

Chapter **56****Community Health and Nutrition Programs**

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Rapid improvements in health and nutrition in developing countries may be ascribed to specific, deliberate, health- and nutrition-related interventions and to changes in the underlying social, economic, and health environments. This chapter is concerned with the contribution of specific interventions, while recognizing that improved living standards in the long run provide the essential basis for improved health. Consideration of the environment as the context for interventions is crucial in determining their initiation and in modifying their effect, and it must be taken into account when assessing this effect.

Undoubtedly much change has stemmed from scientific advances, immunization being a prominent case. However, the organizational aspects of health and nutrition protection are equally critical. In the past several decades, people's contact with trained workers has been instrumental in improving health in developing countries. This factor applies particularly to poor people in poor countries but is relevant everywhere; indeed, it is a reason that social services have essentially eliminated almost all occurrences of child malnutrition in Europe (where, when malnourished children are seen, it is caused by neglect).

Community-based programs under many circumstances provide this crucial contact. Their role is partly in improving access to technology and resources, but it is also important in fostering behavior change and, more generally, in supporting caring practices (Engle, Bentley, and Pelto 2000; UNICEF 1990). Such programs may also play a part in mobilizing social demand for services and in generating pressure for policy change.

In community-based programs, workers—often volunteers and part-time workers—interact with households to protect

their health and nutrition and to facilitate access to treatment of sickness. Mothers and children are the primary focus, but others in the household should participate. Commonly, people go regularly to a central point in their community—for example, for growth monitoring and promotion—or are visited at home by a health and nutrition worker. The existence, training, support, and supervision of the community worker—based in the community or operating from a nearby health facility—are indispensable features of these programs. Thus community organizations are a key aspect of community-based health and nutrition programs (CHNPs).

This chapter focuses on large-scale (national or state) programs. Although these programs are primarily initiated and run at the local level, links with the national level and levels in between are necessary. Both horizontal and vertical organizations are needed. Local organizations make action happen, but they need input and resources, such as training, supervision, and supplies, from more central levels.

The experience on which this chapter is based comes from a considerable number of national and large-scale programs. Most of these programs include both nutrition and health activities, aimed particularly at the health and survival of reproductive-age women and children. We draw on these experiences as we try to put forward principles on which future programs can be based—programs that may have broader health objectives for other population groups and diseases.

As of 2001, some 19 percent of global deaths were among children—and 99 percent of all child deaths took place in low- and middle-income countries. The disability-adjusted life years (DALYs) lost attributed to zero- to four-year-olds—plus maternal and perinatal conditions, nutrition deficiencies, and endocrine disorders—amount to 42 percent of the total disease

Table 56.1 Estimated Contributions to the Disease Burden in Developing Countries

Factor	DALYs lost (percentage)		
	Direct effect	As risk factor	Total
General malnutrition	1.0	14.0	15.0
Micronutrient deficiencies	9.0	8.5	17.5
Total	10.0	22.5	32.5

Source: Mason, Musgrove, and Habicht 2003, table 10.

burden (all ages, both sexes) from all causes for developing regions. CHNPs address about 40 percent of the disease burden. In terms of prevention, Mason, Musgrove, and Habicht (2003) estimated that eliminating malnutrition would remove one-third of the global disease burden. Comparative studies by Ezzati, Lopez, and others (2002) and Ezzati, Vander Hoorn, and others (2003) have reemphasized malnutrition as the predominant risk factor and improvement of nutrition as playing a potentially major role in reducing the burden. Clinical deficiencies contribute directly to malnutrition, but even more, malnutrition is a risk factor for infectious diseases (table 56.1). Furthermore, changes in child malnutrition levels in developing countries are closely related to the countries' mortality trends (Pelletier and Frongillo 2003).

Dealing with women and children's health and nutrition addresses a substantial part of global health problems. Moreover, the experience of community-based programs linked to nutrition constitutes a significant part of the body of knowledge on ways of improving it. A number of large-scale, sustained health interventions, such as those described by Sanders and Chopra (2004), use a mix of improved access to facilities and community health workers. These interventions include the Comprehensive Rural Health Project, Jamkhed, India; community health projects in Brazil (Ceará, Pelotas); and the work of the Bangladesh Rural Advancement Committee (BRAC). Table 56.2 describes the program experiences drawn on.

The evidence is clear that significant differences occur between countries in the rates of change in health and nutritional status. Figure 56.1 shows a comparison of Indonesia, the Philippines, and Thailand. As is common, the indicator used is underweight children, which is likely to reflect broader conditions of health and survival. For Thailand, the figure shows the now-well-known rapid improvement in the 1980s and 1990s. For Indonesia, it shows slower but consistent improvement. The Philippines had little progress until recently, and the start of an improving trend coincided with increases in the number of village health workers and implementation of high-coverage interventions such as iodized salt and vitamin A supplementation (FNRI 2004). A crucial issue is how much of the improvements was caused by interventions that could be replicated—and within that issue is subsumed how much was because of

context, how much was programmatic, and what were the interactions. The contrasts between these three countries are instructive in part because they have several similar contextual factors; for instance, the status of women is relatively good, and social exclusion¹ is not extensive (compare both of these in, for example, South Asia). Thus programs may account for a significant part of the differences seen in improvement.

The benefits from CHNPs extend well beyond child nutrition (which is used as a summary measure). These benefits have not been quantified but would include improved education (see chapter 49) and probably increased earning capacity associated with it and with physical fitness.

WHAT IS KNOWN ABOUT EFFICACY AND EFFECTIVENESS

The efficacy of health and nutrition interventions in developing countries has been established for decades (for example, Gwatkin, Wilcox, and Wray 1980). Prospective studies in several settings showed that health interventions with or without supplementary foods caused children to thrive and survive better: studies in Narangwal, India (Kielmann and others 1978; Taylor, Kielmann, and Parker 1978); by the Institute for Nutrition for Central America and Panama (Delgado and others 1982); in Jamaica (Waterlow 1992); and in The Gambia (Whitehead, Rowland, and Cole 1976) are examples.² These studies showed the effect of interventions on growth and (usually) mortality but did not generally factor out the relative contributions of health and nutrition. In fact, results from Narangwal showed similar mortality effects from food *or* health care; results from The Gambia indicated interaction such that sick children did not grow even with adequate food intake (appetite also playing an important role), and well children did not grow with inadequate food intake (Gillespie and Mason 1991, annex 2).

By the early 1980s, the conclusion, based on data at the experimental level (not from routine large-scale programs), was that better health and better nutrition are both required for child survival and development. This conclusion remains generally agreed on today; furthermore, concern exists that health interventions may become less effective unless nutrition is concurrently addressed (Measham and Chatterjee 1999; Pelletier and Frongillo 2003). In their chapter on malnutrition in the first edition of this book, Pinstrip-Andersen and colleagues (1993) drew largely on efficacy findings, with an emphasis on food supplementation. Those studies are not revisited here, but we can continue to build on their conclusions.

The efficacy studies were followed by a number of national or other large-scale programs in several countries. Some of those were a direct follow-on; for example, the World Bank Tamil Nadu Integrated Nutrition Program (TINP) followed the

Table 56.2 Country Experiences in Community-Based Programs

Country and program	Program experience
<i>Africa</i>	
Tanzania: Iringa	Area program with UNICEF and WHO inputs, 1984–91. After rapid initial drop in child malnutrition, moderate steady improvement. Program not sustained.
Tanzania: Child Survival and Development Program	1985–95, World Bank support. Results similar to Iringa.
Zimbabwe: Supplementary Feeding Programme	Wide-scale program following independence, 1980–90; infant mortality rate (IMR) dropped from 110 to 53 (1988). Not sustained.
<i>Asia</i>	
Bangladesh: Bangladesh Integrated Nutrition Program (BINP) and national	BINP: area targeted covering 7 percent of population. Rapid improvement at start (1997); final evaluation not seen. National: program coverage expanding from 2000 on. Substantial improvement in anemia and child underweight seen in Bangladesh starting 1995.
Bangladesh: Bangladesh Rural Advancement Committee (BRAC)	Community-based health services with village health workers. Wide coverage since 1980s; particular focus on diarrhea.
India: Integrated Child Development Services (ICDS)	Implemented since 1976. Village program with community health (<i>anganwadi</i>) worker. Accelerated improvement reported in some states.
India: Tamil Nadu Integrated Nutrition Program (TINP)	Implemented 1980 to mid 1990s. Village program in Tamil Nadu with World Bank support; growth monitoring, supplementary feeding, and so on. Substantial improvement in underweight reported.
Indonesia	Massive expansion of village programs 1975–90, covering all villages by 1990. Steady decrease in underweight during this time. Program not sustained in 1990s; now planned to restart.
Philippines: national	No wide CHNPs despite national decree in 1974. No significant improvement in child nutrition.
Thailand	National program from late 1970s; 500,000 village health volunteers trained (1 percent of population). Rapid improvement 1980–90; for example, 36 percent to 13 percent underweight children.
<i>Americas</i>	
Costa Rica	Expanding rural health services from 1970s following malaria control. Rapid fall in IMR 1965–80; in stunting 1979–89.
Jamaica	Expanded health services with community health aides from mid 1970s. Rapid fall in underweight, 1985–89.
Nicaragua	Community health movement, 1979–90, reduced IMR, eliminated polio; about 1 percent of population as village health volunteers.

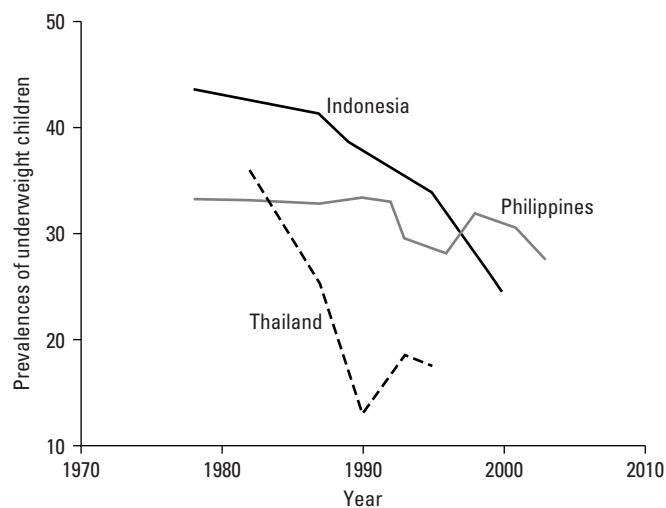
Source: Authors, from data derived as follows: *Tanzania*—Gillespie and Mason 1991; Gillespie, Mason, and Martorell 1996; Jennings and others 1991, 117; Kavishe and Mushi 1993; Pelletier 1991; Sanders 1999; *Zimbabwe*—Sanders 1999; Tagwireyi and Greiner 1994; Werner and Sanders 1997; *Bangladesh*—BINP and UNICEF 1999; BRAC 2004; Chowdhury 2003; INFS and Department of Economics 1998; Mason and others 1999, 2001; Save the Children U.K. 2003; *India*—Administrative Staff College of India 1997; Mason and others 1999, 2001; Measham and Chatterjee 1999; Reddy and others 1992; Shekar 1989; *Indonesia*—Berg 1987; Jennings and others 1991, 108; Rohde 1993; Soekirman and others 1992; *the Philippines*—Guillermo-Tuazon and Briones 1997; Heaver and Hunt 1995; Heaver and Mason 2000; Mason 2003; *Thailand*—Kachondam, Winichagoon, and Tontisirin 1992; Tontisirin and Winichagoon 1999; Winichagoon and others 1992; *Costa Rica*—Horwitz 1987; Jennings and others 1991, 77–81; Muñoz and Scrimshaw 1995; *Honduras*—Fiedler 2003; *Jamaica*—ACC/SCN 1989, 1996; Samuda 2004, personal communication; Robinson 2004, personal communication; *Nicaragua*—Sanders 1985; Werner and Sanders 1997.

Narangwal study, which was supported by the U.S. Agency for International Development (USAID). A number of overviews and analyses of these programs have been conducted—for example, Allen and Gillespie (2001); Berg (1981, 1987); Gillespie, Mason, and Martorell (1996; includes a summary of overviews, 60); Gillespie, McLachlan, and Shrimpton (2003); Jennings and others (1991); Mason (2000); Sanders (1999); and Shrimpton (1989). These plus some newer examples provide case studies for this chapter, and the sources for the case studies are included in table 56.2.

Underweight prevalences are improving at about 0.5 percentage points (ppts) per year except in Sub-Saharan Africa, which is largely static (ACC/SCN 1989, 1992, 1996, 1998, 2004). Programs are needed to accelerate this trend. Cost data

from an earlier study (Gillespie and Mason 1991, 76), combined with the estimated improvements from large-scale programs, led to the assertion that “there seems to be some convergence on around \$5 to \$10 per head (beneficiary) per year being a workable, common level of expenditure in nutrition programmes, though not generally including supplementary food costs . . . effective programmes, with these levels of expenditure, seem to be associated with reducing underweight prevalences by around 1–2 percentage points per year” (Gillespie, Mason, and Martorell 1996, 69–70).

A further important consideration is that the effect is likely to be nonlinearly related to the expenditure, showing the familiar dose-response S-shaped curve. Thus, the first expenditures produce little effect on the outcome, and one needs a minimum



a. -2 standard deviations NCHS/WHO standards; ages 0-60 months.
Sources: ACC/SCN 2004; FNRI 2004; Mason, Rivers, and Helwig 2005.

Figure 56.1 Comparison of Trends in Underweight Children in Indonesia, the Philippines, and Thailand

input level of resource use before a worthwhile response is achieved (Habicht, Mason, and Tabatabai 1984). This factor generally applies to drawing inferences from cost-effectiveness ratios, which often assume linearity. If the relation is S-shaped, the implication is important: applying too few resources does not simply solve the problem more slowly but does not solve it at all and is a waste. Therefore, program intensity (resources per person) is a critical measure.

Effective interventions must include a range of activities relating to health and nutrition. They should be multifaceted, not just for effectiveness but also for organizational efficiency. The structure needed for community-based programs could never make sense or be sustainably set up for single interventions alone. One often-argued case (for example, by Save the Children U.K. 2003) concerns children's growth monitoring: evidently growth monitoring in isolation from activities that *improve* children's growth is not going to achieve anything (or worse, considering the opportunity cost); however, weighing children and charting their weight can be a useful part of broader programs (for example, as growth monitoring and promotion).

COMMUNITY- AND FACILITY-BASED PROGRAMS

Protecting and improving health, especially in poor communities, requires a combination of community- and facility-based activities, with support from central levels of organization, as well as some centrally run programs (for example, food fortification). The place of these activities in a strategy is likely to vary, depending on level of development (of infrastructure, health services, and socioeconomic status) and on many local factors. For the poorest societies, the first priorities are basic

preventive services, notably immunization, access to basic drugs, and management of the most serious threats to health, such as some access to emergency care. Moving up the development scale, starting community-based activities may soon become cost effective for prevention, referral, and management of some diseases (notably diarrhea) when coverage of health services is poor. Community-based programs continue to play a key role until health services, education, income, and communications have improved to the point that maternal and child mortality has fallen substantially and malnutrition is much reduced; at this intermediate development level, the needs are less felt, and health services again take on a more prominent role. In this scheme, the widely felt need for better access to emergency obstetric services is problematic, requiring a well-developed human and physical infrastructure, yet arguably being one of the highest priorities.

Facility-based programs can be seen either as linking with the community program (referrals, home visits from clinics, and so forth) or as actually being part of the same enterprise. A distinction is that community-based activities take place outside the health facility, in the home or at a community central point, even if they may be supported by health personnel based in health facilities. The local workers in community-based programs may be drawn from the community itself, may be home visitors from a health center or clinic, or may sometimes be volunteers supervised by these home visitors. Many community-based programs come under the health sector, whatever the exact arrangements with local health services. Regarding specific program components, we return to the relative role of community programs and facilities later.

The integrated management of infant and childhood illness (IMCI) program provides guidance mainly on the curative health aspects and contains a number of nutrition activities (for example, administration of vitamin A capsules). Links to local health facilities are essential for the maintenance of the community activities and for referral in cases of illness (see chapter 63). As the IMCI training and implementation progresses, it should integrate directly with CHNPs (in fact, become part of the same exercise), which will add treatment of additional diseases. IMCI addresses diarrhea, acute respiratory infection (ARI), malaria, nutrition, immunization, safe motherhood, and essential drugs (WHO 1997). The 16 key practices for child survival defined in the context of IMCI (Kelley and Black 2001, S115) are exactly those to be promoted within CHNPs, and most are already included (four are nutritional).

Decentralization should be considered in this context. Although decentralized systems might be thought to be more effective in supporting CHNPs, the evidence for this assumption is scarce. Decentralization can reduce resources available at the local level if it involves devolving responsibility without the concomitant budgetary resources (Mills 1994). For example, in Kenya, decentralization did not accompany devolving authority

for raising revenue locally. In other cases (for example, the Philippines), decentralization has involved a shifting of resources, but with priorities set in the local government units by locally elected officials (municipal and city mayors), these resources may be used for shorter-term priorities than under previous, centrally decided, policies.

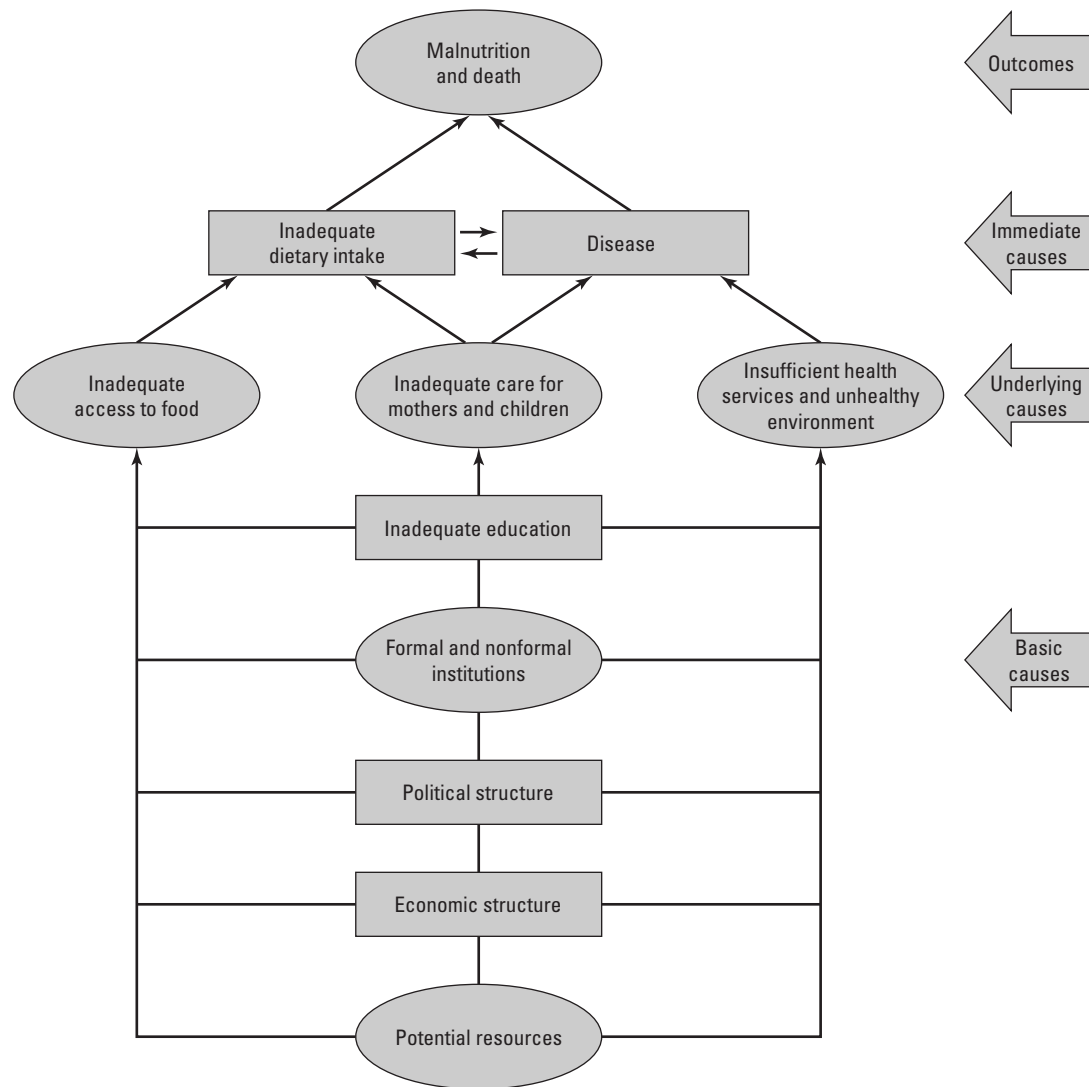
SUCCESS FACTORS

A number of useful concepts grew in the 1990s in relation to effective community-based programs. The concept of success factors helped sort out complex interactions: when numerous possibilities exist, understanding the successful pathway to effectiveness is more important than trying to disentangle what did not work. Focusing on successful programs helps simplify complexity and identify success factors, only some of which are

programmatic (directly under the influence of the intervention itself); others are contextual.

The importance of context, within which programs are initiated and run, thus emerged as crucial, and priority factors were proposed from studies of community-based programs in Asia (Gillespie, Mason, and Martorell 1996, 67; Jonsson 1997). Sanders (1999) described similar concepts under the headings of *community participation* and *political will*. This distinction and interplay between context and program factors is helpful in identifying required supporting policies to improve the context to make programs work. Details are in the later section titled “Contextual Factors.”

An overall framework (figure 56.2) for causal links to child survival and nutrition, put forward by the United Nations Children’s Fund (UNICEF 1990), gave a basis for a common language—even if the details might be questioned—revolving



Source: Redrawn from UNICEF 1990.

Figure 56.2 Conceptual Framework for the Causes of Malnutrition in Society

around food, health, and care as proximal causes to be addressed through programs. Improving these factors attacks hunger, disease, and neglect, which are the converse of food, health, and care. Basic causes are, like context, open to influence through policy decisions and acting through directly influencing food, health, and care and by modifying the effect of programs. Here malnutrition is seen as the outcome of processes in society, and direct interventions are seen as both shortcutting the needed basic improvements in living conditions and being dependent on these improvements in the long run for sustainability.

COMMUNITY-BASED PROGRAMS—WHAT ARE THEY?

Community health and nutrition programs are often initiated and run by the health sector, but sometimes a separate ministry (for example, in India and Indonesia) or service (for example, in Bangladesh) is set up. Attempts to use a national coordinating body appear to be less effective in leading to widespread community programs; an example existed in the Philippines until approximately 2000 (Heaver and Mason 2000). This ineffectiveness stems from the tendency of the coordinating body not to have direct authority over fieldworkers or the budget to create a national program with sufficient coverage and intensity to have a measurable effect. In some other cases, the services linked to poverty alleviation and social welfare programs can play this role (for example, the Samurdhi program in Sri Lanka). Involvement of the health services remains crucial, sometimes as the operational agency responsible for the programs and certainly always for referral.

CHNPs have so far been much more relevant to communicable diseases than to noncommunicable diseases in conditions of poverty and where undernutrition is common. (An exception occurs if CHNPs help prevent intrauterine growth retardation with later risks of noncommunicable diseases.) However, in areas where diet-related chronic diseases are developing in conditions of poverty (for example, much of Latin America and the Caribbean) and obesity is rising rapidly, the promotion of behavior change through counseling in CHNPs may become increasingly important. Promoting healthier diets requires access to outlets for fruit and vegetables, often displaced by fast foods, which should be a concern of community activities, as should lifestyle improvements such as use of exercise and recreational facilities.

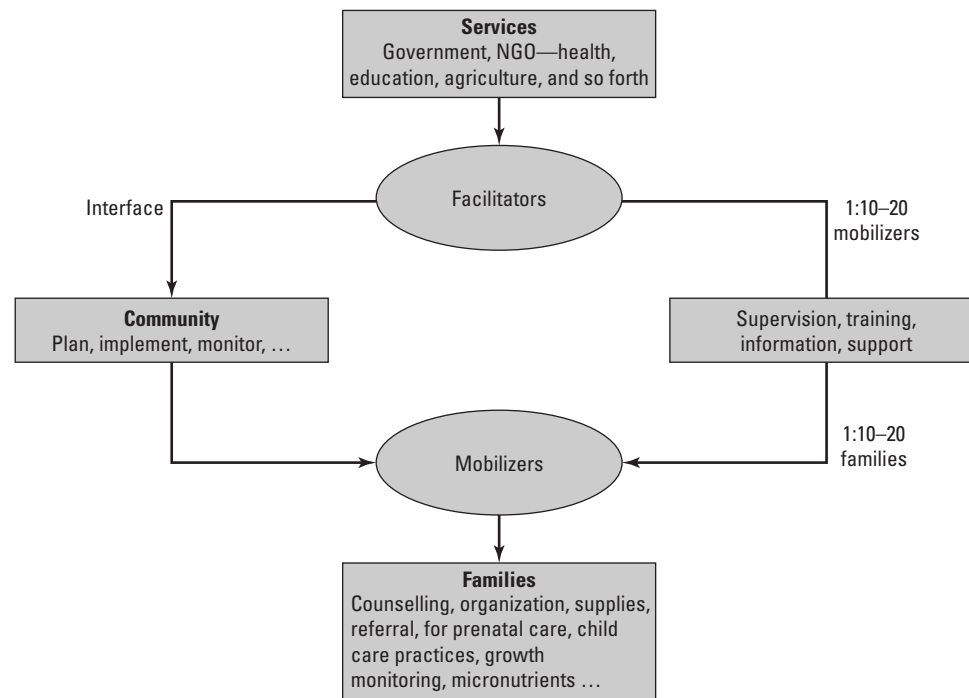
CHNPs often include activities well beyond direct prevention and behavior change. As envisaged with primary health care, water, sanitation, and other aspects of environmental health are frequently included, as well as agricultural interventions (for example, Zimbabwe in the 1980s). In Thailand, the village programs are part of the “Basic Minimum Needs” approach, which includes housing and environment, family

planning, community participation, and spiritual and ethical development.

A diagram of the structure, derived from Thailand’s program (figure 56.3), shows the relations between services that provide supervision and contacts with the community (“facilitators”) and with community workers, referred to as “mobilizers.”

The activities undertaken in CHNPs—the program content—are familiar and are described here only briefly. Program components, implemented by village workers or in facilities, come under the following headings, which form a menu, with the actual mix depending on local capabilities and conditions (UNICEF 1998, 84; see chapter 24):

- *Prenatal care* includes checking weight gain in pregnancy, prepregnancy weight, anemia, and blood pressure; providing multiple micronutrient supplementation and immunization (tetanus); counseling on diet, workload, breastfeeding; and predicting and arranging for delivery.
- *Women’s health and nutrition* entails counseling on health and nutrition and checkups, promoting improved status and resource allocation in home and outside, promoting improved access to health services, and often offering family-planning services (these services may even be an initiating factor for CHNPs, for example, in Indonesia).
- *Breastfeeding* includes providing knowledge on practices (initial, exclusive, continued); arranging mutual support; building confidence; preventing misinformation and undermining factors; facilitating time for breastfeeding; and providing information along the lines of the infant formula code.
- *Complementary feeding* includes providing knowledge and counseling (timing of introduction, type, energy density, frequency, and so on); sometimes promoting village or urban area production of weaning foods; sometimes marketing inexpensive food; facilitating mother’s time allocation; and promoting technology—storage, preservation, hygiene methods (fermentation, even refrigerators).
- *Growth monitoring and promotion* requires equipment (scales, charts, manuals); training and supervision; needs training of weigher to interpret charts and counsel mother; and a referral system for problems (for treatment, counseling, or other preventive intervention if growth is faltering). Weighing at birth and monthly weighing should be included, if possible, and adequate weight gain (rather than achieved weight or any gain) should be used for guidance on counseling or other intervention.
- *Micronutrient supplementation* should include vitamin A for nonpregnant and pregnant women (low dose weekly, preferably as part of multinutrients); for women within one month of delivery (massive dose to protect infant through breast milk); for infants and children (massive dose at nine months immunization contact and thereafter every six months and when medically indicated). It should also



Source: Adapted from Tontisirin (1996, personal communication).

Figure 56.3 General Structure for Community-Based Programs, Based on Thailand's Program

include vitamin A—daily or weekly, with immunization campaigns, and so forth—and iron—daily or weekly for women (especially during pregnancy) as well as for children and adolescents. Iron is usually provided together with folic acid and may also be provided as part of multiple micronutrient supplementation. Iodine is usually provided by fortification and can be an infrequent (six-monthly) oral supplement, if necessary, but it should be part of multiple micronutrients for pregnancy.

- *Micronutrient fortification* is not usually included locally, although it is an important central program, but local monitoring is a coming opportunity, especially of iodized salt testing kits.
- *Supplementary feeding, using external supplies* may sometimes be appropriate in emergencies and in conditions of extreme poverty (for example, the Bangladesh Integrated Nutrition Program, or BINP), providing 200 to 500 kilocalories per person per day, but otherwise it is to be avoided as costly, with high opportunity cost, and not very effective; moreover, it can distort programs, which come to be seen largely as a source of free food.
- *Supplementary feeding, using local supplies* can be useful for complementary feeding (weaning) if carefully organized (which requires some resources). Village community production and processing are useful, if feasible (for example, in Zimbabwe), and the system can move to coupon method (for example, in Thailand).

- *Oral rehydration* includes highly effective local preparations for dehydration in acute diarrhea, as well as (or better than) oral rehydration salts. These preparations require counseling of mothers and take a lot of parents' time. Persistent diarrhea requires other intervention, especially nutritional. Care of children during sickness—especially continued breastfeeding and other foods—needs to be stressed (applies also to other illnesses).
- *Immunization* includes informing, referring, and facilitating.
- *Deworming* requires distribution and dosage supervision of mebendazole every few months, a highly effective nutrition intervention. Distribution methods are an issue.

The relative suitability of community- and facility-based operations for the different components again depends on local conditions, and these operations should be complementary. Community activities are essential for infant and child feeding, other caring practices, environmental sanitation, and the like. Facilities have a key role in immunization, prenatal care, and—of course—referral for treatment. Growth monitoring, micronutrient interventions, oral rehydration, and similar activities may be focused in either. Because it has more regular contact with clients, a community-based program may be more effective in actually reaching mothers and children with the component interventions than one that is facility based. Box 56.1 compares two programs in Honduras that offered the same content but differed in where the programs were based.

Box 56.1**Differential Effectiveness of Community- and Facility-Based Programs**

Effectiveness is more likely to be possible through community-based programs because contact with caregivers is typically more frequent and consistent. For example, 83 percent of children enrolled in a community-based growth monitoring and promotion program in Honduras (Atención integral a la niñez comunitaria, or AIN-C) were weighed two or more times in a given three-month period, whereas only 70 percent of children were weighed with the same frequency in a facility-based program. Workers visited 30 percent of mothers participating in the community program in their homes at least once for follow-up when their children were sick, were not growing, or had missed a weighing session. Controlling for a range of maternal and socioeconomic factors, researchers found that children 6 to 24 months of

age participating in the community-based program were 1.6 times more likely to be appropriately fed than were children not enrolled in growth monitoring and promotion. Children participating in the community program also were more likely to have received vitamin A and iron supplements than children participating in the facility-based program. Results show that consistent participation in the community-based program was associated with better weight for age. When a range of maternal and socioeconomic factors were taken into account, children participating fully in the community program were 435 grams heavier than children who were enrolled but participated infrequently. In the facility-based program, there was little difference in weight for children based on levels of participation.

Source: Plowman and others 2002.

PROGRAMMATIC FACTORS

Programmatic factors are considered first in terms of the characteristics of the activities—their population coverage and targeting, how much resources are applied per head (intensity), and the technologies used. Then the needs for initiating and sustaining these activities are discussed—the training needs, supervision methods, and (importantly) incentives and remuneration for field workers.

Coverage, Targeting, Resource Intensity, and Technology

Even effective programs improve the health and nutrition only of those they reach, so achieving as complete coverage as possible of those at risk is a major determinant of the effect. Although variations in the content of programs are seen in different circumstances, most activities are common to most programs. Variations in effect stem from factors such as coverage and adequacy of resources. How have CHNPs fared in reaching large sections of the population with adequate resources—and, indeed, what is the gap that would need to be filled? The achievements of the 14 programs drawn on here as case studies are summarized in table 56.3.

The programs expanded to include most of the communities within the areas targeted. The common evolution was to target select areas and specific biological groups within those areas—generally women and children—but not to give priority to any great extent to poorer or less healthy communities. Screening is sometimes done of individuals for admittance into

the programs (a form of targeting), based on nutritional status, as in growth monitoring and promotion, as well as on a one-time basis (for example, thin children in Zimbabwe). Recent thinking suggests that because mortality risk, growth failure, and morbidity are concentrated in children less than two or three years of age, in contrast to an earlier focus on children under five, these younger children should increasingly be a focus of CHNPs. A common policy observed in practice, therefore, is to aim for complete coverage within the areas participating, adding new sites until the entire region is covered. Relatively untargeted expansion to universal coverage may have been at the expense of establishing adequate resources and quality in the areas initially covered. In at least one case (Thailand), having achieved broad coverage and reduced malnutrition, the program became more targeted to areas in which progress was lagging. The coverage figures in table 56.3, although approximate, demonstrate considerable success in initiating and implementing CHNPs on a large scale—usually enough to have a substantial effect if the other factors needed for success were met.

How complete a coverage of the population should one recommend? This factor relates to targeting, to the additional resource requirements to reach the nonparticipants, and to their level of risk. Usually risk is spread throughout the population, although the extent varies considerably—at least a doubling of indicators of risk is usually seen between better- and worse-off areas or groups (for example, see Mason and others 2001, figures 1.4–1.7, 1.10–1.13). The remoter areas—or

Table 56.3 Characteristics of Selected Programs

Country	Coverage, targeting	Resources, intensity
<i>Africa</i>		
Tanzania: Iringa F: (+)	Population served = 250,000 in 6 districts, 610 villages, 46,000 children, of which 33,700 participated (73 percent). Targeting: children < 5 years and women; no socioeconomic selection of communities. Progressed from 168 to 610 villages 1984–88.	US\$8 to US\$17/child/year (approximately US\$30/child/year from total costs: approximately US\$6 million 2 village health workers/village = 1,220 total; approximately 1:40 children [Volunteers]
Tanzania: Child Survival and Development Program F: 0	9 of 20 regions (population total approximately 12 million; 2 million children). Aimed for complete coverage.	US\$2 to US\$3/child/year [Volunteers]
Zimbabwe: Supplementary Feeding Programme F: ++	Population served: 56,000–96,000 with supplementary feeding; up to 60 percent of all children in community-based growth monitoring.	External: US\$3 million over 10 years For example, 1990, US\$0.5 million, approximately US\$0.50/child/year (Approximately 1:10–200, based on numbers per project) [Extension agents]
<i>Asia</i>		
Bangladesh: BINP F: +	BINP: in 6 <i>thanas</i> , or subdistricts (7 percent of population), children < 2 years, 8 million pregnant and lactating women.	1 community worker per 1,000 population Approximately 1:200 children US\$14 million/year; approximately US\$18/child/year [Project supported]
Bangladesh: BRAC	Health coverage 25 percent. Nutrition with BINP, now expanding.	1 community health volunteer per 300 households; 1 community nutrition promoter per 200 households; community nutrition centers, 1:120 mothers and children; supervision of community nutrition promoters by community nutrition organizer, 1:10
India: ICDS F: ++/++	Children 0–6 years and pregnant and lactating women, in 3,900 of 5,300 blocks, or subdistricts; approximately 74 percent of population. Coverage expanded without targeting except by area.	1 community worker (<i>anganwadi</i> worker, or ANW) per 200 children; 1 supervisor per 20 ANWs Nonfood costs: approximately US\$2/child/year. [ANW paid, at low rate]
India: TINP F: +	Children 6–36 months, pregnant and lactating women. Children with growth failure selected. 40 percent of blocks in Tamil Nadu; 20 percent of children in 1990.	1 community nutrition workers per 300 children; 1 supervisors per 10 community nutrition workers US\$9/child/year, plus approximately US\$3 on food. [Project supported]
Indonesia F: (+)	By 1990, 60,000 villages (of 65,000: 92 percent) had <i>posyandus</i> (village health/nutrition center). Women and young children.	US\$2–11/child/year, depending on supplemental food; Rohde (1993) gives < US\$1 recurrent. Village workers (approximately 3 million total), 1:60 people, approximately 1:10 children; supervision 1:200. [Volunteer]
Philippines: national F: 0	Several programs, all targeted (for example, to poorer areas), none with national coverage.	US\$0.40/child/year in targeted areas. Village workers (<i>barangay</i> nutrition scholars) approximately 1:300 [Low allowance given]
Thailand: Primary Health Care + Poverty Alleviation Program + Basic Minimum Needs F: (+)	Expanded over about 5 years to cover 95 percent of villages. 600,000 village health communicators (1 percent of population) trained; 60,000 village health volunteers.	Ministry of Public Health; approximately US\$11/head/year (1990) 1 village health communicator or volunteers per approximately 20 children; 1 supervision extension workers per: 24 village health communicators and volunteers [Volunteer]

(Continues on the following page.)

Table 56.3 Continued

Country	Coverage, targeting	Resources, intensity
<i>Americas</i>		
Costa Rica F: ++ to 0	Expanded rural health program coverage 19 to 67 percent (1974–89).	RHP: US\$1.70/child/year Food and Nutrition Program: US\$12.50/child/year 2 health workers (full time) per 5,000 population; approximately 1:350 children [Health worker]
Honduras F: 0	With community health volunteers, AIN-C covers > 50 percent of health areas (expanded 1991 on), > 90 percent of children < 2 years in these; growth monitoring and home follow-up, plus referral and treatment.	Cost estimated as US\$6/child/year Volunteer teams 3:25 children, about 3.5 hours/volunteer/week
Jamaica F: 0	Community health aides (CHAs), waged, cover most of country from health centers, with home visiting.	CHAs (full time) 1:500 households; approximately US\$7/household/year [Health worker]
Nicaragua F: 0	Community health workers (<i>brigadistas</i>) with “multiplier” approach, training others; 1980 approximately 1 percent trained; many more for malaria control.	Volunteers, approximately 1:20 households

Source: See sources for table 56.2.

Note: F refers to role of supplementary feeding in the program; F: ++ = mainly a feeding program, or primary role; F: + = significant but not main role, often to selected children; F: (+) = existed but relatively minor; F: 0 = none. The status of community workers is given in brackets in the last column.

groups that are hard to include for other reasons—may be more expensive to reach. Clearly the calculations depend on conditions and have to be made on a case-by-case basis. The principle is obvious: only those areas and people included in CHNPs are going to benefit; so wherever need exists, programs are indicated. The implementation strategy, in theory, may need to begin with the most urgent needs, although in practice, programs may expand from the easier, more accessible areas; this practice seems reasonable, provided that the expansion really occurs and leads to equitable use of resources.

The program content is a mix of the components described earlier, varying with local priorities. The most crucial difference is whether extensive supplementary feeding is included. In middle-income countries, supplementary feeding was less prominent, often considered unnecessary, and because expensive, perhaps counterproductive (for example, in Costa Rica; Mata 1991). At the other extreme, such as for the Integrated Child Development Services (ICDS) in India, food distribution became the *raison d'être* of the program but, alone, was again probably not worthwhile. For some of the intermediate cases, supplementary food played a supporting role, with varying results. Except in the very poorest societies, supplementary feeding seems unlikely to be cost-effective.

The resources used for the programs found in table 56.3 can be expressed per participant (referred to as *intensity*), as total expenditures, and in terms of personnel; the latter figures may be more generalizable. (The outcomes associated with these resources are shown in table 56.5.) Data such as these have been

the basis for estimating that US\$5 to US\$10 per child per year may be needed for effective programs. The dollar figures vary from less than US\$1 to more than US\$20. Probably the low end of this range (say, less than US\$1 per child per year) does explain low or doubtful effect. Both low coverage and low intensity may explain the unchanged underweight prevalences in the Philippines until 2000. Fund levels in Indonesia are unsure; Rohde (1993) gave a figure of less than US\$1, but others gave higher estimates. Most would reckon the intensity in India too low (Measham and Chatterjee 1999) at about US\$2 per child per year. Looked at otherwise, the intensity planned for external funding (even if part of such funding is international costs) is in the US\$10 to US\$20 range (Bangladesh, India—Tamil Nadu, and Tanzania) and is the same as the estimate for Thailand. A level of US\$10 to US\$20 per participant per year is probably advisable for planning and sustaining effective programs.

The intensity measures of workers per mother-child and the supervision ratios are relevant in assessing needs. The suggested norms, originating from the Thai experience (see figure 56.2), are 1:10–20 for both. Since then, it has emerged that the full-time equivalence of community workers must be taken into account; the Thai workers are local volunteers, probably devoting 10 to 20 percent of their time. In Honduras, Fiedler (2003) in a careful cost study estimated that each volunteer spent 3.5 hours per week (less than 10 percent of full-time equivalent, or FTE), with a ratio of 1 volunteer to 8 children. The ratio of community health and nutrition workers (CHNWs) to children may, therefore, be as low as 1:200 for

FTEs and as high as 1:8 or 1:10 for part-time volunteers. In Jamaica, where the community health aides work full time, the ratio is 1:500 households; in the BRAC program in Bangladesh, it is 1:300, about half-time work (afternoons) (Chowdhury 2003). (An indication of the status of community workers is shown in brackets in the last column of table 56.3.) In any event, these ratios provide some basis for gauging the adequacy of personnel, and it seems that an effective ratio may be about 1:500 for community workers employed full time and 1:10 or 1:20 for local volunteers working part time.

In reality, the ratios of community workers to children are probably—not surprisingly—on the low side. Thailand, which trained 600,000 village workers (1 percent of the population), operated at about 1:20 for part-time volunteers, with similar supervision ratios. The Indonesian program was similar (or better) but had much less supervision. In contrast, the low resourcing of the ICDS in India shows up in a ratio of 1:200 (for part-time *anganwadi* workers, or ANWs), and in the Philippines, the ratio has until recently been 1:300 (for essentially voluntary workers).

Increased application of technology can contribute to the organization and running of community-based programs. Technology can be applied easily to methods of assessment and monitoring of children's progress; improved weighing scales (or in some circumstances, where rapid assessment in remote areas is important, using arm circumference) can simplify anthropometry. Modern computer technology for recordkeeping could be much more widely used, freeing staff time for home visits (for example, in Jamaica); e-mail, which is being rapidly adopted, has great potential for transferring information, troubleshooting, and consultation. Cell phone use is beginning to transform communications even in the poorest countries, where it is leapfrogging landline installation and use; as coverage expands, it will facilitate referral, for example, for emergency obstetric care, the need for which may first be identified by community workers. Coupled with improved transportation and procedures to allow the use of such transportation in cases of urgent need, modern communications can link communities to centers with advanced knowledge for information exchange and, by facilitating transportation when time is crucial, for referral. Modern communications may also provide more efficient ways of providing training, retraining, and supervision.

Application of current research and resulting technologies can improve many of the other interventions discussed earlier. In the micronutrient field, periodic supplementation (with vitamin A in high doses) can be extended through community programs, and fortified foods and micronutrient “sprinkles” can be promoted (see chapter 28). The prospect of enabling communities to test their salt for iodine content with simple and cheap test kits is intriguing and has often been recommended but has not yet been widely applied. Improved immunization technology should continue to protect health, for

which CHNPs' main role is to provide information and to ensure that children are taken for immunization (either to regular clinics or for National Immunization Days and the like). Periodic deworming can be conducted by community programs (and hookworm vaccines currently under development may soon contribute). Supporting the use of insecticide-treated bednets could be fostered through CHNPs. By far the most potentially important application of technology, certainly in Sub-Saharan Africa, will be the unprecedented effort to provide millions of people with antiretroviral therapy and associated care and support, as discussed later.

Training, Supervision, Incentives, and Remuneration

Community-based health and nutrition programs typically involve community workers, who may be entirely part-time volunteers (for example, in Honduras and Thailand) or may receive some remuneration financially or in kind (for example, in India). Community workers may be part of the health system, earning a wage and based in a local clinic (for example, in Jamaica) or in the community itself (for example, in Costa Rica); or they may be selected by and report to the community (for example, in Tanzania and Thailand). Table 56.3 indicates the status of community workers in the programs examined here. The training, supervision, and incentives for community workers are critical aspects of successful programs.

Inadequate training and supervisory support of community workers are common weaknesses. Considerable attention was given to training for the Iringa project (Tanzania), with village health workers trained for up to six months. In the Tamil Nadu Integrated Nutrition Program in India, community workers received three months of training and participated in annual refresher trainings. ICDS (India) initially trained the ANWs for three months, with two annual refresher courses, but this process declined. In Thailand, volunteers had two to five days of initial training, with annual refresher courses; Indonesian practice was similar. In Jamaica, where the community workers are employees of the health system, two months of initial training is provided to recruits with significant prior educational requirements. In Bangladesh, the BRAC community health volunteers have four weeks of training. The quality of the training has varied, poor training having been blamed for inadequate implementation in cases such as ICDS in India (Measham and Chatterjee 1999). Sanders (1985, 176–93) describes experiences in the 1980s of village health workers (and barefoot doctors) and their relation to the community.

Supervision of community workers is generally done by employees who are commonly in the sector. Training of supervisors (who often take on the role in addition to many other tasks) for these purposes is highly variable and not always adequate. Providing resources for visits to provide supervision to community workers is a further constraint. Supervision

ratios in effective programs are about 1:20 (table 56.3, last column, when reported). Supervision and training of community workers are closely linked; indeed, supervision (which must be supportive rather than disciplinary) should include a substantial element of on-the-job training.

Remuneration and incentives for sustaining motivation are key issues in replicating the successful features of these programs, and the options vary with the culture. In Thailand, it is argued that village volunteers consider the prestige associated with the role of health worker preferable to getting a low wage. In many cases, some right of access to health care is part of the incentive. For the ICDS in India, in contrast, the ANW receives a small financial remuneration, but the government (as elsewhere) will not grant formal employment status (and attempts to form unions have been strongly discouraged). Direct comparisons of the options of paid remuneration and voluntary work are rare. One opportunity to study options for remuneration is in the Philippines, where under a World Bank Early Child Development project, the child development worker receives a wage, which could be compared to near-volunteers at the *barangay* (village) level.

When CHNWs are primarily voluntary, they are selected by the community and report to community committees in some form. CHNWs on government payrolls may come from the communities and thus may be known to and identify with the communities, but they may report to supervisors higher up in the system. Both models can work, depending on the culture. What probably works least well is when the community worker is paid little and receives inadequate support and recognition from the community or even comes from elsewhere. Furthermore, as development progresses, reliance on volunteerism may become less useful.

For planning CHNPs in terms of community workers, the total numbers and resource implications can be estimated as follows. A full-time equivalent CHNW might visit 5 to 10 households per day, averaging a visit to each household roughly every two months; a ratio of 1 CHNW to 200 households, therefore, seems to be in the range within which an effect in terms of improving child health and nutrition is expected. Calculations from salaries of community health aides (CHAs) in Jamaica work out to US\$7 per household per year, within the usual range for expected effect. An important factor in regard to financial resources, however, concerns the substantial cadre of personnel who have training and job descriptions for community work, are based in health centers, and for administrative and financial reasons seldom leave the health facility. Moreover, funds may not be released to allow travel to nearby villages. An example is from Jamaica, where, because of clinic workloads, CHAs spend time helping in clinics rather than on home visits; in fact, technology could free staff time for community work by automating tasks, such as record keeping, that detain the CHAs. More effective deployment of existing personnel may

frequently be an option. Hiring additional personnel as community health workers would consume a significant proportion of typical health budgets (at 1:200 households for FTEs, this would amount to US\$1 to US\$2 per person per year, or about 20 percent of public health budgets in low-income countries). A mix of redeployment of existing staff and new hiring from budget reallocations should, nonetheless, be cost-effective.

Organization

Effective, respected, and socially inclusive organization at the community level seems to have been a key feature of the success in launching, expanding, and sustaining CHNPs. Most of the successful CHNPs drew and built on established community procedures; where they did not, effect and sustainability were in doubt. In Thailand, the health services and the religious organization at village level were important. The health services themselves play a key role in Costa Rica, Honduras, and Jamaica. In Indonesia, it was the community organizations (and women's groups) together with (initially) the family-planning services. In Iringa, Tanzania, it was the local political party structure, with substantial input from UNICEF. In Zimbabwe, immediately after independence, it was the village organizations that had fought the war, later helped by a consortium of national and international nongovernmental organizations (NGOs). The major part of the still-expanding program in Bangladesh is run by BRAC, an NGO, and has built on its links to the community for development, food security, and educational activities, as well as for health. In contrast, CHNPs that either failed to launch a wide program (for example, in the Philippines) or had limited effect (in India, ICDS) probably lacked some of these features. Inclusiveness is probably hard to achieve if not inherent.

Support from the central government is also crucial: CHNPs need this support for training, supervision, wages, supplies, facilities, and the like. Where such support becomes a regular government budget item, activities tend to become embedded and are sustained, in contrast to where the support is from donors.

A further issue concerns maintaining the community program's preventive orientation. In Indonesia, for example, according to Rohde (1993), the health services co-opted (and medicalized) the *posyandu* (weighing post, or community health and nutrition center) system by adding a diagnostic and treatment module (in fact, a table in the meeting place). This module attracted most of the attention, to the disadvantage of the preventive aspects of the program. Thus, if the extension of IMCI into the community means treatment (by trained but not medically qualified people) in the community rather than referral to facilities, treatment could become the main or even sole focus, shifting attention from prevention. Some parallels exist to the experience of ICDS in India, where, as noted earlier, food became the *raison d'être*.

CONTEXTUAL FACTORS

Community-based programs *can* work usefully, bringing steady progress; whether they do depends on myriad factors relating to the context. Three different concerns are (a) factors affecting widespread initiation of CHNPs of potentially adequate coverage, intensity, and content; (b) factors that lead to sustainability; and (c) factors that allow activities to be effective in improving health and nutrition—at best, when they, themselves, also contribute to a rapid transitional improvement, as in Thailand, Costa Rica, and Jamaica.

Contextual factors may bring about improvements in health and nutrition without any additional direct action—through improving living conditions, education, and so forth. Often, the changes caused by such nonprogrammatic factors are diffi-

cult to distinguish from program effects (current examples are in Bangladesh and Vietnam, both showing rapid improvement in nutrition). Moreover, the same factors (again, such as education) may both produce endogenous change and increase the effect of program activities.

Five contextual factors have been suggested as priorities (in Asia; Mason and others 2001):

- women's status and education
- lack of social exclusion
- community organization
- literacy
- political commitment.

Table 56.4 shows estimates of the positions of countries with case study programs in regard to these factors. The levels of

Table 56.4 Context in Which Selected CHNPs Start and Run

Country	Approximate period	Women's status and education ^a	Lack of social exclusion	Community organization	Literacy	Level of health and administrative infrastructure	Political commitment	Total minus political commitment	Total
<i>Tanzania</i>									
Iringa starts	1984–90	2	4	4	3	2	5	15	20
Iringa declines	1990–	2	4	2	3	2	2	13	15
<i>Zimbabwe</i>									
Supplementary Feeding Programme starts	1981–90	2	4	5	2	2	5	15	20
Supplementary Feeding Programme declines	1990–	2	2	2	2	2	2	10	12
<i>Bangladesh</i>									
BINP	1997–	1	3	2	2	3	3	11	14
<i>India</i>									
ICDS	1975–	1	1	2	2	2	3	8	11
TINP	1980–9	2	2	3	3	3	4	13	17
<i>Indonesia</i>									
UPGK starts	1975–	2	4	3	2	2	4	13	17
UPGK declines	1990–	2	4	2	2	3	2	13	15
<i>Philippines^b</i>	1974–2000	4	4	3	4	3	1	19	20
<i>Thailand</i>	1982–	4	3	4	4	3	4	18	22
<i>Costa Rica</i>									
RHP	1973–	4	4	4	3	4	4	19	23
<i>Jamaica</i>	1985–	4	4	3	4	4	4	19	23
<i>Nicaragua</i>	1979–90	3	2	3	3	3	4	14	18

Source: Authors.

Note: 0: worst; 5: best.

a. Women's status and education can be quantified by indicators such as adult literacy rates, females as percentage of males, and secondary school enrollment for girls.

b. Since 2000, the Philippines has begun a significantly improving trend, one factor being increased implementation of programs (CHNPs, as well as others, such as salt iodization); this increase is caused in part by increased political commitment, both as new legislation and resource allocations.

health and administrative infrastructure have been added. The table also shows changes in these factors that may help explain why the CHNPs declined in three cases.

Political commitment can lead to initiating community programs and mobilizing resources. It may also respond to emerging community mobilization, as seems to be the case when programs start after political upheavals, as in Zimbabwe and Nicaragua. Declining political commitment accounts for loss of interest by the government in CHNPs; economic decline undermining resource availability may cause a shift away from financial support of CHNPs (for example, in Tanzania). In table 56.4, estimates of levels of contextual factors are totaled both without and including political commitment (last two columns). The total without commitment may indicate how favorable the context is if commitment is then made. Costa Rica, Jamaica, and Thailand had a favorable context and, with commitment, succeeded. The Philippines had comparable favorable conditions—the position of women is generally good, there is limited social division (exclusion), and so on. However, the necessary commitment (of resources, in particular) was made only recently, with new legislation, adherence to regulations (for example, iodized salt went from 25 to 65 percent coverage), and increased resource allocation and assignment of community workers. This new commitment may well explain the recently resumed decrease in child malnutrition (figure 56.2). In other examples—such as Indonesia and Tanzania—the conditions were moderately favorable, and while political support and finance existed, progress was made. In Tanzania, financial crisis denied the programs sustained support; in Indonesia and Zimbabwe, bureaucratization and centralization of the political process, followed by political turmoil, contributed to a similar outcome (Sanders 1993). The situations in India and Bangladesh have not been very favorable. The position of women and social rifts, amounting to exclusion, have probably inhibited effective programs, even with political commitment. This context may now be changing in Bangladesh, as seen in the activities of BRAC. Finally, this analysis demonstrates the relation of decline in programs to falling political commitment in Tanzania, Zimbabwe, and Indonesia.

If this analysis approximates the truth, the forward-looking policy implications may be important:

- First, investing initially in a favorable context makes sense (as does possibly committing resources preferentially to interventions in the more favorable contexts). Supporting policies can address social constraints—such as improving education for women—and (relatedly) seek to improve human rights. In many cases, human rights may be of overriding importance for health: Farmer (2003) has made a compelling case for rethinking health and human rights as a

prerequisite for progress and as a responsibility for those working for health, especially of the poor and of the destitute sick. This investment may be long term and difficult—as in Kerala, India, for instance—but must be seen as integral to the struggle for health (Sanders 1985). Operationally, this commitment to human rights puts greater responsibility on advocates and investors in health to broaden the dialogue and scope for allocating resources and to avoid committing resources regardless of the prospect of success as influenced by the social and human rights context. In health and nutrition, as in other areas, adjustment of policies to support the success of interventions would be pragmatic as well as the right thing to do.

- Second, even if the context is more favorable, genuine political commitment is still essential. Excessive donor input may inhibit this commitment. It is striking that Thailand had to reject donor influence and make its internal decisions before its programs became successful (Tontisirin and Winichagoon 1999), Costa Rica had to fight and overcome a medicalized approach (Muñoz and Scrimshaw 1995), and Indonesia's *posyandu* system was undermined when treatment displaced prevention (Rohde 1993).
- Third, it is clear that severe economic stress, political pressure, or both have caused unsustainability (Indonesia, Nicaragua, Tanzania, and TNIP).
- Fourth, if the context is unfavorable, it might be better to work on improving the context than to commit resources to programs that may not succeed—but, of course, success in improving context itself depends on circumstances, notably political commitment.

Considerations like these should contribute to identifying supporting policies needed for programs to be effective and modifications to interventions in particular conditions. For example, it is often observed that a particular factor—say, access to health services—is more strongly related to improvement among the better off (for example, the educated) population. This interaction of program with context leads to identifying new needs—in this example, perhaps facilitating access for the illiterate. In the longer run, resources or legislation (for example, to combat social exclusion or discrimination against women) may be highlighted as prerequisites before a program can be expected to work. Often failure to take account of context when trying to transfer experiences from a pilot trial (“scaling up”) may explain why efficacious interventions prove ineffective in a larger population.

This analysis of contextual circumstances indicates that targeting the poor may not always be cost-effective, and some interventions may not be feasible in certain contexts. An example is when the health infrastructure and services are almost nonexistent; under those conditions, it can be argued that

emergency treatment (especially for the diseases addressed by IMCI) should be established and reliable resources put in place first. A similar difficulty, often seen in food security, is that most interventions may not work for the poorest of the poor. For instance, supporting food (or cash crop) production in low-potential areas may not be realistic; nonagricultural employment may be better.

Thus, community-based programs work in a specific time and place: programs may start, work for a time, and then evolve or fade away. Even if they fade away, some useful effect may be achieved: sustainability need not be forever. At the same time, short project cycles (three years for many donors) can act against sustained programs. Some compromise in donor policies to allow assurance of continuity for reasonable periods (such as 10 years) could do a lot to increase the effectiveness of donor support to CHNPs.

The essence of time and place is not fully understood. Werner and Sanders (1997) give examples of favorable times, as when the old order is changing (for example, after internal conflict, as in Nicaragua and Zimbabwe) and when there is renewed vigor and some new organization is in place. Another generalization of a favorable context is when energy and interconnectedness exist in society. Thailand illustrates both: the Thais needed to change the approach, moving away from donor influence, in order to initiate the successful community programs that helped transform health and nutrition throughout the country, and that worked in part because of cohesive features of Thai society (Tontisirin and Winichagoon 1999).

In these examples, programs that continued on a large scale—either until the problem was largely resolved, as in Costa Rica, Jamaica, and Thailand, or as it was expanding, as in BRAC in Bangladesh or AIN-C (Atención integral a la niñez comunitaria) in Honduras—clearly had supportive context, but their specific common features (and hence how they could be replicated) are elusive. Perhaps one crucial condition for success is that circumstances are such that people and communities begin to have the sense that they can take responsibility for—and control of—their health and quality of life. Responsibility comes with the emancipation of societies from colonial or other repressive conditions and possibly when grassroots attention becomes widespread, as it did in Bangladesh through an NGO that identified with the people. Evidence is growing that, among the poor in the United States, this sense of control is directly related to better health and reduced exposure to HIV and AIDS; Sampson, Raudenbusch, and Earls (1997) call the concept *collective efficacy*. Cohen and others (2000) show that health conditions improve when communities themselves fix up their environment—the “broken windows” theory. Such ideas may equally apply to poor communities, especially urban ones, in developing countries too.

RESULTS

Indicators of progress in implementation—*process indicators*—referring to coverage, intensity, and so on, are shown in table 56.3. As discussed earlier, most programs expanded population coverage without much targeting. But usually the level of resource application (intensity) was on the low side. More research is needed on the contribution of CHNPs to health process indicators, such as immunization coverage rates, as well as to nonhealth activities, for instance, in agriculture and community development.

Impact evaluation, which refers to the net effects of interventions on changing health outcomes, is sorely lacking. The efficacy of most of the component parts of CHNPs, when resources are adequate and the problems are correctly identified, is established, but in routinely administered large-scale programs, the changes in outcome that can be ascribed to program actions are less known. Although controlled trials by definition are not applicable, plausible evidence can be obtained by careful attention to research design, measurement, and analysis (Habicht, Victora, and Vaughan 1999). Some form of “with and without” and “before and after” comparisons is needed; for instance, such methods as staggered implementation, natural experiments, and selection of comparison groups with some statistical control can yield valuable information now lacking and should be more widely attempted. In this context, it should be noted that because of the timing and level of effort necessary for the evaluation, the impact evaluation results (changes in outcome ascribed to the program) may be more important for policy decisions on *future* programs than for the program that has been evaluated. Moreover, not all programs require detailed evaluation. Thus, financial support for such policy-relevant evaluations may come from budgets other than that of the program to be evaluated. The evaluations should also be prospective as far as possible, so decisions on evaluation design and finance are needed earlier rather than later.

Impact

For the examples used here, inferences were drawn from piecing together results either from ad hoc surveys or from program and administrative data; occasionally such inferences were made from the comparison of baseline estimates with midterm or final assessments, but the comparison groups, if any, were imperfectly matched. Thus, the conclusions on impact now put forward are tentative and based on judgments from available information. Some of these conclusions were drawn from trend assessments, details for which are in Mason (2000, annex 5).

The most widely available indicators are mortality rates (infant, child, and to a lesser extent maternal; reliable data on

age zero and cause-specific mortality rates are not usually available from most developing countries); prevalences of underweight in children from national surveys (often supported by demographic and health surveys or UNICEF Multi-Indicator Cluster Surveys); and indicators of health services (notably immunization coverage rates). Estimates of morbidity, even of the common diseases (such as diarrhea and ARI), are not available systematically enough to judge trends in relation to programs. Child underweight (or stunting) has a particular value, because it measures an attribute of all children (age and weight or height), rather than assessing a relatively rare event, as in mortality estimates. Moreover, experience is well established of how underweight prevalences behave as a robust indicator, having a useful degree of responsiveness but not being subject to wide fluctuations with transient events.

Under controlled conditions, improving health and nutrition allows rapid catch-up in bodyweight and fast rates of reduction in underweight prevalence (for example, Pinstrup-Andersen and others 1993, 405). But in the real-world conditions of CHNPs, the expected rate is slower. As examples, Thailand maintained a reduction in underweight of about 2.9 ppts per year in the 1980s (see figure 56.1); the 22 projects reviewed as reported by Jonsson (1997) ranged between about 1 and 3 ppts per year. A reduction rate of -2 ppts per year, suggested earlier as an expectation from successful programs, would lead to very significant improvement if achieved at national levels: for South Asia, it would mean going from a prevalence of underweight of about 60 percent in 1980 to 20 percent in 2000; for Africa, from 30 percent in 1990 to 10 percent in 2000.

Detecting this rate can be difficult with the noise of sampling and nonsampling errors and with the common seasonal changes, which can amount to 5 ppts fluctuations or more, certainly in Africa. The potential program-ascribed trend needs to be separated from the underlying secular trend for the country, roughly 0.5 ppts per year (from 1985 to 1995; ACC/SCN 1996). Clearly the longer the program and the observing periods, the easier assessing trends is.

Where the data are detailed enough, an initial rapid fall is seen in severe malnutrition—and probably in mortality,—followed by a slower fall in mild to moderate malnutrition. The reasons for the initial rapid fall are presumed to be immediate effects of improved health care, immunization, and the use of oral rehydration therapy. The outcomes estimated for the programs considered here concentrate on the sustained trend—after a year or two of implementation—as summarized in table 56.5.

In Zimbabwe, from 1980 to 1988, the infant mortality rate (IMR) fell from 110 to 53 per 1,000 live births, and severe malnutrition fell from 17.7 to 1.3 percent. However, stunting fell only in 1982–88, from 35.6 to 29 percent (1.1 ppts per year). Tanzania shows a similar effect in Iringa, with severe and moderate malnutrition falling much faster for the first two years.

Interestingly, the Child Survival and Development Projects (supported by the World Bank, among others), which covered a much larger population (but with less intensity than in Iringa), appeared to show almost the same pattern as in Iringa: a rapid initial fall (as much as 8 ppts per year, for one to two years), continuing at 1 to 2 ppts per year.

In Costa Rica, the child mortality rate plummeted in the late 1960s, well before stunting fell in the 1970s (Saenz 1995, 129; Vargas 1995, 111). A lag was seen in Thailand, where the child mortality rate started to fall rapidly in 1977, and both severe and moderate malnutrition appeared to start their fall in 1983–84. Both these improvements preceded the major growth in gross national product, which began in 1987 (Kachondam, Winichagoon, and Tontisirin 1992, tables 8 and 33). In analyzing Indian experience, where the IMR has fallen faster than child malnutrition, Measham and Chatterjee (1999) suggest that further improvements in child survival may be constrained by the high rates of child malnutrition.

The sustained effects are generally of about an additional 1 ppt per year improvement (table 56.5). For Bangladesh (the BINP), Tanzania, and Thailand, it is possible to distinguish the sustained rate from the initial rapid fall. In Bangladesh, the BINP started during a period of rapid improvement overall, so extracting the underlying trend is especially important to give a plausible view of the “with-project” rate: about 1.6 ppts per year again seems a reasonable estimate. A similar extraction of likely with-project changes allowing for underlying trends was reported previously (Mason 2000, annex 5) for Tamil Nadu, Andhra Pradesh (ICDS), and Orissa, indicating plausible improvements for the first two states.

In sum, these results support the contention that after an initial rapid fall, the sustained rates of improvement in child underweight prevalence settle down to about an additional reduction of 1 or 2 ppts per year. This conclusion is the same as previously reached (Gillespie and Mason 1991), now supported by some new results.

Cost-Effectiveness

Therefore, if we use prevalences of underweight children as the basis for calculation, US\$10 per child per year gives a reduction of 2 ppts per year. If we are to translate this cost into an implied effect on health and survival, underweight must be related to the measure of disease burden, DALYs lost. Then the resources needed per DALY saved—dollars per DALY—can be estimated. A 32.5 percent reduction in the loss of DALYs is associated with eliminating general plus micronutrient malnutrition as both direct effects and risk factors (see table 56.1, discussed earlier); as a first approximation, the average prevalence for developing countries of 30 percent underweight can be applied. We can calculate the associated DALYs gained from reducing malnutrition at this rate (and assume that loss of DALYs from *all*

Table 56.5 Outcomes and Resources in Selected Programs

Country	Outcomes	Resources
<i>Africa</i>		
Tanzania: Iringa	Underweight 50 to 35 percent (1984–88) Immunization 50 to 90 percent Rates in underweight: initial 2 years, –8 ppts/year; first 4 years, –4.5 ppts/year; sustained (years 2–7), –0.8 ppts/year	US\$8 to US\$17/person/year (US\$34/child/year from total costs); 2 village health workers/village = 1,220 total; Approximately 1:40 children
Tanzania: Child Survival and Development Program	Underweight reduction rates similar to Iringa	US\$2 to US\$3/child/year
Zimbabwe: Supplementary Feeding Programme	Stunting: 35.6 to 29 percent (1982–88) –1.1 ppts/year IMR: 1980–88: 110–153	External funds, approximately US\$0.50/child/year
<i>Asia</i>		
Bangladesh: BINP	BINP, first 6 <i>thanas</i> , initial effect (1997): approximately –11 ppts/year; then (to February 1999) approximately –1.6 ppts/year additional Underlying (nonprogram) trend: national approximately –1.7 ppts/year, program area approximately –2.4 ppts/year	1 community worker per 1,000 population; Approximately 1:200 children; US\$14 million/year, approximately US\$18/child/year
Bangladesh: BRAC	No program-specific data, but child underweight and anemia in women have substantial falling trend in recent years.	Over all programs, US\$196 million in 2003 (approximately US\$8/household over all households); health program covered 31 million people, over 20 percent
India: ICDS	Overall prevalence underweight declining only slowly; some states reported faster, but link to ICDS not shown.	1 supervisor to 20 ANWs
India: TINP	1979–90: –1.4 ppts/year in TINP districts; –0.7 in non-TINP districts: increased improvement of approximately –0.7 ppts/year (Reddy and others 1992, 45). From other data, increased improvement of –1.0 ppts/year.	US\$7–12/child/year
Indonesia	Probably about –1 ppt/year; underlying trend unknown IMR: 1970, 1980, 1990: 118, 93, 61	US\$2 to US\$11/child/year, depending on supplementary food. Rohde (1993) gives < US\$1 recurrent. Village workers (about 3 million total) 1:60 people; approximately 1:10 children; supervision 1:200
Philippines: national	No change found in underweight. IMR: 1960, 1996: 77, 32.	Low coverage and intensity
Thailand	Approximately –2.9 ppts/year improvement in child underweight. Breaks down to 1982–84: –7.8 ppts/year; 1985–90, –1.9 ppts/year. IMR: 1970, 1980, 1990: 73, 55, 27	Ministry of Public Health, approximately US\$11/head/year (1990) Village health communicator or volunteer approximately 1:20 children; supervision by extension workers: village health communicators and volunteers approximately 1:24
<i>Americas</i>		
Costa Rica	Stunting improved by approximately 1–1.5 ppts/year (estimated from Muñoz and Scrimshaw 1995, 111), 1979–89. IMR: 1970, 1980, 1988: 62, 19, 16	Rural health program: US\$1.7/child/year Food nutrition program: US\$12.50/child/year 2 health workers (full time)/5,000 population, approximately 1:350 children
Jamaica	–1.9 ppts/year 1985–89 IMR: 1960, 1996: 58, 10	
Nicaragua	IMR fell from (at least) 92 to 80	Large numbers community health volunteers trained and supported

Source: See sources for table 56.2.

malnutrition comes down at this rate; CHNPs include some attention to micronutrients). This reduction is then cumulated through time (five years here) and assumes a linear relation between cost, underweight reduction, and disease burden avoided. The calculation also assumes a persistent effect of reducing malnutrition.

Using these assumptions gives an estimate of US\$200 to US\$250 per DALY saved in sustained programs. This estimate does not include gains in DALYs from diseases that do not show up as underweight, which must be substantial. Moreover, if this calculation is applied just to the first rapid fall, typically (in the three cases examined) about 8 ppts per year, the ratio might fall by a factor of four, to US\$50 to US\$60 per DALY saved (but start-up costs are higher too). The sustained figure should be the more generalizable.

Many further provisos exist. Much of the effect here is on a risk factor—malnutrition—reducing, which, in turn, makes other interventions more effective; hence, the comparison of CHNPs with more direct interventions may not be valid. But conversely (or perversely) improving nutrition could actually reduce the cost-effectiveness of other interventions—such as measles immunization—by reducing the mortality risk of children who are not immunized.

FUTURE APPLICATIONS

The experience so far in CHNPs can be applied more broadly, especially where community organizations can sustain support for CHNWs. CHNPs have worked best so far in Asia and Latin America. However, with the HIV/AIDS epidemic in Sub-Saharan Africa needing high-priority attention, application of CHNP experience to the HIV/AIDS crisis should be explored.

Extending CHNPs' Coverage and Intensity

In a project sponsored by the Asian Development Bank (ADB) and UNICEF that was aimed at identifying ways of investing in improved child nutrition, Mason and others (1999, 2001) have reviewed the extent of CHNPs in Asian countries. Resources were estimated in terms of annual expenditures per child and of ratios of population to community workers (“mobilizers”). The project addressed the needs of eight countries (Bangladesh, Cambodia, China, India, Pakistan, the Philippines, Sri Lanka, and Vietnam), and previous experience in Indonesia and Thailand provided additional guidance.

The population coverage of CHNPs was estimated as about 5 to 20 percent, except for India with the ICDS, which reports about 70 percent coverage. The next indicators refer to estimates *within* programs. The calculated intensity was commonly 200 children to 1 community worker (for example, Bangladesh, India, Sri Lanka); ratios of up to 100:1 were reported in Pakistan

and Vietnam and up to 60:1 in the Philippines. Further research has stressed the variation in time commitment of CHNWs in different places—hence the need to convert to FTEs. The ratio used as the norm, derived from experience in Thailand and Indonesia, of about 1:20 is probably equivalent to 1:200 in FTEs. In India, opinion has been that about a doubling of the ANW numbers in the ratios is needed to get more effect (Measham and Chatterjee 1999). From this perspective, these estimates indicate that both coverage and intensity are low, although intensity may be half that needed, whereas coverage (except in India) is far too small. Supervision ratios are estimated as about 1:20 and higher. Expanding the numbers of CHNWs also means increasing the number of supervisors (usually from the health system), with associated costs.

Calculations from scarce financial resource data show that most government programs cost about US\$1 per participant child per year or less, whereas Bangladesh (BINP, with donor support and in line with other donor-supported programs) reached costs of US\$15 to US\$20 per child per year. By this calculation, too, the resources per head, as well as the coverage, were in most cases too low for widespread effect.

The estimates of coverage and intensity can be combined to calculate the extent of current programs in relation to that needed for full coverage at adequate intensity. The results based on a 1:20 ratio of CHNW to children suggest that less than 1 percent of the need was currently available; at 1:200 (which would cost more, because the CHNW would work full time) perhaps 10 percent of the need would be covered. Either way, a massive expansion would be called for if CHNPs were to be used as a means for widely improving health (but still calling for only about 20 percent of the public budget for health).

Expansion requires major resources, and not only financial ones. Thailand trained 1 percent of the population as community health workers (part time) and established an extensive supervision and support structure, including retraining. The estimates for the ADB-UNICEF project in financial terms were, for Bangladesh, Cambodia, Pakistan, Sri Lanka, and Vietnam, some US\$190 million to US\$280 million per year for improvement of underweight by an additional 1.5 ppts per year (Mason and others 2001, 64–68).

The Potential Role of CHNPs in Combating HIV and AIDS in Sub-Saharan Africa

Controlling the epidemic of HIV and AIDS in Sub-Saharan Africa will take an unprecedented effort. As antiretroviral therapy becomes available there will be new opportunities to turn the tide. Supply of antiretroviral therapy drugs, although essential and the cutting edge of new programs, is only part of the need. Food and income support, care for children (orphans and others affected), counseling, support to promote and sustain behavior change, and rehabilitation of people and

communities are needed (see chapter 18). Many of these activities have precedents in the types of CHNPs run by community health workers that are discussed here. What lessons are transferable?

One concern is that CHNPs have a greater history of success in developing countries *outside* Africa. Those within Africa seem to have been sustained for limited periods, often linked to donor interests. Reasons may have to do with lower levels of administrative infrastructure, different existing community organization, and varying political commitment (see table 56.4). These factors may now be weakened as the AIDS epidemic reduces the numbers of qualified people and undermines community organizations. It will be urgent to work on such contextual factors to create conditions in which community organizations can be refurbished and built on.

Community organizations can work in Africa, as elsewhere, when they have a real function with activities perceived as useful to pursue and some resources (including mobilizing their own) to use. Some transferable lessons are that such local organizations are crucial; that in regard to supervision and access to certain resources, they need to work with the government structure—often through health system employees; and that they need sustained resource support, much of which must come from donors.

Treatment and rehabilitation of people with AIDS will be home based in most cases and will depend substantially on community support. Nutrition is an important component; improved food intake is likely to enhance the effect of antiretroviral therapy, and when treatment progresses, nutrition will help get sick people back on their feet and returned to a productive life. A village health worker could play a key role in this process. In much of Africa, HIV and AIDS affect many communities, and in southern Africa, where HIV prevalences reach 30 to 40 percent, almost all communities have chronically sick adults. This fact means that most communities need programs: the problem is not highly concentrated. On the positive side, the more developed and accessible communities are those most affected by AIDS (Mason and others forthcoming; UNICEF 2004), where establishing programs may be easier. HIV and AIDS are affecting children both directly, as pediatric AIDS, and indirectly, through the impoverishment and destitution of affected households. This effect is seen in worsening child malnutrition. Here, too, support through CHNPs could play a useful role.

The characteristics of CHNPs elsewhere—in terms of intensity, training, supervision, and so forth—may provide some guidance for establishing or extending them in Africa. Mechanisms for identifying, supporting, and training village or community health workers in this context can draw on experience with CHNPs; such issues as their identification in the community and links with community and facility programs will arise. A key issue will be the remuneration and incentives

for community workers, and this issue may need some research and testing of different approaches. The activities of community workers in dealing with treatment (and prevention) of HIV and AIDS have parallels to malnutrition and would probably include the following items:

- social support and facilitating access to resources (possibly including food aid)
- counseling
- treatment and referral for opportunistic infections
- promoting rehabilitation to productive life (which may benefit from improved nutrition) as antiretroviral therapy progresses.

Schools too have an extremely important role in the fight against HIV and AIDS and should be linked to, or part of, CHNPs. Schools provide a refuge and a means of providing help for orphans and vulnerable children, and they also provide a crucial opportunity for preempting and combating high-risk behavior.

RESEARCH NEEDS

The question of incentives, training, and support for community workers urgently needs research, both from current experience and with prospective designs. The issues include the following:

- What is the CHNW's status, relative to the community or to the government (or NGO) hierarchy?
- How are CHNWs selected and to whom do they report (for example, community health committees, supervisors employed in the health or other system)?
- What educational background and how much training and retraining—and by what methods—are needed for CHNWs?
- What ratios of CHNWs to households are effective (or most cost-effective), both as part-time workers (volunteer or otherwise) and as full-time employees?
- What supervision ratios work?
- What remuneration and incentives are effective?
- How can these efforts be financed?

Enough programs have been in operation for long enough that researchers could base on them much of the needed research on processes of implementation, launching new trials only for processes for which sufficient information does not exist. In contrast, impact evaluation requires new and preferably prospective studies.

A major gap in research is the application of community-based programs to urban areas. Urban communities are

conceived differently from the rural areas of most CHNPs, organizations run along different lines, and so forth. Yet population growth is in urban areas, and some problems, notably HIV and AIDS, are worse there.

Finally, the cost-effectiveness analysis results given in an earlier section are based on rather few and approximate results. CHNPs may well provide a viable and cost-effective approach under many circumstances in poor countries, and it may be necessary to demonstrate this viability better and more quantitatively for support to CHNPs to compete with more traditional service delivery interventions. That, too, would constitute worthwhile research.

NOTES

1. Social exclusion refers to the exclusion of groups from the mainstream of public actions: lower castes in India, poorer groups in Pakistan, many indigenous ethnic groups throughout Asia and the Americas, migrant workers in China and elsewhere; the result for public health is that excluded people do not participate in programs even if they are available.

2. Pinstrup-Andersen and others (1993) provide a more complete list.

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