SESSION 3.3

SOCIAL SECTORS
EDUCATION AND HEALTH

Introductory Course on Economic Analysis of Investment Projects

Economics and Research Department (ERD)

Education

- Benefit valuation based on incremental earnings
- Lifetime earnings profile with and without education project
- Sometimes adjustment to allow some of incremental earnings to other factors
- Benefits = PV .a(Yw - Ywo) where Y is income, w is with and wo is without project, a is adjustment for other factors

Education: Private versus Social Returns

- Private benefits = PV (Yw – Tw – Yw –Two) where T is tax on income
- Private costs = household investment in education (fees, loss of working time, travel)
- Social benefits = PV (Yw – Ywo + E) where E are externalities (health, innovation)
- Social costs = Investment in project + loss of working time + travel

Education Rates of Return

- Calculated private and social returns as IRR of benefit/cost streams
- Some recent estimates suggest private returns > social returns
- Calculated for different education levels; primary, secondary, higher
- Still relatively infrequent for ADB projects

Estimated Returns to Education: Psacharopoulos and Patrinos (2004).

Region	Social			Private		
	Primary	Secondary	Higher	Primary	Secondary	Higher
Asia*	16.2	11.1	11.0	20.0	15.8	18.2
Europe/Middle East /North Africa*	15.6	9.7	9.9	13.8	13.6	18.8
Latin America/ Caribbean	17.4	12.9	12.3	26.6	17.0	19.5
OECD	8.5	9.4	8.5	13.4	11.3	11.6
Sub-Saharan Africa	25.4	18.4	11.3	37.6	24.6	27.8
World	18.9	13.1	10.8	26.6	17.0	19.0

Cost Effectiveness Analysis

- Requires indicator of education impact to compare with costs eg pupils graduating, or test scores achieved
- Impact (eg pupils) must be discounted and compared with discounted costs
- CEI = PV (Costs)/ PV (Pupils graduating) to give cost per pupil
- Only rough indicator, requires a reference point or norm

Health

- Benefit valuation highly controversial
- Can we put monetary values on lives saved or health improved?
- ‘Value of statistical life’ either ‘revealed’ from willingness to pay to reduce risk of death or ‘stated’ in surveys
- E.g., people take on higher paid but more risky jobs; reveals their risk versus money trade-off
- Surveys can ask willingness to pay to reduce risk

Value of Statistical Life

- Once average WTP to reduce risk in statistical way is estimated a value of life is inferred
- If on average WTP is $50 to reduce risk from 5 per 10,000 to 3 per 10,000
- Value of one statistical life is $50 times population covered (10,000) divided by lives saved (2) = $250,000
- Problem in comparing across countries if estimate is for a wealthy country A can we scale this down for poor country B?
- eg if B's income per head is 10% of A's can we say a life in B is worth only 0.10* $250,000 = $25,000

Cost Effectiveness Analysis

- Rate of return analysis in health not done in ADB (see Health Guidelines) because of this problem
- Cost effectiveness analysis requires comparing
- PV(Project costs) with PV (Health Impact)
- CEI = PV(Cw - Cwo)/(HIw - HIwo) where C is total costs, HI is health impact and w, wo are with and without
- Usually discounted at social time preference rate of 2% to 3%

Health Impact

- Process indicators; patients treated or bed nights tell nothing about health outcomes
- Three main alternative impact indicators
- Years of Life Gained (YLG)
- Healthy/Quality Adjusted Years of Life Gained (QALY)
- Disability Adjusted Years of Life Gained (DALY)

Years of Life Gained

- allows a comparison between different ways of saving life (preventative or curative treatment)
- comparison across projects is by discounted costs per discounted year of life saved
- requires an estimate of expected duration of life with and without a project for all those patients who will be treated
- data by each disease or condition the project will address eg incidence of the condition (new cases per 1000 of population), percentage case fatality rate, probability of survival without the condition, average age of onset, average age of death for those affected

Quality Adjusted Years of Life Gained

- Introduces morbidity effects
- Estimates for years affected by disease or disability before premature death (YD) plus years of chronic disability for those who do not die prematurely (YCD) plus years lost to temporary illness from the same condition (YT)
- Requires information on the degree to which those suffering from a condition suffer disability from its onset to premature death, where the latter is relevant, the proportion of those suffering who survive but are permanently affected and the severity of their chronic condition
- Compares years of disability with a healthy year with disability weights

UK QALY Weights

- QALY routinely used in the UK, in assessment of treatments to be offered by the National Health Service
- QALYs represent levels of quality of life enjoyed by individuals in different health states.
- The weights run from 1.0 for perfect health to negative values for severe disability.
- The weighting scheme assesses the ability of individuals to function in five dimensions relating to mobility, pain, self-care, anxiety/depression and usual activities. Each dimension has three levels relating to the severity of problems.
- Weights for these conditions are derived from responses from a random sample of the population asked how many weeks or months of normal health equate to a year of a particular health condition.
- If 9 months of normal health is deemed equivalent to a year suffering from diabetes, the latter condition has a weight of 0.75.
- The implication of a negative weight is that saving a year of very severe disability is worse than death which has a weight of 0.

Health State	Description	Valuation
11111	No problems	1.000
11221	No problems walking; no problems with self care; some problems performing usual activities; some pain or discomfort; not anxious or depressed	0.760
22222	Some problems walking; some problems washing or dressing; some problems performing usual activities; moderate pain or discomfort; moderately anxious or depressed	0.516
12321	No problems walking; some problems washing or dressing; unable to perform usual activities; some pain or discomfort; not anxious or depressed.	0.329
21123	Some problems walking; no problems with self care; no problems performing usual activities; moderate pain or discomfort; extremely anxious or depressed.	0.222
23322	Some problems walking; unable to wash or dress; unable to perform usual activities; moderate pain or discomfort; moderately anxious or depressed.	0.079
33332	Confined to bed; unable to wash or dress; unable to perform usual activities; extreme pain or discomfort; moderately anxious or depressed.	-0.429

QALYs

- Refer to years gained so aim is to maximise QALYs for a given health budget or minimise cost per QALY
- CEI = (Costs)/PV (QALY)
- Costs can vary greatly for different treatments

Cost/HYLG: WHO 2010

Country (currency)	Condition	Costs/HYLG current	Costs/HYLG optimal
Zambia (US$)	Malaria drug treatment	10.7	8.6
Thailand (Baht)	Cardiovascular disease prevention	300,000	2,185
Nigeria (Naira)	Schizophrenia	210,544	67,113
	Depression	104,586	62,095
	Epilepsy	13,339	10,507

Disability Adjusted Life Years

- DALY is similar to the HYLG except that it adds weights for years of life saved at different ages as well as quality of life
- DALYs represent levels of loss caused by ill-health and the sum of DALYs is a benefit in terms of losses avoided.
- If merit of saving an extra year of life is influenced by the productivity of those affected (which is a controversial view), saving the lives of those of working age will create a higher social gain than saving the lives of the elderly and the very young.
- Original DALY age weighting gave a weight of more than 1.0 to those aged 9 to 54 and weights of below 1.0 to those aged below 9 and above 54.
- Eg age 60 weight of 0.874

Disability Adjusted Life Years

- Double weighting, disability weights based on expert opinion
- Reference for disability weights is death 1.0
- Serious condition averted weight of 0.92
- So 1 year of most serious condition averted for someone age 60 is 0.92*0.844 = 0.78
- For someone age 10 weight is 0.92*1.086 = 1.0

Cost/DALY: Jamison et al 2006

Intervention	US$/DALY
Coronary bypass graft	37,000
Drug and psychosocial treatment of depression	1,699
Polypill to prevent heart disease	409
Improved emergency obstetric care	127
Tuberculosis treatment	102
Basic childhood vaccines	7

How to Use Cost Effectiveness Indicators (1)

- Reflect cost of treatment and say nothing about priorities, although they make clear that certain treatments for infants, mothers and children can have large health impacts at very low cost.
- Some interventions are found to be very low cost per DALY averted; Griffiths (2004) reports that neonatal immunization against tetanus in Pakistan has a cost of only US$ 3.6 per DALY.
- Rule of thumb has been put forward as a rough screening device (WHO 2002) that very cost effective intervention is one where cost per DALY is no more than average income per capita in the country concerned

How to Use Cost Effectiveness Indicators (2)

- Interventions that cost up to three times per capita income are still considered cost effective but those that exceed this not cost-effective.
- Such rules no more than guidelines since taken literally they imply that new facilities to carry out coronary bypass operations would not be introduced in poor countries
- Country specific studies needed to establish norms for different interventions

Risk of Inappropriate Use in Health

- CEI cannot in itself determine whether a health project is a good investment. Its role is in the ranking of alternatives and selecting the one with the lowest cost per unit of outcome provided
- Different health impacts can be converted to an appropriate common unit
- Alternatives are divisible – so that several more cost effective smaller alternatives can replace one large less cost effective project in reaching the same number of patients
- Budget for health projects is fixed so that more patients cannot be treated by expanding the budget

Risk of Implicit Valuation

- Where the divisibility condition does not hold there is the possibility of implausible implicit valuations
- If we can save 10 lives at a cost of $1 million dollars or 5 lives at a cost of $0.4 million the respective cost effectiveness ratios are $0.1million/life for the larger alternative and $0.08/life for the smaller
- If we opt for the more cost effective smaller alternative we are saying we would rather save $0.6 million than save 5 lives, which is an implicit valuation of less than $0.12 million per life saved.
- Where the smaller program can be expanded to cover more people this is not an issue, but where it cannot the implicit valuation problem remains
- Decision-takers and the wider community may be uncomfortable if the full implications of some cost saving decisions were known and cost-effectiveness analysis cannot address this.

Thank you.