial book values or the corresponding present values with due consideration of depreciation, discounting and resale values. However, it was noted that the capital items' outlay under each of the three programmes considered was much similar. This meant that there was no major difference among them in terms of the capital costs. Also, it was observed that there was relatively little amount of capital assets within each programme which indicated that the annualized costs would be small. Another point to mention is the study focussed solely on providers' costs, i.e., the programme costs.

All recurrent costs were grouped into the following five broad categories:

- Salary of field staff (basic salary, plus other fringe benefits and allowances of the fieldworkers and supervisors);
- Salary of clinic staff (basic salary, plus other fringe benefits and allowances of the providers at the clinic, such as paramedics, health workers and ayas);
- Salary of administrative and support staff (basic salary and other fringe benefits);
- Cost of drugs and clinical supplies; and
- Other overhead costs (rents, utilities, stationery items, etc.).

"Ingredients" approach through step-wise allocation was employed in distribution of the recurrent costs of the programmes:

- Direct costs were assigned directly to cost centres;
- Joint/overhead costs at the programme level (e.g., salary of administrative and support staff and other overhead costs) were first apportioned into service-delivery outlets (field and clinic). Then, these costs were apportioned into the two basic types of services (family planning and MCH services), and finally among the cost centres. Similarly, joint overhead costs at the field outlet (e.g., salary of field staff) and at the clinic outlet (e.g., salary of clinic staff, and costs of drugs and clinical supplies) were first apportioned into service types, and then among the services;
- Time allocation of the direct service providers (fieldworkers, health workers, paramedics) to the cost centres and volume of production (output quantity) served as the basis of apportioning the joint/overhead costs.

For Gandaria and Siddique Bazar, one branch clinic served various supervisory areas (each of the intervention and comparison areas was one such supervisory area). Therefore, the total clinic salary costs of these branches were equally distributed among the respective supervisory areas.

For the Primary Health Care Clinic in Hazaribag, clinic salary costs comprised salaries of its providers: the Doctor, Paramedics, Health Workers, and Ayas.

Salary of administrative staff included salaries for the Coordinator, Office Secretary, Peon and Guard attached to the branch office of the CWFP. The salary costs of the branch administrative staff were also equally distributed among the corresponding supervisory areas.

Similarly, costs of drugs and clinical supplies (like cotton, savlon, etc.) incurred at the branch clinic were equally distributed among the supervisory areas in Gandaria and Siddique Bazar. However, at the PHCC, the drugs and clinic costs were those spent at that clinic.

Other overhead costs included rents of the branch offices/clinics, costs of utilities, maintenance, cleaning, stationery items, and travel costs. These costs were similarly distributed among the supervisory areas under the Gandaria and Siddique Bazar branches. The PHCC is located in the Hazaribag Community Centre and is rent free. For the sake of comparability in analyses, however, an opportunity cost of Tk. 2500.00 per month was assigned to the PHCC as rental fees.

Measures of Effectiveness

The consequences of the service-delivery strategies under consideration were divided into two broad types of effects: family planning and health. One important methodological issue to be addressed in an economic appraisal is the choice of effectiveness measure--whether this should relate to intermediate outputs, such as cases appropriately treated for MCH services, and couple years of protection (calculated on the basis of FP methods distributed) for family planning services; or to final output, such as additional life-years gained for MCH services, and births averted for family planning services. In this study, the approach adopted was based on the concept of cost-utility analysis which is a form of economic appraisal that focuses particular attention on the quality of health outcomes caused or averted by the programme. Another reason for conducting the cost-utility analysis was uniform identification of the consequences (a common denominator) under similar but not totally equivalent interventions/strategies. The three service-delivery strategies (conventional, cluster and static clinic-based) produced single or multiple effects, not necessarily common to all three strategies. The common effects were also achieved to varying degrees by the different alternatives. Therefore, two common measures of effectiveness were identified, each for the family planning and the MCH services.

Effectiveness of family planning services has been 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 total of couple years of protection (CYP)² was estimated and divided by the mean birth interval (Cakir et al., 1996).

Effectiveness of the mother and child health services was measured by considering quality-adjusted life-years (QALYs) gained. Such conversion of effectiveness data to a common unit of measure enables cost-utility analysis to incorporate simultaneously both the increase in the quantity of life (reduced mortality) and the increase in the quality of life (reduced morbidity).

The QALYs gained from the MCH services were estimated on the basis of the formula for utility values derived from the health state classification system (Drummond et al., 1987). The formula produces a single utility value for each health state on the standard scale where health is rated as one and dead as zero, and is based on the four-attribute health state classification system with further subdivisions into a number of levels having corresponding multiplicative utility factors (Torrance et al., 1982). The health state classification system adapted in the analysis considers subjects with age greater than two years. Following is the formula used for deriving health state utility according to this approach:

$$U = 1.42 (m_1 \times m_2 \times m_3 \times m_4) - 0.42$$

where, U = utility of health state

m_1, m_2, m_3, m_4 = corresponding multiplicative utility factors for the specific levels of the four attributes (physical function, role function, socio-emotional function and health problems) of the health state classification system (see Annex 3 and 4 for the health state classification system and the corresponding multiplicative utility factors).

The standard error (\hat{S}) for this formula was estimated to be 0.06. Therefore, a sensitivity analysis of $\pm 2\hat{S}$ gave an upper bound utility value of $U+0.12$ and a lower bound of $U - 0.12$.

It was observed that the main bulk of MCH services delivered from CWFP clinics included antenatal care and limited curative services for mothers and curative services for children. Most of the pathological services were found to be related with maternal health services. Around a half of all the child health services were provided to children of more than two years of age. Since the clinics included in the study were first-level primary clinics, the

² Couple year of protection is the number of methods distributed to cover one year of family planning to a couple.

case fatality rates were negligible and not of major concern. Therefore, considering the utility value of MCH services as a function of second-level physical (P_2), second-level role (R_2), third-level socioemotional (S_3) and fourth-level health attributes (H_4), and putting the corresponding multiplicative factors, the health state utility was estimated to be:

$$\begin{aligned} U &= 1.42 (P_2 \times R_2 \times S_3 \times H_4) - 0.42 \\ &= 1.42 (0.91 \times 0.94 \times 0.86 \times 0.90) - 0.42 \\ &= 0.53 \end{aligned}$$

A sensitivity analysis of $\pm 2\tilde{S}$ gave an upper bound utility value of 0.65 and a lower bound value of 0.41.

Thus, with the consideration that the illness-related problems, if not treated, would have lasted on an average for at least three months, the upper and lower bound values of QALYs gained from the above calculations for each unit of MCH service were fixed to be 0.16 and 0.10 respectively.

The cost-utility ratio was, then, obtained for family planning services by dividing the corresponding production costs by the number of births averted, and for MCH services by dividing the related production costs by the total amount of QALYs gained.

Results

The economic appraisal of the alternative service-delivery strategies, as was mentioned earlier, was conducted with respect to the costs and cost-utility analysis. To attain these ends, in line with the methodology discussed above, costs of each type of output was ascertained, followed by an assessment of the respective utility values.

Cost Analysis

As shown in Table 1, transition from the door-step to a clinic-based service-delivery strategy led to some increase in the programme costs at the onset because of the required strengthening of the clinic facility. Because of the strengthened clinic activities, the relative share of clinic-related costs (staff costs, drugs and clinical supply costs), significantly increased in the clinic-based (PHCC) strategy at Hazaribag, in comparison to the CSP and the door-step strategy. The CSP-based strategy was, in fact, a modification of the conventional door-step distribution system, which required no extra resources. The PHCC-based strategy, however, called for additional recurrent costs. For example, appointment of the doctor and other personnel (paramedic) for the evening clinic and enhanced use of clinic services resulted in higher expenditures on salaries, drugs and clinical supplies. With reduction in the field staff, however, there was a declining trend in the operating costs of the clinic-based strategy. There was a similar decrease in the respective amounts of the CSP-based intervention area for the same reason.

The PHCC at Hazaribag was a Satellite Clinic, which was turned into a regular primary clinic within the static clinic-based alternative. This called for some investment costs. Capital investment to a tune of about Tk. 60,000.00 was required to procure some medical equipment and furniture, and to upgrade the facility into a regular clinic. As mentioned earlier, capital costs were not included in our analysis due to a lack of cost information on the capital items of the other two strategies under consideration.

Table 1. WFP programme costs (recurrent) in intervention and comparison areas

In Taka

Cost items	Intervention areas				Comparison area	
	Hazaribag (PHCC)		Gandaria (CSPs)		Siddique Bazar (Door-step)	
	Aug '96	May '97	Aug '96	May '97	Aug '96	May '97
1) Salary of field staff	18360.00 (41)	10614.00 (26)	17221.00 (58)	15288.00 (46)	25526.00 (65)	24912.00 (62)
2) Salary of clinic staff	16400.00 (37)	19160.00 (47)	2896.00 (10)	4056.00 (12)	3607.00 (9)	3788.00 (9)
3) Salary of administrative and support staff	4117.00 (9)	5645.00 (14)	4090.00 (14)	5774.00 (17)	5374.00 (14)	4860.00 (12)
4) Cost of drugs and clinical supplies	2500.00 (6)	2500.00 (6)	458.00 (1)	633.00 (2)	472.00 (1)	524.00 (1)
5) Other overhead costs	3000.00 (7)	3000.00 (7)	5096.00 (17)	7295.00 (23)	4248.00 (11)	6324.00 (16)
TOTAL COSTS	44377.00 (100)	40919.00 (100)	29761.00 (100)	33046.00 (100)	39227.00 (100)	40408.00 (100)

Note: Figures in parentheses indicate the corresponding percentage values
US\$ 1 = Tk. 45.00.

Thus, in terms of the absolute recurrent costs, the clinic-based service-delivery strategy was found to be the costliest one, followed by the conventional door-step strategy. With the cessation of door-step distribution of contraceptive commodities and resulting reductions in the fieldworker requirements, however, total recurrent costs within the clinic-based strategy at Hazaribag considerably decreased over the two time periods: in May 1997 compared to August 1996.

When the amount of outputs (shown in Table 2) were compared with the corresponding costs of production (given in Table 3), i.e., the unit costs of family planning, MCH and other services were analyzed, the findings turned out to be quite different. As is reflected in Table 4, the costs of producing, from the clinics, a unit of any of the services under consideration was the least in the clinic-based strategy, with significant differences ranging between 30 and 70 percent less than those of the door-step and CSP-based strategies. Between the two strategies (CSP-based and door-step) that included outreach distribution of FP services, more precisely contraceptive commodities like pills and condoms, the unit costs were four to five times lower than under the conventional door-step system. The unit costs were found to be dependent on three basic factors: time needed to perform one unit of a particular service, total volume of the services and the amount of corresponding programme costs. The main bulk of the output for the door-step strategy, as seen from Table 2, was distribution of pills and condoms. Therefore, the unit costs of these services were lowest for this strategy. However, because of the high emphasis on the non-clinical supply methods intrinsic in the door-step delivery system, utilization of clinical contraceptives and other clinical services was apparently much lower. Consequently, the unit costs of clinical FP services, including injectable and IUD and other MCH clinical services, were highest in the conventional home delivery strategy.

The CSPs were mainly intended to replenish those pill/condom users who, prior to the withdrawal of door-step distribution, were supplied by the fieldworkers at their homes. This led to a decrease in the dependence on the fieldworkers. Urban women, though willing to leave their houses for FP services, were not adequately motivated to come to the Community Service Points only for the resupply of methods. During the pre-intervention period, the FWs were evaluated by the quantity of pills and condoms they supplied. This was not the case during the intervention. Therefore, the FWs were presumed to be in an improved position to motivate the women to seek services from static site facilities. These factors, in combination, resulted in a moderate decrease in pill/condom supply from the CSPs, along with a slight increase in clinic utilization. Therefore, the unit costs of FP services at the outreach points were higher, but the unit costs of clinical FP methods were ultimately lower than those of the home-based delivery strategy.

Table 2. MCH-FP and other services provided by CWFP programme (at community/field and clinic) in intervention and comparison areas

Types of outputs	Intervention areas				Comparison area	
	Hazaribag (PHCC)		Gandaria (CSPs)		Siddique Bazar (Door-step)	
	Aug '96	May '97	Aug '96	May '97	Aug '96	May '97
SERVICES AT COMMUNITY						
• Family planning						
bclients supplied with pills	-	-	156	103	609	673
bclients supplied with condoms	-	-	131	109	699	708
SERVICES FROM CLINIC						
• Family planning services	405	446	82	115	108	115
– clients supplied with pills	58	48	0	1	0	1
– clients supplied with condoms	44	51	1	7	6	8
– clients provided injectable	188	176	53	61	55	40
– clients inserted IUD	19	15	1	1	0	1
– follow-up of FP clients	76	120	16	40	35	50
– side-effect management	20	36	11	5	12	15
• MCH and other services	364	506	83	141	117	135
– maternal health care (ANC, PNC, sick mother treatment)	153	196	28	51	55	81
– child health care	67	140	8	16	19	20
– pathological and others	144	170	47	74	43	34

Note: here was no door-step supply at Hazaribag in the clinic-based strategy. Services at the community were provided from the Community Service Points by the fieldworkers at Gandaria, and by the fieldworkers at the door-steps under the conventional strategy at Siddique Bazar. The quoted clinic services at the Gandaria and Siddique bazar research areas represented the corresponding services provided from the respective CWFP branch clinics to the clients of those areas .

Table 3. Apportioned programme costs by types of services in intervention and comparison areas

In Taka

Cost items	Intervention areas				Comparison area	
	Hazaribag (PHCC)		Gandaria (CSPs)		Siddique Bazar (Door-step)	
	Aug '96	May '97	Aug '96	May '97	Aug '96	May '97
- Salary of field staff	11016.00	6368.00	10333.00	9173.00	15316.00	14947.00
- Salary of clinic staff	6560.00	7664.00	1158.00	1622.00	1443.00	1515.00
- Salary of administrative and support staff	2470.00	3387.00	2454.00	3464.00	3224.00	2916.00
- Cost of drugs and clinical supplies	950.00	775.00	202.00	203.00	170.00	152.00
- Other overhead costs	1800.00	1800.00	3058.00	4377.00	2549.00	3794.00
- Total production costs of FP services	22796.00	19991.00	17205.00	18839.00	22702.00	23324.00
• Costs of FP services provided at community	10242.00	7742.00	10616.00	11399.00	14130.00	14510.00
• Costs of FP services provided from clinic	12554.00	12249.00	6589.00	7440.00	8572.00	8814.00
- Salary of field staff	7344.00	4246.00	6888.00	6115.00	10210.00	9965.00
- Salary of clinic staff	9840.00	11496.00	1738.00	2434.00	2164.00	2273.00
- Salary of administrative and support staff	1647.00	2258.00	1636.00	2310.00	2150.00	1944.00
- Costs of drug and clinical supplies	1550.00	1728.00	256.00	430.00	302.00	372.00
- Other overhead costs	1200.00	1200.00	2038.00	2918.00	1699.00	2530.00
-Total production costs of MCH and other services	215181.00	20928.00	12556.00	14207.00	16525.00	17084.00
• Costs of mother health care services	9851.00	9332.00	4547.00	5455.00	7833.00	10023.00
• Costs of child health care services	5393.00	6473.00	1661.00	2224.00	3018.00	2980.00
• Costs of other services	6337.00	5123.00	6348.00	6528.00	5674.00	4081.00

Note: based on the findings from the observation of field workers at the research areas, it was revealed that 60 percent of the time used was related to FP, and the rest to MCH activities. Accordingly, 60 percent of the salary of field staff, salary of administrative staff and other overhead costs had been apportioned to FP services. Similarly, it was observed that two-thirds of the time the fieldworkers spent in FP activities were related to non-clinical re-supply methods, while the rest was spent in motivation/referral for clinical FP. The time allocation study also revealed that the distribution of clinic staff time among the services was as follows: 40 percent for FP, 30 percent for mother health, 20 percent for child health, and 10 percent for other services. Therefore, salary costs of clinic staff were distributed among the services provided from clinic according to these proportions. All other clinical costs were, however, distributed among the clinic services (excepting the services provided from clinic that involved no claim on these costs, such as distribution of pills and condoms from the clinic and providing FP follow-ups) on the basis of the proportions of the related service volumes. (See Annex 1 and 2 for the multipliers of distributing these costs).

Table 4. Unit costs of outputs in intervention and comparison areas

In Taka

Types of outputs	Intervention areas				Comparison area	
	Hazaribag (PHCC)		Gandaria (CSPs)		Siddique Bazar (Door-step)	
	Aug '96	May '97	Aug '96	May '97	Aug '96	May '97
FP at community	-	-	36.99	53.77	10.80	10.51
FP at clinic	56.29	44.82	80.35	64.70	79.37	76.64
Mother health care	64.39	47.61	162.39	106.96	142.42	123.74
Child health care	80.49	46.24	207.63	139.00	158.84	149.00
Pathology and other services	44.00	30.14	135.06	88.22	131.95	120.03

The service-delivery strategies under consideration featured two outlets as integral parts of the same system: field and clinic. There was no distribution of FP methods at the field level in the clinic-based service-delivery strategy at Hazaribag, and limited distribution (through community service points) in the CSP-based system at Gandaria. Results from the clinic-based strategy clearly indicated that, if properly informed and promoted, this strategy could attain higher utilization, and consequently lower per unit costs for all types of clinical services. However, the most critical factor in turning the clinic-based strategy into a cost competitive one, in comparison to the other two strategies, was to ensure enhanced capacity utilization of the clinic facilities, which, in turn, made the clinical services the cheapest, benefiting from economies of scale.

Cost-utility Analysis

Data about the effectiveness of the FP services measured in terms of couple years of protection, births averted, and effectiveness of the MCH services ascertained through estimating the additional QALYs gained have been provided in Table 5. It was found that the mean interval between two consecutive births for the experimental areas ranged from 2.4 to 2.6 years. The number of births averted was, therefore, calculated taking 2.5 years as the mean birth interval. The clinic-based strategy yielded the highest utilization of clinical FP methods, followed by the CSP and door-step strategies respectively. It was observed that the most remarkable contribution in this regard was made by IUD (intra-uterine device), followed by injectable contraceptives. The comparative advantage of the clinic-based strategy, however, became most apparent in the cost-utility analysis. As seen in Table 6, cost

per birth averted was lowest for the clinic-based strategy: one-third and half of the corresponding costs within the CSP and door-step strategies respectively. In this study, the commodity costs of the contraceptives were not considered. Inclusion of these costs would have led to even greater cost-effectiveness of the clinic-based FP services.

QALYs gained was estimated for both the upper and lower bound values on the basis of the total number of services provided from the clinic setting to mothers and children of more than two years of age. As shown in Table 5, the number of additional QALYs gained within the clinic-based strategy was four to six times higher than for the CSP strategy and three times higher than the door-step strategy for both estimates. Cost per additional QALYs gained has been shown in Table 6. The corresponding costs for the clinic-based strategy were less than a third of those required for the CSP-based strategy and one-half to one-third of those under the door-step strategy. These results indicate significantly higher cost-effectiveness for the clinic-based strategy compared to both the CSP-based and door-step strategies.

Table 5. Births averted and QALYs gained in intervention and comparison areas

Effectiveness measure	Intervention areas				Comparison area	
	Hazaribag (PHCC)		Gandaria (CSPs)		Siddique Bazar (Door-step)	
	Aug '96	May '97	Aug '96	May '97	Aug '96	May '97
- Pill	4.5	3.7	12.0	8.0	46.8	51.8
- Condom	0.4	0.4	1.1	1.0	5.9	6.0
- Injectable	47.0	44.0	13.3	15.3	13.8	10.0
- IUD	47.5	37.5	2.5	2.5	0	2.5
Total CYP ³	99.4	85.6	28.9	26.8	66.5	70.3
• Birth averted	39.8	34.2	11.6	10.7	26.6	28.1
• QALYs gained						
Upper estimates	29.8	42.6	5.1	9.4	10.0	14.6
Lower estimates	18.7	26.6	3.2	5.9	6.3	9.1

³ Conversion factors used to calculate one couple year protection (CYP) were: 13 cycles of pills/120 condoms/4 doses of injectables/0.4 IUDs. Commodity costs were not included in the estimations. For information, however, cost per CYP for commodities was (Source- Family Planning Logistics Management): Pill- Tk.104.00 @ Tk.8.00 per cycle, Condom- Tk. 150.00 @ Tk.1.25 per piece, Injectable- Tk. 152.00 @ Tk. 38.00 on average per dose (shot), and IUD- Tk. 15.00 @ Tk. 38.00 per IUD.

Table 6. Cost per birth averted and QALY gained in intervention and comparison areas

In Taka

Effectiveness measures	Intervention areas				Comparison area	
	Hazaribag (PHCC)		Gandaria (CSPs)		Siddique Bazar (Door-step)	
	Aug 96	May'97	Aug'96	May'97	Aug'96	May'97
Birth averted	572.76	584.53	1483.19	1760.65	853.46	1170.14
QALY gained						
Upper estimates	724.19	491.27	2461.96	1511.38	1652.50	1170.14
Lower estimates	1154.06	786.77	3923.75	2407.97	2623.02	1877.36

Discussion and Policy Implications

Among the two alternative strategies for the delivery of MCH-services from static sites, the clinic-based option was the most radical one. The outreach (door-step) distribution of pills and condoms was completely withdrawn under this strategy. The alternative, based on CSP, was a transitional strategy, which was designed and tested with the notion that a radical withdrawal of the long-practised door-step distribution might have a negative effect on contraceptive use and programme indicators and that some type of community-based outreach arrangement would be necessary--at least temporarily--prior to a complete shift to a clinic-based service-delivery system.

The performance indicators monitored during the intervention indicated that neither of the strategies proved detrimental to overall programme performance. However, in terms of the programme sustainability indicators, such as the relative share of clinical contraceptives in the overall method mix and relative share of static-site facilities and commercial sources in the overall source mix for contraceptors, the clinic-based alternative produced the most encouraging results. In so far as it is concerned with economic indicators (precisely, with the cost and effectiveness implications of the various strategies), the clinic-based strategy has demonstrated a clear edge over the CSP (cluster spot)-based and door-step options. Cost per birth averted and cost per additional QALY gained were lowest for the clinic-based strategy. However, as was evident, transition from the conventional (door-step) strategy to the clinic-based one initially increased the programme's operating costs because of the required strengthening of the existing clinic facility. Key to higher cost-effectiveness of the clinic-based strategy was enhanced capacity utilization of the clinic services. This calls for the development of appropriate promotional mechanisms.

Certain clinical services seemed to play a critical role in making the clinic-based service-delivery strategy more cost-effective. In case of family planning, these were IUD and injectable. Longer-acting clinical methods are less costly on one hand and more remunerating in terms of effectiveness on the other. Increased number of clinical services provided to mothers and children was also key to raising the cost-effectiveness of the MCH services.

Policy implications of these findings are impressive. In urban Dhaka (and probably, also in the big cities) a clinic-based service-delivery strategy is a more cost-effective way of providing MCH-FP services than the door-step distribution. Contrary to the beliefs persistent among many programme managers and policy makers that withdrawal from the door-step strategy will require a transitional arrangement, the shift seems, instead, to be feasible with one-step restructuring. The static-clinic based delivery of health and family planning services, complemented with a scaled-down cadre of fieldworkers (outreach workers) with a redefined role of undertaking targeted/selective home visits to provide information and motivation to the hard-to-reach and hard-core clients (e.g., non-users of family planning), emerged as the most cost-effective service-delivery alternative in urban Dhaka. Clearly, there is a potential for its replication in other urban areas of the country.

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Annex 1. Multipliers for the distribution of costs for drugs and clinical supplies among the FP and MCH services provided from clinics

Types of outputs	Intervention areas				Comparison area	
	Hazaribag (PHCC)		Gandaria (CSPs)		Siddique Bazar	
	Aug '96	May '97	Aug '96	May '97	Aug '96	May '97
FP services involving drugs and clinic supplies' costs (injectables, IUD and side-effect management)	227 (0.38)	227 (0.31)	65 (0.44)	67 (0.32)	67 (0.36)	56 (0.29)
MCH and other services	364 (0.62)	506 (0.69)	83 (0.56)	141 (0.68)	117 (0.64)	135 (0.71)
Total	591 (1.00)	733 (1.00)	148 (1.00) ¹	208 (1.00)	184 (1.00)	191 (1.00)

Annex 2. Multipliers for the distribution of costs for drugs and clinical supplies among the MCH and other clinical services

Types of outputs	Intervention areas				Comparison area	
	Hazaribag (PHCC)		Gandaria (CSPs)		Siddique Bazar	
	Aug '96	May '97	Aug '96	May '97	Aug '96	May '97
Mother health	153 (0.42)	196 (0.38)	28 (0.34)	51 (0.36)	55 (0.47)	81 (0.60)
Child health	67 (0.18)	140 (0.28)	8 (0.10)	16 (0.12)	19 (0.16)	20 (0.15)
Pathological and other	144 (0.40)	170 (0.34)	47 (0.56)	74 (0.52)	43 (0.37)	34 (0.25)
Total	364 (1.00)	506 (1.00)	83 (1.00)	141 (1.00)	117 (1.00)	135 (1.00)

Annex 3. Health state classification system

Physical function: mobility and physical activity		
Level	Code	Description
1	P1	Being able to get around the house, yard, neighbourhood or community without help from another person; and having no limitation in physical ability to lift, walk, run, jump or bend.
2	P2	Being able to get around the house, yard, neighbourhood or community without help from another person; and having some limitations in physical ability to lift, walk, run, jump or bend.
3	P3	Being able to get around the house, yard, neighbourhood or community without help from another person; and needing mechanical aids to walk or get around.
4	P4	Needing help from another person in order to get around the house, yard, neighbourhood or community; and having some limitations in physical ability to lift, walk, run, jump or bend.
5	P5	Needing help from another person in order to get around the house, yard, neighbourhood or community; and needing mechanical aids to walk or get around.
6	P6	Needing help from another person in order to get around the house, yard, neighbourhood or community; and not being able to use or control the arms and legs.
Role function: self-care and role activity		
Level	Code	Description
1	R1	Being able to eat, dress, bathe, and go to the toilet without help; and having no limitations when playing, going to school, working or in other activities.
2	R2	Being able to eat, dress, bathe and go to the toilet without help; and having some limitations when playing, going to school, working or in other activities.
3	R3	Being able to eat, dress, bathe and go to the toilet without help; and not being able to play, go to school or work.
4	R4	Needing help to eat, dress, bathe or go to the toilet; and having some limitations when playing, going to school, working or in other activities.
5	R5	Needing help to eat, dress, bathe or go to the toilet; and not being able to

		play, attend school or work.
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Social-emotional function: emotional wellbeing and social activity

Level	Code	Description
1	S1	Being happy and relaxed most or all of the time, and having an average number of friends and contacts with others.
2	S2	Being happy and relaxed most or all of the time, and having very few friends and little contact with others.
3	S3	Being anxious or depressed some or a good bit of the time, and having an average number of friends and contacts with others.
4	S4	Being anxious or depressed some or a good bit of the time, and having very few friends and little contact with others.

Health problem

Level	Code	Description
1	H1	Having no health problem.
2	H2	Having a minor physical deformity or disfigurement such as scars on the face.
3	H3	Needing a hearing aid.
4	H4	Having a medical problem which causes pain or discomfort for a few days in a row every two months.
5	H5	Needing to go to a special school because of trouble learning or remembering things.
6	H6	Having trouble seeing even when wearing glasses.
7	H7	Having trouble being understood by others.
8	H8	Being blind or deaf or not able to speak.

Annex 4. Multiplicative utility factors

Physical function		Role function		Social-emotioal function		Health problem	
Level	Multiplica- tive utility factor m_1	Level	Multiplica- tive utility factor m_2	Level	Multiplica- tive utility factor m_3	Level	Multiplica- tive utility factor m_4
P1	1.00	R1	1.00	S1	1.00	H1	1.00
P2	0.91	R2	0.94	S2	0.96	H2	0.92
P3	0.81	R3	0.77	S3	0.86	H3	0.91
P4	0.80	R4	0.75	S4	0.77	H4	0.91
P5	0.61	R5	0.50			H5	0.86
P6	0.52					H6	0.84
						H7	0.83
						H8	0.74