

**Setting Priorities in South Australian
Community Health II: Marginal Analysis of
Mental Health Services**

Stuart Peacock

Lecturer, Health Economics Unit, CHPE

Jeff Richardson

Director, Health Economics Unit, CHPE

Rob Carter

Deputy Director, Health Economics Unit, CHPE

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The Co-ordinator
Centre for Health Program Evaluation
PO Box 477
West Heidelberg Vic 3081, Australia
Telephone + 61 3 9496 4433/4434 **Facsimile** + 61 3 9496 4424
E-mail CHPE@BusEco.monash.edu.au

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Setting Priorities in South Australian Community Health II: Marginal Analysis in Mental Health Services

1 Introduction

The Health Economics Unit, at the Centre for Health Program Evaluation, was commissioned to advise the South Australian Health Commission on the use of PBMA in the Community Health sector. The Unit was asked to conduct two pilot studies, applying PBMA to setting priorities in Community Health. The first pilot study examines priorities in mental health services provided by the Community Health sector in metropolitan South Australia. The principles of PBMA and its application, and the development and results of the program budget for the first pilot PBMA study were the subject of an earlier report (Peacock and Edwards, 1997) which should be read in conjunction with this paper. This report focuses on the marginal analysis of selected mental health services, and the implications for setting priorities in the Community Health sector in Adelaide.

The guiding principle of marginal analysis is allocative efficiency: the maximisation of benefits from the resources available. Marginal analysis firstly seeks to identify services which are potential candidates for change in the future. Services which are candidates for change include services which are options for introduction or expansion (increments), and options for withdrawal or contraction (decrements). These options are evaluated in terms of their costs and benefits, with the most cost-effective options representing the services which offer the most benefits for the resources used. By providing the most cost-effective services from the options for change, the overall benefits to the population served will be increased, improving the allocative efficiency with which health services are provided. The aim of marginal analysis is to focus on incremental changes in services provided rather than global reform, resulting in a gradual move towards allocative efficiency over time. This process seeks to avoid a serious dislocation in services provided which can occur under global reforms. The principles of priority setting and marginal analysis are given fuller consideration elsewhere (Peacock & Edwards, 1997).

2 Outcomes In Community Health Mental Health Services

2.1 Defining Outcomes and Evaluating Services

Producing health from health services can be thought of as a two stage process. In the first stage resources are combined to form health services or health care interventions. The second stage of the process is the consumption of health services by individuals which (hopefully) yield benefit, or utility, for the consumer. Benefits from the consumption of health care have most commonly been assessed in terms of health status improvements (health outcomes) gained by individuals through their utilisation of health care. Health status improvements have been measured using an array of instruments, including biomedical indicators, mortality and morbidity measures, and quality of life instruments such as the Short Form 36 questionnaire (SF36) and the Australian Quality of Life (AQoL) Instrument.

Priority setting focuses on the maximisation of benefits which individuals receive from the consumption of health services, and therefore requires information about the health related benefits from the health services being studied. PBMA studies have sought to find suitable measures for health related benefits, and published quantitative evidence about those benefits, with which to evaluate the health services being studied. Published quantitative evidence, such as data from randomised controlled trials and cohort studies, however, has only been reported as being used as the basis for evaluating services in a PBMA study on one occasion, in a study of elderly people with dementia (Donaldson and Farrar, 1993). In many contexts there has been a paucity of quantitative evidence which was of use in evaluating the services being included in the PBMA study. Such a lack of published quantitative evidence is also evident in the Community Health context, where evaluations of services have concentrated on qualitative approaches to assessing benefits.

The major reason for the relative lack of published quantitative evidence for Community Health services is the complexity of the benefits derived from Community Health services. In the secondary and tertiary care sectors, where quantitative evidence is more common, research has tended to focus on a narrow definition of benefits in the form of health status improvements for individuals. Community Health, however, embraces a more holistic approach to health which allows for a wider set of possible benefits from health services, encompassing a range of physiological, psychological and social factors. This complexity has led to (at least in part) a focus on the qualitative evaluation of Community Health services, an approach which has particular strengths in handling complex concepts of benefits from services.

Benefits in Community Health may include individual emotional and psychological well-being; client autonomy; client satisfaction with the process of care; enhancement of social and community supports for vulnerable or isolated groups; individual and community empowerment; enhanced health promotion awareness in the whole community; and improved social conditions (such as housing). Moreover, benefits in Community Health may occur as a stream over a number of years, and benefits may not become fully known for a number of years, particularly for

health promotion activities. These inter-temporal factors make the quantitative evaluation of Community Health benefits even more difficult.

These factors have all contributed to the focus on qualitative evaluation in the Community Health context. A comprehensive review of the qualitative evidence relating to Community Health services, and its uses, is beyond the scope of this study. However, an excellent overview of the qualitative approach in the South Australian context is provided elsewhere (SACHRU, 1994; SACHRU, 1996). The merits of a qualitative approach to evaluating Community Health services are not in dispute, qualitative evidence is extremely useful in many contexts as its flexibility allows it to capture the multi-faceted nature of benefits. However, its usefulness in setting priorities can be somewhat limited. Qualitative evidence does not provide measures of outcome, or benefits, which are directly comparable between services, making the assessment of the effectiveness of different services in providing benefits difficult. In an ideal situation, it would be desirable to have both qualitative and quantitative evidence available to make fully informed judgements about the relative effectiveness of services. However, without reliable evidence which can really be used to make informed and transparent judgements about the merits of different health care services, it is necessary to find an alternative method for evaluating benefits from services in a meaningful way.

Indeed, many PBMA studies have also found that published quantitative evidence on benefits for the services being considered has not been available, and have employed an alternative technique. The technique adopted in most cases has been to use an expert panel to estimate the benefits from services, in the form of an options appraisal exercise (Craig et al, 1995; Cohen, 1994; Cohen, 1995; Twaddle and Walker, 1995).

The use of expert panels has several advantages. Firstly, it provides an acceptable alternative to published quantitative effectiveness evidence as panel members are asked to provide the estimates of benefits for the services being studied. Secondly, and very importantly, the panel define the elements, or dimensions, of benefits which are relevant to the context of the PBMA study (the objectives of the organisation and the services it provides). Therefore, the panel has full ownership over the criteria with which its services are evaluated, whereas published evidence may not be applicable to the context of the PBMA study. Thirdly, the approach is explicit and open for scrutiny, allowing outside parties the chance to understand, and discuss how services were evaluated and how decisions were made. The transparency of the process also allows issues to be discussed amongst the panel which may have previously been left unaddressed, and implicit in decision making. Finally, the expert panel can make direct use of qualitative evidence in the definition of benefits, the importance of the different elements of benefits, and in the evaluation of services. In that way the process can include qualitative evidence where it is available into a meaningful decision aid for setting priorities.

2.2 An Options Appraisal Framework

Options appraisal, as used in the above PBMA studies, is based on decision analysis techniques which draw from the psychology and economics disciplines. Under the options appraisal approach the expert panel identifies the relevant elements, or dimensions, of benefits from services, assesses the relative importance of each dimension of overall benefit, and evaluates each health service being studied in terms of those dimensions of benefit. An overall “score” for benefit is created for each service by combining the scores for each dimension of benefit for each service, whilst adjusting for the relative importance of the dimensions of benefit.

The approach adopted for this study extends the techniques used in the use of the expert panel beyond that previously reported, and represents the most rigorous use to date of expert judgment in the application of PBMA to priority setting in health care. The framework adopted here involves several key elements.

- (i) The expert panel for the decisions analysis exercise should consist of members of the management committee for the project, and an additional group of key stakeholders, including representatives from the community, and other mental health and primary health care agencies. This panel should represent a wide range of key interests in estimating the benefits associated with different options for changes in services.
- (ii) The expert panel should receive significant education and training in the principles of priority setting and decision analysis. The panel should have ownership of the process and the results of the study, and a prerequisite is that the panel understand the aims and techniques to be used. The panel should also be asked to complete exercises prior to the actual exercise, to make discussion meaningful and well considered.
- (iii) The panel should identify services which are to be evaluated, both in terms of services which may be introduced/expanded or withdrawn/contracted in the future. If full consideration of all options for future levels and types of services is to occur, it is vital that the panel owns the project, and understands the aims and importance of priority setting. To elicit a full range of services for consideration for expansion or contraction, it may be necessary to use a range of techniques in identifying services to be evaluated (for example by identifying services which would be expanded/contracted under hypothetical budget changes, or by identifying services which are, a priori, thought to offer relatively high or low benefits for clients).
- (iv) The panel should be allowed to define benefits, and the dimensions of benefits, which are relevant to the organisational context and the objectives of the organisation. The panel should be allowed full discussion of the meaning of benefits in order to gain a clearer, and shared understanding, of benefits in that particular context. The expert panel should determine descriptions of different levels of benefits under each different dimension of benefit to ensure that understanding of the nature of each dimension of benefit is clear, and shared by the panel.

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- (v) The expert panel should assess the relative importance of each dimension of benefit, as dimensions are unlikely to be of equal importance. Again, a range of techniques should be used to attempt to derive meaningful estimates of relative importance, and the panel should feel comfortable with the estimates it has given.
 - (vi) Each service, identified above, should be evaluated under each dimension of benefit, and “scored” according to the panel’s expert judgment. The panel should use their experience, and qualitative evidence where available, in arriving at their judgment. The panel should use the descriptions of different levels of the dimensions of benefit as a guide in “scoring” each service.
 - (vii) The panel’s scores for each service under each dimension of benefit should be combined in a model which accounts for relative importance of each dimension. The combined benefit score should be placed on a scale which is easy to understand, and the scores should be both intuitive and plausible. The panel should be able to return to parts of the exercise for validation if they feel a combined score is not plausible for a given service.

The decision analysis exercise results in measures of the benefits from a range of services, capturing the multi-faceted nature of benefits and their importance, and incorporating qualitative evidence. The benefits measures then give a guide to the effectiveness of individual services. For priority setting purposes, these effectiveness measures are then combined with information about the costs of different services, yielding measures of the relative cost-effectiveness of services. These cost-effectiveness measures can then be used as an aid to decision making in planning services. If the objective of maximising health related benefits from a limited budget is upheld this implies moving away from services with lower cost-effectiveness to services with higher cost-effectiveness.

3 The Options Appraisal Exercise Methodology

The options appraisal exercise was set up to take place over two consecutive days using independent facilitators. The expert panel used for the exercise should consist of a range of key stakeholders in mental health and Community Health services, to ensure a wide range of values, opinions, and expert knowledge in undertaking the exercise. To meet this need, invitations to participate as a member of the expert panel were extended to the pilot study management committee, service providers from other sectors of primary and mental health care, and to selected Community Health Service Board members to act as community representatives.

Members of the pilot study management committee included service providers, managers, finance officers, and systems controllers in Community Health, as well as representatives of the South Australian Health Commission Purchasing Office. Service providers from other sectors of primary and mental health services would provide expert advice in evaluating options for changes in services, and represent key population groups they provide services for, who are also significant users of mental health services in the Community Health sector. Community Health Service Board members would act as community representatives, and were to do so rather than consumers or general members of the community, as they have extensive prior knowledge and experience of mental health and Community Health issues, which was required given the time frame of the project. A more lengthy piece of research on benefits and evaluating services should seek to include consumers and general community representatives in such an exercise.

3.1 Dimensions of Benefit in Mental Health Services

The first step in the options appraisal exercise is to define precisely what is meant by benefit in the context of the study. This is not a trivial task, as benefits from health services may be diverse and complex, and as a result are frequently difficult to define. This often results in a lack of clear, and shared, understanding of the outcomes from different health services. The options appraisal exercise attempts to define the range of benefits from health services by eliciting different dimensions, or elements, of benefits which the expert group perceive as making up overall benefits from the services provided. This approach raises two key issues.

Firstly, dimensions of benefit identified by the expert group are specific to the context of the study. The elements of benefit identified by this exercise relate to the perceived benefits of mental health services provided within the Community Health sector in metropolitan South Australia. Such dimensions may not be appropriate for other types of services in Community Health, for health service areas other than Community Health, or for health services outside of South Australia. Hence, generalisation of study results must be done with caution. The specificity of the context in the options appraisal exercise reflects the underlying aim of PBMA to be tool for aiding decision making for specific problems.

Secondly, the dimensions must be mutually exclusive, or orthogonal. This means that each dimension of benefit should be separate and distinct from the other dimensions of benefit

identified, and the elements of overall benefit the dimensions attempt to capture should not overlap. If dimensions of benefit are orthogonal they will measure the separate and distinct parts of overall benefit. However, if the dimensions of benefit are not orthogonal, then different dimensions will measure the same elements of overall benefits as other dimensions. This leads to a problem of double counting. If a service is evaluated under dimensions of benefit which are not orthogonal then the some items of benefit will be measured and counted twice, and the overall benefit from the service will be overestimated.

The identification of dimensions of benefit, and ensuring orthogonality across dimensions, could represent a significant research project in its own right. To attempt to identify dimensions of benefit for this study a two stage process was adopted, involving work prior to, and during the two day exercise.

Prior to the options appraisal exercise the expert panel attended a workshop to introduce them to the aims and methods to be used. They were then asked to complete a preliminary exercise before the two day options appraisal workshop. The aim of the preliminary exercise was for members of the expert panel to become familiar with, and to discuss, potential notions of benefits and the possible different dimensions of benefit associated with mental health services in the Community Health context. This exercise sought to make the fuller discussion of benefits and dimensions of benefit at the options appraisal exercise more informed and meaningful.

The preliminary exercise asked members of the panel to consider what benefits clients may derive from Community Health services in general, and specifically benefits in relation to mental health services. The panel was asked to consider possible dimensions of benefits, and the meaning of those different dimensions. Given that the concept of benefits in health services is nebulous, the panel were given three possible examples of dimensions of benefit: health gain, equity, and empowerment. The panel was asked the following questions about these possible dimensions:

- (i) Are these dimensions applicable to clients receiving Mental Health services?
- (ii) Are you comfortable with these dimensions of benefit: are they intuitive and plausible?
- (iii) If the answer is no for either of the two above questions, what dimensions of benefits might be considered as being more appropriate?
- (iv) Also, do the above dimensions capture all pertinent areas of benefits to clients, and if not, what other dimension(s) should be included?

In defining dimensions of benefit, the panel was asked to attempt to ensure that dimensions be distinct and separate (obeying the principle of orthogonality) to avoid double counting benefits. The panel was given a set of possible, brief definitions for each of the three dimensions as a starting point for discussion:

(i) Health Gain

The level, or amount, of improvement in an individual's health gained from receiving a service. Health itself is multi-faceted, and can be examined in terms factors such as an individual's illnesses and symptoms, independence in everyday living, social relationships, physical senses, and psychological well-being.

(ii) Equity

Equity usually means fairness, in terms of social justice, for individuals and groups of individuals. Fairness may mean equality or inequality between individuals and groups, such that equals are treated equally, and unequals are treated unequally. An equitable service may be one which gives all individuals and groups the same opportunity to use that service, or it may be one which gives greater opportunities to socially disadvantaged groups (or simply those groups with unmet need for health care), with the aim of raising the health and well-being of those specific individuals. Equity in health care is most usually expressed in terms of access to health care, as equality of health across individuals is very difficult to achieve, and equality of use of health services restricts individuals' choices in health care decision making.

(iii) Empowerment

Empowerment may be thought of in terms of enhancing individuals' and communities' ability to take control of their lives and the environment around them. A service may be empowering if it enhances the communities cohesiveness either through participation or through the "structures" a service leaves behind; if it enables individuals to exert a greater degree of self determination in their health and the health of the community (both in terms of involvement in health service decision making and in terms of control over the environment within which they live); and if it enhances the degree of self-support in health for individuals and communities, and their ability to act as advocates for their own well-being.

The panel were asked to consider these definitions only as a starting point for discussion, and to consider the appropriateness of the dimensions and their descriptions in the context of Community Health and mental health services.

Members of the pilot study management committee were asked to meet in four small groups at Northern, Central and Noarlunga regions, and at SAHC, to answer the preliminary exercise. The other key stakeholders were asked to complete the preliminary exercise as part of their introductory workshop. The results and issues raised by these groups were intended to inform debate about benefits in the options appraisal exercise.

The first morning of the two day exercise was set aside to discuss benefits and dimensions of benefits, informed by this preliminary exercise. The session aimed to clarify values and notions of benefits in the context of mental health services in Community Health. The intention was to identify the distinct (and orthogonal) dimensions of benefits, by starting with a broad discussion of

benefits, and to distil out the separate elements within the broader notion of benefits. This requires considerable discussion of the meaning of different concepts associated with benefits, and clarification of those concepts. Through such a discussion the aim is to bring the expert panel to a shared understanding of the dimensions of benefits, and to attempt to ensure that dimensions are orthogonal. It is vital in this process that the dimensions of benefit identified come from the expert panel, and not the facilitators, so that ownership rests firmly with the panel. The purpose of the facilitators here is to clarify issues and concepts, and not to identify the dimensions of benefit themselves.

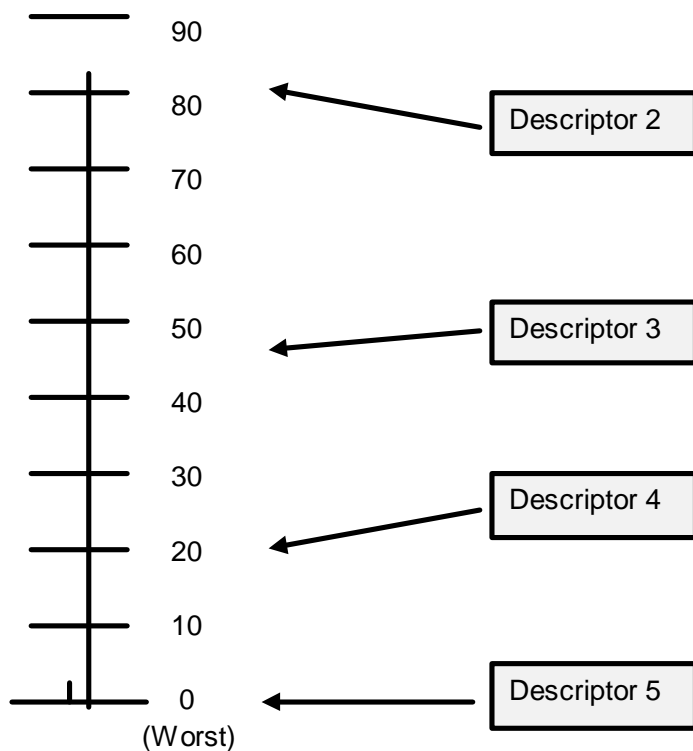
Having identified the dimensions of benefit, the rest of this session involves the expert panel determining appropriate descriptors for each dimension of benefit. These descriptors provide a description of the different levels under each dimension of benefit, which lie between the best and worst levels under each dimension. Since the options appraisal exercise asks the panel to rate services in terms of these different dimensions, it is vital that each member have a clear understanding of what type of benefit each dimension is intended to capture, and how to measure benefits under each dimension. Descriptors of different levels of benefits provide the panel with a clearer understanding of each type of benefit, and give them a guide to the different levels of benefit which may occur under each dimension of benefit. Moreover, not only should each panel member have a clear understanding of dimensions, it is crucial that members have the same, shared, understanding. To achieve this it is important that the description of each type of benefit is more than just a one line broad statement about that dimension of benefit.

To start this process the panel are asked to define the best and worst state for each dimension of benefit. The approach, is therefore, similar to that used in the construction of health utility instruments such as the AQL and the EuroQoL, where the best health state may be described as, for example, “full health”, and the worst as “dead” or “persistent vegetative state”. The major differences here are that the expert panel are outlining the best and worst state descriptors for multiple dimensions of benefit, and those dimensions and descriptors are specific to mental health in the Community Health sector.

Evaluating services for each dimension of benefit is be done later in the exercise using a rating (or visual analogue) scale ranging from 0 to 100. The descriptors for the best and worst state for each dimension are placed at 100 (best), and 0 (worst) to define the endpoints of the scale. Having defined the endpoints of the scale, the panel then is asked to decide on descriptors of different levels under each dimension which lie somewhere in between the best and worst states. The concept of interval properties of rating scales is then explained to the panel, and they are asked to place each descriptor on the rating scale where they feel the “value” of that level, or state, (for that dimension of benefit) should lie between best and worst. This exercise is illustrated in figure 1.

Figure 1: Descriptors for dimensions of benefits





The expert panel is asked to describe the best and worse possible states for the dimension of benefit of interest. These are descriptors 1 and 5 respectively in figure 1, and these are placed at the endpoints of the rating scale (0 is worst, 100 is best). The panel are then asked to describe 3 possible states (for example), or levels, of the dimension of benefits which are given by descriptors 2,3, and 4 in figure 1. Each member of the panel is then asked to place these intermediate descriptors on the rating scale, between 0 and 100. Where each descriptor is placed should reflect the panel members' assessment of the value of that level of benefit (the utility or level of satisfaction/pleasure they would associate with that level of benefit).

Each panel member's responses are collected, and the average value for the descriptors of each dimension are calculated. This gives a calibrated scale from 0 to 100 for each dimension, with descriptor states at different intervals on the scale. The positioning of each descriptor on the scale reflects the groups average values. This gives a calibrated scale for assessing services under each dimension, which should maintain the interval property required for rating scales. Moreover, through the process of constructing the descriptors the panel raises the level of shared understanding about the meaning and nature of different dimensions of benefit.

3.2 Weighting dimensions

The next stage is to assess the relative importance of each dimension benefit. It is very unlikely that all dimensions of benefit will have the same importance or significance. If dimensions have

differences in their relative importance they should be weighted, or adjusted, to reflect those differences. Whilst, the PBMA literature has recognised the need for weighting dimensions, expert panels in many studies have failed to reach agreement on an appropriate set of weights. These weights are crucial if the scores for services evaluated under each dimension of benefit are to be combined in a meaningful way. If the relative importance of dimensions do differ, but the panel cannot reach a decision about the size of the weights, there will be a serious shortcoming in the study results, as combining the score for benefits without weighting those scores implicitly gives each dimension equal importance (a weight of one). Therefore, whilst a panel may feel unclear at the outset about the relative importance of each dimension, failure to reach agreement on their relative importance leads to a clear, but implicit, statement that all dimensions are equally important. To attempt to avoid this problem the importance of weighting the dimensions of benefits was outlined at the workshops prior to the options appraisal exercise, in the preliminary exercise, and at the two day exercise itself.

The methodology used to assess the relative importance of each dimension again uses a rating scale, this time to compare, and value the different dimensions of benefit. Two approaches are used in this exercise. The first method, the bottom up method, uses a starting point of all dimensions of benefit at their worst level, and assesses the value, or utility, each panel member places on movements from the worst to the best state of different dimensions of benefit. The second method, the top down method, uses a starting point of all dimensions of benefit at their best level, and assesses the value, or utility, each panel member places on movements from the best to the worst state of different dimensions of benefit. Each panel member is asked to complete the exercise for both approaches, and their average values for the difference between best and worst states under different dimensions of benefit are calculated. The reason for using two approaches is that individual's valuations of the difference between the best and worst states may depend on the reference point which the individual starts at. This is due to framing effects, a concept, which put simply, states that how you ask a question may influence the answer you get. For example, it is fairly easy to see that an individual's response to an invitation to go white water rafting may differ if they were told in advance that they had an 80 per cent chance of returning alive, verses if they were told in advance they had a 20 per cent chance of drowning. Averaging the values from the bottom up and the top down methods is, therefore, an attempt to reduce the impact of potential framing effects.

The bottom up method for eliciting dimension weights is shown in figures 2 and 3. The first important issue to note is that this method makes use of valuing the importance of dimensions of benefit relative to the dimension of benefit of health gains to the individual receiving a health service. That is, one the dimensions of benefit from Community Health mental health services, health gains to individuals, was predetermined before the options appraisal exercise. The decision to ensure that individual health gain was included as a dimension of benefit in the study was taken by the steering committee prior to the options appraisal exercise, on recommendation by the Health Economics Unit. The rationale for this decision was that the fundamental aim of all health services had to be to provide health improvements for individuals, and that evaluation of all health services should include assessment of how effective those services are in providing

improvements in health for individuals. This decision was also unanimously accepted by the expert panel.

The bottom up method first asks panel members to assess the value, or utility of a move from worst to best possible health state for an individual, with all other possible dimensions of benefit at their worst level. This corresponds to asking the panel members how far they would move up the rating scale from the point 0, where all dimensions (including individual health gain) are at their worst level, to a point M, where individual health is at its best level, but all other dimensions remain at their worst level. Figure 2 shows this movement for two other possible dimensions for simplicity. Having determined the value M, each individual panel member then uses this point as the reference point for the rest of this part of the weighting exercise, as shown in figure 3. Each panel member is asked to assess, in turn, the position on the scale for each of the other dimensions of benefit, when it is at its best level, with individual health also at its best level, whilst all other dimensions remain at their worst level. That is, for each dimension in isolation, panel members are asked how much they would value (or how much would you be willing to pay for) a movement in that dimension from its worst to its best level, with health always at its best level and all other dimensions at their worst level.

Figure 2: Weighting dimensions - Bottom up method for individual health

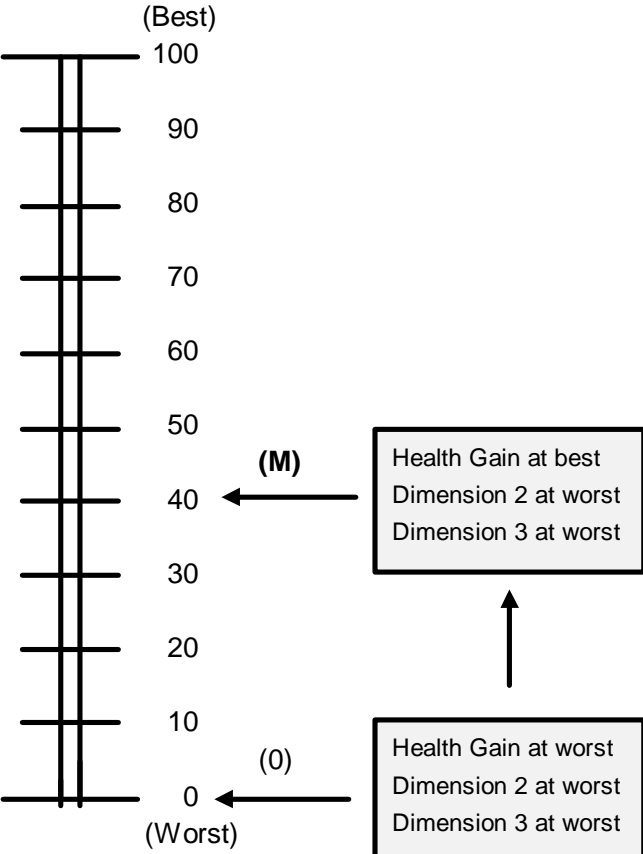
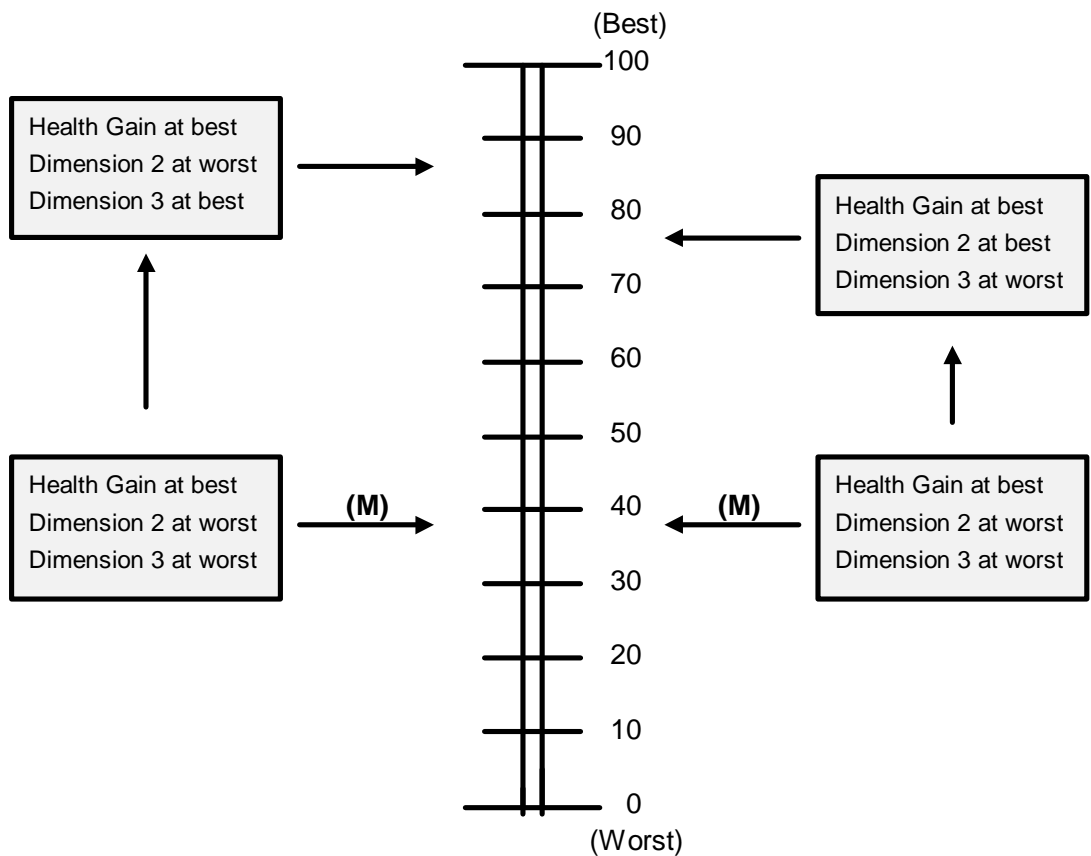
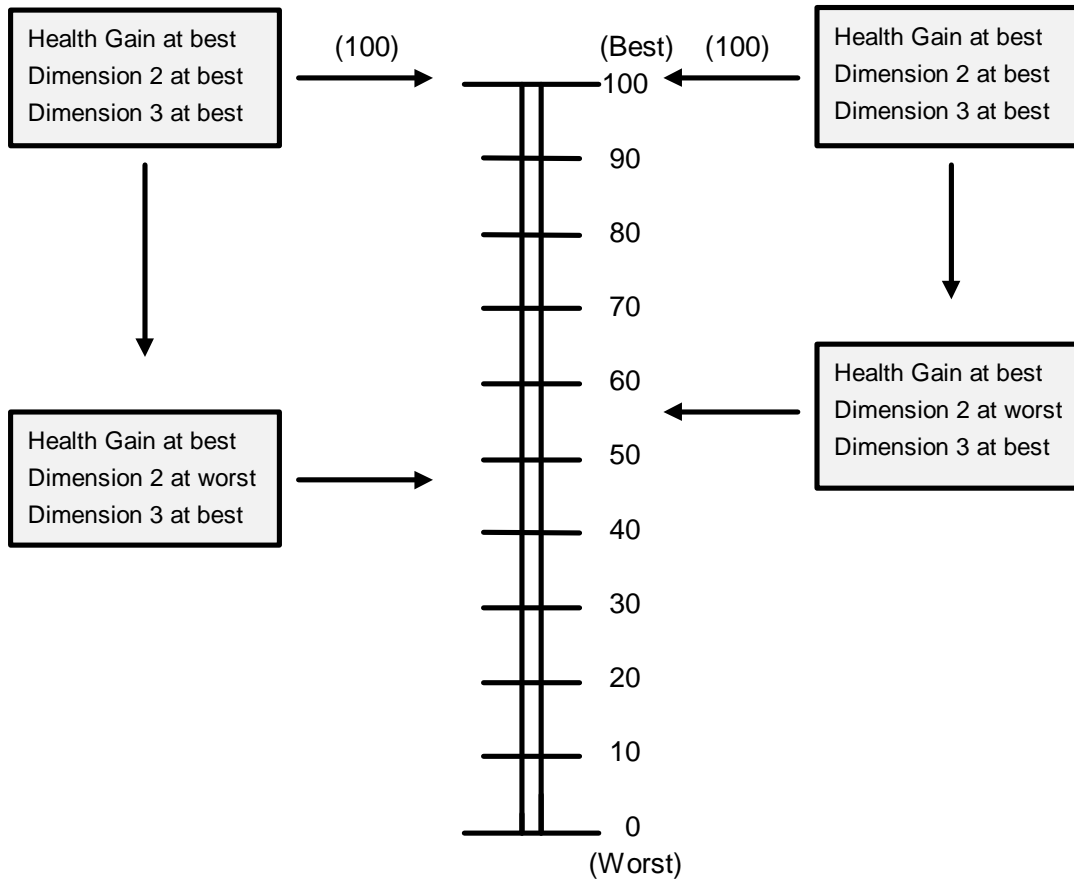


Figure 3: Weighting dimensions - Bottom up method for all other dimensions



The top down method for eliciting dimension weights is shown in figure 4. This method uses the top point of the scale, 100, as the reference point, where all dimensions are at their best level. Panel members are then asked, for each dimension in turn, how much value would they place on (how much would they be willing to pay to avoid) a move from a dimension's best to worst level, with all other dimensions held at their best levels. Note, these weights do not sum to 100, it is the relative size of each weight (the ratio of one weight to the others) which is determined by this process.

Figure 4: Weighting dimensions - Top down method



From these two methods the basis of the weights for the different dimensions of benefit are found. The bottom up methods yields the single value M , which forms the basis of the weight for the relative importance of individual health gain. The bottom up and the top down methods yield two sets of importance values for each of the other dimensions of benefit. The average value for each panel member is then found to adjust for the potential impact of any framing effects. The individual panel members average values for the other dimensions, and their values for M , are then used to construct the group average set of relative importance values. This average is then used to construct the importance weights. The two sets of information generated can be written as:

M = Group average for the maximum value of individual health when health is at its best level, and all other dimensions of benefit are at their worst levels.

W_i = Group average of the importance values for dimension i , where there are $i = 1, \dots, n$ other dimensions of benefits (the 'raw scores' for importance weights).

To construct a final utility, or combined benefit score for the services to be evaluated, the raw importance weights for all dimensions are re-scaled by a factor k , where:

$$k \sum W_i = 100 - M$$

so

$$k = (100 - M) / \sum W_i$$

and

$$w_i = k W_i / M$$

where w_i are the weights for each of the $i = 1, \dots, n$ other dimensions of benefit to be used in the model to calculate utility scores for each service.

3.3 Identifying Options for Change

Some published PBMA studies have reported significant difficulties in generating the options for changes to services to be evaluated. Primarily, some expert panels have found it difficult to, or have been unwilling to, identify services which they might consider for contraction in the future. In some cases this has led to the marginal analysis exercise failing completely, and the study has not been able to assess priorities (Street, Posnett and Davis, 1995). One suggestion to circumvent this problem has been to use patient flow models to identify all possible treatment options for individuals with a given condition (Posnett & Street, 1996). Whilst this approach may have some merits for a PBMA study with a disease based program structure, it is likely to be of limited use in PBMA studies with other types of program structure. Its applicability to this study is thus limited, as the focus is on a client or service based program containing many different conditions, and many different possible approaches to providing services for those conditions. Moreover, such an approach does not lend itself to identifying possible health promotion strategies, and may limit the number of suggestions for new and innovative types of services by constraining the consideration of options to a rather rigid treatment paths structure.

The approach adopted for this study focused on the education of the panel members, outlining that failure to identify options for contraction will mean that the available resources for Community Health are unlikely to be employed in the best way to serve the community. Considerable time was spent on the notions of opportunity cost and allocative efficiency to reinforce the need to be open about identifying and evaluating options for change. The study was aided in this process by reinforcing the pilot nature of the study: that the results would not be directly implemented, but instead would inform the development of a long term strategic planning approach.

In addition to the education and training of the panel, the pilot study management committee was also asked to answer 3 questions in the preliminary exercise addressing services which may be potential options for change in the future. The aim of this preliminary exercise was to stimulate thought and discussion before the full options appraisal. Three separate approaches to identify options were used to identify as full a list of options for change as possible. This also had the advantage of attempting to adjust for any potential framing effects in the way in which the committee were asked to identify options for change. The pilot study management committee

met in three regional groups, as each region was to evaluate its own services in this study, and to examine priorities only within their regional mental health services (and not across regions).

The three questions in the preliminary exercise were:

- 1(a) Identify those services which were provided in your region during the period January to June 1996, which are no longer provided.
- 1(b) Identify those services which are currently provided in your region, which were not provided during the period January to June 1996.
- 2(a) Of the services provided in your region during the period January to June 1996, identify those services which you feel gave relatively low benefits to clients, when compared to other services provided by your region.
- 2(b) Of the services provided in your region during the period January to June 1996, identify those services which you feel gave relatively high benefits to clients, when compared to other services provided by your region. Also identify services which your region did not provide in 1996 which you feel would give relatively high benefits, when compared to other services provided by your region.
- 3(a) If your region was facing a budget reduction of \$50,000 for January to June 1997, which services which were provided in 1996 would you choose to no longer provide (using the service costs as found in the program budget)? You may choose to no longer provide a whole sub-program, or to no longer provide services drawn from a range of sub-programs, or to scale down some existing services.
- 3(b) If your region was facing a budget increase of \$50,000 for January to June 1997, which services which were not provided in 1996 would you now choose to provide (using estimates of service costs drawing on the service costs as found in the program budget)? You may choose to provide an entire new sub-program, or to provide new services covering a range of sub-programs, or to expand some existing services.

In answering questions 2 and 3 the management committee were also asked to consider the following questions:

(i) *For existing services:*

Is there an ongoing need for the service in your community?

Is the service effective in meeting that need (and is there any evidence to support that the service is effective)?

Do other agencies provide the same or equivalent services - if so, is it “appropriate” for Community Health to provide that service. That is, would that service fit into the underlying principles and values of Community Health (for example, as laid down by the Ottawa Charter).

Is the service being provided primarily because other agencies do not provide that service, and otherwise the service does not really fit the underlying principles and values of Community Health?

(ii) For services which are not currently provided:

Are there needs in the community not currently being met which Community Health should (given the underlying principles and values of Community Health) be meeting?

What services would meet this need effectively (and is there any evidence to support that the service is effective)?

3.4 Evaluating Options for Change

The services identified as options for change are then evaluated by the panel. This is done by taking each service in turn and asking how well that service performs under each of the dimensions of benefit. To assess how well a service performs under each dimension the panel used the rating scale for each dimension as shown in figure 1. This rating scale has a range from 0 (worst) to 100 (best) for each dimension. The descriptors for each dimension are placed on the scale, using the group average position on the rating scale, to provide a guide for panel members in determining the position of the service in question on the scale. Panel members are not confined to choosing one of these descriptors as the relevant point on the scale to place a service, instead the descriptors are markers to aid panel members in evaluating services. Previous PBMA studies have not used this approach, instead only using a 0 to 100 scale with no descriptions added. This approach may lead to confusion and rather arbitrary scores for services under different dimensions, and may invalidate the interval property of the rating scale.

During the exercise the panel are split into regional groups to evaluate services, as the priority setting exercise as a whole is to be intra and not inter regional. Regional representatives would have the most complete knowledge of the relative merits of their services, and the exercise would not be used to examine cross boundary flows of resources between regions. However, whilst the potential reallocation of resources was only considered within, and not between Community Health Regions, the use of a ‘pan-regional’ panel in the pilot study allowed wider discussion of key issues and wider dissemination of information generated by the study.

For each service this exercise results in values for all dimensions of benefit. These values can be written as:

H = the value for individual health gain, on a 0-100 scale.

D_i = the value for dimension i on a 0-100 scale, where the are $i = 1, \dots, n$ other dimensions.

3.5 Modeling Benefit Scores

Prior to the options appraisal exercise, two models for combining benefit scores were presented to the PBMA project steering committee. The first model was the simple additive model given by:

$$U = w_H H + w_1 D_1 + \dots + w_n D_n$$

Where U is the utility, or combined benefit, score; w_H is the weight on individual health gain; and w_1, \dots, w_n are the weights on the other $1, \dots, n$ dimensions of benefit.

Under this model the combined benefit score, for a given service, is the sum of the scores for each dimension of benefit weighted for the relative importance of each dimension. Whilst this model is conceptually very simple, easy to understand, and is easy to compute, it has a major disadvantage. It is possible that a given service may score very poorly (or even zero) for individual health gain, but still have a high value of U due to high scores on other dimensions. For example, if equity is another dimension of benefit and a service scores highly on equity but zero on individual health gain we may get a high score for utility U. That is, the model may suggest that service performs well under our criteria and should be expanded in the future, when in fact the service is merely equitable in the way it is ineffective in providing health gains for individuals. Given the underlying principle of providing health care to yield health improvements for individuals, this property of the model may be highly undesirable.

To attempt to counter this undesirable property a second model was proposed using multiplicative weights for health for each service examined. The model is given by:

$$U = [1 + w_1 d_1 + \dots + w_n d_n] U_H$$

where

d_i = the value for dimension i on a 0-1 scale (ie $D_i/100$) (for a given service)

U_H = the utility of individual health gain (for a given service)

This model holds the property that if individual health gain is zero the utility score, U also goes to zero. Hence, positive combined benefit, or utility scores, for services can only occur if the service yields some improvement in the health of an individual using that service. Individual health gain in this model is then weighted by the importance of, and scores for, each of the other dimensions of benefits when a service is evaluated. The term U_H , the utility score for individual health gain is given by:

$$U_H = hM$$

where

h = the value for individual health gain on a 0-1 scale (ie, $H/100$) (for a given service)

M = Group average for the maximum value of individual health when health is at its best level, and all other dimensions of benefit are at their worst levels.

This model can be expanded to be used directly with the data elicited from the expert panel responses. The panel will determine the relative importance of each dimension, as shown in section 3.2, yielding the values M and W_i for the $i = 1, \dots, n$ other dimensions of benefit. Then the panel will determine the scores for each service to be evaluated over each dimension, H and D_i , for $i = 1, \dots, n$. These data can be placed directly into the formula.

$$U = \frac{H}{100} \left[M + \left(\frac{100 - M}{\sum W_i} \right) \frac{W_1 D_1}{100} + K + \left(\frac{100 - M}{\sum W_i} \right) \frac{W_n D_n}{100} \right]$$

to derive the utility score of the service (proof of the derivation of this equation is given in appendix 2). This utility measure has a 0 to 100 scale, with zero representing the worst possible utility score, and 100 the best possible utility score.

The PBMA project steering committee decided to adopt the second model for the purposes of the options appraisal exercise. The reasons for adopting this approach were again explained to, and agreed by, the pilot study management committee.

4 Results from the Options Appraisal Exercise

Prior to the exercise the pilot study management committee identified a range of key stakeholders to invite. These key stakeholders covered community representatives, together with service providers and managers from other primary and mental health care agencies. Individuals to be invited were identified where they had specific knowledge of primary, community, and mental health care, and also where they could represent key population groups which Community Health services seek to target (both current client groups and future client groups). Prior to the decision analysis exercise, the management committee identified several key stakeholder groups for which they felt representation was important. The stakeholder groups identified were: Aboriginal and Torres Strait Islanders, non-English speaking background, Gays and Lesbians, the disabled community, Divisions of General Practice, Child and Youth Health Services, Adult Mental Health Services, Adelaide Central Mission, and the Mental Health Resource Unit.

Invitations to participate in the options appraisal exercise were then extended to 27 stakeholders identified through the above process. Of the 27 invited, 6 could not attend the two day workshop, which meant the expert panel consisted of 21 stakeholders. Members of the expert panel are given in Appendix 1.

Two independent facilitators, Carol Beaver and Helen Morton from the Northern Territory Health Department, with considerable experience in mental health issues and in facilitating options appraisal exercises were brought in for the two day exercise. In addition Stuart Peacock, Rob Carter and Jeff Richardson, attended to provide advice on technical issues and help facilitate the exercise.

Shortly before the options appraisal exercise, the pilot study management committee received a half day workshop covering the aims and methods of the exercise. The other key stakeholders invited to participate also received a half day workshop covering the aims and methods of the options appraisal exercise, as well as introducing the background to the whole study, the principles of PBMA, and the work undertaken to construct the mental health program budget. These workshops sought to provide the background and aims of the study, and to clarify the role of the expert panel and any technical issues.

4.1 Dimensions of Benefit

A range of issues were raised by the preliminary exercise, these included:

- the distinction between long term verses short term benefits and approaches to their measurement;
- relevance/appropriateness and accountability as potential dimensions of benefit;
- the need for a clear definition of access if equity with respect to access is a dimension of benefit;

-
- potential uncertainty in achieving benefits from some services;
 - severity of an individual's condition and its relationship with health gain;
 - continuous verses discontinuous benefit streams over time; and
 - the potential for benefits to accrue from a service due to the specific individual running that service, and not due to the service per se.

One of the key themes which came from these workshops was that the Ottawa Charter (WHO, 1986) and primary health care policy in South Australia (Baum, 1995) provide a sound basis for starting to address values and benefits in Community Health services. As a result the pilot study management committee agreed prior to the options appraisal exercise that the principles from these documents would underpin the benefits measures developed by the expert panel. The preliminary workshops also presented the opportunity to clarify that the aim of the exercise was to evaluate benefits from services in terms of the benefits which clients receive, and not to evaluate benefits to the health service itself. Hence, the panel were instructed not to consider dimensions of benefit such as accountability, which relates to organisational goals rather than direct benefits for clients. Moreover, the panel was instructed to consider the outcomes for clients as benefits (such as individual health status improvements) and not to consider process based measures which are measures of the means to achieving the outcomes.

Identifying the dimensions of benefit at the options appraisal exercise itself proved to be the most challenging aspect of the whole exercise. This was not unexpected, given the multi-faceted nature of benefits from Community Health services, and the degree of ambiguity surrounding many concepts relating to benefits. The whole panel was first led in a general discussion to attempt to identify dimensions of benefit for clients. After some time, the group agreed to work with three dimension areas: health gain, community empowerment, and equity. The panel then split into three groups, with each group taking a single dimension to attempt to clarify its definition, and a set of potential descriptors for the best, worst, and several intermediate states under that dimension. The individual groups found this to be quite a difficult exercise, particularly within the time constraints of the exercise. These groups then reported back to the full panel.

It quickly became evident that some of the panel were uncomfortable with the process, and the definitions and descriptors suggested. As a result the panel backtracked to identify the areas which were troublesome, and the rest of the first day was then spent on defining dimensions, and descriptors for those dimensions. The major difficulties surrounded the dimensions of health gain and community empowerment. The main problems were unease with the concept of empowerment, and the need for a distinction between health gains at the individual level and health gains at a wider community level. Having identified these as the major problems, the panel then moved relatively quickly to agreeing a set of dimensions of benefit to be used for the exercise, which were: individual health gain, community health gain, and equity. The rest of this part of the exercise then concentrated on defining descriptors for the best and worst states under these three dimensions, and a range of intermediate states. The panel appeared to find this exercise somewhat easier than identifying the dimensions themselves, though it still required much discussion about the exact wording and meaning of descriptors. However, the result of

generating these descriptors seemed to be clarification and a greater understanding of the dimensions of benefits by panel members. Moreover, by changing to using the whole panel rather than three smaller groups in this process, a shared understanding appeared to emerge.

The dimensions of benefit and their descriptors were:

(i) Individual Health Gain

1. (Best) Individual has a sense of independence and well-being; belonging and acceptance; has acquired useful skills; is able to achieve their potential and is aware of social context and own needs and responds positively to life's challenges (ie. personal, interpersonal, and environmental) and is able to influence events around them.
2. Individual has a sense belonging and acceptance; but occasionally feels distressed and unable to resolve issues alone, but recognises need for help and able to gain assistance. Still able to respond to life's challenges, but less able to influence events around them.
3. Individual has a sense of distress and isolation, recognises need for help and able to seek help. Unable to respond to life's challenges in a positive way without assistance.
4. Individual has a sense of distress and isolation and recognises need for help. Unable to respond to life's challenges in a positive way without assistance, and is unable to access help.
5. (Worst) Individual is in crisis and unable to respond. At risk to self or others; isolated and unable to access help, yet has acute mental health needs.

(ii) Community Health Gain

1. (Best) Community knowledge, skills, and support to take action to deal with health issues of their collective health; to select, manage, and control services and planning/funding system; benefit is sustained and operates over the long term.
2. Community in real partnership with planning/funding system; with real input to decision making but no control. Benefits go beyond life of immediate project, but not sustained.
3. Community participation, but no ownership or control; limited influence on decision making. Benefits limited to life of project.
4. Token community participation; no impact on decision making; no influence; few choices. Benefits dissolve during life of project.
5. (Worst) Community with no participation in planning/provision; no ownership and control; plus divisive and disenfranchised.

(iii) Equity

1. (Best) Highly culturally appropriate, physically available, perceived to be accessible, free at point of use, and addresses circumstances which assist disadvantaged groups.
2. Culturally appropriate, available, perceived to be accessible, and addresses some circumstances which assist disadvantaged groups.
3. Culturally appropriate, available, perceived to be accessible, but only for relatively advantaged groups.
4. (Worst) Culturally inappropriate, only available and accessible to relatively advantaged groups. Does not consider special needs and presents barriers to disadvantaged groups.

The context for the equity dimension was defined as primary and community health services, with a societal perspective (ie equity issues relate to all groups within society).

The panel were then given rating scales for each dimension, with the best state for each placed at 100, and the worst state placed at 0. They were asked, for each dimension in turn, to place the other descriptors where they thought it was appropriate between the best and worst states on the scale. To do this they were asked to think of the value, or utility, associated with each descriptor relative to the best and worst states. This is equivalent to asking how much each panel member would be willing to pay for a move from the worst state in each dimension to the state given by the descriptor in question. Each individual panel member's responses were collected and the group average score for each descriptor calculated. The panel appeared to find this exercise to be fairly straightforward. The results were presented to the panel, and formed the basis for calibrating the rating scales for use in evaluating individual services. The group average scores used for the calibration of the dimension scales are shown in figures 5 to 7.

Figure 5: Descriptors for Individual Health Gain

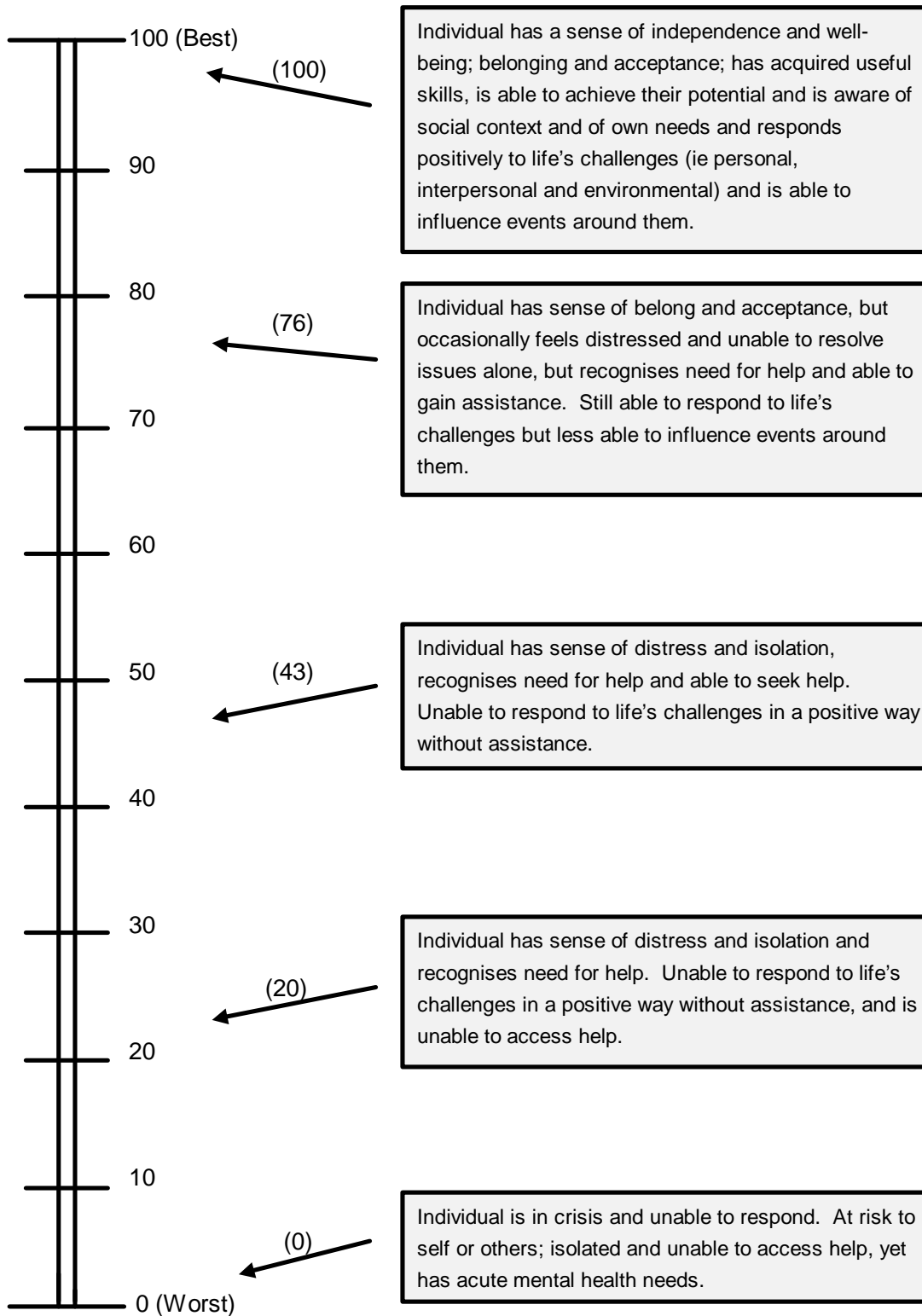


Figure 6: Descriptors for Community Health Gain

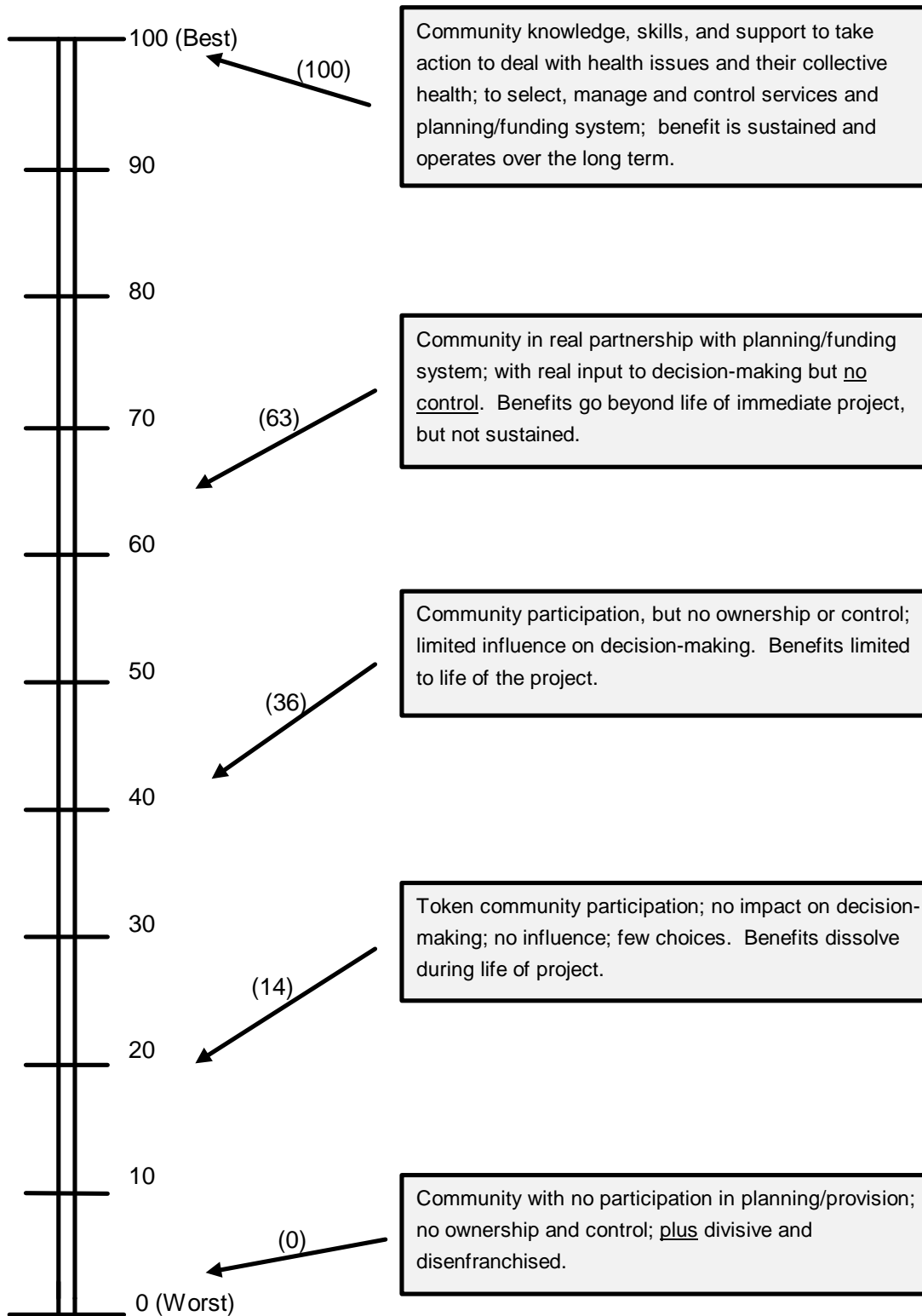
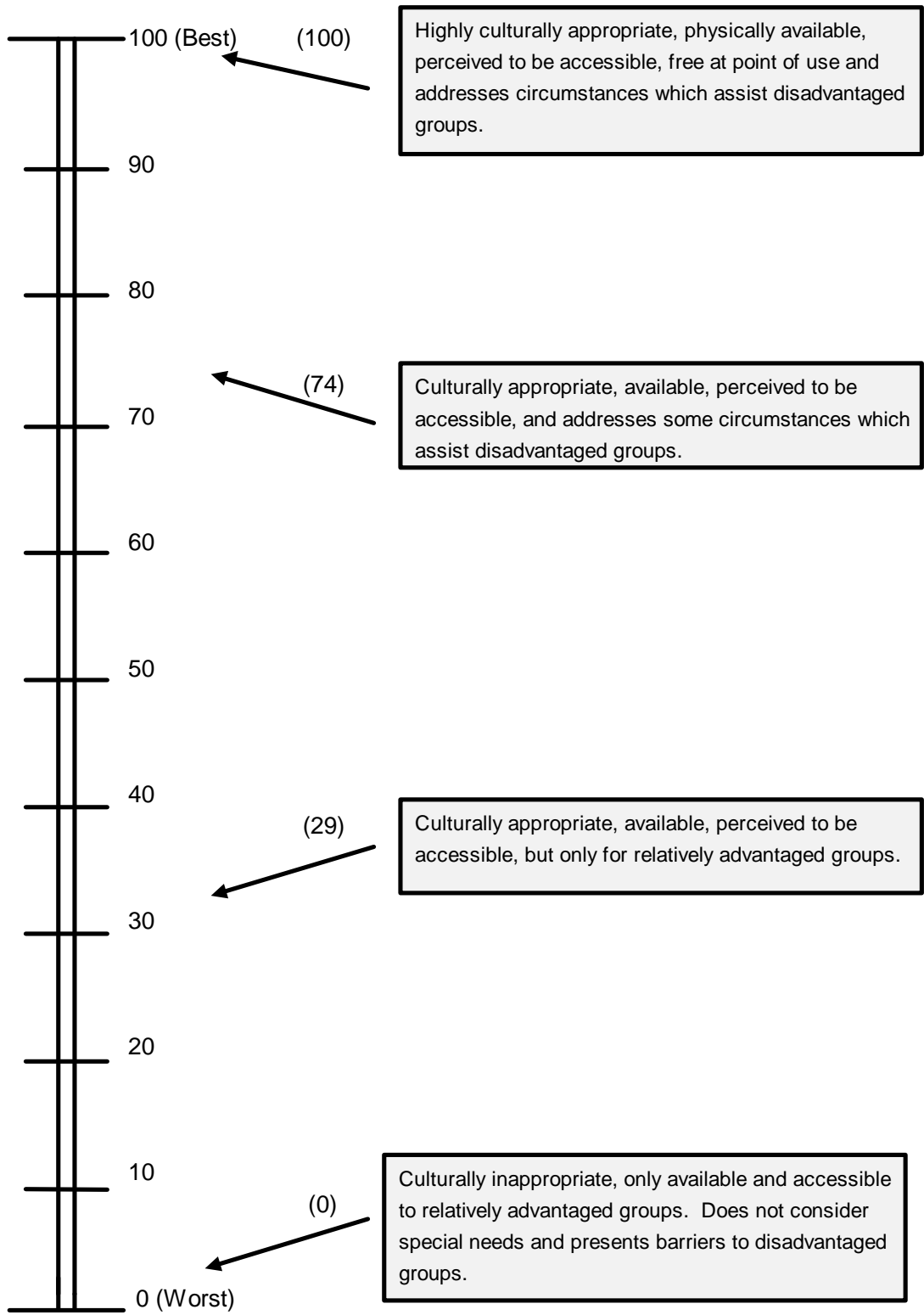


Figure 7: Descriptors for Equity



4.2 Importance Weights for Dimensions of Benefit

The next stage was to ask the panel to assess the relative importance of the individual health gain, community health gain, and equity dimensions of benefit, using the bottom up and top down methods outlined earlier. The panel found this part of the exercise quite difficult, partly due to the methodology used, and partly due to the difficulties associated with obtaining clear definitions of the dimensions of benefit. Results from individual panel members were collected, and the average of the scores for community health gain and equity from the bottom up and top down methods were calculated for each person. The scores from each individual were then used to calculate a group average for all three dimensions. These results were then presented back to the group, who agreed to use them for the rest of the exercise. The group average results are shown in table 1.

Table 1: Group average responses for dimension weights (raw scores)

Dimension	Top Down Method	Bottom Up Method	Dimension Weight (W_i)	Approximate Importance
Individual Health Gain*	Not Applicable	23.84	Not Applicable	21.3%
Community Health Gain	50.26	26.26	38.26	34.2%
Equity	66.05	33.37	49.71	44.5%

* Note, under the top down method Individual Health Gain is fixed at 100, and other dimensions are scaled against Individual Health Gain set at 100. An average value for Individual Health Gain is therefore not applicable as the dimension is constrained to be 100 under the top down method, and the score from the bottom up method is used as the dimension weight.

Table 1 shows that, on average, the panel placed most importance on equity as a dimension of benefit, followed by community health gain, with the least importance attached to health gains at the individual level. The final column of the table shows the approximate importance attached to each dimension, given by the percentage from dividing each dimension weight (W_i) by the sum of all dimension weights. This figure can act as a rough guide to the importance of different dimensions of benefit, as determined by the expert panel. The column shows equity was considered to be more than twice as important as health gains to individuals. Such a result may not hold for all parts of the health system but reflected the particular context of this study, and may be seen as largely compatible with many of the principles which underpin Community Health internationally and in South Australia.

The raw scores for importance weights (W_i) were then re-scaled following the method outlined in section 3.2 to derive the weights for use in the multiplicative model for combining the benefit scores.

Subsequent to the options appraisal exercise, panel members were asked to complete a validation exercise to explore the robustness of importance weights. The validation exercise used a person trade off methodology to compare results with the visual analogue (or rating) scale approach used above. Results from the validation exercise broadly supported the results shown in Table 1. The approximate importance attached to each dimension of benefit were: equity 45%, community health gain 27%, and individual health gain 28%. The equity weight was therefore very similar in magnitude, but the relative difference in weights for the other dimensions changed slightly. Such results are encouraging, as they indicate a good degree of consistency between the results under different methodologies, but they also indicate the need for further work in weighting the dimensions of benefit in the absence of a 'gold standard' approach to the problem.

4.3 Options for Change

Very little time was actually spent at the options appraisal exercise in the identification of options for change. The panel split into regional groups, and had little difficulty in identifying options for change for evaluation from those they identified as part of the preliminary exercise. In doing so, the groups displayed considerable willingness to consider changes to services in the future. In the context of the pilot study, the groups were asked to identify five services to consider as options for contraction, and five services as options for expansion. All regions identified five options for contraction, but in the end, time constraints in the exercise meant that Noarlunga could only evaluate three options on the day. Similarly, the panel had little difficulties in identifying options for expansion, but were limited by the remaining time available to evaluate those options. This resulted in Noarlunga evaluating three options for expansion, and Northern and Central four options (these two regions required an extra half day session to complete the exercise). The options which were identified, and subsequently evaluated were (with brief descriptions where they were available):

(a) Northern Metropolitan Community Health Service (Northern)

Options for Contraction

1. One to One Counselling
2. Post Natal Distress Group
3. Stress Management and Relaxation Groups
4. Cancer Support Group
5. Parenting Group

Options for Expansion

1. Kids and You
Focuses on the prevention of child abuse through sound mental health for families (based on UK newpin model). Based in local neighbourhood centres, integrating the families and children dealing with parenting etc., with some domiciliary visits and collaboration from other agencies. Will include NESB and Aboriginal and Torres Strait Islander communities.

2. Youth Suicide

Peer education, working in schools, training contact people in schools.

3. Aboriginal Mental Health

Examining how to involve the Aboriginal community in issues such as dementia, alcohol etc. Involves consultation with local communities in getting what the Aboriginal community wants from the program.

4. Saxon Street

Saxon Street has significant social problems, with a very high transient population, and high levels of violence and crime. Project would look to set up safe houses and to use peer education in the street. Includes collaboration with the local Housing Trust, Family and Community Services, and Playford Council.

(b) Adelaide Central Community Health Service (Central)

Options for Contraction

1. Promoting Mentally Healthy Communities Program (Music and Travel Groups - Health Promotion Activities)

The groups are run at various sites in inner Western Adelaide. Music group: highlight's mental health through public performance and develops social and musical skills among the socially isolated who may have diminished mental health. Travel group: helps isolated men and women with poor mental health to develop skills and to join mainstream clubs and groups.

2. COPE (Assertiveness, Stress and Conflict Groups)

Assertiveness, stress, and conflict groups. Run by COPE facilitators with site Community Health workers.

3. Elderly Social Isolation Groups

Krinkly Wobblies, Social groups, Port Owls, and Silver Threads groups run at Community Health Centres.

4. Long Term One to One Counselling

Counselling run at all sites, with small numbers receiving long term counselling.

5. Well-Being Project

Partly grant funded: health promotion activity in large secondary schools.

Options for Expansion

-
1. **Mental Health Awareness (Collaboration)**
A broad primary health care project aimed at raising the awareness of mental health issues in the region. Collaboration with other agencies, for example, South Australian Mental Health Service, McMhap project, and Western Nunga Health Association. Health promotion and education at a variety of venues, including a mobile health unit.
 2. **Aboriginal Family Health Program**
Aimed at addressing grief and loss, as well as counselling in the Western Aboriginal Community. Health promotion and community agencies will be a focus of the program, including the provision of group and individual sessions.
 4. **Early Intervention: Children under 12 years**
Aims for early identification of children at risk and includes those with developmental issues in pre-school years. Primary school children will be targeted through the health committees and health promoting schools programs, as well as raising awareness throughout the school communities.
 4. **Young Men and Risk Taking behaviour**
Targeting the 14-20 year age group. The program would aim to identify those at risk, raise community awareness, and promote and link with appropriate services. Health education, promotion, and support.

(c) *Noarlunga Health Services (Noarlunga)*

Options for Contraction

1. One to one counselling for registered clients (10% reduction)
2. One to one counselling for unregistered clients (10% reduction)
3. Food with friends
Community involvement in planning initial events to attract socially isolated community residents (single parents living alone, recently single, low income earners, and people from non-English speaking backgrounds). Fosters friendship and creates positive networks within this group, whilst providing a social occasion on a regular basis through the sharing of a meal.

Options for Expansion

- 1 Aboriginal health issues - grief and loss
- 2 Men - life changes
Young and older men's specific health service providing targeted programs for men in emotional/psychological areas, nutrition, health promotion, injury and safety, and culturally relevant specialised programs.
- 3 Integrated approach to mental health - coordination of mental health services in the region

Network with local service providers to identify local/regional priorities, develop integrated and coordinated strategies to ensure mental health services are provided in the most efficient, effective, and cost-effective.

4.4 Evaluating Options for Change

In evaluating these options for change the panel was instructed to use the rating scales developed earlier, with the descriptors placed on those scales as shown in figures 5 to 7. These descriptors were to be used as a guide in estimating the scores on dimensions for each service considered. The panel members remained in their regional groups to evaluate the options, with the score for each option determined by discussion and consensus amongst the group.

To determine the scores for each dimension the groups were instructed how to approach the scoring of each dimension. For individual health gain the group were asked to consider a representative individual receiving the service in question, and asked to estimate their initial health score or state, and their final health score or state. The difference between the score for the initial and final states would give the representative individual's change in health status. For options for contraction individual health gain was assessed in terms of the change in health status an individual would experience if they moved from the position of receiving that service, to a position where that service was no longer available to them. The measure of the change in individual's health was therefore a measure of the potential reduction in health for an existing recipient of those services, when the individual is facing a situation where those services will no longer be available. For options for expansion, individual health gain was assessed in terms of the improvement in health for an individual who moves from a position of never having received the service in question, to receiving that service.

Scoring community health gain was done in much a similar way, with the regional groups asked to determine the initial and final scores for community health gain, giving a change in community health gain associated with options for contraction and expansion. In the end, however, only the level of community health when the service is provided was used in modeling the utility scores. This meant that under the model used for this study the change in individual health gain was weighted by the level of the community health a service provided, rather than the change in community health gain due to the introduction or withdrawal of the service. The level of community health benefit is likely to be larger than the change in community health benefit, as prior to the introduction of a specific service many communities will not be at the worst position on the community health benefit scale shown earlier.

In scoring equity the regional groups were asked to estimate the level, or degree, of equity associated with the service in question (if it was provided). This score was then also used to weight the change in individual health gain for that service, as outlined in the model in section 4. Hence, the multiplicative model consisted of the change in individual health gain associated with the provision of a particular service, weighted by the absolute levels of community health and equity associated with that service.

Having elicited the scores for each dimension from each regional group, these scores were put into a spreadsheet which calculated the combined benefit score using the multiplicative model outlined above. Essentially this model takes the individual health gain for a representative individual and weights that score according to the level of community health benefit and the level of equity associated with that service. That is, a service which gives lower individual health gain will get a higher score if that service provides high levels of community health benefit, and is highly equitable. In doing this calculation the model also accounts for the relative importance of the dimensions of benefit which were estimated earlier in the exercise. The final, combined benefit score shows a measure of the benefit to a representative individual receiving the service in question. The combined benefit score lies between 100 (best benefits) and 0 (worst benefits), so services with higher scores provide relatively more benefit in terms of individual health gain, community health benefit, and equity, than services with lower scores. The dimension scores and combined benefit scores for the options are given by region in Table 2 (Northern) Table 5 (Central) and Table 8 (Noarlunga). Note, numbers receiving benefit for options for contraction refer to estimates of the current level of activity, not a proposed reduction in the numbers of individuals receiving that service. Numbers receiving benefit for options for expansion are estimates of the proposed size of services.

All regional groups successfully managed to evaluate all options for contraction and expansion. However, there were some reservations from the panel members that time constraints had made it difficult to arrive at a meaningful assessment of benefit in some cases. This was not seen as a major problem in the context of this pilot study, as study results were to inform future planning processes, rather than to inform current decisions.

Care must be taken in drawing comparisons across the three regions. Each regional group assessed their options for change in isolation, and may have arrived at benefit scores for those services from different value bases and using slightly different interpretations of the dimensions of benefit. The panel expressed a wish, in future exercises, that more time should be available in general in identifying and weighting benefits, and in evaluating options for change. Furthermore, the panel requested that the exercise include more emphasis on clarifying the values which underpin the notions of benefit in community health.

5 COST-EFFECTIVENESS RESULTS

5.1 Costing options for change

The cost estimates for each region's options for change are given in Table 3 (Northern), Table 6 (Central), and Table 9 (Noarlunga). Cost estimates for options for contraction (existing services) were derived from the program budget, developed earlier in the study (Peacock and Edwards, 1997). Cost estimates for the options for expansion (proposed services) were derived from estimates provided by members of the Project Management Committee. The number of individuals for options for contraction were the number of unique clients, or numbers receiving services, in the program budget (where available). For options for expansion these numbers was the estimated number of clients or individuals who would receive each type of service. Cost per individual figures were then calculated.

5.2 Cost-effectiveness of options for change

The combined benefit scores and cost per individual estimates were then combined to get an overall ratio of the cost-effectiveness of each service evaluated. The cost-effectiveness ratio is expressed in terms of a representative client for each service, as the combined benefit score provides a measure of benefit for each individual receiving the service. The cost-effectiveness ratio has a simple interpretation: for each service it shows how much each unit of the measure of benefits used in the study costs to provide. For example, a cost-effectiveness ratio of 5 implies each unit of benefit for an individual receiving that service costs \$5 to provide, or a ratio of 0.4 implies each unit of benefit for that service costs 40 cents to provide. The lower the cost-effectiveness ratio, the more cost-effective a service is. If, for instance, there was \$5,000 available to provide either of these services, then the most cost-effective service (with a ratio of 0.4) should be provided (all other things being equal) as it would give overall benefits of 12,500 verses benefits of 1,000 which would be provided by the alternative service (with a ratio of 5).

The cost-effectiveness ratios for each region's option for change are presented in Table 4 (Northern), Table 7 (Central), and Table 10 (Noarlunga).

Table 2: Benefit Scores for Northern region

Option	Numbers Receiving Benefit *	Individual Health Gain (H)	Community Health Benefit (C)	Equity (E)	Combined Benefit Score
Options for Contraction					
1 1:1 Counselling	567	65	50	60	43.1
2 PND Group	201	35	60	10	16.8
3 Stress Management	59	40	30	10	15.2
4 Cancer Support	534	50	70	10	25.7
5 Parenting	7	35	15	10	11.6
Options for Expansion					
1 Kids and You	125	70	100	90	67.0
2 Youth Suicide	60	60	85	80	51.9
3 Aboriginal Mental Health	30	60	70	90	51.5
4 Saxon Street	175	55	75	75	44.5

* Numbers receiving benefit refers to estimates of current numbers of clients for options for contraction, and estimates of proposed numbers of clients for options for expansion.

Table 3: Costs of options for change - Northern region (January - June 1996)

Option	Service Total Cost Estimate (\$)	Number of individuals	Cost per individual (\$)
Options for Contraction			
1 1:1 Counselling	142,269	567	251
2 PND Group	20,097	201	100
3 Stress Management	5,575	59	95
4 Cancer Support	5,678	534	11
5 Parenting	1,239	7	177
Options for Expansion			
1 Kids and You	78,000	125	624
2 Youth Suicide	6,522	60	109
3 Aboriginal Mental Health	8,762	30	292
4 Saxon Street	8,760	175	50

Costs presented here are based on the costing model developed for the PBMA study, and should be interpreted in light of the context of this study and the methodology adopted. They do not represent unit costs derived from an individual level costing exercise.

Table 4: Cost-effectiveness of options - Northern region

Option	Combined Benefit Score	Cost per individual (\$)	Cost/ Benefit Ratio
Options for Contraction			
1 1:1 Counselling	43.1	251	5.8
2 PND Group	16.8	100	5.9
3 Stress Management	15.2	95	6.3
4 Cancer Support	25.7	11	0.4
5 Parenting	11.6	177	15.3
Options for Expansion			
1 Kids and You	67.0	624	9.3
2 Youth Suicide	51.9	109	2.1
3 Aboriginal Mental Health	51.5	292	5.7
4 Saxon Street	44.5	50	1.1

Costs presented here are based on the costing model developed for the PBMA study, and should be interpreted in light of the context of this study and the methodology adopted. They do not represent unit costs derived from an individual level costing exercise.

Table 5: Benefit scores for Central region

Option	Numbers Receiving Benefit *	Individual Health Gain (H)	Community Health Benefit (C)	Equity (E)	Combined Benefit Score
Options for Contraction					
1 Promoting Mentally Healthy Communities	19	26	40	75	18.0
2 COPE	49	20	50	40	11.5
3 Elderly Social Isolation	49	25	50	55	16.0
4 Long Term 1:1 Counselling	1600	25	0	20	8.1
5 Well-Being Project	587	30	65	60	21.4
Options for Expansion					
1 Mental Health Awareness	150	20	80	60	15.2
2 Aboriginal Family Health	50	20	75	85	17.1
3 Early Intervention: Children	60	30	50	75	21.8
4 Young Men Risk Taking	25	20	40	65	13.0

* Numbers receiving benefit refers to estimates of current numbers of clients for options for contraction, and estimates of proposed numbers of clients for options for expansion.

Table 6: Costs of options for change - Central region (January - June 1996)

Option	Service Total Cost Estimate (\$)	Number of individuals	Cost per individual (\$)
Options for Contraction			
1 Promoting Mentally Healthy Communities	2,751	19	145
2 COPE	3,056	49	62
3 Elderly Social Isolation	8,821	49	180
4 Long Term 1:1 Counselling	320,312	1600	200
5 Well-Being Project	66,935	587	114
Options for Expansion			
1 Mental Health Awareness	11,000	150	73
2 Aboriginal Family Health	12,150	50	243
3 Early Intervention: Children	12,150	60	203
4 Young Men Risk Taking	16,500	25	660

Costs presented here are based on the costing model developed for the PBMA study, and should be interpreted in light of the context of this study and the methodology adopted. They do not represent unit costs derived from an individual level costing exercise.

Table 7: Cost-effectiveness of options - Central region

Option	Combined Benefit Score	Cost per individual (\$)	Cost/ Benefit Ratio
Options for Contraction			
1 Promoting Mentally Healthy Communities	18.0	145	8.1
2 COPE	11.5	62	5.4
3 Elderly Social Isolation	16.0	180	11.3
4 Long Term 1:1 Counselling	8.1	200	24.7
5 Well-Being Project	21.4	114	5.3
Options for Expansion			
1 Mental Health Awareness	15.2	73	4.8
2 Aboriginal Family Health	17.1	243	14.2
3 Early Intervention: Children	21.8	203	9.3
4 Young Men Risk Taking	13.0	660	50.8

Costs presented here are based on the costing model developed for the PBMA study, and should be interpreted in light of the context of this study and the methodology adopted. They do not represent unit costs derived from an individual level costing exercise.

Table 8: Benefit scores for Noarlunga region

Option	Numbers Receiving Benefit *	Individual Health Gain (H)	Community Health Benefit (C)	Equity (E)	Combined Benefit Score
Options for Contraction					
1 1:1 Counselling Registered (10%)	940	30	30	70	19.2
2 1:1 Counselling Unregistered (10%)	3842	23	14	75	14.0
3 Food with Friends	106	55	70	80	44.8
Options for Expansion					
1 Aboriginal Health	20	70	57	90	57.0
2 Men - Life Changes	20	35	65	90	29.4
3 Integrated MH Approach	5000	40	65	74	30.9

* Numbers receiving benefit refers to estimates of current number of clients for options for contraction, and estimates of proposed number of clients for options for expansion.

Table 9: Costs of options for change - Noarlunga region (January - June 1996)

Option	Service Total Cost Estimate (\$)	Number of individuals	Cost per individual (\$)
Options for Contraction			
1 1:1 Counselling Registered (10%)	243,513	940	259
2 1:1 Counselling Unregistered (10%)	90,809	3842	24
3 Food with Friends	13,040	106	123
Options for Expansion			
1 Aboriginal Health	12,500	20	625
2 Men - Life Changes	12,500	20	625
3 Integrated MH Approach	25,000	5,000	5

Costs presented here are based on the costing model developed for the PBMA study, and should be interpreted in light of the context of this study and the methodology adopted. They do not represent unit costs derived from an individual level costing exercise.

Table 10: Cost-effectiveness of options - Noarlunga region

Option	Combined Benefit Score	Cost per individual (\$)	Cost/ Benefit Ratio
Options for Contraction			
1 1:1 Counselling Registered (10%)	19.2	259	13.5
2 1:1 Counselling Unregistered (10%)	14.0	24	1.7
3 Food with Friends	44.8	123	2.8
Options for Expansion			
1 Aboriginal Health	57.0	625	11.0
2 Men - Life Changes	29.4	625	21.3
3 Integrated MH Approach	30.9	5	0.2

Costs presented here are based on the costing model developed for the PBMA study, and should be interpreted in light of the context of this study and the methodology adopted. They do not represent unit costs derived from an individual level costing exercise.

6 CONCLUSIONS AND RECOMMENDATIONS

The marginal analysis phase of the first PBMA pilot study in mental health services has been, in the main, a successful undertaking. Both the Project Management Committee and the expert panel for the options appraisal exercise demonstrated considerable willingness, and at times patience, to embrace new concepts and ideas in priority setting. Their openness to the process, which addresses some very difficult and potentially uncomfortable issues, contributed significantly to the successes of the pilot study.

Both the Project Management Committee and expert panel received significant amounts of information and training in the principles of priority setting and PBMA. This training is intended to help inform strategic planning in community health in the long term. However, for this pilot study to achieve this goal fully there is a need for the training of other community health and SAHC staff in aspects of priority setting, and a need for the wider dissemination of experiences with this study and its results. In particular, education of service providers is vital, as a lack of ownership by these staff members will dilute the usefulness of priority setting exercises.

The study has addressed notions of benefit in providing community health services in South Australia. Whilst these notions and definitions of benefits require further debate and clarification, they none the less represent a significant advance in the context of planning services in South Australia. Future priority setting exercises should revisit these definitions adopted in this study, and seek to clarify further their nature and the values that underpin them.

The options appraisal exercise resulted in the expert panel managing to use the agreed definitions of benefit to evaluate the effectiveness of a range of mental health services. Estimates of the costs per individual receiving services were then derived from the program budget for the options for contraction and options for expansion which expanded existing services. Estimates from the Project Management Committee were used for the cost of options for expansion where a new type of service was considered. Benefit and cost estimates were combined to derive a cost-benefit ratio for each service evaluated. This ratio gives an estimate of the cost per unit of benefit for each individual receiving the service in question. Tables 2 to 10 indicate that there was a mix of services considered to be relatively cost-effective (low cost-benefit ratios) amongst the options for contraction and expansion. This is not surprising, suggesting that some potential options for contraction appear to be cost-effective when subjected to more formal evaluation. Equally some options for expansion appear to be relatively poor in terms of cost-effectiveness. These results indicate the need for a rigorous approach to planning services based on the effectiveness of those services in providing benefits, and in terms of the resources used in providing those benefits.

Comparison of study results across the three regions must be done with caution. There appear to be some differences in the magnitude of cost-benefit ratios between the regions for similar services. These differences may be due to genuine differences in the effectiveness of services, the characteristics of individuals receiving those services, in the costs of providing services, and in the cost data for those services. However, differences may have also occurred if the regional

groups had slightly different understandings and interpretations for the dimensions of benefit. If this was the case then cross regional comparisons may not truly be comparing like with like. Future studies may attempt to reduce the potential for such differences using additional exercises to explore the meaning of benefits in community health, or by using a pan-regional group to evaluate the services in all community health regions.

Three other cautionary points emerged about the interpretation of the cost-benefit ratios. Firstly, the Project Management Committee expressed difficulties in arriving at the cost estimates for the options for expansion. These estimates may be less robust than the cost estimates derived from the program budget for existing services. In future more time may be needed for estimating the resource implications of options for expansion, and allowances made to discuss these at the options appraisal exercise. Particular attention needs to be given to estimates of staff and capital costs for options for expansion, and what component of each may be considered as variable or fixed costs. The level of fixed costs will have important implications for the expansion of services. Secondly, time constraints in the exercise prevented a full validation of the cost and benefit estimates for services. Again, in future more time may be needed in revisiting estimates to check their validity. However, the need for revisiting cost estimates may be reduced through the development of data systems which generate the cost information needed for PBMA and service planning in general. Thirdly, the study did not fully address issues concerning the size and importance of: community volunteer time in service delivery; the costs of buildings; and links in service delivery with other government and non-government agencies. Future work may be extended to give these issues fuller consideration and are linked to further consideration of the perspective to be used in PBMA (for example a societal perspective versus an organisational perspective).

The issues raised by the options appraisal exercise as a whole indicate that more time may be required for undertaking marginal analysis. One of the key issues in the future may be to undertake the exercise over a number of sessions, with time for further work and thought made available between these sessions. This model may mean holding three or four half day or day sessions over a period of several weeks. Extending the time and consideration given to the marginal analysis phase of PBMA becomes increasingly important if the results from future exercises are to be accepted and implemented as part of the health services planning process.

The marginal analysis phase of the study should be seen primarily as a process of learning and understanding. The results of this study do not provide definitive guidelines to priority setting in community health, reflecting the study's pilot nature. It is clear that the study has addressed a significant number of key issues, but further work is still required in several areas. The key issues addressed by this study include: the notions of benefits and their importance in Community Health; the importance of allocative efficiency, marginal analysis, and opportunity costs in planning services; and the need to evaluate services both in terms of the benefits they provide, and the resources they use. Further work is still required in the areas of identifying and weighting dimensions of benefit, of estimating the costs and benefits of services, and in the training and education of community health service staff. However, the results of the study do provide some

insight into the relative cost-effectiveness studies provide indications of some services which may, in the future, be considered as options for change.

It is important, however, that the results from this study are interpreted in their appropriate context. The cost-benefit ratios derived from PBMA studies are intended to be an aid to planning health services, and are not intended to be a definitive decision making rule. Many factors are considered in planning health services, of which cost-effectiveness may only be one, and these study results should be seen as one piece of information in aiding the planning process. The study results are also based explicitly on local judgement, and therefore should be used in conjunction with qualitative and quantitative cost-effectiveness information where it is available. Moreover, the results are therefore applicable to local circumstances and should only be generalised with caution.

Cost-benefit ratios generated by PBMA will be of use in the short to medium term in planning services. Services which have very low cost-benefit ratios should be interpreted as performing well under the criteria established by the study. Services which have very high cost-benefit ratios should be interpreted as performing poorly under these criteria. Intermediate cost-benefit ratios indicate services which need further work in evaluation.

Over time the resources used and the effectiveness of services may change, due to organisational changes, changes in the health services needs of populations, and advancements in service delivery leading to more effective services. Therefore, services may need to be re-evaluated in the medium to long term if particular circumstances have changed. PBMA is therefore an iterative process, which sets research agendas and which is aided by the development of data sources through time. The outcome is an ongoing management information system to aid service planning.

On completion of the final phase of the first PBMA pilot in mental health we would like to make the following recommendations:

- That strategic planning moves away from an input based focus to an outcome based focus, using programs which are consistent with the objectives, organisation and notions of benefit of Community Health Services in metropolitan South Australia.
- That planning processes seek to achieve clarity in notions of objectives and benefits in Community Health.
- That outcomes based strategic planning recognise the importance of allocative efficiency: the maximisation of the population's welfare from available resources for health services; and the importance of opportunity costs: the benefits forgone by providing a particular set of services.
- That outcomes based strategic planning is founded in the principles of marginal analysis, as a method of incrementally moving towards a goal of allocative efficiency.

-
- That the South Australian Health Commission should seek to inform outcomes based strategic planning through qualitative and quantitative evidence on outcomes from Community Health Services, and should seek to commission research wherever possible, where evidence is not available.
 - That the study process for the first pilot, and the issues raised, inform future PBMA studies and priority setting approaches. In particular:
 - ◆ These should be continued recognition of the importance of training and ownership in PBMA studies.
 - ◆ Community Health Services in South Australia are undergoing a process of change, and PBMA has contributed to that process.
 - ◆ Further work be undertaken in defining benefits and clarifying values across the expert panel.
 - ◆ The level of community representation and participation in establishing values, benefits, and their importance should be raised.
 - ◆ More time be available for the process of identifying and weighting the dimensions of benefit which underpin the marginal analysis exercise.
 - ◆ More time be available for the process of costing options for change, in particular options for expansion.
 - ◆ The SAHC and Community Health Regions should seek to develop costing systems which provide management cost information for the planning of services.
 - ◆ The SAHC and Community Health Regions should seek to train Community Health staff in the principles of priority setting and PBMA, and disseminate the issues raised and results from this pilot study.
 - ◆ The size and importance of the use of community volunteers in providing services, the costs associated with buildings, and the role other agencies in the provision of services be explored more fully.
 - ◆ The options appraisal phase of the study be approached by using three or four sessions with the expert panel, spaced over a period of four to eight weeks.

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Allocative efficiency

Allocative efficiency occurs when total benefit across all individuals is maximised from the resources available.

Economic evaluation

Identification, measurement, and valuation of costs and consequences associated with alternative services, treatments, and health care programs. A generic term for cost-benefit, cost-effectiveness, cost-minimisation, and cost-utility analyses.

Fixed costs

Cost which, in the short term, do not vary as output increases or decreases.

Marginal analysis

Analysis of changes in services at the margin. That is, examination of changes to existing levels of service provision and not just whether an entire set of services should or should not be provided. Changes are assessed in terms of marginal costs and marginal benefits.

Marginal benefit

Benefit from providing one extra unit of a service, or from providing services for one extra individual.

Marginal cost

Cost of providing one extra unit of a service, or of providing services for one extra individual.

Opportunity cost

The value of benefits forgone when resources are employed for one use, but have other potential uses.

Options appraisal

Technique which uses an expert panel to identify services to be evaluated, and to provide cost and benefit estimates for those services.

Program Budget

A summary of the costs and activity associated with a program (a coherent set) of health services.

Variable costs

Costs which vary as output increases or decreases.

Visual analogue (rating) scale

A scale, or ruler, which is used to rank and measure health related benefits.

Weights

Fractions, or ratios, which reflect the relative importance of different aspects of health related benefits.

Pilot Study Management Committee Membership

Mr Richard Hicks (Chairperson)	(Noarlunga Health Services)
Ms Roslyn Street	(Noarlunga Health Services)
Ms Sandy Edwards	(Noarlunga Health Services)
Mr Geoff Evans	(Noarlunga Health Services)
Ms Raven North	(Northern Metropolitan CHS)
Ms Cathy LeCornu	(Northern Metropolitan CHS)
Ms Bron Marie	(Northern Metropolitan CHS)
Ms Rosie Bonnin	(Adelaide Central CHS)
Mr Matt Dougherty	(Adelaide Central CHS)
Ms Pam Quick	(Adelaide Central CHS)
Ms Joanne Gell	(Purchasing Office, SAHC)
Mr Ian Hender	(Purchasing Office, SAHC)
Ms Nancy McWaters (Project Manager)	(Purchasing Office, SAHC)
Ms Alexandra Hurley (Project Assistant)	(Purchasing Office, SAHC)
Mr Stuart Peacock (Academic Consultant)	(Health Economics Unit, Monash University)

Steering Committee Membership

Ms Marguerite Tohl (Chairperson)	(Purchasing Office, SAHC)
Mr Richard Hicks	(Noarlunga Health Services)
Ms Liz Fudge	(Noarlunga Health Services)
Ms Adaire Garrett	(Northern Metropolitan CHS)
Ms Raven North	(Northern Metropolitan CHS)
Ms Marj Ellis	(Adelaide Central CHS)
Ms Claire Shuttleworth	(Adelaide Central CHS)
Mr Rob Carter	(Health Economics Unit, Monash University)
Mr Richard Cooke	(South Australian Community Health Research Unit)
Ms Nancy McWaters (Project Manager)	(Purchasing Office, SAHC)
Mr Stuart Peacock (Academic Consultant)	(Health Economics Unit, Monash University)

Options Appraisal Analysis Exercise Expert Panel

Mr Richard Hicks	(Noarlunga Health Services)
Ms Roslyn Street	(Noarlunga Health Services)
Ms Sandy Edwards	(Noarlunga Health Services)
Ms Raven North	(Northern Metropolitan CHS)
Ms Cathy LeCornu	(Northern Metropolitan CHS)
Ms Rosie Bonnin	(Adelaide Central CHS)
Mr Matt Dougherty	(Adelaide Central CHS)
Ms Pam Quick	(Adelaide Central CHS)
Ms Joanne Gell	(Purchasing Office, SAHC)
Mr Ian Hender	(Purchasing Office, SAHC)
Ms Jill Faulkner	(Second Story Youth Health Service)
Ms Jan Dolman	(Migrant Health Service)
Ms Julia Lamont	(Inner Southern Community Health Service)
Dr Claire Hale	(Purchasing Office, SAHC)
Mr Steve Griffiths	(Moodswing Education Centre)
Ms Maggie Carey	(Adelaide Central Mission)
Mr Jon Hare	(Noarlunga Health Services)
Mr Henry Lukowicz	(Board Member - Adelaide Central CHS)
Mr Paul Lamberts	(Board Member - Northern Metropolitan CHS)
Ms Nancy McWaters	(Purchasing Office, SAHC)
Ms Alexandra Hurley	(Purchasing Office, SAHC)

Facilitators for the Options Appraisal Exercise

Ms Carol Beaver	(Northern Territory Health Department)
Mr Stuart Peacock	(Health Economics Unit, Monash University)
Ms Helen Morton	(Northern Territory Health Department)
Prof. Jeff Richardson	(Health Economics Unit, Monash University)
Mr Rob Carter	(Health Economics Unit, Monash University)

Proof for multiplicative weights for health model

The 'basic' model is given by:

$$U = [1 + w_1 d_1 + K + W_n d_n] U_H$$

where the weights, w_i , and are given by:

$$w_i = kW_i / M$$

and

$$U_H = hM$$

Substituting for these yields:

$$U = \left[1 + \left(\frac{kX_1}{M} \right) d_1 + K + \left(\frac{kX_n}{M} \right) d_n \right] hM$$

Next substituting for k , where

$$k = \frac{100 - M}{\sum W_i}$$

Gives

$$U = \left[1 + \left(\frac{100 - M}{\sum W_i} \right) \frac{W_1 d_1}{M} + K + \left(\frac{100 - M}{\sum W_i} \right) \frac{W_n d_n}{M} \right] hM$$

and substituting for d_i and h yields.

$$U = \frac{H}{100} \left[M + \left(\frac{100 - M}{\sum W_i} \right) \frac{W_1 D_1}{100} + K + \left(\frac{100 - M}{\sum W_i} \right) \frac{W_n D_n}{100} \right]$$