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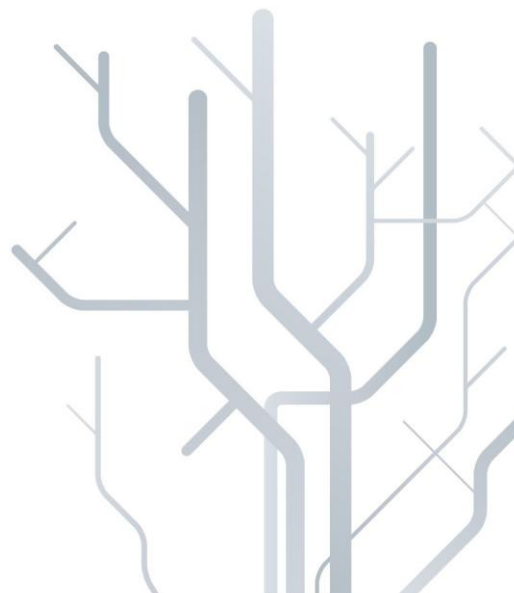
Assessment of the effect of participation in self-help groups for landmine accident survivors in rural Cambodia through analysing pre- and post-intervention changes in health determinants

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Preface

Growing up in a multi-cultural environment and having the possibility to travel to countries quite different from Norway, international health has always been a topic that caught my attention. Throughout my bachelor in Nursing I used every possibility to do my internships abroad, something that gave me the opportunity to work in an intensive care unit in Poland and in home based care for the elderly in a Palestinian refugee camp in Lebanon.

This interest in international health brought me into contact with Tromsø Mine Victim Resource Centre (TMC) and their work with war victims and mine accident survivors in poor and oppressed countries in the South. Their work interested me because it is sustainable and involves the local communities' knowledge and uses this in how their projects are constructed.

When considering topic for my master thesis in Public Health I was clear quite early that I wanted to write about international health. I contacted Hans Husum working in TMC to figure out if they were working on any interesting projects that I might be able to do some research on for my thesis. He introduced me to Trauma Care Foundation Cambodia and their work with mine accident survivors and war victims. With the support of TMC I travelled to Cambodia and met with the people working with self-help groups for mine accident survivors. Their work interested me and I decided that this was the perfect project for me to write about.

Acknowledgement

First I would like to thank Tromsø Mine Victim Resource Centre for introducing me to their work with mine accident survivors and war victims in general, but in particular with their work with self-help groups for mine accident survivors in Cambodia, and allowing me to use this work in my thesis. I want to thank the people working there, especially Margit Steinholt, Sondre Røvik Kippernes, and Hans Husum.

I owe great thanks to the people working at Trauma Care Foundation Cambodia, for letting me see and understand how they work, and for allowing me to use their work as a basis for my thesis. Special thanks to Sano Ray who has translated the interviews with the members of the self-help groups, and Vuthy Svay and the other field workers who re-interviewed the members of the self-help groups, collecting new data on their life situation. You guys welcomed me with open arms when I came to visit, and made me feel like one of you. I couldn't have done this thesis without your help and support.

These two years in the master program in public health have been great. I have in my classmates found good friends and discussion partners. I want to thank every single one of you for two interesting and educational years. The people working at ISM, and in particular those at the Public Health master program have always been helpful and I leave this program feeling more ready for working in the real world with the knowledge you have provided me. Special thanks to my supervisor Bjørn Straume.

Finally I have to thank my wonderful family and friends. Your support during this time has been invaluable, and without your advices and encouragement I don't think I would have made it! Thank you all!

Abstract

Objective: Landmines injuries are considered a major public health issue. Cambodia is the 4th most land mined country in the world. Landmine accident survivors face challenges with poverty and pain, with little chance of improving their lives on their own. Trauma Care Foundation Cambodia started with community based self-help groups in 2000. The aim of the study was to evaluate the impact of self-help group on health determinants in mine accident survivors and war victims.

Method: Pre- and post-intervention interviews, about different health determinants, were conducted on 91 self-help group members, all participating between 2 and 8 years, from Battambang and Pailin provinces in Cambodia. The main denominator of these health determinants was poverty, including underlying factors for poverty. This pretest-posttest assessment of changes in health determinants and following participation in SHG has been conducted using non-parametric statistical analyses.

Results: Statistical significant improvement was detected in health determinants such as; housing standard ($p < .001$), total income sources ($p < .001$), total number of animal species ($p < .001$), months with lack of food ($p = .011$), total social participation ($p < .001$), socioeconomic position ($p < .001$). No significant change was detected in health determinants such as hectares of farming area ($p = .399$).

Conclusion: A correlation between SHG and improvement in health determinants seems likely. Further research with a more direct focus on health, including all self-help group members, not only the mine accident survivors, with a control group with individuals from the same districts, with and without landmine injuries, might substantiate a causality between the self-help groups and the improvements in health determinants and health.

Keywords: Mine accident survivor. Disability. Community self-help groups. Health determinants. Poverty. Non-parametric method. One group pretest-posttest. Cambodia.

Abbreviations

CMVIS	Cambodia Mine/ERW victim information system
ERW	Explosive remnants of War
HDI	Human Development Index
HIC	High income country
IFDP	Information Form for Disabled Persons
LMIC	Low- and middle-income country
MPI	Multidimensional Poverty Index
NGO	Non-governmental Organisation
NORAD	The Norwegian Agency for Development Cooperation
SD	Standard Deviation
SEP	Socioeconomic position
SES	Socioeconomic Situation
SHG	Self-help groups
SWB	Subjective well-being
TCFC	Trauma Care Foundation Cambodia
TMC	Tromsø Mine Victim Resource Centre
UN ESCAP	United Nations. The Economic and Social Commission for Asia and the Pacific
UNDP	United Nations Development Programme
WHO	World Health Organization

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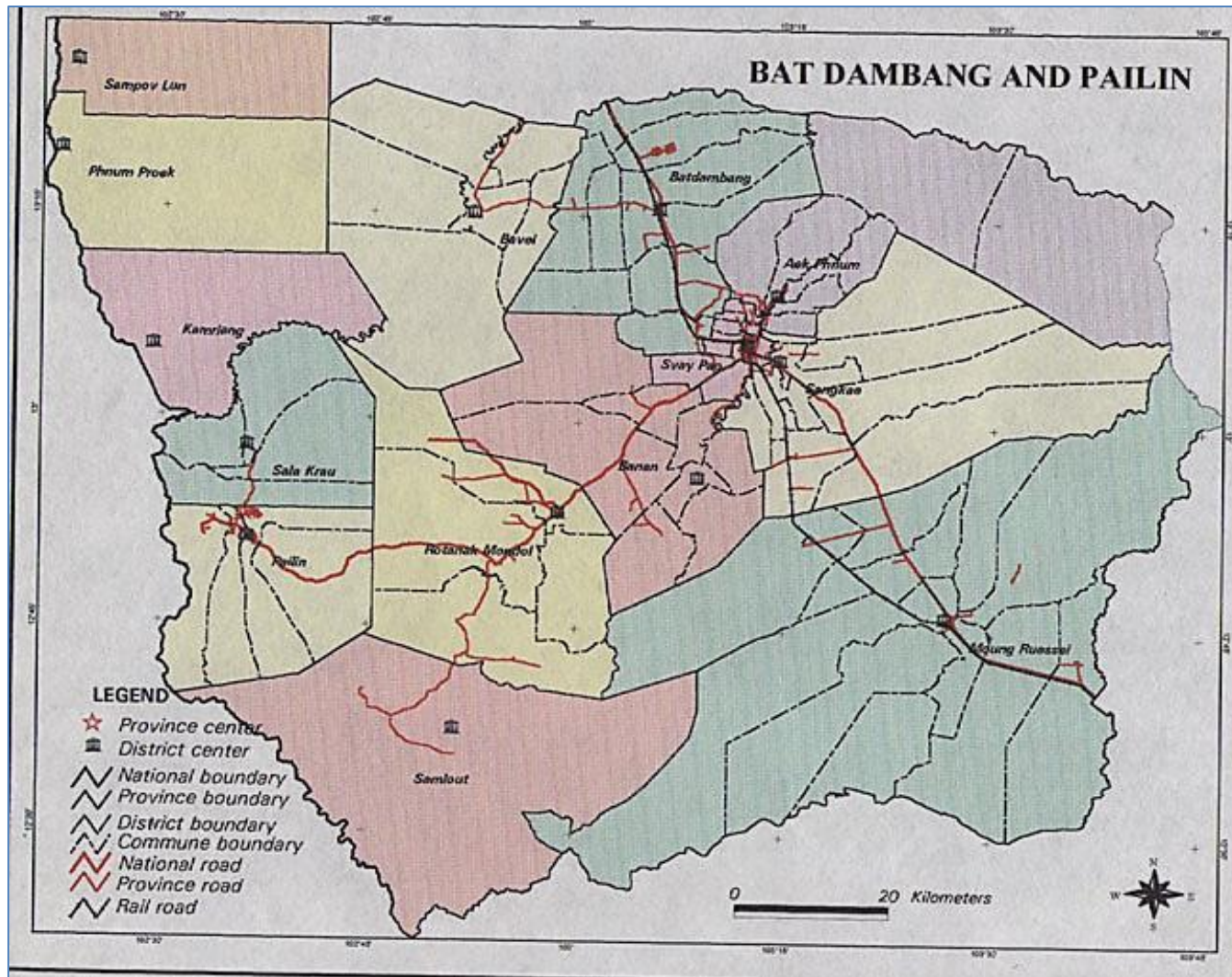
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Map of Battambang and Pailin Provinces



(2)

Background

“Landmines are among the most barbaric weapons of war; because they continue to kill and maim innocent people long after the war itself has ended. Also, fear of them keeps people off the land, and thus prevents them from growing food.”

- Kofi Annan, former Secretary-General of the United Nations

Estimations show that during the last 65 years over 110 million anti-personnel mines have been spread in 70 different countries around the globe. These mines are designed to maim or kill anything that comes into contact with it, unaffected by peace treaties or whether or not it is a civilian who is passing by. Every year between 15 and 25 thousand people are maimed or killed by landmines, approximately 80 per cent of these civilians (3). Social, physical, and economic consequences for the individual could be massive. The survivors of landmine injuries are likely to require long term rehabilitative and/or medical care as a result of their injuries (4). In 1998 during the fifty-first world health assembly it was declared that damage caused by the use of anti-personnel mines is a public health problem (5). Cambodia is estimated to be the 4th most land mined country in the world (3), and the home of the people this thesis is focused on.

Cambodia

Cambodia, located in Southeast Asia, bordering to Thailand, Laos, Vietnam and the gulf of Thailand, is an agricultural country with a total land area of 181 thousand km². According to the latest general population census, conducted in 2008, 13,4 million people populate the country, 80,5 per cent of these living in rural areas. The average life expectancy at birth is 63,6 years. The literacy rate among the population above the age of 15 is in total 78 per cent; 85 per cent for males and 71 per cent for females (6). According to the Human Development Index (HDI), a summary measure of three basic dimensions of human development, based on

international data from institutions such as United Nations Population Division and the World Bank, Cambodia is in the medium human development category. Their HDI value for 2012 was 0.543, positioning the country as number 138 out of 187 countries and territories. Survey data collected in 2010 shows that Cambodia's Multidimensional poverty index (MPI), an index identifying multiple deprivations in education, health and living standard in the same households, is 0.212. 45,9 per cent of the population are living in multidimensional poverty and an additional 21,4 per cent are vulnerable to multiple deprivations (7). The 2010 World Bank Development Report gives an estimate that just over 40 per cent of the population lives on less than 1,25 \$ a day (8). Transparency International's Corruption Perception index 2012 puts Cambodia with a score of 22, making it the 19th most corrupt country out of 176 countries (9).

History of Cambodia

Cambodia has a long and rich history. The country is based on the Ankor civilization of the Khmer that was one of the greatest civilizations in South-eastern Asia around a thousand years ago. In recent history, after gaining independence from the French in 1953, the country has been subjected to political instability and internal conflict (10).

During the Vietnam War in 1965 the United States covered the country with general-purpose- and cluster bombs, and in 1970 U.S soldiers invaded the country, thus prompting war between the U.S allies and Vietnam supporters Khmer Rouge. After the Americans were forced out in 1975 Pol Pot and his Khmer Rouge took control over the country (8).

Between 1970 to 1979 estimations show that between 1,7 million and 3,42 million died in Cambodia, with mortality because of violence increasing from 1974 to early 1980s (11). In 1979, after Vietnamese troops invaded the country a new government was installed.

This government was not supported by the Khmer Rouge and the conflicts continued, evolving into a civil war that did not end until a UN peace treaty was signed in 1991 (10). Even though the conditions in the country improved after this, the Khmer Rouge's final surrender, and real peace, did not happen until the end of the 1990s (8).

During the U. S bombardments from 1965-1975 almost 3 million tonnes of ordnance was dropped over Cambodia (12). From 1978 until the end of 1989 it is estimated that around 6 million landmines were laid by different army fractions (4).

The consequences of almost 30 years with continuous war are still obvious to this day, both in the country's infrastructure and among its people. Accurate statistics on disabled persons in Cambodia are not available, and varies from publication to publication. According to United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP) 2002, Cambodia has one of the highest rates of disability in the developing world (4).

Cambodia Mine/ERW victim information system (CMVIS) reports that landmines and explosive remnants of war (ERW) caused a total of 64261 casualties from 1979 to May 2013. 90 per cent of the victims were men and boys. 31 per cent of these were killed, 55 per cent injured, and 14 per cent became amputees.

The official numbers of mine accidents are steadily decreasing because of de-mining, with 286 casualties reported in 2010, 211 in 2011, and 186 in 2012 (13), but as these numbers are from the urban areas, there is a high probability of unrecorded casualties in the rural areas. The impact of the massive land mining also has other implication – the land becomes inhabitable. One study from 1995 suggested that without landmines the agricultural production in Cambodia could increase by 135 per cent (14).

Trauma Care Foundation – Cambodia

Trauma Care Foundation Cambodia (TCFC) is a Cambodian NGO. It was established in 1996 as a task force to reduce deaths from landmine injuries in Battambang and Pailin provinces. TCFC set up “chain-of-survival” rescue systems outside hospitals, which reduced death rates in land mine accidents from 40 per cent to 10 per cent (15). Since 2003 TCFC’s programs has been implemented in six provinces in North-Western Cambodia.

The provinces of Battambang and Pailin are located close to the border of Thailand. The area for these provinces is 12,505 km² with a population of almost 1,1 million people (16). The area is highly fertile with a very strong agricultural sector – called Cambodia’s rice bowl, producing around 670 thousand rice tonnes per season. It is also the most heavily land mined area in all of Cambodia. According to the 2007 annual report, CMVIS reported the highest number of incidents of landmine casualties in Battambang, Pailin and three other districts in the North West of Cambodia. Pailin is known as the last stronghold of the Khmer Rouge, where thousands of former Khmer Rouge soldiers and officials lived and fought until 1997 when they finally surrendered. Pailin is also the poorest province of its size in Cambodia, indications from the World Bank puts up to 70 % of the inhabitants below the national poverty line (8).

TCFC is financed by The Norwegian Agency for Development Cooperation (NORAD) and is a partner of Tromsø Mine Victim Resource Centre (TMC). TMC is a medical action research centre at the University Hospital of North-Norway. It was founded in 1999 and is funded by the Norwegian Ministry of Foreign Affairs. Collaborating with partners TMC forms trauma - and maternal health systems in rural and remote areas in countries like Lebanon, Laos, Iraq and Cambodia.

TMC aims to develop new and evidence based models for trauma care, maternal, and perinatal health in poor and oppressed countries, documenting these findings and then publishes these. TMC works closely with local authorities and bases training and treatment on local standards and technology (17).

TCFC are working in situations of poverty and exclusion, focusing on self-reliance and empowerment of villagers and village health care workers without fully relying on Western expertise. TCFC runs several projects; the first rural medical research centre in the North-western province of Cambodia, a delivery life support project, traumatic injury management, rural blood bank service, rehabilitation workshops, and community based rehabilitation for mine accident survivors (18).

When TCFC was founded the first project was teaching traumatic injury management for mine accident survivors to community medics, the before mentioned “chain of survival”. The sites where most mine injuries occur are far from hospitals and the immediate life support from the trained local first helpers reduced mortality significantly. This reduced mortality increased the need of prostheses, and TCFC subsequently founded rehabilitation workshops where prostheses were made – often by the mine accident survivors themselves (18).

Self-help groups

Community medics reported high levels of pain and depression amongst the mine accident survivors. A study conducted by TMC found that 64 per cent of landmine accident survivors suffered from chronic pain syndromes, and in 85 per cent of the cases the economic standing of the survivor’s family had deteriorated after the accident. The conclusion was that no other factors correlated to the severity of the pain experienced by the survivors, but poverty (19).

During 2000 and 2001 TCFC tested the effect on pain with village-based self-help groups (SHG) for landmine accident survivors, with support of a “cow bank”, inspired by a model made by Indian rural health workers. After evaluation of this project pain problems had decreased – and the participants were able to provide for their family. This positive result resulted in the continuation and expansion of the SHG. By 2011 the SHG included a total of 240 families in 8 different districts (18).

To be included in the SHG a committee consisting of members of the local authority, local medics, and TCFC staff selects the participants based on if they are members of families affected by mine/ERW injuries, poor female headed households, or very poor families in remote villages. The SHG provide help with animal breeding, vocational skill studies, a crop seed bank, handicraft tutoring, microcredit loans, and agriculture land that can be used for farming. The animals the participants can breed with the help of the SHG are cows, fish, frogs, pigs, and poultry. The concept is the same for each animal, the participant loans this animal, and when the animal has produced offspring these are given back to TCFC which in turn loan these animals to new participants. With cows and pigs the system is that if you loan one, after it has produced two offspring, you can chose to give the animal back to TCFC and keep the offspring – or opposite. Fish and frogs are given in packs of 200 and when they have doubled in number, half of the animals are given back to TCFC. Poultry breeding follows the same pattern, but with different number of animals loaned and given back. With this system the animal loan can be repaid quickly and easily. Agriculture land is available for rent for growing crops that are of marked demand. With all different projects included in the SHG it is demanded of the participant that they study the skill that is needed for them to succeed with their project (18).

Purpose of thesis

In 2000 and 2001 during the testing phase of the SHG an evaluation was performed. Years have passed since then, without any assessment of the SHG and its effect on the participants. All SHG members were interviewed before participation in the SHG. New interviews were conducted earlier this year. Through analysing data from these interviews I wish to see if the participation in SHG has had any impact on the health of the SHG members.

Definition of health and what determine it

The concept of health might be somewhat abstract, making the definition of it difficult. One definition, like the one from WHO defines health as “... a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.” (20).

The basic requirements for good health are not many, but interact complexly. The degree that these requirements are fulfilled determines health status, and therefore they are collectively referred to as health determinants, and can be grouped and labelled in various ways. Socioeconomic, cultural and environmental factors interact with individual behavioural and genetic factors to determine the health of a person (21). WHO includes the above mentioned factors and these listed, as determinants of health; income and social status, education, physical environment, social support networks, genetics, health services, and gender (22).

Poverty and health

Populations with lower socioeconomic position or status have lower life expectancy, poorer nutritional status and lower coverage of preventive health interventions (23). Income, and therefore also poverty, can be causally related to health in many ways; directly affecting the material conditions that are necessary for biological survival, through affecting social participation and the possibility to control life circumstances. Individual income becomes more important the fewer goods and services that are provided by the community, like in the poor, rural villages in Battambang and Pailin (24).

United Nations Development Programme (UNDP) lists the following main causes of poverty: lack of income and assets to attain basic necessities – food, shelter, clothing, and acceptable levels of health and education, sense of voicelessness and powerlessness in the situations of state and society, vulnerability to adverse shocks that is linked to an inability to cope with them (25). Overrepresented among the poorest people in developing countries are people with disabilities. The disability perspective is unique because it has to do with poverty within poverty, because people with disabilities in low-income countries are among the most vulnerable. Poverty is itself a significant cause of disability. An example of this is land mine accidents when poor Cambodian farmers, out of necessity, plough their field fully aware of the danger of landmines (26).

It's easy to imagine how poverty affects the ability to provide for yourself and your family. Food, water, housing, education and medicine costs money. Malnutrition is the most important risk factor for illness and death globally, and in addition it also increases one's susceptibility to infections. The main underlying cause of malnutrition is poverty (27). How poverty affects social participation and how this affects health might be more difficult to imagine.

Income determines the ability to participate in the society in the way that is deemed acceptable (24). In most societies social participation is not always free of charge. Money might be required for joining in different events, for such as buying gifts for birthdays and weddings. The further down the social ladder in the society one is placed the life expectancy shortens and most diseases are more common, the risk is usually twice as high as those on top. Poor economic and social circumstances affect throughout life. The disadvantages it entails can include owning few assets, less education, less social contact, insecure employment, poor housing, difficult circumstances to bring up a family and living on an inadequate retirement pension (28). Social support, a network consisting of family, friends, neighbours and relatives or members of the same clan or ethnic group, has been found to be important for sustaining both good mental and physical health (21).

Education and health

Education is considered the second most important health determinant. The link between female education and child survival is proved to be significantly important. Almost everywhere this relationship has been studied it has been connected with lowering infant mortality. Even though education might be a proxy variable for higher family income, after controlling for socioeconomic situation, education itself is still associated with better health (20). Independent of basic demographic and labour market factors, better educated people have lower morbidity rates from the most common chronic and acute diseases. These differences cannot be accounted on different health behaviours between those less educated and those with better education (29).

Subjective well-being, socioeconomic position and health

Subjective well-being (SWB) is a broad concept including individual, subjective experience of high levels of pleasant emotions, absence of negative emotions and a general high life satisfaction. Evidence suggests that high SWB causally influences health and longevity positively. To measure SWB one can look at presence of positive and negative emotions in how individuals describe their feelings (30). A wide number of studies suggest that socioeconomic position (SEP) doesn't play a role in SWB, implying that individuals who strongly value wealth and material experience low SWB. When measuring SEP using local status, not by a global status, studies show that individuals with higher SEP reported higher SWB. However, SWB is also associated with a rise in sociometric status, which is a status based on peer respect, rather than SEP (31).

Objectives of thesis

From the pre-intervention and post-intervention interviews a clear picture of the SHG member's SEP emerge through their reported status of the health determinants analysed. The main health determinant analysed is poverty; including the underlying factors for poverty such as nutrition, housing, income sources, livestock and assets, social participation, education, socioeconomic position and subjective well-being. All these underlying factors are in themselves health determinants with a proven causal link to health.

The objective of this thesis is to study changes in health determinants, and impact on health, for mine accident survivors participating in SHG in rural Cambodia.

Pretest-posttest

Pretest-posttest designs are primarily used for comparing groups and/or measuring change resulting from different treatments. This pretest-posttest is a one-group pretest-posttest design, meaning that the dependent variable, in this case the health determinants, is measured before and after the intervention, the SHG, within one group of people. This design enables calculations of a contrast between means from pre- and post-intervention, and thus shows an eventual change in the dependent variable (32).

Statistical analyses

When comparing two groups, or one group at two different times, the null hypothesis is that there will not be a difference between the groups, no effect of the treatment. Because the data from the SHG members were significantly skewed – thus not normally distributed I used only non-parametric statistical analyses, as these make no assumption of normal distribution. The data is paired; the SHG members answer the same questions at two different occasions, however the form of the variables differ and thus different statistical methods had to be used. All statistical analyses were done on all SHG members in the pre-and post-intervention, independently of district group.

Some of the data variables were continuous, such as age and time in the SHG, continuous and ordinal, such as number of months in a year with lack of food, total income sources, and SEP, and for this data I have used Wilcoxon Signed Rank Test (Wilcoxon) (33). The data variables that were categorical and ordinal, with few different categories, such as SEP groups and housing standard, have been analysed with Sign Test.

For categorical variables, such as participation in the different social events or different income sources, with binominal answers, questions answered with yes or no, McNemar's test of change (McNemar) was used for the analyses. To analyse correlation between attributes for the SHG member and their variable outcome Spearman's Rho (Spearman) was used (34, 35). I used SPSS, version 20, for the analyses.

Wilcoxon converts the scores of the data to ranks, and then compares them at time 1 and 2, in this case pre-intervention and post-intervention, and then gives the test statistics outcome as Z. In addition to presenting the statistical significance of the results from the Wilcoxon, I have calculated the effect size of these results. Effect sizes can be used to determine the theoretical or practical significance of an effect, the power of an analysis and the effect of an intervention in different circumstances (36). To determine the effect size of the Wilcoxon, Cohen's r calculation for effect size was used, $r = \frac{Z}{\sqrt{N}}$. Cohen effect size criteria is .1 = small effect, .3 = medium effect, .5 = large effect (36,37).

McNemar analyses the changes in dichotomous variables from pretest, in this case pre-intervention, to posttest, in this case post-intervention, for those participants who do change their answer. In this test only the p-value is given as a result, and if this is significant it means that there has been a significant effect of the intervention, the SHG, on the variable chosen. Sign test is used when the null hypothesis is an equal number of differences in changes in each direction, no effect of the intervention, for example the same amount of SHG members increases their SEP group as those who decrease it. This test discards all participants who did not change from pretest to posttest; these results are called ties and are not used in calculations. The positive differences show the number of participants, SHG members, who improved, and the negative differences show the number of participant, SHG members, who

deteriorated, and the p-value tells if there are a significant higher number of improvements than deterioration (34).

Spearman uses ordinal data to look for a significant relationship between two variables, rather than a correlation due to chance. The test statistics outcome is given as rho, and can be a positive or negative value between 0 and 1. A perfect negative relationship is $\rho = -1$, and a perfect positive relationship is $\rho = 1$. The strength of the correlation is suggested by Cohen as $\rho .1 - .29 =$ small/weak, $.3-.49 =$ medium, and $.5$ to 1 is strong. (35, 37)

The SHG members had in common that they were mine accident survivors participating in the same SHG. There were however differences in the time passed since their injury occurred, they had been in the SHG for a different period of time and their pre-intervention SES groupings were different. To investigate if there were any differences in the changes in the health determinants within the SHG members based on the differences mentioned Spearman was applied to look for correlation on seven different variables. I calculated the differences in these variables by subtracting the results from pre-intervention interviews from the results from the post-intervention interviews. The variables chosen were lack of food, SEP, number of total income sources, housing standard, total social participation, number of different assets and number of different animal species.

Selection of SHG members and IFDP

As a part of the selection process of who are eligible for joining the SHG, baseline surveys are conducted. These baseline surveys are done by field workers from TCFC, in the form of an interview using a questionnaire called Information Form for Disabled Persons (IFDP).

These forms were developed for standardised and systematic gathering of information about the SHG members, after initially using name lists with some details about the potential SHG

member. The questions in the IFDP were intended to give an overall view of the life of the interviewee, with information about size of the household, and thus information about how many mouths to feed. Questions about if the potential SHG member was living in the village permanently could give information about if the family owned land or not, or if they were aware of the danger of landmines in the surrounding area. There were also questions about how they were injured, their pre-hospital help and their stay at the hospital. These questions were asked to learn about the quality of health care provided. The last section of questions were to capture living conditions, food availability, ownership of assets or farming area, livestock and vocational skill, etc.

The IFDP and its form is linked to the previously mentioned study on chronic pain in landmine accident survivors, that led to the current form of the SHG. From the IFDP I used information on the SHG members and their injuries to learn about the composition of the SHG, in addition to the use of questions linked to health determinants that are well known in their link to health. I focused on the information about the SHG members' socioeconomic position, their income sources, housing standard, livestock and assets, and eventual months of lack of food because I wanted to look at the link between poverty and health. Social participation, education and subjective well-being are also causally linked to health, and thus I chose to look at these health determinants as well.

However, as both I and TCMC were interested in assessing the effect of the SHG on mine accident survivors, this limited the number of baseline interviews from 240 to 91. A few members with injuries caused by war and one member with injuries caused by disease were included, as their injuries were similar to the mine accident survivors, the majority of these being amputees. As the IFDP were not created for directly assessing the health of the SHG members, this excluded the use of some of the information found there.

Selection of informants for thesis

We applied convenience sampling in choosing of the members to be re-interviewed. We wanted to interview SHG members who were representative of the differences found within the group of SHG members and the districts in the Battambang and Pailin province. To collect the members who would be part of the assessment – and therefore interviewed after participating in the SHG the timeframe of the completion of the interviews and translations of these interviews as well as the timeframe for completion of the thesis had to be taken into account. The limited time available necessitated a restriction of which districts the members could reside in. The members live in rural areas that are not easily accessible, and as the field workers had to travel to the members to interview them this had to be taken into account. Because of the vast differences in geography, infrastructure and population in the Battambang and Pailin provinces, it was important to choose districts that represented these differences, thus enabling interviews with members with different outsets and challenges, substantiating the possibility of interviewing members that represented this. In the available baseline-/pre-intervention interviews SHG members who had participated for minimum 2 years were chosen. The choosing of SHG members to be re-interviewed was done without considering their observed outcomes, as we wanted SHG members representing all different possible outcomes.

To choose the districts where the SHG members resided the top focus was the districts with the higher number of SHG members and activities. Seven districts were chosen; Bavel, Kamrieng, Phnom Proek, Sampov Loun, Pailin, Sala Krao, and Samlot. The main interest is to find differences in the health determinants for all SHG members pre-and post-intervention, but as the SHG members live in different provinces it was interesting to group them in different district groups to see if there were differences in these. Because of the limited data material these provinces were grouped into three groups.

The staff at TCMC helped with this grouping, as they are familiar with the geography and infrastructure in the area, and know which districts that represent different geographical settings. Group one consists of Bavel, Kamrieng, Phnom Proek, and Sampov Loun, provinces that are linked by road access and vicinity to each other. Group two include Pailin and Sala Krao, two districts that are close to each other and in the same Pailin province. The third group consists of Samlot, because it geographically locates far from the other districts. The district groups are thus chosen because of their similarity in infrastructure, geography and population.

Data collection

The IFDP interviews conducted by TCFC were made available for me to examine if they contained any information that I could use for my thesis. After deciding that I wanted to use their baseline interviews as pre-intervention interviews, it had to be decided on how the pre-intervention interviews could be conducted and in what form. The IFDP questionnaires were altered slightly, removing questions that were deemed irrelevant, or questions already answered thoroughly. These altered IFDPs, called IFDP-PII, were then used by three field workers from TCFC. They travelled to the home of the SHG member conducting the interviews in February, March, and July 2013. These field workers are the same people who decided who would join the groups and were well known to the SHG members.

Both pre- and post -intervention interviews were then translated from Khmer to English by a translator working with TCFC.

Punching

After I received the translated interviews in written form the questions asked were categorized into variables in a database in SPSS, including answers for both baseline/pre-intervention interview and the post-intervention interview. The participants were named in the IFDP and IFPD-PII, but in order to protect their identity I designated numbers for each person to make them anonymous. The numbering was used to ensure that the responses from both interviews were connected to the same individual. Their answers were then coded and punched into the databases by myself. Information that could not be punched into different answer categories and that did not seem relevant was excluded.

In the rest of the thesis the wording “pre-intervention” and “post-intervention” will be used for the pre-intervention/baseline interview and the post-intervention interview.

Subjective well-being

In the IFDP forms there was a question about how the member felt when she/he came back home after the accident and how they are feeling now. The information provided by this question was mainly of a qualitative form, but of value because it said something about their subjective well-being. By using 14 different key words in their answers they were made into quantitative variables. I read through the questionnaires two times and punched yes or no whenever the SHG member used one of the chosen words. When not mentioned, I left that variable blank. The feelings were classified as negative and positive feelings. A summary of the words used were made to form a general impression, with the negative feeling and positive feelings grouped. The key words used were depressed, sorrow, worries, excluded, different, shame, karma, included, hopeful, normal, better, happy, grateful, and able to work.

Socio-economic position

Measuring socioeconomic position (SEP) in high-income countries (HIC) is common, but less has been written about low- and middle-income countries (LMIC). SEP is referring to the economic and social factors affecting the position individuals hold in a society. Measuring SEP can be done with different measures, and the most fitting measure in LMIC might be the asset-based measure that does not use economic indicators such as income. This economic indicator often is replaced in Demographic and Health surveys in LMIC with information about ownership of assets (TVs, cars, etc.) and housing characteristics. The simplest method to calculate SEP is to sum the number of indicators chosen from each household, including occupation, education, literacy and income sources (22)

In order to make a scale to measure the SEP for the SHG members I looked at different scales like, “Socio-economic Status Scale (rural)” by Pareek and Trivedi. This scale measures caste, occupation, education, social participation, land, house, farm powers, material possessions and family. It is made for rural and mixed populations only, and is known for its high reliability (38). However, it did not fit the members of SHG, so I revised it making a scale that fitted better. I combined total income sources, total social participation, what kind of house the member lived in, total number of different kinds of animal, total of different kinds of tools, and land area groups to make a scale measuring total SEP. The range for this scale in pre-intervention interviews was 0-19 and post-intervention 5-23.

I then grouped the SES scores into different groups to show where in a scale of SEP the members belonged. The low SEP class had scores from 0 to 5, low-middle SEP class scored from 6 to 10, middle SEP class scored from 11 to 15, and high SEP class scored above 16.

SHG members

The members of the SHG consists of a total of 6 (6,6 %) females and 85 (93,4 %) males. The age of the SHG members varies between 6 and 68 years in the pre-intervention and 11 and 74 years in the post-intervention

Table 1. SHG members in age groups pre- and post-intervention

Age groups	Pre-intervention	Post-intervention
	N (%)	N (%)
6 years - 20 years	1 (1,1%)	1 (1,1%)
21 - 40 years	30(33%)	11 (12,1%)
41 - 50 years	34 (37,4 %)	33 (36,3 %)
51 - 60 years	23 (25, 3 %)	43 (47,3 %)
61-74 years	2 (2,2%)	3 (3,3 %)
Total	90 (98,9 %), 1 (1,1%) missing	91 (100%)

In the pre-intervention almost 86 %, and in the post-intervention 90 % of the SHG members were in the age between 31 and 60 years.

District groups

In the pre- intervention district group 1 consists of 35 SHG members (38,5%) with 4 SHG members from Bavel, 8 SHG members from Kamrieng 8, 8 (8,8%) SHG members from Phnom Proek, and 15 SHG members from Sampov Loun. District group 2 consists of 24 SHG members with 19 SHG members from Pailin and 5 SHG members from Sala Krao. District group 3 has 32 members from Samlot.

In the post-intervention 2 members have moved and the district groups have changed slightly. District group 1 has not changed, but two members have moved from Phnom Proek to Sampov Loun. In district group 3 two members moved to Pailin in district group 2, making the population in district group 2 consist of 26 members (28,6 %) and district group 3 having 30 members (33 %).

Time passed between pre-intervention interview and post-intervention interview

The time passed since the pre-intervention interview to the post-intervention interview varies between 1,61 years to 8,05 years.

Table 2. Distribution of time passed since pre- and post-intervention interview

Time passed	N (%)
Up to 2 years	7 (7,7%)
Between 2 and 3 years	17 (18,7%)
Between 3 and 4 years	11 (12,1%)
Between 4 and 5 years	14 (15,4%)
Between 5 and 7 years	22 (24,2%)
More than 7 years	15 (16,5%)
Total	86 (94,5%)
Missing	5 (5,5%)

The first pre-intervention interviews were conducted in February 2005 and the latest in July 2011. The post-intervention interviews were conducted in February, March and July 2013.

Time elapsed since mine accident and information about SHG members' injuries

Table 3. Distribution of time elapsed since injury, and 2013 in 5 year groups

Time passed	N (%)
Up to 5 years	4 (4,4%)
6 - 10 years	14 (15,4%)
11 - 15 years	9 (9,9%)
16 - 20 years	11 (12,1%)
21 - 25 years	17 (18,7%)
26 - 30 years	29 (31,9%)
31 - 35 years	6 (6,6%)
Total	90 (98,9%)
Missing	1 (1,1%)

Time passed since the mine accident and 2013 varies between 3 and 35 years.

Table 4. Information about SHG member's injuries in different district groups

District Group	All districts	Kamrieng, Phnom Proek, Sampov Loun	Pailin, Sala Krao	Samlot
Reason for joining SHG	N (%)	N (%)	N (%)	N (%)
Landmine injury	84 (92,3%)	33 (94,3%)	22 (91,7%)	29 (90,6%)
Illness	1 (1,1%)	0	0	1 (3,1%)
Injury from war	4 (4,4%)	1 (2,9%)	2 (8,3%)	1 (3,1%)
Other	2 (2,2%)	1 (2,9%)	0	1 (3,1%)
What kind of injury				
Arm amputation	3 (3,3%)	1 (2,9%)	2 (8,3%)	0
Foot amputation	72 (79,1%)	28 (80%)	19 (79,2%)	25 (78,1%)
Amputation of more than one limb	9 (9,9%)	3 (8,6%)	1 (4,2%)	5 (15,6%)
Other	7 (7,7%)	3 (8,6%)	2 (8,3%)	2 (6,3%)
What was being done when accident happened				
Farming	17 (18,9%)	6 (17,1 %)	6 (25 %)	5 (16,1 %)
Walking somewhere	12 (14,4%)	6 (17,1%)	3 (12,5%)	4 (12,9%)
While in the army	40 (44,4%)	15 (42,9 %)	9 (37,5 %)	16 (51,6%)
Searching for food	7 (7,8%)	2 (5,7%)	3 (12,5%)	2 (6,5%)
Other	2 (2,2%)	2 (5,7%)	0	0
Not mentioned	11 (12,2 %)	4 (11,4 %)	3 (12,5%)	4 (12,9 %)

70 % of the injuries occurred more than 15 years ago, during the civil war, and more than 90 % of the total number of injuries were caused by landmines. 44,4 % of the injuries occurred when the SHG member was in the army, and 26,7 % of the injuries occurred while the SHG member were performing different tasks to provide food for themselves and their families. The majority of the injuries were foot amputations, a common injury from landmines.

Housing standards for SHG members

The different housing standards were coded ordinal from 0 = other, with the coding increasing with the housing standard, ending with 6 = two floor house, therefore Sign Test was used.

Table 5. Distribution of housing standards of SHG members pre- and post-intervention

District Groups	All districts		Phnom Preok, Sampov Loun		Pailin, Sala Krao		Samlot	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Kind of House	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
No own house/ living with family	7 (8,5%)	3 (3,3%)	4 (12,1%)	1 (1,1%)	2 (10,5 %)	0	1 (3,3%)	2 (6,7%)
Hut	2 (2,4%)	2 (2,2%)	1 (3 %)	1 (1,1%)	1 (5,3%)	1 (3,8%)	0	0
Wood house with thatch roof	27 (32,9%)	2 (2,2%)	12 (36,4%)	0	3 (15,8%)	2 (7,7%)	12 (40%)	0
Wood house with zinc roof	27 (32,9%)	67 (74,4%)	6 (18,2%)	28 (82,4%)	7 (36,8%)	14 (53,8%)	14 (46,7%)	25 (83,3%)
Concrete house	2 (2,4%)	8 (8,9%)	1 (3%)	0	0	6 (23,1%)	1 (3,3%)	2 (6,7%)
2 floor house	0	5 (5,6%)	0	2 (5,9%)	0	2 (7,7%)	0	2 (6,7 %)
Other	17 (20,7%)	3 (3,3%)	9 (27,3%)	2 (5,9%)	6 (31,6%)	1 (3,8%)	2 (6,7%)	0
Total	82 (100%)	90 (100%)	33 (100%)	34 (100%)	19 (100%)	26 (100%)	30 (100%)	30 (100 %)

A Sign Test was conducted showing a statistically significant increase in housing standard ($Z = -6,548$, $p = <.001$). There were 3 negative differences and 53 positive differences post-intervention compared to pre-intervention. 25 ties showed that 25 SHG members did not change their housing standard. Information from this test reveals that the majority of the SHG members improved their housing standard, however 28 out of 81, or 34.6% of the SHG members did not improve their housing standard, or in fact decreased their housing standard post-intervention compared to pre-intervention.

Looking at the different district groups, in district group 1 the percentage of SHG members living in a wooden house with a zinc roofing increased with the highest percentage (64,2 %), district group 3 increased this the second most (36,6%), and district group 3 increased this percentage with the least (17%).

Food shortage

Table 6. Distribution of lack of food in different district groups pre- and post-intervention

District groups	All districts		Phnom Proek, Bavel, Sampov Kamrieng Loun		Pailin, Sala Krao		Samlot	
	Pre N (%)	Post N (%)	Pre N (%)	Post N (%)	Pre N (%)	Post N (%)	Pre N (%)	Post N (%)
Lack of food								
Sufficient food all year	1 (1,4%)	31 (34,4%)	1 (3,6%)	10 (29,4%)	0	9 (34,6%)	0	12 (40%)
Lack of food 1 month	24 (33,8%)	22 (24,4%)	13 (46,4%)	8 (23,5%)	5 (35,7%)	6 (23,1%)	6 (20,7%)	8 (26,7%)
Lack of food 2 months	25 (35,2%)	14 (15,6%)	8 (28,6%)	6 (17,6%)	4 (28,6%)	3 (11,5%)	13 (44,8%)	5 (16,7%)
Lack of food 3 months	9 (12,7%)	11 (12,2%)	1 (3,6%)	4 (11,8%)	2(14,3%)	5 (19,2%)	6 (20,7%)	2 (6,7%)
Lack of food for 4 months	1 (1,4%)	5 (5,6%)	1 (3,6 %)	3 (8,8%)	0	0	0	2 (6,7%)
Lack of food for 5 months	4 (5,6%)	5 (5,6%)	2 (7,1%)	2 (5,9%)	1 (3,4%)	2 (7,7%)	1 (3,4%)	1 (3,3%)
Lack of food for 6 months or more	7 (9,9%)	2 (2,2%)	2 (7,1)	1 (2,9%)	2 (14,3%)	1 (3,8%)	2 (14,3%)	0

A Wilcoxon Signed Rank Test was performed on number of months in the year with lack of food, a continuous variable ranging from 0 to 12 months, revealing a statistically significant reduction in months with lack of food following participation in SHG ($Z = -2,532$, $p = .011$), with a low-medium size effect ($r = .2$).

The largest change was one individual who went from 12 months in the year with lack of food to no months. In total there is an increase of 33 % SHG members who have sufficient access to food the entire year in the post-intervention interview compared to the pre-intervention interview.

There has been a 7,7 % decrease in SHG members who lack food for 6 months or more from pre- to post-intervention interview. However, the total percentage of SHG members with more than 3 months with lack of food has only decreased slightly, by 4 %. The total percentage of SHG member who lack 4 months of food has actually increased.

Income sources

Table 7. Distribution of income sources in the different district groups pre- and post-intervention.

District groups	All districts		Phnom Proek, Bavel, Sampov Kamrieng Loun		Pailin, Sala Krao		Samlot	
	Pre	Post	Pre	Post	Pre	Post	pre	Post
Income sources	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Income from orchard	68 (76,4%)	70 (77,8%)	25 (71,4%)	19 (55,9%)	16 (66,7)	21 (80,8%)	27 (90%)	30 (100%)
Income from rice farming	20 (22,5%)	15 (16,7%)	4 (11,4%)	5 (14,7%)	1 (4,2%)	0	15 (50%)	10 (33,3%)
Income from repairing	3 (3,3%)	5 (5,6%)	2 (5,7%)	4 (11,8%)	1 (4,2%)	1 (3,8%)	0	0
Income from pension	0	7 (7,8%)	0	0	0	2 (7,7%)	0	5 (16,6%)
Daily labour fee income	31 (34,4%)	23 (25,6%)	16 (45,7%)	13 (38,2%)	10 (41,7%)	6 (23,1%)	5 (16,1%)	4 (13,3%)
Income from selling animals	8 (8,9%)	45 (50%)	2 (5,7%)	12 (35,3%)	0	16 (61,5%)	6 (19,4%)	17 (56,7%)
Other income	22 (24,4%)	35 (38,9%)	11 (31,4%)	19 (55,9%)	6 (25 %)	9 (34,6%)	5 (16,1%)	7 (23,3%)
Total income sources								
0 income sources	1 (1,1%)	0	0	0	0		1 (3,3%)	0
1 income source	34 (38,2%)	17 (18,9%)	13 (37,1%)	8 (23,5%)	15 (62,5%)	6 (23,1%)	6 (20 %)	3 (10%)
2 income sources	45 (50,6%)	40 (44,4%)	19 (54,3%)	14 (41,2%)	8 (33,3%)	12 (46,2%)	18 (60 %)	14 (46,7%)
3 income sources	8 (9%)	28 (31,1%)	3 (8,6%)	12 (35,3%)	1 (4,2%)	7 (26,9%)	4 (13,3%)	9 (30%)
4 income sources	1 (1,1%)	4 (4,4%)	0	0	0	1 (3,8%)	1 (3,3%)	3 (10%)
7 income sources		1 (1,1%)	0	0		0	0	1 (3,3%)

Total income sources is an ordinal and continuous variable ranging from 0 to 7 income sources, and thus a Wilcoxon test was conducted, showing a statistically significant difference between pre- and post-intervention ($Z = 4,304$, $p = <.001$), with a medium effect size ($r = .31$)

The mean number of total income sources pre-intervention was 1,71, with a standard deviation (SD) of 0.694. Post-intervention the mean number of total income sources were 2,27, with a SD of 0.946.

McNemar Test on income from orchard, income from rice farming, income from repairing, and income from labour fee, all dichotomous variables, showed no statistical significant difference pre- and post-intervention. However, looking at the table 8 (8,8%) less SHG members earned their income from daily labour post-intervention compared to pre-intervention.

On other income, income from pension, and income from selling animals, also dichotomous variables, the McNemar Test shows a statistically significant change. Results on other income was ($p = .035$), with a 14,5 % increase in SHG members earning income from other income sources post- compared to pre- intervention. Results on income from pension was ($p = .039$), with 7 SHG members receiving pension post-intervention compared to none pre-intervention. Results on income from selling animals was ($p = <.001$). This with a 41,1% increase in SHG members earned income from selling animals after participation in SHG. This rather large change could be connected with the increase in SHG members owning animals showed below.

Hectares of farming area

Wilcoxon test was conducted on amount of hectares of farming area pre- and post-intervention, a continuous and ordinal variable. The test showed a non-significant change ($p = .399$). The mean of amount of hectares pre – intervention was 2,4106 with a SD of 2,852, post-intervention the mean amount of hectares was 2,4356, with a SD of 2,181. The increase in mean from pre- to post-intervention might indicate that the members have slightly more farming area, even if this change is not significant. The decrease in SD pre-to post-intervention might indicate that the variance of hectares of farm area owned within the SHG group has decreased. The minimum amount of hectares both pre- and post-intervention was 0 and the maximum amount of hectares pre-intervention was 15, and 10 in post-intervention. There is only one SHG member with 15 hectares of land, and this individual reports selling farm area and using this income to buy assets for the family.

McNemar was also conducted on whether the SHG members had farming areas or not, and if they were renting/borrowing land, dichotomous variables. These tests were non-significant as

well. Results on owning farming area were ($p = 1$). In the pre-intervention 3 SHG members reported borrowing/renting land, in post-intervention 8 SHG members reported the same. McNemar reported a non-statistical change in this ($p=289$).

Assets and livestock

Table 8. Distribution of owning livestock and assets in district groups

District Groups	All Districts		Bavel, Phnom Kamrien Proek, Sampov Loun		Pailin, Sala Krao		Samlot	
	Pre N (%)	Post N (%)	Pre N(%)	Post N (%)	Pre N (%)	Post N(%)	Pre N (%)	Post N (%)
Having animals	57 (65,5%)	81 (90%)	23 (65,7%)	29 (82,9%)	10 (50%)	24 (92,3%)	24 (75%)	28 (96,6%)
Owning fish	0	17(19,1%)	0	0	0	2(8%)	0	15 (51,7%)
Owning cow(s)	12 (13,8%)	55 (61,8%)	4 (11,4%)	24 (68,6%)	1 (5 %)	12 (48%)	7 (21,9%)	19 (65,5%)
Owning poultry	27 (31%)	56 (64,4%)	14 (40%)	15 (42,9%)	4 (20%)	19 (76%)	9 (28,1%)	22 (81,5%)
Owning pig(s)	7 (8%)	18 (20,2%)	4 (11,4%)	1 (2,9%)	0	2 (8%)	3 (9,4%)	15 (51,7%)
Borrowing animal(s)	22 (25,3%)	2 (2,2%)	4 (11,4%)	2 (5,7%)	8 (40%)	0	10 (31,3%)	0
Total species of animals								
0 animals	49 (56,3%)	9 (10,3%)	15 (42,9%)	6 (17,1%)	16 (80%)	2 (8%)	18 (56,3%)	1 (3,7%)
1 spieces of animal	31 (35,6%)	33 (37,9%)	18 (51,4%)	18 (51,4%)	3 (15,%)	13 (52%)	10 (31,3%)	2 (7,4%)
2 species of animals	6 (6,9%)	31 (35,6%)	2 (5,7%)	11 (31,4%)	1 (5%)	8 (32%)	3 (9,4%)	12 (44,4%)
3 species of animal	1 (1,1%)	9 (10,3%)	0	0	0	2 (8%)	1 (3,1%)	7 (25,9%)
4 species of animals	0	5 (5,7%)	0	0	0		0	5 (18,5%)
Having assets	50 (58,8)	77 (84,6%)	18 (54,5%)	31 (88,6%)	14 (63,6 %)	21 (80,8%)	18 (60%)	25 (83,3%)
Owning bike	5 (5,9%)	20 (22%)	4 (12,1%)	13 (40,2)	0	2 (7,7%)	1 (3,3)	5 (16,7%)
Owning TV	12 (14,1%)	26 (28,6)	4 (12,1%)	15 (42,9%)	4 (18,2%)	6 (23,1%)	4 (13,3%)	5 (16,7%)
Owning motorbike	35 (41,2%)	64 (70,3%)	9 (27,3%)	22 (62,9%)	11 (50%)	20 (76,9%)	15 (50%)	22 (73,3%)
Owning tractor	0	9 (9,9%)	0	2 (5,7%)	0	0	0	7 (23,3%)
Owning tools/other	4(4,8%)	4 (4,4%)	3 (9,1%)	2 (5,4%)	1(4,5%)	2 (7,7%)	0	0

A Sign Test was conducted on the total number of different animal species, a variable with 5 categories. The results showed a statistical significant increase ($Z = -6,623$, $p = <.001$) in number of different animal species, with 3 negative, 54 positive differences and 27 ties. The mean number of animals owned pre-intervention was .53, with SD of .679, and 1.63, with SD 1.001 post-intervention. These results show that the number of animals species owned by SHG members post-intervention is larger than pre-intervention, and that the majority of the SHG members increased the number of animal species owned. 45,9 % more of the SHG

members owned one or more animal species post-intervention compared to pre-intervention. McNemar test was conducted on variables owning fish, cow, poultry, pig, bike, TV, motorbike, tractor, tools and borrowing animals. On owning fish the test showed a statistically significant change from pre-to post-intervention, ($p. = <.001$), with an increase from no SHG members owning fish pre-intervention to 17 SHG members owning fish post-intervention. McNemar test on owning cows, poultry and pig showed a statistically significant change from pre- to post-intervention. The results for owning cow were ($p. = <.001$), with a 48 % increase in SHG members owning cows. On owning poultry pre- to post-intervention the test results were ($p. = <.001$), with a 33,4 % increase in SHG members owning poultry. On owning pigs the test results were ($p. = .027$), with a 12,2 % increase in SHG members owning pigs. The test also showed a statistically significant decrease on borrowing animals pre- to post-intervention, ($p. = <.001$), with a 23,1 % decrease in SHG members borrowing animals.

McNemar test on owning tools showed a statistically non-significant difference pre- and post-intervention, but did show a statistical significant change on having assets, owning bikes, TV, motorbike, and tractor. Results of McNemar on having assets were ($p. = <.001$), with a 25,8% increase in SHG members having assets. McNemar results on owning TV ($p. = .037$), has a 14,5 % increase in SHG members owning a TV. Results on owning motorbike ($p. = <.001$), has a 29,1 % increase in SHG members owning a motorbike. Results on owning tractor ($p.=.016$), has a 9,9 % increase in SHG members owning a tractor, and results on owning bike ($p. = .007$), has a 16,1 % increase in SHG members owning a bike.

Official statistics on owning assets compared to SHG statistics on owning assets

The official statistics for the 2008 population census (39), including more than 200000 inhabitants in the rural Battambang province and more than 14 000 in the rural Pailin province, contains the percentage of the population who own bikes, TV, motorbike, and

tractor. I have used this statistic to describe and showcase the differences between the SHG members and the inhabitants questioned in the official statistics.

Table 9. Percentage of rural Battambang and Pailin residents owning assets according to official statistics compared to SHG members pre- and post-intervention

Assets	Rural Battambang (%)	Rural Pailin (%)	SHG Battambang pre-intervention	SHG Battambang post-intervention	SHG Pailin pre-intervention	SHG Pailin post-intervention
Owning 1 or more bike	52,96 %	22,95 %	4(7,3%)	15 (24,6%)	1 (3,3%)	5 (16,4%)
Owning 1 or more TV	52,36 %	42,41 %	8 (14,5%)	21 (34,4%)	4 (13,3%)	5 (16,7%)
Owning 1 or more motorbike	36,10 %	51,78 %	20 (36,4%)	42 (68,9%)	15 (50%)	33 (73,3%)
Owning one or more tractor	1,18 %	1,54 %	0	1 (3,3%)	0	7 (23,3%)

To be able to compare the SHG members with the official statistics the district groups have to be changed slightly to show who lives in Battambang province and who lives in Pailin province. District group 1 and 3 belongs to Battambang, and district group 2 belongs to Pailin.

In the official statistics a higher percentage of the inhabitants in rural Battambang and rural Pailin own one or more bike and one or more TV both pre- and post-intervention. However, in the official statistics for Battambang the percentage owning one or more motorbike is almost the same as for the members in SHG in Battambang pre-intervention. Post-intervention the percentage of SHG members owning one or more motorbike exceeds the official statistics. The same can be said about owning one or more tractors in the post-intervention interview for both SHG members in Battambang and Pailin. Among the SHG members in Pailin the percentage owning one or more motorbike exceeds the official statistics both pre- and post-intervention.

Social participation

Table 10. SHG member's participation in social events in different district groups

District Groups	All districts		Phnom Proek, Sampov Loun		Pailin, Sala Krao		Samlot	
	Pre	Post	Pre	Post	Pre	Post	pre	Post
Participation in	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Weddings	35 (60,3%)	83 (92,2%)	17 (58,6%)	30 (88,2%)	6 (54,5%)	25 (96,2%)	12 (66,7%)	28 (93,3%)
Parties	3 (5,2%)	41 (45,6%)	2 (6,9%)	18 (52,9%)	0	7 (26,9%)	1 (5,6%)	16 (53,3%)
Community meetings	11 (19%)	39 (43,8%)	3 (10,7%)	11 (32,4%)	2 (18,2)	14 (53,8%)	6 (31,6%)	14 (48,3%)
Religious ceremonies	35 (60,3%)	78 (86,7%)	16 (55,2%)	28 (82,4%)	7 (63,6%)	24 (92,3%)	12 (66,7%)	26 (86,7%)
Total social participation								
0 events	12 (21,1%)	5 (5,6%)	8 (28,6%)	3 (8,8%)	2 (18,2%)	1 (3,8%)	2 (11,1%)	1 (3,4%)
1 event	14 (24,6%)	1 (1,1%)	6 (21,4%)	1 (2,9%)	3 (27,3%)	0	5 (27,8%)	0
2 events	25 (43,9%)	27 (30,3%)	11 (39,3%)	10 (29,4%)	6 (54,5%)	9 (34,6%)	8 (44,4%)	8 (27,6%)
3 events	5 (8,8%)	39 (43,8%)	2 (7,1%)	14 (41,2%)	0	12 (46,2%)	3 (16,7%)	13 (44,8%)
All events	1 (1,8%)	17 (19,1%)	1 (3,6%)	6 (17,6%)	0	4 (15,4%)	0	7 (24,2%)

Total social participation has few categories, and thus Sign Test was used showing a significant increase post- compared to pre-intervention ($Z = -5.879$, $p. = <.001$), with 2 negative, 42 positive differences and 12 ties. The percentage of SHG members not participating in any social events have decreased with 15,5 % from pre- to post-intervention, and the percentage of SHG members participating in two events or more have increased with 38,7 % from pre- to post-intervention.

McNemar test was conducted on the different social events, all dichotomous variables, showing only statistically significant result. The results for attending weddings ($p. = <.001$) has a 31,9 % increase in SHG members attending weddings. The results for attending parties ($p. = <.001$), has a 40,4 % increase in SHG members attending parties comparing pre- to post-intervention. The results on participating in community meetings ($p.= .014$), has a 24,8 % increase in SHG members participating comparing pre – to post-intervention. Results on participation in religious ceremonies ($p. = <.001$), has a 26,4 % increase in SHG members participating comparing pre – with post-intervention.

SHG members’ children’s education

There is a large discrepancy in the information provided by the SHG member about their children in the pre- and post-intervention interviews. The total number of reported children by the SHG members was 326 pre- and 331 post-intervention. In the pre-intervention information about the education of the SHG members’ children was missing in 42 interviews, a large contrast to only missing this information in 2 interviews in the post-intervention. In table 11, there are more than three times the children in the post-intervention, compared to the pre-intervention.

Table 12 have more than double the amount of children post-intervention compared to pre-intervention. This illustrates the limitations on the data on the SHG members’ children’s education.

Table 11. Number and percentage of children attending school pre-and post-intervention

	Pre	Post
Children attending school	N (%)	N (%)
No	7 (33,3%)	6 (8,8%)
Yes	9 (42,9%)	13 (19,1%)
All have attended	5 (23,8%)	49 (71,2%)
Total number of answers	21	68

The answers to this variable tell about the attendance in school of the SHG member’s children. “No”, means that none of the children attend or have attended school. “Yes” means that all children are attending school currently. “All have attended” means that every one of the SHG members’ children have attended school at one point in time, including not only those presently attending but also those who quit school.

Despite the limited data a Sign Test revealed a statistically significant change in whether all of the SHG members' children had attended school in pre- and post-intervention groups. With 1 negative difference, 13 positive differences, 3 ties, and $(p = .002)$. The reason why the Sign Test was only used on 17 SHG members is because there only were 17 SHG members who had answered on both pre- and post-intervention.

Table 12. Number and percentage of grades for SHG members' children in school

	Pre	Post
Children in school	N (%)	N(%)
Primary education (1 - 6 Grade)	28 (66,7%)	74 (66,7%)
Lower secondary education (7-9 grade)	11 (26,2%)	22 (19,8%)
Upper Secondary education (10-12 grade)	2 (4,8%)	14 (12,6%)
University	1 (2,4%)	1 (0,9%)
Total number of kids	42	111

The percentages of children in lower secondary-, upper secondary education and university have decreased from pre-intervention to post-intervention. The numbers of children in these grades have however increased considerable, especially those children attending primary education and upper secondary education.

The problem with this variable is that there in some cases had passed up to eight years, so the children measured might not be the same. Disregarding the limitations to this data, there has been an increase in number of children attending school, and that might indicate that it is caused by the parents of these children joining the SHG.

The increase can also be caused by the improvement of data about the SHG members' children in the post-intervention compared to the data in the pre-intervention.

Socioeconomic position

A Wilcoxon Signed Rank Test revealed a statistical significant increase in uncategorized SEP, a continuous variable, following participation in the SHG ($Z = -7,496$, $p = <.000$), with a large effect size ($r = .56$). The mean for SEP pre-intervention was 8,67 and for SEP post-intervention 13,78. The minimum value for SEP was 0 pre- and 5 post-intervention, and the maximum value for SEP was 19 pre- and 23 post-intervention. This indicates that those SHG members with the lowest SEP have increased their SEP significantly, as the change from 0, meaning that they have nothing, to 5 has to be considered a big change.

Table 13. Distribution of SEP class in district groups pre- and post-intervention.

District Groups	All Districts		Bavel, Proek, Kamrieng, Loun		Pailin, Sala Krao		Samlot	
	Pre N (%)	Post N (%)	Pre N (%)	Post N (%)	Pre N (%)	Post N (%)	Pre N (%)	Post N (%)
Low SEP class (0-5)	16 (17,6%)	2 (2,2%)	6 (17,1%)	2 (5,7%)	7 (29,2%)	0	3 (9,4%)	0
Low-middle SEP class (6-10)	46 (50,5%)	14 (15,4%)	15 (42,9%)	8 (22,9%)	12 (50%)	6 (23,1%)	19 (59,4%)	0
Middle SEP class (11 - 15)	27 (29,7%)	48 (52,7%)	12 (34,3%)	21 (60%)	5 (20,8%)	10 (38,559)	10 (31,3%)	17 (56,7%)
High SEP class (above 16)	2 (2,2%)	27 (29,7%)	2 (5,7%)	4 (11,4%)	0	10 (38,5%)	0	12 (43,3%)

The SEP group variable is categorical, with values from 0 – 4, making a Sign Test appropriate. This was applied and gave the results ($Z = -7,725$, $p = <.001$), showing 3 negative differences, 70 positive differences, and 18 ties in SHG members SES group post-intervention compared to pre-intervention. This would indicate that for 21 SHG members the SHG did not change, or changed for the worse, in their SEP grouping.

In pre-intervention the majority of the SHG members were placed in the low- and low-middle SEP class (68,1 %). In the post-intervention the majority of the members (82,4 %) were placed in the middle- and high SEP class.

Pre-intervention the low SEP class consists of 17,6 % of the SHG members. Post intervention the low- and low-middle SEP class in total consists of the same percentage as this. The same

pattern can be seen in all SEP classes, the SHG members seem to have moved in post-intervention into the SEP class above where they were placed pre-intervention.

Subjective well-being and sociometric state

Table 14. SHG members' answers to IFDP question about how they were feeling after injury and now.

Negative feelings	Depressed		Sorrow		Worries		Excluded		Different		Shame		Karma	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Right after injury	70 (76,9%)	0	21 (23,1%)	21 (23,1%)	0	4 (4,4%)	4 (4,4%)	2 (2,2%)	17 (18,7%)	0	4 (4,4%)	0	0	0
Feel now pre-intervention	6 (6,6%)	2 (2,2%)	4 (4,4%)	12 (13,2%)	1 (1,1%)	7 (7,7%)	3 (3,3%)	0	0	0	0	0	0	0
Feel now post-intervention	4 (4,4%)	5 (5,5%)	0	5 (5,5%)	2 (2,2%)	0	2 (2,2%)	0	0	1 (1,1%)	0	0	0	0

Positive feelings	Able to work		Normal		Hopeful		Better		Happy		Included		Grateful	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Right after injury	0	29 (31,9%)	6 (6,6%)	1 (1,1%)	2 (2,2%)	0	0	0	16 (17,1%)	1 (1,1%)	0	0	0	0
Feel now pre-intervention	13 (14,3%)	5 (5,5%)	25 (27,5%)	0	7 (7,7%)	26 (28,6%)	7 (7,7%)	0	21 (23,1%)	1 (1,1%)	2 (2,2%)	0	0	0
Feel now post-intervention	27 (29,7%)	3 (3,3%)	37 (40,7%)	0	15 (16,5%)	56 (61,5%)	25 (27,5%)	1 (1,1%)	7 (7,7%)	0	19 (20,9%)	0	0	0

In the pre-intervention interviews 70 SHG members (76,9 %) described themselves as depressed when they first came back to their home after the accident. In the pre-intervention group 6 SHG members (6,6 %) described themselves as feeling depressed now, and in the post-intervention group 4 SHG members (4,4 %) describes the same.

Right after the injury only 6 SHG members (6,6 %) described feeling normal. In the pre-intervention interview this has increased to 25 SHG members (27,5 %), and in the post-intervention interview 37 SHG members (40,7 %) describes feeling normal now. Many of the members explains feeling normal because they now see and meet other disabled persons; they are no longer looked down upon, making them feel less ashamed. This feeling of normality is often followed by the statement that it makes them feel better. The feeling of normality is also connected with the SHG member being able to work.

Feeling included is described by 16 SHG members (17,1 %) right after the injury, a description that increases to 21 SHG members (23,1 %) in the pre-intervention interview. In the post-intervention interview describing feeling included has decreased to 7 SHG members (7,7 %).

When the SHG members talk about their injury, they mention feeling guilt and shame about their injury, and say that they believe it is their karma, their fault, because of previous events. Feeling ashamed about the injury is mentioned by 17 SHG members (18,7 %) right after the injury, but only mentioned once in the post-intervention interview, and then as not feeling shame.

As many as 19 members (20,9 %) express gratitude towards TCFC in their interview, thanking for the help that they have received, but also express that they feel that it is important that they take responsibility for their own lives and make the best out of it.

Differences within the SHG

Spearman's rho showed no correlation between the number of years since injury and the difference in lack of food, difference in assets, difference in number of animal species, difference in SEP, or differences in housing standard following participation in the SHG.

It did however find a medium strong negative correlation between years passed since injury and the difference in total social participation following participation in the SHG ($N = 55$, $p = .026$, $\rho = -.300$). This indicates that the difference in social participation pre- and post-intervention increase when the number of years passed since the injury decreases, indicating that those with more recent injuries participate in more social event after participating in SHG.

Spearman's rho showed found the same results with no correlation between the amount of time spent in SHG and the variables with no found correlation between the number of years since injury. A medium strong positive correlation was found between amount of time spent in SHG and difference in total social participation pre-and post-intervention ($N= 52$, $p = .009$, $\rho = .361$), indicating that the difference in social participation increases with the amount of time spent in SHG increases.

No correlation was found between pre-intervention SEP and the difference in lack of food, difference in assets, difference in number of animal species, difference in social participation, or differences in housing standard following participation in the SHG. The only correlation found was a medium strong negative correlation between pre-intervention SEP and difference in SEP following participation in SHG was found ($N=85$, $p = <.001$, $\rho = -.439$), indicating that the difference in SEP pre- and post-intervention increase when the pre-intervention SEP decreases. This indicates that those SHG members with low pre-intervention SEP increased their SEP most after participation in the SHG.

SHG members and shortcomings in their selection

The SHG members were mostly male, coinciding with the numbers from official CMVIS reports. The decline in mine accidents the last 15 years can be explained by peace and de-mining. Males being overrepresented in mine accident survival statistics can be explained both by the wars, where males were enrolled in armies, exemplified by the Khmer Rouge regime resulting in a deficit among males in the 20-40 year age group at the end of 1979. This fact could also explain the high percentage of SHG members in the same age groups, in both pre- and post-intervention. The fact that males more often goes looking for food for the family and/or does the clearing of farm land and farming might also explain the male dominance within the SHG (11).

The SHG members have not been in the groups for a very long time, and there is a discrepancy in the distribution of the duration of participation in the SHG. The fact that there are few differences within the group of SHG members depending on the duration of their participation does suggest that these differences did not matter much, but having a more standardised participation duration might be beneficial in further studies. The same might be said about the distribution of time since the mine accident, as these results are similar to participation time, however this might not be possible, as new landmine accidents happen every year.

The selection of SHG members to be re-interviewed was not randomly, as only mine accident survivors living in specific districts were picked, making the number of SHG members re-interviewed less than the total number of SHG member. This small sample size is an issue. There is the risk of a type 1 error, incorrectly rejecting the null hypothesis of no change when it is true, but generally a small sample size does not increase this risk.

However does the risk of type 2 error, failing to reject the null hypothesis when it is false, is higher in small sample sizes (40). Since changes were found it could be said that this error did most probably did not happen here.

However, the fact that all members had both pre- and post-intervention interview, making the response rate no less than a 100 per cent, does makes the foundation of the data quite solid. Ideally having a control group with informants living in the same districts as the SHG members to compare the SHG members to would be the best solution. This could help clarify if the changes seen in the SHG members' health determinants came from the intervention or if the same changes were seen in the control group, thus controlling for overall changes in the society. The best would possibly be if this control group contained mine accident survivors not participating in the SHG, as well as members of the districts without mine injuries. This would give a good overview of the development in the districts for all inhabitants.

It also has to be noted that convenience sampling does reinforce the possibility of selection bias (40). The SHG members chosen for re-interviews might have unknowingly or not, have been chosen because they had the most progress. Nonetheless does this seem unlikely, as not all SHG members have had positive results. The post-intervention interviews were made by the same TCFC field workers who accepted them into joining the SHG.

This permits the risk of interviewer bias, and measurement error through response-shift bias. Response-shift bias means that the SHG members' answers might be altered, in both a positive and negative direction. As many of the SHG members express gratitude towards TCFC there is a possibility that they answered in more positively manner because they wanted to please the field workers (40). To prevent this anonymous response through a questionnaire might be used. However answering a questionnaire anonymously might not be an alternative, as the conditions in LMIC are different than in HIC.

The culture of answering questions in this way is different, and the complexity that a questionnaire would need to have to substitute the content of the interviews does bring forward the possible problem that not all SHG members have adequate reading and writing skills to understand and answer it correctly.

The district grouping of the SHG members had to be done because of the amount of districts and the number of SHG members in each of these. This grouping was done based on similarities in geography and population, but there might still be differences within the districts that are reflected in the groups, resulting in district groups with seemingly more or less progress than what would have been seen without the grouping. The statistical analyses have been done on all SHG members individually to try to avoid this possible bias, not on the district groups. To clearly show differences between pre- and post-intervention the results were showed in total district groups in the tables, but also in district groups to highlight the changes in these quite different geographical areas.

Limitations of method

One – group pretest-posttest design has some flaws that have to be considered when looking at the statistical results. There is no control group, so it is difficult to say conclusively that the SHG are the reason there has been change in the health determinants. Other risks to this method are those from history, an external event occurred during the timeframe of SHG participation that might be responsible for the effect, and maturation, a natural process that leads the participants change. However, this risk increases the longer time between pre- and post-intervention, so the risk of this might not be very high. The fact that the same questionnaire, IFDP, were used in both interviews decreases the threat of instrumentation; changes because of the measure used (32). The fact that the quality of answers varied in pre- and post-intervention is an issue worth considering.

The IFDP questionnaires used for obtaining information about the SHG members were created to gain insight in their lives and demand for help, not with a focus on the SHG members' health, nor the assessment of this. More questions directly aimed at gathering knowledge about their health and their subjective well-being might be useful in further research to figure out whether the SHG members themselves feel that their health has improved. The question about their level of pain in post-intervention lacked, and as the SHG were initiated to investigate the SHGs effect on pain, this would have been interesting to analyse and compare with previous findings.

The statistical methods used also have their flaws. The tests only show if there has been a difference in the variables compared pre- and post- intervention, they do not say anything about why the change has happened. The changes might have come naturally because of the change in time. Ideally with control groups as those mentioned before it would be easier to see if the changes in the SHG members were significantly different than the control group, and thus causally relate the changes to the intervention. However, looking at the situation in Cambodia the SHG seems to be a plausible explanation to the changes in the pre- and post-intervention groups. The increase in Cambodia's GDP has not affected the conditions in the poor villagers in rural Cambodia, the affect have been almost conclusively directed towards the population living in urban villages and cities (8). There are also limitations in the different statistical methods. Non-parametric tests have less power to detect statistically significant difference between conditions because of their lack of assumption of type of data, normal distribution or equivalence of variances (33).

In the thesis multiple statistical tests have been conducted, and this problematizes the question about significance level. In multiple statistical tests the significance level of $p = <0.05$ might be a too low significance level.

This can be corrected by dividing the $p. = <0.05$ with the number of comparisons made (33). However, most of the statistical analyses had significance levels much lower than that, so this might not be an issue here.

There's also the possibility of interpretation bias, as I have in subjectively analysed the answers to the pre – and post- intervention interviews (40). This is in particular in the questions about the SHG members' feelings that were the base for the part on subjective well-being. I have done my best to avoid this and remain as objective as possible, but the risk of bias is still present.

The scale for SEP was made by looking at similar scales made for rural areas. This allows the risk of measurement bias, and does not, however secure that the SEP classes are represented as well as they could have. Cross-cultural SEP is difficult to estimate, as the Western HIC criteria not always match that of LMIC.

Health determinants

None of the questions asked to the SHG members were directly about health, so the question is then if improvement of health determinants say anything about improvement in health. With the knowledge that the requirements for good health are what determine health, it is not an unlikely assumption that improving these determinants would imply an increase in the quality of health (21).

The total socioeconomic position has changed significantly from pre- to post-intervention groups. This could indicate that the sum of all health determinants has improved. The data shows that a majority of the SHG members have increased their SEP, and their SEP group. Because the SEP grouping made was used to reflect local SEP, this increase might indicate a higher SWB as well (31).

With the knowledge that climbing the social ladder might lengthen life expectancy, this increase might be said to improve their health. Research shows that increasing income level corresponds to gains in health and health outcomes, positively linking income to health. (41) The increase in income sources and assets owned, and the decrease in months with lack of food could indicate that the poverty of the SHG members has decreased. The knowledge of this causal relationship between poverty and health, strengthens assumptions that decreasing poverty could affect health in a positive way.

The change in the SHG members' explanation of their feelings, with more positive emotions and less negative following the participation in the SHG might indicate that the SWB have improved. Positive emotions, such as hopefulness and happiness are linked to positive psychological well-being, and this improvement in SWB is causally linked to a reduced mortality (30). This change in how SHG members describe their feelings a rise in sociometric scale might be assumed, and with this the possible health effects. It has however to be considered that these questions were translated from Khmer to English, and the meaning in Khmer might not be exactly the same as in English.

Housing standard for SHG members

The change in housing standard was statistically significant. The change though from a wooden house with thatch roof to a zinc roof should not be underestimated. The change from thatch to zinc roof is obvious. Adequate housing is essential for good health (24), and a zinc roof protects more against the heavy rain that follows the monsoon period from May to October (6). The majority of the SHG members improved their housing standard, but there were also quite a few SHG members who did not improve, or worsened their housing standard. Identifying this group and eventual similarities within it might be useful to figure out why their situation is like this, and if there is anything that can be done to change it.

There were quite large differences within district groups of the SHG in increase in wooden house with zinc roof. In district group one this increase was the highest, but this group also has the highest number of the housing standard “other”, so this might explain this, as houses coded as “other” often lacked information about roof, but did mention that the house was made by wood. District group 3 had less improvement in this compared to group 1, but was also the group with the highest percentage of zinc roofed wood houses in all district groups pre-intervention. District group 2 however did increase this the least, and quite less than the other district groups. In this group, however, the increase in the two highest housing qualities were the largest, and pre-intervention this group had the least percentage with SHG members living in wood houses with thatch roofing. This might indicate that they were somewhat better off in housing standard pre-intervention, and thus their post-intervention increase coincides with this.

Lack of food

The statistical analyses have shown that there has been a significant reduction in months without adequate food supply for the SHG members. This increase in food availability could possibly decrease the risk of malnutrition, a crucially important risk factor for illness and death (27). The increase of SHG members now having sufficient food supply the whole year, this might have a tremendous effect of their health. However, the analyses show that despite the decrease in SHG members with the longest time period with lack of food supply throughout the year, the overall percentage of SHG members with lack of food for more than three months remained more or less the same. This might suggest that further action should be targeted at those SHG members to identify reasons why their situation is as it is, and what can be done to improve it.

Income sources, farming area, and livestock

The change in total income sources might say something about the increase in income for the SHG members, because increased number of income sources might mean increased income. The members of the SHG consist of people living in rural areas of the Battambang and Pailin districts, and their livelihood is often based on agricultural work and livestock. The changes in earning income from orchard or rice farming did not change significantly; for the SHG members these used to be, and still are the most common income sources.

No significant change in having farming area and in hectares of farming area might indicate that the focus on acquiring farm land for the SHG members have been inadequate. It might also say something about the lack of de-mining in those rural agricultural areas, which makes the acquisition of farming land difficult. The lack of significance might also be because of lack of power, as the sample size on hectares of farm area might be too small. Having access to land for farming is important, especially as orchard farming is the most common income source for the SHG members. However a slight decrease in SD from pre – to post-intervention might indicate that the land resources are slightly more equally distributed.

During the years since the start of the SHG the Cambodian Social affairs department has started paying out veteran pension and youth rehabilitation pensions. This explains the change in SHG members receiving this in the pre-intervention interviews to the post-intervention interviews.

Daily labour fee is when you sell your labour skills to for example farmers who need help with harvesting crops. This is most often done when the individual selling their labour force does not have access to farm area or animals of their own to sell for income, and the only option for earning income is to sell their labour skills. This can also be seen in the SHG statistics, those SHG members with less assets and farm area were also those who depended

on daily labour fees for income. The decrease in SHG members earning income from daily labour might indicate that they have gained skills, animals or farm area that enables them to obtain income from these sources. This decrease does seem important to discuss because of these indications, despite the results being non-significant. This lack of significance might as well be because of lack of power, the sample size of SHG members relying on daily labour fee for income is not large, and might be too small to find significant changes.

Income from selling animals increased significantly from pre- to post-intervention. This could be explained by the significant increase in SHG members owning animals following participating in the SHG. This increase might also explain the significant decrease in borrowing animals following participation in SHG, but another reason might be that the SHG members after the intervention had increased their income and resources enough to buy their own animals.

Before joining the SHG none of the SHG members owned fish. Fish keeping is a husbandry that requires little time and supervision; the pond for the fish is on the land for the SHG member, making the keeping of fish easy and timesaving. The increase in owning fish, and the other animal species might affect the health of the SHG members in two ways. The animals can be used as a food source for the SHG members in addition to being sold and thus provide income, indicating that owning animals might affect both lack of food and lack of income in a positive way.

Reports of owning cows also increased from pre- to post-intervention. Cows can be used in as draft animals in farming, their milk can be used as food and they can be slaughtered for meat. Their use is versatile and valued in most agricultural countries, and owning one might affect both lack of food, income, and reduce the time used for farming activities.

Assets

Owning assets becomes more possible as income increases, and the growth in the SHG members income sources might be connected to the increase in the SHG members owning assets.

Comparison on the numbers of SHG members owning bikes and TV with the official statistics shows a great discrepancy, something that can illustrate the differences between the socioeconomic position of the members of SHG and the population in the rural parts of Battambang and Pailin. This is backed by the knowledge that disabled people are the poorest of the poor (26). The SHG members surpass the rural population according to the official statistics in owning motorbikes and tractors.

This can be explained by the SHG members depending more on agricultural income than the average inhabitant in the official statistics. It also has to be taken into consideration that the official statistics consists of data from several more people than those in the SHG. The roads in the most rural parts of the districts are worse off than those in the less rural parts, something that might make the SHG members more dependent on motorbikes for transportation to their farm areas and to the less rural parts, especially considering that their disability might make their mobility less than that of uninjured people. During the monsoon period the roads in the most rural parts of the districts become inaccessible for cars, and motorbikes are the only means of transportation that is available. This is also important for transport to hospital if there is a mine accident, because time is off the essence if the mine accident victim is to have any chance of survival.

Social participation

Social contact is a basic factor in human life. We are social beings, and good social relations and social support contribute positively to health. Social exclusion increases the risks of illness, disability, addiction and social isolation that in turn increase the risks of additional exclusion and poverty (28).

All social participation has increased significantly for the SHG members following participation in SHG. In Cambodian culture and religion participation in all kinds of social events is a big part of the social and cultural life. Not participating in these events might bring shame on both the individual not participating and their family. In the pre-intervention interview a high percentage of the SHG members talked about feeling depression and shame, many mentioning that they tended to not attend social events because they felt different and ashamed after their amputation. Increased descriptions of feeling normal and happy among the SHG members in the post-intervention compared to the pre-intervention interview could to some extent explain the increased social participation. Another explanation might be that the income of the SHG members has increased.

When participating in weddings the norm in Cambodian culture is to give the newlyweds gifts, these gifts often contain money. In the pre-intervention interviews many of the SHG members say that they participated less in weddings because of not having enough money to spare for gifts. The increase in participation in religious ceremonies, where the norm also is to give gifts or offerings to the monks and other religious authorities, might also be connected to the increase in income. In the pre-intervention many SHG members explain that not being able to assist those throwing the party, means that they dread participation and often decline invitation.

After joining the SHG the members might feel more able to assist because of having more money to spare, but also because they are able to work and walk with their prostheses.

Children attending school

Education is an important health determinant, with research showing a lower morbidity rate from the most common diseases, both acute and chronic among better educated people. If participation in SHG could increase the SHG members' children's education this could imply that their health might be affected positively. Unfortunately was data on the SHG members' children's education was highly inadequate. The data on whether the children had attended school did nonetheless show a significant increase in attendance; however more research on the education of the SHG members' children is needed for a more definitive conclusion because of the poor quality of this data.

The increased number in children found attending school post- intervention in comparison to the number attending pre-intervention might be because of the differences in the quality of data collected, but might also imply that more children attended school post-intervention. The data on the percentage of children attending different education levels show that that few children attended school above lower secondary education level. Research shows that Latin-American mothers without education had a 35 per cent higher infant mortality compared to those mothers with 4 – 6 years education (20), indicating that even a few years of education might make a change. Education for the SHG members' children might not only affect the children's health positively, but in turn also their children.

Differences within SHG groups

There analyses showed few differences within the group of SHG members. This might indicate that the SHG affect the members similarly. However the correlation found that indicated that those who had been injured for the longest amount of time participated less in social events might simply mean that those also were the oldest SHG members, who because of their age were not able to participate as often as those younger.

The relationship found between years spent in SHG and social participation might indicate that the longer the SHG members have been participating in the group the more social they becomes. This might be explained with increasing confidence the longer the SHG member has been participating in the SHG.

Pre-intervention SEP correlated with the increase in SEP from pre- to post-intervention. This might indicate that those worse off benefited more of the participation in SHG. It does not however say that that those with higher pre-intervention SEP did not benefit from the SHG, as very few of the SHG members degenerated their SEP grouping following participation in the SHG. Those with lower SEP grouping had for instance fewer assets, income sources and more months with lack of food pre – intervention, and their change in SEP might mean a larger change in their lives than those who were better off.

Other research

Interventions like this, with its close cooperation with the local medics and based on a similar groups made by Indian rural health workers, is not very common yet, and studies on these not easily found. These particular SHG have been the focus of a qualitative master thesis in international community health in Oslo. I found one study on the effect of rehabilitation on the Quality of life on disabled people in Cambodia, but besides the already mentioned articles published by people associated with TMC or TCFC, not much research has been done on this.

This SHG method, with its low costs, local foundation and development should perhaps inspire establishing comparable interventions, and research on similar projects.

The statistical analyses of the health determinants, that all are underlying factors of poverty, including food supply, housing standard, income sources, livestock and assets, social participation, education, SEP and SWB measured in the pre- and post-intervention showed statistical significant changes in a positive direction. Not all determinants analysed did show significant changes. Hectares of farming area and some specific income sources are examples of these.

A correlation between the SHG and improvement in health determinants seem likely. Research causally links these health determinants examined with health. As these have changed for the better one might conclude that the SHG have affected the health of the members to the better. However not all SHG members show improvement of some health determinants, and some SHG members have worsen situations in some variables.

Further research on the SHG members aimed more concretely on their health status might give clearer answers on the effect on health. A follow up study in including all 240 SHG members might give a clearer result on the effect of the SHG, especially if one at the same time does a study in the same districts with participants who are mine accident survivors but not participating in the SHG, and inhabitants in the same districts, to compare the results with. A study like this might be more accurate because it will have less of the flaws that this data and method contains.

However, despite the flaws in the data and method used, the positive results should not altogether be dismissed. The health determinants have improved in most cases for the SHG members, and despite not knowing definitively if the SHG are the cause of this, these results are important, both for the future of the SHG members and for interventions based in comparable areas and with similar approaches.

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