



JobNut

Public Health Nutrition Intervention Management



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ADDITIONAL COPIES

The complete suite of 18 Public Health Nutrition Workforce Development units developed by the JobNut Project and the related Educator's Guide are available for downloading at the following website:

<http://www.medicine.tcd.ie/nutrition-dietetics/jobnut/>

DISCLAIMER

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Evaluation

Unit 16 - Economic Evaluation

Learning Objectives

On completion of this unit, students should be able to:



1. Describe the value of economic evaluation in public health nutrition intervention management
2. Identify and detail the different types of economic evaluation
3. Apply an economic evaluation framework to public health nutrition interventions to measure intervention efficiency
4. Explain the relationship between effectiveness, efficiency and equity in economic evaluation

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Unit Readings



- Wang, L., Yang, Q., Lowry, R. and Wechsler, H. Economic analysis of a school-based obesity prevention program. *Obesity Research*. 2003. 11(11): 1313-1324.
- Gusi, N., Reyes, M., Gonzalez-Guerrero, J., Herrera, E. and Garcia, J. Cost-utility of a walking programme for moderately depressed, obese or overweight elderly women in primary care: a randomised controlled trial. *BioMed Central Public Health*. 2007. 8: 231-241.
- Hagberg, L. and Lindholm, L. Is promotion of physical activity a wise use of societal resources? Issues of cost-effectiveness and equity in health. *Scandinavian Journal of Medicine and Science in Sports*. 2005. 15(5): 304-312.

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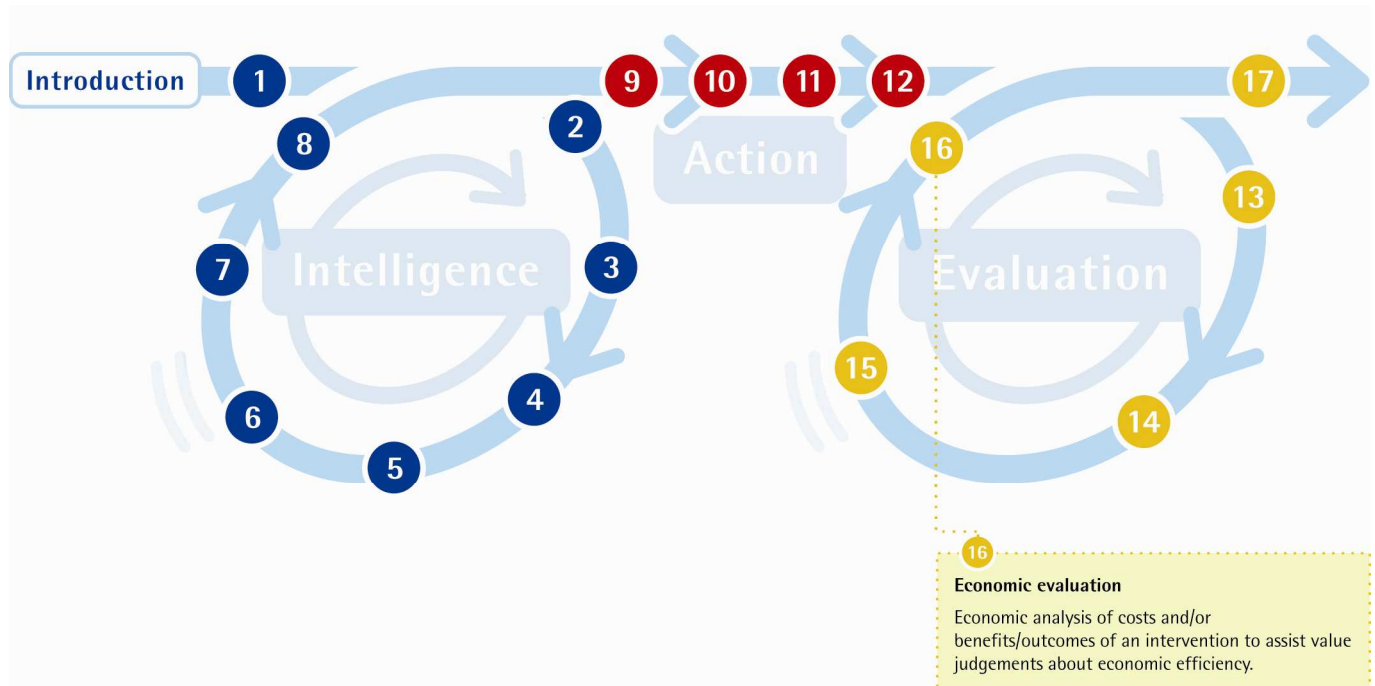
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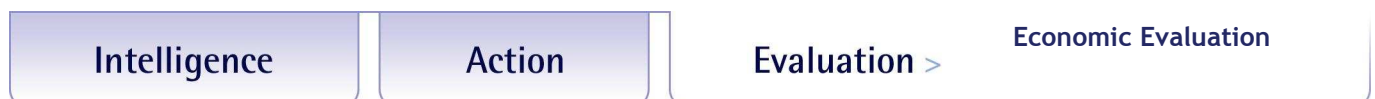


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From: Hughes R, Margetts B. *Public Health Nutrition: A Practitioners Handbook*. Blackwell Publishing, 2009.





Economic Evaluation

Preamble

Economic evaluation is an under-used but arguably essential component of public health nutrition (PHN) intervention evaluation. Economic evaluation considers assessment of intervention effects in economic terms, which is often of greatest interest to fund allocators. Economic evaluation requires a considerable degree of expertise that is often outside the scope of an individual public health nutritionist's personal competencies however it is important to consider economic evaluation opportunities in the context of evaluation planning and practice.

Cost and Consequence in Health Care

Economic evaluation is an essential component of PHN intervention evaluation. Intervention evaluation involves two measures; (i) the health effects or effectiveness of the intervention (impact, outcome and capacity gain measures), and (ii) the value or efficiency of the effects (economic evaluation). Knowing the outcomes or effects of an intervention is essential for economic evaluation to be undertaken, no intervention can be more efficient or cost-effective than the alternatives unless it is effective (1). Performing economic evaluation of PHN interventions is important to enable comparisons between interventions with similar and different outcomes, and help decision makers prioritise society's scarce health care resources (2).

In a truly practical sense, economics is the ultimate arbiter of intervention implementation. Resources for public health nutrition and health promotion are finite thus ensuring value for money is an important objective for those delivering and funding interventions (3, 4). Professionals in preventive health practice cannot underestimate the importance of cost and consequence of the activities they deliver. Health funding is limited and prevention activities are notoriously underfunded due to historical political power in traditional medicine disciplines and societal trends of overplaying the role of treating illness rather than preparing the well for future health. Economic evaluations can show public health and health promotion interventions in a comparable measure of value with treatment interventions (5).

Characteristics of Economic Evaluation

Economic evaluation involves identifying, measuring and valuing both the inputs (costs) and outcomes (benefits) of the intervention/s and their selection is dependent upon the problem being addressed and the perspective of the study. As discussed in Unit 14, the intervention goal and objectives set the criteria of success for the intervention outcomes according to the determinant analysis of the PHN problem.

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In terms of perspective, there are two broad areas of perspective for economic measurement:

- **provider or narrow perspective** - the evaluation is designed for a particular customer - commonly the organisation implementing or funding the intervention - who needs to understand the costs involved, the potential savings resulting from the intervention and what improvements in health the target population will gain.
- **societal perspective** - evaluation involves considering broader impact than that immediately affecting the provider, to capture all relevant costs borne by providers, potential beneficiaries, coexisting provides to produce an aggregate of all costs and benefits that accrue across society as a whole (5).

Economists would argue that the provider approach has great limitations because the ranking of interventions in terms of value for money may be very different if the analysis includes all costs and benefits not just those incurred by the provider.

Exercise 1.



Considering you selected scenario explain the both advantages and disadvantages of undertaking a narrow perspective or a societal perspective for your economic evaluation. Outline which perspective you will take, providing an explanation for your selection.

Workshop/tutorial option:

Complete the exercise in small groups followed by a whole-class debriefing

CPD option:

Conduct the above exercise in the context of your current work role and an identified nutrition problem in the community or population you are working with.

A further distinction can be made between evaluations of health interventions in that they can be partial or full economic evaluations. **Full evaluations** consider both inputs (costs) and outcomes (benefits), and compare both aspects across alternative interventions. **Partial evaluations** include only some elements of inputs and outcomes (3). Table 1 shows the characteristics of partial and full economic evaluations. These characteristics are described in further detail in the next section

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Table 1. Characteristics of partial and full economic evaluations

Is there comparison of 2+ alternatives?	NO	Are both costs and benefits analysed?		
		NO		YES
		Examines only consequences	Examines only costs	
YES		Outcome description	Cost description	Cost-outcome description
		Effectiveness evaluation	Cost analysis	Full economic evaluation <i>Cost-minimisation analysis</i> <i>Cost-effectiveness analysis</i> <i>Cost-utility analysis</i> <i>Cost-benefit analysis</i>

Types of Economic Evaluation

Various types of partial evaluation include outcome description, cost analysis and or cost-outcome description and each of these types of measurement can be undertaken on a single intervention. The procedure of costing health promotion interventions however presents several problems. Many interventions involve time and resources from a range of individuals and agencies that are often engaged in a range of activities, in addition to the intervention of interest. Tracing all inputs and finding valuations for all the various resources used can be very difficult in PHN interventions, however should not deter intelligent estimates being made.

A **cost-outcome description** may examine for example, the relationship between level of resources and intervention participation. Costs in terms of resources used could be assessed by considering contributions of the community in time, money or materials, plus the professional input including time, education materials, media costs etc, and may be collected through questionnaires and reviewing records or receipts (3).

Outcome description or **effectiveness evaluation** has limited use economically, as the resources used to achieve the different outcomes is not considered. Similarly, just conducting a **cost description** or **cost analysis** is limited by the fact that economically efficient interventions do not necessarily yield the best outcomes.

Evaluations that consider both outcomes and resources use can be considered full economic evaluations, of which there are four distinct types: cost-minimisation, cost-effectiveness, cost-utility and cost-benefit. Each type expresses inputs or costs in monetary units however different in how the principal outcome is measured. Table 2 illustrates the main features of each type of full economic evaluation.





Table 2. Different types of full economic evaluation

Type	Cost Measure	Outcome identifier	Outcome measure	Comparison
Cost-minimisation analysis	Monetary terms	Identical in all respects	None	Lowest cost for equal result
Cost-effectiveness analysis	Monetary terms	Single effect of interest, common to both alternatives but achieved to different degrees	Natural units (body wt, fruit and vegetable intake, glucose level, blood pressure, life years)	Example: € : kg wt loss
Cost-utility analysis	Monetary terms	Simple or multiple effects, not necessarily common to both alternatives	Quality adjusted life years (QALYs) Disability adjusted life years (DALYs)	Example: € : QALY
Cost-benefit analysis	Monetary terms	Single or multiple effects, not necessarily common to both alternatives	Monetary terms	Example: € : €

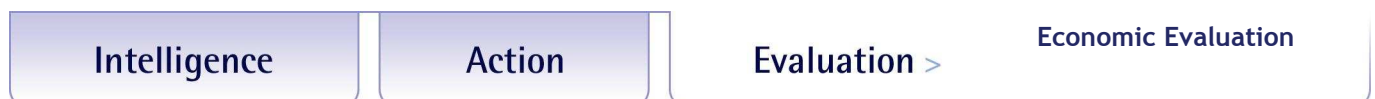
Cost-minimisation analysis

Cost-minimisation involves the comparison between two or more alternative interventions whose outcomes are assumed to be exactly the same. A strong assumption for this method is that all consequences of the alternative interventions are the same. For example, in addition to direct benefits some PHN interventions may have consequences or additional benefits such as reducing future demands on health care resources. The individual benefits may be assumed to be the same, however interventions could have a number of additional consequences and assuming equality of all consequences in monetary terms may be difficult. Generally, this method is not recommended (3).

Cost-effectiveness analysis

Cost-effectiveness is the most common type of economic evaluation in health care. The individual benefit is usually measured as a quantifiable unit, either behavioural (fruit and vegetable intake) or a health outcome (glucose/ blood pressure level). Such measures have been criticised for failing to recognise the broader potential benefits from PHN interventions however quantification of measures is required. Robroek et al (6) considered the direct-costs of medical service consumption (contacts with health professionals) and indirect-costs of loss of productivity in two year a worksite health promotion programme on physical activity and nutrition in the Netherlands. The cost-effectiveness ratio was also calculated on general health and risk for cardiovascular events.

It is important to note that without a common health measure, cost-effectiveness analysis cannot be used to compare interventions. Cost-effectiveness analysis is most suitable when programs with the same health aims are being compared and these health objectives are the primary outcomes of interest (3).





Cost-utility analysis

Cost-utility analysis uses a common measure of outcome that enables a comparison between a range of interventions including between health promotion interventions, or between a health promotion intervention and a treatment approach (4). Benefits or outcome measures are expressed as a measure that reflects how individuals value or gain utility from the quality and length of life, namely QALYs (quality adjusted life years), DALYS (disability adjusted life years) or HYE (health year equivalents). Calculating QALYs involves combining life expectancy with the measure of health related quality of life attributable to the intervention. For example, if health-related quality of life is valued on a scale of 0 (death) to 1 (perfect health) and an intervention increases the quality of life for an individual from 0.5 to 0.9 for 10 years, then the intervention yields a health gain of 4 QALYs ($10 \times (0.9 - 0.5)$).

Gusi et al (7) provides an example of using QALYs to assess the cost-effectiveness of adding a supervised walking program to best practice for overweight, moderately obese and moderately depressed women in Spain. Outcome measures for the study were health care costs and QALYs. Each QALY gained by the intervention was costed against the control and was shown to be both feasible and cost effective.

While useful for comparing outcomes across health care interventions, cost-utility measures when improvements in population health are observed but individual change is relatively small or difficult to quantify. In addition, PHN interventions can have non-health benefits for target populations such as increasing self-efficacy or confidence which may translate into healthier choices but not necessarily changes in health-related quality of life (3).

Cost-benefit analysis

Cost-benefit analysis measures all outcomes in monetary terms and relies on creating or calculating monetary values of health benefits and costs to conclude if one side is greater than the other - commonly expressed as cost-benefit ratio (5). This method is useful for comparing interventions with many diverse outcomes and is the most appropriate method for economic evaluation of inter-sectoral interventions which involve communities and involve numerous different agencies. Currently available utility-based health measures are unlikely to capture all these outcomes (3).

Wang et al (8) provide an example of a cost-benefit analysis of a school-based obesity prevention program in the United States of America. The three categories of costs measured include: intervention costs, medical care costs associated with adulthood overweight, and costs of productivity loss associated with adulthood overweight. The results showed that at an intervention cost of \$33,677 or \$14 per student per year, the intervention would prevent an estimated 1.9% of the female students becoming overweight adults. Furthermore, society could expect to save an estimated \$15,887 in medical care costs and \$25,104 in loss of productivity costs.

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Practice Note



Conducting a thorough economic evaluation required specialised health economics expertise and can be a rather resource intensive process. Ideally economic evaluation should only be undertaken if the benefits of improving efficiency of health resources outweigh the costs of evaluation.

There is no consensus of opinion of which method is best and the decision is likely to be limited to the type and quantity of information available, and time and resource restraints. **Choose a method that is most appropriate to the data available.**

Although funding agencies financing PHN interventions will be interested in the economic benefit from an organisational perspective most agencies would prefer to promote the societal benefits the intervention they funded had, hence taking a societal perspective to economic evaluation is preferred.

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Reading

Gusi, N., Reyes, M., Gonzalez-Guerrero, J., Herrera, E. and Garcia, J. Cost-utility of a walking programme for moderately depressed, obese or overweight elderly women in primary care: a randomised controlled trial. *BioMed Central Public Health*. 2007. 8: 231-241.

Exercise 2.



After reading the articles by Gusi et al (2007) consider you selected scenario and decide which type of economic evaluation is best suited to your intervention evaluation. Describe the rationale for your selection and detail the inputs and outcomes to be included in your economic evaluation.

Workshop/tutorial option:

Complete the exercise in small groups followed by a whole-class debriefing

CPD option:

Conduct the above exercise in the context of your current work role and an identified nutrition problem in the community or population you are working with.

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Conducting an Economic Evaluation

The main steps to consider when conducting an economic evaluation are outlined below in Table 3. To undertake a high-quality economic evaluation a multidisciplinary team containing both economists and public health nutritionists is required. Further information about conducting an economic evaluation can be found in the additional reading list at the end of this unit.

Table 3. Main steps of economic evaluation

Step	Description
Defining the economic question and perspective	<p>Choice of study is either:</p> <ul style="list-style-type: none"> • comparison between <i>single health promotion intervention strategies</i> (healthy eating social marketing v's policy change at workplaces), or • comparison between <i>multiple health promotion intervention strategies</i> (social marketing + education verses policy change + social marketing at workplaces), or • comparison between <i>health promotion and treatment alternative</i>. <p>Decision to take a narrow/provider perspective or a societal perspective.</p>
Determining the alternatives to be evaluated	<p>Full economic evaluations require two or more alternatives to be compared. A prior appraisal reviewing costs and benefits in broad terms may assist to create a short list of options.</p> <p>One option is to do nothing, with a comparison between benefits and costs of the PHN intervention compared with the predicted population health/ healthcare costs of maintaining the status quo.</p> <p>Multi-component interventions may also be compared by comparing the results of adding different components to core activities or more intense activities with certain groups.</p>
Choosing the evaluation design	<p>Choosing evaluation design involves selecting the economic evaluation method (partial or full) and type. The appropriateness of choice depends on the context and PHN problem being addressed.</p> <p>Full economic evaluations occur at the end of the evaluation process measuring intervention progress and effectiveness. Economic data would be collected concurrently with the effectiveness data, though costs may be collated retrospectively.</p>



Table 3. *Continued*

<p>Identifying, measuring and valuing the costs</p>	<p>The full range of costs to be identified include:</p> <ul style="list-style-type: none"> • <i>direct costs incurred by the health promotion agency</i> - consumables, staff costs, overheads • <i>direct costs to other agencies</i> - staff time, resources (other agencies will have staff and resource opportunity costs) • <i>direct costs to participants</i> - travel, childcare, other expenses including difficult-to-measure costs such as distress, worried-well syndrome • <i>productivity costs</i> - loss of productivity due to participation, during working hours, leisure time etc. <p>It is advisable to show these costs separately so readers can examine the estimated costing for each item.</p> <p>A decision to exclude any costs should be justified - such as identical costs for some items between alternatives.</p>
<p>Identifying, measuring and valuing the benefits</p>	<p>Measuring, identifying and valuing the effects of alternatives varies with each type of economic evaluation:</p> <ul style="list-style-type: none"> • <i>cost-effectiveness analysis</i> -uses process measures (for example, number of leaflets distributed) and/or outcome measures (process measures must be adequate proxy for the outcomes of the alternative intervention being compared) • <i>cost-utility analysis</i> - uses a broad health measure such as QALY or DALY (QALYs are a set of health descriptors that measure changes in health status as a result of the intervention, for example EQ-5D) • <i>cost-benefit analysis</i> - values health outcomes in monetary terms. Methodologies range from market valuations to asking people about their willingness to pay. (more useful at capturing more subtle changes and can include other benefits in addition to direct health benefit such as non-health benefits, social diffusion effects and effects on future resource use)



Table 3. *Continued*

<p>Adjusting costs and benefits for the differential timing</p>	<p>Some health benefits and health care savings will occur at a different time than the direct costs of the health promotion intervention.</p> <p>Considering the costs and benefits over as long a period as is practicable and discounting future costs against those in the present compensates for the fact that people value future benefits or costs less than those that occur at present. This process is called time discounting and is common commercial economic practice.</p> <p>There is much debate about the exact value and necessity for discounting in economic evaluation of health promotion interventions particularly as discounting gives lower weight to potential future health care savings.</p>
<p>Measuring incremental costs and benefits</p>	<p>Knowing the extra costs or benefits for one extra unit of activity is an important element of economic evaluation as comparing alternatives may be more a decision between how much of A and how much of B rather than a choice between A and B. For example, mass-media campaign about fruit and vegetables may be less effective than a direct mailing strategy at low levels of expenditure but have much greater reach and effectiveness at high levels of expenditure.</p> <p>Valuing the costs or benefits of units of activity may be hard to define and the average cost of a unit may vary with the level of fixed costs. For example, the set-up costs for producing 1000 leaflets for a campaign involves all design and preparatory costs, but printing an extra 300 leaflets may cost only a little more.</p>
<p>Putting the costs and benefits together</p>	<p>Once all the costs and benefits have been measured, valued and discounted to present values, the results can be collated.</p> <p>Analysis may show a clear alternative that has greater effects and lower costs, or may show that one alternative has greater effects and higher costs. Marginal analysis can ascertain the amount of extra benefit for each extra increase in resources available. Cost-effectiveness results should be shown as the net costs per main effect, and cost-benefit results should show the net social worth (benefit minus cost) for each unit if of the intervention compared to the alternative.</p>



Table 3. *Continued*

Testing the sensitivity of the results	Economic evaluations usually involve some estimates of future health gains. These health gains involve uncertainties so the sensitivities of any economic evaluation results should be tested by using different estimates of gains. Uncertainty tests can be done by using statistical properties of the estimated effects such as confidence intervals around the estimate and/or varying discounts rates.
Presenting the results	Economic evaluation is a powerful tool that can influence policy and funding decisions of key opinion leaders. The results of economic evaluation will be useful only when presented with clarity and transparency, and address aspects of interest. It is important to avoid inappropriate generalisations.

Adapted from: (3, 5)

Intelligence

Reading

Wang, L., Yang, Q., Lowry, R. and Wechsler, H. Economic analysis of a school-based obesity prevention program. *Obesity Research*. 2003. 11(11): 1313-1324.



Exercise 3.

After reading the article by Wang et al (2003) and considering the steps outlined above explain the methodology you would take to conduct an economic evaluation of your PHN intervention in accordance with your selected scenario. Be sure to include a timeline, identify who is responsible and state the predicted costs for the evaluation.



Workshop/tutorial option:

Complete the exercise in small groups followed by a whole-class debriefing

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Efficiency verses Equity

There is often thought to be a trade-off between maximising aggregate benefits and attaining an equitable distribution across the whole population (5). A principle criterion for economic evaluation of maximising outcomes within a defined budget fails to account for who receives these outcomes. For example, the most cost-effective intervention may be the one directed at currently healthy, well-educated, wealthier individuals that could result in widening health inequalities (3).

The evaluation of an intervention is best explored in terms of effectiveness, efficiency and equity. Efficiency is the relative effectiveness of an intervention and considers resource allocation, marginal costs and benefits to society as a whole but do not attempt to identify the individuals or communities which gain or lose (4). Therefore equity aims should sit alongside economic efficiency or value-for-money objectives to ensure the three dimensions of evaluation are considered. Targeting coverage rather than output can increase equity particularly when those not reached are most likely to benefit, commonly more disadvantaged groups - unemployed, lower education levels, lower income levels etc (3).

Another ethical consideration in economic evaluation is the value given to life and the comparison of worth over different individuals. Measures based on expected earnings are biased towards people with higher earning capacity and generally, measures based on earning capacity unless when a population average is applied are not recommended. Other measures such as QALYs have an in-built equity component because the same worth is applied regardless of the individual (3).

Intelligence

Reading

Hagberg, L. and Lindholm, L. Is promotion of physical activity a wise use of societal resources? Issues of cost-effectiveness and equity in health. *Scandinavian Journal of Medicine and Science in Sports*. 2005. 15(5): 304-312.



Exercise 4.

Review the article by Hagberg and Lindholm (2005) and considering your selected scenario and results to Exercise 2 outline what equity aims you will consider alongside your economic evaluation. Briefly articulate your measurement of the three elements of evaluation - effectiveness, efficiency and equity.

Workshop/tutorial option:

Complete the exercise in small groups followed by a whole-class debriefing

CPD option:

Conduct the above exercise in the context of your current work role and an identified nutrition problem in the community or population you are working with.



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Assessment

Considering your selected scenario and using your responses to Exercises 2, 3 and 4 complete the economic evaluation section of the intervention management template.



CPD option:

Conduct the above exercise in the context of your current work role and the community or population you are working with.

Key Points

- Intervention evaluation involves two measures; (i) the health effects or effectiveness of the intervention (impact, outcome and capacity gain measures), and (ii) the value or efficiency of the effects (economic evaluation).
- Performing economic evaluation of PHN interventions is important to enable comparisons between interventions with similar and different outcomes, and help decision makers prioritise society's scarce health care resources. Economic evaluations can show public health and health promotion interventions in a comparable measure of value with treatment interventions.
- Economic evaluation involves identifying, measuring and valuing both the inputs (costs) and outcomes (benefits) of the intervention/s and their selection is dependent upon the problem being addressed and the perspective of the study. Economic measurement can have a narrow/provider perspective or a societal perspective.
- Evaluations of health interventions can be partial or full economic evaluations. Full evaluations consider both inputs (costs) and outcomes (benefits), and compare both aspects across alternative interventions while partial evaluations include only some elements of inputs and outcomes. There are four distinct types of full economic evaluation: cost-minimisation, cost-effectiveness, cost-utility and cost-benefit.



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Additional Resources and Readings

Economic evaluation methodology

- Cohen, D. and Henderson, J. *Health Promotion and economics*. 1988. Oxford Medical Publishers: Oxford.
- Tolley, K. *Health promotion: how to measure cost-effectiveness*. 1992. Health Education Authority: London.
- Drummond, M., O'Brien, B., Stoddart, G. and Torrence, G. *Methods for the economic evaluation of health care programmes*. (2nd Ed) 1997. Oxford University Press: Oxford.

References

1. Richardson, J. Economic evaluation of health promotion: Friend or Foe. *Australian and New Zealand Journal of Public Health*. 1998. 22(2): 247-253.
2. Ganz, M. The economic evaluation of obesity interventions: its time has come. *Obesity Research*. 2003. 11: 1275-1277.
3. Godfrey, C. Economic evaluation of health promotion. In Rootman, I., Goodstadt, M., Hyndman, B., McQueen, D., Potvin, L., Springett, J. and Ziglio, E. (Eds) *Evaluation in Health Promotion: principles and perspectives*. 2001. World Health Organisation Regional Publications European Series, No. 92: Copenhagen.
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5. Stevens, W. Economic evaluation of health promotion interventions. In Thorogood, M. and Coombes (Eds), Y. *Evaluating health promotion: practice and methods*. 2004. Oxford University Press: New York.
6. Robroek, S., Bredt, F. and Burodf, A. The (cost-) effectiveness of an individually tailored long-term worksite health promotion programme on physical activity and nutrition: design of a pragmatic cluster randomised control trial. *BioMed Central Public Health*. 2007. 7: 259-270.
7. Gusi, N., Reyes, M., Gonzalez-Guerrero, J., Herrera. and Garcia, J. Cost-utility of a walking programme for moderately depressed, obese or overweight elderly women in primary care: a randomised controlled trial. *BioMed Central Public Health*. 2007. 8: 231-241.
8. Wang, L., Yang, Q., Lowry, R. and Wechsler. Economic evaluation of a school-based obesity prevention program. *Obesity Research*. 2003. 11(11): 1313-1324.

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