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Integrated non-communicable disease control program in a Northern part of India: Lessons from a demonstration project in low resource settings of a developing country

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Summary
Background: Chandigarh healthy heart action project (CHHAP) was initiated in 2004 to increase awareness in the community for the major NCD risk factors by health promotion, training of health staff for CVD risk assessment and management, and surveillance of NCD risk factors.
Methods: Key strategies included capacity building, health promotion in different settings, risk factor surveillance and advocacy. Educational materials for the project included modules for doctors, health workers and school teachers; brochures, WHO protocol charts for CVD risk assessment and management, handbills and posters. Multiple health promotion activities were undertaken. An intersectoral committee for policy issues and a coordination committee for technical issues were also constituted.
Results: Most of doctors in public (245) and private sectors (150), health workers (227), school teachers (190) and pharmacists/staff nurses (181) were trained for CVD assessment and management in batches during 2005—07. NCD risk factor surveillance encompassed 2763 individuals in the population of Chandigarh. The prevalence of smoking was 10.2% (20.1% among males and 0.8% among females). Alcohol was consumed by 14.2% (26.8% males and 1.2% females). A sedentary occupation was identified in 94.2% in Chandigarh. Due to strong advocacy, Chandigarh was

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declared a smoke free city from July 2007, which is a first in the developing world, and the project was up scaled to an integrated State NCD control program in the 11th 5-year plan (2007—12).
Conclusion: CHHAP is a large-scale implementation of the WHO CVD risk management package, implemented as a routine in the health care delivery system.

Introduction

Non-communicable diseases (NCDs) are the leading cause of death around the world [1,2]. While the current global mortality from chronic diseases is approximately 30%, in developed countries deaths from cardiovascular disease (ischemic heart disease and stroke), cancer, chronic respiratory diseases and diabetes mellitus account for more than 50% of all deaths. All indicators suggest that the chronic disease related mortality will reach 50% worldwide by 2020 [1]. In addition, unlike in developed nations, chronic disease mortality is higher among younger individuals in developing countries. For example, in 1990, 52.2% of the cardiovascular disease (CVD) related deaths in India occurred below the age of 70 years, while the corresponding figure for the industrialized countries (established market economies) was only 22.8% [2].

India contributes substantially to the global burden of NCDs, which are emerging as an epidemic [3]. It was projected by Murray and Lopez that the overall NCD burden will rise sharply by 2020 in India. About 40% of deaths were attributable to NCDs in the 1990s and are projected to increase to 66% by the year 2020 [2]. CVDs in India alone, account for around 2.4 million deaths, in contrast to nearly 3.2 million deaths due to that cause in all the industrialized countries put together. More NCD deaths occur in India in middle age (30—69 years) than in industrialized countries, where they occur largely in old age (>70 years). The economic loss due to premature death in 2005 was about $9 billion from cardiovascular disease and in the following 10 years this is expected to amount cumulatively to $237 billion [4]. In India, pooled epidemiological studies show that hypertension is present in 25% of the urban and 10% of the rural population. Union Territory of Chandigarh is facing an advanced epidemiological transition [3]. The cause specific mortality due to diseases of the circulatory system has doubled to 35.7% of all reported deaths in the last two decades. Similarly the prevalence of hypertension has doubled in the last three decades from 26.9% in 1968 to 44.9% in 1996—97 in Chandigarh [5]. Another study reported a prevalence of hypertension in the elderly (>65 years) of 58% [6].

There are many successful interventions for prevention and control of NCDs from developed countries such as the North Karelia project, which lead to significant decline in mortality from CVDs and Coronary Heart Disease [7]. The most successful example of a community-based NCD intervention program in developing countries is from Mauritius [8]. There are no reports of integrated community-based interventions for prevention and control of NCD from India.

Chandigarh healthy heart action project (CHHAP) was launched on October 21st, 2004 initially for a period of 2 years (2004—06) in partnership with Health Department, Chandigarh Union Territory, Departments of Community Medicine, Internal Medicine, Cardiology, Post Graduate Institute of Medical Education and Research, Chandigarh (PGIMER), supported by World Health Organization (WHO). The project was then scaled up to an integrated NCDs control program in 2006—07. The main objectives of the project were to increase awareness for major NCD risk factors in the community by health promotion, implementation of a standard protocol for CVD risk management and diabetes by health care staff, and to conduct surveillance of NCD risk factors. This paper describes the experience of the 3-year demonstration project and up scaling of the project to an integrated NCD control program.

Materials and methods

Chandigarh Union Territory is also known as City Beautiful in India. It is divided into sectors with a population of approximately 1 million as of the 2001 census [9]. The community-based intervention project was undertaken from October 2004 to September 2007 in all the sectors, villages and slums of Chandigarh. Each sector in Chandigarh has approximately 4000 houses with a population of 20,000—25,000. The adjoining slums and villages, which fall within the municipal limits of Chandigarh, were also included for the intervention. The key strategies for prevention and control of NCDs were capacity building, surveillance, health promotion and advocacy.

The cardiovascular disease risk management package developed by WHO [10] was adapted by a local committee of experts/health care staff from primary, secondary and tertiary care settings according to the local needs. The educational materials developed for the project included modules, based on the WHO CVD risk management package, for doctors, health workers and school teachers; project brochures in Hindi and English, chart for CVD risk assessment and management, handbills, poster in English, Hindi, as well as folders on common NCDs and for tobacco cessation. All health promotion material was pilot tested before being used and changes were made based on feedback.

Capacity building

All 135 doctors and 110 health workers in Union Territory of Chandigarh were trained in 2 and 1 day sessions, respectively, with the adapted version of the WHO CVD risk management package. Doctors and health workers were trained to assess and manage CVD risk, to organize regular follow-ups and to maintain proper records. Doctors in the private sector were also trained through the local body of the Indian Medical Association (IMA). Continuing medical education (CME) sessions were also conducted in 2007. Similarly, two teachers from each school (physical training and science) were trained for counseling. The module for teachers included protocols for counseling on diet, physical activity and cessation of tobacco and alcohol use. Training involved lectures by experts and group discussions.

Risk factors surveillance

NCD risk factor surveillance was undertaken in Chandigarh by using a questionnaire based on the WHO STEPS-1 approach [11]. A minimum sample of 2500 persons across the recommended core age range of 15—64 years (equivalent to 250 participants in each 10-year age and sex group) was selected, proportional to size from urban, rural and slum areas. The first household in any area was selected randomly and then consecutively until the required sample was achieved. All eligible persons in a household were included for detailed interviews by a trained post-graduate level research fellow.

Health promotion activities

An extensive health promotion campaign was conducted with the involvement of partners, NGOs, electronic and print mass media to increase the awareness of NCD risk factors and adoption of a healthy lifestyle. A health promotion core committee was formed consisting of various stakeholders. The committee was responsible for designing and finalizing a health promotion calendar and for implementation of initial health promotion activities, which were continued by project staff. The targets for the health promotion campaign were different for different population groups. The focus of health promotion was on lifestyle DPT (unhealthy diet, physical inactivity, and tobacco and alcohol cessation) besides stress.

Every fourth Sunday of the month was celebrated as health promotion day by focusing on physical activity. Regular cycle rallies were organized with the Chandigarh Amateur Cycling Association (CACA) and other organizations, schools clubs, etc. Strict enforcement of the Tobacco Act, which was mainly on paper, was taken up by the local administration with the help of different stakeholders. The impact of these activities was evaluated in a stratified sample of 160 key stakeholders, i.e., teachers, employees and students using a predesigned and pre-tested questionnaire.

Advocacy

The advocacy meetings for healthy policy were held at the highest level of administration, i.e., Advisor to Administrator, Health Secretary, UT Chandigarh besides other stakeholders. Public health and Intersectoral Coordination Committees were constituted under the chairmanship of the Advisor and Health Secretary, UT Chandigarh, respectively, for policy issues. A technical steering committee was constituted to take up operational and technical issues under the chairmanship of the Director of Health Services. Regular meetings were held to discuss key issues for implementation and to review progress. The stepwise framework developed by WHO for prevention of chronic diseases was adapted to the local situation.

Implementation

Health care staff working at the primary and secondary health care levels conducted the opportunist screening of all patients above 30 years and any hypertensive patient was offered the package of services. They also distributed relevant health promotion materials to all patients during their routine duty and home visits. Private doctors were also involved. The national guidelines developed for chronic NCDs such as diabetes, COPD and cancer were also promoted for the management of such cases.

Table 1 Training of different categories of staff for CVD risk assessment and management in Chandigarh.

Personals trained	No. of person trained	
	2005	2007
Doctors	131 (6)	114 (4)
Pharmacists/staff nurses	110 (4)	71 (2)
Health workers	103 (4)	124 (4)
Teachers	190 (8)	—
Private practitioner	100 (1)	150 (1)

Figures in parentheses are number of batches of staff trained.

Health workers used interpersonal communication and focused group discussions. They organized meetings with the Resident Welfare Association (RWA) for health promotion activities and distributed health promotion material. The other community-based organizations such as local NGOs and primary child care (Anganwari) centres were also involved in health promotion. Health promotion activities were undertaken in schools and workplace settings. Mass media including newspapers, TV, local cable TV channels and radio were used extensively for this purpose. A log book of activities was maintained on a daily basis for recording and reporting.

Results

Capacity building

Training was organized for different categories of staff in CVD risk assessment and management (Table 1). The duration of training was 2 days for health workers and 1 day for doctors, other paramedical staff and teachers. The focus of training was interactive sessions and skill-based training for anthropometric and BP measurements. The duration of training, which was reduced in view of the other competing 10—12 national health programmes and multiple duties, was found to be feasible and there was significant improvement on the post-evaluation ($p < 0.05$). This was followed by continued medical education (CME) and training in 2007.

NCD Risk factors surveillance

NCD risk factors were assessed in 2763 individuals of Chandigarh, in which more than 50% of the survey populations were in the age group 15—34 years. The distribution of NCD risk factors in Chandigarh is shown in Table 2. Fruit and vegetable intake of at least one serving per day for 7 days a week was 32% and 70%, respectively, while 6.2% were not consuming fruits at all. The preference for fast foods was also high (54%). More than 90% of the people were involved in sedentary occupation in the city. Moderate exercise of at least 10 min a day was done by only 24.4% of the people. The prevalence of current smokers and alcohol intake was 10.8% and 14.2%, respectively. The blood pressure had not been recorded even once in the last 5 years in 39.7% of the study subjects.

Health promotion activities

Educational aids were developed during the project by involving professional institutions in the city and

Table 2 Distribution of common NCD risk factors among study population in Chandigarh.

Risk factor	Categories	Chandigarh $N = 2763$ (%)
Dietary habits	Fruit intake 7 days per week	885 (32)
	Vegetable intake of 7 days per week	1946 (70.4)
	Salt intake of >5 g per day	852 (30.8)
	Preference for salty foods	2063 (74.7)
	Preference for fast foods	1492 (54)
Physical activity	Involved in sedentary occupation	2602 (94.2)
	Moderate exercise for at least 10 min at a time	675 (24.4)
Tobacco	Ever smoker	298 (10.8)
	Current smoker	282 (10.2)
	Current smokeless tobacco	109 (3.9)
Alcohol	Ever drinker	425 (15.4)
	Current drinker	395 (14.2)
Blood pressure	Self-reported hypertension	348 (12.6)
Blood sugar	Self-reported diabetes	85 (3.0)

Figures in parentheses are percentage.

Table 3 Education materials developed under the Chandigarh healthy heart action project.

S. no	Material	Quantity
1	Modules for doctors	600
2	Modules for health workers	600
3	Modules for teachers	450
4	Brochures	13,000
5	Treatment charts	500
6	Handbills	70,000
7	Posters	5,000
8	Folder for common NCDs in Hindi	1000
9	Tobacco cessation folder in Hindi	1000

multiple health promotion activities were undertaken as shown in Tables 3 and 4. There were 24 cycle rallies organized during the project period for promotion of physical activity. NGOs including Rama Krishna Mission were involved for tobacco control. Anti tobacco volunteers were promoted in health institutions. Linkage with a tobacco cessation clinic in a tertiary care hospital was established for those in need of assistance to quit smoking. Chandigarh was declared a Smoke Free City from July 15th, 2007 [12] and a logo was developed (Fig. 1).

World Heart, Diabetes and No Tobacco days were celebrated by organizing multiple activities. Regular health promotion messages were telecast from February 1st, 2007 on a local cable "Yellow channel" about 8—10 times a day. An informative street play on non-communicable diseases entitled "Dilon Ki Hartaal" (hearts on strike) was staged in schools and slum areas. A website on NCD's (www.chhap.org) and a project logo were developed (Fig. 2).

Advocacy

Key outcomes of advocacy meetings were a separate budget head for NCD control, availability of

Figure 1 The logo of smoke free Chandigarh displayed at different places of the city.

healthy food in all educational institutions and a change in tendering conditions for healthy canteens. Fruits and vegetables were introduced in the mid-day school meal program in 2007. The tourism department in collaboration with Green Tire, an NGO, has been promoting cycling tourism since 2006. Observing a period of 45 min for physical activity in all schools and colleges has ensured promotion of physical activity since 2007. Strict enforcement of the Tobacco Act and tobacco control cell has been established under the chairmanship of the Health Secretary, leading to a smoke free status for the city. Coronary artery disease (CAD), hypertension, diabetes mellitus, and stroke have been made notifiable for weekly reporting from all public health institutions (primary, secondary and tertiary care levels) in UT Chandigarh since 2007 under the Integrated Disease Surveillance Project (IDSP).

Table 4 Different health promotion activities undertaken in Chandigarh Union Territory (2005—07).

Activity	Details (no. of activities)
Interactive sessions	Schools, colleges, employees organizations (58)
Cycle rallies	Promotion of physical activity (24)
Mass media	News items (130) and health articles (14) on NCDs in leading newspapers, health talks on AIR and DD (5)
Local cable channel	Health promos are being telecasted on a local channel about 8—10 times a day
Street plays	16 plays
Exhibition on NCDs	4 in different parts
Health education material distribution	Handbills (30,000), brochures (4000), posters (700), WHO protocol charts (500)

Figure 2 Logo of Chandigarh healthy heart action project (CHHAP).

Initially the programme focused on CVD for the first 2 years followed by inclusion of diabetes in the third year. It was realized that an integrated programme would be more suitable. Therefore, the scope of the program was further widened by covering four major chronic NCDs, i.e., CVDs, Diabetes, COPD and Cancer that share many common preventable risk factors including unhealthy diet, physical inactivity, tobacco and alcohol compounded by stress.

CHHAP was scaled up to a State Integrated NCD control programme with a budget of INR 10 millions (US $250, 000), made under the 11th 5-year plan (2007—2012). In fact, Chandigarh has become the first Union Territory/State in India to have its own State NCD control program with its own budgetary provision. Besides a nodal officer, a post of medical officer, a health promotion officer, and support staff for data management have been sanctioned for this program. The State Nodal Officer for Integrated Disease Surveillance Program (IDSP) is responsible for health promotion activities.

Discussions

CHHAP is a large-scale implementation of the WHO CVD risk management package in a low resource setting. Implementation was pilot tested and was found to feasible in the primary health care setting by investigators in their earlier study [13]. The training duration of 1 and 2 days for doctors and health workers, respectively, was found to be adequate. There was a lot of enthusiasm among health workers when they were trained for blood pressure measurement as it was perceived to give them more respect in the community. Trained non-physician health workers (NPHW) in Bangalore and Pakistan employing Scenario-I of the WHO CVD Risk Management Package, were found to be comparable to physicians, who are arguably better skilled [14].

Logistic support to an NCD program is crucial as NCD kits with a few items (sphygmomanometer, weight scale, measuring tape, etc.) and essential drugs for use at the PHC level are required to implement a successful program.

NCD surveillance data are used as baseline data and will be compared after 5 years for any changes in the prevalence of NCD risk factors. Chandigarh is experiencing an advanced epidemiological transition. The traditional diet is giving way to a fast food culture, which is reflected in a high preference for salty food (74.7%) and fast foods (54%) and is a likely result of urbanization and food market globalization with aggressive marketing. It is being compounded by high engagement in sedentary work and low physical activity. A study of NCD risk factors in urban Haryana indicated a higher prevalence of risk factors, current smokers being 22.2% for males and 1.4% for females, and physical inactivity was reported by 23.2% for males and 52.4% for female respondents [15].

There is evidence that the prevalence of risk factors changes after a period of time following an intervention such as the one from Mauritius [8] a developing country, where the prevalence of hypertension decreased from 15% to 12% among males and 12.4% to 10.9% among female from 1987 to 1992. The effect of our intervention is difficult to comment on given the short period of follow-up.

Policies are very important for NCD control programmes, therefore, involvement of the bureaucracy and politicians who have the authority to take policy decisions is very important. A coordination approach is crucial for multiple stakeholders and has worked well in this project. A health promotion strategy needs to be reviewed periodically.

Sustainability of NCD projects is a persistent challenge because the health system is still more focused towards communicable diseases for historical reasons in India and competing scarce financial resources. However, it has been ensured in this project by up scaling it to integrated State NCD control program. Integrated NCD control program focusing on preventable risk factors and common chronic NCDs is more relevant and cost-effective for developing countries including India. From the 3-year demonstration project, it can be concluded that integrated NCD control program is feasible

through health services in a low resources setting by capacity building of health staff, logistic support, provision of essential drugs and by adopting a health promotion model focusing on common risk factors in different settings.

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