

## **INTRODUCTION**

In the two situations below, a decision is required on which technology should be purchased. When the question is phrased in such a manner, it is difficult to decide because the choices are limited to the technologies being considered, and the needs are vaguely described (i.e. a "worried" district doctor, "recommended" by a newly trained radiologist). To avoid being placed in such a difficult situation, one should pro-actively and regularly do a *needs assessment*. These needs can be prioritised based on burden of disease, availability of cost-effective technology and values or preferences of the community. A rational and responsive technology acquisition and implementation program can then be subsequently drafted.

### **Situation A**

A hospital is considering buying a helical CT scan, based on the recommendations of a radiologist, newly returned from training in a foreign country. However, within the same department, it takes five days before an ultrasound examination can be performed from the time of scheduling.

### **Situation B**

It is now rainy season. The district doctor is worried about diseases like hepatitis, diarrhoea and even mosquito-borne diseases like dengue fever. His choices are:

- a. order a fogging machine and insecticides for environmental control of mosquitoes;
- b. recheck all houses for sanitary disposal of waste, and if needed, construct latrines; and
- c. purchase hepatitis A vaccines.

## **NEEDS ASSESSMENT**

The first step in conducting a needs assessment, is to decide what needs to measure. Despite a seemingly objective terminology, the process is value laden and the focus depends on the individuals undertaking the assessment.

*Need for health or for health care*

What need is being assessed? Is it need for health, or need for health care? When focusing on a need for health, does it mean that this automatically defines the need for health care and vice versa? If one is measured, does this mean that it is a reasonable proxy of the other? (Mckee)

If the interest is in defining need for health, the question "what is health?" should be answered. The WHO definition of health is the "state of complete physical, mental and social well-being and not merely the absence of disease and infirmity". Using this definition of health is admittedly ambitious, but it gives the idea that health is more than the opposite of a diseased state, and conceptually is closely linked with social welfare.

If an interest lays in defining the need for health care, then the "ability to benefit from a health care intervention" (Acheson) should be looked at. This definition gives a more circumscribed perspective, and therefore is more manageable for administrators. However, it is very much dominated by the "pill-oriented" biomedical approach. It is only in the recent past that there has been a serious effort for mental illness, gender confusion, addiction and family abuse, for example, to be openly recognized as legitimate health concerns.

For most managers, the need for health care is more consistent with their job descriptions and with the traditional "silo" budgeting approaches in the government. However, a broader approach to health is worth incorporating, in recognition of the multi-factorial nature of disease and the inherent limitations of a medical perspective. As the past has consistently shown, health improvements have been significantly associated with better socio-economic conditions. For example, a drop in the rate of prevalence of tuberculosis was demonstrated with improvement of living conditions even before the first anti-TB medicine, streptomycin, was introduced.

#### *Absolute or relative needs*

Is the need absolute or relative? When defining need, some deviation from the expected or the norm is implied. Who defines the expected, who defines the norm? Is there one absolute global standard that is applied to all, (i.e. a life expectancy of 80 years which is the life expectancy in Japan and that which is currently the highest life expectancy in the world?) Or is the definition formed according to environment, culture, or an individual perception of reality?

What is possible and achievable at the highest levels is probably the ultimate target; however, frustrations can occur with setting difficult-to-achieve targets. Perhaps for managers with circumscribed geographic areas of responsibilities, the main concern is that of equity or trying to satisfy the health needs of individuals in an equitable manner. This will mean that those marginalized or those who are more vulnerable will have to be identified and extra assistance extended. Another concern would be to try to move the entire community to a higher level, a "moving target" approach. This, coupled with equity considerations, would provide a feasible method of definition of needs.

#### *Normative or felt needs*

When looking at need as the capacity to benefit, should need be defined normatively by health professionals? Are perceived needs of an individual, whether expressed as a demand or not, equally valid (Bradshaw)? Social scientists distinguish between disease and how an individual perceives his disease. How is the evidence that self-reported illness is more frequent in those with higher socio-economic standing interpreted? Are they more sickly, and therefore more in need?

This issue is raised because managers often use previous accomplishments (i.e. number of requests for an ultrasound, or number of individuals who received hepatitis immunizations) as the basis planning of the next year's budget (a "historical budget" with the main adjustment to account for inflation). This is a reflection of felt needs, expressed as demand. In these instances, patterns of delivery of health care are expected to be maintained and equity concerns will not be directly addressed. In many ways, this is because of asymmetry of information between health professionals assuming the role of an "agent" for the patient. This is the rationale for the health education programs and IEC (information, education and communication) materials distributed to the public. Demand is being created, to fill any gap between normative and felt needs.

In summary, for a manager performing a needs assessment, needs are enjoined to encompass a broader definition of health. Health needs are to be defined relatively to address specific equity concerns within the manager's geographic area of responsibility. Needs defined normatively have to be matched with a pro-active intervention to convert felt needs and generate a demand.

### *Evaluation of need*

The second step is deciding how to measure the need. Deviation implies the presence of a measurable quantity, the need. How should one measure need? Again, the decision on how to measure is value laden.

Once a measure of need is adopted, how is it evaluated? Is there a hierarchy or primacy among needs? This is a vertical approach. What is equitable? If immunization is important, are there groups which are not being reached? This is a horizontal approach. Does sheer quantity (ie life years lost) immediately imply greater value? Is an intervention where one young person with a remaining life expectancy of 30 years equal to an intervention where five elderly individuals each have a remaining life span of six years? Assumed in this valuation or implicit comparison is the presence of a common metric. Is there really a single currency with which the different needs can be measured fairly?

What if there are several effective health care interventions but individuals with the same need have different capacities to benefit? Should we then look at their existing need, decide that all have equal need, and distribute resources equally? Or should we look at the expected health gains based on their differing capacity to benefit and perhaps, distribute resources differentially?

What if there is no effective health care available or there is no capacity to benefit? Should this need be ignored? Maybe. But more specifically, should it still be measured. Should a health manager be interested in measuring something about which nothing can be done? What about research as an option? How is this comparable with other health interventions? How can a reasonably accurate prediction be made based on the usefulness or potential contribution of planned research and its intended products?

A simplistic answer to all the above questions is to say that it depends on whose needs are being assessed and why, as well as the avowed values of the society doing the assessment. At this stage, it is important to recognize that the needs assessment is not purely an objective exercise of gathering numbers that exist ready for the picking. Rather, it is a value-laden process where conscious deliberation and explicit decision-making are needed. These decisions, whether deliberately made or automatically assumed, will influence the results of any needs assessment.

To avoid being paralysed by philosophical or political discussions, Culyer (1995) has proposed the following conditions in order to determine a definite need:

- That its value-content be up-front and easily interpretable;
- That it be directly derived from the objectives of the health care system;
- That it be capable of empirical application in issues of horizontal (treating the same those who have the same need) and vertical (treating those differently who have different needs) distribution;
- That it should be service and person-specific;
- That it should enable a straightforward link to be made to resources; and
- That it should not, if acted upon as a distributional principle, produce manifestly inequitable results.

## **MEASURING HEALTH AND MORTALITY**

The third step in conducting a needs assessment is to define the requirements for an assessment. (Murray). Measuring need for health, biomedically defined, can be classified into measuring fatal outcomes and non-fatal outcomes. Both fatal outcomes (mortality) and non-fatal outcomes (morbidity) have to be attributed to specific diseases or etiology. In addition, conditions have been identified as definitive risk factors leading to a fatal or nonfatal outcome. The fields of measurement of mortality, morbidity and risk factors are at different levels of advancement. Accordingly, instruments, expertise and databases vary in terms of their availability, accuracy and technological sophistication.

### *Measurement of Mortality*

Mortality data has been collected through the years by most governments. The definition of death is clear and it is difficult to misclassify an individual as dead. The completeness of reporting, and the listing of the cause of death however, may be subject for some concern, particularly in poorer areas. Sources of data for the number of deaths in an area include systems for vital registration (nation-wide) and sample registration (selected, representative areas). If there is not a significant amount of emigration, the completeness of routine reporting can be validated by surveying households in the area regarding any deaths which occurred during a particular period. Indirect demography methods like birth history for child mortality and deaths through incidents such as widowhood for adult mortality can be utilized in these surveys.

Data regarding cause of death are more prone to misclassification. Even in advanced countries where most deaths are medically certified, patterns of training regarding underlying and immediate cause of death may bias estimates in favour of one diagnosis, (i.e. cardiovascular disease). Error rates of medically certified causes compared to a gold standard such as autopsy may range from 6 - 55%; however, most of the errors are minor and in the case of major errors, false positives balance false negatives.

In some developing countries, verbal autopsy is used to determine cause of death. Verbal autopsy is a posthoc attribution of cause of death by applying an algorithm on information collected from the dead person's relatives. Algorithms for verbal autopsy in children have been tested. Sensitivity, specificity, and positive predictive values depend on the disease cluster being studied (ie acute respiratory infection or diarrhoea) and are also affected by the methodological considerations of interviewer training, choice of interviewee, etc. Little work has been done on verbal autopsy for causes of adult mortality.

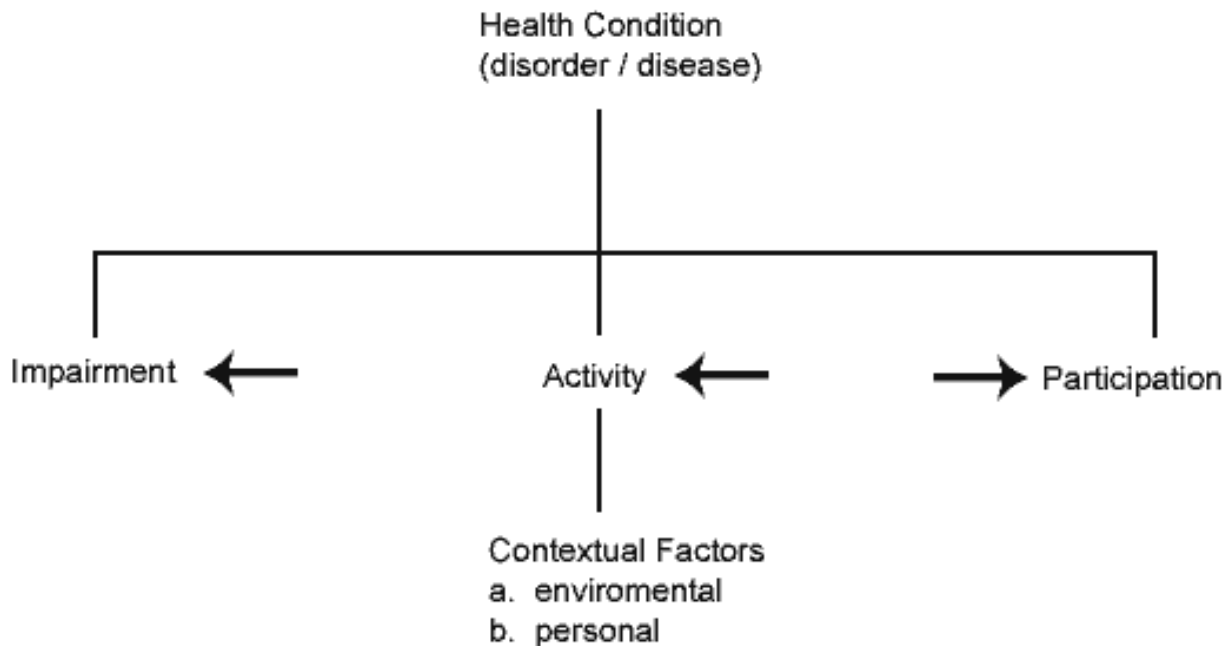
Epidemiological estimates of cause of death can be generated with information on incidence / prevalence and case fatality rates. Figures obtained through this method, in general, tend to overestimate the burden of disease attributed to the disease being studied. This occurs because most of the studies fully attribute death to the disease, neglecting the multi-causal nature of death.

Compared to reporting systems for fatal outcomes, fewer databases are available and the available data frequently reflect under-reporting for non-fatal health outcomes. There are two components which can possibly be measured. The first is the presence of the state of morbidity itself and the other is the valuation or preference of the individual for being in such a state. The presence of the two components applied to the time lived with the disability allows the possibility

of combining mortality outcome with mortality outcomes where death is given a satisfaction / preference of zero.

*Measurement and Valuation of Morbidity*

Morbidity can be classified conceptually into impairment, disability, handicap and disease (International Classification of Impairments, Disabilities and Handicaps, WHO 1980). An impairment is any loss or abnormality of psychological, physiological or anatomical structure of function (organ level). A disability is any restriction or lack (resulting from an impairment) of ability to perform an activity, within the range considered normal, for a human being (individual level). A handicap is a disadvantage for a given individual resulting from an impairment or disability that limits or prevents the fulfilment of a role that is normal (depending on age, sex, and social and cultural factors) for that individual (level of environmental and social interaction). Some have interpreted that there is a unidirectional flow from impairment to handicap. However, the progression from impairment is not necessarily linear and for the same impairment, there may be differences in disability (adaptation). Disability may not necessarily lead to handicap, but frequently does. The key advantage of this classification is its explicit separation of the physical effects of the diseases and their impact on the individual as a social being. Knowing that disability may vary between individuals and that handicap varies between cultures, a conceptual distinction is necessary. The impact of the loss of the little finger may be insignificant for a heavy equipment operator versus a violinist. Infertility is viewed as a loss of value for women in certain developing countries. A 1998 update ICDH-2, specifically addresses this erroneous assumption and provides a more complex model (see below).



According to this model, disability is seen as an interaction / complex relationship between the health condition and the contextual factors. There is a dynamic interaction among these factors; interventions at one element level have the potential to modify other related elements. The interactions are specific and not always in a predictable one-to-one relationship with each other. The dimensions indicated refer to a person's experience or circumstances.

Impairment may be routinely measured through surveillance systems (list of notifiable diseases) in hospitals or other points of delivery of care, or through registries (cancer, diabetes, genetic diseases, etc). These give incidence data. Alternatively, one-time surveys may be carried out to survey disabilities or impairments. This may be repeated at regular intervals (national prevalence surveys). Rapid techniques include interviews of key informants including disease experts and focus group discussions. Secondary sources of data, collected for some other purpose, may also be used to derive estimates of morbidity.

Impairment and disablement can be described and can be valued. This is the area of quality of life, or more specifically, health-related quality of life. There are different instruments which have been proposed for measurement of health-related quality of life. Instruments which have been tested internationally include WHOQOL and SF36, among others.

A final area for measurement includes risk factor measurement which is closer to the idea of targeting interventions for prevention. There are even fewer data with risk factors and they are limited to special surveys. When the risk factors include acquired habits, a look at a convenient data source (ie: consumer market profiles) to determine who smokes, drinks alcohol, etc. is needed. The difficulty is to define the attributable risk, or the fraction of the burden of disease averted with interventions targeted to decrease risk factor exposure.

#### *Measuring Health Care Needs*

Health care needs assessment has been defined as "identifying an intervention that is effective in some circumstances, defining those individuals who will benefit from it, in terms that are measurable, and assessing how many such people exist in a defined population." (Frankel).

This need for health care, normatively defined, can be wanted by the individual and translated into demand. If there is action on demand, then there is use of the intervention. And finally, with use, there is the expectation that the need will have been satisfied or diminished (outcome). It is very possible that need exists which is not being expressed as a demand. Also, there can be demand and use where there is no need (but there is desire). And finally, there can be use, but no satisfaction or diminution of need. At times, there can be creation of new needs (i.e. complications of intervention) or new levels of demands due to increased expectation resulting from the experience of the intervention (Mckee). The recognition of need, want, demand, use and outcomes, allows us to postulate relationships which might allow the estimation of one parameter from available measurements of another parameter (convenience data sets). It is important to emphasize that the relationships are not necessarily linear and there can be dangerous pitfalls in this approach.

An example of this is to look at service data on immunizations given to children. Service data routinely collected and reported can be validated using cluster sampling for vaccine coverage. The inference can be made from vaccine coverage, using data on field effectiveness of the vaccine, that a certain number of children will be protected from the disease (i.e. measles) and a certain number will suffer from the disease and its sequelae. At another level, one convenient source of data might be drug manufacturer's annual sale (i.e. anti-tuberculosis medications) and the use of standard daily doses to calculate the prevalence of the disease. This approach will require several assumptions, including:

- percentage under treatment;
- percentage with ability to pay;

- compliance; and
- reported effectiveness of the regiment.

Most of the needs assessment tend to use data reflecting what has happened. For planning purposes, it is equally important to be able to predict future needs. Anticipatory planning can help conserve waste due to a lack of preparation to meet future needs. Forecasting depends on establishing past trends, current ability to implement interventions effectively to achieve targets, and scanning the environment for new challenges to health (i.e. rapid urbanization, industrialization) and technological developments.

#### *Measuring equity*

The measurement of equity is an area not as well-developed as measurement of morbidity, mortality or health care needs. Primarily, it consists of dissemination of these measures of morbidity, mortality, and health care needs by sectors (i.e. rural vs. urban, or remote vs. central areas, racial groups, socio-economic categories). In addition, it may also include measures of inputs (i.e. doctor; population ratio in rural vs. urban areas) (McCoy and Gilson).

#### **Indicators**

The fourth step in conducting a needs assessment is to represent the information using indicators. The choice of which indicator to use depends on the purpose for which needs are being assessed. If priority setting is to be done, then there is need for a common or generic metric across diseases. However, if there is already a public clamour for action on a certain impairment or problem, (i.e. alcoholism or drug abuse), then there may be need for a disease specific measure which might better reflect sensitively any improvements due to the interventions to be adopted.

Ideally, an indicator:

1. Must directly describe those aspects of health that society cares about. Proximate measures (i.e. service data) may be convenient, but as has been previously stated, only translates to those "aspects that society cares about" if certain assumptions are adopted;
2. Should reflect a consensus in social values. The description of the aspects of health should also be valued and the indicator should reflect both the descriptive and the valuation aspect. The two should ideally be separable, with an explicit delineation of how much is due to the descriptive part and how much is due to the valuation part;
3. Can be disaggregated to the different causes (deaths or disability due to diseases or risk factors); and

4. Has discriminatory power. To the extent possible, it is expected that the indicator is sensitive enough to reflect any change due to adoption of specific health interventions.

An example of generic indicators which satisfy those requirements are DALYs. Other generic indicators are QALYs, HYE, PYLL, etc.

The last step is to present the indicators. Indicators can be visually represented, to facilitate communication. Use of graphs and tables are helpful. A compelling visual representation, made easy by advances in computer technology, is the assembly of geographic information systems which allow mapping of indicators to geographic areas. It is possible to have a geographic map overlaid by maps of health facilities, immunization coverage and measles outbreaks. This one map can tell the whole story graphically in a persuasive, documented way.

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