CHAPTER II
LITERATURE REVIEW

This chapter discusses about public-private mix models of DOTS service for the treatment of tuberculosis that have been practicing in various parts of the world and theoretical approach of cost-effectiveness.

2.1 Public-Private Mix Models

2.1.1 Public-Private Mix project, ruining by Mahavir

Mahavir trust hospital (not-for-profit) in Hyderabad City in India has a success story of PPM DOTS. It serves tuberculosis treatment services (DOTS) through 26 DOTS centers. This project has achieved the case detection target of 70% and cure rate more than 85% among new infectious patients. The medical advisor, Dr. Murthy, of this project believes that the model is replicable in other parts of urban India. He points out that private centers already exist and that patients already use them. He feels that a strategy of public-private collaboration is feasible, replicable and in the best interest of patients, providers and the government (WHO/CDC/TB/2001.285).

2.1.2 A variety of public-private mix delivery models

Varieties of model are being tried out or have been proposed in sites in India, the Philippines, Vietnam, and Indonesia etc. The PPM models are site specific but in all cases, there is a single DOTS agency that is responsible for the delivery of TB care to a defined area or population. In particular, DOTS agency looks after the "public health" elements in provision of TB care such as quality microscopy, regular drug supply, patients support services, absentee retrieval and recording and reporting including one TB register. The emerging PPM models can be grouped into two sets.

In one set of models, DOTS agency is a conventional DOTS unit within the NTP. Working examples include the local NTP units in Jamnagar and Ahmedabad in India. The local NTP staff liase with private practitioners and practitioners can be involved in a variety of tasks. The second sets comprise models where the DOTS agency is private, not a formal part of NTP. Such efforts include those in Manila, the Philippines, and Hyderabad in India. A private, often not-for-profit, institution such as a charitable hospital can assume the role of DOTS agency. It is responsible for delivering TB care to a defined area or a population. The functions of the local NTP changes- the focus is now on identifying a promising candidate for the role of the DOTS agency, negotiating a Memorandum of Understanding (MoU) and monitoring performance. The NTP will usually provide drugs and stipulated amount of cash to cover start-up and recurrent costs. A major motivating factor for a private DOTS agency is that some local private institutions might be better placed to interact with private practitioners and perform key "public health" task (WHO/CDC/TB/2001.285).

The PPM models may vary by site but there are important common elements. First, the essential features of the DOTS package are preserved. The NTP guidelines are adhered to, accredited sputum microscopy laboratories are used, and standard treatment regimens prescribed.

In India, annual household expenditure on account of TB is estimated at US$ 150 million, many times the government expenditure on TB control (WHO/TB/97.223.1997). Treatment outcomes in private health sector in India suggest that much of this expenditure is wasted-delivering symptomatic improvement but not cure. This shows that proper management for TB care is very important in private sector.

DOTS can impose substantial time and labor costs on the health system. Even with the growing body of literature on relative cost-efficacy of DOTS than other form of

TB control, governments are reluctant to make long term funding commitments. In fact, Kenyan NTP is already seeking to shift the higher income TB patients to private sector DOTS type scheme in order to free limited public resources for the truly needy. The private health sector also offers major opportunities to further TB control. The private sector is a valuable resource, located close to, and trusted by, many TB patients. By involving PPs, NTPs can increase case detection. Since many patients first approach PPs, there is an opportunity to reduce diagnostic delay with a concurrent reduction in transmission. By enlisting PPs, NTPs can enhance patients' access and acceptance, thereby improving treatment outcome (WHO. 2001b).

The potential economic benefit of DOTs for TB control in SEAR are enormous. TB control is the most cost-effective intervention in primary health care (WHO.1998b). TB control is a public investment with payoffs. To increase the coverage of DOTS throughout the country, the government health budget may increase initially. However, the societal benefits are immediate, cumulative and greatly exceed the investment. World Bank considers DOTS one of the most cost-effective health strategies available (WHO.1998a). For Thailand, it was estimated that every US$ invested in DOTS will result in an return of more than US$ 50. For India it was estimated that implementation of DOTS would result in a saving of a least 0.3% of GDP. It is estimated nationwide implementation of DOTS would cost no more than US$ 0.10 per capita (WHO. 1998b)

Cost of providing treatment to TB patients is not limited only to drug costs; other component of costs, i.e. routine costs, other medical care costs may be substantially greater than drug cost (Bundit et al.1992). In the same study researchers compared the total provider cost of delivery of service to TB patients with three short course anti-tuberculosis programs with that of standard regimen at 4 zonal TB centers in treatment of new smear positive case of pulmonary tuberculosis in Thailand. They also showed that different regimen has different provider cost and total provider cost

varies from place to place and number of visits increases the routine service cost, which has direct impact on total provider cost.

2.2 Theoretical differences between for-profit and not-for-profit providers

The decision to mobilize the private sector to help achieve government objectives largely depends on a cost-effectiveness question: Is working with private provider the most cost–effective way to achieve government objectives? Projection of implementation costs is required to determine whether working with the private sector is the most cost-effective way to achieve government objectives. The government can increase the efficiency of its activities with private providers (lower transaction costs), if it can identify the capable and motivated partners. Transaction costs are generally lower if the providers are large and organized. Working with NGOs having good networking would be more efficient than working with individual practitioners to cover defined population.

In private sector we can distinctly observe two types of providers- for-profit and not-for profit health care provider. There are some theoretical differences between them:

Not-for-profit health care provider

- Initial capital from donation
- Prohibited from distributing profit
- Very difficult to sell their firm
- Certain type of taxes are exempted and are eligible to receive subsidies from government

For-profit health care provider

- Acquire initial capital by their own
- Are capable of earning accounting profit
- Can sell their firms
- No subsidies receive and no taxes exemption from government

Traditional economic theory suggests that for-profit health care providers should behave in more efficient manner than their not-for-profit counterparts. According to Sloan (1988), the property rights theory suggests that For-profit health care providers are more efficient than either Not-for-profit or public health care providers. For-profit health care provider must be efficient because residual claimants in For-profit firm put

pressure on management to pursue maximum profit that are potentially obtained by producing output with least-cost method. In contrast, a residual claimant is absent in both not-for profit and public health care providers.

Not-for-profit hospitals generates significantly more community benefits than for-profit hospitals and that the monetary value of those benefits exceeds the subsidy received through their tax-exempt status (Scactman, 1996). The empirical evidence also indicates that there is a wide dispersion in the level of community benefits provided across not-for-profit hospitals, with large not-for-profits providing the bulk of the community benefits (Santerre, 2000). This literature review suggests that working with not-for-profit organizations would produce more benefit to the community and help the government achieve its objectives.

In many countries, private providers are primary care providers for large segment of the population, and thus they are a valuable distributional channel for priority services. In India, there are one million semi-qualified urban and rural medical practitioners, and 61% of outpatient consultations are made with private providers. In many developing countries, private pharmacies are also important providers, since many people self-medicate without seeking a medical diagnosis. The private sector may include sophisticated state-of-the-art hospital in the urban centers of more well off countries. Government strategies to work with private sector will vary according to the type of providers that are prevalent in the country (Partnerships for Health Reform, 2001).

2.3 Theoretical Approach

Cost-Effectiveness Analysis (CEA) incorporates information about both costs and health outcomes to describe the value of particular health care program. CE analysis evaluates an intervention through the use of a cost-effectiveness ratio. In the ratio, all the health outcomes are included in denominator and all costs or change in resources use are included in the numerator (Weinstein, 1996)

CE Analysis investigates the best way of achieving a single objective by comparing health effects and costs. It evaluates either:

- Which of a number of possible interventions will achieve a given health objective at least cost, or
- Given a fixed budget, the interventions that maximizes the effectiveness of the expenditure

Its results are expressed either as costs per unit of output (total costs of intervention divided by total health effect) or as effect per monetary unit (total health effect divided by total available resources) (Mills and Gilson, 1988).

All economic evaluation techniques involve three basic steps:

- Identification of costs and consequences
- Measurement of cost and consequences
- Valuation of costs and consequences

In addition, all economic evaluation studies should consider adjusting costs and consequences for differential timing, and should incorporate an incremental and a sensitivity analysis. To simplify the above-mentioned three basic steps, Walker (2001) has published some useful guidelines for developing countries in Journal of Health Policy and Planning, which is listed in Table 2.1.

Table 2.1: Guidelines for Developing Countries

Methodological Approach	Diarrhoeal diseases (WHO 1988)	Primary health care and HIV/AIDS (Creese and Parker 1994: Kumaranayake et al. 2000)	Vectors (Phillips et al. 1993)
Perspective/view point	• Service providers	• Service Providers	• Societal and service provider
Alternatives/comparator	• Should be comparable- only differ with respect to costs or the specified effectives	• Best possible alternatives	• Feasible alternatives for achieving the stated objectives
Identification of costs and outcomes	• Resource use associated with an intervention-distinction between capital and recurrent costs • Outcomes ranging from the provision of goods and services up to achieving an impact on health	• Resource use associated with an intervention-distintion between capital and recurrent costs • Impact of HIV prevention strategy	• Resource use associated with an intervention-distinction between capital and recurrent costs. Excludes money transfers (taxes and subsidies) which do not reflect resource consumption
Measurement of costs and outcomes	• Quantity inputs in physical units • Method for allocating joint costs include: time used: distance traveled, space used; or proxies • Intermediate measures are easiest but large large difference in outcome measures	• Sources of cost data are: government contracts: supply records from donor; local dealer estimates • Methods for allocating joint costs include: time used; distance • Service outputs are preferred as outcomes measure	• Outcomes: change in activity, behavior or disease that the intervention brings about • Allocate joint costs on a pro rata basis by using units of quantity that relate to that particular input. • Measure of outcome can be generic (DALY) or disease specific
Valuation of costs and outcomes	• Convert cost data into constant (or real) prices • Market value of subsidies and donation should be estimated • Use the exchange rate employed by the economic planning Ministry to covert items purchased from overseas	• Shadow prices for foreign exchange and labor should be used	• Convert cost data into constant (or real) prices • Shadow prices should be used if market prices differ from opportunity prices by more than 10%
Discounting	• Rate used by the economic planning office or Ministry of Finance • Or estimate the rate • Or use 10%	• Rate used by the economic planning office or Ministry of Finance • Or estimate the rate • Or use World Bank rate	• Rate used by the economic planning office or Ministry of Finance • Or estimate the rate • Or use World Bank rate
Presentation of results	• Average C/E ratios	• Average C/E ratios	• Average C/E ratios
Sensitivity analysis	• Substitute the upper and lower values of uncertain variables	• Substitute the upper and lower values of uncertain variables	• Substitute the upper and lower values of uncertain variables
Affordability/sustainability	• Affordability must be assessed	• Affordability must be assessed	• Affordability must be assessed

Source: Warker, D. 2001. Health Policy and Planning; 16(1): 113-121. Oxford University Press.

2.3.1 Cost classification

Classification of cost by inputs (Creese and Parker. 1994)

Capital costs

- Vehicles: bicycle, motor-cycle, four-wheel-drive vehicles, trucks
- Equipment: X-ray machine, microscope, other equipment with a unit cost (price) of US$ 100 or more
- Buildings, space: Hospital, health centers, administrative office, storage facilities
- Training: training activities for health personnel that occur only once or rarely
- Social mobilization, non recurrent: social mobilization activities, e.g. promotion, publicity campaigns that occur only once or rarely

Recurrent costs

- Personnel (all type): supervisors, health workers, administrators, technicians, consultants, casual labors
- Supplies: drugs, syringes, slides, small equipment (unit cost of less than US$ 100)
- Vehicles, operation and maintenance: petrol, diesel, lubricants, tyres, spare parts, registration, insurance
- Buildings, operation and maintenance: electricity, water, heating, fuel, telephone, telex, insurance, cleaning, painting, plumbing, roofing, electricity supply/appliances
- Training, recurrent (e.g. short in-service course)
- Social; mobilization: operating costs
- Other operating costs not included above

2.3.2 Cost allocation of shared inputs

Some inputs such as building, staff, vehicles, supplies, equipments may be shared for particular intervention. In this case, it is necessary to find a reasonably accurate way of dividing the costs of shared resources among various activities or programmes. The process of dividing cost is called cost allocation. In this case, we must know about the particular components of various inputs that determine cost (Creese and Parker. 1994). The components that determine the cost of inputs are listed below:

Table 2.2 Cost Determining Components

Inputs	Components that determine the cost
Vehicles	• Distance traveled/time used
Equipment	• Time used
Building space	• Time used/space used
Personnel	• Time worked
Supplies	• Weight/volume
Vehicles: operation and maintenance	• Distance traveled/time used
Building: operation and maintenance	• Time used/space used
Other inputs	• Miscellaneous

In many cases, it is not easy to measure staff time. There are some highly accurate, but not necessarily practicable, ways of measuring time. It is risky to rely on staff members' memories of how they distribute their time. We can arrange for staff to fill out time sheet routinely or over a certain period of time. This procedure requires supervision to be reliable. We can also directly observe staff on a random sample of days, recording what they do in every half-our. But this is impracticable. So, it is suggested that (Creese and Parker. 1994) to use proxy- that we can expect to be closely related to the direct determinant of cost. But we should be aware of the

assumptions that underlie choice of proxy. If these assumptions are not true, the proxy may not be accurate. If there is no reasonable proxy and none of the more accurate methods is feasible, we might have to make some kind of direct measurement with some reasonable margin of error.

2.3.3 Measure of Effectiveness:

One of the primary objectives of economic evaluation is to relate the costs of any program to its consequences. Consequences or outcomes of any program can follow a spectrum, giving different outcomes at different levels. It is, therefore, the analyst's judgment to decide what outcome is the most relevant to answer the primary research question (Pokhrel, S. 1999).

To carry out cost-effectiveness analysis good indicators of change in health status are needed. The simplest indicators such as lives saved, life-years gained are commonly used, but recently attempts have been made to incorporate the quality of life, and to construct composite indicators such as the Physical Quality of Life Index (PQLI) or Quality Adjusted Life Years (QALYs) (Green, 1992). Garber (1997) emphasizes that QALYs has become the common currency for sophisticated CA analysis. CEA usually looks at the intermediate outcomes, such as number of case detected in a screening program, and calls the outcomes or consequences as the program's "effectiveness" (Drummond, 1997).

A study of cost-effectiveness analysis of TB treatment program done in Indonesia (Prijono, 1988) was based on comparison of the monetary cost of particular control program and program effects measured in terms of the estimated prevented cases. The government policy was to treat only sputum-positive cases (by microscopic examination). So, the monetary cost consists of the government expenditure to purchase drugs for sputum positive case only. In leprosy control program the most

appropriate effectiveness (health outcome) considered are cases prevented and healthy-years gained (Max, 1988). A cost–effectiveness analysis of Lambdacyhalothrine-treated nets for malaria control (Pirom et al. 1999) uses case prevented as the effectiveness of the two activities.

Table 2.3 Examples of effectiveness measures used in cost-effectiveness analysis

Study reference	Clinical field	Effectiveness measures
Logen et al. (1981)	Treatment of Hypertension	MmHg blood pressure reduction
Schuiman et al. (1990)	Treatment of Hyperchlestrolaemia	% Serum cholesterol reduction
Hull et al. (1981)	Diagnosis of deep-vein thrombosis	Case of DVT detected
Sculpher and Buxton (1993)	Asthama	Episode-free days
Mark et al. (1995)	Thrombolysis	Years of life gained

Adapted from: Drummond(1997)

Health Outcomes:

Health outcomes, in the denominator of cost-effectiveness ratio, can be reported as intermediate outcomes or longer-term outcomes such as life saved, life years gained, or quality-adjusted life years gained. QALYs can capture both quantity and quality of life. This outcome is becoming popular in cost-effectiveness analysis as well as cost-utility analysis. This study took into account the cured/complete cases as its health outcomes.