Scaling-Up Non-communicable disease interventions in South-East Asia

SUNI-SEA

Work Package 2 Final Report

Cost-effectiveness Key findings and recommendations

This report Cost-effectiveness key findings and recommendations is part of a series of three reports. The other two reports are Experiences with scaling-up (WP1) and Guidelines and training materials (WP3). Together, these reports provide a comprehensive overview of the SUNI-SEA research project.
Also read our policy briefs Achieving Universal Health Coverage for NCDs, Scaling up community-based NCD interventions Bridging the digital divide.
Find all information about the SUNI-SEA research project on www.suni-sea.org

Scaling-Up NCD Interventions in South-East Asia (SUNI-SEA)
The increasing prevalence of non-communicable diseases (NCDs) and their high impact on mortality, morbidity, and public health, particularly in low- and middle-income countries, prompted the launch of an implementation research project "Scaling-Up NCD Interventions in South-East Asia (SUNI-SEA)" which was implemented in Indonesia, Myanmar, and Vietnam. This four year initiative began in 2019 and was a collaboration between ten consortium members, namely University Medical Center Groningen (Netherlands), Faculty of Economics and Business, University of Groningen (Netherlands), University of Passau (Germany), Trnava University (Slovak Republic), HelpAge International, Age International, Sebelas Maret University (Indonesia), Thai Nguyen University of Medicine and Pharmacy (Vietnam), Health Strategy and Policy Institute (Vietnam) and Vietnam Association of the Elderly (VAE).

The SUNI-SEA project aimed to identify the best and most affordable ways to expand programs that prevent and control diabetes and hypertension in Southeast Asia. The project investigates which interventions work effectively and are worth the investment, also in other low- and middle-income countries.

Disclaimers:
The contents of this report are the sole responsibility of the SUNI-SEA consortium and do not necessarily reflect the views of the European Union or the Global Alliance for Chronic Diseases.

Table of Contents

Executive Summary

Introduction
This report presents a summary of the key findings and recommendations from the 4-year research project SUNI-SEA – Scaling-up non-communicable diseases (NCDs) interventions in Southeast Asia. The overall aim of the SUNI-SEA project was to evaluate and validate effective and cost-effective scaling-up strategies of evidence-based diabetes and hypertension prevention and management programs and apply the results to enhance sustainable action for the achievement of the Sustainable Development Goals (SDGs), based on experiences in South-East Asia. The report provides insights into the activities and results of Work package 2 of the project, which focused on the assessment of the effectiveness and cost-effectiveness of community-based programs to prevent and control NCDs in Indonesia and Vietnam.

Retrospective Phase
The aim of the retrospective phase (year 1 of the project) was to assess and to synthesize the evidence of a broad set of NCD interventions in Southeast Asia to learn about the effectiveness of different approaches. Moreover, the objective was to identify implementation gaps of community-based programs already implemented in Indonesia and Vietnam. Several implementation and knowledge gaps were identified, such as suboptimal coverage rates, inadequate reach of the target population and missing screening and referral guidelines for NCDs. Also, community initiatives were not always aligned with primary health care services.

Interventions
To improve the situation that was identified in the retrospective phase, SUNI-SEA implemented multiple interventions focusing on the following dimensions:

- **Increase the package of services** in the existing community program s or in the health facilities in the research area, for example by making NCD screening and counseling available for all adults.
- **Increase the quality of service** in communities or health facilities, by building capacities of volunteers and health care professionals, to achieve a more sustainable impact.
- **Increase the coverage of services,** for example by training staff in new health facilities or initiating more community groups, reaching more people in more geographical areas.

The results presented in this report focus specifically on the interventions addressing the **quality dimension**. The major interventions consisted of a training program for health volunteers in the community-based programs as well as short training for health professionals in primary health care. The intention was to improve the linkages between community- based services and the primary health care system and thereby to create synergies. The SUNI-SEA team developed a simple screening protocol (algorithm) to be used to identify people with NCD-risk factors in all three countries, especially hypertension and diabetes and to identify those who need referral. Furthermore, the training included sessions about appropriate health education and how to promote participation as well as individual prevention and healthy lifestyles.

Impact Evaluation

To assess the effectiveness and cost-effectiveness of the interventions, we conducted three impact evaluations for Indonesia and Vietnam during the prospective phase (years 2-4 of the project):

Indonesia

- The impact evaluation provides evidence on the effectiveness of Posbindu, i.e. sheds light on the question how participation in the community based NCD program in Indonesia affects diabetes and hypertension knowledge, awareness, treatment adherence, health behaviors and NCD risk factors.

- The second impact evaluation answered the question how an improved Posbindu, i.e., a Posbindu that had received a capacity building intervention and where new screening algorithms were implemented, performed in comparison to regular Posbindu, that had not received such interventions.

Vietnam

- The impact evaluation provides evidence on the effectiveness of Intergenerational Self-Help Clubs, i.e., it sheds light on the question how participation in ISHCs, which provide NCD screening and other health activities, affects diabetes and hypertension knowledge, awareness, treatment adherence, health behaviors and NCD risk factors.

Key findings

The analyses show that participants in community-based interventions relative to non-participants demonstrated significantly increased health knowledge about NCDs and awareness of risk factors. Some small improvements in service level and quality could also be detected. This is promising and shows that the capacity- building interventions for health workers and volunteers led to positive changes for the program participants. Yet, the improved knowledge has only partly resulted in better health care behavior and healthier lifestyles. Given the limited time in which the improvements in the programs could unfold their full potential due to the Covid-19 crisis, more time is needed for the interventions being able to affect behaviors and lifestyles.

Cost-effectiveness

When relying on an extrapolation of the effects found in the Indonesian and Vietnamese programs, a favorable cost-effectiveness for an up-scaled program ratio seems in reach only if the quality of community-based activities and subsequent health care delivery can be ensured. Explicit efforts should be put into ensuring that health education creates awareness to improve lifestyle and early detection of symptoms of diabetes. In addition, efforts should be made to strengthen the two-way referral between community healthcare stations and primary healthcare, to reduce the number of undiagnosed cases, and to ensure the adherence to long-term treatment.

Call for Action

- **Intensify training activities** through repeated and in-depth training for community health workers and primary health care officials to mobilize human capital in communities for improvement of health and wellbeing.
- **Increase efforts to reach out to new target groups,** especially the working and male population. Workplace or institutional screenings, as they are being tested in Indonesia, are a promising approach. Similarly, integrating NCD programs in already existing community group structures, as it is done in Vietnam, is deemed an effective solution. Different incentive schemes or encouragement designs can also offer a useful instrument to increase participation.
- **Strengthen the two-way referral** between community healthcare stations and primary healthcare.
- **Ensure sufficient funding** for community NCD programs and give NCDs high priority in healthcare.

1. Introduction

This report presents a summary of the key findings and recommendations from the 4-year research project SUNI-SEA – Scaling-up non-communicable diseases (NCDs) interventions in Southeast Asia. The overall aim of the SUNI-SEA project was to evaluate and validate effective and cost-effective scaling-up strategies of evidence-based diabetes and hypertension prevention and management programs, and apply the results to enhance sustainable action for the achievement of the Sustainable Development Goals, based on experiences in South-East Asia. The report provides insights into the activities and results of Work package 2 of the project, which focused on the assessment of the effectiveness and cost-effectiveness of community-based programs to prevent and control NCDs in Indonesia and Vietnam.

NCDs, such as diabetes and cardiovascular diseases, have overtaken infectious diseases as the number one cause of death worldwide. The spread of NCDs is especially grave in the Southeast Asian region, which saw a steep increase in the NCD burden over the last decades (1). Especially affected are the region's poor, who face the risk of carrying the greatest burden of NCDs and, as a result, also of facing the consequences of further widening health and economic inequalities (2,3). This escalation is to a large extent driven by urbanization, economic development and globalization, which rapidly have pushed the region's populations toward adopting more unhealthy lifestyles, such as consuming unhealthy diets, foregoing physical activity and smoking tobacco, and ultimately to a larger risk of contracting NCDs. To counteract this trend, the SUNI-SEA research consortium conducted a 4-year research project to 1) assess the current state of NCD prevention and control interventions in Vietnam, Indonesia and Myanmar, focusing on community-based screening and health interventions, 2) to implement and evaluate capacity trainings within the health care system with the aim to improve existing community based NCD programs, and 3) to provide cost-effectiveness analyses of these programs to derive policy recommendations for the given context about efficient and cost-effective scaling-up strategies of such programs.

This report synthesizes results from different stages and sub-projects. It begins with insights from the **retrospective phase** (2019) of the project, in which the current state of NCD prevention and control activities throughout Southeast Asia was assessed in the form of a systematic review, qualitative interviews with local stakeholders, reviews of local guidelines and grey literature, and field research visits of the country teams in Indonesia and Vietnam. Based on the findings and identified implementation gaps, the **prospective phase** (2020-2023) was designed to provide potential solutions and means to address these gaps. Specifically, the research consortium implemented capacity building interventions, including training for primary health care workers and health volunteers in the community-based NCD programs and complemented these interventions with impact evaluations. For the case of Indonesia, the impact evaluation focuses on the community- based NCD program Posbindu, whereas for the case of Vietnam, the analysis focuses on community health interventions implemented in Intergenerational Self-Help Clubs (ISHCs). The key findings and recommendations from this prospective phase are presented in the second part of this report. Lastly, in the third part, this report presents insights from different **modelling exercises** in which several future scenarios based on the outcomes of the impact evaluations were assessed, and cost-effective up-scaling strategies were discussed.

2. Retrospective phase

The aim of the retrospective phase was to assess and to synthesize the evidence of a broad set of NCD interventions in Southeast Asia to learn about the effectiveness of different approaches. Moreover, the objective was to identify implementation gaps of community-based programs already implemented in Indonesia and Vietnam. The key results of this review could then be used to inform the activities to be implemented and evaluated in the prospective phase of the project. To this end, we conducted a systematic literature review covering evidence from the whole Southeast Asian region. Further, we conducted field research visits at the

implementation sides of the local NCD programs, conducted qualitative interviews with local stakeholders, and reviewed country-specific guidelines. We present the results from each of these activities in turn.

2.1 Systematic review

As a starting point of the project, we conducted a systematic literature review on the universe of interventions which aim to achieve a reduction in NCD risk factors, an increase in NCD prevention efforts or an improvement in the general practices of health facilities in any Southeast Asian country (for the complete review see Fritz & Fromell, 2022) (4). This review had the objective to provide a complete picture on the available evidence of NCD interventions in Southeast Asia and, thereby, establish a knowledge base that could inform the future stages of the project. The literature search resulted in a final sample of 51 studies and is depicted in Figure 1. We sorted them into six different intervention categories with respect to their targeted disease, risk factor or intervention design. In total, we looked at a universe of 23 different health outcomes that such interventions can address.

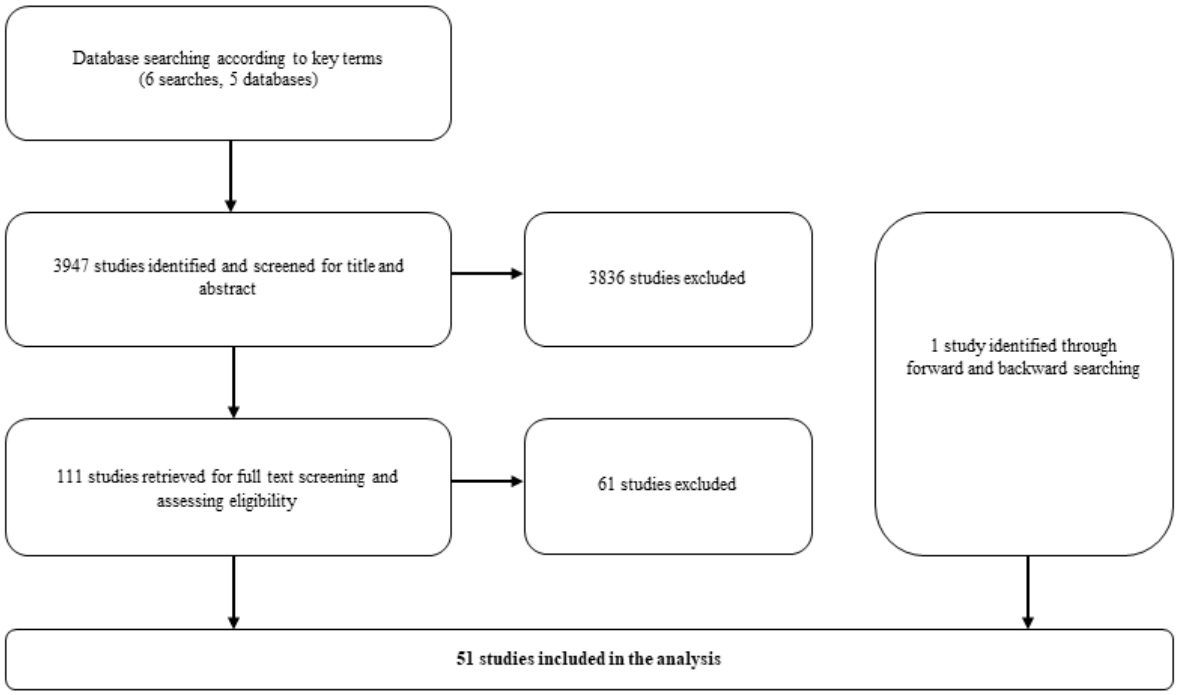

Figure 1: Search strategy and results. Source: Fritz & Fromell (2022) (4)

Our review showed that especially programs focusing on smoking cessation, on the take-up of preventive screening activities or educating patients on how to cope with NCDs achieved sizable impacts. Dietary and physical activity interventions largely failed to achieve improvements in analyzed health outcomes. In line with the latter, we also showed that health outcomes related to weight loss, i.e., BMI and waist circumference, are those that seem hardest to address by the interventions under study (Figure 2).

The review also showed that the number of contact moments study participants had with the implementing health authorities strongly related to the intervention effectiveness. Also, the age of the targeted participants and whether the intervention was implemented in a group design moderated the effect size: Smoking studies with on average older participants achieved larger effect sizes all else equal, while screening studies with on average older participants found smaller effect sizes. We also found evidence for stronger effect sizes for screening interventions targeted at groups. This suggests that community- or group-based approaches can effectively increase screening rates, which was deemed favorable, given that several Southeast Asian countries focus on community-based approaches for NCD prevention.

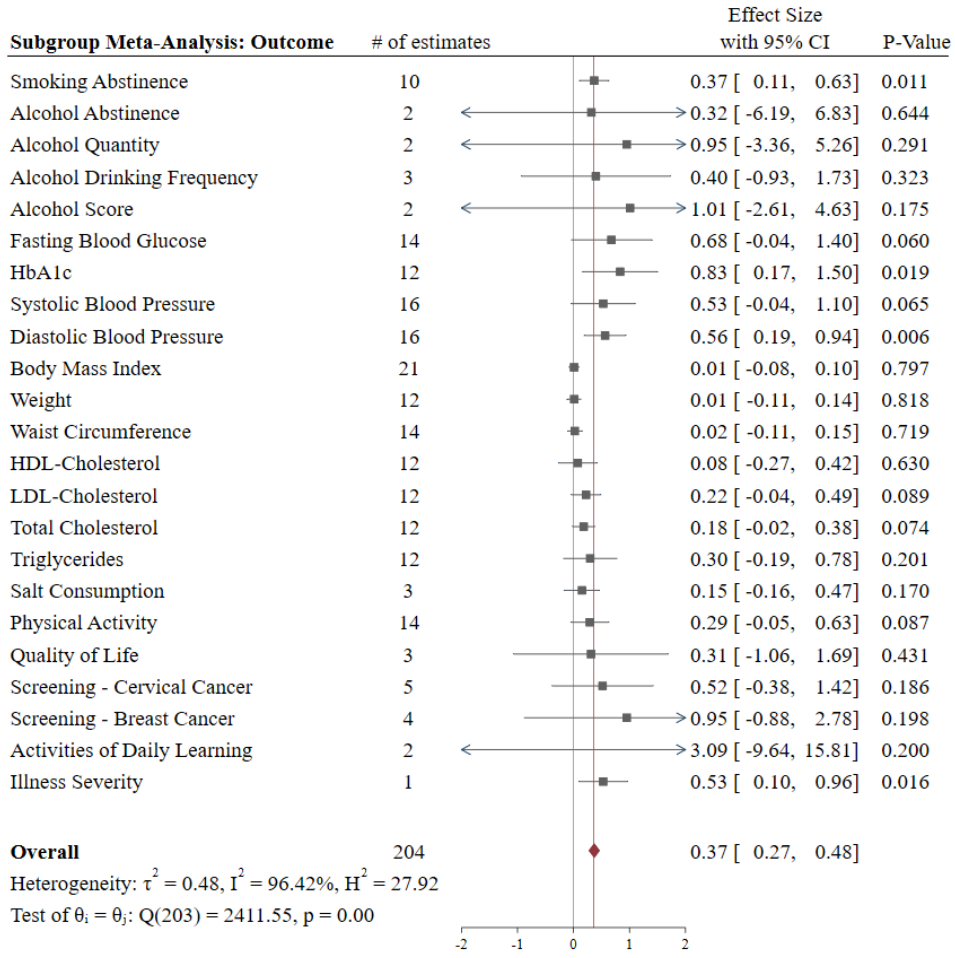

Figure 2: Results of the meta-analysis. Source: Fritz & Fromell (2022)

2.2 Results from the retrospective Phase: Indonesia

The research activities in Indonesia focused on the community-based NCD program Posbindu. Posbindu is a community-level screening program for the prevention and control of non-communicable diseases. Posbindu invites on a regular level (preferably every month) community members to gather, to undergo NCD screening and get education and advice by so-called cadres (village health volunteers) on health-related behavior. Posbindu operates in close collaboration with the primary health care centers (Puskesmas) to which they refer patients who need follow-up exams or treatment, and from which nurses are sent to participate in Posbindu.

In the course of the retrospective phase, the SUNI-SEA team Indonesia visited several Posbindus in the study sites and noticed inadequate reporting and recording of important information. After inspections of secondary data in Posbindu, it also became evident that many NCD related surveillance data were missing. The most common data available in the Posbindu registers were demographic information, and physical measurement i.e. waist circumference, systolic/diastolic blood pressure, whereas measurements on blood sugar or cholesterol were largely missing.

In addition, there were suboptimal coverage rates as well as an inadequate reach of the target population. Most of Posbindu visitors were female (80.3%). Furthermore, although the proportion of participants in the age range 24-59 is the highest, it was still considered low relative to the proportion of this age group in Indonesian population, and one third of all visitors were elderly above the age of 59 (Figure 3). With respect to the risk factors for NCDs, a

significant share of Posbindu visitors have hypertension (37.4%). Moreover, there was a significant share of Posbindu visitors being overweight (32.2%) or obese (12.1%).

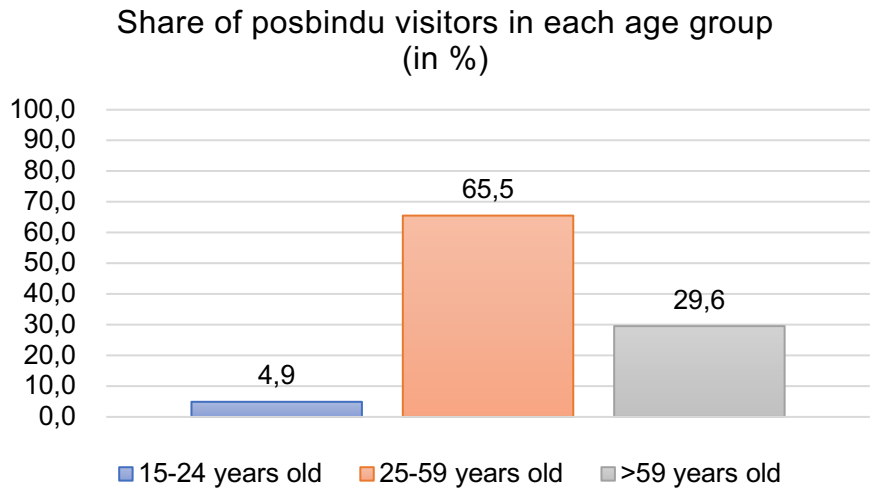

Figure 3: Age structure in Posbindu. Source: Own representation.

Several major issues were identified in the retrospective phase: (1) There was an inadequate linkage between Posbindu and primary health care; mainly due to missing guidelines on procedures for referral. (2) Practical guidelines for cadres for how to motivate people to participate in Posbindu, and in health education and monitoring procedures were absent. (3) There was a lack of NCD education materials for cadres and communities on how to improve awareness in NCD (5).

The Indonesian team also measured the knowledge people have on diabetes and hypertension, using the KAP-questionnaire (Knowledge, Attitude, Practice). People seemed to know what diabetes is and what symptoms go with it, but one third did not know about risk factors, complications and prognosis. About 80% of the people interviewed thought a healthy lifestyle is not important because medicine would help in the case of sickness. Generally, only half of the respondents had a lifestyle that was considered healthy.

In summary, the retrospective phase identified the following gaps around NCD control in the context of Posbindu in Indonesia:

1) Gap in policy and guidelines:
   - Limited policy on NCD screening sustainability (budgeting)
   - Lack of practical guidelines for program activities
   - Lack of guidelines for referral systems, after screening
2) Gap in implementation:
   - Suboptimal target population (missing men and younger people)
   - Suboptimal activities
   - Suboptimal referral system
   - Lack of implementation of guidelines
   - Lack of cadres' knowledge and materials for cadres' support
   - Lack of materials for health education and promotion
3) Gap in monitoring and evaluation:
   - Manual and irregular reporting, monitoring, and evaluation
   - Complicated reporting systems, unmatched to existing resources
   - Un-integrated database

2.3 Results from the retrospective Phase: Vietnam

The research activities in Vietnam focused on health care services provided by primary health care centers (PHC), commune health stations (CHS) and screening activities taking place in Intergenerational self-help clubs (ISHCs) at the village level. The Government of Vietnam started to strengthen the primary healthcare system with a focus on delivering the basic package of health services, including prevention, control and care for NCDs. With adequate staff and resources, the CHSs are designed to bring healthcare closer to the individual by managing NCDs in the communities. The objective of this strategy is to reduce the rate of individuals suffering from NCDs, to limit the disability and early death due to NCDs, and to limit the burden of disease and mortality through raising awareness and mobilizing local resources. Types of implemented primary healthcare facility programs in Vietnam identified during the retrospective phase include ensuring provision of medicines and basic health services at primary health care; capacity building of professionals (such as developing and implementing training programs for medical staff); follow-up treatment at district health centers (DHC) and CHS; strengthening practice skills for the prevention and management of chronic conditions; and developing and implementing guidelines for hypertension and diabetes management. However, the retrospective phase showed that Vietnam faces substantial barriers to efficiently implement the proposed programs. At the primary health care and community level further capacity strengthening of both individuals and organizations is needed. The identified gaps and corresponding recommendations were as follows:

- Policies and guidelines for service provision at DHC and CHS were not adequately applied in all facilities;
- NCD services provided did not cover the whole required spectrum of services (for instance, the following services were recommended to be included: promoting hypertension treatment at CHS level, screening for diabetes at CHS where applicable, adding or refining the preventive health component of community group interventions, adding or improving screening);
- The reached target population was limited to certain population groups, hence it was advised to reach new groups and reaching individuals within communities who were not yet in ISHCs;
- The quality of the provided services was often insufficient. Hence it was advised to increase the quality of services, in PHC facilities as well as in community-based programs, by capacity-building activities and a rigorous evaluation of these activities.

Consequently, the SUNI-SEA consortium proposed a strategy to help address some of these barriers. The main focuses for the prospective phase were designed to strengthen the capacity of PHC facilities and community in provision, access and utilization of health services related to the prevention, treatment, and management of selected NCDs, particularly hypertension and type 2 diabetes. Within communities, the project collaborated with the ISHCs to reduce the burden of NCDs. The aim of the ISHC capacity building was to strengthen community engagement and actions by improving individuals' knowledge of high blood pressure and diabetes, which enables individuals to identify risk factors and detect symptoms earlier, and proactive access to prompt diagnosis and proper treatment.

3. Prospective phase

The prospective phase was planned from January 2020 to October 2022. However, due to the COVID-19 pandemic the prospective phase started later and was interrupted for several months. A no-cost extension made it possible to continue until March 2023.

3.1 Results from the prospective Phase: Indonesia

During the prospective phase for Indonesia, we conducted two impact evaluations. The first provides evidence on the effectiveness of Posbindu, i.e., sheds light on the question how participation in the community-based NCD program in Indonesia affects diabetes and hypertension knowledge, awareness, treatment adherence, health behaviors and NCD risk factors. The second impact evaluation answered the question how an improved Posbindu, i.e., a Posbindu that had received a capacity-building intervention and where new screening algorithms were implemented, performed in comparison to regular Posbindu, that had not received such interventions.

3.1.1 Assessment of the effects of participating in Posbindu versus no participation

To allow for a quasi-causal comparison of the outcomes of Posbindu participants with non-participants, we relied on a so-called matching approach. This approach accounts for the fact that a simple comparison of Posbindu participants and non-participants would not provide a causal analysis of the impacts, since individuals choosing to participate might be different from those choosing not to participate. Hence, matching allows to create an artificial control group by comparing each participant with a non-participant with similar observable characteristics (e.g., age, gender, income level, previous health history) and the outcomes of interest are compared between these matched individuals and then averaged over all pairwise comparisons. This quasi-experimental method allows to derive nearly causal estimates of the effects of Posbindus on health outcomes as long as participation is largely explained by observable characteristics.

For the analysis, we combined different data sampling strategies. We used a purposive sample of 600 Posbindu participants (10 randomly selected individuals from the participant lists of each of the 60 Posbindu that were included in the study). Next, we randomly selected ten households that resided in close proximity to these 60 Posbindus. For each of the sampled 600 households, an interview was conducted with the household head and additionally with a second household member that was closest in terms of observable characteristics to the average Posbindu participant. Hence, the final sample consists of 1800 individuals from 1200 households: 600 Posbindu participants (1 per household), 600 household heads (could be participants or not) and 600 additional household members belonging to the 600 household heads (could be participants or not/ those who were more likely to participate). This combined sample allowed us to investigate the effect of Posbindu on the range of health-related outcomes mentioned above by comparing individuals that had participated in Posbindu (“treated individuals”) with individuals that had never participated in Posbindu (“control individuals”), but who otherwise were similar in terms of their observable characteristics. The underlying theory of change (or result chain) is displayed in Figure 4.

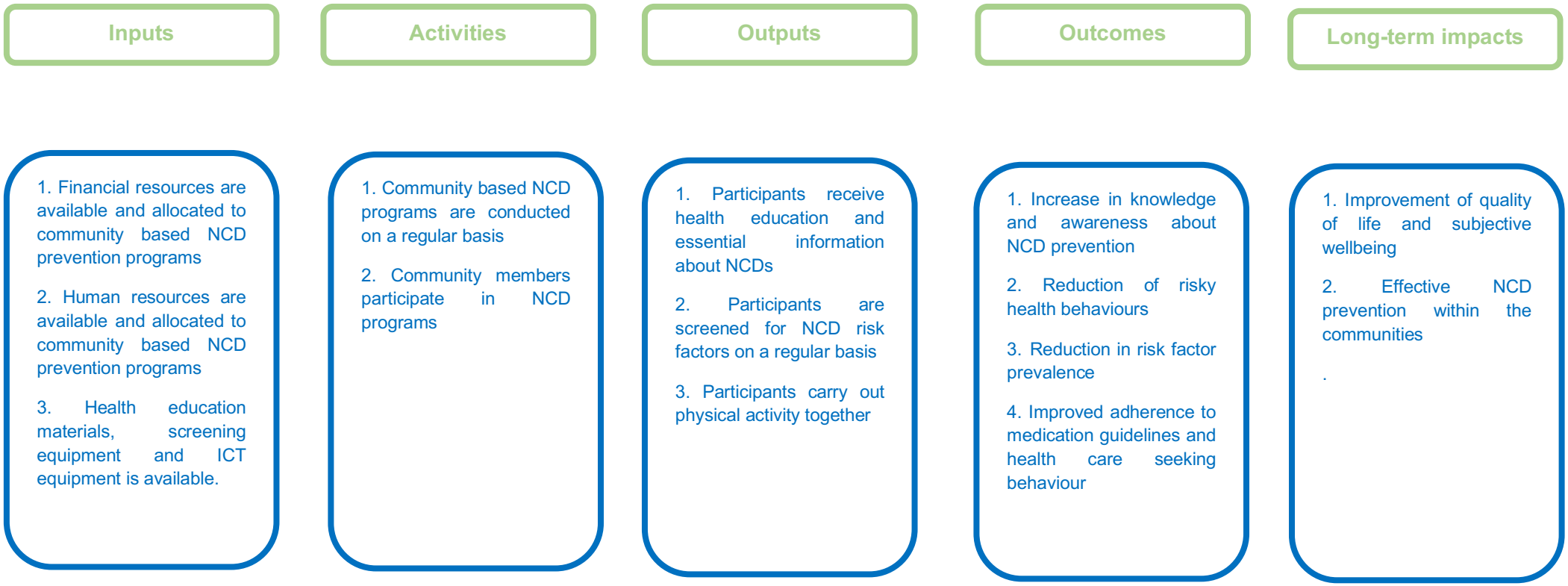

Figure 4: Theory of change. Source: Own representation.

The results of our analysis showed that the community-based NCD program Posbindu has significant and positive effects on NCD knowledge. Participants are more knowledgeable about the risk factors, symptoms and complications of diabetes and hypertension. They are also more likely to have heard of some of the medical terms related to NCDs. This is a promising finding, as it is precondition for many other potential improvements in health-related behavior and health status later in the result chain.

We also observed an improvement in the perceived importance of conducting certain health activities to manage hypertension and diabetes which further supports the knowledge effects. Yet, despite the improvements in health knowledge we found no significant changes in behavior or lifestyle. These behavioral changes may need more time to unfold.

Consequently, in Indonesia, we could not yet detect any improvements in metabolic risk factors – measures for systolic and diastolic blood pressure are similar for participants and non-participants. Posbindu participants have on average also similar BMIs, waist and hip circumferences as non-participants.

In terms of the service quality, we found higher detection rates of hypertension, i.e. participants of Posbindu are more often tested and more cases of hypertension are detected than for non-participants. Moreover, Posbindu participants visited a primary health care center or sought medical care due to NCDs almost twice as often as non-participants.

Hence, overall, we found significant improvements in the first stages of the theory of change: Posbindu participation significantly increases NCD knowledge, indicating that participants receive health education and essential information about NCDs from the health volunteers in the program. Also, participation significantly increases the probability of having been screened and being detected with hypertension. These results are promising, but also show that further improvements in Posbindu are needed to affect health outcomes further down the theory of change.

3.1.2 Assessment of improved Posbindu

This section provides an impact assessment of the effectiveness of the improved Posbindu program as compared to the standard Posbindu program. In the provinces of East and Central Java (see Figure 5), four study sites had been selected; two from each province. These include the two cities Surakarta (Central Java) and Kediri (East Java) and the two regencies Jember (East Java) and Batang (Central Java). Kediri and Batang constituted the intervention areas and Surakarta and Jember the control areas.

Figure 5: Study locations. ***Source:*** **Own representation.**

The assessment relies on a comparison of the changes in the intervention area relative to the changes in the control area assuming that the intervention area would have seen the same changes as the control area in the absence of the intervention (difference-in-difference design). The assessment makes use of a baseline survey collected before the intervention and an endline survey collected 15 months after the first improvements in the intervention area were

implemented. Yet, in some areas the implementation had been delayed due to Covid-19, so that the duration between intervention and endline survey varies between 6 and 12 months.

The assessment is complemented with qualitative information from focus group discussions and in-depth interviews with Posbindu cadres and health staff at the community level, patients and other stakeholders to substantiate and rationalize the findings from the quantitative assessment. Additionally, information from administrative records ("monitoring data") from various Posbindu sessions is used to provide detailed descriptions of average participation rates, prevalence of risk factors and referrals. An overview of the different data sources is provided in Figure 6.

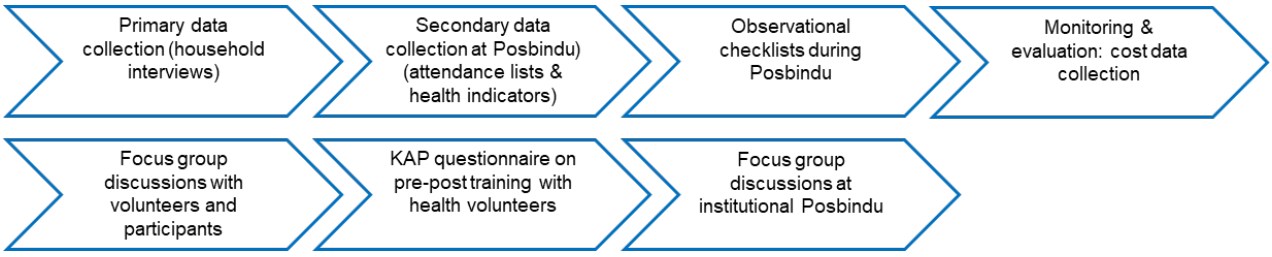

Figure 6: Overview of data sources. ***Source:*** **Own representation.**

The aim of the interventions was to improve the situation that was identified in the retrospective phase. The major change consisted of a training program for cadres in Posbindu as well as short training for health professionals in primary health care. The intention was to improve the linkages between Posbindu and the primary health care system and thereby to create synergies. The SUNI-SEA team developed a simple screening protocol (algorithm) to be used to identify people with NCD-risk factors in all three countries, especially hypertension and diabetes and to identify those who need referral. Furthermore, the training included sessions about appropriate health education and how to promote participation as well as individual prevention and healthy lifestyles. Figure 7 shows the aims and target groups of the implemented training programs.

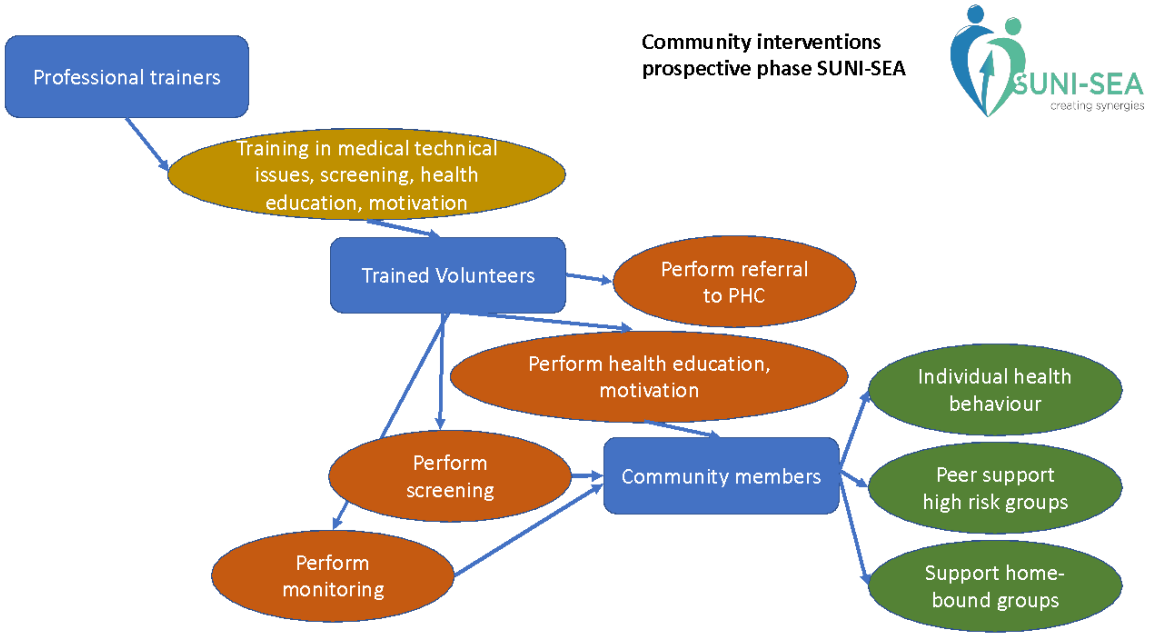

Figure 7: Intended pathway from improved training and training material on individual health behavior, health care and ultimately health. ***Source:*** **Own representation.**

Given the short period between implementation and endline survey, the assessment weighs especially the short-term effects on the most immediate outcomes such as attendance, undertaken screenings, health knowledge and referrals. Health related behavior and health status may need more time to be significantly affected by the improvements brought to Posbindu.

Overall, the assessment shows that the effects observed in the intervention area as compared to the control area are rather modest and concentrated on outcomes very early in the result chain, such as a few health knowledge dimensions, dietary and smoking behavior as well as physical activity. But the changes are small, not very robust and sometimes counteracted by deteriorations in other dimensions. For example, participants in the intervention area received more advice on some topics (e.g., on how to manage their high blood sugar), treated Posbindu participants perceive themselves as less likely to add salt or salty sauce to their meals in comparison to others, they are more likely to conduct physical activity and more likely to have stopped smoking. However, reported daily servings of vegetables are significantly lower for participants in the intervention area and participants in the intervention area reported less often to have received advice on how to manage high blood pressure (selected outcomes are presented in Figure 8). Overall, we see only small improvements in terms of risk factors (blood pressure, BMI, waist and hip circumference) and chronic disease status in the intervention area. Moreover, no increase in participation rates can be observed.

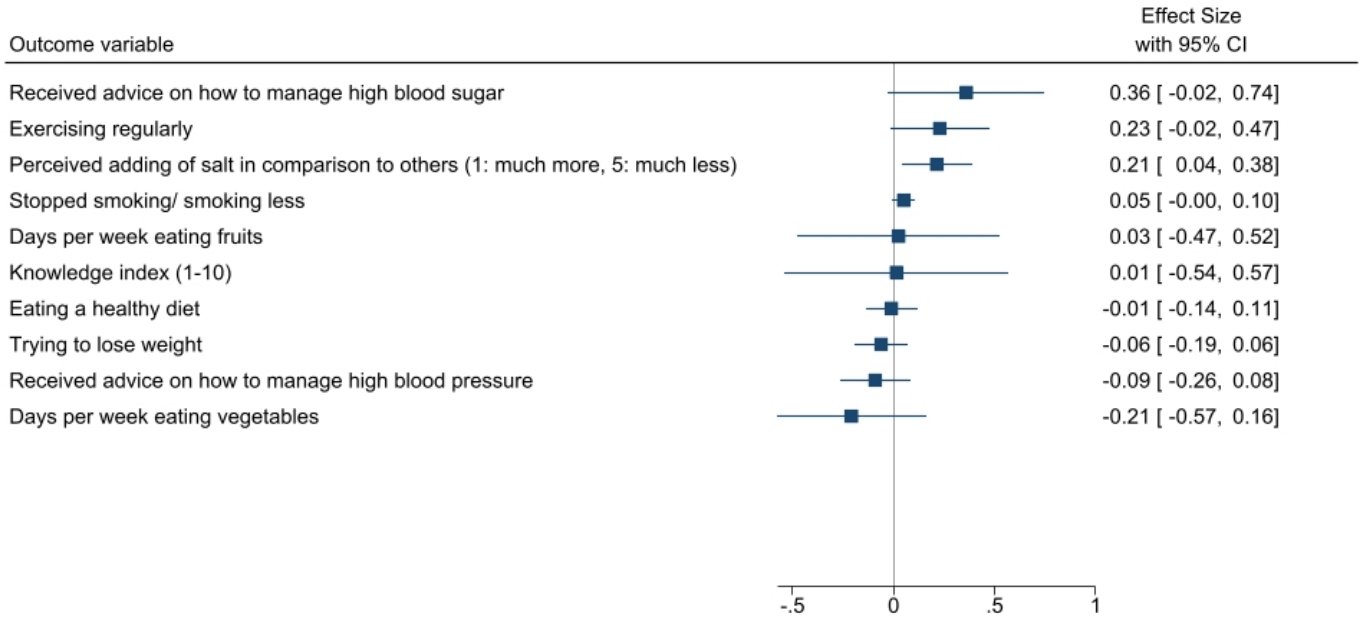

Figure 8: Intervention effects. ***Source:*** **Own representation.**

We believe that there are mainly three reasons for these modest effects: First, the time was very short so that longer term outcomes such as improved health-related behavior and ultimately health status could not yet be affected. Second, the continuation of the COVID pandemic during the observation window meant that many Posbindu opened only shortly before the endline survey. This problem was further aggravated by Ramadhan celebrations (April) and closures due to the national Independence Day (August) and the fact that even after the end of COVID many people were reluctant to return to the Posbindus. This implied that the training intervention could not unfold its full potential since trained cadres had only limited opportunities to engage with participants. Third, there were some flaws in the implementation of the intervention. Even if the training of the cadres indeed resulted in improvements of cadres' knowledge, the training sessions were well implemented and Posbindu participants appreciated the education provided by the cadres, the assessment also revealed implementation obstacles, for example, the fact that several trained cadres had to rotate between Posbindu or that some

Posbindu were actually mobile and moved between several communities. This implied that several trained cadres could not pass on their improved knowledge to participants, new cadres had to be re-trained and the mobile Posbindu could not offer repeated education to the same participants. Mobile Posbindus were more frequent in the intervention areas.

3.1.3 Cost of Posbindu

Next to the actual impact assessment, we collected cost data on the funding sources of Posbindu, which later also served as input for the cost-effectiveness analysis (Section 4). This cost data showed that the main funding for the Posbindu program comes from the national fund; it is complemented by district and village-specific funds. It is not harmonized across districts, but depends on political decisions, village-level participation and the health status of the population. The allocation is also partly left to the discretion of Government officials. For example, in villages in Batang (intervention) and Solo (control), Government officials transfer some funds away from Posbindu, directly to the Puskesmas, this did not happen in the Kediri (intervention) and Jember (control). Overall, the basic budget for Posbindu (without the intervention funding) is larger in the control areas than in the intervention areas. Whereas in the intervention area the budget was between IDR 1,000k – 10,050k (€ 62.30 - € 626.12), in the control area it was IDR 13,400k - 30,244k (€ 834.83 - € 1,884.23). The total budget must cover the costs for the training of cadres, incentives for cadres and other staff, equipment, costs for medical devices and other consumables. There are substantial differences in the budgets for cadre training across districts. In the intervention area the regular budget is between IDR 2,850k and 3,425k per year (€ 177.56 - € 213.38), whereas in the control area it is around IDR 1,800k per year (€ 112.14).

In terms of costs for the improved Posbindu, the following considerations can be made: The main budget items with respect to the improved Posbindu included stationary and seminar kits, consumables, costs for training activities and medical devices for training. About 52 to 59% of the budget went into these activities. About 4 to 5% were spent on education materials for Posbindu participants. The smart application generated costs of IDR 25.000k or about 10% of the total budget. About a third of the budget was needed for the research kits at the Faculty of Medicine UNS.

	Kediri			**Batang**		
	Cost IDR in 1,000	Cost EUR	%	Cost IDR in 1,000	Cost EUR	%
Consumables and material for cadre training*	56,983	3,550	52%	77,123	4,805	59%
Education materials for participants**	5,113	319	5%	5,113	319	4%
Development of smart application**	12,500	779	11%	12,500	779	10%
Posbindu research kit	35,000	2,181	32%	35,000	2,181	27%
Total	109,596	6,828	100%	129,736	8,083	100%

* Stationary, seminar kits, consumables and medical devices for cadre training
** Costs equally divided over Kediri and Batang.

Table 1: Costs of improved Posbindu in intervention areas

In absolute terms these costs can be considered as relatively moderate, yet they exceed the annual budget of a Posbindu roughly by a factor of 20. Some of the costs can of course be considered as up-front investment costs and would not have to be covered each year, this also includes the smart app, yet others like the intensive training will have to be incurred quite regularly, especially in light of the very high staff turnover. These costs must be pondered against the benefits the improved program generates. It is still too early to make such a

comparison as the potential effects will need more time to unfold, so this assessment must be left for future work.

Yet, based on a model-based extrapolation of the effects of Posbindu participation (see Section 4), we conclude that a favorable cost-effectiveness (or even cost-saving) ratio seems in reach. However, if the quality of community-based activities and subsequent health care delivery is not ensured, then solely focusing on access and coverage of the preventive strategy will not achieve the desired health and economic outcomes in the longer term, so here the intervention with intensive cadre training and health education of participants comes potentially into play.

The assessment leads to several direct avenues for future action. First, training intensity must be further increased and take into account the turnover of staff. Hence, repeated and in-depth training for cadres is recommended. Second, given that it is hard to increase coverage with improved service quality, Posbindu require additional efforts to reach out to the active, especially male population. A useful approach, which is already in the phase of being pilot-tested, is the launch of so-called workplace or institutional Posbindu. Alternatively, different incentive schemes or encouragement designs could offer a useful instrument to increase participation. Another possibility is to integrate Posbindu into existing community organizations as it is done in the case of the Intergenerational Self-Help Groups in Vietnam (see Section 3.2). This would give Posbindu more leverage to activate communities to participate.

3.2 Results from the prospective Phase: Vietnam

In Vietnam, the SUNI-SEA intervention took place within the provinces of Hai Phong and Ninh Binh (Figure 9). The main objective of the intervention was to improve health care services and improve access to NCD care, which can help reduce the burden of NCDs. The intervention contains two sub-interventions: (1) Interventions related to health facilities and (2) interventions related to ISHCs. This report focuses on the intervention related to ISHCs, which are community-based solidarity groups aiming to promote active and healthy ageing. These clubs consist of community members from different age groups. However, most members are aged 60 years and older. ISHCs' health activities include fostering social connections (improves mental health), regular health communication and education, physical exercise, providing health screening, bi-annual health check-up, promotion of health insurance uptake, and community-based homecare service for those most in need.

Figure 9: Study locations within Vietnam. ***Source:*** **Own representation.**

All intervention activities are depicted in Figure 10 as the health facilities intervention may (partly) explain results of the ISHC intervention.

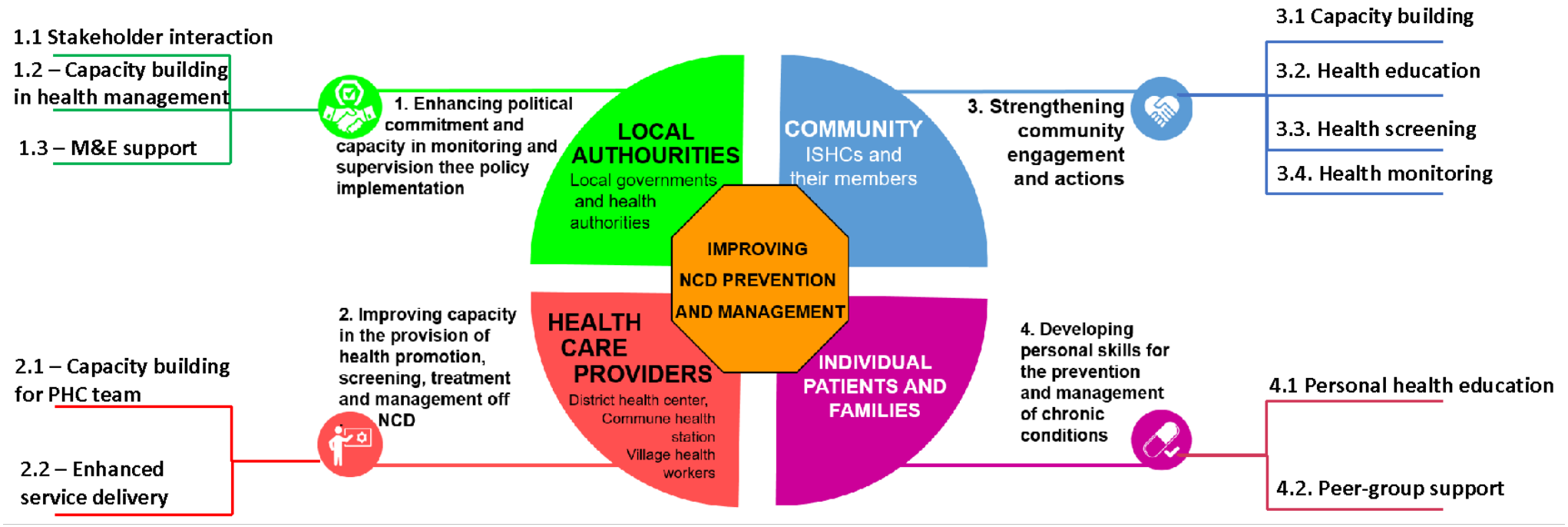

Figure 10: SUNI-SEA Vietnam intervention activities. ***Source:*** **Own representation.**

3.2.1 Assessment of the effects of participating in ISHC versus no participation

This section of the report presents an analysis of the effectiveness and cost-effectiveness of the ISHC intervention. SUNI-SEA supported these clubs by providing resources (financial and non-financial) that were used to increase the number and quality of health-related activities. Examples of non-financial resources provided include scales, tablets, communication material, and software used to record screening activities. These resources were used to engage in various capacity-building activities. This included regular monitoring and support for ISHC board members, local health volunteers, and other relevant stakeholders. These key stakeholders also participated in training about knowledge and skills related to NCD prevention and management. After participating in these trainings, they then provided health education and health screening for members of their respective clubs. The underlying theory of change is depicted in Figure 4.

We assess the impact of these activities by evaluating the changes to knowledge, screening, diagnosis, health behaviors, and health indicators due to the intervention. This is done by evaluating how changes in the intervention area compare to changes in the control area, provided that changes in the intervention and control areas would have been the same without the intervention (difference-in-difference design). The cost-effectiveness is then assessed by relating these changes to the costs induced by the intervention.

The SUNI-SEA intervention had a positive impact on the knowledge outcomes. After the intervention, ISHC members were able to name more risk factors, symptoms, and complications of both diabetes and hypertension (Figure 11). Similar trends were seen in other knowledge indicators. However, there were not many differences related to screening, diagnosis, and health behaviors. We only found differences in ever being diagnosed with hypertension, complying with physical activity guidelines, and knowing the recommended amount of salt intake. There were fewer people with high blood pressure amongst ISHC members, and their health behaviors generally improved. Due to the COVID-19 pandemic there were various delays, which resulted in a short implementation time. The short implementation time was insufficient to allow for the various physiological changes required to assess the impact on health indicators. It also explains why we mostly saw changes in knowledge, as this is the most proximal element in our theory of change; it is too early to accurately assess the full impact of the intervention on the other outcomes.

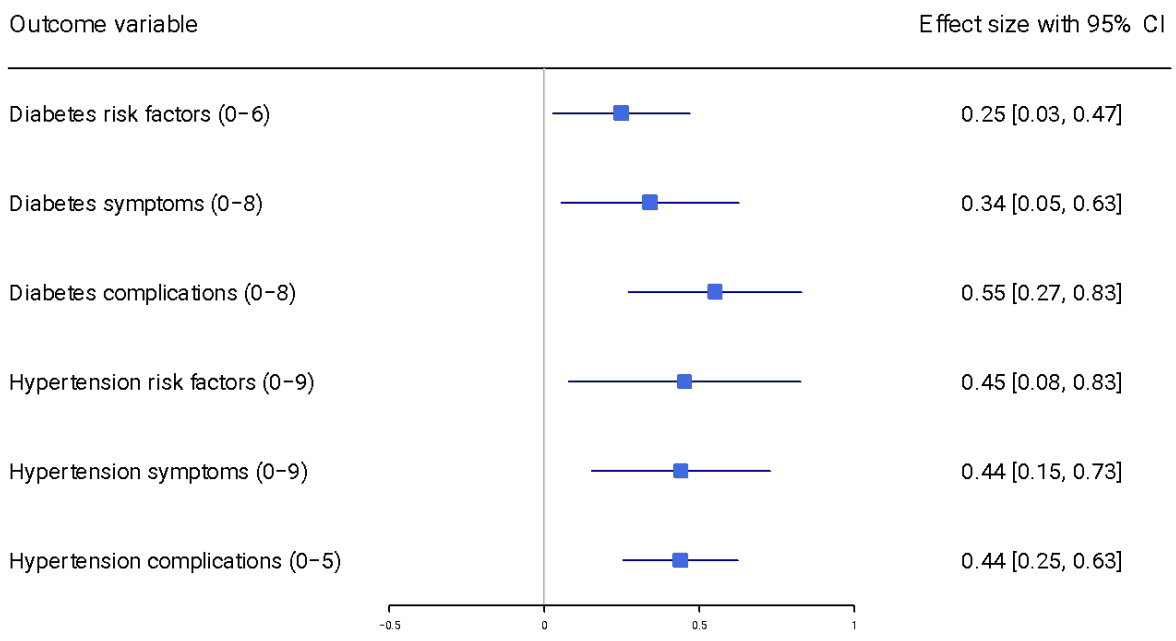

Figure 11: Knowledge changes due to ISHC intervention. ***Source:*** **Own representation.**

3.2.2 Cost of ISHCs

Table 2 presents the initial investments and costs during the implementation period of the intervention for both the ISHCs and the control groups (CBGs). The costs are presented per club related costs (initial investments and membership fees), screening costs, and other costs. These costs are compared between the ISHCs and CBG level, as well as costs per member, to account for the differences in club size. Naturally, the costs of the intervention related activities were higher in the ISHCs, in the intervention area, compared to the CBG, in which no specific intervention took place. CBG had on average per club a minimal investment of club related costs, and only substantial cost of the delivery of health-related activities (only two CBGs received external funding for health education and promoting screening during the intervention period). In each village, a village health worker (health volunteer) oversees health education. On occasion, these village health workers provide general health education, topics may include hypertension, diabetes, vaccination, and nutrition, during village meetings. However, the content of this information is very general compared to the much more detailed information ISHCs provided. However, the costs per member were much lower compared to the ISHC costs per member in this category. All costs categories taken together (i.e., training and organization and screening and operations) resulted in a total difference in costs of 2,859,189 VND ($121.72) more per club member in the ISHCs compared to the CBGs.

Table 2: Club reported cost data of club related costs, screening costs, and costs of other activities

	Cost item	Mean costs per ISHC (n = 59)	Mean per ISHC member (total members n=3,328)	Mean costs per CBG (n=50)	Mean per CBG member (total members n=16,689)	Difference in costs per member
Club related costs		59,813,525 VND	1,060,335 VND	3,076,898 VND	9,218 VND	1,051,117 VND ($44.75)
Screening costs	Training	20,197,714 VND	358,052 VND	0 VND	0 VND	796,091 VND ($33.89)
	Monitoring and support	924,673 VND	16,392 VND	0 VND	0 VND	
	Activity delivery	23,785,093 VND	421,647 VND	0 VND	0 VND	
Costs of other activities (e.g., health education, physical exercises)	Training	40,395,429 VND	716,104 VND	197,877 VND	593 VND	1,011,980 VND ($43.08)
	Monitoring and support	1,849,347 VND	32,784 VND	0 VND	0 VND	
	Activity delivery	21,797,684 VND	386,415 VND	40,964,946 VND	122,730 VND	
	Total	**168,763,468 VND**	**2,991,730 VND**	**44,239,721 VND**	**132,542 VND**	**2,859,189 VND** ($121.72)

Description of cost-effectiveness of ISHCs

Below the incremental cost-effectiveness ratios of the screening activities are presented. The outcome of the screening is based on the reporting of the clubs during the intervention period. The costs are the total screening costs per club as described above. The incremental costs per outcome are the total screening costs per club, divided by the related outcome, such as number of screenings per club.

In Figure 12, the screening flow of the SUNI-SEA intervention compared to a control situation is presented. The flow is presented for an average ISHC, which consists of 59 members, makes 23 referrals, thereby 12 new members with both hypertension and diabetes are detected, leading to 10 new treated members. A comparable control situation, based on a CBG, did not report any screening activities, and therefore the 10 new treatment cases could be considered as undiagnosed and untreated cases in the control situation. Additional costs will be incurred as new treatment cases have consequences in terms of additional treatment cost related to diagnosis, as well as additional costs of undiagnosed cases and its related complications of untreated cases in the control group. These consequences remain hypothetical as the time horizon falls outside the scope of this project. In Table 3, the results of the incremental costs per screening outcomes are presented.

In conclusion, the SUNI-SEA intervention was shown to improve knowledge, and there were some positive indications for changes in the medium and long-term impacts. However, it is still too early to accurately assess these impacts. Nonetheless, our current cost-effectiveness evaluation suggests that although there is need for a substantial investment in preventive activities such as screening, health education, and added treatment of HBP and DM, potential savings in prevented complications of HBP and DM could make this investment worth its value.

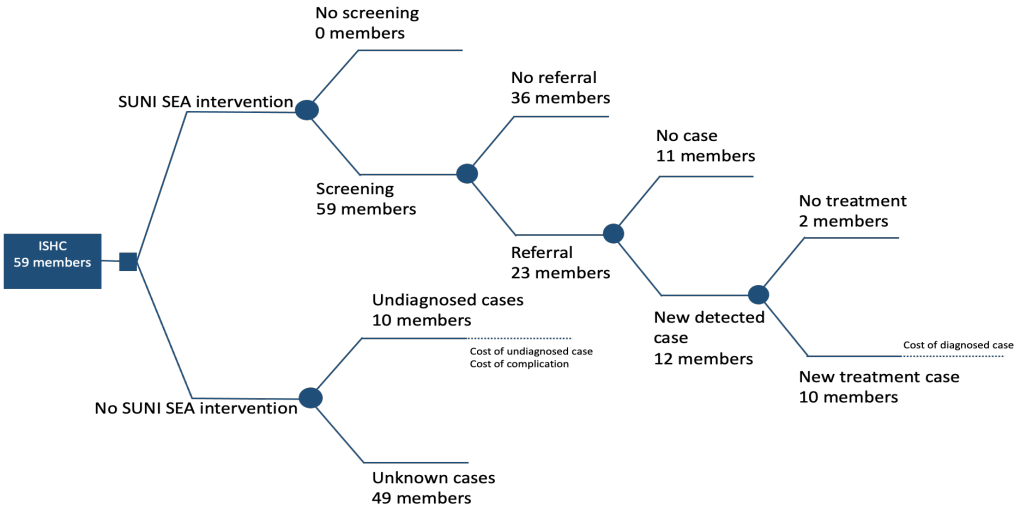

Figure 12: Knowledge changes due to ISHC intervention. ***Source:*** **Own representation.**

Table 3: Incremental cost-effectiveness of screening outcomes as reported by the ISHC compared to a control situation

	ISHC (n=59 members)	Theoretical CBG (n=59 members)	Incremental costs per outcome reported
Total costs of screening per club	46,969,355 VND	0 VND	46,969,355 VND ($1999)
Number of members screened	59	0	796,090 VND ($33.89) per member screened
Number of members referred	23	0	2,042,146 VND ($86.94) per member referred
Number of new detected cases	12	0	3,914,113 VND ($166.63) per new detected case
Number of new treatment cases	10	0	4,696,936 VND ($199.95) per new treatment case

4. Insights from the model-based cost-effectiveness study

Due to the short-term implementation and follow-up time of the intervention, it is difficult to determine the long-term impact of the SUNI- SEA interventions. For example, short-term changes in knowledge and awareness of NCDs, such as diabetes, could lead to healthier behavior, and if this effect sustains, could lead to improved wellbeing in the longer-term, perhaps even a reduction of disease development. Based on an extrapolation of the SUNI-SEA results, and related scientific literature, we tried to make a prediction of the potential impact of diabetes prevention beyond the SUNI- SEA program by means of a model-based cost-effectiveness study according to the WHO CHOICE methods [6].

The outcomes of the model-based cost-effectiveness study suggests that both programs in their current forms can be deemed cost-effective: the initial investment into the program is outweighed by the potential savings of prevented treatment and health benefits in the future. Yet, when relying on an extrapolation of the effects found in the Indonesian and Vietnamese programs, a favorable cost-effectiveness for an up-scaled program ratio seems in reach only if the quality of community-based activities and subsequent health care delivery can be ensured. Explicit efforts should be put into ensuring that health education creates awareness to improve lifestyle and early detection of symptoms of diabetes. In addition, efforts should be made to strengthen the two-way referral between community healthcare stations and primary healthcare, to reduce the number of undiagnosed cases, and to ensure the adherence to long-term treatment. Solely focusing on access and increased coverage of the NCD programs without improving the quality of the services might not lead to the desired health and economic outcomes, and will likely lead to inefficient investments into health, prevention, and healthcare in Vietnam and Indonesia. These learnings should be considered when prioritizing and scaling up cost-effective interventions in the prevention of NCDs such as presented in the WHO ‘Best Buys’. [7] [8]

5. Conclusion

This report summarizes the results of Work package 2 of the SUNI-SEA project. This work package focused on the effectiveness and cost-effectiveness of community-based programs to prevent and control NCDs in Indonesia and Vietnam. The results were presented in two parts: A retrospective part, i.e. a look back at the pre-project stage and a prospective part, i.e. a forward-looking part that accompanied the implementation of SUNI-SEA-supported interventions at the community level.

A systematic review of the current state of NCD prevention and control activities throughout Southeast Asia, qualitative interviews with local stakeholders, reviews of local guidelines and grey literature, and field research visits of the country teams in Indonesia and Vietnam showed that community- or group-based approaches can effectively increase screening rates, which was deemed favorable, given that several Southeast Asian countries focus on community-based approaches for NCD prevention. Yet, in Indonesia and Vietnam, several major issues were identified in the retrospective phase. In Indonesia, there was an inadequate linkage between Posbindu and primary health care; mainly due to missing guidelines on procedures for referral, practical guidelines for cadres for how to motivate people to participate in Posbindu, and in health education and monitoring procedures were absent and there was a lack of NCD education materials for cadres and communities on how to improve awareness in NCD. Although most people seemed to know what diabetes is and what symptoms go with it, but one third did not know about risk factors, complications and prognosis. Likewise, in Vietnam, substantial barriers to efficiently implement the proposed programs were identified implying that further capacity strengthening of both individuals and organizations was needed.

The prospective phase was designed to provide potential solutions and means to address these gaps. Guidelines were developed, and health education materials provided. Specifically, the research consortium implemented capacity- building interventions, including training for primary health care workers and health volunteers in the community-based NCD programs and complemented these interventions with impact evaluations. For the case of Indonesia, the impact evaluation focused on the community based NCD program Posbindu, whereas for the case of Vietnam, the analysis focused on community health interventions implemented in ISHCs.

The analysis clearly shows that participants in community-based interventions relative to non-participants demonstrated significantly increased health knowledge about NCDs and awareness of risk factors. Yet, the improved knowledge has only partly also resulted in better health care behavior in terms of physical activity and diets. In Vietnam, behavioral changes are more pronounced and also reflected in improved health status measures. On average, the BMI decreased, even if only slightly. However, the intervention group is seen to be worse off compared to the control group with regards to changes in systolic blood pressure, diastolic blood pressure, self-rated health, and quality of life. In both countries, some improvements in service level and quality could also be detected, especially in the case of Indonesia, more patients were tested, and more persons with high risk for hypertension and diabetes could be detected. Patients also turn more often to the primary health care center if needed. Yet, in Vietnam neither testing nor diagnosed cases have increased. The number of cases with high blood pressure even rather declined.

The assessment of the short-term effects of the intervention implemented in a subset of the target regions in Indonesia to improve the service quality of Posbindu showed only small effects. The intervention comprised a more intensive training of the cadres serving in the Posbindu, the development of a more stringent treatment algorithm, more and better education material for participants and an app that can support patients to manage their risk factors and health behavior. In the longer term, the improved service quality is sought to attract also new participants. Overall, this assessment demonstrates that the effects observed in the intervention area as compared to the control area, where the standard Posbindu continued to

be implemented, are rather modest and concentrated on outcomes very early in the result chain. This has several reasons, including the short time since the roll-out, COVID and some implementation flaws and high staff turnover. This provides several direct avenues for future action. First, training intensity must be further increased and take into account the turnover of staff. Second, given that it is hard to increase coverage with improved service quality, Posbindu require additional efforts to reach out to the active, especially male population. One possibility would be to integrate Posbindu into existing community organizations as it is done in the case of the Intergenerational Self-Help Groups in Vietnam. This would give Posbindu more leverage to activate communities to participate. Another possibility, which is already pilot-tested, are workplace Posbindu.

More generally, our model-based extrapolation of the effects of the ISHCs and SUNI-SEA programs demonstrate that a favorable cost-effectiveness (or even cost-saving) ratio seems in reach. However, if the quality of community-based activities and subsequent health care delivery is not ensured, then solely focusing on access and coverage of the preventive strategy will not achieve the desired health and economic outcomes.

References

1. World Health Organization (2014). Global Status Report on Noncommunicable Diseases 2014. Geneva: World Health Organization.https://apps.who.int/iris/bitstream/handle/10665/148114/9789241564854_eng.pdf
2. Niessen, L. W., Mohan, D., Akuoku, J. K., Mirelman, A. J., Ahmed, S., Koehlmoos, T. P., ... & Peters, D. H. (2018). Tackling socioeconomic inequalities and non-communicable diseases in low-income and middle-income countries under the Sustainable Development agenda. The Lancet, 391(10134), 2036-2046.DOI: https://doi.org/10.1016/S0140-6736(18)30482-3
3. Mirelman, A. J., Rose, S., Khan, J. A., Ahmed, S., Peters, D. H., Niessen, L. W., & Trujillo, A. J. (2016). The relationship between non-communicable disease occurrence and poverty—evidence from demographic surveillance in Matlab, Bangladesh. Health policy and planning, 31(6), 785-792.https://doi.org/10.1093/heapol/czv134
4. Fritz, M., & Fromell, H. (2022). How to dampen the surge of non-communicable diseases in Southeast Asia: insights from a systematic review and meta-analysis. *Health Policy and Planning, 37*(1), 152-167.
5. Widyaningsih, V., Febrinasari, R. P., Pamungkasari, E. P., Mashuri, Y. A., Sumardiyono, S., Balgis, B., ... & Probandari, A. (2022). Missed opportunities in hypertension risk factors screening in Indonesia: A mixed-methods evaluation of integrated health post (POSBINDU) implementation. BMJ open, 12(2), e051315. http://dx.doi.org/10.1136/bmjopen-2021-051315
6. Melanie Y. Bertram, Jeremy A. Lauer, Karin Stenberg, Tessa Tan Torres Edejer. Methods for the Economic Evaluation of Health Care Interventions for Priority Setting in the Health System: An Update From WHO CHOICE. Int J Health Policy Manag 2021, 10(11), 673–677
7. WHO. Tackling NCDs: ‘best buys’ and other recommended interventions for the prevention and control of noncommunicable diseases. Geneva: World Health Organization; 2017.
8. More ways, to save more lives, for less money: World Health Assembly adopts more Best Buys to tackle noncommunicable diseases [Internet]. World Health Organization; 2023. Available from: https://www.who.int/news/item/26-05-2023-more-ways--to-save-more-lives--for-less-money, world-health-assembly-adopts-more-best-buys--to-tackle-noncommunicable-diseases