

The Heartfile Lodhran CVD prevention project- end of project evaluation

Sania Nishtar¹, Asma Badar¹, Mohammad Umer Kamal¹, Azhar Iqbal¹, Rashid Bajwa², Tauqeer Shah², Zahid Larik³, Fazle Karim⁴, Mahmood ul Hassan Mehmood⁵, Haroon Jehangir³, Syed Iqbal Azam⁶, Yasir Abbas Mirza¹, Shahzad Ali Khan¹, Aamra Qayyum¹, Fauzia Aqeel⁷, Abdul Bakir⁷ and Ejaz Rahim⁸

Abstract: Mainstream preventive interventions often fail to reach poor populations with a high risk of cardiovascular diseases (CVDs) in Pakistan. A community-based CVD primary prevention project aimed at developing approaches to reduce risk factors in such populations was established by Heartfile in collaboration with the National Rural Support Program in the district of Lodhran. The project implemented a range of activities integrated with existing social and health service mechanisms during a three year intervention period 2000/01-03/04. These were targeted in 4 key settings: community health education, mass media interventions, training of health professionals and health education through Lady Health Workers. The project received support from the Department for International Development, UK. At the community level, a pre-test-post-test quasi-experimental design was used for examining project outcomes related to the community component of the intervention. Pre and post-intervention (training) evaluations were conducted involving all health care providers in randomly selected workshops in order to determine baseline levels of knowledge and the impact of training on knowledge level. In order to assess practices of physician and non-physician health care providers patient interviews, with control comparisons were conducted at each health care facility. Significant positive changes were observed in knowledge levels at a community level in the district of intervention compared with baseline knowledge levels particularly in relation to a heart healthy diet, beneficial level of physical activity, the causes of high blood pressure and heart attack and the effects of high blood pressure and active and passive smoking on health. Significant changes in behaviors at a practice level were not shown in the district of intervention. However the project played a critical role in spurring national action for the prevention and control of non-communicable diseases and introducing sustainable public health interventions for poor communities in Pakistan. (*Promotion & Education*, 2007, XIV (1): pp 17-27)

Key words: cardiovascular disease, Pakistan, prevention

Résumé en français à la page 48. Resumen en español en la página 56.

Cardiovascular diseases (CVDs) and their risk states are highly prevalent in Pakistan. A recent population-based survey has estimated a Coronary Artery Disease (CAD)¹ prevalence of 26.9% in men and 30.0% in women, with the risk being uniformly high in the young (Jaffar et al, 2005). Data from an unselected autopsy series have also shown coronary artery involvement, in more than 24% of those, studied (Sattar, A.B., 1967 and Rashid, H., 1967)). This trend has grave implications for economically disadvantaged populations that have limited opportunities to access high-cost tertiary cardiovascular care (Nishtar, 2002). There is, therefore, the need to prioritize the disease prevention, risk factor control and health promotion approach to CVDs in Pakistan. Compelling evidence in other populations shows that preventive interventions can reduce the incidence of CVDs (Puska et al, 1995). Many risk factors, which have established causal associations with CAD in Pakistanis such as low levels of High Density Lipoprotein (HDL) and high waist-hip-ratio are known to be amenable to such interventions; these involve the modification of personal choices (Nishtar et al,

2004). More than 70% of Pakistan's population lives in rural areas and 30% live on less than one dollar a day (Government of Pakistan, 2003). It was perceived that mainstream preventive interventions often fail to reach these under-privileged populations. It was therefore envisaged that appropriately suited approaches could reach out to these groups. This realization lent impetus to the development of a community-based research and demonstration CVD primary prevention project by the Heartfile (Heartfile, 2006), in partnership with other stakeholders.

KEY POINTS

- **A three year community-based CVD primary prevention project was set up testing the hypothesis that: "low resource setting-sensitive interventions designed for poor populations can increase knowledge about CVDs and their prevention."**
- **The project implemented a range of activities integrating them with existing social and health service mechanisms targeting communities and health care providers.**

- **Significant positive changes were observed in knowledge levels in the intervention site about CVD prevention; however, changes at a practice level were not shown.**
- **The project played a critical role in spurring national action for the prevention and control of non-communicable diseases.**

Project design

The project involved a community intervention aimed at reducing the risk factors for CVDs in poor populations. Progress towards achieving a set of objectives was determined by tracking predetermined indicators at an outcome level (Table 2, p.19). It was envisaged that reduction in risk factors would ultimately cause reductions in CVD.

The main hypothesis of the project stated that low resource, setting-sensitive primary prevention community interventions designed for poor populations could increase knowledge about cardiovascular disease and its prevention, impact favorably on practices and decrease the prevalence of cardiovascular risk states. It was

1. Heartfile, Pakistan. Correspondence to Sania Nishtar: One Park Road, Chak Shahzad, Islamabad, Pakistan (sania@heartfile.org)

2. National Rural Support Program, Lodhran, Pakistan.

3. Deputy Director General Health, Islamabad, Pakistan.

4. Deputy Chief, Planning Commission Islamabad, Pakistan.

5. Medical Superintendent Punjab Health Department, Pakistan.

6. Statistician, Agha Khan Hospital, Karachi, Pakistan.

7. Master Trainer PHC, Ministry of Health, Islamabad, Pakistan.

8. Ex-Federal Secretary Cabinet Division, Islamabad, Pakistan.

(This manuscript was submitted on March 13, 2006. Following blind peer review it was accepted for publication on February 7, 2007.)

accepted that within the limited time frame of the project it was unlikely that it would be possible to demonstrate major change in the prevalence of cardiovascular risk states and that ideally a longer longitudinal study was required.

The district of Lodhran (Pakistan) was identified as the intervention site – a predominantly rural area in the least developed part of the country characterized by high rates of poverty, illiteracy, low educational levels, high unemployment, and health systems challenges. The District is sited in the province of Punjab spreading over an area of 1790 sq.km with a population of 1.17 million and a per-capita income of less than US\$ 400. There were an estimated 150 practicing doctors and more than 200 non-physician health care providers in the District; of these more than 50% offered services both in the public and the private sectors. Seventy percent of the outpatient contacts in the Districts were with health providers in the private sector. An estimated 2% of the population assessed traditional health care providers (Government of Pakistan, 1998). The public sector’s

health service delivery infrastructure included 3 hospitals, 4 Rural Health Centers, and 50 Basic Health Units – the majority of the latter being underutilized. Within the District, the State provided Primary Health Care services inclusive of maternal and child health, and infectious disease prevention and control; these were largely delivered through Lady Health Workers (LHW) – Pakistan’s field force of health care providers at the grass roots level, which provide reproductive health and immunization services and other basic services door-to-door in 120 Districts of Pakistan covering 52% of its population (Oxford Policy Management, 2002). Chronic disease prevention did not feature as part of PHC and therefore there were no other organized cardiovascular disease preventive activities in the District.

The Project was designed and run by Heartfile in collaboration with other stakeholders (Table 1). The objective of partnership building as part of this initiative was three-fold. Firstly, to integrate community organization principles into the planning and implementation of this project; sec-

ondly, to build inter-sectoral collaborations with local non-governmental organizations and district health and education offices; and thirdly, to establish an organizational structure to ensure long-term attention to the prevention of CVD. All partners in this coalition agreed on the same goals; there were no reported conflicts of interest. Roles and responsibilities of the partners are outlined in Table 1.

This three year project received support from the Department for International Development, UK, through its Small Grants Scheme in Pakistan as part of an institutional grant to Heartfile.

Project objectives

Project objectives were as follows:

1. To raise knowledge levels about heart disease and its risk factors at a population level.
2. To reduce cardiovascular risk factors among the population.
3. To increase the knowledge of health care providers about cardiovascular diseases and their risk stages and their methods of prevention.

Table 1. Roles and responsibilities of participating organizations.

Organization	Role	Financing and its mechanisms	Background
Heartfile	<ul style="list-style-type: none"> • Conceptualized the project; took primary responsibility for planning and implementation, developing the tools of intervention, training and evaluating the project. 	<ul style="list-style-type: none"> • Contributed their technical resources and provided secretarial support. • Played a key role in generating funding for the project. 	<ul style="list-style-type: none"> • Health Sector NGO with a national and international focus on chronic disease policy and planning.
National Rural Support Program (NRSP) and their communities and village activists	<p><i>The following roles were played by NRSP as part of a formal Memorandum of Understanding:</i></p> <ul style="list-style-type: none"> • Assisting with logistic support in Lodhran. • Linking Heartfile with the NRSP community organizations. • Assisting with community health education sessions and village activist training. • Assisting with conducting training. • Assisting with establishing linkages with local offices. 	<ul style="list-style-type: none"> • Heartfile paid a service charge to NRSP for the use of their office space, utilities and transport facilities. In addition a contribution was also made under the head of project fund, which was at the discretionary use of NRSP. 	<ul style="list-style-type: none"> • Social development NGO with a nation-wide network of rural grass root level community organizations to plan and implement development initiatives.
District Department of Health (Lodhran)	<ul style="list-style-type: none"> • Assisting with planning and organizing training. • Ensuring participation of health care providers in training. • Disseminating tools. • Signage deployment. 	<ul style="list-style-type: none"> • Per diem paid by Heartfile to health care providers during training. 	<ul style="list-style-type: none"> • District Department of Health, with responsibility for organizing health related activities in Lodhran.
National Program for Family Planning and Primary Healthcare (NPFPPHC)	<ul style="list-style-type: none"> • A Memorandum of Understanding(15), with the NPFPPHC enabled Heartfile to introduce CVD prevention into the work-plan of 435 LHWs in the District. • The central program office in Islamabad assisted with the creation of intervention tools and facilitated linkage with the Provincial office. • The District office assisted with organizing and conducting training. 	<ul style="list-style-type: none"> • Per diem paid by Heartfile to LHWs during training. 	<ul style="list-style-type: none"> • National Program of the Ministry of Health.
Federal Ministry of Health	<ul style="list-style-type: none"> • Gave permission to the NPFPPHC to sign the MOU with Heartfile. 	<ul style="list-style-type: none"> • None. 	<ul style="list-style-type: none"> • The Federal Ministry of Health. (the NPFPPHC is under the control of the Federal Ministry of Health.
Local professional societies	<ul style="list-style-type: none"> • Members participated in the meetings. 	<ul style="list-style-type: none"> • None. 	<ul style="list-style-type: none"> • Local chapters of the Pakistan Medical Association.
Department of International Development, UK	<ul style="list-style-type: none"> • Provided Funding for the project through their Small Grants Scheme. 	<ul style="list-style-type: none"> • Major project donor. 	<ul style="list-style-type: none"> • Office of the International Development Agency of the United Kingdom in Islamabad, Pakistan.

4. To improve the practices of healthcare providers (Physicians/non-physicians) in relation to cardiovascular disease prevention.

Table 2 outlines the indicators used to track progress towards achieving the project objectives.

Interventions

The project implemented a range of activities during the intervention period; most of these were integrated with existing social and health service institutional mechanisms. These included community health education, mass media interventions, training of health professionals and health education through Lady Health Workers.

1. Community Health Education

The projects' partnership with the National Rural Support Program (NRSP), enabled access to a district-wide network of organized grass roots-level community organizations (CO). Structured health education sessions were used for imparting health-related knowledge during community organization meetings; illustrated posters were used; these and accompanying pamphlets were used as give-aways. An average session lasted 3 hours and was conducted onsite in the village in a culturally acceptable manner. No incentive was given to villagers to participate. The session was conducted by an officer trained to deliver

the talk in local language, who also invited interactive debates around issues raised. The components of the session linked with objectives 1 and 2 (Table 2). The average attendance in the community session was 35. A total of 182 community sessions were held in 45 villages targeting more than 5,667 individuals who were then expected to disseminate this message in their villages.

2. Mass media interventions

The intervention and control sites were in different radio media pockets. A one year radio campaign was launched as part of this project (2000-2003) through which spots were broadcast daily on local radio through the local station. The messages were configured to address the project objectives.

3. Training of health professionals

This project component targeted all categories of health care providers focusing on objective 3 and 4. It involved an active collaboration with the District Health Department. Interventions involved one day workshops, in which 40 physicians and 60 non-physicians health care providers were subject to interactive training utilizing locally adapted, validated and resource sensitive risk management and assessment protocols (WHO, 2003). Separate workshops and tools were used for training doctors and non-physician health care providers. Doctors received signage with

the Heartfile logo and the inscription 'have you had your blood pressure checked' after the training.

4. Health education through Lady Health Workers

Lady Health Workers deliver services in the field. These workers conventionally undergo class room training – three days a month – on an ongoing basis in Basic Health Units (BHUs); these trainings are conducted by BHU staff. LHW training as part of the project, was organized following the cascade approach, which included a “Train the LHW Trainers component” and “Training of LHWs.” 31 training sessions were held for 703 LHWs. The average attendance at each workshop was 28. Each consisted of a 6 hour session, conducted at the local BHU. A Heartfile officer took the role of the lead trainer and conducted interactive training in the local language. The workshops emphasized the role of Lady Health Workers in advocating healthy life styles and stressed the need for opportunistic screening of blood pressure. The objective of training was to create awareness about the role of lifestyle changes in preventing CVDs and aimed at equipping them with the necessary knowledge and tools to disseminate this message in the communities. Training was not focused on treatment in any form. Intervention tools included those that were used for community sessions, in order to synchronize messaging.

Table 2. Indicators used to track progress towards achieving project objectives

<p>Objective 1: To raise knowledge levels about heart disease and its risk factors at a population level</p> <ul style="list-style-type: none"> • Proportion of individuals with correct perceptions about: heart attack; causes of heart attack; benefits of physical activity; healthy diet; harmful effects of tobacco on health; harmful effects of passive smoking on health; population prevalence of high blood pressure; the extent to which blood pressure can be controlled; about the presentation of a heart attack (pain in the chest, pain in the shoulders and arms, breathlessness); first step to be taken in the case of a heart attack; causes of high blood pressure; the effects of untreated and uncontrolled high blood pressure on the body. <p>Objective 2: To reduce cardiovascular risk factors among the population</p> <ul style="list-style-type: none"> • Respondent's level of physical activity: in the work domain; during transportation: during recreation and leisure; Servings of fruits consumed per day, vegetables consumed per day. • Proportion of individuals using: types of fat used for cooking. • Proportion of individuals: smoking; using smokeless tobacco; smoking in the presence of other people: exposed to passive smoking. <p>Objective 3: To increase the knowledge of health care providers about cardiovascular diseases and their risk stages and their methods of prevention</p> <ul style="list-style-type: none"> • Proportion of physicians with correct knowledge about: the dietary items which can be eaten in any amount; dietary components that can be eaten in moderation; dietary components that need to be substantially reduced in the diet; the beneficial level of physical activity; optimal level of blood pressure of patients who have suffered from heart attack; the optimal level of blood pressure of patients who have suffered from diabetes; the three most important things to be assessed during the management of the high blood pressure; the indications for a referral of a patient with high blood pressure to a ca for the management of hypertension in daily practice. • Proportion of non-physicians with correct knowledge about: the dietary items which can be eaten in any amount; the dietary components that can be eaten in moderation; the beneficial level of physical activity; the harmful effects of passive smoking; the most important things to be assessed during the management of high blood pressure; the indications for referral of a patient with high blood pressure to a doctor for further management; the dietary items which need to be substantially reduced in the diet of diabetics. • Proportion of LHWs with correct knowledge about the population prevalence of high blood pressure; causes of heart attack; the preventable risks for cardiovascular disease; passive smoking; the ill effects of passive smoking; the harmful components in the diet in relation to heart disease; beneficial components in the diet in relation to heart disease prevention; high blood pressure as a cause of maternal mortality; proportion of LHWs with the perceptions that they have enough knowledge about cardiovascular disease risks which can enable them to disseminate the information in the community. <p>Objective 4: To improve the practices of healthcare providers (Physicians/non-physicians) in relation to cardiovascular disease prevention</p> <ul style="list-style-type: none"> • Proportion of physicians doing opportunistic screening of blood pressure. • Proportion of physicians giving advice about tobacco, passive smoking, diet and physical activity. • Proportion of non-physicians doing opportunistic screening of blood pressure. • Proportion of non-physicians giving advice about tobacco, passive smoking, diet and physical activity.
--

Evaluation

The evaluation of this intervention was done in two settings:

Community level

At the community level, a pre-test-post-test quasi-experimental design was used for examining project outcomes related to the community component of the intervention. The District of intervention, Lodhran, was matched with Rahim Yar Khan – a community of similar size 160 km from Lodhran. The two communities were as far apart as Lodhran’s small area allowed and were in different media markets. Cross sectional surveys were conducted in the intervention and control sites, both before and after the intervention. Males and females between 18-65 years of age (inclusive), who were willing to participate, were included in the study.

From each site, the sampling frame consisted of the entire populations of the District of Lodhran and Tehsil Rahim-Yar-Khan respectively. The District of Lodhran has a total population of 1.17 million according to the 1998 census; of this 85.5% is rural, whereas 14.5% is urban. The Tehsil Rahim Yar Khan, on the other hand, has a population of 0.99 million of which 72% is rural and 28% is urban. The sample was divided into urban and rural sub-samples according to the rural-urban distribution of the population. Based on this there were a total of 20 Primary Sampling Units (PSUs) in Lodhran; of these 17 were in the rural and 3 were in the urban areas. In Rahim-Yar-Khan, there were a total of 20 PSUs – of these, 14 were in the rural and 6 were in the urban areas. The sampling strategy involved multi-stage cluster sampling; rural and urban areas were considered as two different strata. Each urban and rural area was further divided into clusters. In urban

areas, these clusters (blocks) consisted of 200-250 structures (houses as enumerated by the Federal Bureau of Statistics) and in rural areas each village/*dehs/mouzas* were considered as a cluster. At the first stage, clusters from urban and rural areas were randomly selected proportionate to the population size of the two strata from the list of clusters. At the second stage, from each cluster 30 households were selected using systematic sampling.

It was assumed that prevalence of CVD ranged between 5% to 30% in rural and urban control and intervention sites; with 95% confidence level, 3% precision, and design effect of 2.5 after allowance for incomplete responses and population distribution, a sample size of 300 was estimated for each of the surveys or a total of 1,200 equally divided respondents among Lodhran (pre intervention and post intervention) and control site (pre and post intervention).

Components of the questionnaire were compiled with the use of previously validated questions included in previous studies. Data was collected through face-to-face interviews (Table 3). Informed consent was obtained from the respondents before each interview. Three attempts were made to contact respondents – during different hours of the day, before deciding to code it as “non-interview.”

For physical activity, the GPAQ STEPS module was followed. Data was analyzed using SPSS (version 11.0). Chi-square and differences in proportions with 95% CI was used to assess the difference between the following groups: Lodhran pre- (baseline evaluation in the district of intervention), Lodhran post- (post-intervention evaluation in the district of intervention), RYK Pre- (baseline evaluation in the control district), RYK post- (evaluation in the control district

at the time of the post-intervention evaluation in the district of intervention).

Health care provider level

At the level of health care providers, two sets of evaluations were conducted:

1. Impact of training on knowledge levels: pre and post-intervention (training) evaluations were conducted involving all physicians, non-physician health care providers and LHWs in randomly selected workshops in order to determine baseline levels of knowledge and the impact of training on knowledge level. Different questionnaires were used for each category of health care provider focusing on knowledge levels about cardiovascular disease prevention. Mc Nemar test with 95 percent confidence interval was used to assess the significance difference between awareness level before and after training.
2. Impact of training on practices: in order to assess the practice of physician and non-physician health care providers, Patient Interviews, with control comparisons were conducted at each health care facility. The patient interviews were conducted following a normal consultation at the health facility. The list of physicians and non-physician health care providers trained was used as a sampling frame as was a list of physicians and non-physicians from the control district. From each of these four lists, three health care facilities were sampled through stratified random sampling and a total of 100 consecutive consenting patients, which met the age criteria (above 21 years) were recruited to the patient interviews from each of the health care facilities. A total of 1,208 patient interviews were therefore conducted from almost equally divided patients in four settings: physicians

Table 3. Components of the questionnaire

Domain	Variables used	Source
Age	Date of birth. If unavailable, estimation of age with reference to an index event	Modified RISKCORN methodology (6)
Education and work status	Based on the level of education and work status relevant in Pakistan	As above
Socio-economic status	Education, occupation and income	As above
Physical activity	Work activity, leisure time	STEPS/NCD V1.41 (WHO, 2003)
Smoking	Frequency and quantity; Duration of exposure; Past status; Environmental tobacco smoke	As above INTERHEART (Ounpuu, 2001)
Diet	Dietary patterns	As above
History of high blood pressure and diabetes	Screening for blood pressure Compliance with therapy	As above
KAP modules	As indicated in the Integrated Framework for Action of the NAP (Heartfile, 2004)	BRFSS questionnaire V1.5e (CDC, 2004) Heartfile Methodology (Nishtar 2004)

before training; physicians after training; non-physicians before training and non-physicians after training. Components of the questionnaire assessed the practice of physicians with regard to opportunistic screening for high blood pressure and giving advice to patients about healthy lifestyles. Chi-square test and difference in proportions with 95 percent confidence interval was used to assess the difference between two groups – physicians before and after training and non-physicians before and after training.

Results

Community level

A total of 1,196 interviews were conducted from almost equally divided respondents among Lodhran (pre-intervention and post-intervention) and control site (pre and post-intervention). The response to the baseline survey was 100% (n=301 in the control area and 303) in the intervention area. The response to the post-intervention survey in the control area was similar (n=304) whereas 288 completed the questionnaire in the intervention area.

There were only a few significant demographic differences between respondents interviewed: from the intervention and control sites both before and after the intervention (Table 4, p. 23).

Significant positive changes were observed in knowledge levels in the district of intervention compared with baseline knowledge levels particularly in relation to a heart healthy diet, beneficial level of physical activity, the causes of high blood pressure and heart attack and the effects of high blood pressure and active and passive smoking on health (Table 5, p. 24). On the other hand, significant changes in behaviors were not shown in the district of intervention except in the case of vegetable intake where an increase was observed amongst those that took two or more servings a day (Table 6, p. 25).

No changes were seen in the level of physical activity, smoking patterns, consumption of fruits or the use of ghee for cooking (Table 6). With regard to physical activity, the most dramatic effect was observed in the control district where there was a significant change in the level of physical activity in the transport domain with a decrease in inactivity and an increase in the vigorous category. This could not be accounted for. More than 95% of the respondents were inactive in the leisure time/recreation domain.

Health care provider level

Significant changes were observed in the awareness levels of physicians in many areas (Table 7, p. 26); this also enabled the

validation of the curriculum used and identified problem areas, where knowledge levels were not being enhanced such as in the case of criteria for referral and the treatment of blood pressure in special circumstances. Table 8 (p. 26) shows significant increase in self reported knowledge relating to cardiovascular disease risk factors after training of non-physician health care providers compared with the baselines. 85% of the LHWs reported that CVD/CVA was prevalent in their working areas and 53% reported that workshops had been very beneficial for them whereas 40% percent reported that the workshops has been somewhat beneficial. A significant difference in the awareness among LHWs was observed before and after the training workshop except in the areas of awareness regarding effect of passive smoking (Table 9, p. 26).

Interviews with patients following routine consultations showed that training improved the practice of health care providers in relation to giving advice and doing routine checks. The improvement was greater for non-physician health care providers compared with physicians (Tables 10 and 11, p. 26)

Discussion

The outcome evaluation of the Lodhran CVD prevention project suggests that the project had a slightly favorable intervention effect in influencing knowledge levels among the community; it was, therefore, enable to meet its first objective of raising knowledge level about CVD and its risk factors at a population level in the district of intervention. These beneficial outcomes are prerequisites to decreasing health risk and improving community health status – raising awareness, is the first stage of community readiness. It is well established that change in practices that are new occurs in stages: the user must be aware of a need for improving a practice, search for methods for improvement, select one method from alternatives, gather the necessary resources to initiate the practice, implement the practice and sustain it. However, the project was unable to significantly influence behaviors and, therefore, objective number 2 remained unmet.

When programs such as the Heartfile Lodhran CVD prevention project are held to the standards of influencing behavioral risk and related morbidity or mortality, they often do not seem promising. However, drawing such a conclusion may not be correct for a number of reasons. It is well established that changes in CVD behavioral risk factors are usually the result of five or more years of continual intervention activity. Morbidity and mortality changes are not measurable for at least 10 years. In addition,

to effectively test the hypothesis (decreasing CVD risk states) a longer longitudinal study should have been ideally planned. However, in the present project, the community was exposed to the intervention for only slightly longer than 2 years. The project, on the one hand, lacked the time to procure or construct elements that were fundamental to achieving behavioral change; ideally resources should have been available for a minimum of a five year intervention. On the other hand, it needed more inputs to establish certain prerequisite conditions before producing behavioral or health status outcomes. The model was designed to influence behavior primarily; however, it did not have the scope or the capability to influence the living conditions that influenced these and their consequences.

At project inception, these limitations were factored into planning; however, it was envisaged that if initial successes were evident, the project could be built upon further; and if it was not successful, then the process evaluation would illuminate several aspects of the intervention model, which needed refinement for project effectiveness. This assumption proved to be correct as the project yielded several lessons that are relevant to implementing complex community health initiatives, and introducing supplementary health education models into district health planning in addition to other important lessons.

The process-related feedback from the local partners showed that this project would have benefited from multiple synchronous interventions, which in addition to the health care providers also used traditional health care providers, village elders, religious leaders, local politicians and other members of the establishment as an entry point. Secondly, it was perceived that the establishment of formal organized community groups at a local level could have implemented, coordinated and targeted activities on a sustainable basis.

Notwithstanding, it was perceived that several of the activities of the project stimulated interest in cardiovascular disease prevention in the region and generated future commitment to chronic disease initiatives among local service providers and other influential community members.

The most significant contribution of this demonstration project related to the key role it played in mainstreaming non-communicable diseases on the national health agenda in Pakistan. The interfacing of the NGO Heartfile with the Ministry of Health through the Lodhran CVD prevention project paved the way for a longer term and more sustained relationship in the shape of the “*National Action Plan for Non-commu-*

nicable Disease Prevention, Control and Health Promotion in Pakistan” NAP- NCD, (Heartfile, 2005). As the 8th National Public Health Programme of Pakistan, this programme is novel both on the account of the public-private partnership model within which it has been set and the framework for action, which it utilizes to incorporate multidisciplinary interventions across the broad range of chronic diseases into a single model. This model has received international acclaim for the ingenuity of its design (World Health Organization, 2005). Presently in the first phase of its’ implementation, NAP-NCD’s current scope of work involves the establishment of a surveillance system, a nationwide behavioural change communication campaign and introduction of chronic disease into the work plan of Lady Health Workers. Details about implementation are posted online (Heartfile, 2005). This model was conceptualized and designed by Heartfile under a formal agreement with the Ministry of Health and the World Health Organization (<http://heartfile.org/napmou.htm>); the terms of this agreement gave Heartfile a lead role in this tripartite partnership. Specifically, the experience relating to the incorporation of CVD prevention and control into the work-plan of LHWs and the methodology and tools of intervention employed for the Lodhran project were further built upon and expanded to encompass the non-communicable diseases prevention and control perspective in the NAP-NCD program. This experience also showed that it was feasible to integrate supplementary health education into existing District-level health services and that these services had some level of infrastructure to support such activities if appropriate capacity was developed within the system.

The Heartfile Lodhran CVD prevention project may not have led to dramatic changes in terms of influencing practices within the District of intervention. However, it played a critical role in spurring national action for the prevention and control of non-communicable diseases and introducing sustainable public health interventions for poor communities in Pakistan. By these standards, the Lodhran CVD Prevention Project can be regarded as highly successful.

1. defining coronary heart disease (CAD) as the composite outcome of abnormalities indicative of definite or probable CAD based on Minnesota classification of ECG, or past history of heart attack.

Table 4. Respondent's demographic & socio-economic characteristics

Respondent's characteristics	Control Pre (n=301)	Control post (n=304)	Lodhran Pre (n=303)	Lodhran post (n=288)	Difference Lodhran pre and Lodhran post (p-value)	Difference Control pre and Control post (p-value)	Difference Lodhran pre and Control pre (p-value)	Difference Lodhran post and Control post (p-value)
<i>Age of the patient (p-value=0.418)</i>								
<30	24.9	22.7	24.1	25.7	0.724	0.778	0.367	0.327
30-39	32.9	33.9	29.4	30.2				
40-49	23.1	25.2	23.1	21.5				
50-59	10.3	12.5	12.2	14.2				
60 years & above	7.0	5.3	11.2	8.3				
Average age (SD)	38.1 (10.8)	38.4 (10.3)	39.6 (12.3)	38.8 (11.7)				
<i>Sex of the Respondent (p-value=0.127)</i>								
Male	68.8	72.7	66.0	74.0	0.035	0.288	0.469	0.729
Female	31.2	27.3	34.0	26.0				
<i>Level of Education (p-value<0.001)</i>								
Illiterate	59.8	56.6	52.1	49.0	<0.001	0.405	0.078	0.047
Primary/ Religious schooling	12.9	17.8	20.5	25.7				
Middle	9.0	10.2	8.6	8.3				
Matric	9.6	8.9	7.3	12.8				
Intermediate	6.0	3.3	6.3	2.1				
Graduate & above	2.6	3.3	5.3	2.1				
<i>Employment Status (p-value=0.226)</i>								
Government Employees	3.0	3.0	3.0	2.4	0.188	0.141	0.933	0.307
Private Employees/Self employed	65.1	66.1	63.4	71.9				
Student	1.7	0.0	1.7	0.3				
Housewife	27.9	26.6	29.7	23.3				
Retired	0.0	0.0	0.3	0.0				
Unemployed	2.3	4.3	2.0	2.1				
<i>Household members (18 & above)(p-value<0.001)</i>								
1-2	35.8	21.7	52.3	47.5	0.642	0.002	<0.001	<0.001
3-4	43.5	53.6	28.1	32.6				
5-6	14.4	17.1	12.3	12.8				
7 & above	6.4	7.6	7.3	7.1				
Average household size (18 & above) (SD)	3.5 (2.1)	3.8 (1.9)	3.1 (2.0)	3.2 (2.1)				
<i>Monthly Income (in Rs.) (p-value<0.001)</i>								
<3000	36.9	32.9	8.5	31.6	<0.001	0.107	<0.001	0.050
3000-4499	36.2	46.0	20.9	37.9				
4500-5999	11.7	9.3	10.8	11.4				
6000 & above	15.2	11.8	19.6	19.1				
Average monthly Income (SD)	5,594 (10,590)	4,081 (4,706)	5,771 (10,737)	4,616 (5,964)				

Table 5. Respondent's knowledge levels

Respondent's characteristics	Control Pre (n=301)	Control post (n=304)	Lodhran Pre (n=303)	Lodhran post (n=288)	Difference Lodhran pre and Lodhran post (p-value)	Difference Control pre and Control post (p-value)	Difference Lodhran pre and Control pre (p-value)	Difference Lodhran post and Control post (p-value)
Knowledge about causes of high blood pressure Correct/somewhat correct Incorrect Do not know	5.3 32.9 61.8	5.3 40.8 53.9	10.9 31.4 57.7	28.1 23.3 48.6	<0.001	0.969	0.012	<0.001
Knowledge about prevalence of high blood pressure in Pakistan Correct/somewhat correct Incorrect Do not know	5.7 30.6 63.8	13.8 32.9 53.3	5.3 29.0 65.7	10.4 40.3 49.3	0.019	<0.001	0.985	0.217
Knowledge of Effect of high blood pressure on health Correct/somewhat correct Incorrect Do not know	4.0 34.2 61.8	6.0 39.8 54.2	5.6 39.3 55.2	12.5 38.2 49.3	0.003	0.273	0.346	0.005
Knowledge of heart attack Correct/somewhat correct Incorrect Do not know	1.6 41.6 56.8	1.6 48.0 50.4	2.0 40.3 57.8	7.6 49.8 42.6	<0.001	0.987	0.769	<0.001
Knowledge of causes of heart attack Correct/somewhat correct Incorrect Do not know	8.0 31.2 60.8	7.9 38.5 53.6	11.9 28.4 59.7	33.3 24.3 42.4	<0.001	0.971	0.105	<0.001
Opinion about regular moderate physical activity Beneficial Harmful Do not know	8.6 63.5 27.9	7.9 74.0 18.1	8.3 63.4 28.3	44.9 32.8 22.3	<0.001	0.749	0.854	<0.001
Knowledge about healthy diet Correct/somewhat correct Incorrect Do not know	18.6 58.8 22.6	19.1 68.4 12.5	15.8 61.7 22.5	36.8 51.7 11.4	<0.001	0.913	0.357	<0.001
Knowledge about effects of smoking on health Correct/somewhat correct Incorrect Do not know	29.9 42.2 27.9	39.4 43.8 16.8	25.4 44.6 30.0	55.6 25.7 18.7	<0.001	0.013	0.241	<0.001
Knowledge about effects of passive smoking on health Correct/somewhat correct Incorrect Do not know	26.2 42.9 30.9	27.0 53.3 19.7	18.5 48.5 33.0	57.3 19.4 23.4	<0.001	0.953	0.016	<0.001

Table 6. Respondent's risk behaviors

Respondent's characteristics	Control Pre (n=301)	Control post (n=304)	Lodhran Pre (n=303)	Lodhran post (n=288)	Difference Lodhran pre and Lodhran post (p-value)	Difference Control pre and Control post (p-value)	Difference Lodhran pre and Control pre (p-value)	Difference Lodhran post and Control post (p-value)
Smoking Status								
Daily smoker	23.9	27.3	32.3	33.8	0.918	0.187	0.143	0.090
Occasional smoker	1.3	0.0	1.3	1.0				
Past smoker only	1.0	1.0	0.7	1.0				
Never smoker	73.8	71.7	65.7	64.1				
User of smokeless tobacco								
Daily user	4.0	4.3	0.0	0.7	0.222	0.393	0.002	0.022
Occasional user	0.0	0.0	0.0	0.0				
Past user only	1.3	0.3	1.0	0.3				
Never used	94.7	95.4	99.0	99.0				
Consumption of fruits per day								
Two or more servings	2.0	0.7	1.7	2.1	0.693	0.150	0.752	0.132
Less than two servings	98.0	99.3	98.3	97.9				
Consumption of veg per day								
Two or more servings	1.3	2.6	1.0	6.6	<0.001	0.251	0.697	0.020
Less than two servings	98.7	97.4	99.0	93.4				
Consumption of fruits & veg/day								
Five or more servings	0.7	1.0	0.3	0.3	0.969	0.661	0.559	0.344
Less than five servings	99.3	99.0	99.7	99.7				
Type of oil/fat/ghee as cooking medium								
Vegetable oil	5.6	0.3	11.2	10.8	0.453	0.311	0.710	0.527
Banaspati Ghee	45.2	88.2	4.0	42.3				
Desi Ghee	35.9	0.0	75.6	35.0				
Palm oil	2.3	2.3	0.3	0.3				
Combination	11.0	9.2	8.9	11.5				
Checked Blood Pressure in past 12 months	30.2	36.8	35.6	41.8	0.133	0.085	0.157	0.229
Physical activity: work domain								
Inactive	69.8	63.3	61.7	72.1	0.007	0.158	0.103	0.007
Moderate	15.6	16.5	18.7	17.3				
Vigorous	14.6	20.2	19.7	10.7				
Physical activity: during transportation								
Inactive	53.7	38.8	37.4	29.0	0.031	<0.001	<0.001	0.012
Moderate or Vigorous	46.3	61.2	62.6	71.0				
Physical During recreation/leisure								
Inactive	99.0	98.3	97.0	96.0	0.744	0.604	0.185	0.228
Moderate	0.7	0.7	1.3	1.5				
Vigorous	0.3	1.0	1.7	2.6				

Table 7. Pre and post-intervention (physician training) knowledge level assessments (n = 20)

Variable	Awareness level before training (%)	Awareness level after training (%)	%Difference (95% CI)	p- value
Dietary components that can be eaten in any amount	13 (65.0)	20 (100.0)	35.0 (9.1,60.9)	0.016
Dietary components that need to be eaten in moderation	6 (30.0)	18 (90.0)	60.0 (33.5, 86.5)	<0.001
Dietary components that need to be reduced in the diet	11 (55.0)	20 (100.0)	45.0 (18.2, 71.8)	0.004
Beneficial level of physical activity	13 (65.0)	20 (100.0)	35.0 (9.1, 60.9)	0.016
Ideal BP for patients with heart disease	8 (40.0)	15 (75.0)	35.0 (4.9, 65.1)	0.039
Ideal BP for patients with diabetes	9 (45.0)	13 (65.0)	20.0 (-11.3, 51.3)	0.288
Important things to look for in case of high BP	12 (60.0)	20 (100.0)	40.0 (13.5, 66.5)	0.008
Criteria for referral to cardiologist in cases of high BP	17 (85.0)	18 (90.0)	5.0 (-16.8, 26.8)	1.000
Categorization of CVD risk based on blood pressure level	5 (25.0)	13 (65.0)	40.0 (13.5, 66.5)	0.008
Drug of choice for treating high BP in pregnant women	8 (40.0)	7 (35.0)	-5.0 (-31.8, 21.8)	1.000
BP lowering drugs which must never be prescribed to patients with Asthma	15 (75.0)	19 (95.0)	20.0 (-2.5, 42.5)	0.125
High BP lowering drug of choice in diabetics	6 (30.0)	18 (90.0)	60.0 (33.5, 86.5)	<0.001
Diet forbidden for diabetics	16 (80.0)	20 (100.0)	20.0 (-2.5, 42.5)	0.125
Possess guidelines to treat hypertension/BP management	8 (40.0)	20 (100.0)	60.0 (33.5, 86.5)	<0.001

Table 8. Pre and post-intervention (non-physician training) knowledge level assessments (n=30)

Variable	Awareness level before training (%)	Awareness level after training (%)	%Difference (95% CI)	p- value
Dietary components that can be eaten in any amount	3 (10.0)	30 (100.0)	90.0 (75.9, 104.1)	<0.001
Dietary components that need to be eaten in moderation	1 (3.3)	24 (80.0)	76.7 (58.2, 95.1)	<0.001
Beneficial level of physical activity	7 (23.3)	30 (100.0)	76.7 (58.2, 95.1)	<0.001
Harmful effects of passive smoking	15 (50.0)	26 (86.7)	36.7 (16.1, 57.2)	0.001
Important things to look for in case of high BP	2 (6.7)	16 (53.3)	46.7 (23.2, 70.1)	0.001
Criteria for referral to doctor in cases of high BP	14 (46.7)	30 (100.0)	53.3 (32.2, 74.5)	<0.001
Diet forbidden for diabetics	20 (66.7)	30 (100.0)	33.3 (13.1, 53.5)	0.002
Possess guidelines to treat hypertension/BP management	8 (40.0)	20 (100.0)	60.0 (33.5, 86.5)	<0.001

Table 9. Pre and post-intervention (Lady Health Worker) knowledge level assessments (n=299)

Variable	Awareness level before training (%)	Awareness level after training (%)	%Difference (95% CI)	p- value
Prevalence of CVD/CVA	253 (84.6)	271 (90.6)	6.0 (1.5, 10.6)	0.009
Prevalence of hypertension in the age above 45 years	179 (59.9)	239 (79.9)	20.0 (14.1, 26.0)	<0.001
Cause of heart attack	145 (48.5)	267 (89.3)	40.8 (34.5, 47.2)	<0.001
Preventable risks of heart disease	124 (41.5)	258 (86.3)	44.8 (38.4, 51.2)	<0.001
Effect of passive smoking	275 (92.0)	278 (93.0)	1.0 (-2.9, 4.9)	0.710
Types of Effect of passive smoking	92 (30.8)	114 (38.1)	7.4 (0.9, 13.8)	0.025
Harmful diet for heart	157 (52.5)	263 (88.0)	35.5 (29.4, 41.5)	<0.001
Beneficial diet for heart	161 (53.9)	284 (95.0)	41.1 (35.1, 47.2)	<0.001
Causes of mortality in pregnancy	107 (35.8)	223 (74.6)	38.8 (32.4, 45.2)	<0.001

Table 10. Patients' responses following routine non-physician consultation pre- and post-training

Variable	Non-physician Pre (n=300)	Non-physician post (n=304)	Difference (p-value)
Age of the patient Average age (SD)	30.4 (6.0)	29.9 (4.3)	0.23
Sex of the Respondent Male Female	50.0 50.0	50.3 49.7	0.9
Blood pressure checked (%)	50.7	63.2	< 0.001
Gave advice regarding tobacco (%)	0.0	22.4	< 0.001
Correct/somewhat correct advice regarding tobacco among advised (%)	-	100.0	< 0.001
Gave advice regarding passive smoking (%)	0.0	3.9	< 0.001
Correct/somewhat correct advice regarding passive smoking among advised (%)	-	100.0	< 0.001
Gave advice regarding diet (%)	0.0	40.5	< 0.001
Correct/somewhat correct advice regarding diet among advised (%)	-	100.0	< 0.001
Gave advice regarding physical activity (%)	0.0	38.8	< 0.001
Correct/somewhat correct advice regarding physical activity among advised (%)	-	100.0	< 0.001

Table 11. Distribution of different demographic, health care facility related and different types of advices for patients visited physicians at pre- and post-exit interviews

Variable	Physician Pre (n=300)	Physician post (n=304)	Difference (p-value)
Age of the patient Average age (SD)	33.5 (8.1)	32.3 (6.4)	0.04
Sex of the Respondent			
Male	49.3	62.2	0.001
Female	50.7	37.8	
Blood pressure checked (%)	52.3	67.1	< 0.001
Gave advice regarding tobacco (%)	10.7	34.9	< 0.001
Correct/somewhat correct advice regarding tobacco among advised (%)	100.0	98.0	0.04
Gave advice regarding passive smoking (%)	0.0	7.9	< 0.001
Correct/somewhat correct advice regarding passive smoking among advised (%)	-	90.0	< 0.001
Gave advice regarding diet (%)	16.3	51.0	< 0.001
Correct/somewhat correct advice regarding diet among advised (%)	100.0	96.0	< 0.001
Gave advice regarding physical activity (%)	9.3	53.6	< 0.001
Correct/somewhat correct advice regarding physical activity among advised (%)	99.7	96.0	0.002

References

- Centers for Disease Control and Prevention (2004) *Behavioral Risk Factor Surveillance System*; Centers for Disease Control and Prevention, Atlanta, USA. <<http://www.cdc.gov/brfss/>> Viewed May 6, 2006.
- Government of Pakistan (1998) *Fifty years of Pakistan: summary of volume 1*. Federal Bureau of Statistics, Islamabad.
- Government of Pakistan (2003) *Accelerating economic growth and reducing poverty- the road ahead; Poverty Reduction Strategy Paper*. Ministry of Finance, Islamabad.
- Heartfile (2003). *Lodhran CVD Prevention Project: Memorandum of Understanding between Heartfile and National Program for Family Planning and Primary Health Care*; Heartfile, Islamabad. <<http://heartfile.org/lodhranmou.htm>> Viewed March 20, 2006.
- Heartfile (2004) *Integrated Framework for Action: National Action Plan for non-communicable diseases prevention, control and health promotion* <<http://heartfile.org/napIFA.pdf>> Viewed May 12, 2006.
- Heartfile (2005) *National Action Plan for non-communicable diseases prevention, control and health promotion*. <<http://heartfile.org/nap.htm>> Viewed January 12, 2006.
- Heartfile (2005) *Process of implementation: National Action Plan for non-communicable diseases prevention, control and health promotion* <<http://heartfile.org/nappppp.htm>> Viewed January 12, 2006.
- Heartfile Community Programs (2006) <<http://heartfile.org/community.htm>> Viewed November 30, 2006.
- Jaffar, T.H., Jafery, F.H., Jessani, S., Chaturvedi, N. (2005) Heart disease epidemic in Pakistan: women and men at equal risk *American Heart Journal* vol.150, no.2, pp. 221-226.
- Nishtar, S. (2002) Prevention of coronary heart disease in south Asia. *Lancet* vol. 360, pp. 1015-1018.
- Nishtar, S., Mirza, Y.A., Jehan, S., Hadi, Y., Badar, A., Yusuf, S., Shahab, S. (2004) Newspaper articles as a tool for cardiovascular prevention programs in a developing country. *Journal of Health Communication* vol. 9 no. 4, pp. 355-369.
- Nishtar, S., Wierzbicki, A.S., Lumb, P., Hammill, M.L., Turner, C.N., Cook, M.A. (2004) Low HDL and waist hip ratio predict the risk of coronary artery disease in Pakistanis. *Current Medicine Research and Opinion* vol. 20 no. 1, pp. 55-64.
- Ounpuu, S., Negassa, A., Yusuf, S. (2001) INTERHEART: A Global Study of Risk Factors for Acute Myocardial Infarction. *American Heart Journal* vol. 141, pp. 711-721.
- Oxford Policy Management (2002) *Lady Health Worker Programme's external evaluation of the National Programme for Family Planning and Primary Healthcare – NWFP and FATA survey report*. Oxford Policy Management, London.
- Puska, P., Tuomilehto, J., Nissinen, A., Vartiainen, E. (1995) *The North Karelia Project: 20 years of Results and Experiences*. National Public Health Institute, Helsinki, Finland.
- Rashid, H., Jafery, N.A. (1967) Atherosclerosis in Karachi; a Study of an Unselected Autopsy Series. Part 2. *Journal of Pakistan Medical Association* vol. 17, pp. 252.
- Sattar, A.B., Khan, B. (1967) Atherosclerosis in Karachi; a Study of an Unselected Autopsy Series. Part 1. *Journal of Pakistan Medical Association* vol. 17, pp. 245.
- World Health Organization (2002) *WHO CVD Risk Management package for low and medium resource settings*. World Health Organization, Geneva.
- World Health Organization (2003) *WHO Stepwise Approach to Surveillance*. World Health Organization, Geneva. <http://www.who.int/ncd_surveillance/steps> Viewed December 31, 2006.
- World Health Organization (2005) *World Chronic Disease Report: the faces of chronic disease*. World Health Organization, Geneva.