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LOCAL ALCOHOL PREVENTION IN SWEDEN

- Construction of a prevention index and
assessments of prevention effects on
consumption and harm**

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LOCAL ALCOHOL PREVENTION IN SWEDEN

- Construction of a prevention index and assessments of prevention effects on consumption and harm

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ABSTRACT

Background: Over the past 15–20 years, local alcohol and drug prevention has developed substantially in Sweden. This has largely been a planned strategy from the national level with channels through to the regional level and down to the local level, which should be seen as a reaction to Sweden joining the European Union in 1995. Following that event, the restrictive import quotas on alcohol from other member states were gradually abolished. This led to greater availability of cheaper alcohol in Sweden and alcohol consumption increased in the following years. This, in turn, put increased pressure on the restrictive Swedish national alcohol policy, especially to reduce the taxation of alcoholic beverages. Thus, the government searched for alternative prevention approaches, e.g., strengthening local alcohol and drug prevention.

Aims: The aim of this thesis is two-fold: 1) to develop a composite measure (index) for monitoring local alcohol prevention, and 2) to investigate the effects of an increase in local alcohol prevention efforts on alcohol consumption and alcohol-related harm in Sweden, 2006–2014.

Methods: A composite measure of local alcohol prevention, Alcohol Prevention Magnitude Measure (APMM), was constructed based on a systems model for alcohol prevention and community action. APMM was validated by comparing the change in APMM score in community intervention municipalities (where previous evaluations pointed at increased prevention) with that in non-intervention municipalities (studies I–II). Fixed effects models were used to analyse the prevention effects of a community intervention called LUMA and of APMM on consumption and harm (studies III–IV).

Results: Studies I–II. Initially, indicators and data sources for monitoring alcohol development in Sweden were identified. An APMM was constructed with 37 indicators of local alcohol prevention. These indicators were divided into five main categories of prevention. Categories were scored with a maximum of 20 points each (i.e., maximum total 100 points). The validation of the APMM indicated that it reflected changes in local alcohol prevention. Another result was that local alcohol prevention, measured using APMM, increased among Swedish municipalities between 2006 and 2010. **Studies III–IV.** Findings revealed increased prevention activities in the LUMA municipalities compared with control municipalities. Positive developments for alcohol consumption and several alcohol-related harm indicators were found. When a weighted version of APMM (WPI, a combination of a direct and a lagged prevention effect of one year) was analysed in relation to consumption and harm, the main results suggested that an increase in APMM (WPI) by 1 percent yielded a decrease in alcohol-related mortality by 0.26 percent. However, the estimated effect of APMM (WPI) on alcohol consumption was very small, -0.02 percent. Unlike mortality, most of the effect estimates on morbidity revealed no effects of prevention.

Implication and conclusion: This thesis has shown how a prevention index for monitoring local alcohol prevention can be constructed and applied. Furthermore, the findings suggested that the increased efforts on local alcohol prevention in Sweden have had some effect on alcohol consumption and related harm. However, given the identified limitations of the measures of local prevention, consumption, and harm, the results must be interpreted with caution. Additional studies on the effectiveness of local alcohol prevention are needed to assess the generalizability of the current findings.

LIST OF SCIENTIFIC PAPERS

- I. Andréasson S, Nilsson T & Bränström R. (2009) Monitoring alcohol and alcohol related problems in Sweden. *Contemporary Drug Problems*. 36/fall-winter, 625–642.
- II. Nilsson T, Leifman H. & Andréasson S. (2015) Monitoring local alcohol prevention in Sweden: Application of Alcohol Prevention Magnitude Measure (APMM). *Nordic Studies on Alcohol and Drugs*. 32, 479–494.
- III. Nilsson T, Allebeck P, Leifman H, Andréasson S, Norström T. & Guldbrandsson K. (2018) Effects on Alcohol Consumption and Alcohol Related Harm of a Community-Based Prevention Intervention With National Support in Sweden. *Substance Use & Misuse*. Vol 53, No 3, 412–419.
- IV. Nilsson T, Norström T, Andréasson S, Guldbrandsson K, Allebeck P & Leifman H. (2018) Effects of local alcohol prevention in Swedish municipalities, 2006-2014. *Submitted*.

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LIST OF ABBREVIATIONS

ANDT	Alcohol, Narcotics, Doping, Tobacco
API	Alcohol Policy Index
APMM	Alcohol Prevention Magnitude Measure
APS	Alcohol Policy Scale
ATOD	Alcohol, Tobacco, and Other Drugs
Brå	The Swedish National Council for Crime Prevention
CAN	The Swedish Council for Information on Alcohol and other Drugs
CMCA	Communities Mobilizing For Change on Alcohol
CTC	Communities That Care
DALY	Disability-Adjusted Life Years
EU	The European Union
ICD 10	International Statistical Classification of Diseases and Related Health Problems – Tenth Revision
LUMA	Local Development with Ambitions
OLS	Ordinary Least Square
SBU	The Swedish Agency for Health Technology Assessment and Assessment of Social Services
SCB	Statistics Sweden
SEK	Swedish kronor (currency)
SoS	The National Board of Health and Welfare
UNODC	The United Nations Office on Drugs and Crime
WHO	World Health Organization
WPI	Weighted Prevention Index (APMM)

1 INTRODUCTION

Alcohol consumption is linked to approximately 230 types of diseases and injuries, such as liver cirrhosis, cancers, poisoning, road injury, and interpersonal violence (1). In 2016, harmful consumption was estimated to cause approximately 3 million deaths worldwide, accounting for 5.3 percent of all deaths and 5.1 percent (132.6 million) of all DALYs (1). To deal with this, most countries have adopted national alcohol policies in order to reduce alcohol consumption and alcohol-related negative consequences. Sweden is among them, having implemented relatively high alcohol prices through high alcohol excise duties, high age limits, a restricted number of sales outlets and licenses for alcohol sales, as well as limited opening hours for outlets and licensed premises. These prevention components have been shown to be effective in reducing consumption and harm (2).

In comparison with other European countries, the total alcohol consumption and alcohol-related mortality are relatively low in Sweden (1). Despite this, alcohol is the source of extensive health and social problems within the country. Nearly six percent of the Swedish population (2013) has been estimated to be either alcohol-dependent or have a harmful use of alcohol. In absolute terms, this corresponds to approximately 285,000 men and 161,000 women: a joint total of 446,000 people (3). The latest available alcohol-related mortality statistics for Sweden, based on the year 2017, revealed that the number of deaths with an alcohol diagnosis on the death certificate (underlying and/or contributory cause of death) reached 1,936 out of a total of approximately 92,000 deaths that year (4). However, the real level of alcohol-attributable mortality is probably much higher, since the official figure does not include a number of alcohol-associated deaths, such as different forms of cancer, cardiovascular disease and trauma. Therefore, other estimates have suggested higher numbers of alcohol-related mortality in Sweden (5, 6).

Sweden joined the European Union (EU) in 1995, leading to the gradual abolishment of the restrictive import quotas on alcohol from other member states. This led to greater availability of cheaper alcohol in Sweden and alcohol consumption increased after 1995 (7, 8). This put increased pressure on the restrictive Swedish alcohol policy, especially to reduce the taxation of alcoholic beverages (9, 10). Thus, the government searched for alternative prevention approaches, e.g., by strengthening local alcohol and drug prevention.

Consequently, over the past 15–20 years, local alcohol and drug prevention has developed substantially in Sweden. This has largely been a planned strategy at the national level, with channels through to the regional level and down to the local level. All 21 Swedish regions (counties) and most, if not all, 290 Swedish municipalities (local level) have taken part in the efforts. Regular training and education of local alcohol and drug prevention workers (coordinators) from most Swedish municipalities has been one aspect. Another has been the performance of several nationally supported community intervention trials, encompassing

more than 60 municipalities in all. A third aspect has been the development of various prevention methods and programs. Increased investments in implementation of these programs have also taken place (see further (11)). In order to achieve the highest possible impact of these increased efforts, a regional and local structure was formed, consisting of regional and local alcohol and drug coordinators. The regional (county) coordinators, supported by the government, coordinate local coordinators within their respective regions. The local coordinators were initially supported fully or partially by the government, but are now locally financed. The strategies and way forward were repeatedly described in national action plans and strategies, first separately for alcohol and narcotics (2001–2005) and then for alcohol and narcotics together (2006–2010) and, since 2011, for alcohol (A), narcotics (N), doping (D) and tobacco (T) together (ANDT). (For more information on the implementation of the initial strategy, see (11).)

Seen from an international context, substantial financial resources have been invested in Sweden to support this systematic effort aimed at strengthening the local ANDT prevention work. Although some of the community intervention trials have been studied, and to some extent evaluated (see Section 2.4.2), much remains to be researched, including the effects, if any, of local prevention activities on consumption and harm at the population level in Sweden. This thesis is an attempt to, at least partly, fill that knowledge gap. Two of the four studies in the thesis focus on the effectiveness of local prevention; first in a specific community intervention (Study III, 25 municipalities) and then more generally among a majority of the Swedish municipalities (Study IV, 207 municipalities). However, in order to study this, data on local indicators are needed on prevention as well as on alcohol consumption and related harm. Therefore, the two first studies (I and II) in this thesis focus on developing local composite prevention measures and identifying local alcohol consumption and harm outcomes.

Finally, it should be mentioned that the increased national support for the development of local alcohol (and drug) prevention is interesting not only from an alcohol prevention perspective, but also from a broader public health perspective. It was an attempt to counteract a predicted increase of a serious public health problem (alcohol and drug problems), following the Swedish-European integration, using systematically developed countermeasures. Thus, there are lessons to be learned also for possible future national initiatives in the field of public health. The initiatives have been focused on alcohol and other drugs (narcotics and lately also tobacco), but this thesis has a focus on the most predominantly used substance in Sweden: alcohol.

2 BACKGROUND

The following sections supplement the introduction with information on several areas relevant for this thesis, such as alcohol prevention at the local level, monitoring of local prevention consumption and harm, indices for monitoring local alcohol prevention and follow-ups of Swedish national action plans and community interventions in recent years.

2.1 PREVENTION AT THE LOCAL LEVEL

Municipalities are important actors for public health promotion and prevention in Sweden (12-18). Public health policy in Sweden is part of the public sector, which includes the state, county councils, and municipalities as operating areas (19). Public health policy entered onto the political agendas of municipalities in the late 1980s and a national public health agency was founded in 1992 to perform national cross-sectoral public health promotion and disease prevention (19). In 1995, there was a directive for parliamentary investigation to propose national goals and strategies for improving public health. In 2001, public health became a separate policy area (in the government's work) and in the following year a minister for public health and social services was appointed (19). In 2003, a national public health policy was adopted (19), consisting of an overall aim and 11 target goals, with ANDT (and gambling) being the focus of one (13). In 2008, a *renewed* national policy was adopted, with similar aim and goals (19). Ten years later, a *developed* national policy was adopted, where the former eleven goals were transformed into eight goals (17).

Alongside this systematic development in the public health policy arena, the concepts of risk and protective factors have become increasingly accepted and used in the public health area, including in relation to alcohol and other drugs (e.g., Hawkins (20)). Today, the most common risk and protective factors for the misuse of alcohol and for alcohol problems are, probably, rather widely known among professionals (e.g., prevention workers), and so too is the fact that alcohol is a risk factor for many other public health problems and diseases. Also, the national strategies for alcohol and narcotics (2006–2010) (14) and for alcohol, narcotics, doping and tobacco (ANDT) (2011–2015) (16) emphasized the importance of reducing the risk factors and strengthening the protective factors related to alcohol and other drug-related problems. Furthermore, it was stated that ANDT to a large extent shared the same risk and protective factors (16).

In all three national public health policies mentioned above (i.e., (13, 15, 17)), as well as in national action plans (12, 14) and strategies (16, 18) on alcohol and drugs, municipalities are mentioned as important for public health promotion and prevention.

In Sweden, the local level is more or less synonymous with municipalities, below the regional and national level. Often, important decisions with an impact on citizens are made at the local level. Municipalities in Sweden have a substantial degree of autonomy, including taxation

rights. Actually, the lion share of the income taxation is from local taxes, which vary between municipalities. In Sweden, municipalities are, among other things, responsible for school services and social and elderly care, which are thus financed by local taxes. ANDT prevention is not mandatory under law, but almost all municipalities conduct various prevention activities and initiatives, at least to a certain extent. Most of these target young people, but by no means all of them.

The municipalities are governed by local politicians in municipal boards (a kind of local government; in Swedish: *kommunstyrelse*) and municipal councils (a kind of local parliament; in Swedish: *kommunfullmäktige*). Local elections are held at the same time as the national elections, i.e., every fourth year. Different municipalities thus have different political colours and agendas. Some put large efforts into public health and prevention, others do not. They also differ in other respects, such as the socioeconomic composition of the population, the number of citizens, and geographical size. In summary, municipalities in Sweden share some common judicial denominators, but are very different in many other respects. The municipal variations in prevention as well as in alcohol consumption and alcohol problems – across municipalities and over time – make them a suitable and interesting study object.

2.1.1 Community alcohol prevention approaches

In the latest *Global status report on alcohol and health* (2018) (1), the World Health Organization (WHO) recommended governments and stakeholders to support communities in taking joint action to reduce harmful use of alcohol and harm related to alcohol consumption. Community action (community prevention/local prevention) can build on knowledge of the local conditions needed in order to develop locally relevant interventions (1). According to the same WHO report, community prevention as a strategy seems to be accepted by policymakers as well as by the public and there is evidence that suggests that it might be effective in reducing problems related to alcohol consumption (1).

One of the first models for a systematic, whole-of community approach on alcohol prevention was Holder's systems model (21). In this model, community-based alcohol prevention should target multiple areas (subsystems) and their interactions to be effective. Holder's model includes the following subsystems: alcohol consumption, retail sales, regulation and control, social norms, legal sanctions, and social/health and economic consequences. Consumption is central to the model because it affects, and is affected, by other parts of the model. Consumption is affected, for example, by price, income, availability, regulation, social acceptance, and norms, and changes to these can lead to consumption changes in the local community. Holder's model has influenced prevention of other drugs (ATOD, methamphetamine, illicit drugs) (22-24) as well, and the foundation of a systems approach for prevention is always central. Holder's model and similar approaches based on multicomponent interventions, have been tested in several trials, such as Communities That Care (CTC) and Communities Mobilizing for Change (CMCA), with promising results (e.g., (25-27)). However, community-based multicomponent prevention approaches tend to focus

on young people (28). In this thesis, systems approach comprising several components formed the starting point for the construction and application of a composite measure of local prevention (see Sections 2.2 and 5.1.1).

In an evaluation by the WHO of community prevention projects on alcohol (since 2006), it was concluded that such projects function best when various sectors in the community are mobilised. (29). In the *International Standards on Drug Use Prevention* (30) published by the United Nations Office on Drugs and Crime (UNODC), it was shown that multimodal efforts at the municipal level can prevent the use of alcohol, drugs, and tobacco. What characterizes effective efforts is that they support enforcement of drug policies focusing on several different areas, such as family, school, workplaces, and the entertainment industry, that higher education institutions are used to support the implementation and follow-up of evidence-based methods, that adequate resources and education are obtained in the municipalities, and that efforts are maintained for more than one year (30). The Swedish Agency for Health Technology Assessment and Assessment of Social Services (SBU) has found that multimodal projects where different actors in the local community work together and where several efforts limiting availability are included can reduce alcohol consumption among young people. It was emphasized as important that the efforts were well-implemented (31).

Although the above findings are in line with a systems model approach and support a multicomponent community-based prevention approach, several scientific reviews of the degree of effectiveness of multimodal community intervention/programmes on alcohol/drugs indicate a low to moderate effectiveness (32, 33). The most recent (2018) scientific review and meta-analysis concludes that intervention trials targeting whole populations have limited effectiveness when it comes to reducing alcohol- and drug-related harm at the population level. However, there is some evidence indicating that such a prevention approach can be favourable for reducing several alcohol- and drug-related outcomes (28).

It should be mentioned that evaluations of system-based prevention interventions are difficult, especially monitoring the exposure of individuals in a community to an intervention (34). Therefore, it is challenging to validate the potential effectiveness of community alcohol prevention approaches for reducing consumption and harm.

Multicomponent community-based approaches usually have a mix of interventions, but most of them focus on influencing the demand of alcohol, not the supply (28). Findings, however, reveal, in line with the findings from SBU (31), that interventions aiming at reducing the availability of alcohol (supply side) show a much greater potential in reducing alcohol-related problems (35) and this actually regardless of whether the intervention are carried out on national or local level. Often, these two levels are interweaved, e.g., national legislation stipulating age limits for the purchase of alcoholic beverages interacts with local level actions

servicing to secure compliance with these age limits. As a matter of fact, enforcement (35) of existing legislations and regulations is stressed as an important prevention component.

Most of the evidence of community intervention actions probably derives from studies in which the research community and/or program developers have been involved in the actual planning and performance of the interventions (see e.g., (36)), creating a possible source of bias. Efficacy studies are generally based on conditions that are rarely attainable within a community's regular everyday prevention activities, especially given the often limited resources. Ideally, an efficacy study should be followed by effectiveness studies assessing the impact of the interventions in more realistic settings (see, e.g., (37)).

Although it is difficult to draw a clear dividing line between efficacy and effectiveness studies (often there a mix between them), the two studies on prevention effects in this thesis (Studies III and IV) should be seen mainly as effectiveness studies. Both studies focus on local prevention work conducted or implemented by local actors within the framework of the municipalities' regular prevention activities. Some of the actions have been supported or guided from the national level, but the degree of support per municipality is rather limited. Still, in the long term, this is perhaps realistic.

2.2 MONITORING LOCAL ALCOHOL PREVENTION

This section describes the basis for monitoring local alcohol prevention and examples of indices for monitoring alcohol prevention.

Prevention is usually divided into three main groups: universal, selective, and indicated. Universal prevention is most often directed towards whole populations, where the risk for harm is diffuse, whereas selective prevention focuses on subgroups at risk of harm. Indicated prevention targets high-risk individuals with symptoms. Universal prevention is thus wider and less focused than the other two types (38).

Most important in the context of community prevention is, as indicated above, universal prevention. Alcohol prevention deals with influencing factors of importance to drinking and can be roughly divided into two categories when the target group is the entire population (in Sweden), i.e., national legislation and prevention at the local level (municipal). National legislative regulations, such as alcohol taxes and age limits, are the same throughout Sweden, while local actions vary in both magnitude and intensity between municipalities (or regions). Thus, the variation in local prevention entails an opportunity to analyse the eventual possible impact on the development of alcohol consumption and its negative consequences.

The basis for monitoring local alcohol prevention in this thesis has been to use a composite measure (index) to capture a wide range of prevention efforts, with a systems model for local alcohol prevention and community action in mind. Given the potential importance of community action and the systems model approach, it seems highly relevant to monitor alcohol prevention in several prevention target areas among municipalities. Such monitoring would facilitate analyses to assess whether or not ‘whole-of community’ interventions reduce consumption and harm.

2.2.1 Indices for monitoring local alcohol prevention

To assess the extent of alcohol prevention over time, different individual indicators can be used, such as opening hours, taxation level, presence of a national alcohol action plan, etc. However, in order to get a more comprehensive understanding of the overall magnitude of alcohol prevention efforts, composite measures (indices) of individual prevention items are sometimes constructed.

Some advantages of using indices compared with individual indicators are that (39) they capture more dimensions under study, making it possible to summarize complex multidimensional phenomena. In addition, it may be easier to interpret an index than a battery consisting of several different indicators, and the index facilitates communication with the public. Some disadvantages of using an index are that it may give incorrect information if it is poorly designed or incorrectly interpreted. The indicators or any weights attributed to indicators in an index can, of course, be discussed (39). The main argument among those who advocate that it is better to use a set of indicators rather than an index is that the weighting process that often occurs in the merging of several indicators is discretionary (40).

In the research literature, there are several examples of indices for monitoring alcohol policy (prevention) (41-49). There is no "gold standard" for the construction of indices monitoring alcohol policy/prevention and this is mentioned by several researchers (46, 48). On the other hand, the David and Walsh scale, from the beginning of the 1980s, is sometimes mentioned as the basis for later indices. This scale aimed to analyse the impact of national alcohol control policies on alcohol consumption and harm. The scale was based on several policy items in four dimensions: (1) control of production, (2) control of distribution, (3) measures of social and environment, and (4) measures of price and taxes. Each policy item was given one point if present and zero points if absent (46).

In general, most of the indices mentioned above are characterised by primarily measuring formal *national* policies on availability, traffic, and advertising. However, one of the indices (48) measures alcohol prevention at the *regional* level (US states). In Sweden, indices have previously been used sporadically (50-52) to monitor *local* alcohol prevention among municipalities. Comparative policy analyses at the local level within countries have been identified as an important arena for future policy research (53).

2.3 INDICATORS FOR MONITORING LOCAL ALCOHOL CONSUMPTION AND HARM

Monitoring the local development of prevention is just as important as monitoring the levels and trends of alcohol consumption and related harm among municipalities. This requires reliable data on consumption and harm per municipality that is comparable also between municipalities over time. Many indicators in different areas (e.g., consumption, mortality, morbidity, traffic, violence) may be considered, but few are actually useful, mainly due to a lack of data at the municipal level. Other aspects, such as validity and reliability, must also be considered. When the work on this thesis began, a review of data and useful indicators for measuring local alcohol development in Sweden was lacking. In recent years (2011–2012), a project group has proposed consumption and harm indicators (54) to follow up the national ANDT strategy, and if possible the regional and local level (see also Sections 5.2 and 5.3). However, these proposed indicators have rarely been analysed at the local level in relation to local prevention activities, despite the fact that the local level has been highlighted as an important prevention arena several times in national action plans and strategies.

2.4 NATIONAL ACTION PLANS AND STRATEGIES SINCE 2001

As mentioned above, the importance of local (municipal) alcohol prevention efforts in reducing the harmful effects of alcohol has repeatedly been emphasized in national alcohol action plans (2001–2005, 2006–2010) (12, 14) and in ANDT strategies (2011–2015, 2016–2020) (16, 18). As an example of this, it can be mentioned that in the action plan for 2001–2005 it was stated (page 1) that “*the action plan establishes that the goal of society's alcohol policy also in the future should be to reduce the medical and social harm of alcohol. The main focus of alcohol policy shall be to stimulate the development of targeted and coordinated prevention efforts at the municipal level.*” It is also obvious that extensive financial resources have been invested over the last 15-20 years in order to create long-term, structured and knowledge-based local alcohol prevention work. An example of this is that SEK 940 million was allocated to the action plan during the planning period 2001–2005, of which SEK 530 million went to develop the municipal drug prevention work. It is also noteworthy that approximately 295 drug prevention coordinators (at local and regional level) were employed (14) during this time (see also (11)). This should be seen in light of the fact that there are 290 municipalities in 21 counties in Sweden. During 2006 and 2007, at least SEK 510 million (250 + 260) were assigned for implementation of the action plans (14). Between 2011 and 2014, the government intended to allocate approximately SEK 260 million

per year (260 * 4 years = 1,040 million) (16). In the latest (and current) ANDT strategy (2016–2020), the government estimated allocating SEK 163 million for 2016 and SEK 213 million per year in 2017 and 2018 to pursue an effective ANDT policy (18).

2.4.1 Follow-ups of national action plans and strategies since 2001

Follow-ups of previous action plans and strategies briefly reveal the following.

2.4.1.1 National alcohol action plan to prevent alcohol-related harms (2001–2005)

An overall assessment stated that the development of alcohol was negative and that alcohol consumption increased initially but then stabilized. Adolescent alcohol consumption decreased. Acute and chronic alcohol harm increased, although the latter increased less than expected. Action on alcohol availability weakened, but efforts to reduce the demand increased. It was found that the alcohol trend was not as negative as has been feared, but that there were no certain explanations for this development (51).

2.4.1.2 National action plans on alcohol and narcotics (2006–2010)

The development of alcohol was considered to be positive, with a decline in both total per capita alcohol consumption and binge drinking. The number of adolescents who drank also declined. The positive development should be seen in light of the fact that alcohol became more available and the exposure to alcohol advertising increased. It is further stated that the alcohol-related harm were still at a high level, but that they appeared to develop in the right direction towards the end of the period. It was emphasized that it was difficult to determine which of all the preventive interventions had been effective and that it was probably the combined prevention activity that had been important. Prevention among municipalities seemed to be more long-term as well as structured. Furthermore, cooperation seemed to increase and municipalities received better national and regional support. In addition, more municipalities worked with evidence-based methods (55).

2.4.1.3 National ANDT strategy 2011–2015

In terms of alcohol development, it was stated that several positive outcomes had been reported over the past decade. Examples include a reduced proportion of alcohol consumers among pupils, a reduced risky consumption in the population (not among women), and a reduced total number of alcohol-related deaths. On the other hand, the numbers of treated for an alcohol-related diagnosis and deaths with alcohol-specific liver disease had increased. No analyses were performed in the follow-up to study the possible effects of preventive efforts after the ANDT strategy had been implemented (56).

2.4.2 Community initiatives with national support since 2001

Several specific community initiatives with national support have been initiated to strengthen municipalities, to reduce consumption and harm, and to increase knowledge about local prevention work after 2001. The nationally initiated municipal initiatives that have been implemented are: the Trelleborg project (1999–2002), the Six Community Trial (2003–2006), Three Times Three (2006–2009), Small Municipalities (2006–2010) and Local Development with Ambitions (LUMA) (2009–2010). Brief descriptions of the initiatives and follow-ups are presented below.

2.4.2.1 The Trelleborg Project (1999–2002)

The Trelleborg Project was a community prevention project that went on for three years, 1999–2002. The overall aim of the project was to implement a community policy that spanned several sectors, combined with an action programme to reduce alcohol consumption and harm in Trelleborg. The project was initiated and funded by the Swedish National Institute of Public Health. The project was structured with a steering committee, a project coordinator, and five action groups (workplace, child/youth, availability, parents, networks). The policy programme had five objectives: focusing on children and adolescents, decreasing binge drinking, delaying the age of onset for alcohol consumption, changing attitudes and behaviour regarding alcohol among adults, and maintaining alcohol and drug prevention. The Trelleborg project was evaluated both in terms of a process evaluation (qualitative research such as interviews and focus group discussions) and through effects (quantitative research based on surveys among adolescents in classrooms). The overall findings from this comprehensive evaluation (research) were that a policy programme implemented together with an action plan could reduce both alcohol consumption and alcohol-related harm (accidents, violence) among adolescents. It was also stated that there was a need for balance in terms of internal and external input to institutionalize the intervention, but also that it was not given that a weak institutionalization rendered poor effects (57, 58).

2.4.2.2 The Six Community Trial (2003–2006)

The purpose of this community intervention was to develop the alcohol and drug prevention work in six selected municipalities. A number of criteria had to be met in order to participate: a current drug policy (covering primary and secondary prevention), an intention to make preventive work permanent, and a management team comprising the municipal chairman, politicians, officials and representatives from the county council. There should be a coordinator responsible for the drug policy and the project should have support from politicians and officials. Each intervention (trial) municipality received regular knowledge support from an expert group, training from an alcohol and drug coordinator, and continuous updates on the alcohol and drug situation in their municipality. In addition, municipalities received financial support for the implementation of preventive efforts. Six control municipalities were matched to the six intervention municipalities to study if the latter had

better alcohol and drug development. Interviews with key persons showed that the intervention municipalities had a better organization and stronger structure than the control municipalities. Registry studies that reflected acute injuries such as assaults, drunk driving and alcohol intoxication showed that these increased during the intervention, but that there were no differences between intervention and control municipalities. Chronic alcohol harm was fairly unchanged during the intervention, and no differences appeared between intervention and control municipalities (52). An in-depth study (59) focusing on changes in youth drinking and alcohol-related harm found few significant improvements in the six intervention municipalities. Some lessons learned from the project were that it was possible for municipalities to develop their preventive work, but it requires alignment towards effective prevention methods to influence consumption and negative effects (52, 59).

2.4.2.3 *Three Times Three (2006–2009)*

Three municipalities in three counties (Södermanland, Jämtland, and Norrbotten) were selected to be part of a community intervention to strengthen long-term alcohol and drug prevention work and reduce consumption. Requirements for participation were (briefly): developing alcohol and drug policies, employing a drug coordinator, forming a local steering group, monitoring the drug situation, and developing implementation plans. The municipalities received financial support for, among other things, knowledge development. The model that was implemented in *Three Times Three* was based on the experiences from *the Six Community Trial*. A difference between them was that the preventive work and methods in *Three Times Three* were directed at availability limitation and parental support. The evaluation of the project focused on implementation and goal fulfilment. It was concluded that the municipalities had considerably developed their alcohol and drug prevention work. This was for instance reflected (in the implementation plans) by increased coordination and broader embedment compared with before commencement of the community initiative. The municipalities worked more with proven methods and had also developed and used their own methods. The primary purpose of the evaluation was not to measure effects on consumption. It was stated that such a purpose would require more resources and a different study design than was possible within the framework of the evaluation performed. However, the development of alcohol sales, as well as treated and deceased with an alcohol diagnosis in the intervention municipalities were highlighted in relation to the nation's development. No generally deviating trends were noted among the participating municipalities (60).

2.4.2.4 *Small Municipalities (2006–2010)*

Small municipalities in two counties (Värmland and Örebro) were invited to participate in a community intervention to strengthen preventive work against alcohol and drugs. Two areas were prioritized in the project: parental support and availability limitation. A total of 23 municipalities participated. In order to participate, the municipalities would agree to the

following: that there would be a designated person in the municipality who managed and coordinated the work, that there would be a cross-sectoral steering group, that an alcohol and drug policy would be adopted before the end of 2006, and that a mapping of the drug situation would be carried out and used as starting point to establish a implementation plan with a focus on availability limitation and parental support. Furthermore, a system for follow-up and evaluation would be developed and municipalities undertook to attend training and meetings related to the community intervention. The municipalities received financial support if they met the requirements above and also used effective methods in the two priority areas. The evaluation of the project revealed that the alcohol and drug prevention work had been given higher priority and that the municipalities worked with parental support and availability-limiting methods, mainly in the field of alcohol. Furthermore, it appeared as if work had become more systematic and that knowledge of mapping, methods, and preventive work had increased, for example among the coordinators. No analysis of the possible effects of preventive work on consumption and harm was performed (61).

2.4.2.5 Local Development with Ambitions (LUMA, 2009–2010)

The last nationally initiated community intervention was run for two years in five counties (Stockholm, Uppsala, Östergötland, Västernorrland, and Västra Götaland). A total of 25 selected municipalities participated. As in previous interventions, requirements were set up for municipalities to participate and to receive financial support. Examples of requirements were: there should be a coordinator before the initiatives began, there should be a cross-sectoral steering group, and there should also be a current and long-term drug policy with measurable goals. In addition, politicians and civil servants should participate in education on how to prevent misuse, the drug situation should be mapped with a focus on supply and demand, and an implementation plan containing availability limitation and parental support should be developed. It was also a requirement that the activities would be systematically documented. Results from evaluations showed (62), for instance, that the municipalities largely met the requirements for funding and that many different methods of availability limitation and parental support were used. Data on the effects at the population level were very uncertain, even though trends towards a better development in the LUMA municipalities could be seen in some respects (accidents, crimes, risk consumption). Furthermore, in a follow-up (63), it was stated that alcohol prevention had developed in the right direction and that work was more well-organized, long-term and based on effective methods.

3 KNOWLEDGE GAP

Chapter 1 illustrates clearly that there have been changes in the Swedish alcohol policy over the past 15–20 years, with an increased focus on the local level. Major investments in local alcohol prevention have been made. Despite this, there has been no single measure available for monitoring the development of local alcohol prevention over time in a systematic way in Sweden. In addition, there are a few scientific studies on the effects of some of the specific community trials on alcohol consumption and related harm.

Furthermore, the basic question remains unanswered, namely if the overall increase in prevention efforts (among all municipalities) has been effective in reducing alcohol consumption and related problems. Studies are particularly lacking with respect to the effects of local prevention work conducted or implemented across municipalities by local actors within the framework of the municipalities' regular local prevention activities.

4 AIM AND RESEARCH QUESTIONS

4.1 AIM

The aim of this thesis is two-fold: 1) to develop a composite measure (index) for monitoring local alcohol prevention, and 2) to investigate the effects of an increase in local alcohol prevention efforts on alcohol consumption and alcohol-related harm in Sweden 2006–2014.

The specific research questions of each of the four studies are listed below.

4.1.1 Research questions

Study I. Monitoring alcohol and alcohol related problems in Sweden.

Research question: How can a system of indicators be developed in order to monitor alcohol development at both national and local level in Sweden?

Study II. Monitoring local alcohol prevention in Sweden: Application of Alcohol Prevention Magnitude Measure (APMM).

Research question: How can an Alcohol Prevention Magnitude Measure (APMM) based on local data be constructed and then used to monitor the development of local alcohol prevention in Sweden?

Study III. Effects on Alcohol Consumption and Alcohol Related Harm of a Community-Based Prevention Intervention With National Support in Sweden.

Research question: Did local alcohol prevention (policy and activities) increase and were consumption and alcohol-related harm reduced among municipalities that participated in a community intervention (LUMA) with national support?

Study IV. Effects of local alcohol prevention in Swedish municipalities 2006-2014.

Research question: Does local alcohol prevention (measured using the APMM which was developed in Study II) reduce alcohol consumption and harm in Swedish municipalities?

5 DATA AND METHODS

There are data on local (municipal) drug prevention work in Sweden. In addition, there are several registers in Sweden with consumption and harm data per municipality. Thus, there is an opportunity to use several different data sources and measures (indicators) to monitor prevention, consumption, and harm at the local level in Sweden.

5.1 PREVENTION DATA

Since the beginning of the 2000s, the Public Health Agency of Sweden (formerly the Swedish National Institute of Public Health, before 2014) has annually asked all municipalities about their drug prevention work through a web-based survey called the County Report. The County Report (64) comprises eight questionnaires (2014) and monitors drug prevention as well as inspections pursuant to the act on alcohol and tobacco. The County Report is sent to all county boards ($N = 21$) and all municipalities ($N = 290$). Districts in the three major cities (Stockholm, Göteborg, and Malmö) are also covered since 2011. The questionnaires are filled out by prevention coordinators or persons with similar duties. The questionnaires have been continually improved and expanded. Generally speaking, response rates are high, especially in more recent years. As an example; in 2014, 95% of the municipalities (275 of 290) responded to the municipal drug prevention questionnaire and 98% replied regarding inspections pursuant to the Alcohol Act (65). Prevention data used in this thesis come almost exclusively from these two questionnaires. The municipal drug prevention questionnaire covers topics such as policy, staff, budget, cooperation, methods, and activities, while the part relating to the Alcohol Act covers inspections specifically, such as the number of inspections conducted at licensed premises. Most questions have fixed response options and are usually dichotomous (i.e., yes/no, there is/is not).

The prevention survey data are supplemented with some register data from the National Alcohol register (66) at the Public Health Agency of Sweden. This register comprises information on licensed premises, production of alcoholic beverages, and sales at restaurants. Annual data per municipality, such as the number of licensed premises (public, private) and their opening hours, were obtained. The number of licensed premises has been available for all municipalities over time (2006–), while the availability of data on opening hours (latest closing time) has improved dramatically over the years (especially since 2010) with missing data decreasing from almost 27% in 2007 to less than 0.1% in 2012.

Based on these two prevention data sources (County Report, Alcohol Register), composite prevention indicators (index) have been constructed and used in different ways in the studies (I–IV, (67–70)) that are part of the thesis. An overview of these composites is presented below.

5.1.1 Composite indicators of local alcohol prevention

5.1.1.1 Composite indicator of local alcohol prevention in Studies I and II

In Study I, an early version of a so-called alcohol prevention index was presented. This was further developed into the Alcohol Prevention Magnitude Measure (APMM) in Study II. The major differences between the two composite measures are that the APMM consists of more indicators (37 vs. 27) and is somewhat more detailed, as well as being divided into five categories instead of the two categories used previously (Organization and Activity). The five categories in APMM are: 1) Staff and Budget, 2) Policy, 3) Cooperation, 4)

Inspections/licenses, and 5) Activities. APMM thus enables a more comprehensive but also more detailed follow-up of alcohol prevention, compared with the early version of the alcohol prevention index. Based on previous knowledge and data availability (over time), 37 indicators were chosen to be included in APMM. These were scored and grouped into five categories (see above) that could be important for local alcohol prevention work. (For detailed information on these indicators and categories, see Table 1 in Study II.

The five categories were chosen to monitor prevention because it is hard to imagine any work occurring if there is no staff and budget, while policy is needed to gain political support and stability over time. Municipal cooperation with other agencies, such as the police, is essential in order to reach sectors that fall outside the authority of the municipality. Furthermore, restrictive alcohol availability in combination with inspections is important to impact on both consumption and harm (2). Preventive activities are essential in and of themselves and also for building public support and mobilization in the municipality. Each of the five categories is thus assessed to be important. They are also assumed to strengthen one another by creating a system of prevention affecting different structures, arenas, and individuals within a municipality. The indicators included in each category have been scored so that the maximum total for each category is 20 points. This was done because it is difficult to assess how much more important one category (or single indicator) might be than any another. If it had been possible to make such an assessment on good grounds, it would still be problematic, because basic single indicator data are mostly dichotomous (see Section 5.1 above). This means that information about the dose and quality of individual prevention indicators is missing, which significantly complicates any assessments of relative scoring of indicators, as well as of categories.

In the APMM, the indicators within each category have - in so far as possible - been rated as equally important and assigned the same values. For example, in Policy, Cooperation and Activities, there are 10 dichotomous indicators in each category that can yield 0 or 2 points each, making for a maximum of 20 points per category. The Inspection and license category comprises four continuous indicators (divided into fixed intervals), each of which can yield up to five points (there are $4 * 5 = 20$ maximum points for the category). Staff and budget deviates from the pattern, because of the underlying data; there are only three indicators, two of which can generate up to 8 points, while the third indicator can contribute with 4 points as

maximum (there are $8 + 8 + 4 = 20$ maximum points for the category). Given the construction of APMM, it is desirable to report categories one by one as well as together (as the overall sum of APMM), in order to gain information on prevention development.

5.1.1.2 Composite indicators of local alcohol prevention in Study III

Composite prevention indicators reflecting Policy and Activity were constructed to get more extensive and thus more analysable indicators. The Policy composite included six indicators reflecting policy, whereas Activity comprised seven indicators selected to reflect parental support and limitations of alcohol availability, as such intervention activities were the focus of the community intervention in Study III (see table 2a and 2b). Each of these seven single Activity indicators were given 1 or 0 points based on presence or not in the municipality, meaning that a maximum sum of 7 points could be achieved. The scoring was slightly different for Policy indicators, as four of the six indicators were follow-up questions linked to an overall policy situation (alcohol policy present or not). The “follow-up” questions (indicators) were given 0.5 points if present, whereas the other two indicators were given 1 point if present. The Policy composite could thus generate a maximum of 4 points. Policy (4 points) plus Activity (7 points) could together yield to 11 points. Single indicator data are mostly dichotomous (see Section 5.1 above).

5.1.1.3 Composite indicator of local alcohol prevention in Study IV

The APMM that was developed in Study II (see Section 5.1.1.1) was used in Study IV. However, a weighted version of APMM (calculated as $WPI = (PI_t + PI_{t-1}) / 2$, where PI is the prevention index APMM), was applied, as analyses indicated a direct and a lagged prevention effect of one year on consumption and harm in Study IV. The weighting means that the potential effect of prevention is equally important to the direct effect (0.5) and the one year lagged effect (0.5).

5.2 ALCOHOL CONSUMPTION DATA

There are two main types of data sources that reflect alcohol consumption in Sweden: surveys and sales data. The main surveys for monitoring alcohol consumption in Sweden are the “Monitoring Project” (ages 16–84) and the “Alcohol and Drug Use Among Students” (ages 15–16 and ages 17–18). Both of these are conducted by the Swedish Council for Information on Alcohol and other Drugs (CAN). Unfortunately, data is not sufficiently comprehensive to break down at the municipal level per year and over time for either of these surveys. Register data, on the other hand, in terms of recorded sales from Systembolaget, can be broken down for all ($N = 290$) municipalities per year and over time. However, local data on recorded sales from restaurants (licensed premises) and grocery shops are not available. The consumption indicator (sales) used broadly follows the recommendations made by a specially appointed project group regarding indicators to be used in order to follow up the ANDT situation and the national ANDT strategy (54).

5.2.1 Alcohol consumption indicator

Systembolaget compiles statistics on recorded alcohol sales from stores and agents (426 and about 500, respectively, in 2013 (71)); there is at least one located in every municipality. This information is retrieved and processed by the Public Health Agency of Sweden and then presented in an online database (72) which includes the municipal level. Sales data in the database are presented as beverage-specific (spirits, wine, strong beer, cider and alcopops, in litres of pure alcohol (100%)) per inhabitant 15 years and older. Recorded sales data are of high quality. However, they do not capture total consumption and might also be affected by cross-border trade as well as tourism. Unrecorded consumption is estimated to be 22 percent of total consumption in Sweden (2014) (73), with some variation between and within the regions.

The following indicator was collected from the online database (72) and used in Studies III and IV:

- Sales data (litres of pure alcohol, 15+) per municipality, per year, as a proxy for total consumption.

5.3 ALCOHOL-RELATED HARM DATA

Alcohol consumption can cause many different negative consequences, such as medical and social harm. Some alcohol-related problems are acute (e.g., assaults, poisoning), while others are of a more chronic nature (e.g., liver cirrhosis). Medical harm is often monitored via health care statistics, whereas data on social problems are more difficult to capture and monitor, especially at the local level over time. The availability of useful alcohol-related harm measures (indicators) at the municipal level is limited. Those included in the thesis, with their pros and cons, have been chosen to reflect acute and/or chronic negative consequences in four categories: morbidity, mortality, violence, and traffic. Harm indicators used broadly follow the recommendations made by a specially appointed project group regarding indicators to be used in order to follow up the ANDT situation and the national ANDT strategy (54).

5.3.1 Alcohol-related harm indicators

5.3.1.1 Alcohol-related morbidity and mortality indicators

The National Board of Health and Welfare (SoS) is responsible for two registers that are important for monitoring alcohol-related harm: the Cause of Death Register and the Hospital Discharge Register. The official death statistics in Sweden originate from the Cause of Death Register and the purpose of the register is to describe causes of death and follow the development of mortality in Sweden (74). The cause of death statistics are based on all deceased who were registered as Swedish residents when death occurred. Few cause of death certificates are missing (1.1% in 2013) (75). One of the purposes of the Hospital Discharge Register (76) is to monitor the health development of the population; it contains information

on in-patient care. In 99 percent of all in-patient cases, there is a diagnosis (77). Both registers are currently (1997–) based on the International Statistical Classification of Diseases and Related Health Problems - Tenth Revision (ICD-10). In general, both registers are of very high quality, but indicators based on them can be affected by policy alterations as well as diagnostic practices.

Indicators reflecting alcohol-related morbidity and mortality (Studies III and IV) were obtained from the two registers. Indicators were age-standardized (2010 mean population) and expressed in rates per inhabitant 15 years and older, per 10,000 inhabitants, per municipality. The following indicators were used:

- Patients treated (in-patient care) with an alcohol-specific diagnosis (ICD 10: E24.4, F10, G31.2, G62.1, G72.1, I42.6, K29.2, K70, K85.2, K86.0, O35.4, P04.3, Q86.0, T51, Y90.1-Y90.9, Y91.1-Y91.9, Z50.2, Z71.4, Z72.1) as primary and/or bi-diagnosis (i.e., an index of alcohol specific diagnosis, maintained by The National Board of Health and Welfare).
- Patients treated (in-patient care) with liver disease (ICD 10: K70, K73, K74) as primary diagnosis.
- Patients treated (in-patient care) with an alcohol intoxication diagnosis (ICD 10: T51, F10.0.) as primary and/or bi-diagnosis.
- Deaths with an alcohol-specific diagnosis (ICD 10: E24.4, F10, G31.2, G62.1, G72.1, I42.6, K29.2, K70, K85.2, K86.0, O35.4, P04.3, Q86.0, T51, Y90.1-Y90.9, Y91.1-Y91.9, Z50.2, Z71.4, Z72.1) as the underlying and/or contributory cause of death (i.e., an index of alcohol specific diagnosis, maintained by The National Board of Health and Welfare).

5.3.1.2 Alcohol-related violence indicator

The Swedish National Council for Crime Prevention (Brå) is responsible for the official crime statistics in Sweden (1994–). Crime statistics cover reported crimes, solved crimes, criminal suspects, and convicted persons. The statistics of reported crimes include incidents reported as crimes, registered by police, customs or prosecutors (78). Assaults is a violent crime that is alcohol-related (79) but sensitive to reporting propensity (78). It is also worth mentioning that it has been indicated that violent crimes committed outdoors to a greater extent are alcohol-related than those committed indoors, especially if the perpetrator is unknown to the victim (54).

An indicator reflecting alcohol-related violence at the local level (Studies III and IV) was obtained from an online database on crime statistics (80) maintained by the Swedish National Council for Crime Prevention. The following indicator was used:

- Police-reported assaults that occurred outdoors and where the perpetrator was not known by the victim (Crime codes: 355, 357, 375, 377, 9317, 9319, 9341, 9343), per 10,000 inhabitants aged 15 years and older and per municipality.

5.3.1.3 *Alcohol-related traffic indicator*

The Public Health Agency of Sweden provides an online database (72) covering alcohol-related traffic accidents at the municipal level. Input data to the database is delivered by the Swedish Transport Agency, but originally based on police-reported data. It is well-known that alcohol consumption is a risk factor for traffic accidents (2). In addition, studies have shown an overrepresentation of alcohol-affected drivers in the night-time and for single vehicle casualties (81), but the number of unreported accidents is likely to be large. The following indicator was collected from the online database (72) and used (Studies III and IV):

- Single vehicle accidents (resulting in injury) between 10 PM and 5 AM. Data reflect the municipality where the accident occurred. Expressed per 10,000 inhabitant per municipality.

5.4 SOCIOECONOMIC DATA AND SOCIOECONOMIC INDICATORS

It is known that while consumption is lower in less prosperous societies, groups with low socioeconomic status have a higher alcohol-related burden of disease (82). In addition, recent analyses (83) of Swedish data have shown that municipalities with a large population, high income and high education tend to have better prerequisites for conducting local drug prevention. Therefore, some potentially important socioeconomic variables (indicators) have been included in the statistical analyses to control for their potential effects on the outcome (Study IV). The following socioeconomic indicators were used: median net income (Swedish kronor in thousands), unemployment (percent among population in ages 16–64), post-secondary education (percent among population in ages 25–74), and population size (15 years and older). All of these were obtained per municipality from online databases maintained by the Public Health Agency of Sweden (72) and Statistics Sweden (SCB) (84).

5.5 STUDY POPULATION

In this thesis, Swedish municipalities constitute the main study population. The size of the study population (number of municipalities) varies between the studies. However, the joint and decisive denominator for the study sample sizes is the availability of local prevention data in combination with various cut-offs for missing data.

5.5.1 Study I

A majority (72%, N = 208) of Swedish municipalities were included when a preliminary composite of local alcohol prevention was constructed. These municipalities were selected as they had at most one missing value on indicators included in the composite prevention measure. The study population also comprised several national surveys and registers as they

were explored in order to suggest suitable data sources and indicators for monitoring alcohol development in Sweden.

5.5.2 Study II

A little more than 65 percent (N = 189) of all municipalities in Sweden constituted the study population. These 189 municipalities were selected as they had data for at least 80 percent of indicators in APMM for 2006–2010. The study population was also sectioned into five additional subgroups: municipalities that had taken part in one of four different community intervention projects (N = 5, N = 19, N = 6, N = 22) and municipalities that had not taken part in such projects (N = 137). The municipalities represented all counties and 63 percent of the Swedish population. However, the three big municipalities, Stockholm, Göteborg and Malmö, were initially excluded as they comprise city districts and the survey which APMM was based on was not adjusted for municipalities with districts before 2011.

5.5.3 Study III

As in Study II, Stockholm, Göteborg, and Malmö were excluded because they comprise city districts. Twenty-two intervention municipalities (LUMA) and 132 control municipalities were used as the study population on prevention. These were selected as they had at most 25 percent missing values on single indicators of policy and activity in total during 2006 to 2012. The 22 LUMA municipalities that were included were equivalent to 88 percent of all LUMA municipalities (N = 25). The 132 selected controls represented 59 percent of all potential control municipalities (N = 224, i.e., those that had not participated in municipal projects, 2006-2012). All LUMA (N = 25) and all potential control municipalities (N = 224) were used when consumption (sales) and harm were analysed, since these outcomes were based on register data and did not suffer from missing data in the same way as local prevention data. The control municipalities had somewhat lower socioeconomic status than the LUMA municipalities.

5.5.4 Study IV

As in Studies II and III, Stockholm, Göteborg, and Malmö were excluded because they comprise city districts. Municipalities with APMM data for a minimum of eight of the total nine years in the study period (2006–2014) were selected as the study population. The study population included 207 (71%) municipalities, comprising nearly 68 percent of the population (15+) in Sweden. There were small socioeconomic discrepancies between the study population and all municipalities of Sweden. When analysing APMM in relation to alcohol consumption (proxied by sales), 182 of the initially selected 207 municipalities were used. Tourist municipalities and municipalities near national borders were excluded due to inadequate validity of sales data.

5.6 ANALYSIS

5.6.1 Study I

Data sources, indicators, indices, and their categorizing into a system for monitoring alcohol were suggested on the basis of the data and the literature, but also based on practical experience of Swedish data and indicators. A systems model for prevention and basic statistics (e.g., frequencies and mean values) operations on prevention indicators provided the basis for the construction and presentation of the early composite prevention measure.

5.6.2 Study II

Cronbach alpha analyses were performed to assess the internal consistency of the APMM based on 37 indicators, but also in categories with varying numbers of indicators ($N = 3-10$). In addition, Wilcoxon two-sample tests were performed to validate APMM by comparing the change in APMM score between 2006 and 2010 in intervention municipalities and non-intervention municipalities. The Wilcoxon signed rank test was then conducted to analyse if APMM and category scores had changed between 2006 and 2010 among municipalities in general and in non-intervention municipalities. Furthermore, a regression analysis was undertaken to investigate how APMM (total points) related to corresponding values in prior years. Correlation analyses (Spearman) were performed to explore how APMM and categories were interrelated based on their prevention scores. Additional correlation analyses (Spearman) were performed to examine how APMM (total points) would relate to alternative versions of itself (created by applying different weighted category scores).

5.6.3 Studies III and IV

The analysis procedures in Studies III and IV have much in common, but also several differences. Here, the analysis procedures for both studies are described to give an overview of the analysis approaches, similarities, and differences.

In Study III, the intervention effect was estimated using a dummy variable which was set to 1 for intervention municipalities (LUMA) during the defined intervention years (2009–2012) and otherwise set to 0. The intervention effect was thus estimated as the difference between the intervention years (2009–2012) and the pre-intervention period (2006–2008), controlling for the parallel difference among the non-intervention municipalities (controls) (e.g., difference in difference). The intervention effects (LUMA vs. controls) were estimated first for prevention (policy, activity) and then for alcohol consumption and alcohol-related harm.

In Study IV, the effects of APMM (WPI, weighted) and its categories were used as input series, whereas alcohol consumption and harm indicators were used as output series, meaning that input and output series were analysed in relation to each other (2006–2014). Socioeconomic variables were also included as other possible explanatory variables in the analysis model.

In Study III, linear models were applied, but semi-logged (logged output) models were also used to gain estimates of relative changes. In Study IV, log-log models (both input and output series logged) were used to get normally distributed data and also to get results that were easier to interpret in terms of estimates of relative changes. In both Studies III and IV, 0.1 was added to the measures before logging, as zeros cannot be logged.

Both Studies III and IV comprised cross-sectional time series data. A potential source of bias in analyses of such data is the potential occurrence of unobserved differences between the study units that are linked to the outcome as well as to the explanatory variable (i.e., the intervention). Therefore, municipality dummies were included in the analyses so that only variation over time was investigated (so-called fixed effects models). In addition, yearly dummies were included in the analysis model in order to control for time effects that were not related to the intervention and could bias the results. Cross-sectional time series data can also be problematic, as it is likely that there are cross-unit and serial dependencies of the errors. Such potential presence generates a downward bias of the Ordinary Least Square (OLS) estimates of the standard errors, leading to overconfidence in the results. To handle this, a modelling technique was chosen that 1) accounted for the cross-unit dependence of the errors by using the more conservative panel-corrected standard errors suggested by Beck and Katz (85), and 2) accounted for serial dependence by including panel-specific auto-regressive parameters for estimation of residual autocorrelation. (See also (68, 70)).

5.6.4 Missing data

Consumption and harm data are based on registers, which do not suffer from missing data as the survey-based prevention data does. In general, when prevention data have been missing they have been substituted with data from the previous year. However, for 2006, which is the first year of prevention, missing data were replaced with data from the following year (2007).

5.7 ETHICAL CONSIDERATIONS

All four studies included in the thesis were approved by the regional ethics committee in Stockholm, application number 2010/247-31/5, revision approved April 9 2015.

The four studies included in the thesis are based on municipality-aggregated data, which means that individuals cannot be identified in the basic data used. Furthermore, it should be mentioned that analyses and conclusions of data are done at the aggregated level. This means, for example, that municipalities are grouped into different constellations (such as community intervention municipalities, non-intervention municipalities, or all municipalities) to analyse the development of prevention, consumption, and harm. Not even individual municipalities with low levels of prevention or extensive alcohol-related harm are reported. Even if such municipalities were to be reported, it might be more useful than harmful for the municipalities concerned; the situation should be highlighted, as this might lead to action to increase prevention and reduce harm.

6 RESULTS

A summary of the main results for each of the four studies, I–IV, is presented in this section.

6.1 STUDY I

Study title: Monitoring alcohol and alcohol related problems in Sweden.

Indicators and data sources for monitoring alcohol development in Sweden were identified. These indicators were divided into four categories; 1) Determinants of drinking (such as availability), 2) Consumption, 3) Harm, and 4) Prevention. In addition, a composite measure of prevention, divided into organization and activity, was suggested. Descriptive analyses based on the composite prevention measure indicated considerable variation in prevention magnitude among Swedish counties (2006).

6.2 STUDY II

Study title: Monitoring local alcohol prevention in Sweden: Application of Alcohol Prevention Magnitude Measure (APMM).

An Alcohol Prevention Magnitude Measure (APMM) was constructed by using 37 indicators of local alcohol prevention. These were divided into five main categories of prevention; 1) Staff and Budget, 2) Policy, 3) Cooperation, 4) Inspections/licenses, and 5) Activities.

Internal consistency analyses, Cronbach alpha (standardised), showed acceptable (86) values for APMM, ranging from 0.75 to 0.78, with a mean of 0.77 (based on 37 indicators per year 2006–2010). The individual categories, on the other hand, were more or less inadequate seen from a Cronbach alpha perspective. This can be exemplified with values for the year 2010: 0.33 for Staff and Budget, 0.62 for Policy, 0.66 for Cooperation, 0.26 for Inspections/licenses, and 0.66 for Activities. The low values for Staff and Budget, as an example, may in part be due to the fact that there are few (3) indicators in the category and that these actually measure different things (staff positions, funding, specific alcohol prevention coordinator). Though the values were low, it seemed reasonable to have these indicators in the same category from a theoretical prevention perspective.

The validation of the newly developed APMM indicated that it captured changes in local alcohol prevention. This conclusion was drawn as APMM increased significantly in municipalities who had taken part in community interventions compared with in non-intervention municipalities.

Another result was that local alcohol prevention, measured using APMM, increased significantly (median 4.5 points) among Swedish municipalities (N = 189) between 2006 and 2010. Significant increases were observed in the categories of policy (median 2 points) and activity (median 2 points). Sixty-two percent of the 189 municipalities increased their overall APMM scores between 2006 and 2010. Analyses also revealed that all five category values

(in 2010) were correlated to the total score of APMM and that the total APMM score (2010) was related to scores for prior years (2009–2006). Elaborations with relative scoring of categories in APMM showed that the municipalities with high scores on the current APMM were likely to gain high points even if the category scoring was altered between categories.

6.3 STUDY III

Study title: Effects on Alcohol Consumption and Alcohol Related Harm of a Community-Based Prevention Intervention With National Support in Sweden.

The main results indicated that prevention, measured using a composite indicator of activity, increased (+25 percent) in the LUMA intervention municipalities in comparison with the control municipalities. On the other hand, no significant increase was observed for the composite prevention measure used to monitor policy. When examining (descriptively) the seven single prevention indicators within the composite of Activity, they all turned out to be more common (on average) in LUMA municipalities than in control municipalities during the defined intervention period, but not during the period before the intervention began. In addition to increased prevention activity, the LUMA municipalities also displayed a better development in terms of alcohol consumption (sales, -8 percent) and several alcohol-related harm indicators (single vehicle accidents at night -17 percent, treated for alcohol diagnosis -7 percent, treated for liver disease -18 percent, and alcohol-related mortality -15 percent) compared with the control municipalities. Treated for alcohol intoxications and assaults displayed no significant improvement. The overall findings suggested that financial support combined with requirements and support from both national and regional level could facilitate alcohol prevention at the local level and reduce consumption and harm.

6.4 STUDY IV

Study title: Effects of local alcohol prevention in Swedish municipalities 2006-2014.

Local alcohol prevention in Sweden, measured using APMM, increased from 2006 to 2009 (+9%), but then decreased until 2013 (-10%) before increasing slightly again in 2014 (+4%). Alcohol consumption measured via sales increased during the whole study period 2006–2014 (+17%), but the harm indicators showed no uniform trend. However, the majority of them showed a positive (declining) trend. When local alcohol prevention (APMM) was analysed in relation to consumption and harm indicators over time, a direct and lagged prevention effect of one year was found. Therefore, a weighted APMM (WPI) was used. The main results suggested that an increase in APMM (WPI) by 1 percent yielded a decrease in alcohol-related mortality by 0.26 percent. However, the estimated effect of APMM (WPI) on alcohol consumption was very small, -0.02 percent. Fifteen of 42 effect estimates revealed prevention effects and two showed effects in the opposite direction. All in all, the results suggested that local alcohol prevention reduced alcohol consumption and some forms of harm in Sweden 2006–2014. But both input (prevention) and output (consumption, harm) indicators suffered from some limitations such as lack of dose and quality (prevention) and small numbers (mortality). Thus, the results should be interpreted with caution.

7 DISCUSSION

In this section, the main findings of the studies, as well as strengths, limitations, implications, conclusions, and future research are discussed.

7.1 MAIN FINDINGS

7.1.1 Studies I and II

To get a better understanding of trends for alcohol consumption and related harm, their determinants should be assessed as well, especially those that are relevant and possible to change from an alcohol policy and prevention point of view.

Study I suggests a system and indicators for alcohol monitoring in Sweden. Indicators were divided into four categories: determinants of consumption, consumption, harm, and prevention. A composite measure (index) of alcohol prevention at the local level was also presented. The indicators and the composite prevention measure were suggested as useful tools for national, regional, and local monitoring. Although there were international guides for monitoring already in place (87), this was the first time such a comprehensive review of data and indicators was presented for Sweden.

Generally speaking, the availability of alcohol-related indicators (data) in Sweden is rather good, at least in an international perspective. The usefulness of these indicators decreases with smaller jurisdictions, however, due to decreasing numbers of cases. Nevertheless, it is important to monitor the alcohol situation at the local level (municipal level) and to identify sub-national trends which might differ from the national trends. In addition, many prevention activities are carried out at the local level by municipalities and, as repeatedly shown in this thesis, the national ambitions to strengthen prevention initiatives at the local level have increased substantially. Thus, it is important to find feasible methods to monitor the magnitude of local alcohol prevention. Subsequently, a composite prevention measure (index) consisting of two categories (organization including 16 indicators and activity, including 11 indicators) was developed based on previous attempts at such monitoring (51). The composite measure presented in Study I was further developed into the APMM presented in Study II. The uniqueness of the composite prevention measure lies in that it is based on yearly data on local prevention and that it covers a broad range of prevention initiatives. An overall measure facilitates monitoring of the magnitude of local prevention over time.

Local prevention data has been collected by the former Swedish National Institute (and later by the Public Health Agency of Sweden) since the beginning of the 2000s, but only since 2006 does it include a number of items covering a broad spectrum of prevention efforts sufficient to construct a meaningful composite measure. For example, only 12 indicators were used in constructing an early version of an alcohol composite prevention measure (51) based

on data from 2002 to 2005, whereas 37 indicators were deemed possible and relevant to include in the APMM from 2006 and onwards. The APMM included 37 indicators which were grouped into five categories: 1) Staff and Budget, 2) Policy, 3) Cooperation, 4) Inspections/licenses, and 5) Activities. All five categories were scored so that they were equally important (same maximum, 20 each, with a total maximum of 100 points).

Although research (2, 35) shows that different components of interventions are differently effective (e.g., strong evidence of availability measures as the most effective interventions also at the local level), it is not possible to estimate how much more important this category (Inspections and licenses) is in relation to any of the other categories in APMM. This is especially difficult as some of them (staff/budget, policy, cooperation) are necessary for carrying out various activities, such as enforcements of age limits. On the other hand, analyses in Study II showed that different scoring for the APMM categories made very little difference in terms of rank order of municipalities: municipalities that scored high (low) for one of the variants also scored high (low) for another.

Of course, single indicators within each category may also differ in effect sizes. However, constructing 37 weight-adjusted indicators which are related to their effect sizes is simply not possible. The starting point for the construction of the APMM has rather been that indicators within each category have been scored so that they are equally important (the same points), in so far as possible. Another basic assumption was that the categories strengthen each other and together form a system of prevention. It should be added that the APMM is based on dichotomous data, since data on the dosage (or scope) and degree of implementation for the indicators on prevention activities are not available. Actually, some dosage-related items were included (in the prevention survey) a few years ago (e.g., number of schools which had implemented different programs), but it turned out to be too difficult for the respondents in the municipalities to answer these questions with an acceptable level of accuracy.

Potential shortcomings of the most often dichotomous (yes/no) single items (indicators) in the composite measure (APMM) should be balanced against the feasibility of conducting an annual prevention questionnaire in all 290 municipalities, and getting it filled out by an overwhelming majority (approx. 95% in later years).

Overall, APMM should be seen as an indicator on the *magnitude* of local alcohol prevention. The overall assessment of APMM in its present form is that it discriminated fairly well between municipalities as regards the magnitude of local alcohol prevention and that it also captured locally based changes in prevention over time. An observation is that municipalities with large populations generally had higher values for APMM than less populated municipalities, indicating that they carry out more prevention activities.

Descriptive analyses of the APMM, in Study II, showed that municipalities that took part in specific interventions increased their prevention compared with non-intervention municipalities and that local alcohol prevention increased in general among Swedish municipalities from 2006 to 2010. In a wider context, these findings are significant in relation

to the major efforts that have been made at the local level in Sweden. The findings thus suggest that the national investments have contributed to a strengthening of alcohol prevention at the local level in Sweden, in accordance with the plans.

Though the APMM was constructed some years ago, there is still no corresponding composite prevention measure for any other country to be used at the *local* level. However, there are, in an international perspective, several indices for monitoring alcohol policy (prevention) (41-49), but almost all are limited to formal *national* policy based on categories such as availability, traffic, and advertising. One of these, the Alcohol Policy Scale (APS) (48), measured alcohol prevention at the *regional* level in the USA and was based on 29 policies covering 50 states and Washington DC, during 2000–2010. Interestingly, the APS study also included a modified Delphi-driven rating of the efficacy and implementation of each of the 29 policies, but this was limited to the policies' relation to binge drinking and impaired driving among adults and youth. A panel of ten alcohol experts played a key role in the development of the APS and a separate publication on rating efficacy of APS was made (88).

To date, the APS and APMM, with their pros and cons, are at the forefront of alcohol policy-index research at the sub-national level. At the national level, the Alcohol Policy Index (API) by Brand et al. seems to be at the forefront (41), as it facilitates many national comparisons and deals with the effectiveness of regulations.

7.1.2 Study III

The criteria for LUMA municipalities¹ to get financial support were clearly stated, but the degree of fulfilment of the criteria most likely varied somewhat between the municipalities.

The main findings from the study were that municipalities that took part in the LUMA project increased their prevention activity and showed improved trends in alcohol consumption and several harm rates compared with control municipalities.

In a broader context, this means that it seems possible to increase local prevention and reduce consumption and alcohol-related harm with the combination of specific requirements on municipalities and economic support and backing from the national and regional levels. Of course, all support must have rendered into different prevention activities focusing mainly on limiting the alcohol availability, increasing parental support in different ways, and policy work.

However, the study suffered from a “black box problem,” as exact interventions and prevention intensity remained unknown. The survey prevention data used in the study were

¹ Coordinator for alcohol and drug prevention, steering group, attending meetings arranged by regional/national level, updated alcohol/drug prevention policy, politicians/public officials attending training on drug prevention, conducting a survey of the drug situation, having an action plan with a focus on availability and parental support, and implementation documentation.

collected independently from the LUMA project, which is an advantage, but on the other hand, the data lacked specific information on the exact type of intervention, dosage and degree of implementation (see also Study II, since the same data source was used there). Hence, an important lesson learned from this study was that it is very important to use standardised templates or log books, so that prevention could be monitored in more detail in future community interventions.

Two composites were constructed to get more extensive measures of prevention. One was focused on policy work and the other on activities related to parental support and availability interventions. These were the main domains which the LUMA municipalities were supported to develop within the project period (see inclusion criteria). The included indicators in the Activity composite (see Table 2b in Study III) may not have been the best for reflecting parental support and availability limitation, but would have been good enough. They were selected from among limited items (on the relevant topics) in the prevention data used (the County Report). Standard indicators of consumption and harm based on register data were used as outcome variables (see Table 3 in Study III). However, these can be sensitive to unrecorded consumption such as cross-border trade (applies only to sales data, not to harm data), small numbers, reporting propensity, and diagnosing practices.

Prevention, consumption, and harm were monitored in LUMA, as well in control municipalities, prior to, during, and after the LUMA intervention. The use of controls made it possible to set the changes in LUMA municipalities in relation to the changes in the unexposed (controls) municipalities. Municipalities were included as controls if they had not taken part in any other community intervention trials and if data for prevention, consumption, and harm were available. This approach made it possible to compare the LUMA municipalities with many of all municipalities in Sweden. Matched controls were never tested as a reference group, though this is a common approach. The reasons for this were that it seemed better to use many controls rather than fewer and selected controls, especially as the potential selection criteria were not obvious, with several outcomes (prevention, consumption, and harm) being studied. Analyses also revealed that there were only minor socioeconomic differences between the LUMA municipalities and the control group used, indicating that it was a fairly suitable reference group.

Recently, but after the publication of Study III, a systematic review and meta-analysis of "Whole-of-community interventions" to reduce drug-related harm at the population level was published (28). The review included 24 trials from ten countries. Some trial-inclusion criteria were set up in that study (the studies should include at least two community settings in a specified geographical area, apply a control group, and report findings on alcohol and drug use as well as related harm). Seventeen of the 24 intervention trials (70%) targeted alcohol and other drug use among young people which, of course, limits the degree of generalizability of community interventions targeting the whole population (28). Still, it was concluded that the studies included in the review showed some, albeit limited, effects of whole-of-community intervention on alcohol- and drug-related outcomes. However, it was

also stated that the number of studies was very limited and that the data used were of poor methodological quality in many respects. The review also emphasized the need for more standardised future study designs and outcomes, with more focus on approaches that are effective at the population level, such as regulations on physical availability, countermeasures on drunk driving and regulations on alcohol advertising (28).

Hence, the effects of whole-community intervention approaches on entire populations are still unclear and the generalizability of the LUMA results is difficult to assess. It should be stressed that LUMA focused on one of the most effective interventions for reducing drinking and harm, namely regulations on physical availability, and that all effect outcomes (in relation to the control) pointed in the same, positive (decreasing) direction.

Another important finding from the LUMA study was that prevention activity seemed to increase, which should not be taken for granted simply because an intervention is initiated.

7.1.3 Study IV

The APMM was used in combination with established indicators of consumption and harm to analyse if local alcohol prevention among Swedish municipalities in general had been effective. The main result suggested a marginally reduced effect on alcohol consumption (sales) and a reduced alcohol-related mortality. The small prevention effects on consumption might be explained by a lack of consumption data, reflecting total consumption as well as the pattern of consumption. The strongest prevention effect on mortality was found for the sum of APMM (based on 37 indicators), compared with the separate categories of APMM. This makes sense, as the sum reflects the “overall” magnitude of prevention efforts. In contrast to mortality a majority of the effect estimates on morbidity (in patient care) revealed no significant prevention effects.

As in Study III, the outcome measures used were standard indicators, but they can be sensitive to unrecorded consumption such as cross-border trade (applies only to sales data, not to harm data), small numbers, reporting propensity, and diagnosing practices. In the analyses of the relationships between prevention and consumption, municipalities identified as having a high degree of cross-border trade and/or tourist consumption were excluded, to increase the validity of the consumption indicator.

In order to capture the total effect on prevention, a weighted APMM series was constructed with a weight of 0.5 for the same years as the outcomes (the direct effect) and 0.5 for a one year lagged or delayed effect (prevention effect year 0 on outcomes in the next year (year +1)). It is realistic to assume some sort of delayed prevention effect, since prevention efforts (including structural changes) may take time to have an impact on some outcomes. Furthermore, many of the outcomes (alcohol-related deaths and alcohol-related in-patient care) are a mixture of both acute and chronic harm, which suggests some kind of lagged response. This ratio ($0.5 / 0.5 = 1$) can be discussed and elaborated on. Also, lagged

prevention effects longer than one year are possible. However, the rather short time series (2006–2014) reduces the value of analyses of such longer lagged structures due to the limited number of measurement points. (Each lagged year reduces the number of measurement points by one year for each municipality.)

Furthermore, it should be emphasized that it is challenging to monitor not only prevention activities at the local level, but also consumption and harm. It is especially challenging to analyse the possible impact of prevention on consumption and harm over time. It becomes even more complicated when different prevention efforts and different outcomes are studied together.

Study IV seems to be one of a kind. To date, no other study has applied a composite alcohol prevention measure at the local level covering a majority of municipalities (communities) in a country over time, and analysing the potential effects of local prevention on consumption and harm. However, as previously mentioned (Section 2.2.1), an Alcohol Policy Scale (APS) at regional level (US states) has been constructed and this composite measure has been analysed in relation to consumption and harm. Results from research at this scale (APS) reveal that stronger policies are associated with less binge drinking, lower alcoholic cirrhosis mortality, less impaired driving, and reductions of alcohol involvement in deadly motor vehicle crashes (48, 89-92). Such findings indicate that the results in Study IV might be realistic, though they must be interpreted with caution as there are limitations to APMM and consumption and harm measures. Furthermore, the results in Study IV were not logical in the sense that the prevention effect on consumption (sales) was very weak, although significant, whereas the effect on mortality was much stronger. There could be several possible explanations for this (as discussed in Study IV), but it is not in accordance with the dominating epidemiological model, the so-called total consumption model. When a finding is such an anomaly from the existing paradigm, some further elaboration and analyses of the data would be needed in order to improve the understanding of the results.

7.1.4 Strengths and limitations

A crucial problem for studies of this kind in Sweden is the strong secular trend - that is, a general problem awareness following the entry into the EU. In principle, all municipalities, administrations, non-governmental organizations, etc., were concerned about the expected increase in alcohol and drug problems following the EU membership and were prepared to take action. Most municipalities appointed an alcohol and drug coordinator, making it difficult to find “clean” control municipalities that had done nothing, or significantly less than the intervention municipalities. What has been done in the intervention municipalities is to give an extra push to an ongoing movement.

A strength of the thesis is that it includes most Swedish municipalities in relation to both prevention and consumption and alcohol-related harm over time. Thus, all data are based on the local level, and, for the first time, on local prevention data. A limitation is that the three largest municipalities in Sweden are excluded (due to lack of data before 2011 on prevention

for city districts). Three municipalities out of a total of 290 is only one percent, but they encompass 18 percent of the total population.

A further strength is that the prevention intervention effects are based on studies from two different angles: first by estimating the effects of a community trial in which some municipalities received extra support (Study III), and second by studying all municipalities with prevention data and using the variation over time for each of them as a means to estimate the effect of prevention on consumption and harm (Study IV). Results from both studies point in the same direction, suggesting that local prevention has had an effect on alcohol-related harm.

Another possible strength is that the data collection was done within regular activities in municipalities and state agencies. A weakness, on the other hand, is that these data were not developed and collected for research purposes. This is of particular concern for the prevention data with no measures of, e.g., the dosage and degree of implementation of different interventions, which makes it difficult to assess the degree of impact of individual prevention components. On the other hand, having policy and intervention data at the local level for almost every municipality is unique and something that has never before been used in community prevention studies.

A challenge is to study delayed effects of prevention on the consumption and harm outcomes. Prevention effects usually take time to appear and are gradual over the course of several years. This should be reflected in the modelling of prevention time series. The data covering nine years (2006–2014) do not allow for such delayed and elaborated weighted series encompassing several years. This is a possible limitation, but a weighted time series was constructed in Study IV, albeit based only on year 0 and year -1. It showed that there was indeed such a lagged response to prevention.

Finally, it should be pointed out that this thesis has had a quantitative approach and does not contain any information about the municipal processes and work that has taken place in connection with national investments for strengthening local prevention. However, a qualified assessment would be that municipalities are most successful in terms of alcohol prevention when they have a sustainable long-term perspective on prevention work and focus on evidence-based prevention methods, such as limitations of availability in multiple settings. In order to achieve a sustainable and long-term perspective on prevention it is probably important with well-functioning structures, e.g., prevention coordinator, policy work, funding, co-operation, clear goals, follow-ups, as well as engagement and mandates from politicians and other decision-makers. Support and backing from the national and regional levels might also be important ingredients for successful local prevention.

7.2 IMPLICATION AND CONCLUSION

This thesis has shown how an Alcohol Prevention Magnitude Measure (APMM) can be constructed, validated, and applied to monitor local alcohol prevention over time. Furthermore, the findings suggested that the increased efforts on local alcohol prevention in Sweden have had some effect on alcohol consumption and related harm. However, the results must be interpreted with caution, as measures of local prevention, consumption, and harm have some limitations. It is also important to consider the results in the light of an effective and restrictive national alcohol policy, seen from an international perspective. Additional studies on the effectiveness of local alcohol prevention are needed to assess the generalizability of the results in this thesis.

7.3 FUTURE RESEARCH

Most municipalities in Sweden work with broad prevention, targeting not only alcohol, but also tobacco and illicit drugs, so there might be synergy effects. It would be interesting to expand the current APMM with more activities targeting other substances as well, and analyse a developed APMM in relation to alcohol and drug consumption and related harm. In addition, it would be interesting to conduct qualitative research to increase the understanding of the characteristics of local prevention work in Sweden over the past 15-20 years. Of particular interest would be to know exactly what the municipalities have worked with (methods/programmes) and how (strategies). Furthermore, it would be interesting to delve into the municipalities' opportunities and difficulties related to systematic local drug prevention. Another interesting research area would be to study the sustainability and long-term effects of previous implemented community interventions such as the Six Community Trial. Finally, prevention data are available for city districts for Stockholm, Malmö, and Gothenburg going back to 2011. Thus, analyses of prevention, consumption and harm within and between these areas would be very interesting, especially as they are excluded from this thesis.

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