SYSTEMIC AND FOCUSED HEALTH INTERVENTIONS:

WHAT SHOULD BE DONE AND WHEN SHOULD IT BE DONE?

by

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A: INTRODUCTION:

This paper addresses the sequencing of two different types of health interventions, namely:
(i) "systemic interventions", such as family planning and water supply, which operate through multiple direct and indirect channels to improve health; and....
(ii) "focused interventions", such as oral rehydration therapy and tetanus vaccination, which are designed specifically to prevent deaths from particular causes.

The choice of technologies for improving health in developing countries rests (implicitly or explicitly) on assumptions regarding the effects of an intervention on behavior and disease. This note explores the implications of three concepts -- one behavioral and two epidemiological -- for the sequencing of systemic and focused interventions.

B: THE KEY CONCEPTS

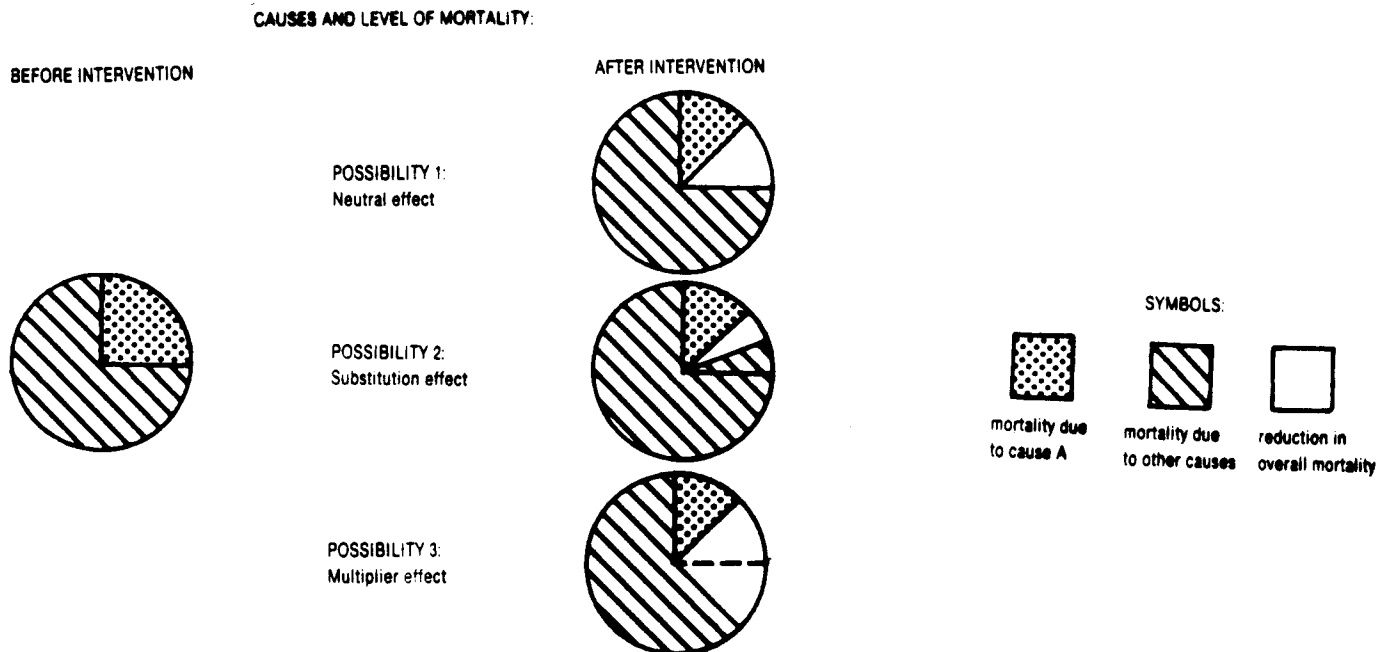Concept #1: Behavioral -- PROVIDING SERVICES THAT PEOPLE WANT

With some exceptions, health programs require that individuals decide (in many cases repeatedly) to participate in such programs. This usually means that a family has to commit resources (time and money) to such an activity. Because many other activities make demands on these resources, individuals and families make this commitment only if the perceived benefits are higher than the perceived benefits from committing these resources to other activities.

Concept #2: Epidemiological -- SUBSTITUTION MORTALITY

4.   While the principal objective of many health programs is to reduce mortality, interventions are usually evaluated by assessing the impact on morbidity and mortality due to a particular disease. In most such analyses (e.g. UNICEF, 1985) it is assumed that if disease A accounts for 30% of total deaths, and if the intervention reduces the deaths due to disease A by 50%, then there will be an overall reduction in mortality of 30% x 50% = 15%.

A closer look at this procedure reveals several problems. Since every person will die some day, the issue is not whether an intervention "saves lives" (an impossibility) but for how long death is averted as a result of the intervention. As illustrated on Figure 1 and Table 1, there are three possible scenarios following a death-deferring intervention.

Figure 1: <u>Possible impacts upon overall mortality of an intervention which reduces mortality due to a specific disease ("cause A") by 50%</u>

CAUSES AND LEVEL OF MORTALITY:

BEFORE INTERVENTION

AFTER INTERVENTION

POSSIBILITY 1:
Neutral effect

POSSIBILITY 2:
Substitution effect

POSSIBILITY 3:
Multiplier effect

SYMBOLS:

mortality due to cause A

mortality due to other causes

reduction in overall mortality

Table 1: <u>Period for which death is deferred</u>

| The length of time for which death is deferred as a result of the intervention:	Reason:	Effect operative	Example of intervention
SHORT DEFERRAL	Individuals whose lives are saved are frail and risks of subsequent mortality are great	**SUBSTITUTION EFFECT**	Oral Rehydration Therapy
MODERATE DEFERRAL	Individuals whose lives are saved are subject to normal risks of subsequent mortality	**NEUTRAL EFFECT**	Tetanus vaccine
LONG DEFERRAL	Individuals whose lives are saved are robust and risks of subsequent mortality are low	**MULTIPLIER EFFECT**	Measles vaccine, water supply

On the basis of theory and (limited) empirical information it would appear (Mosley, 1985 and 1986) that:

(i) in high mortality communitiesnonselective, systemic interventions that prevent the prevalent diseases (which not only kill but which produce a high level of frailty) are most effective in poor, high mortality communities; and

(ii) that focused, biomedical interventions are associated with a long deferral of death only in those individuals and communities which are otherwise at low risk.

Concept #3: Epidemiological -- NECESSARY BUT NOT SUFFICIENT CONDITIONS

Consider the simple model shown in Figure 2, where there are three parallel routes by which organisms can be transmitted from one person to another.

Figure 2: Multiple routes for the transmission of fecal-oral pathogens

% of organisms transmitted via the route

A -- 70%

B -- 28%

C -- 2%
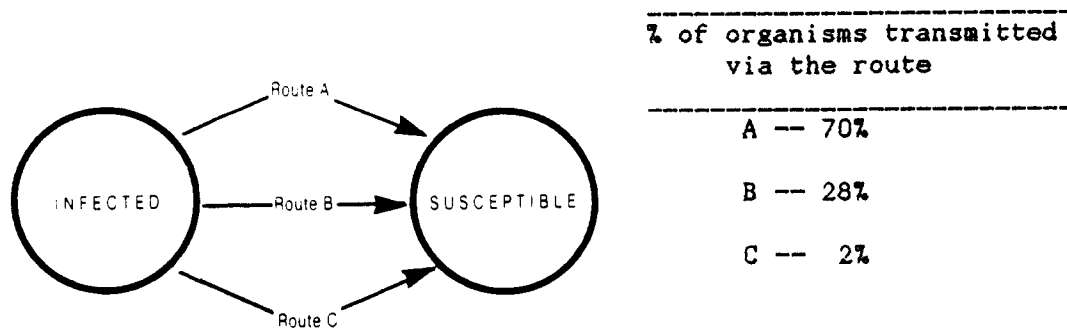
Table 2: The effect of eliminating different transmission routes

EXPOSURE GROUP	NUMBER OF ORGANISMS STILL TRANSMITTED	% OF ORIGINAL NUMBER OF DISEASE CASES STILL INCURRED	CHANGE IN CASES OF DISEASE
Routes A + B + C	100	100%	0%
Eliminate Route A only	30	74%	-26%
Eliminate Route B without having eliminated Route A	72	93%	-7%
Eliminate Route B after having eliminated Route A	2	15%	-85%

For the most common (log-linear) type of dose-response relationship, Table 2 shows that elimination of just one transmission route (even the major transmission route) has little impact on disease. Table 2 also shows that elimination of the major transmission route is nevertheless of great importance in reducing disease, since it is only after this apparently ineffective intervention has been undertaken that subsequent interventions (reducing transmission via other routes) can be effective. In the simple example given in Table 2, the elimination of Route A alone only reduces disease incidence by about 25%. However, the importance of eliminating Route A is not this modest direct effect, but rather the fact that its elimination creates conditions that allow subsequent interventions to be much more effective. In the example given, if Route B only were eliminated, this would have little impact on disease transmission, whereas if Route B were eliminated after the elimination of Route A, this would have a major impact.

Simple as it is, this model captures some essential features of the real world in which water supply and sanitation interventions operate, and thus has important implications for assessing the impact of such interventions. In the many parts of the developing world where there are several parallel routes for effectively transmitting fecal-oral pathogens, it is quite possible that improvements in, say, water supply would have little direct impact on health and yet still constitute an important health intervention. In other words, such improvements are a necessary but not sufficient condition for substantial disease reduction. Care needs to be exercised before concluding that, since there was little direct impact on health, such an intervention is not justified on health grounds.

C. SEQUENCING OF INTERVENTIONS TO INCREASE LIFE EXPECTANCY:

The essence of these three concepts is summarized on Table 3 (overleaf). The implications for the sequencing of health interventions in developing countries are evident:

STEP 1: For poor disorganized communities:
... it is an illusion to think that the health of individuals in such communities can be improved in a sustainable and replicable way in the short term by any health intervention;
... in these communities priority must be given to systemic interventions which (a) contribute to institutional development and (b) constitute the conditions necessary for subsequent improvements;
... only after systemic interventions have been successfully established (thus ensuring that deaths deferred will be deferred for a reasonable time) should focussed interventions be given priority.

STEP 2: For medium-income, relatively organized communities:
... focused interventions are likely (a) to be sustainable, and (b) to result in a long deferral of death, because individuals in these communities are already relatively robust and face only moderate to low risks of death from other causes.

Table 3: The implications for the technology choice

PROPOSITION	REASONING	IMPLICATIONS FOR TECHNOLOGY CHOICE
PROPOSITION #1: SUSTAINABILITY		
To be successful, a health intervention must be perceived to be of value by users	Top-down interventions are not sustainable politically or financially in the medium- and long-run.	Start with interventions which are perceived to be valuable or for which a perceived need can be created.
PROPOSITION #2: SUBSTITUTION MORTALITY		
Narrowly-focused interventions will be effective only when they are applied to individuals (and communities) who are otherwise at low risk.	Substitution mortality will occur in high-risk individuals and communities.	Narrowly-focused interventions should take place only once competing risks have been reduced.
PROPOSITION #3: NECESSARY BUT NOT SUFFICIENT CONDITIONS		
The long-run impact of systemic interventions is greater than the short-run impacts.	Such improvements constitute necessary but not sufficient conditions for improving health.	Despite the lack of short-term impact, such interventions should be undertaken because they create the institutional and epidemiologic conditions necessary for subsequent, improvements in health status.

D. REFERENCES

Briscoe, J (1987) "A role for water supply and sanitation in the child survival revolution", **Bulletin of the Pan American Health Organization**, 21 (2), pp 93-105.

Mosley, WH and LC Chen (1984) "An analytic framework for the study of child survival in developing countries", **Population and Development Review**, Supplement to Vol 10, 25-45.

Mosley WH (1985) "Will primary health care reduce child mortality? A critique of some current strategies with special reference to Africa and Asia", **Social Policy, Health Policy and Mortality Prospects**, IUSSP.

Mosley, WH (1986) "The demographic impact of child survival programs", A paper presented at the international symposium on New Avenues in Health Care Organization, Mexico.

UNICEF (1985) **State of the World's Children**, Oxford University Press, Oxford, 131 pp.