

Evaluation of community-based interventions for non-communicable diseases: experiences from India and Indonesia

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SUMMARY

This paper reports the results of formative and outcome evaluation of two ongoing community-based intervention programmes for integrated non-communicable disease (NCD) prevention and control in urban low-income settings of Ballabgarh near New Delhi, India, and in Depok, West Java Province of Indonesia. At both sites, a coalition of community members facilitated by academic institution and the World Health Organization, planned and implemented the intervention since 2004. The intervention consisted of advocacy and mediation with stakeholders, training of volunteers and school teachers, communication campaigns, risk assessment camps and reorientation of health services. The formative evaluation was based on the review of documents, and outcomes were assessed using the standardized surveys for NCD risk factors in 2003–2004 and 2006–2007. The baseline surveys showed that tobacco use, low intake of fruits and

vegetable, suboptimal levels of physical activity and obesity were prevalent in both the communities. A frequent change in local administrators and lack of perceived priority for health and NCDs limited their involvement. Pre-existing engagement of community-based organizations and volunteers in health activities facilitated its implementation. The reach of the programme among the population was modest (25–32%). Health system interventions resulted in increased diagnosis and better management of NCDs at health facilities. Early outcome measures showed mixed results of change in different risk factors. The experiences gained are being used in both countries to expand and provide technical support to national efforts. This paper adds to the knowledge base on the feasibility of designing and implementing large-scale community-based interventions for integrated prevention of NCDs through modification of risk factors.

Key words: behaviour change; community-based intervention; developing countries; non-communicable diseases

INTRODUCTION

Chronic, non-communicable diseases (NCDs), such as cardiovascular diseases, cancer, chronic

lung diseases and diabetes, contribute to a large proportion of deaths and disability globally. In the South-East Asia (SEA) Region of World Health Organization (WHO), they accounted

for 54% of deaths in 2005. On the basis of available trends, by the year 2020, NCDs are predicted to account for 73% of deaths and 60% of the disease burden (WHO, 2005). In the SEA Region, although mortality from infectious diseases are projected to reduce by 16% during the period 2006–2015, mortality due to NCDs is projected to register an increase of 21% during the same period (WHO, 2005). Data from *World Health Statistics* (2009) show that for India, cause-specific mortality due to all NCDs was ~597 per 100 000, and for Indonesia, it was around 457 per 100 000 population. The primary contributor in both the countries was cardiovascular diseases which accounted for more than two-thirds of the deaths due to NCDs (WHO, 2009).

NCDs are mostly the result of unhealthy behaviours like inappropriate diet, inadequate physical activity, tobacco and alcohol use etc. Preventing NCDs is most effectively done through a combination of a population or community-based approach and an individual-focused intervention for risk reduction (Lewis and Rose, 1991). The principle of community-based action is not only to target the community for bringing about the behavioural change. It includes also empowering the community, encouraging it to act as an agent of change and prompting it to use its own resources for action. The broad strategy comprises of raising awareness of the community so as to change risk perception, providing simple tools, technologies and lifestyle choices and facilitating the process of adoption of appropriate options by the community members (Baker *et al.*, 1998).

There are many examples of successful population-based interventions, notably the North Karelia project in Finland, Pawtucket Heart Health programme etc., for prevention and control of NCDs in different parts of the world (Stern, 1976; Fortmann, 1981; Farquhar, 1985; Puska *et al.*, 1985; Mittlemark *et al.*, 1986; Lefebvre *et al.*, 1988). Valuable lessons have been learnt from implementation of demonstration projects in developed countries (Brownson *et al.*, 1998) and evaluation of various community-based interventions (Sellers *et al.*, 1997). These lessons can be broadly divided into two groups—implementation issues and methodological issues of evaluation. The methodological challenges include, among

others, low statistical power related to study design, sampling issues and limitations related to short period of intervention. Implementation issues include insufficient tailoring to local needs, inadequate intensity of interventions applied to modify risk factors, low community penetration and a limited ecological reach.

Although methodological issues are generic, many of the implementation issues are context-specific and would differ between developed countries and low-income settings of Asia, where large part of global population resides. Recently, the feasibility and effectiveness of community-based strategies has been demonstrated in a low-resource setting in Iran (Sarrafadegan, 2009). However, more such efforts in different sociocultural environments in developing countries are needed.

This paper describes the experiences of two ongoing community-based intervention projects for NCD prevention and control in urban populations of countries in SEA—in India and Indonesia. Both are low-income mega countries (population in excess of 100 million) with a per capita gross national income of 3460 purchasing power parity (PPP Int. \$) for India and 3720 (PPP Int. \$) for Indonesia. The total health expenditure as the proportion of gross domestic product was 5% for India and 2.8% for Indonesia (WHO, 2007). The objectives of implementing demonstration projects were to prove the feasibility of the programme, assess its effectiveness and share the experience with other stakeholders for scaling up of such programmes at the national level. The expected outcomes of the projects were in terms of reduction in the level of select behaviours in the community and improved management of NCDs in local health facilities.

METHODS

Background information about the two sites

The site for community-based intervention was Ballabgarh in India and Depok in Indonesia. The choice of two sites for this analysis was based on the following: (i) the two countries are the biggest in the SEA Region of WHO in terms of population; (ii) both sites are proximal to the capitals of the countries and thus well-

visible to potential national users of evidence; (iii) both sites were linked to premier academic institutions located at the capitals, and (iv) both sites received technical support from WHO. Urban areas were selected as these have higher risk-factor levels.

Ballabgarh

The project was implemented in the urban areas of Ballabgarh block of district Faridabad, Haryana near New Delhi, India, in a population of ~145 000. It is mainly an industrial and a trading town. Culturally, women have lower status than men and this has implications for risk behaviour in terms of doing physical activity, food allocation within family etc. The intervention project was facilitated by the Comprehensive Rural Health Services Project (CRHSP), a project run by the All India Institute of Medical Sciences, New Delhi, in collaboration with the State Government of Haryana. CRHSP runs a 60-bed secondary-level hospital in Ballabgarh and provides outpatient, inpatient and emergency services.

Depok

Depok is one of 433 districts in Indonesia and one of the fast-growing cities in West Java Province. It is located 30 km from Jakarta, capital city of Indonesia. The population size is ~1.3 million and has lot of in migration. Depok is a heterogeneous district and includes urban areas including residential areas, educational areas, industrial and trading areas and rural areas and different ethnic backgrounds. Indonesian women culturally have equal position to men in improving family welfare. The intervention was facilitated by the National Institute of Health Research and Development (NIHRD), Ministry of Health, Jakarta, Indonesia, by providing technical support to the programme implementation at the national and the district levels in close collaboration with the Centre for Diseases Control.

Conceptual framework

The study used a Healthy Settings approach (http://www.who.int/healthy_settings/en/). A setting is where people actively use and shape the environment; thus, it is also where people create or solve problems related to health. Settings can

normally be identified as having physical boundaries, a range of people with defined roles and an organizational structure. Examples of settings include schools, work sites, hospitals, villages and cities. The settings approach has roots in the WHO Health for All Strategy and, more specifically, the Ottawa Charter for Health Promotion. The key principles in Healthy Settings approach include community participation, partnership, empowerment and equity. Most of community trials and programmes have been based on the theoretical models or frameworks. For the individual and community empowerment approaches in the reported interventions, the Roger's innovation-diffusion theory modelled on the experience of North Karelia Project was used (Puska *et al.*, 1985; Rogers, 1995).

The intervention model applied in these demonstration projects is described in Figure 1 and consists of four major sets of activities namely: (i) individual empowerment; (ii) community empowerment; (iii) lobbying, advocacy and mediation; and finally (iv) reorientation of health services. While individual empowerment focuses on the modification of personal knowledge, motivation and skills, community empowerment creates a public pressure or demand for certain desired services/products. These together nudge the decision-makers and other stakeholders towards developing a healthier public policy, a process facilitated by appropriate lobbying and advocacy. If effective, community-based efforts raise the demand for various health services, and therefore, these efforts have to be supplemented with the reorientation of health services towards NCD.

Intervention

The demonstration project involved three phases: (i) a preparatory phase, (ii) intervention phase (which is ongoing) and (iii) evaluation.

Preparatory phase or community diagnosis (mid-2003–mid-2004)

This phase included three components: understanding community structure, assessing community preparedness and estimating baseline prevalence of risk factors.

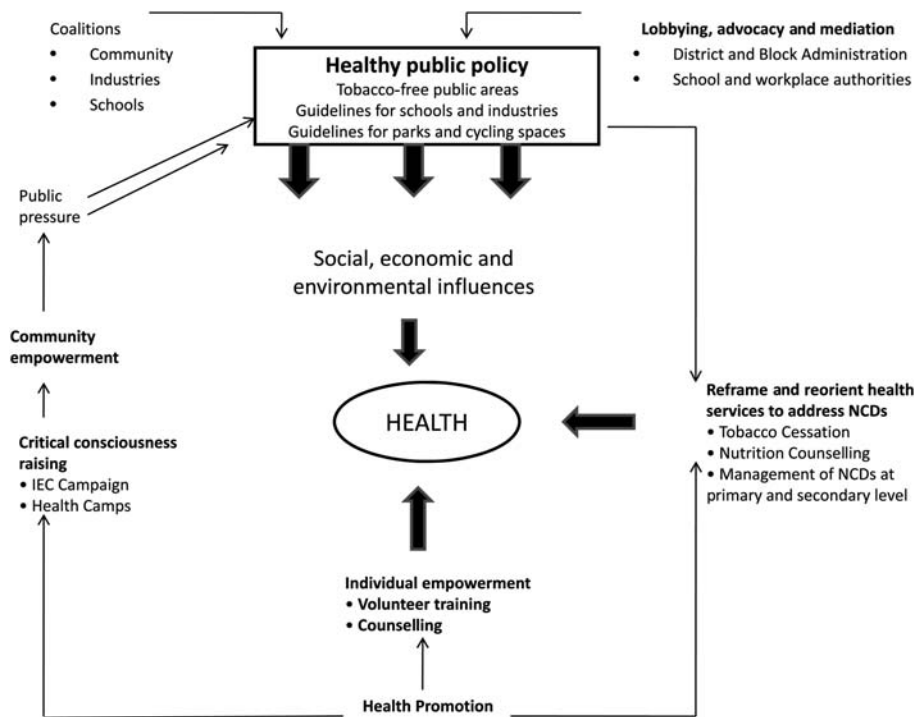


Fig. 1: Framework of intervention used in Community-based Demonstration Projects (adapted from Tones, 2004).

Ballabgarh

The primary government agency responsible for maintenance and infrastructure of urban Faridabad is Municipal Corporation of Faridabad under its Municipal Commissioner. The District Administration is headed by a District Commissioner. Faridabad Industries Association is the largest association with ~400 members. There are very few non-governmental organizations (NGOs) actively working in the area of health in this block. As is true for most urban areas in India, there are inadequate primary healthcare facilities and services. An informal forum of community volunteers called as 'Friends of City' was created which aimed for a 'Healthy Ballabgarh'. This was primarily a group of ~60 volunteers comprising of employed people, school teachers, small business men, housewives and social workers. The details of the community initiative have been described previously (Anand *et al.*, 2006).

Depok

About 75% of administrative units in Depok have initiated community activities addressing various health aspects like child health, health of elderly and NCDs. There is a very active involvement of NGOs and professional organizations in the area of health care. With endorsement from the Mayor of Depok, an umbrella organization called 'Healthy City Forum of Depok' (FKDS) was established to coordinate activities across various sectors and programmes as a part of the 'Healthy Depok 2009' campaign. Many stakeholders in Depok Municipality were actively involved in planning and implementing the interventions such as representatives of local government, health-related NGOs, industries, private businesses and community leaders. In Depok, the initial intervention was restricted to Abadijaya (population of ~30 000), which has both urban and rural population. Subsequently after 1 year, based on local governments'

request, it was expanded to other areas in Depok District.

A baseline survey of NCD risk factors was conducted in both the sites in 2003–2004. The details of its methodology are provided below.

Implementation Phase (mid-2005–mid-2007)

As described in the framework, four strategies formed pillars of intervention in the two sites:

- (i) Advocacy and mediation:
 - (a) sensitization meetings with different stakeholders (policy-makers and programme managers and school and industry administrators) and
 - (b) advocacy for formulation of healthy public policy (establishing tobacco-free areas, provision of cycling and pedestrian areas etc).
- (ii) Strengthening individual skills (individual empowerment):
 - (a) promoting physical exercise, yoga (only in India), and healthy cooking and
 - (b) training of volunteers in community/schools etc.
- (iii) Enhancing social environment and community empowerment:
 - (a) information, education, communication campaigns (posters, films, bill boards),
 - (b) healthy lifestyle camps and
 - (c) holding of regular public events.
- (iv) Reorienting health services:
 - (a) risk assessment activities,
 - (b) starting tobacco cessation and nutrition counselling services,
 - (c) strengthening health system in terms of acquisition of appropriate equipments, drugs and development of guidelines and
 - (d) promotion of traditional systems of medicine.

The site-specific and general issues related to implementation phase of the projects are further depicted in [Box 1](#). At both the sites, the intervention is still continuing. These programmes are being partly supported by WHO and partly by resources generated internally.

Box 1: Key strategies for community-based interventions applied in Depok, Indonesia, and in Ballabgarh, India

- (1) Both sites used the ‘Healthy Settings’ approach. At both the places, they formed a coalition of community-level partners. It was called as ‘Friends of City’ in Ballabgarh and ‘Healthy City Forum’ in Depok.
- (2) At Ballabgarh, Healthy School and Healthy Workplace Guidelines were formulated with the help of the stakeholders. A teacher training workshop has been conducted. At Depok, local policy-makers were successfully involved resulting in a strong policy support for NCD programme.
- (3) Both sites developed and used their own context-specific IEC materials. The campaign in Ballabgarh used a ‘logo’ to give an identity to the IEC campaign. The health education strategy in Depok includes used local jargon ‘Cerdik’ that means smart behaviour that contains message for controlling the risk factors of NCD.
- (4) In Depok, health interventions were executed at integrated health posts (‘Posbindu PTM’) where people were examined and advice or services provided by community volunteers. In Ballabgarh, this was done through health camps organized through community volunteers. At Ballabgarh, an NCD clinic was started at the local hospital to address this aspect. Meanwhile, at Depok, the NCD services are being provided at the most basic level of health service, such as Public Health Centre, in collaboration with the local hospital. In India, yoga was also promoted as a way of improving lifestyle to capitalize the current interest in it.
- (5) Both the projects were linked to a national premier health research agency. This ensured that the programmes got good technical support, which is essential to the success of the programme and the credibility of the institution ensured a good start-up. It also helped in documenting the process of the work and preparation of manuals etc., which can help in expanding these experiences in other areas. At Depok, the research agency also gives substantial contribution to maintain the programme and ensure programme sustainability.

Evaluation

The evaluation was formative and internal and focused on process and outcome measures. The evaluation was based on the framework developed by the CINDI team (WHO, 1999). The programmes were assessed in terms of inputs, processes, outputs and outcomes. Long-term impact of change in disease prevalence and mortality was not measured. The main inputs

measured were resources mobilized and person time utilized. The processes related to different strategies were identified and outputs were listed. The process was assessed in terms of activities carried out as per the planned strategies and reach was measured as the number of people contacted. These data were collected using the documentation of the different activities by the staff of the two sites in 2008.

Outcome evaluation was in terms of change in behaviours and physical parameters targeted in the intervention as assessed by the pre-intervention (2003–2004) and post-intervention (2006–2007) surveys of NCD risk factors. Both used the same protocol for sample size, sampling design and risk-factors measurement. The protocol was as per the WHO-promoted STEPS methodology, in implementing which principal investigators in both sites have been trained (<http://www.who.int/chp/steps/en> as accessed on 2 April 2008). Whereas in Ballabgarh the surveys were done in a representative sample of the whole of urban Ballabgarh (Anand *et al.*, 2007, 2008), in Depok the surveys were restricted to a representative sample of the Abadijaya.

The generic STEPS instrument developed by WHO was adapted, translated and pre-tested. One serving of vegetable was considered to be one cup of raw green leafy vegetables, half cup of other vegetables (cooked or chopped raw) or half cup of vegetable juice. One serving of fruit was considered to be one medium-sized piece of apple, banana or orange, half cup of chopped, cooked, canned fruit or half cup of fruit juice, not artificially flavoured. To gather information on physical activity, the information was gathered on three broad domains, i.e. physical activity at work, transport-related physical activity and leisure time physical activity. The measurement of height and weight was done using the standardized SECA instruments. The digital weighing scales utilized were regularly checked against a standard weight. Waist measurements were done using non-stretchable measuring tapes. Blood pressure recordings were done using a digital sphygmomanometer with an adult-sized cuff. The weight measurements were done till nearest 0.1 kg, height and waist till nearest 0.1 cm and blood pressure till nearest 1 mmHg. The pregnant women were excluded for the component of obesity measurement. The definitions used for

various parameters were as per the WHO STEPS guidelines. Current daily smokers were defined as those who were currently smoking cigarettes, 'bidis' or 'hookah' daily. Current consumption of alcohol was taken as consumption of alcohol in last 1 year. Low intake of fruits and vegetable was defined as taking of less than five servings in a day. Physically inactive was defined as a person who is inactive in all three domains. Raised blood pressure was defined as systolic blood pressure >140 mmHg and/or diastolic blood pressure >90 mmHg or under medication. Body mass index (BMI) was calculated and overweight was defined as $BMI \geq 25 \text{ kg/m}^2$ and abdominal obesity was diagnosed when waist circumference (WC) was >102 cm in men and >88 cm in women.

Statistical analysis

As the approach was population-based, population means were used as the indicators of the status of the risk factor in the population. Means were estimated using methods appropriate for a cluster sample design. The results of change are presented as an absolute mean change from the baseline survey levels. A negative direction indicates that the prevalence/level of the risk factor declined from the baseline survey. A change has been labelled as statistically significant, if the 95% CI of the estimates from both the surveys did not overlap.

RESULTS

The results of the preparatory phase showed that the communities in both the sites recognized NCDs as a growing problem were able to link them to the changes in lifestyles and were ready to take action at individual and collective level to prevent these diseases. Baseline surveys showed that it was possible to measure the key risk factors at the community level. The stakeholders were identified and their roles delineated. These findings established the feasibility of starting a community-based intervention programme at these sites. The community structure at Depok showed a much better organized setup and resulted in a higher level of involvement of the local administration. At Ballabgarh, the community structures were weaker, there

Table 1: Baseline survey results on levels of NCD-related risk factors in the two sites 2003–2004

Survey year variable	Ballabgarh, India		Depok, Indonesia	
	Men (95% CI)	Women (95% CI)	Men (95% CI)	Women (95% CI)
Sample size	2523	2620	847	959
Prevalence (%) current daily smoking	37.3 (35.4–39.2)	6.5 (5.6–7.5)	32.5 (28.1–36.8)	4.2 (2.7–5.7)
Prevalence (%) current daily alcohol consumption	28.3 (26.5–30.0)	0	6 (3.7–8.3)	0.3 (0–0.6)
Percentage consuming < 5 servings of fruits and vegetables/day	94.5 (95.4 – 93.7)	97.4 (98.1–96.9)	87.0 (89.7–84.3)	84.7 (87.5–82.0)
Prevalence (%) of physical inactivity	20.6 (19.0–22.1)	54.1 (52.2–56.0)	32.6 (27.7–37.5)	33.5 (29.7–37.3)
Mean BMI (kg/m ²)	21.9 (21.8–22.1)	23.0 (22.8–23.2)	23.9 (23.5–24.2)	24.9 (24.5–25.2)
Prevalence (%) overweight (BMI ≥ 25)	22.6	30.2	33.7 (29.9–37.5)	40.1 (36.6–43.5)
Prevalence (%) waist circumference >102 cm (men) and >88 cm (women)	5.5 (4.6–6.4)	32.9 (29.1–32.6)	3.4 (2.8 – 5.2)	23.4 (18.2– 25.3)
% Hypertensive (≥140/≥90 or on drugs)	24.7 (23.0–26.3)	18.8 (17.3–20.3)	9.2 (7.1–11.4)	8.6 (6.7–10.4)
% Measured BP in last 12 months	33 (31.1–34.8)	52.9 (51.0–54.8)	61.1 (59.7–66.3)	72.2 (69.7–77.3)
% Measured blood sugar in last 12 months	15.5 (14.1–16.9)	14.9 (13.4–16.2)	24.2 (20.2–28.1)	16.4 (13.4–19.3)

was a little role of government in the daily life and NGOs were not active in the health arena.

The prevalence and levels of various risk factors at baseline are shown in Table 1. The prevalence of smoking was comparable at both the sites with much higher rates among men. About one-third of men smoked tobacco at both sites and it was much less among women. Inadequate consumption of fruits and vegetable was similar in both the sexes and in both the sites. Alcohol use among men in Ballabgarh was 28.3% but was negligible in women of both the sites and men in Abadijaya. The prevalence of physical inactivity was much higher in women (54.1%) in Ballabgarh when compared with men (20.6%), but at Abadijaya, the levels were similar in both the sexes (32.6% in men and 33.5% in women). Although people in Abadijaya were more likely to be obese, their counterparts in Ballabgarh had higher levels of central obesity as measured by waist circumference. Women had higher rates of obesity but lower prevalence of hypertension in both sites. Ballabgarh reported much higher levels of hypertension than Abadijaya. In general, the results point to high levels of risk factors. In Ballabgarh, one in three men and every other woman had their blood pressure checked in last 1 year. In Abadijaya, the rates were much higher at 61% for men and 72% for women. Blood sugar was measured much less often and was similar in both the sexes. These differences reflect the existing access and reach to NCD-related services in the two communities.

Evaluation

Table 2 lists the activities carried out as a part of the community-based intervention. For Indonesia, the intervention unit for this table is Depok District and not only Abadijaya.

Inputs

The technical inputs and seed money to start interventions came from WHO SEA Regional Office. Local community in Ballabgarh contributed resources to setup the office of Friends of City. Till December 2007, a total of 2120 person-hours of volunteer time had been contributed. AIIMS had funded coordinator of the project and supported school-based interventions. Depok project managed to generate most of its funds from local administration. This funding was supplied by the Depok Government Office, which allocated an annual budget for this purpose.

Activities

At Ballabgarh, community meetings and school-based interventions were the main activities. Risk assessment camps in the community and at industrial sites were also used to a limited extent. Guidelines for Health Promoting Schools and Healthy Workplace were developed in consultation with concerned stakeholders in schools and industry. The schools and workplaces were sensitized and given them the guidelines, Information, Education and Communication (IEC) materials, training etc.

Table 2: Community-based activities conducted at the two sites

Activity	Indicator	Ballabgarh (population of 150 000)	Depok (population of 1 300 000)
Community meetings	Events held	150	400
	Number of people covered	6000	65 000
Health camps	Events held	10	25
	Number of people covered	3000	23 000
HP activity in Schools	Events held	43	None
	Number of people covered	5000	—
	Teachers trained	26	30
HP activity in industries	Events held	6	1
	Number of people covered	1500	50
Media involvement	Press/TV clippings events	25	50
Skill enhancement	Demonstration sessions of		
	Cooking	4	None
	Yoga/exercise	5	150
	Diet counselling	3	60
	Tobacco cessation	26	—
	Risk assessment	55	120
Volunteers	Number of volunteers trained	14	85
	Number of person-hours given to the programme	2120 h	Not estimated
Programme reach	Proportion of community who came in contact with the programme	25% ^a	32% ^a

^aIn Depok, it is estimated by totalling the attendance at different activities, and for Ballabgarh, it is based on a community survey.

and left it to them to implement as found feasible. A survey would need to be done again to assess the current status of implementation. Risk assessment strategies and protocols for management of selected NCDs were prepared. At Depok, there were more systematic weekly, monthly, 3 monthly and annual meetings at different levels. Less emphasis was given there to school- and industry-based interventions. At both sites, media were involved in terms of hoardings and press clippings. Individual skill-enhancement activities were limited in both sites.

Scope

About 6000 individuals had been contacted during the community meetings and ~3000 people examined in health camps in Ballabgarh. Five thousand school-children were approached in the school-based programmes. Twenty-six teachers and 10 volunteers have been trained in supporting implementation of the project. About 25% of the respondents in the second survey reported that they had heard about the NCDs or the risk factors from a source related to the intervention. In Depok, estimated 200 000 individuals (~32% of population) have been contacted by health camps.

Health system interventions

Ballabgarh successfully introduced management of NCDs at a secondary healthcare level by starting a weekly clinic. The attendance was ~50–60 patients a week. The medical records of this clinic show a good quality of NCD management. A tobacco cessation clinic is being initiated with the help of Ministry of Health and Family Welfare. The referrals to the tertiary level for the patients followed the usual health system

At Depok, integrated health services for NCDs were provided through 'Yandu PTM' at the community health centre for a nominal fee. The attendance was ~10–20 patients a week. The medicines were given for the period of 2 weeks. In comparison with previous years, additional medicines and equipments were made available at primary and secondary healthcare facilities.

Outcome

The change in measures of risky behaviours is shown in Table 3. Smoking and alcohol use showed a small decline in both sites, although the decline was not statistically significant. The proportion of population consuming less than

Table 3: Change from baseline in the level of selected risk factors and other variables at two sites

Variable	Ballabgarh, India		Depok, Indonesia	
	Men	Women	Men	Women
Proportion of currently smoking (%)	-0.8	-1.6	-6.5	0
Proportion of current consuming alcohol (%)	-1.7	+0.1	-3.3	-0.3
Proportion of consuming < 5 servings of fruits and vegetables/day (%)	-3.4 ^a	-4.9 ^a	-5.2	-1.1
Proportion of physically inactivity (%)	-3.0	+18.3 ^a	-3.9	-19.2 ^a
Mean BMI	+1.0	+0.3	-0.9 ^a	-2.0 ^a
Prevalence overweight (BMI > 25)	+0.2	+2.0	-11.5 ^a	-3.2
Proportion of those with waist circumference >102 cm (for men) and >88 cm (for women) (%)	+2.5	+1.8	-1.6 ^a	-13.6 ^a
% Raised blood pressure ($\geq 140/\geq 90$)	-8.6 ^a	-1.7	-5.2 ^a	-5.7 ^a
% Measured blood pressure in last 12 months	+6.4 ^a	+8.4 ^a	+11.55	+2.83
Mean blood pressure levels (systolic/diastolic)	-2.1 ^a /-1.2 ^a	-2.6 ^a /-1.0	-13.8 ^a /-7.5 ^a	-16 ^a /-9.5 ^a
% Measured blood sugar in last 12 months	+2.3	+7.2 ^a	+56.25 ^a	+62.10 ^a

^aA statistically significant change between the two surveys as indicated by non-overlapping 95% confidence intervals.

five servings of fruit and vegetables showed a decrease in both sites but was statistically significant only in Ballabgarh. This needs to be seen in the context of very low baseline fruit and vegetable consumption at both sites. The change in the physical activity level varied by site as well as by sex. In agreement with the reported changes in physical inactivity, obesity rates in Depok decreased significantly especially for females, whereas in India they increased marginally. The proportion of people who reported having their blood sugar or blood pressure measured showed a significant increase in both sites, pointing to a positive effect of risk assessment programmes. While mean blood pressure levels in Ballabgarh showed a modest decline of 1–3 mmHg, the decline in Depok was in the range 7–16 mmHg.

DISCUSSION

This paper documents the process and early outcomes of the demonstration projects for integrated NCD prevention implemented in two low-resource settings in SEA. Both sites used a similar set of strategies for NCD intervention. The interventions were planned independently within a similar framework and therefore do not follow a single pattern. Thus, emphasis has been given to different components depending on local appropriateness. The discussion is

written around the different components of the framework.

Raising critical consciousness

A behaviour change is achieved by communication—both mass and interpersonal. Influencing human behaviour through mass communication is a difficult and complex process that involves competing with market interests. The mass media (television, radio, newspapers etc.) are more effective in creating knowledge of innovations and are useful for agenda setting. Interpersonal communication channels (small group meetings, house-to-house visits, use of change agents etc.) tend to be more useful in changing attitudes and behaviours (Rogers, 1995). In the study areas, IEC campaign and health camps were used for raising critical consciousness. At both the sites, the use of mass media was limited and the focus was more on interpersonal communication. This definitely compromised the reach of the campaign. The reason for non-use of mass media was the inability to selectively target the intervention community as all the mass media channels were applicable to the whole district/province and using them was resource intensive. Once a national campaign is launched, this should be more feasible. Despite the above-mentioned limitations, at both sites a modest reach of the campaign was

found, which was similar to the participation rates observed elsewhere (Lefebvre *et al.*, 1987).

Community empowerment

Community-level health promotion often centres on community empowerment, building perception of ownership of the project, leadership development and capacity building. Shea *et al.*, in a review of the five major community-based cardiovascular programmes, identified the following successful strategies of community mobilization: social marketing, school-based health education programme, worksite health promotion, screening and referral of those at high risk, education of health professional and modification of physical environments (Shea, 1990a, b). These strategies were used by both the study sites for community mobilization. Mittelmarm *et al.* concluded that the core of the successful programme was the community organization process (Mittlemark *et al.*, 1993). This included identification of key community leaders, citizens, organizations, volunteers and other resources. A better community organization may explain higher level of success in Depok.

Individual empowerment

The intervention focused on augmenting knowledge and motivation of the community members. For behaviour change to occur it is necessary to translate knowledge into action by provision of appropriate tools and enhancing motivation and skills. This component was relatively weak in both sites. Although the initial focus was predominantly on imparting knowledge, the interventions in both sites need to further evolve so to encompass skills development in future.

Reorienting health services

This was clearly the area that maximum success was achieved, largely as the national facilitating agencies were directly or closely linked to the provision of health services in these areas. Activities which were carried out included risk assessment camps, strengthening health facilities with equipments, drugs, initiating tobacco and nutrition counselling services. However, traditional evaluations of community-based

interventions have focused on community-level issues ignoring health system interventions. Evaluation of management of NCDs at a secondary-level clinic at Ballabgarh showed that there were problems with respect to counselling for tobacco cessation and obesity prevention due to lack of capability (Patra *et al.*, 2009).

Advocacy and coalition development

In both sites, the local governments had priorities other than health, and within health, priorities other than NCDs. As the local governments were burdened with maternal and child health and communicable diseases (including polio control) work load, they did not consider NCDs an area of high importance to justify prioritized allocation of scarce resources. The community members involved in the interventions were volunteers and were not paid any honorariums except to cover the expenses incurred in conduct of activities. Community-based programmes cannot be sustained solely on the commitment of volunteers. At both sites, more so in Depok, local government had allocated resources. As these resources were insufficient to run the programme independently, external resources were mobilized.

Effectiveness

In order to generate an estimate of effectiveness, it is essential to have a control group with no intervention. However, having a control group in evaluating health promotion initiatives has been considered as inappropriate, misleading and unnecessarily expensive by a WHO Working Group (WHO, 1998). The concern was about feasibility of finding a truly comparable control area and inability to avoid contamination. Also educational interventions are fundamentally different from medical intervention in terms of complexity and community involvement. In evaluating health promotion interventions, it is equally important to find out whether it worked and to learn why it worked or did not work. As both study sites did not have control areas and information on past trends on risk factors was not available, the changes reported subsequently to community-based intervention may not provide sufficient basis to comment on effectiveness of the intervention. However, comparison with the results of repeated NCD risk-factor surveys conducted

concomitantly in neighbouring rural population in Ballabgarh that received no intervention and with national trends observed in Indonesia during the period 2001–2004 do provide some clues to judge effectiveness of the intervention. The results from the next rounds of survey will help in establishing true trends with more confidence. Nevertheless, the lack of an appropriate control and absence of information on natural long-term secular trends in the study areas is a limitation of the study. Therefore, caution in interpreting the findings needs to be exercised.

The intensity of the intervention effects in the two sites has been at best modest, which is what other researchers have also reported; commonly, the size of the effect of community-based interventions are less in relation to the efforts expended (Susser, 1995). The experience in Isfahan also shows mixed results after 4 years of intervention. Although diet showed improvement and tobacco use decreased among males, physical activity did not change much (Sarrafadegan, 2009). Increase in physical activity as a result of a focused programme was documented in urban Chennai in Southern India (Mohan *et al.*, 2006). In contrast, women of Ballabgarh showed an increasing level of physical inactivity. It is culturally inappropriate in North India, for women to be seen as exercising in open and changing lifestyles are resulting in decreased physical activity at home. Although it is difficult to explain major changes in the blood pressure levels in Depok, they probably reflect an immediate impact of an intensive screening programme followed by effective treatment. As same measurement protocol was used by trained observer, measurement error is an unlikely explanation of observed phenomenon. Preliminary results show that people at high end of BMI and blood pressure distribution have responded particularly well to the screening campaign at health camps, because of their higher risk perception and motivation. A real shift in risk distribution at the community at large, i.e. behaviour change, had not yet occurred. A large increase in the proportion of individuals who had their blood sugar measured in Indonesia was probably also due to high emphasis on screening camps.

While attempting to learn lessons on what works and why in a complex, community-based interventions, it is of paramount importance to be able to relate outcomes to comprehensive

assessment of interventions' dynamics. This would benefit not only the implementation sites but also add to the existing knowledge base on large-scale community-based interventions so as they may be further expanded and better tailored. For this purpose, a full process evaluation using qualitative study techniques is required. Both the sites currently lack adequate expertise in this area and would gain by investing further in external collaboration and exchange of experiences.

Sustainability

For a community-based intervention to be truly effective and sustainable, four important conditions have to be fulfilled. These are ensuring the ownership of the programme by the community, continued political and administrative commitment and support, sufficiently developed capabilities to implement the interventions and availability of resources. Both the programmes were led by the health sector and an external research agency provided the support. Thus, the programmes were initially seen as an external programme. However, gradually the ownership moved to the community coalition that has been formed and that with time has become a leading force of change. The high-level political commitment is more on an individual basis and does not reflect health systems continued commitment. This level of commitment might disappear or considerably lessen if the political situation changes or a new leader/coordinator comes. In Ballabgarh, the district commissioner changed five times in the 4 years. At Depok, the initial process of intervention was intense. Sustaining its high intensity, and maintaining high pace of behavioural change over a longer period of time may be challenging. In Ballabgarh, where the intensity of intervention was gradually going up and as it is still to reach a critical level, larger improvements might be expected in years to come, if the momentum is maintained. There is a continued need of leadership by the health sector and also of continuing technical support of academic/public health institutions and developmental partners.

The issues identified above mirror the findings of an external evaluation of a 'WHO/UNDP –LIFE Healthy City Projects' (World Health Organization, 2000). The evaluation found that stakeholders' involvement was varied. There was evidence of political commitment but the

projects, which were implemented through external agencies, had limited impact on municipal policies. Lack of alternative source of funding threatened the sustainability of the Healthy Cities Project. The recommendations included continued external funding, receiving an explicit request from local governments (municipalities) for implementation of such programmes in their areas, policy change evaluation to be done only after 5 years of intervention, better capacity building.

Link to policy/programme

The successful example of Depok is being replicated in four more places in Indonesia (Banten, Padang, Jakarta and Bengkulu) since 2007. NIHRD, which is the facilitating agency of Depok, is actively involved with the regular national level NCD risk-factor surveys. Ballabgarh serves as a place for training of public health experts and provides technical guidance to the recently launched National Program for Diabetes, Cardiovascular Diseases and Stroke. It is also one of the resource centres for the nationwide Integrated Diseases Surveillance Project (IDSP), wherein surveillance of NCD risk factors is being carried out.

In brief, the following lessons can be drawn from the two projects.

- (i) The level of community organization and community involvement in local governance is a key determinant of success of any community-based initiative.
- (ii) A stronger involvement of public bodies of governance results in better involvement of stakeholders. A bottom-up approach for involvement of non-health stakeholders is difficult.
- (iii) Community volunteers after due training played important role in mobilizing the community to use screening services. Their role in motivation for tobacco/alcohol cessation or diet and physical activity changes was yet to be fully determined.
- (iv) There are persisting methodological challenges in designing and executing self-sustained approaches for periodic evaluation of community-based health promotion programmes. While measuring impact by epidemiologically rigorous community trials for measuring effectiveness

and efficiency is important, process evaluation of operational aspects such as demonstration of feasibility, identification of facilitating factors and barriers and assessing sustainability is equally, if not more, important.

- (v) One of the major barriers for the individual-level change in behaviours was lack of promotion of self efficacy. Individual skill development has to be an important emphasis for further intervention.
- (vi) These interventions primarily used group meetings as community-mobilization approach. Other options including awareness generation and health education through mass media as well as use of interpersonal approaches through volunteers were less prominent.
- (vii) Awareness generation efforts and health education need to go hand in hand with adjustments in local governance and health system strengthening to meet growing demand for services.
- (viii) Reorientation of health system can be achieved and provides a good platform for integration of other health promotion activities.
- (ix) Linking such interventions to recognized academic/public health institutions results in developing an academic approach to the planning and implementation of intervention, its evaluation as well as provision of capacity strengthening inputs.
- (x) This experience also highlights the benefits of twinning/linking similar projects implemented in distant places. These are in terms of sharing practical experiences, enrichment, stimulation, mutual support and testing of cross-cultural issues.
- (xi) International partners, in particular WHO, played important role in initiating the interventions, provided technical inputs for development of local guidelines and manuals and seed funding, facilitated sharing experiences between the projects and disseminating findings to other stakeholders.
- (xii) A stronger link to local and national programme managers at ministry of health results in better utilization of results and increases the likelihood of expansion of the programme. This also results in creating

effective partnerships and networking with all related stakeholders in the community-based intervention programme.

- (xiii) Sustainability of intervention as well as behaviour change needs to be assessed by continued process and outcome evaluation.

CONCLUSION

The formative evaluation of the two ongoing projects provide valuable lessons in development of relevant strategies and tools to implement community-based interventions for prevention of NCDs in two settings of SEA. This paper adds to the knowledge based on the feasibility of designing and implementing large-scale community-based interventions for integrated prevention of NCDs through modification of risk factors.

The projects are already providing technical support to the national NCD prevention and control programmes. However, there are persisting challenges in terms of resource generation, and in sustaining high level of stakeholders' involvement and leadership of the programme.

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