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The Dutch Heart Health Community Intervention 'Hartslag Limburg': design and results of a process study

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Abstract

In 1998, a regional cardiovascular diseases prevention program was started in The Netherlands. This paper presents the design and results of a process study on the community intervention. The main purpose of the study was to gain insight into the reasons why expected effects were or were not achieved. Data was collected using multiple data sources and/or methods to measure indicators of intervention implementation. The results indicate that the community analysis and the subsequent organization of nine local Health Committees had been satisfactory. However, some factors that might influence the actual functioning of the Health Committees could be improved. Furthermore, the expert training for the members of these Committees had not yet been carried out as planned and there were doubts about the added value of collaboration with experts thus far. Environmental strategies were felt to need more attention and ensuring long-term continuation requires continuous effort. Most of the 293 intervention activities had focused on nutrition, while smoking cessation activities had been given lowest priority. It is concluded that the process evaluation has provided information about successful and less successful elements of the community intervention.

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Introduction

In 1998, a regional cardiovascular diseases (CVD) prevention program was started in the Maastricht region of the province of Limburg, called Hartslag Limburg (Dutch for Heartbeat Limburg). Hartslag Limburg is a joint project of the municipal authorities of the Maastricht region, the Maastricht Regional Public Health Institute (RPHI), community social work organizations, the regional community health care organization, GPs, Maastricht University, the University Hospital and various local organizations. In January 2001, the WHO selected Hartslag Limburg as one of 12 so-called 'field projects', based on its potential to meet pre-established criteria of the WHO project 'Towards Unity for Health' (Boelen, 2001). The goal of the community intervention is to reduce CVD risk by a reduction in fat intake, an increase in physical activity and smoking cessation among the general population in the Maastricht region, and specifically among low socioeconomic status groups in four districts of the city of Maastricht. The Maastricht region has approximately 180 000 inhabitants and consists of the city of Maastricht (the capital of the province of Limburg, 120 000 inhabitants) and four smaller adjacent municipalities (12 000–21 000 inhabitants each). The intervention continues to date, but evaluation studies covered the first 3 years. A description of the

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Table I. *Conceptual framework of the community project and the evaluation study*

A: Health	B: Risk behaviors	C: Psychosocial determinants	D: Prevention activities	E: Community principles	F: Project components
CVD	high fat intake smoking not enough physical activity	attitudes social influences awareness stage of change	number reach effects	participation intersectoral collaboration link-up with current situation long-term continuation social network approach multi-media and multi-method strategy environmental strategy activities for different target groups	community analyses Health Committees quality control

project has been published elsewhere (Ruland *et al*., 1999). Contemporary evaluation literature emphasizes the importance of process evaluation as well as effect evaluation, especially for complex programs like community interventions [e.g. (Scheirer, 1994; McGraw *et al*., 1996; Goodman, 1998; Cunningham *et al*., 2000)]. Process evaluation complements effect evaluation by providing data on the actual planning and implementation of a program (Scheirer, 1994; Goodman, 1998).

Design and conceptual framework of the community intervention program and its evaluation study

The theoretical framework of Hartslag Limburg's community project was based on up-to-date program planning and evaluation models, and consists of several stages (Table I) [e.g. (Koepsell *et al*., 1992; Goodman, 1998; Green and Kreuter, 1999; Cooksy *et al*., 2001)]. The model postulates that a reduction in CVD among the population in the Maastricht region could be achieved by means of changes in related risk behaviors (Ronda *et al*., 2003). Behavioral change was expected to result from changes in psychosocial determinants of these behaviors such as awareness, attitudes, social influences, self-efficacy expectations and stages of change (Weinstein, 1988; Ajzen, 1991; Prochaska and DiClemente, 1992). Changes in the determinants were only expected if the project resulted in sufficient activities that were tailored to and effective in changing these determinants, and if these activities actually reached the target population. It was further postulated that the organization, development, implementation and dissemination of these activities could best be achieved by applying community principles: participation of the community in the project, intersectoral collaboration, adjustment to the current situation, long-term continuation of the project, a social network approach, a multi-media and multi-method strategy, environmental changes, and activities tailored to various target groups (Bracht and Kingsbury, 1990; Minkler and Wallerstein, 1998). Finally, these community principles were expected to be achieved by means of a thorough community analysis in each of the communities, followed by the creation of nine intersectoral local Health Committees, collaboration with experts in the planning and implementation of activities, and expert training for the members of the Health Committees (quality control).

Evaluation measures were developed for all the stages of the framework, except for Stage A (health), since no detectable effects on this stage could be expected within a limited number of years. The present process study focused on the actually achieved prevention activities (Stage D), the application of community principles (Stage E) and the implementation of the various planned project components (Stage F). Thus, the present study was conducted to gain insight into the reasons why expected effects were or were not achieved and to provide short-loop feedback to those involved in the project. The effect study of the Hartslag Limburg community intervention showed some

statistically significant intervention effects on fat reduction, fat intake awareness and intentions to increase physical activity (Ronda *et al*., 2004a). No significant intervention effects were found on smoking behavior and its psychosocial determinants (Ronda *et al*., 2004b).

Methods

Data collection

Data were collected from the start of the intervention in September 1998 until May 2001 by means of 'triangulation', i.e. using multiple data sources and/or methods to measure the same indicators or variables (McGraw *et al*., 1996; Goodman, 1998). Process measures and their instruments were grouped by the stages of the conceptual framework (Table II).

In order to obtain information about the implementation of project components and the application of community principles, an independent researcher conducted interviews with the project management team (the general project manager, the community project coordinator and a health educator) and a selection of members of the Health Committees (the chairperson and two other members, $n = 22$). They were asked to describe what had actually happened and to evaluate the specific elements on a five-point 'negative-positive' scale (score ranges from −2 to +2). In addition, the members of the Health Committees were questioned about specific factors that may influence the functioning of the Committees (Kegler *et al*., 1998; Bracht *et al*., 1999). The interviews lasted between 60 and 90 min.

Further, the minutes of the meetings of the Health Committees were collected, and an inventory was made of the number of meetings and members, and the organizations represented by the members.

In order to obtain information about community principles (e.g. intersectoral collaboration) and intervention activities (e.g. number of participants), the researcher conducted interviews with the organizers of activities, i.e. members of the Health Committees or professionals in the field.

Information about community principles and intermediate effects of prevention activities was obtained by providing participants with questionnaires to evaluate group activities.

Finally, in order to obtain information about familiarity with projects and activities, and participation in activities, nine additional questions were added to the questionnaires of the second post-test of the effect evaluation.

Data analyses

The interviews were recorded and transcribed and notes were made by the interviewer. Subsequently, the transcriptions were organized by topic and summarized. The SPSS 10.0 statistical package was used to obtain descriptive statistics (frequencies and means) on quantitative data from the interviews or questionnaires. A multiple logistic regression analysis was conducted to identify potential differences in demographics, according to familiarity with or participation in a project. Differences were considered to be statistically significant if $P < 0.05$.

Results

Project components

Community analyses

The major goals of the community analyses were to help introduce the project to the participating communities, to achieve early community involvement and to evaluate the local situations. Key persons in the nine communities were interviewed about issues such as the major problems in their municipality or neighborhood and the community sectors which should be asked to participate in the Health Committees. Reports on the results of these community analyses were sent to all key persons. Although not all members of the project management team agreed about the quality of the community analyses, the general attitude was that the results of the analyses were quite acceptable in all communities.

Health Committees

The members of the sectors that had been identified as important during the community analysis phase

Table II. *Process measures and data collection instruments by conceptual stage*

Process measure	Instrument	Source	Time
Project components (Stage F)			
	semi-structured face-to-face interviews	project management team members of Health Committees	February 2000 September/November 2000
community analyses Health Committees quality control expert training for members of Health Committees collaboration with experts	structured brief telephone interviews structured brief face-to-face interviews	organizers of activities	September 1998 until May 2001
	document review	minutes of meetings	September 1999 until May 2001
Community principles (Stage E)			
	semi-structured face-to-face interviews	project management team members of Health Committees	February 2000 September/November 2000
participation intersectoral collaboration link up with current situation long-term continuation social network approach multi-media and multi-method strategy environmental strategy	structured brief telephone interviews structured brief face-to-face interviews	organizers of activities	September 1998 until May 2001
activities for different target groups	structured brief written questionnaires	participants of activities	September 1998 until May 2001
	structured additional questions in post-test questionnaires for effect evaluation, sent by mail	samples of general population	May 2001
	document review	minutes of meetings	September 1998 until May 2001
Prevention activities (Stage D)			
no. of activities characteristics of activities	structured brief telephone interviews structured brief face-to-face interviews	organizers of activities	September 1998 until May 2001
characteristics of participants satisfaction of participants with activities intermediate effects	structured brief written questionnaires	participants of activities	September 1998 until May 2001
familiarity with project and its activities participation in activities	structured additional questions in post-test questionnaires for effect evaluation, sent by mail	samples of general population	May 2001

were approached to participate in the Health Committees. Nine Health Committees were set up: one in each of the four smaller municipalities, one in each of four underprivileged Maastricht neighborhoods, and a regional Committee to coordinate and implement regional activities. These Committees played a central role in the community intervention, i.e. they were part of the community intervention, as they were expected to select and organize within their area or municipality, activities

Table III. *Overview of numbers of members, numbers of meetings per year and distribution of health activities by Health Committees*

Variable	Municipalities				Neighborhoods				Regional	Overall
	Eijsden	Margraten	Meerssen	Valkenburg	Heuge-merveld	Malberg	Mariaberg	Wittevrou-wenveld		
No. of members	9 (9[a])	9 (8[a])	14 (13[a])	10 (9[a])	6 (3[a])	4 (4[a])	10 (3[a])	3 (3[a])	4 (4[a])	x
No. of meetings per year	6	6	6	6	12	8	12	8	12	x
Nutritional activities (*n*)	5	20	14	17	15	31	26	18	20	166
Physical activity activities (*n*)	5	5	9	15	9	10	15	10	6	84
Smoking activities (*n*)	2	1	1	–	1	3	3	–	4	15
Activities relating to several behaviors (*n*)	3	2	2	4	4	3	3	5	2	28
Total no. of activities (*n*)	15	28	26	36	29	47	47	33	32	293

[a]Number of members representing an organization.

that facilitate and encourage people to adopt a healthier lifestyle. Each Committee was supported by a health educator from the Maastricht RPHI, a social worker of a social work organization, a civil servant of the municipal authorities (in the municipalities) and a so-called neighborhood assistant (in the neighborhoods). The health educator encouraged and assisted the Committee in choosing and organizing healthy behavior promoting activities from a pool of activities, which had been selected by the project management team on the basis of their proven effectiveness and reach in earlier studies (Ronda and Van Assema, 1997), but also in developing their own activities.

The members of the project management team evaluated the organization of all the Committees as positive, although some comments were made about different levels of organization in the various communities.

The community intervention was officially started in October 1998 with a regional campaign to promote physical activity among those over 55, which was organized by the RPHI in collaboration with a national organization and many other organizations and volunteers in the region (NOC*NSF, 1999). At about the same time, the Health Committees officially started their activities. Table III shows an overview of the number of members and meetings per year for each Health Committee. In addition to the organizations mentioned above, the municipal Committees included representatives of several other organizations, such as women's organizations, organizations for the elderly, public health organizations, socio-cultural organizations, sports clubs, etc.

Several factors may influence the functioning of Health Committees, such as the quality of communication, the sense of commitment, the task orientation during the meetings, the professionalism of the leaders, the staff time devoted, the creation of special task forces or smaller subgroups to plan or implement specific activities, the way in which conflicts are solved, equality among the members, the decision-making process, and the perceived benefits and costs (Kegler *et al.*, 1998; Bracht *et al.*, 1999). Although the overall functioning of all the Health Committees was given a positive evaluation, the quality of communication, the staff time and the creation of special task forces were felt to need improvement. Moreover, two neighborhood committees were perceived to be understaffed.

Quality control

An interim assessment by both the project management team and the members of the Health Committees revealed that the expert training of the members of the Health Committees had not been carried out as planned. The expert training was expected to focus on the importance of selecting and organizing intervention activities tailored to and effective in changing the psychosocial determinants of the risk behaviors, as well as on the application of community principles in the planning and implementation of activities. Unfortunately, in most cases there has not yet been any training. Furthermore, although the average score of the Health Committee members on the question of collaboration with experts in the planning and implementation of activities was positive (mean = 1.86), some members of the project management team gave a fairly negative assessment of the collaboration. The project management team agreed about the importance of this collaboration, but members were doubtful about the added value of the collaboration thus far.

Community principles

Participation and intersectoral collaboration

Members of the project management team differed in their assessment of the participation of inhabitants. They agreed that the participation was growing, but they had different opinions about the level of participation at the time of evaluation. The intersectoral collaboration between local organizations was evaluated as mostly positive by the project management team. The participation of inhabitants (mean = −0.05), and the intersectoral collaboration (mean = 0.00) were not given a very positive evaluation by the Health Committees. Members indicated that the level of participation and collaboration could be improved. Nevertheless, the interviews with the organizers of activities revealed that 58% of the activities had been organized and/or implemented by the Health Committees in collaboration with individual volunteers and as many as 93% of the activities in collaboration with one or more other organizations.

Link up with the current situation and long-term continuation

Linking up with the current situation and thinking about the long-term continuation of the project and its activities were evaluated as satisfactory by the project management team, although they indicated that the long-term continuation required more and constant attention. The members of the Health Committees were positive about linking up with the current situation (mean = 1.67), but rather negative about long-term continuation (mean = −0.48), indicating that in most Committees, thinking about continuation has not yet been an issue.

Social network approach, multi-media and multi-method strategy, and environmental strategy

The use of a social network approach was evaluated as satisfactory by the project management team, and the use of a multi-media and a multi-method strategy as rather positive. However, the members differed in their judgment on the organization and implementation of environmental strategies, expressing doubts about the availability of such activities. The Health Committees evaluated both the use of a social network approach and the use of a multi-media and multi-method strategy as rather positive, with means of 1.18 and 1.00, respectively. Members were less positive about the organization and implementation of activities that affected the environment (mean = −0.22), indicating that there were hardly any activities that affected the environment. This was confirmed in the interviews with the organizers of activities.

Activities for different target groups

The project management team agreed that the planning and implementation of activities directed at different target groups, particularly those aimed at men and the working population, needed more attention. The members of the Health Committees were rather positive about the availability of activities for different target groups (mean = 0.81). The interviews with the organizers of the activities revealed that the main target group for the implemented activities were adults in general.

Prevention activities

During the research period, 293 activities had been registered. The Health Committees were most active in organizing activities relating to nutrition, followed by activities relating to physical activity, with smoking cessation given the lowest priority (Table III). Examples of (ongoing) activities include computer-tailored nutrition education (Brug *et al.*, 1998), nutrition education tours in supermarkets (Van Assema *et al.*, 1998), nutritional meetings (Van Assema *et al.*, 1997), a regional campaign to promote physical activity among individuals over 55 (NOC*NSF, 1999), a daily regional television program called 'Heartbeat on the Move' to promote physical activity (Ronda *et al.*, 2001), walking and cycling months (Ruland *et al.*, 2001), a regional smoking cessation campaign (Ruland *et al.*, 2001), and a non-smoking campaign for the parents of children in playgroups (Ruland *et al.*, 2001).

Table IV shows several characteristics of the implemented activities. Most of the activities were implemented in 2000, and increasing knowledge and awareness of one's own behavior was the main objective of about 50% of all activities. In general, the organizers of activities, mostly health professionals in the case of physical activity and nutritional activities, evaluated their planning and implementation as positive. They were especially pleased with the enthusiasm of the participants. Some negative aspects that came up were mainly organizational such as inappropriate space for activities or lack of personnel.

Information from participants in group activities primarily directed at adults came from 1746 participants in the following activities: informational and educational meetings mainly focusing on nutrition but also on physical activity (n = 1144), nutritional meetings (n = 319), nutrition education tours in supermarkets (n = 161), physical activity courses (country dancing, aerobics and yoga) (n = 61), group walks (n = 53) and a cooking course (n = 8). Participants' level of satisfaction with the activities was high and a large majority said that they had been encouraged to change their risk behavior (Table V).

Table IV. *Overview of health activities (*n = *293) by selected key variables*

Variables	*n*
Year of implementation (start)	
1998 (from September)	18
1999	100
2000	124
2001 (until May)	51
Channel of communication (main)[a]	
(1) face-to-face; single session	147
(2) face-to-face; multiple sessions	64
(3) mass media	7
(4) special events	70
(5) environmental	4
(6) tailored written information	1
Objective (main)	
attention/information	71
knowledge/awareness	152
behavior change	70
Target group (main)	
youngsters	80
adults	140
older adults	20
all	53
Participants	
⩽10	73
11–25	78
26–50	44
51–100	19
>100	34
unknown	45
Organizations involved	
yes	272
no	21
Volunteers involved	
yes	171
no	122

[a]For example: (1) meetings providing nutritional information and education; (2) physical activity courses; (3) television, radio, newspaper and widely distributed printed materials; (4) health fairs; (5) grocery store shelf labeling; (6) computer-tailored nutrition education.

Overall, 24.3% of the 1990 respondents in the Maastricht region who completed the second post-test of the effect evaluation were familiar with a health project. Almost 74% of the population sample indicated that they were familiar with at least one activity relating to nutrition, smoking cessation or physical activity and almost 15% indicated participation in at least one activity. There

were some differences in familiarity with health projects and activities, and participation in activities, between the participating communities. Furthermore, familiarity and/or participation differed according to age, gender and education (Table VI).

Discussion

The goal of the Hartslag Limburg community intervention is to reduce CVD in the Maastricht region by encouraging a reduction in fat intake, an increase in physical activity and smoking cessation. The present process evaluation was conducted to gain insight into the reasons why expected effects were or were not achieved by providing data on the actual planning and implementation of the community intervention. We will discuss the results, implications and limitations of this process evaluation according to the framework presented in Table I.

The process evaluation provided information about successful and less successful aspects of Hartslag Limburg. The study indicated that the community analysis and the subsequent organization of nine local Health Committees had been satisfactory. All Committees were professionally supported in the same way, and subsequently their functioning, as well as the application of community principles and the realization of intervention activities, were comparable. Some factors that might influence the actual functioning of the Health Committees could be improved, i.e. the quality of communication, the staff time, the creation of special task forces and the number of members of the Committees. Quality control, i.e. expert training of the members of the Health Committees, and to a lesser degree also collaboration with experts in the planning and implementation of activities, was a weak link at the time of data collection. Nevertheless, the implementation of project components was found to have indeed resulted in the application of various community principles. The application of most of the principles was already quite satisfactory at this time (e.g. a social network approach and a multi-media and multi-method strategy) and/or there were indications for their application or achievement in the near future (e.g. participation of inhabitants and intersectoral collaboration between organizations). However, it was also found that environmental strategies needed more attention and that ensuring long-term continuation required continuous effort. Still, as expected, the implementation of project components and the subsequent application of community principles had indeed resulted in the development and implementation of a large number of intervention activities. Most of the 293 implemented intervention activities had focused on nutrition, followed by physical activity. Activities on smoking cessation were found to be less prevalent. Although a large

Table V. *Overview of participants' characteristics and satisfaction, and intermediate effects (*n = *1746)*

Variables	
Age (mean)	59.1 (SD = 13.3)
Gender (%)	
female	93.8
male	6.2
Educational level (%)	
low	49.5
intermediate	42
high	8.4
Acquainted with activity through (%)	
mass media	12.5
friends/family	31.6
club/association/company and suchlike	52.6
several sources	3.3
Atmosphere during activity [% (rather) pleasant]	98.6
Information received new [% (rather) new]	75.2
Information received interesting [% (rather) interesting]	79.1
Report mark for activity (mean), out of 10	8.3 (SD = 1.0)
Report mark for instructor (mean), out of 10	8.7 (SD = 1.0)
Encouraged to eat less fat (% yes)[a]	79.5
Encouraged to increase physical activity (% yes)[a]	74.6
Encouraged to participate in (future) activities (% yes)	62.9
Encouraged to help organize/implement (future) activities (% yes)	11.7

[a]Percentage of those involved in activities relating to the specific behavior.

Table VI. *Familiarity of inhabitants with health projects and activities, and participation in activities, by municipality and neighborhood, and by gender, age and educational level* (n = *1990*)

Variable	Eijsden (%)	Maastricht (%)	Margraten (%)	Meerssen (%)	Valkenburg (%)	Neighborhoods	Gender (%)		Age (%)		Education (%)		
							Female	Male	⩽50	>50	Low	Medium	High
Familiar with project	22.9	21	20.9	23.4	31.7	27.5	27.6	20.3[a]	20.3	28.3[a]	25.2	23.7	24.3
Name of project	14.1	12.3	10.9	12.3	18.3	14	15.9	10.8[a]	10.4	16.8[a]	13.8	13.5	13.6
Goal of project	14.1	14	12.1	10.8	18.9	13.5	15.3	12.1[a]	12.2	15.5[a]	10.8	14.4	17.0[a]
Familiarity with activities													
nutrition	57.4	58	60.7	55.3	55.9	43.5	60	51.5[a]	59.6	52.6	44.6	60.2	64.2[a]
smoking	60.9	60.7	63	57.3	58	53	57.6	61.3	65.3	53.2[a]	47.7	63.7	67.5[a]
physical activity	56.4	54.3	59.7	55.5	57.1	46.5	58.9	51.9[a]	54	57.5[a]	48.2	58.8	60.6[a]
Participation in activities													
nutrition	8.5	7	8.8	7.5	8.9	3.5	9.3	5.8[a]	6.3	9.0[a]	8.5	7.2	7.8
smoking	2.4	2	2.8	1	3.3	2	2.1	2.4	2	2.3	3	1.9	1.9
physical activity	9.3	11	7.2	8	11.2	8	10.9	7.0[a]	5.8	12.3[a]	11.1	9	6.1

[a]Significant differences (logistic regression analysis).

number of activities had been implemented, for most of these no proof for their effectiveness is available nor was the present study aimed at testing individual activities. However, it is obvious that if individual intervention activities are of poor quality, i.e. if there are not enough activities that are tailored to and effective in changing the psychosocial determinants of the CVD risk behaviors, no effects can be expected. The majority of activities were only offered once and most of the activities were aimed at increasing knowledge and awareness. Activities more directly aimed at behavioral change by changing attitudes, creating a supportive (social) environment and improving self-efficacy were found to be less prevalent. Unfortunately, information from participants in intervention activities was only collected after the activity was underway, i.e. no pre-tests were used. This meant that it was impossible to assess changes in risk behavior or their determinants induced by specific intervention activities. Nevertheless, a large majority of the participants in activities relating to physical activity and nutrition reported that they felt encouraged to eat less fat or to increase their physical activity in the future. Some activities were selected and implemented on the basis of their proven effectiveness and reach in earlier studies (Ronda and Van Assema, 1997). Specific nutritional activities in particular have been tested, such as computer-tailored nutrition education, nutritional meetings and nutrition education tours in supermarkets (Van Assema *et al.*, 1997, 1998; Brug *et al.*, 1998). These activities aimed at changing relevant psychosocial determinants of a high fat intake, such as awareness of one's own fat intake and self-efficacy expectations towards reducing dietary fat intake. Ideally, all intervention activities should have been tested before in controlled studies. However, not many such activities are available and restricting the intervention choices to just these few tested interventions would have limited community participation in the choice of activities. Nevertheless, expert training for the members of the Health Committees might have improved the quality of the intervention activities, i.e. more activities aimed at changing attitudes,

improving self-efficacy and creating a supportive (social) environment, as well as more activities aimed at certain target groups, such as men and the working population.

The present study also revealed that although familiarity with activities relating to the three CVD risk behaviors was quite high, the actual participation of the general population in activities did not exceed 15%. More highly educated people were found to be more familiar with activities than those less highly educated. Although actual participation in activities was lower in the neighborhoods than in the municipalities, the participation did not differ with educational level. Moreover, 50% of those who participated in group activities indicated that they had a low level of education. Therefore, the project has succeeded in reaching less educated inhabitants and no differences in effect at individual level were found for various levels of education (Ronda *et al*., 2004a).

In summary, although there are indications that several intervention components were effective, the total package of intervention activities may not have been of sufficient quality (in terms of effectiveness in changing all relevant psychosocial determinants of the CVD risk behaviors), quantity (especially in terms of the number of smoking cessation activities) and intensity (in terms of reach and participation), to result in substantial changes in the population studied after the 2.5-year intervention period.

It seems reasonable to assume that the modest effects of the Hartslag Limburg community intervention on fat intake, fat intake awareness and intentions to increase physical activity (Ronda *et al*., 2004a), as well as the absence of effects on smoking behavior and its determinants (Ronda *et al*., 2004b) may, at least partially, be explained by the above pattern of findings. However, the present process study also revealed that participation by the community and intersectoral collaboration between local organizations in the Maastricht region was still growing at the time of data collection, so longer-term measures of individual behaviors may show greater changes.

Secular trends are frequently mentioned as an explanation for modest or absent intervention effects in community-based heart health programs [e.g. (Carleton *et al*., 1995; Brownson *et al*., 1996; Winkleby *et al*., 1997)]. In other words, it might be difficult to generate enough additional exposure in experimental communities to exceed secular trends in control communities. Additional questions in the post-test of the individual level effect study of the Hartslag Limburg community intervention revealed that although familiarity with a health project in the Maastricht region exceeded that in the control region, these data also suggested a substantial perceived exposure to health promotion interventions in the control region (Ronda *et al*., 2004a). Further, these data also revealed that although familiarity with activities on nutrition, physical activity and smoking cessation was higher in the Maastricht region, reported participation in activities on physical activity and smoking cessation was higher in the control region. Unfortunately, baseline values on familiarity and participation were not measured.

Smoking cessation received the least attention, even though it might be argued that smoking cessation should be given first priority for health risk reduction in terms of relative risk (Schram *et al*., 2001). This result illustrates the dilemmas of community-based interventions. What is most important in terms of relative risk (smoking) may not be what the community organizers are interested in (most activities focused on nutrition), which in turn may be not what the general public are interested in (participation in physical activity activities was highest). On the other hand, one might also argue that the prevalence of a high fat intake (65%) and an inadequate physical activity level (58%) was much higher than that of smoking (28%) (Ronda *et al*., 2003), justifying the behavioral targets of the implemented activities. In Hartslag Limburg, there was limited community involvement in the choice of target behaviors. Nevertheless, recent Dutch research revealed that the population itself regarded dietary behavior and physical activity as the most important determinants of health (Commers and De Leeuw, 2001).

It is important to note some limitations of the present study. First, it proved very complicated and time-consuming to organize a thorough and

comprehensive process evaluation to gain in-depth information about the intervention from those who were involved in the planning and implementation of the intervention. Our aim was continuous data collection, and a data collection scheme was designed in which the interviews and questionnaires all had a particular time and place allocated to them. However, community interventions tend to not follow strict planning schemes and therefore the process evaluation scheme also had to be adapted to planning changes. Thus, data collection was sometimes less organized than we had intended. Nevertheless, we did manage to register all activities and several characteristics of these activities. Furthermore, since we tried to measure multiple project components and community principles at the same time, these could not be measured very extensively. Further, the results are mainly based on self-reports and self-reports are often biased. However, the concept of research 'triangulation' is a promising approach to improve confidence in research findings and evidence can best be built from data that are derived from several different sources and from different methods that can be combined and compared (Nutbeam, 1998). In line with these recommendations, we tried to optimize the reliability of the results, by using multiple data sources and/or methods to measure the same variables.

In conclusion, this process study has opened, at least partially, the 'black box' behind a planned, multi-component community intervention project, which may be beneficial to the future of the Hartslag Limburg project, as well as other health promotion community interventions.

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