Working with community
Exploring community empowerment to support non-communicable disease prevention in a middle-income country

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Umeå 2013
I dedicate this thesis to the memory of my mother.
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Abstract

Background: Non communicable diseases (NCD) are recognized as a major burden of human health globally, especially in low and middle-income countries including Indonesia. This thesis addresses a community intervention program utilizing a community empowerment approach to study whether this is a reasonable strategy to control NCD.

Objective: To explore possible opportunities, common pitfalls, and barriers in the process of developing a pilot community intervention program to prevent NCD in an urban area of a middle-income country.

Methods: The study was conducted in Yogyakarta Municipality. The baseline risk factor survey in 2004 (n=3205) describes the pattern of NCD risk factors (smoking, physical inactivity and low fruit and vegetable intake) and demographic characteristics using STEPwise instrument. A qualitative study was conducted in order to illustrate peoples’ perceptions about NCD risk factors and how NCD might be prevented. A pilot intervention was developed based on the baseline survey and the qualitative data. The pilot intervention was conducted in four intervention communities while one community served as the referent area. The intervention was evaluated using quantitative and qualitative approaches. Finally, a second cross-sectional survey was conducted in 2009 (n=2467) to measure NCD risk factor changes during the five year period.

Results: Baseline qualitative data showed that people in the high SES (Socio Economic Status) group preferred individual activities, whereas people in the low SES group preferred collective activities. Baseline survey data showed that the prevalence of all NCD risk factors were high. The community intervention was designed to promote passive smoking protection, promote healthy diet and physical activity, improve people’s knowledge of NCD, and provide a supporting environment. A mutual understanding between the Proriva team and community leadership was bargained. Several interactive group discussions were performed to increase NCD awareness. A working team was assigned to set goals and develop programs, and the programs were delivered to the community. There were more frequent activities and higher participation rates in the low SES group than in high SES group. The repeated cross-sectional surveys showed that the percentage of men predicted to be at high risk of getting an NCD event had significantly increased in 2009 compared to 2004.
Conclusion: The community empowerment model was a feasible choice as a “moderate” strategy to accommodate with people’s need when implementing a community intervention that also interacts with the existing health system. A community empowerment approach may improve program acceptance among the people.

Keywords: NCD, cardiovascular disease, community intervention, prevention, community empowerment, middle-income countries
Original Papers

This thesis is based on the following papers, which will be referred to by corresponding Roman numerals:


* The articles have been published in an open-access journal.
## Abbreviations and Acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>CVD</td>
<td>Cardiovascular Diseases</td>
</tr>
<tr>
<td>Dasa Wisma</td>
<td>Ten Households Organization</td>
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<tr>
<td>DHO</td>
<td>District Health Office</td>
</tr>
<tr>
<td>HIC</td>
<td>High-income country</td>
</tr>
<tr>
<td>Kelurahan</td>
<td>An administrative area in a municipality which is equal to a village in a district</td>
</tr>
<tr>
<td>LMIC</td>
<td>Low and Middle-Income Country</td>
</tr>
<tr>
<td>MIC</td>
<td>Middle Income Country Municipality Health Office</td>
</tr>
<tr>
<td>MHO</td>
<td>Middle-income country</td>
</tr>
<tr>
<td>MIC</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>MOH</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>NCD</td>
<td>Non-communicable diseases</td>
</tr>
<tr>
<td>PHC</td>
<td>Primary Health Center</td>
</tr>
<tr>
<td>PHO</td>
<td>Provincial Health Office</td>
</tr>
<tr>
<td>PKK</td>
<td>Family Welfare Development Organization, a semi formal organization at village level to educate women in various aspect of family welfare (home economics)</td>
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<tr>
<td>Polindes</td>
<td>Village Maternity House</td>
</tr>
<tr>
<td>Poskesdes</td>
<td>Village Health Post</td>
</tr>
<tr>
<td>Posyandu</td>
<td>Integrated Service Post</td>
</tr>
<tr>
<td>Proriva</td>
<td>Program to Reduce Cardiovascular Disease Risk Factors in Yogyakarta</td>
</tr>
<tr>
<td>Pustu</td>
<td>Auxiliary Primary Health Center</td>
</tr>
<tr>
<td>RW</td>
<td>Resident’s association, a non administrative area below a village or a kelurahan</td>
</tr>
<tr>
<td>SES</td>
<td>Socio-Economic Status</td>
</tr>
<tr>
<td>UKBM</td>
<td>Community Based Health Service</td>
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<td>WHO</td>
<td>World Health Organization</td>
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**Pendahuluan**

Penyakit tidak menular (PTM) adalah penyakit yang membebani kesehatan masyarakat secara global, terutama di negara LMIC (Low and Middle Income Country) sebagaimana di Indonesia. Faktor-faktor risiko PTM terkait dengan perilaku tidak sehat, sehingga pencegahan PTM memerlukan perubahan perilaku. Agar dapat memberikan dampak perubahan, tindakan pencegahan PTM mengharuskan tingkat partisipasi yang tinggi dari masyarakat sasaran. Beberapa intervensi komunitas yang dilakukan berdasarkan pemberdayaan masyarakat di beberapa negara LMIC menunjukkan hasil yang menjanjikan dari segi sustainabilitas. Di Indonesia, beberapa instansi telah berpengalaman dalam melaksanakan pemberdayaan masyarakat sebagaimana dalam program imunisasi, revitalisasi posyandu, dan pengendalian diarea. Tetapi pemberdayaan masyarakat tersebut terbatas pada pengendalian penyakit menular. Tesis ini berusaha meneliti suatu program intervensi masyarakat yang memanfaatkan pendekatan pemberdayaan masyarakat untuk mempelajari apakah strategi tersebut dapat dilakukan untuk mencegah PTM di Indonesia, khususnya di Kota Yogyakarta. Tujuan umum tesis ini adalah untuk menjajaki berbagai peluang, kesalahan, dan hambatan dalam proses mengembangkan program intervensi masyarakat untuk mencegah PTM di suatu daerah perkotaan di suatu Negara Middle Income Country (MIC).

**Materi dan Metode**


tiga wawancara pada responden yang berasal dari kelompok SES (Social Economic Status) tinggi, SES rendah, dan dari pemerintah kota. Untuk mengetahui kebijakan nasional dalam pengendalian PTM, sembilan dokumen kebijakan nasional tentang PTM ditambahkan dalam tesis ini.

2) Mendesain intervensi pilot: Suatu intervensi skala kecil dirancang berdasarkan hasil survey awal dan data kualitatif. Survey awal menggambarkan faktor risiko-faktor risiko PTM, sedangkan data kualitatif memandu proses penyampaian intervensi kepada masyarakat.


Hasil

2) Mendesain intervensi pilot: Berdasarkan hasil survey dan data kualitatif tahap awal, suatu intervensi pilot didesain untuk menginisiasi perubahan perilaku. Intervensi pilot ini meliputi perlindungan perokok pasif, promosi diet yang sehat dan aktifitas fisik yang cukup, peningkatkan pengetahuan masyarakat tentang PTM, dan menyediakan lingkungan yang mendukung perubahan perilaku lebih sehat. Intervensi komunitas diorganisir dalam lima fase: 1) membangun kepercayaan, 2) meningkatkan kesadaran, 3) mengembangkan program, 4) mengorganisir masyarakat, dan 5) inisiasi pemeliharaan program.


4) Evaluasi intervensi pilot: Intervensi masyarakat menghasilkan peningkatan pengetahuan secara bermakna di antara laki-laki di kelompok intervensi (56% memiliki pengetahuan PTM yang baik saat pre test menjadi 70% saat post test), sementara sikap dan factor risiko yang lain tidak mengalami perubahan bermakna setelah intervensi. Frekuensi kegiatan intervensi lebih tinggi di masyarakat kelompok SES rendah (40 kegiatan) dibandingkan dengan kelompok SES tinggi (13 kegiatan). Angka partisipasi lebih tinggi pada masyarakat di kelompok SES rendah daripada di kelompok SES tinggi. Pada masyarakat kelompok SES rendah, responden menyatakan terkesan dengan program dan menginginkan kelanjutan program. Kader kesehatan menganggap program sebagai bentuk penyegaran dari aktifitas rutin mereka. Responden dan kader kesehatan dari kelompok SES tinggi menganggap bahwa program bermanfaat.

Pembahasan


Beberapa hambatan perlu diantisipasi dalam intervensi berdasarkan pemberdayaan masyarakat: keseimbangan antara standarisasi dan akomodasi, pemanfaatan kebutuhan sumber daya dan penjagaan tujuan bersama.

Kesimpulan dan Saran

Disimpulkan bahwa pendekatan pemberdayaan masyarakat dapat meningkatkan penerimaan program oleh masyarakat.
A. Introduction

The terms “non-communicable diseases (NCD)” and “chronic diseases” are used interchangeably by WHO [1], and defined as “diseases of long duration and generally slow progression” [2]. The term chronic disease is usually preferred because some of the causes of the NCDs are communicable. Both cervical and hepatic cancer, are examples of chronic diseases caused by viral infection. Furthermore, cardiovascular diseases are to a large extent caused by behavioral risk factors that can be considered as transferrable [3]. Consumers’ preference for junk food is an example of the transferability of new behavior and serves as an illustration of the impact of the global market [4]. The UN High level meeting in September 2011 [5], referred to NCD as diseases with long duration, slow progression, and shared common risk factors.

NCD includes many diseases, each with its own pathologies because of this, it is necessary to focus on certain priority diseases when implementing NCD actions [6] [7]. This thesis will address heart disease, stroke, cancer, chronic respiratory disease, and diabetes as these diseases share many risk factors and also represent the majority of NCD cases [8]. In the first, second and third papers included in this thesis the term cardiovascular diseases (CVD) was used to make it easier for the community to recognize the program. In the fourth paper the term CVD was used to calculate the risk prediction of getting that diseases. In those papers (I to IV) the term CVD was used to refer to NCD in this thesis. By using the broader term “NCD” in this writing we intend to emphasize that benefits from intervening on behavioral risk factors for CVD can also extend to other diseases within the NCD group.

1. The non-communicable disease problem worldwide

Recently, global statistics have shown that NCDs are the leading cause of death (63% of total mortality) [9]. In all WHO regions, except Africa, more than 50% of all deaths are caused by NCDs, Figure 1 [1]. Previously, NCDs were considered to be health problems of high-income countries (HIC). However, in these countries deaths due to NCDs have actually declined within the last two decades [10]. In low and middle-income countries (LMIC), there is evidence that about 80% of deaths are caused by NCDs [9].
As is the case globally, in the South-East Asia Region (SEARO), NCDs cause more than 50% of all deaths in most countries. Furthermore, the percentage of premature deaths caused by NCDs in SEARO is higher than in the rest of the world, Figure 2. Within the SEARO region, Indonesia has the 5th highest percentage of deaths caused by NCDs, Figure 3. In Indonesia, NCDs were responsible for 61% [12], and 63%[13] of all deaths in 2002 and 2008 respectively.
Figure 2. Estimated percentage of premature deaths (<60 years of age) by cause, South-East Asia Region (SEARO) vs. the Non-SEARO

Source: Global Health Observatory World Health Organization 2011

Figure 3. Estimated percentage of deaths by cause in member countries of the South-East Asia Region, 2008

Many investigators have classified the causes of NCDs into biological risk factors, behavioral risk factors, and environmental risk factors as proposed by Dans et al., Figure 4 [7] and modified from WHO [14]. It is predicted that modification of behavioral risk factors could potentially reduce 80% of heart disease, stroke, and diabetes cases and 40% of cancer cases [14]. Because the progression of an NCD is typically slow, it is possible that modification of behavioral factors can substantially impact disease progression [7].

However, modification of individual risk factors alone is insufficient to control NCDs, as environmental risk factors strongly influence both behavioural risk factors and also the NCDs themselves. This fact suggests that NCD risk factors are partly beyond individual control. Several studies have shown that supportive environments serve as important determinants of physical activity and healthy diet practice [15, 16].

The last decade has seen significant increases in the realization of the role of social determinants as major causes of health inequalities, with social determinants being regarded as “the causes of the causes of health problems”. This fact comes from a raising awareness of health inequity both within and between countries. There is an obvious social gradient in the severity of health problems. Inequities in health result from social, economic and political environments which are the product of national policies. If a policy ignores an equity perspective of the people’s basic needs, the policy will accommodate the need of the more powerful groups, leaving the less group of people behind. The poorer the people are, the greater the risk of not benefitting from policy changes [17].

The social gradients in NCDs have been declining in most HICs, but rising in LMICs. Furthermore, among lower SES groups, the case fatality rate has become higher, which could be related to lower accessibility to quality health care. In addition, the burden of NCD is higher among urban versus rural populations [18].
To overcome this social injustice, WHO established a Commission on Social Determinants of Health (CSDH) in 2005 which called for “closing the gap in a generation” by putting health equity as the main objective of every program, intervention and policy [19]. Thus, when implementing a program to reduce NCDs, the social injustice gap should be addressed by targeting the disadvantaged groups [18].

2. The need for action

NCDs have already become the leading cause of death in all WHO regions except Africa [1], and it is projected that in 2015 NCDs will be the leading cause of death in all countries. NCDs were responsible for 58 million deaths in 2005 and are projected to be responsible for 64 million in 2015 [20].

NCDs are also a barrier to developmental goals. Poor people are disproportionately affected, and are systematically plunged into debt once they suffer from an NCD. The prevalence of smoking and insufficient fruit and vegetable consumption are higher for poorer people [7], which both contribute to a higher prevalence of NCD. In addition, the health finance systems in LMIC are dominated by a high out-of-pocket payments [21], which limits the accessibility of health care for the poor. The higher probability of these people contracting NCDs, combined with high out-of-pocket payments for health care, NCD pose a serious threat to the poor, leading to further impoverishment.

Effective interventions are available to deal with the NCD epidemic. Behavioral modification, including smoking cessation, reduced salt, sugar, fat and alcohol intake, increased physical activity and generic multi-drug treatment for high risk individuals are proven to be effective [22]. In addition, WHO called for global action against NCD through development of an international treaty to control tobacco (Framework Convention on Tobacco Control)[23], development of the Global Strategy for Diet, Physical Activity and Health [24], and the Global Strategy for The Prevention and Control of Non-communicable Diseases [25]. Although many activities have been performed to control NCD, the epidemic of NCD keeps occurring. The lack of political commitment which is considered to be the main problem in controlling NCD [26].

The NCD problem is related to risk factors that are both individually and environmentally driven. For example, the lack of space for physical activity, exposure to advertisements of unhealthy diet and tobacco use, lack of screening and prompt treatment will lead to unhealthy choices resulting in higher NCD cases. Thus, the capacity to control NCD lies not only at the health office but also at the private sector, education sector, and industry [6]. Thus, a multi-sector collaboration is
essential to change the unhealthy behaviour in order to prevent and control NCD. Consequently, a strong political back-up is a prerequisite to ensure the NCD control works effectively.

To deal with the political challenge, a global commitment to combat chronic non-communicable diseases from Heads of States was agreed upon at the UNHLM (UN High level meeting) held in September 2011. This meeting sanctioned the primacy of WHO to control NCD. At the 65th World Health Assembly held on the 24th of May 2012, a global target of a 25% reduction in premature death due to NCD by the year 2025 [27] was established. Some priority actions were proposed to address the NCD crisis including 1) leadership, 2) preventative action, 3) treatment action, 4) international cooperation, commitment and funding, and 5) monitoring and accountability [22].

The global NCD strategy incorporates good leadership with a commitment to emphasize the importance of NCD action and to manage the intervention well. A multi-level approach, combining population-wide and individual strategies, focuses on four diseases which share similar risk factors. The multi-level approach includes increasing commitments from global [4], regional and national policy levels, preparing an appropriate health system, and enhancing multi-sectoral involvement [1, 7, 28].

A combination of both population-wide and individual strategy has been proven essential to control NCD effectively [10, 29]. A population-wide strategy aims at primary prevention and seeks to effect a small reduction in risk factors across an entire population. This strategy results in a large reduction in CVD events [30]. The individual strategy targets individual secondary and tertiary prevention, which decrease the number of both fatal and non-fatal NCD cases primarily among high-risk individuals.

In South-East Asian countries NCD become a critical public health threat. It was estimated that the burden of NCD increased 10% within 11 years (1990 to 2001) in LMIC [1]. A review study of NCD risk factors (high blood pressure and LDL), indicated a higher risk of getting acute myocard infarct (AMI) in SEA population than in the world’s population [7]. The increased NCD burden is further compounded by the limitations of the health systems in SEA countries to effectively deal with NCD treatment and prevention. The health care system is perceived to be “highly divergent” with low health insurance coverage and a lack of preparedness for disaster, disease outbreak and NCD prevention [21]. In addition, the presence of both over and under-nutrition [31] in the region reveals the slow response to public health problems [7], which implies some degree of political neglect [32]. Furthermore, globalization has led to the adoption of some unhealthy
habits, and indirectly increased poverty among disadvantaged people [4]. As poverty is also related to increased risk for NCD [14], NCD will be a heavy burden on the poor. Those facts underline the importance of controlling NCD in SEA countries.

3. Theoretical framework of community intervention

Research on community intervention to control NCD in LMIC was performed in Mauritius [33], China [34], Pakistan [35], Iran [36], India [37], and Indonesia [38], Table 1. Those community interventions resulted in some significant changes in risk factors. These studies also underline the importance of program sustainability in order to achieve positive impact on the disease outcome. Some lessons learned from those studies emphasized not only the NCD components but also on the delivery of the program and how it required support from a favourable environment.

With regard to content, an NCD control program typically consists of both primary and secondary prevention and includes a surveillance system to monitor the impact [34, 36-38]. Strategies used in the intervention activities included both top-down and bottom-up processes as these were acceptable to both for the community and the provider [37], and could be readily integrated into the existing health system [37, 38]. Primary activities were organized by a steering committee consisting of members from related sectors [36] and executed under intersector collaboration [36-38]. In addition, a supportive environment for the program was developed by encouraging public health policy [33, 38] and engaging in international collaboration [37, 38].
### Table 1. Examples of community intervention in LMIC

<table>
<thead>
<tr>
<th>No.</th>
<th>Name and location of community intervention</th>
<th>Year</th>
<th>Activities</th>
<th>Lessons learned</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>NCD control in Mauritius [33]</td>
<td>Started in 1987</td>
<td>Governmental change from palm cooking oil to soy bean cooking oil</td>
<td>Regulatory control can effectively lower the cholesterol level in the population</td>
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<td>2.</td>
<td>Tianjin Project, Tianjin, China [34]</td>
<td>Started in 1989</td>
<td>Health education in the reduction of salt intake, control of body weight and appropriate antihypertensive therapy; Providing a salt measuring spoon; Comprehensive hypertension management: follow-up, antihypertensive therapy, lifestyles modification</td>
<td>Promotion by Tianjin Public Health Bureau implied good leadership; Control of hypertension by primary and secondary prevention; Single project center involved in the INTERSALT study (International Epidemiological Study on the relation of electrolite excretion, lifestyle to blood pressure)</td>
</tr>
<tr>
<td>3.</td>
<td>The Metroville Health Study, Karachi, Pakistan [35]</td>
<td>Started in 1995</td>
<td>Establishment of a Department of Preventive Medicine at the National Institute of CVD; Staff training to collect data and deliver intervention</td>
<td>Frequent interpersonal interaction is effective where labour costs are lower and accessible media is limited; Performed with an international collaboration (University of North Carolina, USA; Wake Forest University School of Medicine, USA; National Heart, Lung, and Blood Institute, Bethesda, USA)</td>
</tr>
</tbody>
</table>

- Raising awareness through home visits (14 home visits for each household)
- Reduced consumption of total cooking fat, salt and ghee, and reduced smoking among men
<table>
<thead>
<tr>
<th>No.</th>
<th>Name and location of community intervention</th>
<th>Year</th>
<th>Activities</th>
<th>Lessons learned</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>Community intervention in Isfahan, Iran [36]</td>
<td>Started in 1999</td>
<td>Primary prevention at population level</td>
<td>A steering committee consisting of academics, health providers, and policy makers is useful to manage the program</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Treatment for high-risk individuals</td>
<td>Inter-sector collaboration (NGO, private sectors, health professionals) ensures comprehensive program delivery</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Treatment for NCD patients</td>
<td></td>
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<tr>
<td>5.</td>
<td>Chandigarh Healthy Heart Action Program (CHHAP), Chandigarh, India [37]</td>
<td>Started in 2004</td>
<td>Health promotion to increase community awareness of NCD risk factors</td>
<td>A strong inter-sector collaboration ensured a more comprehensive program delivery</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Training of health staff, teachers, and health workers in NCD risk assessment and management</td>
<td>Combining a top-down (for secondary and tertiary care) and a bottom-up (for primary prevention) process of intervention facilitates the acceptance of the program by both community and the provider</td>
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<td></td>
<td></td>
<td></td>
<td>Surveillance of NCD risk factors</td>
<td>International collaboration (guided by WHO)</td>
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<td></td>
<td></td>
<td></td>
<td>Advocacy</td>
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<tr>
<td>6.</td>
<td>Community intervention in Urban area of Ballabgarh, India and Depok, Indonesia [38]</td>
<td>2005-2007</td>
<td>Individual and community empowerment</td>
<td>Activities delivered through existing community-based organizations activities</td>
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<td></td>
<td></td>
<td></td>
<td>Reorienting health system</td>
<td>Inter-sector collaboration, advocacy to gain political commitment and leadership to ensure proper program delivery</td>
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<td></td>
<td></td>
<td></td>
<td>Healthy public policy</td>
<td>International collaboration (guided by WHO) provided technical consultancy</td>
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</tbody>
</table>
In HIC, the community interventions to control NCD have evolved over four generations: 1) the clinical generation (clinical treatment focusing on high-risk individuals), 2) the bio-epidemiological generation (multiple risk factors and large-scale interventions), 3) the socio-epidemiological generation (similar to the bio-epidemiological but on a small-scale), and 4) the policy and environmental generation (inter sectoral action and policy analysis approach) [39]. The experience from HIC in implementing community interventions has demonstrated the value of combining a population-wide strategy and an individual high-risk strategy, combining top-down and bottom-up strategies, and tailoring the program for both the early and the late-adopters within the community [40]. A report from Singapore showed that active community involvement produced a significant reduction in population risk factors within a short time of community intervention [41].

Based on the experience from the HIC in controlling NCD, it has been suggested that a community based intervention in an LMIC should start from 1) a good understanding of the community 2) development of comprehensive multiple activities involving relevant stakeholders, 3) actions to change the social and physical environment, and 4) underlined the need for determined political decisions [42]. Another group of researchers proposed a “stepwise action” to control NCD in LMICs that consisted of three main steps: core (short term action), expanded (medium term action), and desirable (evidence-based interventions) [43]. To this, the Institute of Medicine (IOM) added strong leadership and advocacy to raise NCD as a political priority [44].

4. The study location

This study was conducted in Yogyakarta Municipality, Yogyakarta Province, Indonesia, Figure 4. Indonesia is a tropical country and is the world’s largest archipelagic nation. It is located between the Asian and Australian continents and includes 17,504 islands situated around the five main islands of Java, Sumatera, Kalimantan, Sulawesi and Papua. Daerah Istimewa Yogyakarta Province lies in the middle part of Java Island, north of the Indian Ocean and south of Central Java Province. Yogyakarta Province is divided into four districts and one city, Yogyakarta Municipality.

In 2007, the infant mortality rate in Indonesia was estimated at 34/1000 live births. National life expectancy at birth in 2009 was 69.21 years and was longest in Yogyakarta Province (73.1 years at birth)[31].
In 2007, the infant mortality rate in Indonesia was estimated at 34/1000 live births. National life expectancy at birth in 2009 was 69.2 years and was longest in Yogyakarta Province (73.1 years at birth) [31].

Data from the national household health survey show that the prevalence of self-reported NCD in Indonesia increased by almost 20% within 12 years, whereas communicable disease prevalence has been decreasing, Figure 5 [45]. However, hospital data for the same period showed a different picture, with infectious diseases being the predominate source of both inpatient and outpatient visits. Hypertension, the highest ranking NCD in terms of patient volume, ranked 7th
among inpatient visits to hospitals [31]. Similarly, in Yogyakarta City, hypertension ranked as the 7th most frequent disease among outpatient visits [46]. These contradictions between population versus hospital data might indicate undiagnosed, unmedicated and poorly controlled hypertension as one NCD related factor. This also suggests that a better surveillance system may be necessary to fully quantify the extent of the NCD problem.

The prevalence of NCD risk factors at national levels was high. Behavioral risk factors were identified among more than 25% of the population. Only the prevalence of alcohol consumption was low. All behavioral risk factors, biological risk factors, and also prevalence of NCD were relatively high in Yogyakarta Province, Table 2 [47].

Table 2. The prevalence of risk factors and non-communicable diseases in Indonesia, in Yogyakarta Province, and in the provinces of the lowest and the highest prevalences in Indonesia 2007

<table>
<thead>
<tr>
<th>Health behavior/disease</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Indonesia</td>
</tr>
<tr>
<td>Smoking</td>
<td>29.2</td>
</tr>
<tr>
<td>Physical inactivity</td>
<td>48.2</td>
</tr>
<tr>
<td>Low fruit and vegetable intake</td>
<td>93.6</td>
</tr>
<tr>
<td>Alcohol drinking</td>
<td>4.6</td>
</tr>
<tr>
<td>Hypertension</td>
<td>31.7</td>
</tr>
<tr>
<td>Heart diseases</td>
<td>7.2</td>
</tr>
<tr>
<td>Stroke</td>
<td>0.83</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.1</td>
</tr>
<tr>
<td>Tumor</td>
<td>0.43</td>
</tr>
</tbody>
</table>

Data source: Riskesdas 2007 [48]

4.1. The Government of Indonesia’s bureaucracy

The former Indonesian public administration system under The New Order Regime was a centralized national government. In The Reformation Era, under The Local Autonomy Policy of 2001, the authorities have delegated most administrative sectors including the health sector to the local governments [49].

Indonesia is stratified into the following regional levels: province, district or municipality (for rural or urban area), kecamatan (sub-district), and village or kelurahan (for rural or urban areas) [50] Table 3.
In a municipality, each kelurahan is stratified further into two non-administrative components, i.e. RW (residents’ association) and RT (neighbourhood association). The heads of RWs are elected by the residents’ representatives, and the head of RTs are elected by the members of a neighbourhood. The RW is the coordinator for community participation, while the RT assists the local government in providing public service, maintaining neighbourhood harmony, and exploring possible activities for community development based on the neighbourhood members’ needs and aspirations [51].

Table 3. Regional stratification of Indonesia

<table>
<thead>
<tr>
<th>Regional level</th>
<th>Urban area (name of the head)</th>
<th>Rural area (title of the head)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level-I region</td>
<td>Province (governor)</td>
<td></td>
</tr>
<tr>
<td>Level-II region</td>
<td>Municipality (mayor)</td>
<td>District (head of district)</td>
</tr>
<tr>
<td>Sub-district</td>
<td>Kecamatan (camat)</td>
<td>Kecamatan (camat)</td>
</tr>
<tr>
<td>Village</td>
<td>Kelurahan (lurah)</td>
<td>Desa (kepala desa)</td>
</tr>
<tr>
<td>Residents’ association (non-administrative)</td>
<td>RW (ketua RW)</td>
<td>RW (ketua RW)</td>
</tr>
<tr>
<td>Neighbourhood association (non-administrative)</td>
<td>RT (ketua RT)</td>
<td>RT (ketua RT)</td>
</tr>
</tbody>
</table>

At the district/municipality level, the working units consist of nine elements: 1) The Regional Secretariat who assists the head of the district/municipality in developing policy and coordinating regional offices and regional technical institutions, 2) The Secretariat of the Regional House of Representatives, 3) The Inspectorate, as the controller of government accomplishment, 4) The Regional Development Planning Agency, 5) Regional Offices, 6) Regional Technical Institutions, 7) A Regional Hospital, 8) Sub-districts, and 9) Villages, the lowest level of administrative area [52]. The number and title of regional offices varies between districts/municipality to accommodate local demands.

The organization of the Government bureaucracy has been criticized as both being too large and therefore inefficient in serving the public, and being incapable of controlling performance, preventing corruption, and avoiding overlapping duties [53].

4.2. The Health System

The health system in Indonesia is coordinated by the Ministry of Health, which controls 33 Provincial Health Offices. The Provincial Health Offices (PHOs) provide guidance, monitoring and supervision for the District Health Offices (DHO) and the municipality health offices. The District/Municipality Health Offices (MHO) are responsible for the health of the population in their area.
through the Primary Health Center (PHC). In each PHC there are Pustu (Auxiliary health center), Polindes (village delivery clinics) and Posyandu (integrated service posts) [31]. More than 90% of the Indonesian population access health care through the primary health care service. Hospitals are the health service for curative, rehabilitative, and referral service. Almost half of hospitals in Indonesia are privately owned [45].

Under the Law of Decentralization and Regional Autonomy, the decentralization effort focuses on the district or municipality levels. These levels have the power to manage most sectors, and only a limited number of sectors are still maintained at the central level. Each health sector is also decentralized into the district/municipality level [49]. The health policy at the central level is focused on six programs: 1) Environmental health, health behavior, and community empowerment 2) Health care 3) Community health nutrition, 4) Health resources development, 5) Food, drug and hazardous materials, and 6) Policy and management of development [54].

The organizational structure of the health office in each province, district/municipality may vary, in line with the decentralization Law, depending on the demands of the region. For example, in The Yogyakarta MHO, health promotion is a section under The Division of Promotion, Development and Health Information System, Figure 6 [55]. In an adjacent DHO, health promotion is a Section under The Health Community Empowerment Division, while in other districts, health promotion is a Division of its own [56].
This huge hierarchical organization within a regional government [53] has been criticized as a barrier to cooperation, especially in the coordination, integration and synchronization between offices/sectors within the municipal government and between sections in the health office. This barrier results in limited understanding and limited support from other sections of a program [57]. A study on the cross-sectoral coordination for a working team in a district health office to control nutrition problems showed that the cross sectoral coordination was still weak due to unclear leadership and sectoral ego. Further, the organizational structure in the working team did not take into account the ranking of the officers from different departments and the fact that a command cannot be given to other officers of higher rank. Each sector works according to its own technical guidance and guidelines laid down by the sector to accomplish its own job[58].
4.3. Typical community

Based on a census in 2010, Indonesia has a population of 237 million with a population density of 124/km². Most of the population (58%) lives on Java Island, which comprises only 7% of the country’s land area [31]. According to The World Bank, Indonesia is classified as a Middle Income Country (MIC) [59]. In 2010, 13.3% of the population were living below the poverty line with about half of these residing in Java [60]. Most of the men (98%) and half of the women were employed. Of this labor force, 39% were agricultural workers and 33% were engaged in trading or service businesses [61]. The unemployment rate was 7.4% [31]. The age dependency ratio was 48.3% of the working-age population. 38% of total expenditure on health was out of pocket [60].

In 2007, Yogyakarta Province had a population of 3.43 million. About one third had graduated from elementary school [62]. The unemployment rate was 5.7% with the majority of people working in agriculture, forestry, hunting and fishery [63].

In Yogyakarta Municipality had 0.46 million inhabitants with a density of 14,029/km². The secondary school graduation rate is 28.57%, with an overall literacy rate of 65% [46]. The proportion of households living below the poverty line was 19% [64]. The overall unemployment rate was 7.4%, with most of the population employed in the trades (45%) [63].

There are some well known organizations in the community including Posyandu, Polindes, village health post (Poskesdes), PKK, and religious organizations. Posyandu, Polindes, and Poskesdes were initiated by the Ministry of Health and were intended to represent a community based health service (UKBM in local language abbreviation) that would encourage community participation. Almost half of households in Indonesia (43%) have accessed at least one of the UKBM [65].

The Posyandu UKBM is responsible for family planning, maternal and child health, nutrition, immunization and diarrhea control. It covers 90% of all villages in Indonesia. In Yogyakarta there are 624 active Posyandus, 28% of which are classified as very active [46]. The Posyandu was initiated during the New Order Era in 1979 after the adoption of the Primary Health Care strategy which promoted community participation as the key to improved community health. Health workers were appointed and trained to be the central actors of Posyandu. However, during the implementation, they were inappropriately placed as assistants to the health and family planning officers, rendering them unable to actively contribute [66].
The village maternity post is another UKBM that is responsible for maternal and child health. The post is staffed by a midwife who is paid by the government and assigned to stay at a home provided by the administration and the community. As of 2007, there were 33,082 Village maternity posts in Indonesia, covering 42% of all the villages in the country [67].

PKK is a semi-formal village-level organization that educates women in various aspects of family welfare (home economics). The members of PKK are typically the wives of the sub-district and village government officers, and the leader is the wife of the head of government officer [66]. Under RT PKK, there is a housewives organization called “ten-households organization” (dasa wisma), which consists of ten households on average [68]. The main activities are social gatherings, occurring at fixed intervals, where members contribute to, and take turns at winning, an aggregate sum of money. Members may also distribute announcements from a higher level PKK at these meetings, or initiate discussions to solve local problems.

Village health posts were developed to enhance the community’s access to primary health care. The main activities of village health posts include early warning surveillance, emergency health care, disaster awareness and maternal and child services.

In addition to these government initiated community organizations, there are many NGO’s focusing on health topics or health related issues in Yogyakarta. Among these are Griya Lentera, an NGO which is concerned with HIV/AIDS; PKBI which addresses reproductive health; Rifka Annisa (also called Women Crisis Center) an NGO that protects women and children; Yayasan Dian Desa, which applies technology in agriculture, irrigation and sanitation; and LSM Lingkungan, which is an Environmental NGO.

The concept of leadership in the Javanese culture is quite different. According to Javanese philosophy, a respectful leader should demonstrate discipline, insight, endurance and steadfastness. These qualities are believed to come from spiritual inspiration to control passions, desires and egotistic motives. On the other hand, a sense of duty is expected to be embedded in the soul of a Javanese. The sense of duty extends not only from an inferior to a superior, but also by the obligation to take care of one’s child. Being in the care of someone means that the recipient owes a debt of gratitude to that person. Similarly, being in the care of a leader imposes the obligation to respect and obey the leader [69].
4.4. What has been done until now with regard to NCD prevention in Indonesia and Yogyakarta

The NCD control activities in Indonesia are reflected in the existing health strategy, the surveillance, and the health insurance system. Indonesia was reported as having an integrated action plan for NCD control, an actively implemented program for unhealthy diet and tobacco control, but not for physical inactivity [7]. The cause-specific NCD mortality rate and the risk factors for NCD are collected by the national health reporting system of NCD related data. Currently, health insurance only covered 20%-50% of the population[7].

Although Indonesia participated actively during the preparation of the FCTC (Framework Convention on Tobacco Control), Indonesia has neither signed nor ratified it [70]. However, tobacco control activities do exist, supported by a strong civil society movement. The Government of Indonesia has also implemented some legislation on tobacco control at national and regional levels. However, it has been pointed out that controlling tobacco in Indonesia should encounter not only the tobacco industry, but also some departments within the Government of Indonesia itself [71]. Tobacco studies have been done in Yogyakarta Municipality among Diabetes patients [72], among TB patients [73, 74], among physicians[74], and regarding how cigarettes are advertised in Indonesia [75].

Health officers in Yogyakarta municipality have claimed (personal communication) that NCDs are now receiving more attention because they represent a heavier disease burden than communicable diseases. Many programs have been launched to control NCD, such as surveillance, screening for 40-year-old citizens, developing a secondary prevention system for Diabetes, controlling tobacco consumption, encouraging physical activity, and eating a healthy diet. Surveillance and screening have been conducted to measure NCD risk factors.

From community action to control smoking, a smoke-free-area in RWs was introduced. This program has been successful in 4 RWs. In addition another 10 are in the process of implementing the program. A smoking-cessation clinic has been established in some PHCs.

Physical activity is encouraged in collaboration with The Office of Art, Nationality, Youth and Sports by the initiation of FORMI (Forum of Exercise, Recreation for Indonesian Community). These encourage exercise for elderly groups, bike-to-work groups, and exercises in some sub-districts.

Healthy diet has been promoted during Posyandu activities in collaboration with The Office of Industry, Trade, Cooperatives and Agriculture.
5. **The Proriva Study**

The Proriva study is a program launched by the PHO of The Special Region of Yogyakarta in response to an increasing NCD problem. Although there is a lack of population-based data to demonstrate the burden of NCD, the fact that the region has the longest life expectancy in Indonesia suggests a probable high burden of NCD in the region.

Using Proriva, the PHO aims to quantify the NCD risk factor burden, to investigate the people’s perception and knowledge of NCD risk factors, to explore possible strategies to prevent NCD, and to develop an NCD prevention program. The PHO has allocated some financial resources to develop an evidence based community intervention model (Proriva) to facilitate long-term implementation.

Because Proriva is a sub-contracted program, the provider of the Proriva services has to be a non-governmental vendor, Proriva could not join forces with primary care [76]. Therefore, the GPU (Global Prima Utama Corporate) was chosen as the provider for Proriva under the procurement process. The writer of this thesis was chosen as a part-time consultant in the GPU for Proriva activities. This facilitated further intervention, data collection, analyses.

The adoption of the model developed by Proriva into PHO system demand involvement of the PHO in the Proriva activities, however involvement of government institution is formally not allowed in a sub-contracted program. To overcome this bureaucratic impediments a join-force was arranged between GPU and HPCB (The Health Promotion Coordination Board), or **BKPK** in the national language, to execute Proriva. The HPCB was set up by the PHO to coordinate the health promotion activities that were funded by the government in the region. The HPCB was intended to strengthen the health promotion capacity of Health Offices pursuant to the policy of decentralization, under a project funded by The World Bank called the Provincial Health Project (PHP). Although the HPCB was an independent body, the HPCB activities were transferred to the Health Office of Yogyakarta Special Region, when the PHP ended.
AIMS

B. Aims

The aim of this thesis is to explore the process of developing a community intervention program for the prevention of NCD in an urban area in a middle-income country. This will identify possible opportunities, common pitfalls, and barriers in community actions to control NCD.

Specific aims are to:

1. Examine how people think about NCD risk factors and about how to prevent NCD (Paper I)
2. Assess NCD risk factor patterns in an urban Indonesian population and illustrate the use of data to facilitate the development of a pilot community intervention (Papers II & IV)
3. Appraise the process of working with the community in order to raise awareness of possible strategies to prevent NCD (Paper III)
C. Materials and methods

Started in the year 2004, the Proriva project consists of six stages, 1) a baseline risk factor survey, 2) design of a pilot intervention, 3) implementation of the pilot intervention, 4) evaluation of the pilot intervention, 5) design and implementation of the broader intervention and 6) evaluation of the broader intervention, Figure 8.

Figure 8. PRORIVA study framework
This thesis reports on the first four stages of the research in communities and includes a five-year repeated cross-sectional survey that was performed to describe the burden of CVD over time.

1. General design

The thesis combines quantitative and qualitative methods in order to provide a more complete picture of the problems under study. Table 4 gives an overview of its four papers in relation to problem areas, research questions, study population, study design and analytical methods.

Table 4. Overview of the thesis’ papers with regard to problem areas, research questions, study population, study design and analytical methods.

<table>
<thead>
<tr>
<th>Problem areas</th>
<th>Research topics</th>
<th>Study population</th>
<th>Study design</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>People’s perception of NCD (Paper I)</td>
<td>People’s perception of:</td>
<td>Yogyakarta municipality:</td>
<td>Focus Group Discussions and individual interviews</td>
<td>Content analysis</td>
</tr>
<tr>
<td></td>
<td>- Health</td>
<td>- 45 lay people</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- NCD sickness</td>
<td>- 12 leaders</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Prevention of NCD</td>
<td>- 11 officers</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 10 Heads of Primary Health Care</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk factors pattern in the population (Paper II &amp; IV)</td>
<td>Descriptive analysis of NCD risk factors in 2004 and 2009</td>
<td>Citizens of Yogyakarta Municipality aged 15-75 years; 2004 (n=3205) 2009 (n=2467)</td>
<td>Two cross-sectional studies</td>
<td>Descriptive analysis</td>
</tr>
<tr>
<td>Working with the community (Paper III)</td>
<td>Experiences from pilot intervention</td>
<td>995 respondents</td>
<td>Quasi-experimental</td>
<td>Difference of prevalence analysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 112 free listing informants</td>
<td>Qualitative: In-depth interviews Free-listing Reports Minutes</td>
<td>Content analysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- of in-depth interviews with 4 informants</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 5 facilitator reports</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Minutes from 80 meeting</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MATERIALS AND METHODS

2. Baseline survey (Paper II)

2.1. Study population and sampling

The baseline survey was conducted from October 2004 to March 2005. The population included all individuals aged 15-75 years who had been living in Yogjakarta municipality for at least six months.

To permit stratified analyses by 10-year age groups, and also gender required 250 respondents from each age group and sex [77]. According to the WHO model, sample size for each of the two cross-sectional surveys should therefore be at least be 3,000 respondents.

The sample was selected using multistage random sampling. The first stage was to select 150 Block Censuses (BCs), the second stage was to select 10-15 households within each BC. The third stage was to select 1-2 individuals within each selected household using Kish methods [77]. When number of respondents was less than the minimum sample size, substituted respondents were selected in each BC from the nearest building, starting from the left to the right of the first selected building.

In total 3,205 respondents were included in the data analysis with 2,147 obtained from the selected households and 1,058 being substitute respondents. There was no statistical difference with regard to risk factors, age, sex, income and education level between selected and substitute respondents.

2.2. Measurements and procedures

The data were collected using the STEPwise standardized protocol model to measure NCD risk factors [78]. Risk factors measured included fruit and vegetable intake, tobacco use, physical activity, blood pressure, height, weight, and some demographic factors.

Fruit and vegetable intake was measured by a set of questions asking how many portions of fruit and vegetables were consumed within a day, and how frequent was this consumption. To measure tobacco use, the respondents were asked about whether they used any tobacco products, how frequently they used them, and what kind of tobacco products they used. Respondents were described as smokers if they smoked at least one cigarette per day.

Physical activity was measured by the amount of effort spent at work, during leisure time activities, and during transportation. These were measured using duration in minutes per day and days per week.
Blood pressure was measured in the right arm while respondents were seated. Three readings were taken to the nearest 1 mmHg at five minute intervals, using a digital device (Omron M5). In addition, the subjects were asked about their history of hypertension or diabetes, and about hypertension or diabetes medication.

Height was measured to the nearest mm in bare feet, looking straight ahead, using a portable height measuring tape (Seca 206). Weight was measured to the nearest 100 g in bare feet and light clothing, using a digital body weight scale (Seca 841).

The respondents were also asked about demographic factors including sex, age, date of birth, ethnicity, education level, occupation, and average monthly household income.

2.3. Quality control and data analysis

The data collection was conducted at a home visit by a trained-surveyor following the STEPwise guidelines for data collection [77]. After providing information about the study, informed consent was sought from the respondents. A supervisor monitored the data collection, checked the completeness of the data, and ensured the quality of the data by cross-checking 5% of the respondents. A data manager coordinated the flow of data collection and did data cleaning.

The questions to measure fruit and vegetable intake were asked by a surveyor who estimated the portions consumed using a set of food models, where one portion was equal to a half cup (80 gr). Intake of fruit and vegetable was defined as low if the respondent consumed less than 4.5 portions per day. This limit is lower than the WHO standard of 5 portions per day [79], but commonly used by FAO [80].

Respondents were defined as physically inactive if average weekly physical activity was <105 minutes, which was the median value for the baseline survey. Respondents were defined as having elevated blood pressure if the average systolic blood pressure was ≥ 140 mmHg and/or the average diastolic blood pressure ≥90 mmHg or they were taking medication of hypertension [79]. Body-mass index (BMI) was derived from the weight (in kilograms) divided by the square of the height (in meters). Respondents were defined as underweight, normal weight, overweight and obese if their BMI was <18.5, 18.5 – 22.9, 23 – 24.9, or ≥25 respectively [81].

To standardize the cross-sectional data from the 2004 survey to the same age and sex distribution as the Yogjakarta population for that year, data were weight-
ed by age and gender (Appendix 1). Risk factor data were then analyzed in relation to sex, and average monthly household income.

3. Qualitative study (Paper I)

3.1. Study population and sampling

In the qualitative study, information was gathered from both focus group discussions (FDGs) and individual interviews. The FGD was used to capture the shared experiences and perceptions of health and CVD prevention. Participants were selected from five sub-districts, two from the northern part and three from the southern part of Yogyakarta municipality. Participants from the southern sub-districts represented those who were more bound by Javanese tradition, while the participants from the northern sub-districts represented those who were less traditionally oriented [82]. Another criterion for selection was socioeconomic status (SES). High SES was defined as ownership of at least one motorcycle, with low SES defined as ownership of only a vehicle that was cheaper than a motorcycle [83].

Residential Associations (RW) of low and high SES were identified by an officer from The Office of Settlement and Regional Infrastructure (Dinas Kimpraswil) of Yogyakarta Municipality. After an RW was selected, the community leader of that RW was identified, and the names of the informant were retrieved from that leader.

Three individual interviews were conducted with community leaders and a lay person, both from high SES group, and one head of the Health Promotion and Development Section of the Municipality Health Office. A total of Eight FGDs were conducted (three FGDs in high SES, three FGDs in low SES, and two FGDs among health officers). These FGDs involved 76 informants and included lay people, community leaders and health officers. In this cover story also includes a new data set capturing national policies on NCD: nine documents including one national regulation, one action plan in health development, six decisions from the Ministry of Health, and one technical guidance document.

3.2. Qualitative Measurements and procedures

A thematic guidance was developed to explore people’s experiences and perceptions of health and CVD risk factors. The FGD and interviews were moderated by the author of this thesis or by two assistants, and took place in the informant’s home, Image 1. This study used an emergent design so that after analyzing the FGDs and interviews, further topics were added to the thematic guidance and further FGDs were decided upon.
3.3. Quality control and data analysis

The FGDs and interviews were conducted in the local language, transcribed and translated into English. A joint analysis was done involving three researchers from different backgrounds: a local public health researcher, a Swedish professor of epidemiology, family medicine, and a Swedish researcher in medical sociology. By involving three researchers from different backgrounds, we aimed to achieve researcher triangulation [84]. Different interpretations were clarified, negotiated, and shown as the result in this thesis.

The qualitative data were analyzed guided by content analysis [85] which focuses on manifest content. The transcript of FGDs and interviews were reread several times to capture the overall meaning of the data. Each meaning unit was identified and condensed into a condensed meaning unit. Each condensed meaning unit was given a code according to the content. Codes with close content were classified into a single category. Within each category, there were sub-categories of low and high SES neighborhood conditions, Figure 9. OpenCode 2 was used to manage the coding process from the text. OpenCode 2 is a software to manage coding qualitative data from text information [86].

Image 1. A focus group discussion with a facilitator to obtain qualitative data
4. Pilot intervention study (Paper III)

4.1. Study population and sampling

The Proriva pilot intervention was conducted in two geographically separated sub-districts (Tegalrejo and Mantrijeron) that were selected based on similarities in mean of age and income. Four intervention communities within Tegalrejo representing both low and high SES were enrolled. One middle SES community in Mantrijeron served as the referent area. The intervention population consisted of 1759 individuals, aged 15-75, while 779 people served as the referent population.

---

**Figure 9.** An example of analysis process using content analysis

<table>
<thead>
<tr>
<th>Meaning unit</th>
<th>Condensed meaning unit</th>
<th>Codes</th>
<th>Sub-category and category</th>
</tr>
</thead>
<tbody>
<tr>
<td>They collect cardboards... plastics.. Any thrown away things in general...</td>
<td>The poor cannot be clean, health means to stay clean</td>
<td>• The poor are unhealthy anyway... which together with other codes from other meaning units...</td>
<td>Destiny mechanism</td>
</tr>
<tr>
<td>Well health for us? health means to stay clean. But you see...here in this neighborhood... it’s a slum area... slum area...</td>
<td></td>
<td>• Who will get a heart attack is determined by destiny • Smoking is a must • More physically demanding job</td>
<td>The cause of heart disease</td>
</tr>
</tbody>
</table>
Sampling frames for the intervention and referent communities were developed from the neighborhood associations’ population records. From these sampling frames, 1131 respondents were randomly selected for pre-intervention data collection and 1027 respondents followed-up for post-intervention data collection. Because of drop-outs and withdrawals (9.2%), and also exclusion of data collected during the fasting month (2.8%), only 995 respondents were available for data analysis.

A qualitative study was conducted in the intervention communities to enhance our understanding of the people’s motives and responses toward program. Five facilitator reports and 80 coordination meeting minutes were collected during the intervention. Additionally, free listing from 112 informants and four in-depth interviews were collected after the intervention. Informants were selected from community leaders, health workers, and citizens some of whom were actively in Proriva while others were not. Informants who gave rich information were selected for the in-depth interviews.

4.2. Measurements and procedures
The measurement procedures for the pre and post intervention surveys were administered using the same STEPwise procedure as in the baseline survey. Knowledge and attitude toward NCD were measured at the pre test and post test. Post-test data were collected one week after the intervention ended.

The questionnaire used to measure knowledge of and attitudes toward NCD initially included 17 knowledge questions and 15 statements reflecting attitudes (Likert scale). The questionnaire was pre-tested on 150 respondents, aged 15-75 who were selected from a BC that was not included in the baseline survey. Internal reliability was calculated using Cronbach’s Alpha [87]. Eight knowledge questions and 12 attitude statements that showed strong reliability scores (≥0.3) were retained, Table 5, while the remaining questions and statements were omitted.
Table 5. Questions used to measure knowledge of and attitudes towards the causes and prevention of NCD

<table>
<thead>
<tr>
<th>No</th>
<th>Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Knowledge</td>
</tr>
<tr>
<td></td>
<td>1 Smoking can cause heart disease</td>
</tr>
<tr>
<td></td>
<td>2 One sign of diabetes is a wound that does not heal</td>
</tr>
<tr>
<td></td>
<td>3 Drinking alcoholic beverages does not cause high blood pressure</td>
</tr>
<tr>
<td></td>
<td>4 Consuming sufficient amount of vegetables can prevent heart disease</td>
</tr>
<tr>
<td></td>
<td>5 High blood pressure can be prevented with regular exercise</td>
</tr>
<tr>
<td></td>
<td>6 Consuming sufficient amount of fruits can prevent heart disease</td>
</tr>
<tr>
<td></td>
<td>7 Coconut oil can increase blood pressure</td>
</tr>
<tr>
<td></td>
<td>8 High blood pressure does not cause strokes (half paralyzed)</td>
</tr>
<tr>
<td></td>
<td>Attitudes</td>
</tr>
<tr>
<td></td>
<td>1 Efforts to prevent cardiovascular disease should be started in the teenage years</td>
</tr>
<tr>
<td></td>
<td>2 By refraining from smoking, we could prevent heart disease</td>
</tr>
<tr>
<td></td>
<td>3 Smoking is permissible in public places</td>
</tr>
<tr>
<td></td>
<td>4 People with high blood pressure should avoid fatty or oily food</td>
</tr>
<tr>
<td></td>
<td>5 One way of preventing heart disease is to avoid alcohol</td>
</tr>
<tr>
<td></td>
<td>6 People with diabetes do not need to limit foods rich in sugar</td>
</tr>
<tr>
<td></td>
<td>7 People with heart disease do not need to do regular exercise</td>
</tr>
<tr>
<td></td>
<td>8 People with high blood pressure should consume vegetables</td>
</tr>
<tr>
<td></td>
<td>9 People with diabetes need to pay regular visits to a physician or primary health care</td>
</tr>
<tr>
<td></td>
<td>10 People over 50 years of age do not need to do frequent morning walks</td>
</tr>
<tr>
<td></td>
<td>11 Fruits should be consumed by people with high blood pressure</td>
</tr>
<tr>
<td></td>
<td>12 People with diabetes need continuous treatment</td>
</tr>
</tbody>
</table>

The proceedings of each activity and the pilot coordination meetings were documented. At the end of the Proriva pilot, the facilitators were asked to submit a report. Two months after the pilot ended, selected informants were asked free-listing questions about how informants were acquainted with the pilot and its components, their perception of Proriva in general, and suggestions for the Proriva improvement.

**4.3. Quality control and data analysis**

Average participation was calculated using this formula:

\[
\text{Average participation} = \frac{\sum \text{Number of participants participating}}{\text{Number of eligible participants}} \times 100\%
\]
The change in NCD risk factors from the pre-test to the post-test was analyzed using McNemar’s test. To minimize the Hawthorne effect [88], the in-depth interviews and free-listing interviews were conducted in the informant’s homes by two facilitators who had never been involved in the program. To keep the trustworthiness, a prolonged engagement to the program was maintained by the author of this thesis [84]. Furthermore, peer-debriefing was pursued by involving a local anthropologist who had never been involved in the Proriva pilot to ensure a more neutral perspective of analysis [84].

4.4. Pilot intervention components

The pilot intervention was conducted during 8 months in three different settings (communities, schools and working places). However this thesis only reports the community setting interventions which were conducted during 7 months. The components of the intervention included health education, screening of risk factors, referral of high-risk individuals, creation of supportive environment, and organizational coordination. Some of the intervention components were included in existing activities and some in new activities, Table 6.

Table 6. Activities and components of the pilot intervention

<table>
<thead>
<tr>
<th>Activities</th>
<th>Health education</th>
<th>Screening of risk factors</th>
<th>High risk referral</th>
<th>Supportive environment</th>
<th>Coordination</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing activities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular public meeting</td>
<td>v</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ten household meeting</td>
<td>v</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neighbourhood meeting</td>
<td>v</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neighbourhood PKK meeting</td>
<td>v</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>New activities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CVD information post</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
</tr>
<tr>
<td>Morning walking</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td></td>
</tr>
<tr>
<td>Weekly exercise group</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td></td>
</tr>
<tr>
<td>Cooking competition</td>
<td>v</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aerobic dancing competition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy walking competition</td>
<td>v</td>
<td>v</td>
<td>v</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health speeches competition</td>
<td>v</td>
<td></td>
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</tr>
</tbody>
</table>
5. Five-year repeated cross-sectional surveys (Paper IV)

5.1. Study population and sampling
As in the 2004 baseline survey, the respondents in the five-year cross-sectional survey of 2009 were aged 15-75 and had been living in Yogyakarta municipality for at least six months.

In the 2004 cross-section, respondents were selected from households based on Kish methods, whereas in 2009, a sampling list from all selected BCs was generated, and 3,900 respondents were selected randomly from that list. The minimum sample for the follow-up survey was 3,000 according to WHO [77], with an additional 900 added to make up for non-response.

Some subjects were excluded from the study because they were physically impaired or outside the age range (2.6%), or could not be interviewed (34.1%), leaving a final total of 2467 respondents. There were no significant differences in terms of age and sex between excluded and included respondents. The data collection activities are summarized in Figure 10.

Figure 10. Data collection activities, sample sizes and year of data collection

<table>
<thead>
<tr>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline risk factor survey (n=3205)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Qualitative study 8 FGD's 2 interviews</td>
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<tr>
<td>Intervention study survey: Low SES intervention community (n=475)</td>
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<tr>
<td>High SES intervention community (n=376)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Referent community (n=144)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Qualitative study: 112 free listing 4 indepth interviews 5 facilitator report Minutes of 80 meetings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 year repeated cross-sectional survey (n=2467)</td>
<td></td>
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</tr>
</tbody>
</table>
5.2. Measurements and procedures
As in the baseline survey, the STEPwise procedure was applied to measure the NCD risk factors in the 2009 cross-sectional survey. Although there was a new version of the STEPwise procedure, the 2009 cross-sectional survey used the similar questionnaire as the 2004 survey in order to facilitate comparison between the cross sections.

5.3. Quality control and data analysis
In order to facilitate comparisons, the definitions, weighting schemes, and data analyses used for the two cross sectional surveys were virtually identical.

A descriptive analysis was performed to compare demographic characteristics and risk factors between the two cross sections. These were stratified by age and demographic group. The risk of getting a CVD event in the next five years was classified into low and high risk according to a risk prediction chart developed by Gaziano [89], which in turn was based on a chart developed by WHO/ISH [90]. This risk prediction is based on a modification of the equation from the Framingham Heart Study for use in regions where blood lipid tests are not available. This adaptation replaces blood cholesterol with BMI and includes age, sex, smoking status, systolic blood pressure, and diabetes as demonstrated in the National Health and Nutrition Examination Survey (NHANES). An evaluation found that BMI could predict a CVD event as accurately as total cholesterol [89].

6. Ethical consideration
Permission to perform the study was granted by Gadjah Mada University, the Local Government, and from the community authority. Individual informed consent was given by each respondent before they participated in the survey. Individual verbal informed consent was sought before the interview, FGD, and free listings. The informants in the qualitative study were told about the aim of the study, the potential benefits of the study, and the use of recording equipment. Although the author guarantees the confidentiality of the informants in the qualitative study, the author cannot guarantee that other informants from the same FGD would comply.

While people in the high SES group have many choices to meet their health demands, people in low SES groups have far fewer choices. By accommodating the needs of low SES groups, the expectation was that the intervention would be readily accepted, and that the impact would be greater. In addition to providing health benefits, a community empowerment action may also strengthen the community’s capacity to solve its own problems [91] and to support people in low SES groups. On the other hand, community interventions can cause ethical dilemmas in the form of unequal accessibility for community members as well as other unintended adverse effects [91]. Unintended adverse effect may also arise in the form of increasing the burden on health workers.
D. Results

1. The population perspective

The qualitative study, Paper I, was performed to capture population perspectives regarding NCD. The categories that emerged included biomedical and destiny mechanism as causes of NCD, men not having time for health, women are caretakers for health, and individual activity versus collective activity, Figure 11. In addition, balance and harmony emerged as themes running through all the categories.

1.1. Perception of causes

Participants were familiar with the term heart disease within the NCD classification. They recognized that heart disease is frightening as it kills suddenly. Heart disease was widely known in the local vernacular as “sitting wind” - a dangerous disease. This expression was however, frequently by mistake interpreted as being “exposed to wind”, a trivial symptom resulting from being exposed to too much wind. This misconception was sometimes reported to lead to improper treatments with fatal results, while at the same time illustrating the public’s need for further health education.

"Javanese call it as angin duduk (sitting wind, a severe masuk angin, the sufferer is only able to sit and die. Masuk angin (exposed to wind is a sickness which is caused by too much exposure to wind), similar to heart disease in medical terminology. I am Javanese, I think they are similar. Sudden death which is called angin duduk. My parent-in-law was like that, he said:” Ouch I got chest pain”.. and he passed away, we were told that he got heart attack, some said it was a angin duduk we call it. My neighbour said, “oh... your parent got angin duduk and you did not give him proper help.” (A woman from high SES)

High SES participants regarded an unhealthy lifestyle as a contributor to NCD, whereas participants from low SES communities considered a heart attack to be decided by destiny, implying that the likelihood of an attack is not amenable to corrective action. In general, the participants in the qualitative study considered “poor” as synonymous with “unhealthy”.

“Heart is the only pump in our body. First is the food factor. ... The nutrients from the food are carried by the blood. If there’s sedimentation (in the blood vessel) such as toxin or nicotine or fat, cholesterol sediment... The second is unhealthy eating habit. For example sweet drinks: the properties in sugar can be toxic. ...The third is exercise...because exercises will increase the blood flow. One more thing, the psychological condition sometimes gives more effects, such as being stressed or depressed. I think those are related to heart disease.” (A man from high SES)
...they collect them to be sold the day after... and they also make a dump of them.. That’s how they make a living, then how am I supposed to tell them to stay clean.. Perhaps we couldn’t do that.. We couldn’t, because it’s their work... their source of income. How would you like them to be (be clean and healthy)?” (A man from low SES)

### 1.2. Ideas of prevention

Although NCDs are frightening diseases, most men disregard preventive actions. Men in the high SES communities emphasized that they are too busy earning their living, and explain that only when they feel sick, and have a condition which hampers their work, will they seek the necessary health care. Men in the low SES communities, however, that they are felt susceptible not only to NCD but also to many other diseases, and concluded that fighting against this destiny is useless.
As compensation for the role of men as breadwinners, domestic tasks are considered to be the responsibility of women. These tasks include taking care of the health of all family members. Women are required to seek health information in order to be able to fulfill their role as a caregiver.

“It seems that the most (of people in the neighbourhood in case of sick, they would)... go to doctor or to hospital directly. Yap, so....maybe from privacy aspects, because we will be differently (differently treated in more sophisticated way than to public services)” (A man from high SES).

“You see that day, those who died because of alcohol (drunken) will not threaten people in this neighbourhood... they'd continue drinking for sure. They are not afraid that.... They keep drinking. Ha...ha...ha.. (laughing together). Well, that’s the condition of people around here.” (A man from low SES)

“We might feel how busy it is. Frequently the wives are the ones who have more time to participate in the elders (health) program because the husbands are busier (than the wives).” (A woman from low SES)

### 1.3. Community organizing

In organizing the community, different types of activities were preferred by the lay people in low versus high SES communities. High SES communities tended to prefer individual activities where individuals are self-directed and the community leaders are rather insignificant. Low SES communities favored collective activities where the role of the individual is to support the collective activities and the community leaders function as dominant models.

“It seems that anybody (is able) to perform it (to initiate a join action). That’s all normally. There is no initiative to work together...nothing.” (A man from high SES)

“In our neighbourhood, we treat them indiscriminately, the security staff who assigned us on which day (to participate in security rounding watch). So our members became hesitant not to participate. If the head of neighbourhood association participate, why they are not (they feel obliged to do the same)? Just so simple.” (A man from low SES)
1.4. Balance and harmony

The concepts of balance and harmony arouse from all categories, which mean that people aim at keeping the balance into their daily lives to achieve harmony in life which in turn will bring wellbeing including health.

When participants reflected on the causes of NCD, they frequently mentioned the issue of balancing unhealthy with healthy habits in order to prevent diseases.

"...Smoking does not do any harm to me because I have the exercise habit. Smoking is related to heart disease only if a smoker does not take exercise, that's true. So, sport can be done to keep the balance..." (A man from high SES)

In the ideas of prevention domain, the balance idea arouse for example, in the assignment of tasks, when women were illustrated as the caretakers for health, she was considered as the right representative for the family to attend a health education session. In the community organizing domain, the balance idea arouse from the roles between lay people and community leader. In the low SES community, while the role of the community leader is important, the lay people are obliged to support collective action.

2. Health system perspective

In the long run, the continuation of Proriva will be the responsibility of the Municipality Health Office (MHO). Thus, the future design of Proriva should complement the existing health care system. In the Health Office, qualitative data were collected from two FGDs comprising the heads of PHC (10 people), a group of community health educators in the PHC (11 people), and one indepth interview with the head of The Health Promotion and Development Section of the MHO.

In order to contrast the perspectives expressed by members of the MHO, some national policies about NCD were collected and analyzed. There were nine national policies in which NCD was mentioned as an important challenge to address in order to reach national health goals. A comparison between the themes in the FGD and these national policy documents is presented in Table 7.
Table 7. Comparison of opinions on NCD in Indonesia based on municipality health officer FGDs and interviews versus National health system policy documents

<table>
<thead>
<tr>
<th>Municipality health system (According to health officers)</th>
<th>National health system (According to policy documents)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCD is an important issue</td>
<td>NCD is a potential threat</td>
</tr>
<tr>
<td>Heavy work load</td>
<td>Gradually establishing preventive programs</td>
</tr>
<tr>
<td>Have to achieve heavy target</td>
<td>Monitoring and evaluation designed to measure output on provincial, district/city levels</td>
</tr>
<tr>
<td>Accessary from other departments as well as from civil society need to meet the NCD challenge</td>
<td>Accessary from other departments but without specifying how other departments can contribute</td>
</tr>
<tr>
<td>Curative action is more important than preventive action</td>
<td>Focus on curative care</td>
</tr>
<tr>
<td>Changing behavior takes time</td>
<td>Set the people as the object not the subject of health development</td>
</tr>
</tbody>
</table>

2.1. Municipality health officers’ opinion

Officers of a PHC expressed to be burdened by the conflict between national health objectives versus the lack of supporting policies from the local authority. As cross-sector support was hardly to be expected, health officers were heavily reliant on health workers to reach people in their neighborhood. Even though health workers were burdened with these every day tasks, the health officers demanded that health workers should also improve their prevention efforts.

"The minister of health of Indonesia suggested that the citizens should not smoke, and in line with the Minister’s (statement) we deliver the message to our Mayor, and hope that the Mayor will lay down an instruction to the citizens. However in fact so far it is only one government regulation laid down, which consider the smoking prohibition among teachers while they are teachings, whereas (the regulation) for all the citizens is not yet issued. The Mayor did not agree, did not dare to, because its enormous social ramifications." (A community health educator officer)

"The key to success in accomplishing a program is the availability of facilities, which are provided by Camat (the head of a sub district) or by Lurah (the head of a village) so it will well accomplished. When the Lurah or the Camat consider that, (this program) belongs to the health office and not belongs to the government the program will lose the support from Lurah or Camat.” (A community health educator officer)

Although the respondents considered preventive action to control NCD as necessary, treatment is still regarded as more important because sick people knock on the doors, whereas preventive action requires behavior modification, takes time, and is only rewarding in the long run.
“Health education yeah, we want to change personal habit, it takes a long time yes, so we should have strong motivation (and great effort), which will bring us to our success, which we are not sure when it will be.” (A community health educator officer)

“As health promotion officers, we are only able (to suggest), “would you quit smoking!” , but why other health officers smoke in front of the public? So when we advised (the citizens to quit smoking), (the citizens would say) “ah..but the health officers are smokers as well, so this reduced our credibility.” (A community health educator officer)

“The health prevention program for the employees is unpopular among companies because of financial considerations, (they would prefer) curative treatment.” (A head of PHC)

The PHC needs health workers as our useful operational appendage, because the task of officers in PHC is heavy. The Lurah, his wife , the community leaders all require the health workers (to comply with), the head of residents’ association require the health workers.” (A head of a PHC)

“The health workers should provide an additional sum to replenish our resources, replenish Miss. For example (health worker) as a human, a mother, (would they have a heart) when there are 40 under - five children, and the budget is only 40.000 IDR (equal to 4 USD), whereas they should provide green bean porridge (for the children)”. (A community health educator officer)

### 2.2. National policies of controlling NCD

The Ministry of Health of Indonesia has recognized NCD as a potential threat and set out some policies for the future. A long term national strategy for health has been prepared for 2005-2025 and is structured in five five-year periods. Within this framework 2005-2009 was an initial period for the NCD control program, while 2010-2014 was expressed as a development period for the program. 2015-2019 will be a stabilization period for the program and at the same time an initiation period for a geriatric service program. Finally, 2020-2025 is proposed as an establishment period of both the NCD and the geriatric service programs [92].

Further guidelines from The Ministry of Health of Indonesia emphasize that the NCD control program should focus on curative orientation. Although the NCD control program should be comprehensive and involve promotive, preventive, curative and rehabilitative aspects, the guidelines state that the program should focus on early case detection and treatment [93, 94].
The strategies of controlling NCD are to:
1) Mobilize and empower communities in prevention and control of CVD risk factors
2) Improve public access to early detection services and qualified treatment of CVD risk factors
3) Develop and strengthen epidemiological surveillance systems for CVD risk factors, develop monitoring and information systems
4) Increase funding for controlling CVD risk factors “(Regulation of Republic of Indonesia [94]).

The ministry of health emphasize that people in the community should be the subjects of health activities, which means that people are encouraged to participate in health problem identification, program planning , running the program, as well as monitoring and evaluating the program[95].

“Recording was done by health workers immediately after activity (in the Posyandu) has been performed. The recording format conformed to the one set in health programs”. (Guidance from Ministry of Health of Indonesia [96])

“The community- based activities to control the risk factors of CVD include:
1. Community- based early detection of CVD risk factors
2. Community -based treatment of CVD risk factors
3. Community-based epidemiological surveillance of CVD risk factors” (A decision from the Ministry of Health of Indonesia [94])

Another part of the policy to prevent and control NCD is the development of national, provincial and regional surveillance systems, which are useful when analysing determinants and risk factors for NCD. Data collection on provincial and regional levels is based on hospital visits and primary health care and laboratory visits. While useful, these data are not representative of the population as a whole [97, 98]. Only the national surveillance system can provide population based data [99].

To monitor and evaluate the success of the NCD control programs at the provincial, district and city levels, the Ministry of health has drawn up a list of indicators.

“Indicators for the achievement of these outcomes (of NCD control programs) in the year 2014 are:
100% of all provinces have regulation on non-smoking areas
100% of provinces provide guidance for prevention and control of NCD
30% of all districts/cities implement prevention and control of NCD
30% of all districts/cities have regulation concerning the prevention and mitigation of smoking impact on health” (Decision of Minister of Health of Indonesia [100])

To conclude, the national documents illustrated the governmental concern about NCD. A set of action has been established to quickly tackle NCD by emphasizing treatment actions, determining people as the object, calling for multi-sector collaboration, and setting up outcome indicators for provincial and district levels.
In line with the national policies, the health officers in Yogyakarta municipality also had the ambition to quickly respond to the NCD threat with similar actions: emphasizing on the treatment, but also emphasizing that behavioral change takes time. They called for collaboration (with health workers), and tried to achieve the targets but at the same time they also expressed this as being challenging as they already have a heavy work load.

3. Comparing perspectives between lay people and the health system

There are both differences and similarities between the perspectives of citizens and those of the health system, as summarized in Table 8. Both groups considered NCD to be a major threat to population health. People mentioned that they were too busy at work and had no time for prevention. Similarly, the health system stated that prevention is necessary but less important than treatment.

<table>
<thead>
<tr>
<th>What is NCD?</th>
<th>Perspectives of lay people</th>
<th>Perspectives of the health system</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• NCD is dangerous</td>
<td>• NCD is a potential threat</td>
</tr>
<tr>
<td></td>
<td>• Misidentification of heart attack</td>
<td></td>
</tr>
<tr>
<td>Action toward NCD</td>
<td>Prevention is not important</td>
<td>Prevention is less important than treatment</td>
</tr>
<tr>
<td></td>
<td>• No need for prevention</td>
<td>• Prevention is less important</td>
</tr>
<tr>
<td></td>
<td>• Health is women’s domain</td>
<td>• Treatment is more important</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Gradual anticipation program</td>
</tr>
<tr>
<td>Orientation of organizing activities</td>
<td>Different preference action</td>
<td>Quick accomplishment</td>
</tr>
<tr>
<td></td>
<td>• Individual action</td>
<td>• Accessary from other stakeholders</td>
</tr>
<tr>
<td></td>
<td>• Self directed</td>
<td>• People as the objects</td>
</tr>
<tr>
<td></td>
<td>• Community leader insignif</td>
<td>• Concern about outcome indicators</td>
</tr>
<tr>
<td></td>
<td>cant</td>
<td>• Heavy workload</td>
</tr>
<tr>
<td></td>
<td>• Collective action</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Sense of belonging of members</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Community leader dominant</td>
<td></td>
</tr>
</tbody>
</table>
4. Tailoring a community intervention:

4.1. Combining baseline results and what people need

The baseline survey identified the risk factor pattern in the study population (figure 12 and 13), while the baseline FGDs guided delivery of the intervention in a way that was acceptable to the population. When integrating the qualitative and the quantitative data, some topics emerged on how to proceed with the planning of a community intervention (table 9). These topics were then translated into activities that could be conducted within the community intervention (Figure 14).

Figure 12. Baseline prevalence of NCD risk factors among men and women

Figure 12 shows that high prevalence of insufficient fruit and vegetable intake, smoking, and physical inactivity were all common in the population. The intervention was therefore tailored to involve these three risk factors (Paper II). While smoking was only common among men, insufficient fruit and vegetable intake and physical inactivity were common in both sexes, Figure 13.

Table 9 summarizes the community intervention plan. The community intervention components addressing smoking was designed to focus on smoking prevention, passive smoking protection and encouraging a supportive environment.

The fruit and vegetable intake component was promoted for the whole population. The intervention topic involved improving the knowledge of women for selecting and processing healthy food and strengthening a supportive environ-
ment. By improving the knowledge of the women, it was expected that this would transfer to all family members, and that in turn healthier food would be available and preferred by the whole family.

The proposed intervention components to support physical activity were improving knowledge, self monitoring of blood pressure and weight, and supporting group exercise for people in low SES communities. Physical activity was promoted for the whole. However, men of low SES communities were not included as the target for physical activity as they already had physically active jobs. Improving knowledge of physical activity was centered on choosing suitable types and intensity activities. Measuring blood pressure and body weight were proposed to encourage individuals to be more physically active. Supporting group exercise was proposed to practice and encourage the adoption of new behavior.
Table 9. Developing a community intervention plan from the results of baseline survey and qualitative data

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Baseline survey</th>
<th>Qualitative data at the baseline</th>
<th>Topic of community intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The target of intervention</td>
<td>Guidelines on how to deliver</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Specific</td>
<td>General</td>
</tr>
<tr>
<td>Smoking</td>
<td>Men</td>
<td>Men perceived smoking is necessary</td>
<td>Prevent smoking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Health is women’s domain</td>
<td>Passive smoking protection</td>
</tr>
<tr>
<td></td>
<td>Whole population</td>
<td>Different preference action</td>
<td>Supporting environment</td>
</tr>
<tr>
<td>Low fruit and vegetable intake</td>
<td>Whole population</td>
<td></td>
<td>Improving knowledge of women for selecting and processing healthy food</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Supporting environment</td>
</tr>
<tr>
<td>Physical inactivity</td>
<td>Whole population</td>
<td>Men of low SES working physics</td>
<td>Improving knowledge of physical activity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Self monitoring of blood pressure and weight</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Supporting group exercise for the low SES</td>
</tr>
</tbody>
</table>

4.2. Phases of activities

After selecting the main topics, community intervention plans were transformed into activities in five phases i.e. building trust, raising awareness, programme development, community organizing and initiation of maintenance, Figure 14.

The first phase (building trust) was aimed at seeking approval for the program. It included meetings with the community leaders of sub-villages, as suggested in Paper I.

The second phase (raising awareness) was aimed at increasing awareness of NCD as a problem in the community through presentations of the results of the baseline survey and also identification of NCD events in the neighborhood. Interactive group discussions were conducted to demonstrate self-identification of NCD risk factors. Those activities were performed during existing citizen’s meetings in the neighborhoods.

During the third phase (program development), the program was integrated further together with the people. A team was set up consisting of personnel from Proriva and people from local representative. This team set some goals for the program and decided what local activities to initiate to address the three risk factors.
Phase four (community organizing) carried out the activities in the community. Prior to being delivered to the people, these activities were first presented to the community leaders and community representatives for suggestion, revision and approval.

The fifth phase (maintenance), consisted of preparation for program sustainability. However, this phase was outside the thesis scope.

Figure 14. Phases of translating the design of the community intervention

5. The process of working with the community to prevent NCD

The overall process by which the program was delivered to the community is described in Figure 15. In all phases, the mutual relationships between the Proriva staff and the local communities were highlighted as the principle behind the intervention. This relationship included mutual understanding, working hand-in-hand, sharing resources, and common learning.
5.1. The building trust phase

The building trust phase was initiated with self-disclosure by the Proriva team members to the community leaders. The aims of the visit, the program, as well as the benefits and consequences of the program were introduced at this phase. After intensive communication and negotiations, a shared goal that benefitted both parties (Proriva personnel and local people) was agreed upon.

5.2. The raising awareness phase

In the raising awareness phase, an interactive group discussion approach was used to facilitate self-identification of NCD problems and risk factors. Various beliefs about NCD were discovered by the Proriva team as they emerged from the population. Some beliefs were considered true and some false according to medical perspectives, but regardless, all were captured for further clarification and program adaptation. Besides self-identification, the results of the baseline survey was explained and discussed.
5.3. The program development phase

As more people in the community became aware of the NCD threat, further actions were agreed upon, and the program development phase was initiated. A team was set up consisting of Proriva personnel and local representative people assigned by the community leaders. The locals people within the team included health workers and sometimes community leaders. Meetings were carried out to decide:

1. Shared aims
2. Activities to achieve those aims
3. Plans on how to deliver those activities to the people including:
   a. Time
   b. Place
   c. Target audience
   d. Persons in charge
   e. Resources in demand
   f. How to fulfill those resources in demand

5.4. The community organizing phase

After the program was ready to be delivered to the community, it was time to begin the community organizing phase. The process for this phase involved:

1. Identification of persons in charge.
   a. Local people tend to be responsible for:
      i. Involving people to participate in the program
      ii. Preparing the food and beverages needed during the activities
      iii. Presenting health education
      iv. Performing screening
   b. The Proriva team members were responsible for:
      i. Preparing training
      ii. Preparing printed materials
      iii. Providing speakers for mass health education
      iv. Providing new equipment
      v. Documentation
      vi. Facilitating further referral.
2. Communicating the process of delivery, results, barriers, and opportunities to the team
3. Adapting the delivery of the subsequent activities in accordance with the previous results of activities.
4. Incorporating a new idea into the subsequent activities after a reasonable consideration was decided by the team.
5.5. The initiation of maintenance phase

The final phase was the initiation of maintenance, which consisted of a hindsight process and preparation for continuation. Meetings were held to look back on lessons learned during the program. A plan for sustainability was then developed by the team, approved by the community leader and community representative and then initiated in the community. In the low SES communities, the internal team proposed four championships and a festival to celebrate what they had achieved. During the festival, the health workers reflected on and expressed their pride in being health workers. The health workers dressed in traditional dress and smiled when accepting a letter of acknowledgement in front of their community members (Image 4.d).

6. Behavior change and program acceptance

Paper III reports that the community intervention activities were performed in the four communities (2538 subjects). Pre and post-tests, involving 1131 randomly selected respondents, who were followed-up before and after the intervention in both intervention and referent areas.

The pre and post-tests indicated no significant change in attitudes toward NCD prevention and practices of healthy behaviors (non smoking, physically active, and consume sufficient fruit and vegetable). The odds ratio from the logistic regression for gaining high knowledge based on treatment group was also not significant. However knowledge among men in the intervention area did increase significantly from 56% to 70%.

Besides the pre and post-test data analyses, qualitative data, including free listings (112), indepth interviews (4), facilitators’ reports (5) and meeting minutes (80) were analyzed to capture the program acceptance.

To illustrate the acceptance of the program, the frequency of activities and the number of participants were summarized from written meeting records and the average participation was calculated (please refer to methods section).

The number of events was much higher in low SES communities (40) than in high SES communities (13). The events in the low SES communities occurred more frequently during the community organizing phase, addressed both health workers and residents, and included events with groups of 21-50 people. The average number of participants was higher in all events in the low SES communities except for events arranged by community leaders, Figure 16.
Paper III reports that respondents from the low SES communities perceived that the intervention program increased their awareness of the NCD threat. They found the program exciting and cheerful, and asked for the program to be continued. Similarly, respondents from the high SES communities viewed the intervention program as a good one and expected it to continue, but with some improvements.

Health workers in the low SES communities found that the program had improved their knowledge and skills to deliver health education to prevent NCD. The program was also considered a welcome break from their routine activities. Even health workers in high SES communities considered the program to be good despite the feeling that it might have been less in demand by their people.

“Everybody supported, because those were relaxing activities, no compulsion, you were welcome to participate or not, so it seems everybody enjoyed it. On Sunday after the morning prayers, there were so many people gathering (walking together on Sunday morning), it seems no barriers, we were all supported.” (A woman, resident in low SES community)

“It was good, it improved our knowledge about heart and vascular diseases for mothers attending the arisan, so we could prevent and avoid heart diseases and vascular diseases.” (A woman, resident in high SES community)

“The health workers could improve their knowledge on health, so we are able to monitor the health of our people, it is our duty to deliver messages, however if there was a team from PROJABAR (Proriva) we would be more excited.” (A health worker in low SES community)

“the low response from our residents also influenced the spirit of health workers to deliver information.” (A health worker in high SES community)
RESULTS

Activities by health promotion action

![Graph showing frequency and percentage of participation based on health promotion actions.]

Activities by type of participants

![Graph showing frequency and percentage of participation based on type of participants.]

Activities by number of eligible participants

![Graph showing frequency and percentage of participation based on number of eligible participants.]

Average participation = \[ \frac{\sum \text{Number of participants participating}}{\text{Number of eligible participants}} \times 100\% \]

Figure 16. Frequency and average of participation (%) with regard to characteristics of activities
7. Risk factor progress in a five-year perspective

Figure 17 shows that the prevalence of smoking decreased significantly among both men and women from 2004 to 2009, while the prevalence of overweight and physical inactivity increased. The prevalence of low fruit and vegetable intake also increased (significantly among men).

Using these data, the risk of having a CVD event within the next five years was calculated. The calculation was based on a WHO chart adapted to developing countries that included sex, age, systolic blood pressure, smoking status, blood pressure treatment status, history of diabetes mellitus, and body mass index. In the calculation presented here CVD risk was used as a marker for NCD risk.
The percentage of men predicted to be at high risk for a CVD event increased significantly from 8.4% in 2004 to 11.3% in 2009. In contrast, the proportion estimated to be at high risk decreased slightly among women, Figure 19.

* significant at $p<0.05$

Figure 19. Proportion of subjects at high risk of getting a CVD event stratified by gender and socio-economic status
Figure 20. Proportion of men and women by age groups in 2004 and 2009 who had high predicted risk of a CVD event within the next five years

Figure 20 shows that the proportion predicted to be at high risk during the five year period 2004-2009 only increased significantly among men aged 55-75 years but not among women.
E. Discussion

1. Designing a community intervention to control NCD

The main aim of this study was to explore the process of developing a community intervention by highlighting possible opportunities, common pitfalls and barriers.

Baseline data disclosed different perspectives between lay people and the health system, Table 7. One important difference related to how to organize intervention activities. These differential preferences in the population (for individual or collective action) implied a need for different health promotion approaches. The health system, due to its heavy workload required support from people in the community and was basically only able to offer a "one fit for all" approach. Generally, the health system provides preventive services according to their understanding of what would be best for the community [101]. However a “one fit for all” approach may not fit for people both in low and high SES group. People in the high SES group are “self directed” (Figure 11), and are to a large extent able to solve their own problems, while for people in low SES communities the conditions are quite different. They have limited resources and choices and are willing to accept whatever the health system can offer.

Preventive actions may not lead to a positive outcome here unless these communities also provide active participation. If a health system in Indonesia aims to support people in low SES communities, it must overcome the notion that destiny, rather than risk factors, is the root cause of NCDs. Unless this can be done low SES people will not perceive their participation in prevention programs to be critical. Programmes with passive participation, according to Laverack [102], will continues as long as there is a significant impetus from the health system, but will rarely achieve the targeted outcome.

1.1. Planning an intervention program

Paper II illustrates how a community intervention can be developed based on population data, and how a program can be designed to comply with people’s perception. The baseline survey provides information on what risk factors to address and whom the program should focus on, whereas the qualitative data inform how to deliver the program in more acceptable way, Table 8.
Many models for planning and implementing health promotion programs have been published as a guidance for health promotion practice [103, 104]. The community intervention design process in this thesis is similar to the intervention mapping approach outlined by Bartholomew [105]. This approach highlights the adjustment to contextual conditions when performing health promotion [105]. The contextual conditions of our target group were mapped and described in a matrix with corresponding methods. The intervention mapping approach involved six stages: 1) needs assessment, 2) matrices between objectives and determinants, 3) theory-based intervention methods and practical strategies, 4) the intervention program, 5) adoption of the implementation program, and 6) the evaluation plan.

1.2. Community empowerment as an approach in community intervention

Paper III showed how a community empowerment approach can be applied to modify unhealthy behavior in a community. The intervention was designed as a “bottom-up” process as reflected in the engagement of local people in the problem identification, planning, and implementation stages. Paper III showed that the program received better acceptance in low SES than high SES groups, as shown by activities being more frequent in low SES group (40 compared to 13 activities).

NCD is considered to be a serious threat to social and economic development worldwide and demands serious international action. That threat was emphasized during the UN High Level Meeting on Chronic Diseases in September 2011, which declared the WHO as the leading body for action [27]. At the same time key actions were defined including a strong need for prevention and treatment [22].

In the Ottawa Charter, adopted in 1986, the need for community participation is strongly emphasized as one strategy for conducting health promotion [106]. Today there is general agreement that maintaining individual health is not only dependent on the individual, but also on the significant others’ behavior and on the social environment. WHO has highlighted the strong effect that the social environment has on an individual by emphasizing that “the people have the right and duty to participate in the planning and implementation of their health care”[107].

Although commonly used in the health field, the term participation actually has two aspects: passive and active participation. “Passive participation” is analogous to the term “community participation”. In contrast, “active participation” is linked more to the term “community action” as defined by Laverack [102]. Passive participation occurs when the community’s members participate in a way that is determined by others, whereas active participation takes place when an action is developed by community members to solve a self-defined problem [102].
According to Kemm and Close, there are three different models of how health professionals work with communities.

- The *community participation* or KAB model (knowledge, attitude and behavior model) is characterized by a domination of health professionals who define the best knowledge, attitudes and behaviors for the community.
- The *empowerment model* is characterized by a facilitation role for health professionals to support the individuals’ capacity to take control over their own health status.
- The *community action model* is characterized by the domination of the community, which organizes and works together to influence patterns or factors that cause the health problem [108].

In the health promotion field, the KAB model is commonly used, implying passive participation on the part of the community. The community intervention in this thesis utilized the empowerment model. The empowerment model, proposed by Kemm and Close, is considered to be the feasible choice to perform a ”moderate” strategy, which might be more acceptable to the community and also feasible for the health system.

### 1.3. Comprehensiveness of the Proriva

As NCDs are related to biological, behavioral and environmental risk factors, they require comprehensive prevention programs. There are, however, several aspects of comprehensiveness:

- Who defines the program, the health authorities or the people in the community?
- Is the program aimed at primary or secondary prevention?
- Who will benefit from the program? Is the program population-wide or designed to address only high-risk individuals?
- Does the program utilize a multi-sector approach?

Previous community interventions in China, Iran, India and Indonesia have reported that top-down strategies can have significant impacts on some behavioral risk factors [33, 34, 38]. The bottom-up strategy is also recognized as an important strategy for further study [38]. As previously discussed, this thesis mainly illustrates a bottom-up strategy.

In the baseline qualitative study, the health officers expressed the opinion that prevention is less important than treatment, because treatment has faster and more tangible impacts. On the other hand, primary prevention is more cost effective than secondary prevention [109]. In this aspect, this thesis is trying to enhance the delivery of primary prevention.
In primary prevention, there are at least two possible strategies: the population-wide strategy and the high-risk strategy. The population-wide strategy, which targets all members of the population, is known to be favorable from a cost–benefit perspective [8]. The high risk strategy is limited to referral of identified cases with high risk factor profiles for further treatment. This thesis focused on the population-wide strategy.

It has been proposed that environmental factors, like globalization, urbanization, poverty, low education and stress are determinants of NCD. Thus, action to prevent NCDs requires controlling environmental determinants, even if they lie outside the health sector [110]. Consequently, preventing NCD demands collaboration among many stakeholders including policy makers, NGOs, the private sector, academia, and appropriate governmental offices [111]. Some NCD community interventions in MIC (Iran, India and Indonesia) have initiated strong multi-sectorial collaborations to control NCD [36-38]. Multi-sectorial collaboration was also called for in the Proriva plan, but has so far mainly been limited to interventions in school and work-place settings (not reported in this thesis).

2. Challenges in community intervention to control NCD in an urban area in a middle-income country

This thesis highlighted some important challenges: 1) The increasing risk of NCD, 2) The limited possibilities for a community intervention to affect social determinant of NCD, 3) The need for education in low SES communities to distinguish between a sudden heart attack and a mild illness.

Paper IV indicates an increasing prevalence of NCD risk factors mainly related to increasing proportion of elevated blood pressure among men. Special efforts should be placed on tobacco control, as smoking is the major risk factor threat among men (Figure 12), and smoking is closely related to hypertension. The government of Yogyakarta Municipality should accept that a failure to initiate effective community interventions will lead to significantly increased NCD morbidity and mortality in the future [41].

In low SES communities, efforts to improve health literacy would help to reduce the misinterpretation of a heart attack as a mild illness, causing a delay in treatment and leading to serious complications or death. Triratnawati [112] in her study about masuk angin (too-much-exposed-to-wind illness) in Javanese context confirmed that heart attack (angin duduk or sitting wind in local vernacular) is a condition of late or ignored too-much-exposed-to-wind illness. In that way, misinterpretation of a heart attack illness as a mild illness leads to a later referral.
3. Opportunities in a community action to control NCD: Utilizing social capital for community empowerment

Paper II considered communities to have varying degrees of social capital available for the implementation of community mobilization. Social capital is the benefit arises from interaction of individuals within a social network [113]. Within the health system of Indonesia, maternal and child health programs, the program for diarrhea control [114] and immunization [115], have for a long time experienced the benefit of mobilization social capital [115]. Most of those mobilizations were possible through Posyandu (integrated service posts). Posyandu is claimed by the Government of Indonesia as a community based organization which is developed by the people in a community. However the development of Posyandu in all villages in Indonesia regulated by an instruction from the Ministry of Internal Affairs [116]. Health workers were recruited, trained, and organized as the backbone of the activities in the Posyandu. Health system indicators have shown encouraging results, such as high immunization rates for children under five years old, increasing utilization of oral rehydration therapy to control diarrhea, and increasing antenatal care visits.

Despite these successes, the practice of assigning voluntary health workers as assistants for government officers has been criticized. According to Sciortino, these health workers provide only passive participation [66].

Kemm and Close underline the importance that the model of how health professionals work with communities are determined by if those who dominates the decision-making also are the one responsible to fulfill the demanded resources [108]. If Posyandu is an artificial organization of government required to meet the government’s need [117], but Posyandu must fulfill the demanded resource for activities including participation of health workers [116]. It is difficult to expect voluntary participation among health workers.

“The fulfilment of facilities and infrastructure are essentially the responsibility of the management of the integrated health post and the local communities.” (A guidance from the Ministry of Internal Affairs [116])

These ambiguous positions of both the Posyandu and the health workers results in activities being run by them without any voluntary spirit, and instead more as forced tasks. As expressed by a health education officer, the health workers are considered to play a ”replenishing role”.
In response to the government’s recognition that the function of the *Posyandu* was declining, a policy to revitalize *Posyandu* was laid down [116]. This policy, however, has continued to maintain that *Posyandu* and health workers are an auxiliary of the primary health care system. There is a danger that health workers will lose their trust in the government and leave their voluntary work, and *Posyandu* will lose its function as a community-based organization for health.

In addition to illustrating the feasibility of using *Posyandu* and health workers in community interventions for health, this thesis illustrated people’s differing expectation towards their community leaders and health workers. For people in low SES, who could be characterized as having an intense sense of belonging, community leaders’ were expected to be dominant. Low SES communities also tended to appreciate health workers. Meanwhile, people in high SES, who tend to be more self directed, look upon their community leader as being insignificant. High SES communities were also less welcoming to their health workers. These characteristics were capture during the intervention (Paper III). Low SES communities tended to favor an altruistic program approach, while people in the high SES communities were more interested in an individualistic approach, Table 10.

<table>
<thead>
<tr>
<th>Low SES community</th>
<th>High SES community</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Altruistic approach</strong></td>
<td><strong>Individualistic approach</strong></td>
</tr>
<tr>
<td>• Group orientation</td>
<td>• Individual orientation</td>
</tr>
<tr>
<td>• Supported community activities</td>
<td>• Disliked community activities</td>
</tr>
<tr>
<td>• Health workers contribution meaningful</td>
<td>• Health workers less welcome</td>
</tr>
</tbody>
</table>

SES= Socioeconomic status

According to the concept of collective actors, when mobilizing social capital in the low SES group, the community leaders are similar to ”the enthusiast” and health workers are similar to ”the conformer”. A community action requires some actors to facilitate the process. Among those actors, the “enthusiast”, is an actor who mobilize to encourage the fighting spirit against collective problem; while the “conformer”, is an actor who pose the role of legitimating action in the name of the community [118]. This different expectation between people in low versus high SES communities illustrates the different degree of social capital between them.

A study by Eriksson explores the possibility of mobilizing social capital to perform a community action as a strategy for health promotion [118]. The social capital is recommended to be developed in four stages: 1) problem identification in the defined community, 2) encouragement of a ”fighting spirit” toward the commu-
nity’s problem from a local trusted leader, 3) motivation of “know-how people” to facilitate the action, and 4) reaching out to achieve support and legitimacy.

The potential roles of health workers and the ability to mobilize social capital within the communities created an opportunity to develop the community intervention program based on community empowerment.

This strategy is, as illustrated in this thesis, more appropriate in the community with high degree of social capital as in low SES communities, than in high SES communities.

4. Barriers in community action to control NCD

4.1. To standardize vs to accommodate when designing a community action

One barrier to the development of a community intervention with a community empowerment strategy is the possible discrepancy between standardization and accommodation. With a bottom-up community empowerment strategy, the major demand is to accommodate to what people need. Of course, it is impossible for the health system to accommodate to all these demands. The health system has to follow the rigor regulation of planning and budgeting for their programs and make decisions long before they run the program [119]. This limits the ability of the program to accommodate to new demands.

A balance between standardization and accommodation is needed when combining bottom-up and top-down strategies. The health officers, as the external agents for community empowerment, must give infrastructure support, provide for skills development, encourage critical awareness, provide technical expertise, support the community’s leaders, provide finances and share control over decision making [120].

4.2. Resources in demand

Another barrier to using a community empowerment approach is the need to generate resources to meet the demands of the program activities. Accommodating to what people need means that some part of the intervention components may require modification after resources have already been budgeted for. For example, in the community intervention of this thesis, local representatives considered that a championship in healthy walking might be an interesting event for people. Accommodating this event required provision of door prizes which were not budgeted for, and were ultimately provided by community members. Were this not the case, the planned activities would have to be modified [121].
When demands are self-provided, program components may in turn generate more of a sense of belonging among the community members. In this way a mutual accomplishment of goals between the health system and the people in the community can possibly be established. As identified in the concept of how social capital emerges, an internalized norm and solidarity within a society might motivate people to make their resources available for others [118].

4.3. Program sustainability and mutual benefit

Some community interventions have been done in LMIC, with various degrees of successes in reducing behavioral risk factors. One key issue is sustainability. Only a sustainable intervention has the potential to have a significant impact on behavioral risk factors [122] and NCD prevalence.

Sustainability requires lasting support from the community or from outside agents. By designing the intervention so that the citizens perceive it as belonging to the community, maintenance will be more likely. A community intervention with a bottom-up design that easily accommodates to the community’s demands will generate a sense of belonging in the people.

A program tailored with a top-down strategy relies on external agents. These external agents will only keep up the maintenance effort if they perceive the intervention to be important enough. In summary, the sustainability of a community intervention relies on the perceived benefit of stakeholders. Generally, a program owned and run by the community will be more sustainable, even if the resources for activities are limited. In programs where the community collaborates with external agents, especially when combining a top-down and bottom-up approaches, it is important to emphasize the mutual benefit between the community and the external agent.
5. Methodological consideration

5.1. Study design

The design of the pilot study was quasi-experimental. Although the randomized clinical trial is considered to be the gold standard, it is usually not feasible when evaluating community interventions [123]. If random assignment is performed, there is the possibility that the information will unintentionally be delivered from the intervention to the referent areas (contamination bias) [124].

5.2. Strength

The strength of this study lies in its attempt to illustrate and explain the process by which a community intervention was implemented. This emphasis on the process itself may enhance our understanding of the mechanisms behind the community acceptance [123]. It is noted that the impact of an intervention is sometimes judged by its effectiveness, while effectiveness is in turn a function of acceptance [125]. Our findings might be of some relevance in both the planning and launching of a program as well as in up-scaling an ongoing program.

The study also contributed to the understanding of how to implement a community empowerment strategy. Community empowerment has been proposed as a possible way to counteract inequities in social conditions [101] and also to empower people to be more responsible for their own future. Community empowerment has been applied with promising results in promotion practices such as in cases of HIV/AIDS [126], nutrition [127], and malaria [128]. However, it has not seen wide-spread use as a strategy to prevent NCD.

5.3. Limitations

This study was carried out in a setting that had limited resources to perform either cross sectional studies or health interventions. As is the case for many studies, it can be difficult to separate out its true impact on the respondents’ increased awareness versus the impact of secular trends [129].
F. Conclusions and recommendations

This thesis addresses a pilot community intervention developed based on a qualitative analysis of people’s perception of cardiovascular diseases and on the analysis of risk factor pattern in the population. The aim of the thesis is primarily to illustrate the feasibility of intervention efforts. The intervention itself applies a community empowerment approach in order to improve the acceptance of its components. The underlying idea is that the higher the acceptance achieved in the population, the stronger intervention effect.

1. CVD is a serious health threat in Yogyakarta municipality both from a public health and a health system perspective. In the thesis this is illustrated in the comparison between its two cross-section studies indicating an increasing predicted risk among males of getting a CVD event.
2. The Indonesian cultural concept of balance and harmony guides also when the Yogyakarta municipality population reflects on and tries to explain their understanding about cardiovascular diseases including the cause of heart disease, how to prevent heart disease and how people can organize their actions.
3. People organize themselves in different way according to which community they belong to. People in low SES communities prefer collective actions, whereas people in high SES communities prefer more individual and independent actions.
4. The community empowerment approach might serve as a moderate option to accommodate with what people need when implementing a community intervention of certain topic defined by external agents.
5. Even if a community empowerment approach is feasible in many respects, several dilemmas remains to be further elucidated: Contradictions between external standardized programs versus local adaptations, allocation of resources that can match the prevention needs as well as intervention program sustainability in a longer term.

The community intervention in this thesis, developed with a community empowerment approach, should be regarded as an initial step. Further studies are needed about how to integrate the community empowerment intervention within the service provided by the existing health system. Furthermore, practicing healthy lifestyle requires a supportive environment which is most likely to be achieved within a multi-sectorial collaboration.

A health promoting public policy implemented on national, regional and local levels is necessary to facilitate multi-sectorial collaboration to prevent NCD.
About the researcher

I have been living in Yogyakarta Municipality since I was born. I am the youngest in a family of 6 children. I was a child with high curiosity; I enjoy to do experiment, frequently ended in destructions of something. Besides that, I have been exposed to social events by my mother who participates in so many social activities. My parents are lecturer with different characters, a serious and diligent character of my father vs. a cheerful and sociable character of my mother.

My first job was a part-time physician on a 24 hours clinic for two months before I was assigned as a physician in a Public Health Center (PHC) in a remote sub-district in Bantul District, Yogyakarta Province. In the PHC I felt overburdened by so many patients, especially in times of a Dengue epidemic. I did hardly have enough rest and felt depressed as I could do nothing to relieve the clinical burden. I pointed my finger to myself why most people in the community did not pay enough attention to what causes their illness. Why were they only concerned by their health when they already were suffering from more serious conditions?

A health educator in the PHC also felt overburdened as he could not manage to educate the whole population by himself. In my mind I just thought that there must be a way to solve this problem.

In 1997 – 1998 I got the opportunity to study for a Master of Public Health in Epidemiology and Public Health at the Department of Public Health and Clinical Medicine, Umeå University in Sweden. After that, I started to work in Gadjah Mada University as a lecturer in Public Health Department, Health Behavior and Health Promotion Division. Furthermore, I also got the opportunity to pursue a doctoral degree again at Epidemiology and Global Health at Umeå University.

Later, I recognized how heart disease and stroke became a dominant cause of death in my extended family. Furthermore, I could notice sporadic cases of NCD among relatives at a younger age than was the case several decades ago. In order to control NCD, controlling tobacco use became my first interest, as I realized that tobacco is strongly related to NCD but this problem was ignored. However, working with tobacco is not enough. To control NCD, there are many determinant factors. After discussion with my supervisor, I decided to change my topic into addressing community interventions to prevent NCD. By studying this topic my hope is to contribute to NCD prevention actions in a wider perspective.
Acknowledgements

In the name of Alloh the Most Gracious and the Most Merciful, all prices to Alloh for the strength and His blessing in completing this thesis.

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I am truly indebted and thankful to Lars Weinehall, my main supervisor who was always there when I needed. I would like to thank for his constant support, suggestion and invaluable motivation throughout the research and thesis work. Hans Stenlund, my co-supervisor, for his suggestion especially in the statistics matter. Ann Öhman, my co-supervisor, for her dedication to work together and give practical guidelines in qualitative work. Mohammad Hakimi, my co-supervisor, for his motivation and suggestion throughout the work.

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## Appendix

### Appendix 1. The weighing value for cross-sectional survey 2004 and 2009

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* Data source: Badan Pusat Statistik (Central Board of Statistics) 2005[130]

** Data source: Badan Pusat Statistik (Central Board of Statistics) 2010[131]
Appendix 2. The intervention location

Image 2. The intervention communities of the pilot study

Image 2.a. Low SES communities

Image 2.b. High SES communities
Appendix 3. Some activities in the pilot community intervention

Image 3. Some activities in the high SES intervention communities

Image 3.a. A training for health workers

Image 3.b. A coordination meeting of working team (Community leader, health workers and Proriva Staff)
APPENDIX

Image 4. Some activities in the low SES intervention communities

Image 4.a. Community meeting

Image 4.b. Sunday morning walking

Image 4.c. Announcement of the champions and door prizes distribution

Image 4.d. Health workers after declaring their intention and accepting a letter of acknowledgement

Image 4.e. A counseling at the heart disease post

Image 4.f. Interactive group discussion to raise awareness toward NCD threat
Appendix 4.
Some examples of media for health education

Image 5. Images in a flipchart for health education

Image 5.a. The function of heart

Image 5.b. How to prevent NCD
APPENDIX

C. Hindari rokok


D. Atasi tekanan darah

Bila tekanan darah normal adalah 100 – 130 mmHg untuk tekanan darah alias pada istri, dan 60-80 mmHg untuk tekanan darah bawah (diastol). Tekanan darah alias tekanan saat jantung menompa darah, sedangkan tekanan darah bawah adalah saat jantung beristirahat. Jika angka tekanan darah di atas angka normal tersebut, maka dikatakan menderita tekanan darah tinggi (hipertensi).

Hal-hal yang dapat dilakukan untuk menege tekanan darah tinggi adalah:

- Berolah raga secara teratur
- Memperbanyak konsumsi buah dan sayur
- Menghindari makan bahun yang mengandung alkohol (sepeti durian dan nangka)
- Mengurangi makan daging, terutama yang berlemak (termasuk jerah dan kail)
- Mengurangi konsumsi garam
- Menghindari minuman kafein
- Menghindari minuman - minuman yang beralkohol
- Mengurangi minum kopi
- Bagi yang sudah terkena tekanan darah tinggi, perlu kontrol ke dokter (psikoterapi) dan mengikuti saran dokter tersebut.

E. Teratur berolahraga

Olah raga adalah satu pilihan terbaik yang bisa kita tergolong sebagai orang yang kurang aktif. Orang yang kurang aktif adalah mereka yang pekerjaan dan kurang menggerakkan anggota tubuh. Oleh sebab sekalipun dipikirkan, yang paling menyenangkan bagi kita dan sesuai dengan kemampuan kita. Tak ada gunanya kita berolah raga yang mahal tetapi hanya dilakukan secara formal biasa saja kembali lagi. Untuk menjalih kondisi tubuh, akan sangat bermanfaat apabila kita dapat berjalan kaki paling tidak 30 menit sebelum kembali dalam sekolah. Apabila ingin melakukan olah raga lain yang banyak mengeluarkan tenaga (misalnya badminton, tenis, dan lainnya), sebaiknya lakukan dengan penuh semangat. Jika sudah cukup berat, mendingan konsultasi dengan dokter yang menekan darah tinggi, karena masalah, lakukan pemeriksaan ke puskesmas terkena terlebih dahulu.

Prinsip oleh raga adalah bertenaga, tetapi, dan berkelanjutan, dimulai dari yang ringan kemudian kembali lama semakin ditambahkan baik kualitas maupun lama waktunya.

Peningkatan: Oleh raga yang tidak sesuai dengan kemampuan justru dapat, memicu serangan jantung atau kumuh segera!
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