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Ph.D. Thesis

USE OF EVIDENCE AND INTERSECTORAL COLLABORATION IN LOCAL PUBLIC HEALTH WORK IN DENMARK

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Summary

Use of evidence in public health work has been of researchers', practitioners' and policy makers' interest especially within the last decade. In 2007, a structural reform of public sector was implemented in Denmark. As a consequence of this, the Danish municipalities now have the responsibility for all public health work except for health care (treatment of disease/illness). To facilitate the most effective public health work, the municipalities should use the best available evidence from research while developing health policies and prioritising, planning and implementing public health interventions. However, several contextual factors and evidence/knowledge from other sources than research has an impact on this work as well, and it seems to be a challenge to balance these inputs in the daily work of the municipalities. Furthermore, it seems to be difficult to identify and apply relevant evidence from research, to ensure sustainable collaboration between municipal sectors involved in public health work, and to structure and have an overview of all public health activities.

The overall aim of this study was to analyse the use of evidence and intersectoral collaboration in local public health work in Denmark. This was done via four interlinked sub-studies resulting in four papers. The aims of these sub-studies were:

- To investigate how and on which level evidence is used in policy processes related to local public health work in Denmark (paper 1)
- To build up evidence on intersectoral action for health at local government level through identifying challenges and facilitating factors in collaboration between sectors when developing and implementing an intersectoral health policy in Varde, Denmark (paper 2)
- To develop a set of criteria for assessing types of public health interventions in Danish municipalities and test it in Varde Municipality (paper 3)
- To investigate the use of knowledge and inclusion of stakeholders in three different public health interventions at the local government level in Denmark and to discuss strategies for future improvements in the use of research evidence (paper 4)

An electronic survey was carried out in Danish municipalities (n = 98, response rate 81%) to study how and on which level evidence is used in policy processes related to local public health work (paper 1). A large variation in understanding of the term evidence was found, and less than half of the respondents expressed that evidence is used at a high level in the public health work. The health managers' emphasis on use of evidence, political desire for use of evidence and evidence capacity were associated with the actual use. The health managers' educational backgrounds and the size of municipalities had no association to this. A request for more use of evidence was found. Barriers for this were conditions connected to time and competences. Increased collaboration between municipalities, collaboration with research units, and guidelines for evidence use were suggested as facilitators.

To build up evidence on challenges and facilitating factors for intersectoral action for health at local government level, a case study of developing and implementing an intersectoral health policy in Varde Municipality was carried out (paper 2). Following challenges were identified: the policy was perceived as an extra task by employees outside the health sector; initially there was no direct funding allocated to intersectoral projects; the level of ambition was not matched between sectors; lack of ownership to the policy; and lack of baseline measures and clear objectives in the policy. I addition, following were considered as facilitating factors: significant political support; public involvement; use of local media; establishment of a "Fund for Health"; establishment of "Health Networks" within sectors; and collaboration with a research group.

To develop a set of criteria for assessing types of public health interventions in Danish municipalities, a knowledge synthesis (including knowledge from research, interviews with key informants, a focus group discussion and a questionnaire administered to experts via e-mail) was carried out (paper 3). Based on this, a set of assessment criteria was developed to classify interventions into the four types of public health work according to The European Community Health Promotion Indicator Development Model (EUHPID model)[1]: Health Promotion, Health Protection, Disease Prevention and Health Care. Information on all current public health interventions in Varde Municipality within a three-month period in spring 2009 was collected, and 154 reported public health interventions were divided into relevant types using the developed criteria. This facilitated an overview of the interventions taking place.

[1] Bauer, G., J. K. Davies, J. Pelikan et al. (2006). "The EUHPID Health Development Model for the classification of public health indicators." Health Promotion International 21(2): 153-159.

Based on results from paper 3 three different types of interventions (one Health Promotion, one Health Protection, and one Disease Prevention) were chosen for in-depth analysis of evidence/knowledge use and inclusion of stakeholders via case study analysis (paper 4). The analysis made it clear that research evidence plays a minor role in the local public health work. More evident was the use of other types of knowledge (available resources, practitioner's expertise, population characteristics, needs, values, and preferences of the setting). This type of knowledge was identified and used via the inclusion of several stakeholders in the interventions.

The study revealed a need for future improvements in relation to use of evidence and intersectoral collaboration in local public health work in Denmark. The results indicated that to achieve such an improvement several actions are needed. Hence, following recommendations were made:

- A clear and operationalisable definition of evidence in relation to local public health work should be made. The definition should be formulated in collaboration between research and practice and take into account the context that evidence is used in within public health work in practice.
- More active and sustainable collaboration between research and practice should be launched. This collaboration would facilitate production of evidence with starting point in practice needs, dissemination of evidence from research to practice, and uptake of evidence in practice work. Within this collaboration it would be important for researchers to acknowledge the various other sources of knowledge that needs to be taken into consideration when doing public health work in practice, and the complex process of carrying out public health work in practice.
- Public health work in practice should be carried out via intersectoral collaboration to enable an evidence informed effort. In doing so, it would be important to ensure sufficient funding, to formulate clear objectives and carry out baseline measurements, to actively involve various stakeholders, and to establish ownership across and between involved sectors. One way of facilitating some of these actions could be to establish an overview of the local public health work using the EUHPID model and the criteria for assessing public health interventions developed in this study.

Dansk resumé

Anvendelse af evidens i forbindelse med folkesundhedsarbejde har, især inden for det seneste årti, interesseret forskere, praktikere og politiske beslutningstagere. I 2007 gennemgik den offentlige sektor i Danmark en strukturreform. Som en konsekvens heraf, er det nu de danske kommuner, som har ansvaret for alt folkesundhedsarbejde på nær sygehusbehandling. For at sikre den mest effektive indsats i forbindelse med dette arbejde, bør kommunerne anvende den bedst tilgængelige evidens fra forskning i forbindelse med udarbejdelse af sundhedspolitikker og ved prioritering, planlægning og implementering af interventioner. Der er dog en række kontekstuelle faktorer og evidens/viden fra andre kilder end forskning, som ligeledes har betydning, og i det daglige arbejde i kommunerne kan det være svært at balancere disse forskellige input. Desuden ser det ud til at være vanskeligt at identificere og anvende relevant evidens fra forskning, at sikre et bæredygtig samarbejde mellem de kommunale sektorer, der er involveret i folkesundhedsarbejde, og at strukturere og få et overblik over alle aktiviteter på folkesundhedsområdet.

Det overordnede formål med dette studie var at analysere anvendelsen af evidens og tværsektorielt samarbejde i lokalt folkesundhedsarbejde i Danmark. Dette blev gjort ved hjælp af fire indbyrdes forbundne delstudier, som resulterede i fire artikler. Formålet med disse delstudier var:

- At undersøge, hvordan og på hvilket niveau evidens anvendes i policy processer i forbindelse med lokalt folkesundhedsarbejde i Danmark (artikel 1)
- At opbygge evidens omkring tværsektorielt folkesundhedsarbejde ved at identificere udfordringer og facilitatorer i samarbejdet mellem sektorer ved udarbejdelse og gennemførelse af en tværsektoriel sundhedspolitik i Varde, Danmark (papir 2)
- At udvikle et sæt af kriterier til vurdering af typer af interventioner på folkesundhedsområdet i danske kommuner og teste det i Varde Kommune (papir 3)
- At undersøge brugen af viden og inddragelse af interessenter i tre forskellige interventioner på folkesundhedsområdet på kommunalt niveau i Danmark, samt drøfte strategier for fremtidige forbedringer i forbindelse med anvendelse af evidens fra forskning (papir 4)

En elektronisk spørgeskemaundersøgelse blev foretaget i de danske kommuner (n = 98, responsrate 81 %) for at undersøge, hvordan og på hvilket niveau evidens bruges i policy processer i forbindelse

med lokalt folkesundhedsarbejde (artikel 1). En stor variation i forståelsen af begrebet evidens blev fundet, og mindre end halvdelen af respondenterne gav udtryk for, at evidens bruges på et højt niveau i folkesundhedsarbejdet. Sundhedschefernes fokus på anvendelse af evidens, politisk ønske om anvendelse af evidens og evidenskapacitet i sundhedsforvaltningerne var associeret med den faktiske evidensanvendelse. Sundhedschefernes uddannelsesmæssige baggrund og kommunestørrelse var ikke associeret til graden af evidensanvendelse. Et ønske om mere brug af evidens i det fremtidige arbejde blev fundet. Barrierer for dette var forhold forbundet med tid og kompetencer. Øget samarbejde mellem kommuner, samarbejde med forskningsenheder, og retningslinjer for evidensanvendelse blev foreslået som facilitatorer.

For at opbygge evidens omkring tværsektorielt folkesundhedsarbejde blev et case studie gennemført med det formål at identificere udfordringer og facilitatorer i samarbejdet mellem sektorer ved udarbejdelse og gennemførelse af en tværsektoriel sundhedspolitik i Varde Kommune (artikel 2). Følgende udfordringer blev identificeret: politikken blev opfattet som en ekstra opgave af medarbejdere uden for sundhedssektoren, i første omgang var der ingen direkte økonomiske bevillinger til tværsektorielle sundhedsprojekter, ambitionsniveauet for politikken var ikke afstemt mellem sektorerne, manglende bredt ejerskab til politikken, samt manglende baseline målinger og klare målsætninger i politikken. Følgende facilitatorer blev identificeret: politisk opbakning, inddragelse af offentligheden, brug af lokale medier, etablering af en "Fond for Sundhed", etablering af "Sundhedsnetværk" i alle sektorer og samarbejde med en forskergruppe.

Som baggrund for at udvikle et sæt kriterier til vurdering af typer af indsatser på folkesundhedsområdet i danske kommuner, blev en syntese af viden (herunder viden fra forskning, interviews med centrale informanter, en fokusgruppe diskussion og et spørgeskema til eksperter via e-mail) gennemført (artikel 3). Baseret herpå, blev en række kriterier udviklet til at klassificere de fire typer af folkesundhedsarbejde identificeret i The European Community Health Promotion Indicator Development Model (EUHPID model)[2]: Sundhedsfremme, Sundhedsbeskyttelse, Sygdomsforebyggelse og Behandling. Inden for en periode på tre måneder i foråret 2009, blev informationer om alle aktuelle interventioner på folkesundhedsområdet i Varde Kommune indsamlet. 154 rapporterede interventioner blev herefter inddelt i de relevante typer af folkesundhedsarbejde ved brug af de udviklede kriterier. Dette gav et overblik over folkesundhedsinterventionerne og den samlede indsats.

[2] Bauer, G., J. K. Davies, J. Pelikan et al. (2006). "The EUHPID Health Development Model for the classification of public health indicators." Health Promotion International 21(2): 153-159.

Baseret på resultaterne fra artikel 3 blev tre forskellige typer af interventioner (én Sundhedsfremme, én Sundhedsbeskyttelse, og én Sygdomsforebyggelse) udvalgt til detaljeret case studie analyse i forhold til brug af evidens/viden og involvering af interessenter (artikel 4). Analysen gjorde det klart, at evidens fra forskning spiller en mindre rolle i det lokale folkesundhedsarbejde. Brugen af andre typer af viden (tilgængelige ressourcer, praktikernes ekspertise, befolkningsmæssige karakteristika, behov, værdier og præferencer) var mere fremtræden. Denne form for viden var blevet identificeret og anvendt via inddragelse af flere forskellige interessenter i interventionerne.

Det samlede studie tydeliggjorde således et behov for fremtidige forbedringer i forbindelse med brug af evidens og tværsektorielt samarbejde i lokalt folkesundhedsarbejde i Danmark. Resultaterne viste, at for at opnå en sådan forbedring er flere forskellige indsatser nødvendige. Derfor blev følgende anbefalinger formuleret:

- En klar og operationaliserbar definition af evidens i forhold til lokalt folkesundhedsarbejde bør udarbejdes. Definitionen bør formuleres i et samarbejde mellem forskning og praksis og tage hensyn til den kontekst som evidens anvendes i ved lokalt folkesundhedsarbejde.
- Mere aktivt og bæredygtigt samarbejde mellem forskning og praksis bør iværksættes. Dette samarbejde vil lette udarbejdelse af evidens med udgangspunkt i praksis' behov, formidling af evidens fra forskning til praksis, og brug af evidens i praksis' arbejde. I dette samarbejde vil det være vigtigt at forskerne anerkender de forskellige andre typer af viden, som nødvendigvis skal tages i betragtning, når der udføres folkesundhedsarbejde i praksis, og den komplekse proces der ligger bag udførelsen af folkesundhedsarbejde i praksis.
- Folkesundhedsarbejde i praksis bør udføres via tværsektorielt samarbejde for at fremme en evidens informeret indsats. I forbindelse hermed er det vigtigt at sikre tilstrækkelige økonomiske midler, at formulere klare mål og gennemføre baseline målinger, aktivt at inddrage forskellige interessenter, og at etablere ejerskab på tværs af og mellem de involverede sektorer. At etablere et overblik over den samlede indsats på folkesundhedsområdet ved at anvende EUHPID modellen og kriterierne udviklet i dette studie, kunne være en måde at lette nogle af disse tiltag på.

List of papers

1. Larsen M, Gulis G, Pedersen KM. Use of evidence in local public health in Denmark. Int J Public Health (2012) 57:477–483.

2. Larsen M, Rantala R, Koudenburg OA, Gulis G. Intersectoral Action for Health – the experience of a Danish municipality. WHO Bulletin (submitted)

3. Larsen M, Pedersen HS, Davies JK, Gulis G. Assessing types of population health intervention practices in a Danish municipality: application of the European Community Health Promotion Indicator Development (EUHPID) Model. Scand J Public Health (accepted in a slightly revised version than included in this thesis)

4. Larsen M, Wiechmann A, Gulis G, Aro AR. Use of knowledge and inclusion of stakeholders in three public health interventions at local government level in Denmark. Scand J Public Health (submitted)

In addition to these four papers, which are considered as the main thesis papers, three supplementing papers are presented in the Appendix. The first one is a letter to the editor of the journal Health Promotion International responding to an editorial about confusion of applied terms within types of public health work. Since this editorial topic was critical in relation to the contents of paper no 3, a response was found very relevant. The second one is an article published in the Danish journal Ugeskrift for Læger describing the challenges and gains of doing practice-based research and having a close collaboration with practice in relation to conduction this PhD research. The results will also be described in the discussion part of this PhD thesis. The article is in Danish, however it was found relevant to include it in the Appendix.

5. Larsen M. How can we as researchers promote a clear discourse in public health research, practice and policy? Health Promot. Int. (2011) 26: 128

6. Jensen JJ, Gulis G, Larsen M, Pedersen HS, Andersen PT. Ny europæisk model til tværsektorielt sundhedsarbejde. Ugeskrift for Læger (2010) 172/32: 2161-2164
(English translation of title: New European model for intersectoral health work)

7. Larsen M, Gulis G, Bak CK, Andersen PT, Aro AR. Gode erfaringer med brobygning mellem forskning og praksis i folkesundhed. Ugeskrift for Læger (2011) 173/25:1792-1794
(English translation: Good experiences with bridge-building between research and practice in public health).

The papers are included in this thesis with the permission of the publishers.

Abbreviations

EBM:	Evidence Based Medicine
EBPH:	Evidence Based Public Health
EIPH:	Evidence Informed Public Health
HiAP:	Health in All Policies
ISA:	Intersectoral Action for Health
RCT:	Randomised Controlled Trial
EUHPID model:	The European Community Health Promotion Indicator Development Model
EBP:	Evidence Based Practice

Introduction

"Researchers tend to push through their scientific opinion, but we policy makers have to take into account also many other opinions" (quote from a Danish policy maker) (Aro 2012).

This thesis concerns the challenges of using evidence and working together between and across sectors in relation to public health work on local level in Denmark.

Within the last decades, the concept of health has developed and changed (Banta 2003, Harrison 2003), and within it an increased focus on the use of evidence in public health work has evolved (Lavis, Posada et al. , Jenicek 1997, Glasziou and Longbottom 1999, Black 2001, Hanney, Gonzalez-Block et al. 2003, Harrison 2003, Jenicek and Stachenko 2003, Anderson, Brownson et al. 2005, Armstrong, Doyle et al. 2006, Brownson, Fielding et al. 2009). Public health interventions should be based on the best available evidence, meaning that use of evidence can potentially enhance prioritisation, planning and implementation of public health interventions (Brownson, Fielding et al. 2009). Use of evidence is expected to facilitate implementation of the most appropriate and effective interventions in relation to cost-effectiveness and the interests of populations and each individual's state of health (Kohatsu, Robinson et al. 2004, Rychetnik and Wise 2004, Nutley 2007, Brownson, Fielding et al. 2009). However, working with evidence in public health practice is a challenge and demands ways of working that are not always easy or familiar for organisations and persons responsible for public health work in practice (Bero, Grilli et al. 1998, Lin and Gibson 2003, Nutley 2007, Barwick, Peters et al. 2009, Bowen, Erickson et al. 2009, Brownson, Fielding et al. 2009, Satterfield, Spring et al. 2009, Higgins, Strange et al. 2011, Orton, Lloyd-Williams et al. 2011).

Collaboration across and between practice sectors is suggested as a useful strategy for coping with the fact that public health is determined by factors both within and outside boarders of the health sector (Dahlgren 1991, Ståhl, Wismar et al. 2006, Kickbusch 2010, WHO and Australia 2010, Ollila 2011). This collaboration is a new way of working in most practice settings and is therefore not straight forward to apply. Furthermore, very limited research on experiences of this approach in practice work exits (Kickbusch 2010, Ollila 2011).

This thesis deals with the issues and studies the use of evidence and intersectoral collaboration from various perspectives related to public work in Denmark. Since 2007 the Danish municipalities (local government level) have been responsible for all public health work taking place outside hospitals. This means that the municipalities provide public health work in relation to disease prevention as well as health promotion and health protection to the citizens (Andersen and Jensen 2010, Olejaz 2012). Because of this, the focus area of this thesis is the local municipal level in Denmark.

The research was carried out in close collaboration with a practice setting; Varde Municipality. In this way, the perceived needs of this municipality have contributed to the aims of the research. The main research aims were:

1. To investigate how and on which level evidence is used in the policy processes related to local public health work in Denmark
2. To build up evidence on intersectoral action for health at local government level through identifying challenges and facilitating factors in collaboration between sectors when developing and implementing an intersectoral health policy in Varde, Denmark
3. To develop a set of criteria for assessing types of public health interventions in Danish municipalities and test the criteria by doing an assessment of public health interventions in Varde, Denmark
4. To investigate the use of knowledge and inclusion of stakeholders in three different public health interventions at the local government level in Denmark and to discuss strategies for future improvements in the use of research evidence.

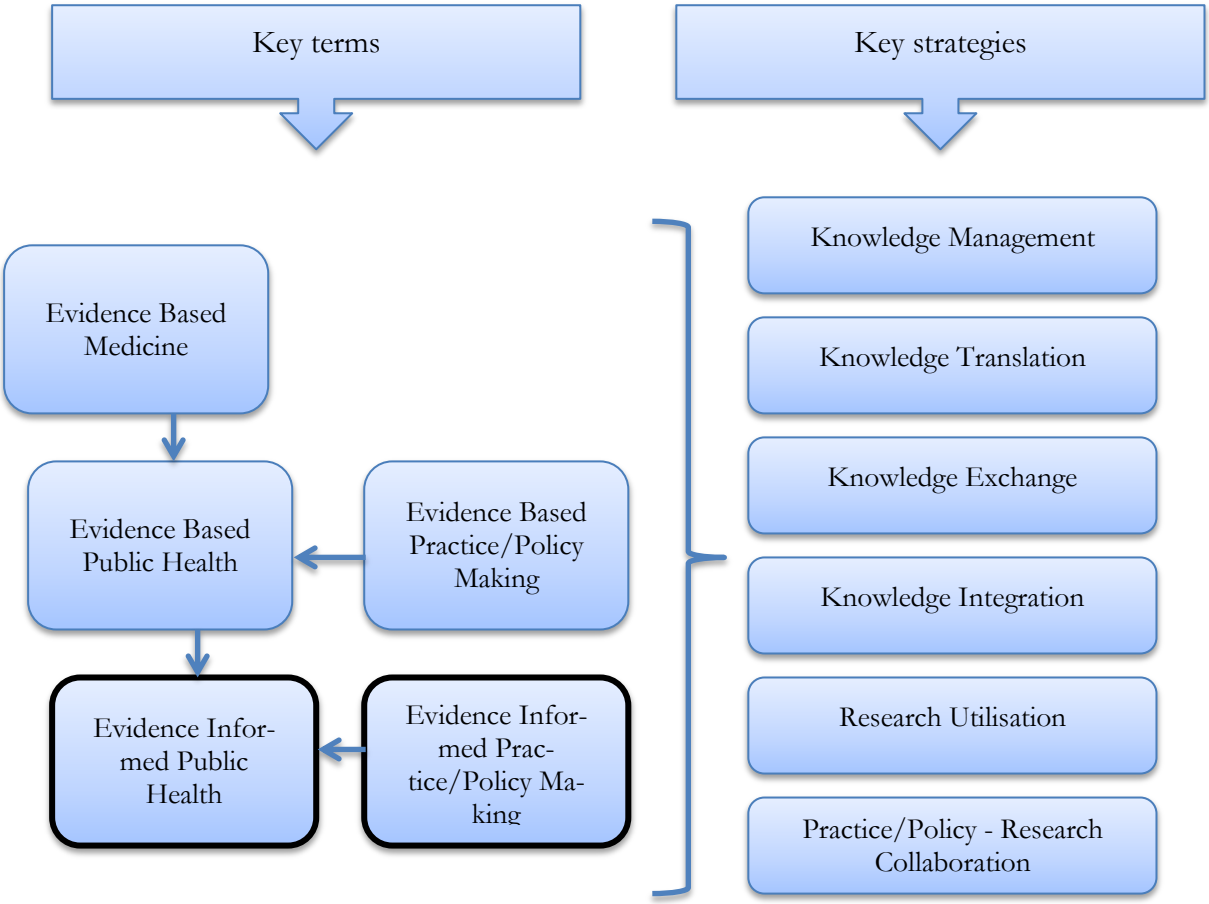
The thesis consists of four individual but interlinked sub-studies, one sub-study for each research aim. In the first sub-study a national investigation was carried out, in the sub-studies 2 and 4 the case study method was applied using Varde Municipality as a case, and in sub-study 3 a mixed methods approach was used. After presenting the theoretical framework, the specific research questions applied will be given.

Before introducing the theoretical framework, the next section will explain how the various terms applied within the research area will be used in this thesis.

Various terms applied in research on the use of evidence

The role of evidence in public health work has been of researchers' and practitioners'/policy makers' interest within the last decades (Lavis, Posada et al., Jenicek 1997, Black 2001, Banta 2003, Harrison 2003, Brownson, Fielding et al. 2009), and a considerable amount of research has been carried out with the purpose to understand what constitutes evidence in public health and how to promote its application (McKibbon, Lokker et al. 2010). Hence, several different terms have been used to label and describe the approaches and strategies within it. In Figure 1 some of the main terms are included and it is shown how the terms are perceived and used in this thesis.

Figure 1: Conceptual framework for the applied terms



It is assumed that the Evidence Based Medicine (EBM) approach was the basis for development of the Evidence Based Public Health (EBPH) approach (Sackett, Rosenberg et al. 1996, Victora, Habicht et al. 2004, Brownson, Fielding et al. 2009). Acknowledging the importance of context and complexity within public health, the Evidence Informed Public Health (EIPH) approach was developed (Lavis, Posada et al. 2004, Bowen and Zwi 2005, Oxman, Lavis et al. 2009). This approach takes into account that many other sources of knowledge, values and beliefs from various stakeholders can have a significant and relevant influence on the public health work (Oxman, Lavis et al. 2009). In this thesis, EIPH is used as the main term when referring to the use of evidence in public health work, hence the black line around the term in Figure 1. Still, knowledge from the literature on EBPH will be used since the approaches are not completely separated in the literature.

Alongside the above-mentioned terms, other terms as Evidence Based Practice, Evidence Based Policy Making, Evidence Informed Practice, and Evidence Informed Policy Making, are perceived as relevant for research on use of evidence in public health work. In this thesis, Evidence Informed Practice and Policy Making will be used as terms, but knowledge from literature on Evidence Based Practice and Policy Making will also be included.

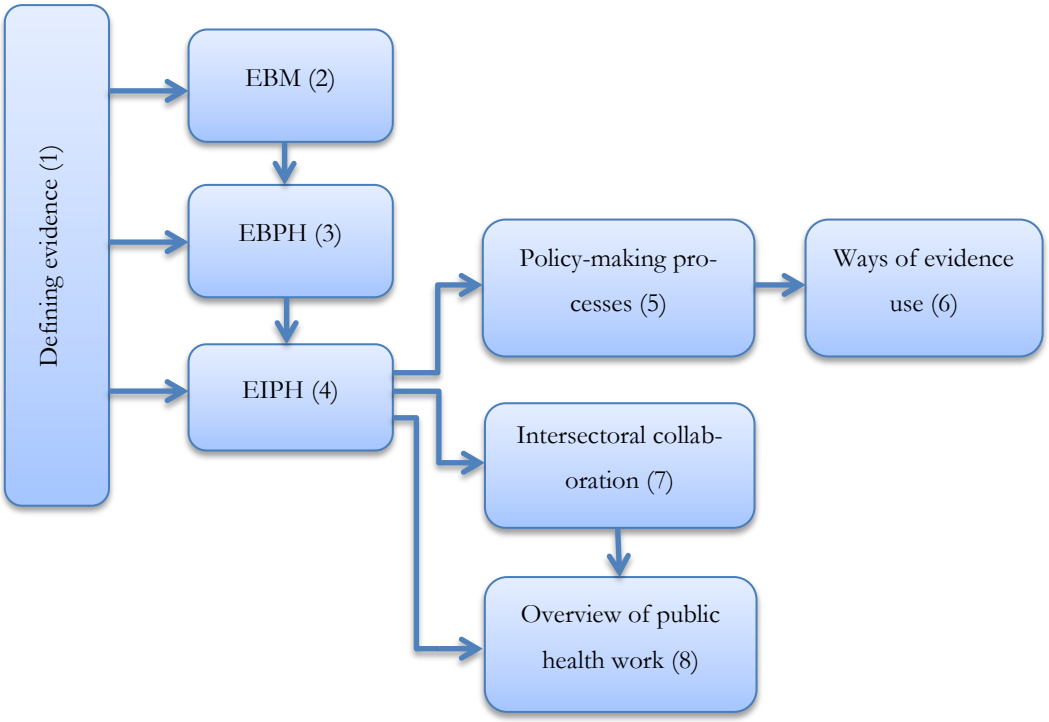
Related to the approaches, several strategies as e.g. Knowledge Translation and Knowledge Exchange have been applied and investigated with the purpose to strengthen the appropriate connections between practice and research. Such connections should improve the use of relevant evidence in practice and promote the integration of practice needs in the research carried out. These strategies are all considered relevant for studying the use of evidence and intersectoral collaboration in public health work. Still, these terms also seem to be used interchangeable within the literature and therefore all of them are included in the conceptual framework for the applied terms in the research done in relation to this thesis.

In addition to the above clarification, it is also important to explain the use of the terms "evidence", "research evidence", and "knowledge". In this thesis, the term "evidence" will be used when referring to results derived by use of scientific methods, but not necessarily only by researchers. The term "research evidence" will be used when referring to research results provided by researchers. The term "knowledge" will be used when referring to results from other sources e.g. population characteristics and practitioners'/policy makers' expertise.
After this clarification of terms, the next chapter will provide the theoretical framework.

Theoretical framework

In this chapter, the theoretical framework for the thesis will be presented. Firstly, the underlying theories of evidence use within public health policy processes and work will be described. This is done via defining evidence in relation to public health work, briefly reviewing the concepts of EBM, EBPH, and EIPH, and presenting theories on policy making processes and ways of using evidence within these. Secondly, intersectoral collaboration as a working method in public health will be presented, and finally a framework for getting an overview of public health work in practice will be displayed. The structure of this theoretical framework is illustrated in Figure 2.

Figure 2: Structure of theoretical framework



Evidence use in public health work

Defining evidence in relation to public health work

(Part 1 in Figure 2)

The term evidence is defined in various ways according to how and where it is used. At its very basis, the term can be defined as:

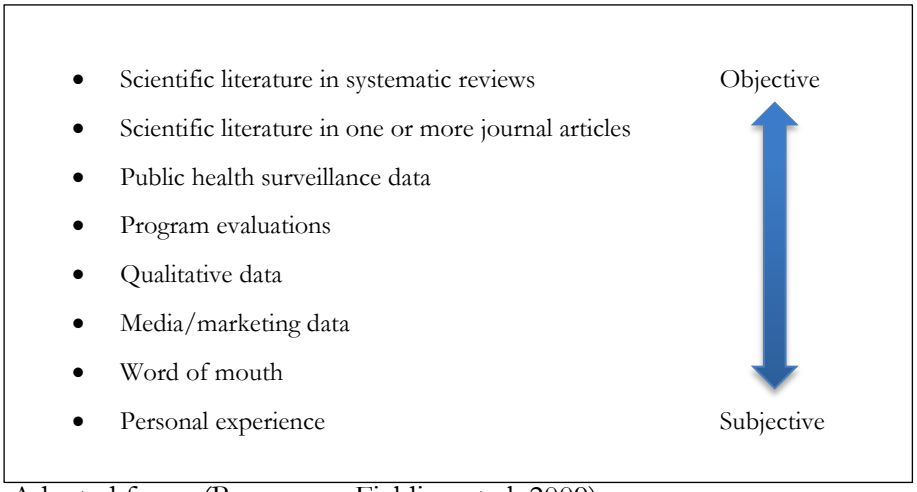
> "A thing or things helpful in forming a conclusion or judgment"
> (Brownson, Fielding et al. 2009)

A slightly more detailed definition is:

> "The available body of facts or information indicating whether a belief or proposition is true or valid"
> (Sackett, Rosenberg et al. 1996, Jewell 2001, Brownson, Fielding et al. 2009)

For a public health practitioner or a public health researcher, evidence is often some form of data. This data can for example be epidemiological data, results of evaluation of interventions or policies, or more qualitative data as results from stakeholder interviews (Dobbins, DeCorby et al. 2004, Victora, Habicht et al. 2004, Asthana and Halliday 2006, Jack 2006, Brownson, Fielding et al. 2009). The different forms of evidence and knowledge in relation to public health work and their variation from objective to more subjective states are shown in Figure 3 below.

Figure 3: Different forms of evidence



Adapted from: (Brownson, Fielding et al. 2009)

Because of the fact that public health work is formed by multidisciplinary disciplines and practices, there is a strong need for both objective and subjective evidence. The type of evidence only needs to be chosen based on the purpose of its use; is the evidence going to be included in a basis for prioritisation, planning or implementation of public health work? (Harrison 2003, Brownson, Fielding et al. 2009).

Within public health it is found relevant to categorize evidence into three different types (Brownson, Fielding et al. 2009). These are described in Table 1 below. Type 1 evidence is evidence that describes risk-disease relations, and identifies the magnitude, severity, and preventability of public health problems. Thus, type 1 evidence points to the fact that "something should be done". Type 2 evidence identifies the effectiveness of specific interventions aimed at addressing a public health problem. Thus, type 2 evidence can help to determine that "this should be done'. Type 3 evidence includes information on design and implementation of an intervention, the contextual circumstances in which the intervention was implemented, and information on how the intervention was received by the target group and other relevant stakeholders. Thus, type 3 evidence describes "how something should be done". Each type of evidence may comprise various combinations of study types and hence various forms of data presented in Figure 3 (Brownson, Fielding et al. 2009).

Table 1: Comparison of the three types of evidence

Characteristics	Type 1	Type 2	Type 3
Typical data	Size and strength of preventable risk – disease relationship (measures of burden, etiologic research)	Relative effectiveness of public health interventions	Information on the adaptation and translation of an effective intervention
Common setting	Clinic or controlled community setting	Socially intact groups or community wide	Socially intact groups or community wide
Example	Smoking causes lung cancer	Price increases with a targeted media campaign reduce smoking rates	Understanding the political challenges of price increases or targeting media messaged to particular audience segments
Quantity	More	Less	Less
Action	Something should be done	This particular interventions should be implemented	How an intervention should be implemented

Adapted from: (Brownson, Fielding et al. 2009)

The Danish Health and Medicines Authority has defined evidence in relation to public health work. This definition is very much inspired by the above definitions and reads:

> "Evidence in public health includes both research- based knowledge (e.g., results of research studies) and non- research-based knowledge based on scientific methods (e.g. meta-analysis, evaluation reports and quality assurance systems). Evidence can be classified into three categories;
> Type I: Descriptions and analyses of the determinants of health and disease and their distribution.
> Type II: Assessments of the relative effectiveness of interventions.
> Type III: Accounts of the best possible design and implementation of interventions in specified contextual circumstances."
> (Skovgaard, Nielsen et al. 2008)

Concluding from the above paragraphs, there is no single and straightforward definition of evidence in relation to public health work. Neither is it easy to state what constitutes evidence in relation to

public health work. In this thesis the definition provided by the Danish Health and Medicines Authority will be used as a basis for defining evidence in relation to local public health work in Denmark.

In addition to the definitions of the term evidence, various concepts for including evidence in the work within public health and health care practices have been suggested. The newest concept within public health is EIPH. In the next paragraphs the historical development of EIPH will be reviewed taking starting point in EBM.

Evidence Based Medicine (EBM)

(Part 2 in Figure 2)

Within the area of public health and healthcare, EBM was the first movement towards acknowledgement of the need for use of evidence in practice. In 1972 the British doctor Sir Archie Cochrane wrote the book "Effectiveness and Efficiency: Random Reflections on Health Services", which showed to be a seminal contribution to the discussion on quality and documentation in modern health care system (Eriksson 2000). He emphasised the randomised controlled trial (RCT) as a tool to sort out in the ineffective and expensive treatments existing at that time in England (Bruun, Hanak et al. 2004). Since then, several researchers and practitioners have accepted the way of thinking and working and in the 1980s the term "evidence based" was developed in relation to medical, clinical practice. In 1992 Journal of The American Medical Association (JAMA) published a series of articles with the overall title "Users' guide to the Medical Literature". These articles have contributed to forming the basis for EBM (Jenicek 1997, Banta 2003, Jenicek and Stachenko 2003).

In 1996 it was suggested to define EBM as follows:

> "…the conscientious, explicit and judicious use of current best evidence in making decisions about care of the individual patient. The practice of evidence-based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research"
> (Sackett, Rosenberg et al. 1996)

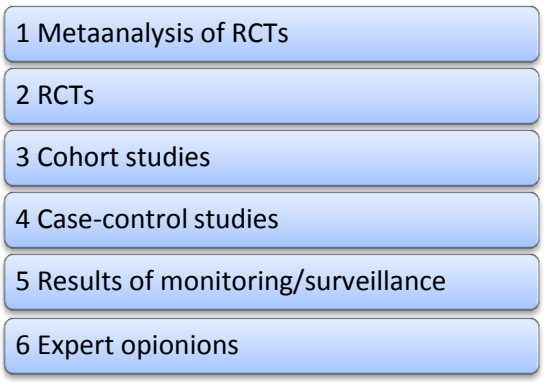
At the same time it was emphasised that it does not mean that the right treatment can be found in a book ("cook-book medicine"), that EBM is not only a method to limit costs, and that EMB does not limit evidence to only include results of RCT's and meta-analysis (Sackett, Rosenberg et al. 1996).

In 2000 the definition of EBM was rewritten to make the emphasis on patient preferences more clear:

> "…the integration of best research evidence with clinical expertise and patient values"
> (Sackett, Straus et al. 2000)

In EBM a hierarchy of evidence is recognised and widely applied to evaluate the strength of evidence. This hierarchy is known as "Cochrane's Evidence Hierarchy" (Harrison 2003, Skovgaard, Nielsen et al. 2008), and has meta-analysis of RCTs in the top and personal experiences/expert opinion in the bottom. Various versions of this hierarchy exist, but they all are designed more or less like this:

Figure 4: The traditional evidence hierarchy



Adapted from: (Skovgaard, Nielsen et al. 2008)

The hierarchy of evidence is one of the most significant differences between EBM and EBPH, since it can be hard to apply the above hierarchy in relation to public health work. The reason for this and how to handle it will be explained in the next paragraph introducing the concept of EBPH.

Evidence Based Public Health (EBPH)

(Part 3 in Figure 2)

With starting point in the experiences from EBM, EBPH was developed during the late 1990s (Jenicek 1997, Anderson, Brownson et al. 2005, Brownson, Fielding et al. 2009). The first definition of EBPH was formulated in 1997:

> "Evidence-based public health is the conscientious, explicit and judicious use of current best evidence in making decisions about care of communities and populations in the domain of health protection, disease prevention, health maintenance and improvement (health promotion)" (Jenicek 1997)

Subsequent definitions have expanded and deepened the understanding of EBPH in relation to both practice issues and the question on how to identify high quality evidence in public health (Glasziou and Longbottom 1999, Anderson, Brownson et al. 2005). As the content of EBPH has been tried out in practice, several new components have been added to the definition of what constitutes EBPH (Brownson, Fielding et al. 2009). These are as follows:

- To make decisions based on the best available scientific evidence (both quantitative and qualitative data)
- To use data and information systems systematically
- To apply program-planning frameworks (often based in behavioral science theory)
- To engage the community in assessment and decision making
- To make sound evaluations
- To disseminate what is learned to key stakeholders and decision makers
  (Brownson, Fielding et al. 2009)

One of the most common used frameworks for EBPH is shown in Figure 5. It is a seven-stage process going from community assessment to evaluation of program/intervention/policy (Brownson, Baker et al. 2003, Brownson, Fielding et al. 2009, Satterfield, Spring et al. 2009).

Figure 5: The most commonly applied framework in EBPH

Adapted from (Brownson, Fielding et al. 2009)

This framework makes it clear how EBPH differs from EBM when it comes to the hierarchy of evidence since various types of data are needed in the different stages (the three types of evidence related to EBPH presented in Table 1. Because of that, the quality of evidence should not be evaluated based on a hierarchy, but on how well it fits the purpose of its use. Public health draws on research from many disciplines and thus does not have a single research methodology tradition or a "gold-standard" for study design. Instead, the methods and traditions based on the various disciplines need to be acknowledges and combined to form the best basis of evidence to solve public health problems (Harrison 2003, Anderson, Brownson et al. 2005, Jack 2006).

In addition to the above mentioned differences between EBM and EBPH, context is an important dimension for public health work (Jack 2006, Aro, Smith et al. 2008). The next paragraph will introduce this issue and lead to presentation of the concept EIPH.

Context, stakeholders and complexity in public health

One challenge of applying the concept of EBPH is the fact that public health work most often is carried out in complex settings under influence of many other sources of knowledge (Harrison 2003, Lin and Gibson 2003, Aro, Smith et al. 2008). Furthermore, the target group for a public health intervention is most often a population group – either at micro level (e.g. a family), at meso level (e.g. the citizens of a municipality) or at macro level (e.g. the citizens of a county) (Aro, Smith et al. 2008, Brownson, Fielding et al. 2009). Hence, several contextual variables are relevant to take into account when prioritizing, planning and implementing public health interventions. In Table 2, the most common contextual variables are presented. The variables can be seen as elements with potential use for supporting public health interventions, but they can also be hindering the success of an intervention if they are not taken into account in planning (Brownson, Fielding et al. 2009). Finally, the variables can be used as parts of the explanation of why a given intervention will result in different outcomes in different settings (Aro, Smith et al. 2008). Therefore, it is very important to be aware of the impact of contextual factors when planning a public health intervention.

Table 2: Contextual variables for public health work

Category	Examples
Individual	Education level
	Basic human needs
	Personal history
Interpersonal	Family health history
	Support from peers
	Social capital
Organisational	Staff compositions
	Staff expertise
	Physical infrastructures
	Organisational cultures
Sociocultural	Social norms
	Values
	Cultural traditions
	History
Political and economical	Political will
	Political ideology
	Lobbying and special interests
	Costs and benefits

Adapted from (Brownson, Fielding et al. 2009)

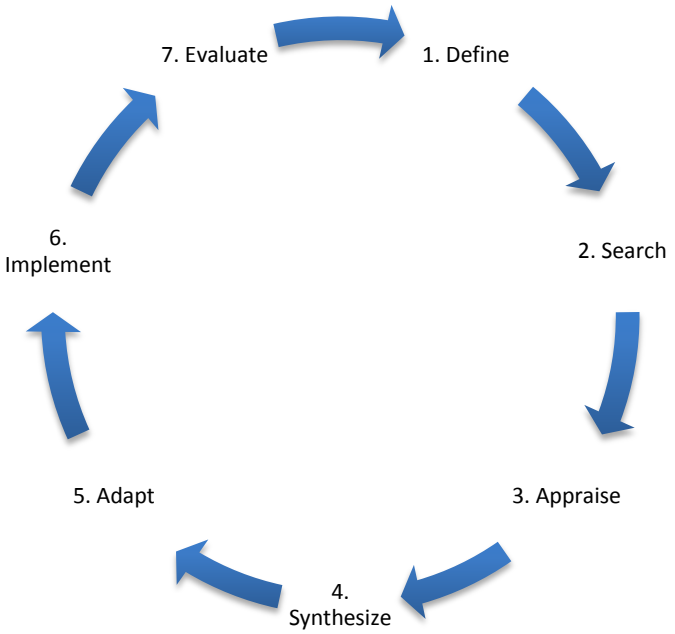
Acknowledging the importance of these and other contextual factors have been a crucial argument for development of the concept EIPH. This concept will be explained in the next paragraph.

Evidence Informed Public Health (EIPH)

(Part 4 in Figure 2)

EIPH builds on the ideas of EBM and EBPH, but acknowledges the fact that many factors, beyond simply the research evidence, influence public health work in practice. EIPH is described as a complex, multi-disciplinary process that occurs within dynamic and ever-changing communities and includes different sectors of society (Lavis, Posada et al. 2004, Bowen and Zwi 2005, Oxman, Lavis et al. 2009). It follows a process somehow comparable with the one in EBPH (Figure 5) but with emphasis on the handling of relevant evidence and other types of knowledge from various sources (Ciliska, Thomas et al. 2008). The process of EIPH can be illustrated as in Figure 6 below.

Figure 6: Working process in Evidence Informed Public Health



Adapted from: Bowen and Zwi, 2005; Ciliska, Thomas et al, 2008

As already explained, it is obvious that EIPH does not happen in a vacuum but instead the process is influenced and informed by several components and hence several sources of evidence and

knowledge. Figure 7 illustrates these intersecting components of effective public health decision-making and visualizes the spectrum of factors to be considered toward developing and providing the best public health interventions possible (Brownson, Fielding et al. 2009, Satterfield, Spring et al. 2009).

Figure 7: Various types of evidence, knowledge and contextual factors in public health work

Adapted from: (Brownson, Fielding et al. 2009, Satterfield, Spring et al. 2009)

Figure 7 shows how EIPH involves integrating the best available research evidence into the public health decision-making process. Additional factors – community health issues and local context, community and political preferences and actions, and public health resources – add to the knowledge foundation and create the environment in which the research evidence is interpreted and applied. Hence, public health decisions made via EIPH are based on a combination of evidence and knowledge from several sources - research being one of them. In Table 3 various sources of evidence and knowledge relevant for EIPH processes are listed and examples on the different types are given (Ciliska, Thomas et al. 2008).

Table 3: Examples of the various sources of evidence

Sources of evidence	Examples of evidence
Evidence from research	The most relevant, high-quality qualitative or quantitative research evidence available. Research findings from a variety of disciplines and sectors relevant to public health.
Evidence about the frequency, causes, and modifying factors of local community health issues	Surveillance data and community health status reports to determine the magnitude of the health issue in the local setting. Significance and importance of the issue in comparison to other community health concerns.
Knowledge from people about community and political preferences and actions	Needs and interests of community members. Support or opposition from the public and/or government officials. Current political climate (local, regional, national, international). Current organizational climate.
Knowledge from various governments and programs about public health resources	Financial resources. Human resources (e.g. personnel, administrative support, support from management). Materials (e.g. workspace, computers, supplies).

Modified based on: Ciliska, Thomas et al, 2008

Given the explained complexity of EIPH it is clear that the working procedures are also complex and it is not straightforward to identify and use the most relevant research evidence in combination with the other types of evidence and knowledge. In the past decade, several strategies for improving this process have been investigated and evaluated (Lomas 2000, Kreuter and Wray 2003, Hyde 2008, Egan, Bambra et al. 2009, Urquhart, Porter et al. 2011, Riley, Norman et al. 2012). These are e.g. Knowledge Management, Knowledge Translation, Knowledge Exchange, Knowledge Integration, Research Utilisation, and Practice/Policy-Research Collaboration as listed in the conceptual framework for this thesis (Figure 1). The common aim of these strategies is to improve the appropriate use of research evidence in practice work and in some of the strategies also to improve the amount

of research carried out based on practice needs. The methods of the strategies vary. Some of them are passive (i.e. making research evidence available on websites) and some are more active (i.e. introducing a knowledge-broker, a person who "translates" research evidence into knowledge applicable to a specific practice setting). However, the literature shows that none of these strategies seems to be working perfectly in all settings. Instead, strategies need to be adapted to each single public health setting and/or case (Larocca et al. 2012).

Concluding from the above, EIPH is the concept that puts most emphasis on inclusion of both research evidence and other sources of relevant knowledge in public health work in practice. In this thesis, EIPH is used as the main theoretical foundation. However, some parts of the research carried out in relation to this thesis studied the use of research evidence and other kinds of evidence derived by scientific methods, while other parts of the research also included studying the use of other types of knowledge (e.g. population characteristics and practitioner expertise).

The frameworks for EBPH and EIPH (Figure 5 and 6) suggest processes for working evidence-based and evidence-informed with public health in practice. These working processes can be understood as policy making processes. The next section will present types of policymaking processes and ways of using evidence within these.

Policymaking processes

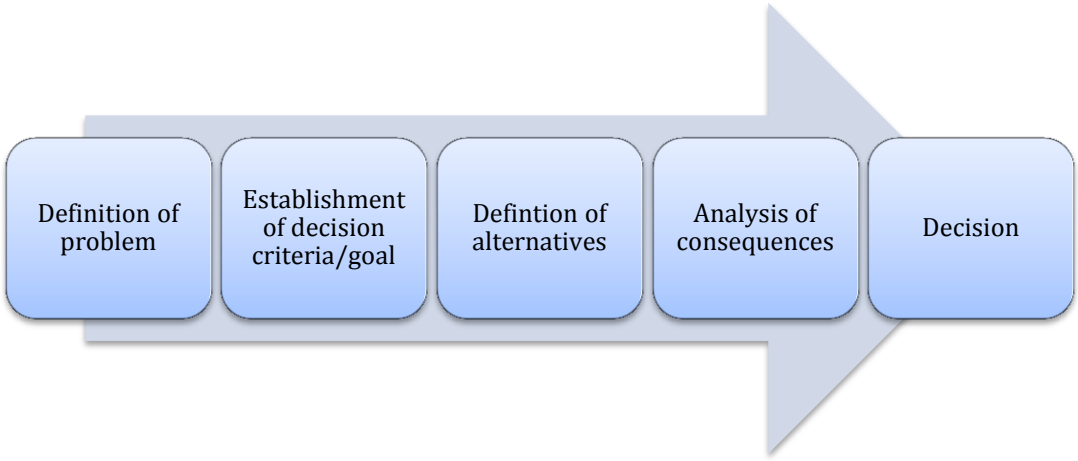
(Part 5 in Figure 2)

Prioritising, planning, implementing and evaluating public health work can be seen as a policy-making process. According to the literature, policymaking can take place in several different ways, some more rational than others (Lin and Gibson 2003, Walt 2004, Nutley 2007). This paragraph will introduce some of the most common models of policymaking processes. The aim of this is to illustrate that public health work in practice does not necessarily follow a rational process and to introduce different ways of evidence use in policymaking processes.

There are many different ways of categorising policymaking processes. The models presented in the following should not be construed as exhaustive but has been selected on the basis of its previously identified relevance in relation to studies of evidence use (Hanney, Gonzalez-Block et al. 2003, Nutley 2007).

It is an on-going discussion, whether public health policies and public health work are being developed on a rational basis (Lin and Gibson 2003, Walt 2004, Nutley 2007). The rational model for policy making (Figure 8) is characterized by the idea of a direct, linear relationship between ends and means; hence evidence should be used as a mean to achieve a defined goal (Walt 2004).

Figure 8: A rational model for policy making



Adapted from: Walt 2004, Nutley 2007

The rational model for policy making has formed the basis for several modified models. In the following paragraphs, some of these models will be briefly reviewed.

As previously mentioned, it has long been recognized that policymaking within public health is a complex process. The process may involve evidence as well as a series of other factors such as different interests, values etc. In the policy processes, evidence must also be balanced with other sources of knowledge derived from e.g. common sense, knowledge about community characteristics and the practitioners' and policymakers' expertise. Incremental models of policymaking allow different stakeholders a role in the policy process and include many sources of evidence and knowledge that may influence the policy making process (Hanney et al, 2003; Nutley et al, 2007). Incrementalism is a part of the decision-making model called "Muddling Through". According to this model, the order of the policy making process is not necessarily that of the perfect rational model (Figure 8). In the analysis of alternative solutions and their consequences new targets can be discovered. For this reason, it is not possible to make a straightforward policy process. Furthermore, analysis of alternatives and consequences is incomplete and thus incremental decisions are taken. This process is in

contrast with the rationality assumption, since policymakers do not necessarily have clear goals, and they can return to goal formulation later in the policy process (Weiss 1979, Walt 2004, Nutley 2007)

Another modified model for policy making is the "garbage can" model. This model suggests that solutions not previously used still are present in the policymaking system. When other problems then later occur, these solutions can be used (Walt 2004). Kingdon (Kingdon 1984) has developed a model for policy processes inspired by the garbage can model. He envisions three independent streams: a problem stream, an alternative stream, and a political stream. At various times these streams are brought together. A problem becomes urgent, and then a solution from the alternative stream is chosen, which then is fed into the policy stream. The probability that the three streams meet depends on whether there is an opening, a so-called "window of opportunities", which advocates for specific solutions suddenly sees an opening and exploits this (Kingdon 1984, Hanney, Gonzalez-Block et al. 2003, Nutley 2007).

These models for policy making are all important for different policy processes within public health work (Nutley et al, 2007). In the next paragraphs different ways of evidence use in the different types of public health policymaking processes will be presented.

Ways of evidence use in policy making processes

(Part 6 in Figure 2)

As already argued, use of evidence in public health policy processes is a complex process and it often means different things to different people (Anderson, Brownson et al. 2005, Brownson, Fielding et al. 2009, Satterfield, Spring et al. 2009, Jansen, van Oers et al. 2010, Cameron, Salisbury et al. 2011). Is "use of evidence" simply to acquire evidence, or is it necessary that the evidence has a direct impact on the policy process and work of public health practice, before it can be called "use"? The following presentation is intended to illustrate how evidence can be used in conjunction with the policy process. Davis et al (Davies, Nutley et al. 2004) have analysed the role of evidence in policymaking processes in several public service areas and have concluded that the momentum of evidence use within public health is great and almost pandemic. Although public health work is complex and influenced by numerous factors, it is therefore an area where evidence use is largely in the focus.

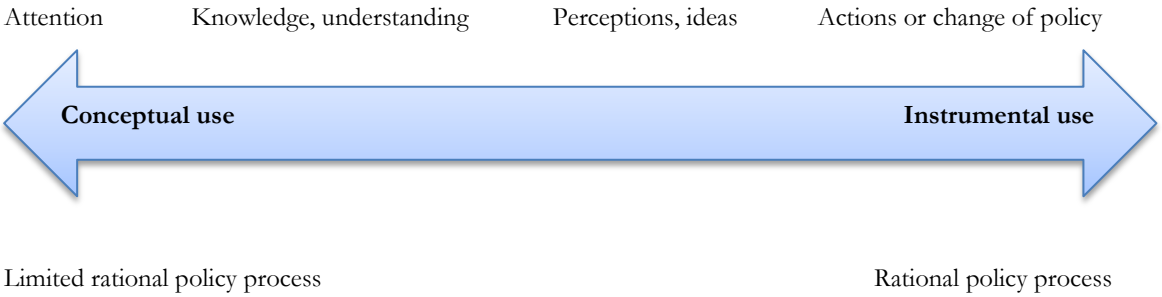
In the literature, the traditional way of perceiving use of evidence is through *instrumental use*, which involves a direct application of evidence in public health practice work and policymaking (Nutley 2007). This approach identifies the influence of a particular piece of evidence on certain decisions or solutions to specific problems (Nutley et al, 2007). For local public health work, this means that evidence will be directly used for prioritisation, planning and implementation of specific local public health initiatives and/or interventions. Thus, this understanding of evidence use can be related to the perfect rational model of policy making in which an explicit relation between ends and means can be identified.

In reality, evidence is often used in a more indirect way (Weiss 1979, Lin and Gibson 2003). This means that evidence helps forming the basis for public health decisions and working practices while taking into account several other contextual factors. Evidence can also be used to form and change general knowledge and understanding. Therefore, use of evidence may possibly be about creating attitudes and ways of thinking, as much as it has to do with a direct influence on decision making (Hanney, Gonzalez-Block et al. 2003, Nutley 2007). *Conceptual use* involves this more comprehensive approach to use of evidence, and includes the complex and often indirect ways in which evidence may influence public health work and policy-making (Hanney, Gonzalez-Block et al. 2003, Nutley 2007)). This understanding of evidence use may therefore be linked to the policy processes, which are described by the more modified models of the rational model because these models do not assume a linear policy process with direct link between ends and means.

Use of evidence in policy making can also be considered as *strategically/tactical use*. In this regard, evidence is used as a mean to achieve a certain objective or as an argument to take a particular decision, without evidence actually being the reason for the decision (Hanney, Gonzalez-Block et al. 2003, Nutley 2007). Finally, the use of evidence can be seen as *process use*, which highlights how the development of evidence can help to influence policy processes as much as the actual message of the evidence (Hanney, Gonzalez-Block et al. 2003, Nutley 2007).

Figure 9 below summarises the different ways of using evidence in different types of policy.

Figure 9: Overview of the different ways of using evidence in different types of policy processes



Adapted based on Nutley, 2007

Various models of policy making processes and evidence use within these have now been presented. This presentation has shown that there are different ways of using evidence connected to the different ways of public health policy making and work. Hence, perceiving that public health work in practice follows the suggested processes of e.g. EIPH may be too simple. Furthermore, acknowledgement of the fact that evidence also can be used "only" as a foundation for forming attention, knowledge, and understanding may be relevant within public health research and practise.

As presented above, EIPH is a multi-disciplinary approach to public health work, and collaboration between many practice sectors needs to be carried out when practicing public health work in an evidence-informed way. This complicates the working process of EIPH since evidence and knowledge from various disciplines can influence the working process. The next section will introduce the concepts Health in All Policies (HiAP) and Intersectoral Action for Health (ISA) as underlying concepts for performing intersectoral collaboration in relation to EIPH.

Intersectoral collaboration in Evidence Informed Public Health

(Part 7 in Figure 2)

As previously mentioned, several strategies and working methods for the use of evidence in public health work have been suggested. In this section, the working method intersectoral collaboration, which is applied in the PhD thesis, will be further elaborated. Intersectoral collaboration builds on the concepts of HiAP and ISA, also referred to as cross-sectoral collaboration in public health

(WHO and Australia 2010). The two concepts are extremely closely related and it can be difficult to separate them.

HiAP is defined as:

> "A horizontal, complementary policy-related strategy contributing to improved population health. The core of HiAP is to examine determinants of health that can be altered to improve health but are mainly controlled by the policies of sectors other than health"
> (Ståhl, Wismar et al. 2006)

ISA is defined as:

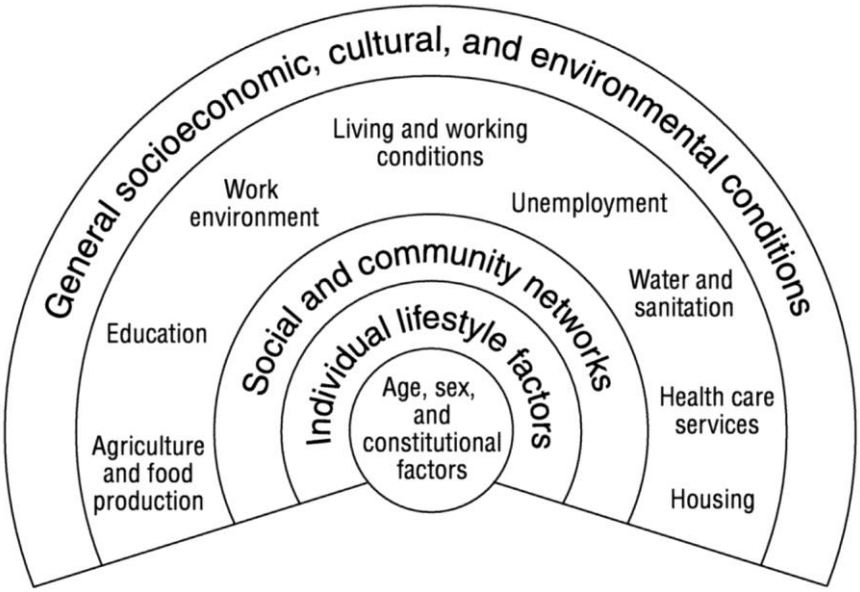
> "A coordinated action that explicitly aims to improve people's health or influence determinants of health"
> (WHO 2013)

Both HiAP and ISA have a solid background in public health science, based on an interaction of evidence on health, governance, and public policies. They are mainly focusing on the policy-level including interventions on public health problems and a focus on population health aiming at influencing health determinants to improve, maintain and protect health (Kreisel and von Schirnding 1998, Armstrong, Doyle et al. 2006, Ståhl, Wismar et al. 2006, WHO and Australia 2010).

The approaches are based on the recognition that population health is not only a product of health sector activities, but to a large extent determined by living conditions and other societal and economic factors. Therefore, public health is often influenced by policies and actions beyond the health sector. Public policies shape the conditions in which populations live in and these conditions may have positive or negative consequences for health. Conditions that are found to have the most significant influence on health are called "determinants of health". Figure 10 shows a model developed by Dahlgren and Whitehead (1991) to establish an overview of the determinants of health. The model distinguishes between five categories of determinants. Some of these are amenable to change

while others are not. There are also important interrelationships between the different determinants; living and working conditions, or social and community influences, may have effects on individual lifestyle factors such as for example drinking habits, smoking and physical activity.

Figure 10: The main determinants of health



Source: (Dahlgren G 1991)

In relation to the research within this thesis the most important aspect of the model (Dahlgren G 1991) is that it emphasises the importance of non-health sectors in relation to influencing the determinants of health. The model makes it very clear that several determinants of health are situated outside of the health sector responsibilities. In the same way, HiAP and ISA are encompassing approaches that go beyond the boundaries of the health sector. They address all policies such as transport, housing, environment, education, fiscal policies, tax policies and economic policies. Therefore, the model developed by Dahlgren and Whitehead (1991) justifies the relevance of HiAP and ISA as relevant strategies for working evidence-informed within public health work in practice via intersectoral collaboration.

Getting an overview of public health work

(Part 8 in Figure 2)

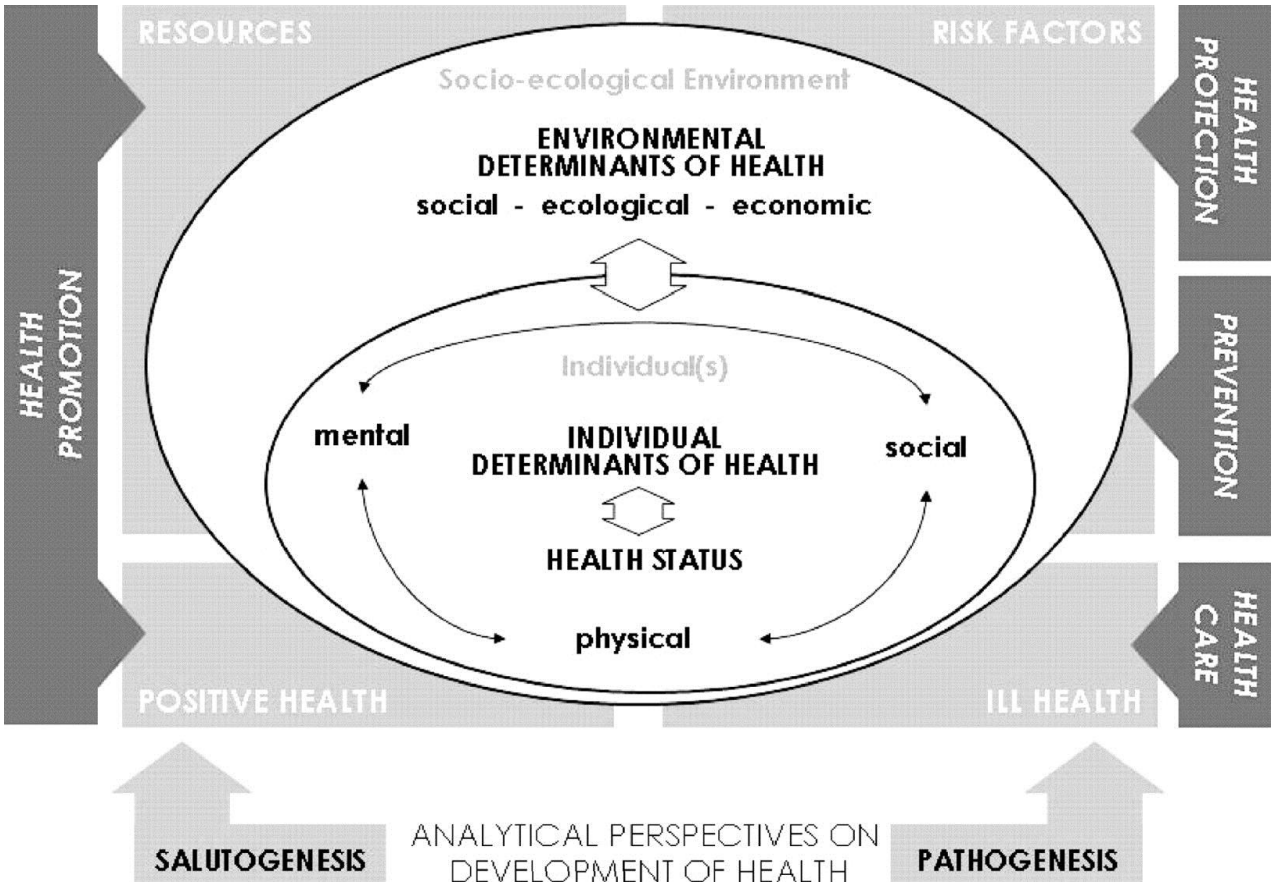
In the previous sections several issues in relation to the use of evidence in public health work have been presented. According to the model of the working process in EIPH (Figure 6), the policy process of this work should start by defining the problem that needs intervention. This can e.g. be done via performing a needs assessment in the community (NHS 2013). Another important issue for being able to identify gaps in the public health work must be to have an overview of all the public health interventions already being carried out. This overview of public health interventions might also be important for being able to establish a sustainable intersectoral collaboration as described in the previous section, since it potentially could identify the roles of different sectors in the public health work. This section will introduce ways to establish such an overview of public health work.

Several theoretical frameworks to classify public health efforts have been developed in an attempt to structure public health interventions and to provide an overview of public health efforts. The 10 Essential Public Health Operations (WHO 2013) is a fundamental framework describing the public health interventions that should be undertaken within all communities. It is very closely linked to National Public Health Performance Standards Program (NPHPSP) (CDC 2013); naturally both of these frameworks are linked to the specific public health infrastructure of USA and are therefore not directly applicable in this thesis on Danish municipalities. Frieden (2010) presents the Health Impact Pyramid as an approach to set up public health action framework of broader applicability less dependent on a concrete national system (Frieden 2010). Other examples of such assessment models include the Health Promotion Outcome Model (Nutbeam 2000), the Generic Logic Model for Planning and Evaluating Health Promotion (Rootmann, Goodstadt et al. 2001), A Framework for Mapping Health Promotion Action (Bauer 2002), Health Promotion as Intervention into the process of Health Development (Noack 2002), and The European Community Health Promotion Indicator Development Model (EUHPID model) (Bauer, Davies et al. 2006). In the following, the EUHPID model will be further elaborated.

The EUHPID model (Figure 11) was developed as a basis for the establishment of a European set of indicators for monitoring public health and health promotion interventions. It builds around the physical, mental and social health of individuals and shows how health develops by interaction between individual and environmental health determinants. It demonstrates that health development

can be analysed from a salutogenic (focusing on the origins of health) and a pathogenic (focusing on the origins of disease) perspective and explains how the differing starting points of various intervention approaches, such as health promotion and health care, are related to these two perspectives (Bauer et al., 2006). The EUHPID model defines four types of public health work: Health Promotion, Health Protection, Disease Prevention and Health Care. However, the model lacks explicit criteria for how to assess public health interventions into the four categories. Furthermore, the model has not been tried out in practice (before the study related to paper 3).

Figure 11: The EUHPID Health Development Model for the classification of public health indicators



Source: Bauer, Davies et al. 2006

Based on the above, the EUHPID model was chosen as the theoretical framework for providing an overview of public health work in a local setting in this thesis. This choice is based on the fact that it outlines how different parts of public health work interact with each other and influence the health

of individuals and communities; it is also fairly simple and thus easy to apply in practice (Bauer, Davies et al. 2006). Another important aspect of this choice is the Eurocentric cultural relevance of the model itself and terminology used in it for the Danish setting.

Summary of theoretical framework

In this section the theoretical framework of the thesis will be briefly summarised.

Evidence in relation to public health needs to be defined broadly and can be derived by various methods and via various channels, based on the purpose for the use of evidence. The most recently developed concept in relation to use of evidence in practice work is EIPH which is developed based on EBM and EBPH. The main difference between these concepts is that EIPH takes into consideration that many other sources of knowledge than research evidence (e.g. community characteristics and practitioners expertise) have an influence on the policy process of public health work.
Working with public health in practice can be seen as a policy process of prioritising, planning and implementing interventions. Policy processes can be carried out in various ways, some more rational than others. In these policy processes, evidence can be used in various ways from forming the conceptual background for a policy process to defining concrete actions.
Intersectoral collaboration is a way to obtain EIPH, since several public health problems are connected to responsibilities of other sectors than health sectors (for example education, housing, agriculture, infrastructure etc.)
The first step of the working process in EIPH is to define public health problems/issues/conditions that need some kind of intervention. To form a basis for this, the EUHPID model offers four categories in which already on-going interventions can be assessed. An assessment like this could potentially also promote the establishment of intersectoral collaboration since the role of various sectors could be identified.

This theoretical framework provides the background for the aims and research questions applied in this thesis. These will be presented in the next chapter.

Aims and research questions

In this chapter the aims of the thesis will be presented again to add on the research questions applied based on the theoretical framework. Since the study was carried out using mixed methods in a sequentially way (will be elaborated in the chapter on material and methods), the findings of papers 1 and 2 informed some of the investigation areas of papers 3 and 4, and the findings of paper 3 also informed the investigation area of paper 4. Because of that, the following section will shortly describe some of the results. The intention is not to present results, but to clarify the process.

To form a basis for the research, it was found relevant to study the use of evidence in local public health work within all municipalities in Denmark. This was necessary since no studies concerning this had been carried out in Denmark before this one. Hence a national investigation was completed using an electronically questionnaire.

The sub-study aimed to provide evidence concerning how and on which level evidence was used when prioritising, planning and implementing public health interventions in the municipalities. Furthermore, the sub-study aimed to analyse which of the selected conditions had an association with the level of evidence use and to identify possible barriers and facilitators for future evidence use.

The aim of paper 1 was:
To investigate how and on which level evidence is used in policy processes related to local public health work in Denmark

The specific research questions applied were:

- How do municipal health managers understand the concept of evidence?
- On which level is evidence used when prioritising, planning and implementing public health work in the municipalities?
- Which contextual factors have an association to the level of evidence use?
- What are the intentions for future use and production of evidence in municipal health administrations?

- What do health managers perceive as barriers and facilitators for future use of evidence?

Literature shows that intersectoral collaboration is crucial in relation to successful use of evidence and for launching effective public health work (Dahlgren 1991, Ståhl, Wismar et al. 2006). Despite this, evidence on how intersectoral collaboration works in practice is very limited. Hence, it was found relevant to analyse the intersectoral collaboration within public health work with special focus on challenges and facilitating factors. This was done using Varde Municipality as a case.

The aim of paper 2 was:
To build up evidence on intersectoral action for health at local government level through identifying challenges and facilitating factors in collaboration between sectors when developing and implementing an intersectoral health policy in Varde, Denmark

The specific research questions applied were:

- What were the key actions in the development phase of the intersectoral health policy?
- What were the key actions in the implementation phase of the intersectoral health policy?
- What were the main challenges for intersectoral collaboration?
- What were the main facilitating factors for intersectoral collaboration?

Some of the critical results from the research done in relation to paper 2 were: 1) The intersectoral health policy was too unspecific and clear objectives were lacking; 2) Non-health sector employees had difficulties in seeing that they also do health related work in their respective sectors; 3) Baseline measures for the policy contents were missing.

In summary, practice (Varde Municipality) had a need to be clearer on how much and which types of public health activities that took place in the municipality. Based on this, it was found relevant to do a mapping and assessment of all public health activities in Varde Municipality. Starting point was taken in the European Community Health Promotion Indicator Development (EUHPID) Model (Bauer, Davies et al, 2006).

The aim of paper 3 was:
To develop a set of criteria for assessing types of public health interventions in Danish municipalities and test it on a selected municipality

The specific research questions applied were:

- How can a set of assessment criteria for the four types of public health work (Health Promotion, Health Protection, Disease Prevention, and Health Care) be developed based on the EUHPID Model?
- How can the public health interventions taking place in Varde Municipality be assessed using the developed criteria?

The research done in relation to paper 3 made it clear that a lot of local public health work of various types is taking place. To wrap up and combine the findings from papers 1-3, it was found relevant to look more into details on the use of evidence and collaborations/stakeholder inclusion in one of each type of the public health activities. This was done using a framework for Evidence Based Practice as an analysis tool (Satterfield, Spring et al. 2009).

The aim of paper 4 was:
To investigate the use of knowledge and inclusion of stakeholders in three different public health interventions at a local government level in Denmark and to discuss strategies for future improvements in the use of research evidence.

The specific research questions applied were:

- Which kind of knowledge was used in working with three different public health interventions?
- Which kinds of stakeholders were included in working with three different public health interventions?
- What were the barriers and facilitators for the use of evidence from research?

Study setting

In this section, the practical context of the research carried out will be explained. This will be done by first introducing public health work in Denmark with a special emphasis of the role and responsibility of the municipalities. Following this, public health work in Varde Municipality will be given special attention due to the fact that this municipality served as the case study setting for considerable parts of the thesis research (papers 2-4).

Public health work in Denmark

Public health challenges

The population of Denmark has a relatively good health status. However, life expectancy is lower compared to other Scandinavian countries (average 78,7 years in 2008)(Olejaz M 2012). The proportion of people overweight or obese has increased over the last years and alcohol consumption and tobacco use continue to be a problem, although the proportion of smokers has decreased in recent years. Socioeconomic inequalities in health have increased and are a further challenge (Diderichsen, Andersen et al. 2011, Olejaz M 2012). Moreover, Denmark has an aging society leading to increase in need for health care among these elderly people (population 80+ years: 2,77 % in 1980; 4,11 % in 2011) (Diderichsen, Andersen et al. 2011, Olejaz M 2012).

Organization

The Danish Welfare state belongs to the group of universalistic welfare states (Esping-Andersen 1990, Esping-Andersen 1999). That means that all Danish citizens regardless their labor market position are covered by the Danish health care system and have equal access to the public health care system (Bambra 2005). Denmark is a small high-income country with a high population density and a demographic development similar to other western European countries. It is a parliamentary democracy, divided into three different administrative levels: the state, the regions, and the municipalities. The health system is fairly decentralized, with the responsibility of public health and health care placed at local levels (regions and municipalities) (Olejaz M 2012).

In 2007, a structural reform of public sector was implemented. This lowered the number of regions from 14 to 5 and the municipalities from 275 to 98. The reform also introduced a new distribution of responsibilities for public health and health care work, and statutory collaboration between municipalities and regions was established in the form of mandatory regional health care agreements covering issues such as coordination of treatment, prevention, discharge and rehabilitation (Andersen and Jensen 2010, Olejaz M 2012).

Today, the state is responsible for national information campaigns and for approving the health care agreements made between regions and municipalities. The regions are responsible for all treatment of diseases/conditions and for rehabilitation performed during hospitalisation, and the municipalities are responsible for all public health work besides this (Andersen and Jensen 2010, Olejaz M 2012). In the next paragraph, the role and responsibilities of the municipalities will be elaborated.

The role of municipalities

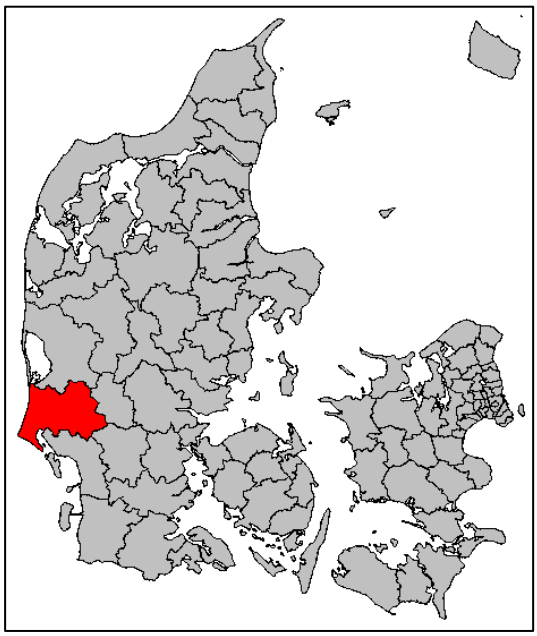
The Danish municipalities' responsibility for all public health work taking place outside hospitals means that the municipalities need to provide disease prevention as well as health promotion and health protection for the citizens. The Danish Law for Health (Sundhedsloven 2010) gives some of the tasks and other tasks are to be prioritized by each municipality. The by law given tasks are: rehabilitation, home nursing, dental care for children and youth up to 18 years, preventive measures for children and youth, and prevention and supervision in relation to alcohol consumption and drug use (Sundhedsloven 2010). Besides this, every single municipality can implement the public health interventions most needed in their respective settings. Hence, a lot of public health work in the form of disease prevention, health promotion and health protection activities are taking place in the municipalities, and municipalities are facing challenges in relation to prioritisation, intervention planning and implementation (Aarestrup, D. et al. 2007). Local Government Denmark, an association of Danish municipalities, suggested that all municipalities should develop a health policy as a tool for dealing with public health work. Most municipalities (app. 73 out of 98) have followed this recommendation and have developed an intersectoral health policy as a guiding framework (Aarestrup, D. et al. 2007).

Varde Municipality has served as the case setting for considerable parts of the research carried out in relation to the thesis (papers 2-4). In the next section, more details about the organisation of public health work, population characteristics and the intersectoral health policy in Varde Municipality will be presented.

Public health work in Varde Municipality

Demographic information

Varde is a municipality in the Region of Southern Denmark on the west coast of the Jutland in southwest Denmark. In terms of geographical area, Varde Municipality is the fifth largest municipality in Denmark with an area of 1255.79 km2. January the 1st 2011 the municipality had a population of 50 351 (Varde 2013).



Source: http://da.wikipedia.org/wiki/Varde_Kommune

Political and administrative organisation

The City Council consists of 25 elected members. Most of these members are affiliated with the centre-right Liberal Party "Venstre" (n=13). Other parties represented are: the Social Democratic Party (n=5), the Conservative People's Party (n=2), the Socialist People's Party (n=2), the Local Party (n=2) and the Danish People's Party (n=1). All members of the City Council are elected for a four-year period, meaning that current councilors serve for the period from 1 January 2010 until 31 December 2013 (Varde 2013).

Most of the City Council's work takes place in six different political committees in which selected politicians meet once a month; the committees are presented in Figure 1 in paper 2. Each committee has decision-making power for the matters, which are within the scope of the municipal statutes. Often decisions are first discussed in committees and then subsequently discussed and decided upon in the city council (Varde 2013).

The administrative and operating work of the municipality is organized with a flat structure containing four sector managers and supporting employees, independent administrative units and a number of operating units (Varde 2013). The four sectors in the municipality are presented in Figure 2 in paper 2.

Public health status

A health profile shows that 86.1% of citizens of Varde consider their own health as excellent, very good or good (Christensen, Davidsen et al. 2010). According to this profile it is estimated that approximately 4500 citizens of Varde have a bad perceived physical health status and 2800 have a bad perceived mental health status. Furthermore, there is an inequality in health status with more poor health status and higher exposure to risk factors among less-educated persons and persons of other ethnicity than Danish (app 2.7 % of the population) (Christensen, Davidsen et al. 2010). Information on further basic health-related conditions is provided in Table 4.

Table 4: Basic health related conditions in the population of Varde Municipality

Health related condition	**Percentage of population**
Diseases	
Feel stressed	8.1
Have a prolonged disease	30.7
Have elevated blood pressure	18.4
Have diabetes	5.0
Have a chronic lung disease	4.0
Felt pain or discomfort within the last two weeks	32.8
Sick leave	
Took sick leave within the last two weeks	11.9
Had a prolonged sick leave within the last year (more than 25 days)	3.2
Health behavior	
Belief that own efforts have influence on health status	7.3
Daily smoking	20.7

Heavy smoking (15 or more cigarettes per day)	10.5
Exceeds the limits for recommended alcohol intake	6.7
Unhealthy diet	15.8
Sedentary lifestyle	14.0
Severe overweight (BMI>30)	14.3
Visited a GP within the last year	74.2
Social networks	
Seldom or never in contact with family	6.2
Seldom or never in contact with friends	6.3
Often alone without wanting to be	4.4
Never or almost never someone to talk to in case of any problems	3.8

(Christensen, Davidsen et al. 2010)

Intersectoral health policy in Varde

This paragraph will describe development of an intersectoral health policy in Varde Municipality and explain the content of the policy.

Preparation of an intersectoral health policy in Varde Municipality was launched during summer 2007. In June 2008 the City Council of Varde Municipality approved the final version of the intersectoral policy, which was valid for the period 2008-2012 (Varde 2008).

The health policy in Varde Municipality is formulated with the starting point in the World Health Organization's definition of health recognising a need for a broad definition of the term to show the importance of involving all sectors (WHO 1948). The main objective of the policy is to provide a framework for improving health and quality of life and to make the "healthy choice" the easy choice for all citizens (Varde 2008). The main approach is intersectoral action with a focus on getting health into all policies as later recommended in the Adelaide statement (WHO and Australia 2010).

The first part of the health policy document presents the legal background for the policy, clarification of concepts, and data on the state of health of citizens in Varde. The second part of the health

policy presents ten priority areas with strategic goals and indicators for the policy; these are shown in Table 1 in paper 2. Most of the areas are related to prevention of non-communicable diseases with a focus on diet, smoking, alcohol and physical activity, and to specific targets groups such as children and youth, ethnic minority groups, persons with disabilities, and persons with mental health conditions. The priority areas set the scene for future intersectoral interventions targeting public health work. It is recognised that special effort is needed in relation to special target groups and the policy sets up recommendations on the development of interventions taking into account the needs of different target groups. These might include special conditions for physical exercise by ethnic minority women who (for cultural reasons) cannot use a shared changing room or providing diet recommendations taking their traditional food habits into account. It could also be physical exercise for youngsters in wheelchairs or exercise in small groups for persons with mental health problems (Varde 2008).

Following this clarification of the practical context of the research, an overview of data and methods used will be provided in the next section.

Materials and methods

In this chapter the materials and methods used in the thesis will be presented, explained, and justified. Firstly, the ethical considerations in relation to the study will be given. Secondly, an overview of data and methods used will be provided in Table 5. Thirdly, the central research methods will be presented, and finally the data and methods of each paper will be handled in separate sections. Discussion of the strengths and limitations of the studies will be provided later in the discussion chapter.

Ethical considerations

According to guidelines provided by the Danish Data Protection Agency (Datatilsynet 2013), no ethical approval was needed for this study since no sensitive data was collected or analysed.

Since practice sector (Varde Municipality) invested a lot of time in providing data and contributing to the development of the research, it was found ethical correct to provide immediate and usable products for this municipality. Hence, several non-publishable reports relevant for practice work were written and explained.

Overview of data and methods used in the four papers

The table below summarises the aims, methods, data, and study periods for the four papers.

Table 5: Overview of aims, methods and data in the four papers

	Paper 1	Paper 2	Paper 3		Paper 4
Aim	To investigate how and on which level evidence is used in policy processes related to local public health work in Denmark	To build up evidence on intersectoral action for health at local government level in Denmark	To develop a set of criteria for assessing types of public health interventions in Danish municipalities	To test the developed assessment criteria on a selected municipality	To analyse the use of knowledge and inclusion of stakeholders in three different public health interventions at local government level in Denmark
Method	Electronic questionnaire	Case study	Mixed methods		Case study
Data	Responses to the questionnaire from 81 % of the study population	App. 500 pages of documents including minutes of meetings and working papers from the time period of 2007-2011 + information from semi-structured interviews with 9 key stakeholders	Literature synthesis + Interviews with 9 key informants from practice sector + focus group discussion with PhD students within public health + questionnaire to public health experts from research	Information on 154 public health interventions in case municipality	App. 300 pages of documents including minutes of meetings and working papers from the time period of 2007-2012 + information from semi-structured interviews with 4 key stakeholders
Study period	Data were collected during summer 2007 and analysed in the period 2007-2010	Data were collected during spring 2011 and analysed in the period 2010-2012	Data were collected during 2009-2011 and analysed in the period 2010-2012		Data were collected in winter 2012 and analysed in the period 2012-2013

In the next section the main study methods in the thesis will be described. These are: mixed methods, case study and content analysis.

Central research methods

Approaching this thesis as an overall study - with the aim of investigating the use of evidence and intersectoral collaboration in local public health work - consisting of four individual but interlinked

sub-studies, the concept of mixed methods was used for collection of the total amount of data. In paper 1, the method used for collecting data was an electronical questionnaire consisting of primary quantitative measures but also some qualitative measures. In papers 2 and 4 the case study method was used for collecting data. Paper 3 was a mixed method study within itself since various methods where used for the collection data; review of knowledge from former research, questionnaires, focus group discussion, and mapping of interventions reported in a questionnaire. In the following paragraphs the methods used for the collection of data will be described and reflections on the use of the methods will be given. The description will start by introducing the concept of mixed methods and how it was used in the thesis. Since the case study method and content analysis were used in both papers 2 and 4, the concept of these methods will also be introduced. Afterwards, the specific and concrete methods used for the collection and analysis of the data in papers 1-4 will be presented in separate paragraphs.

Mixed methods as the overall method for the thesis

By using both quantitative and qualitative research methods to investigate the overall aim of this thesis, it can be justified that the overall method is a "mixed methods" approach. This approach is also called "multi-dimensional methods", "combined methods", and "multi-strategy methods" (Johnson and Onwuegbuzie 2004, Freshwater 2006, Padgett 2011). Due to the fact that the author of this thesis is educated within public health science, the use of both qualitative and quantitative methods was perceived as a natural way of doing research, and the author is trained to consider the advantages and challenges of combining methods in studying various research questions.

Generally, the literature on mixed methods has highlighted two overall objectives: 1) to validate findings, and 2) to gain a more adequate and comprehensive understanding of the phenomenon under study (Caracelli and Greene 1997, Johnson and Onwuegbuzie 2004, Freshwater 2006, Padgett 2011). The overall purpose of mixing methods in this thesis was to gain a more comprehensive understanding of the use of evidence and intersectoral collaboration in local public health work. This area of research can be seen as a complex phenomenon; hence it was found relevant to include both quantitative and qualitative research methods to gain a broader understanding of the phenomenon. When mixing methods for the purpose of obtaining a fuller picture of the phenomenon under study, different methods and perspectives are combined to shed light on different aspects of the phenomenon. For example, the purpose can be complementarity and thus, the use of different methods to supplement each other by letting the findings of one method help clarify the findings of another method (Caracelli and Greene 1997, Bryman 2006, Padgett 2011). In other cases, the rationale be-

hind mixing methods can be to expand the range of the investigation by using different methods to investigate different aspects of a problem or study subject (Caracelli and Greene 1997, Bryman 2006, Padgett 2011). In this thesis, the rationale for using mixed methods was the latter one; since different methods were used to explore different aspects of the complex phenomenon of use of evidence and intersectoral collaboration in local public heath work.

There are different degrees, levels and ways of mixing quantitative and qualitative methods (Padgett 2011). In this thesis, the methods were used sequentially (Stewart, Makwarimba et al. 2008, Padgett 2011), meaning that the findings of papers 1 and 2 informed some of the investigation areas of papers 3 and 4, and the findings of paper 3 also informed the investigation area of paper 4.

The case study as a research method

The case study method was a central research method in this thesis, used in both papers 2 and 4. Researchers have used the case study research method for many years across a variety of disciplines (Flyvbjerg 2006). The case study research method can be defined as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used" (Yin, 1994, p. 13). Hence, case studies emphasize detailed contextual analysis of a limited number of events or conditions and their relationships (Yin 1993, Yin 1994, Yin 1998).

Case studies can be descriptive or explanatory (Yin 1993, Yin 1994, Yin 1998). The case studies performed in this thesis are seen as both descriptive and explanatory. They are descriptive in the way that they aim at *describing* the way of working with public health in the case setting, and they are explanatory in the way that they try to *explain* why this work is difficult. In paper 2 the aim of the case study is to provide knowledge on intersectoral collaboration and in paper 4 the aim is to provide knowledge about the concrete use of different types of evidence and inclusion of various stakeholders. Both studies describe practices and identify facilitators and barriers for collaboration and for the use of evidence; hence they try to explain the complexity of the described work.

Case studies can be prospective (in which criteria are established and cases fitting the criteria are included as they become available) or retrospective (in which criteria are established for selecting cases from historical records for inclusion in the study) (Yin 1993, Yin 1994, Yin 1998). The case studies in both paper 2 and 4 are retrospective since they investigate working processes that started

before conducting the case study and because of that, data included in the studies could be seen as historical.

Content analysis as an analysis method

Content analysis is a research method used to determine the presence of certain words or concepts within a text or a set of texts. Researchers analyse the presence, meanings and relationships of such words and concepts, then make inferences about the messages within the texts, the writer(s), the audience, and even the culture and time of which these are a part. Texts are defined broadly as for example books, book chapters, essays, interviews, discussions, newspaper headlines and articles, historical documents, speeches, conversations, advertising, informal conversation, or really any occurrence of communicative language. To conduct a content analysis on any such text, the text is coded, or broken down, into manageable categories on a variety of levels: word, word sense, phrase, sentence, or theme, and then examined using one of content analysis' basic methods: conceptual analysis or relational analysis. In this thesis, conceptual analysis was used. This means that data was reduced using a coding system and facilitated identification of specific words or patterns that were indicative of the research questions.

Following this justification for use of mixed methods as an overall approach to the thesis, for the case study method used in paper 2 and 4, and for content analysis as a methods used for analysis in paper 2 and 4, the single and concrete methods used for data collection and analysis in each of the four papers will now be elaborated. The details of each sub-study's materials and methods are also provided in the individual papers in appendix. However, in the following section reflections that could not be presented in the papers will be given. The presentation of methods and materials will be structured as follows: Firstly, the general perspectives of the methods and materials will be provided, and secondly the methods used for working with the single research questions for each sub-study will be presented.

Paper 1 - methods

The overall aim of paper 1 was to form a basis for, and obtain knowledge about, the first part of the thesis' study area: use of evidence in local public health work in Denmark, since no evidence on this issue was present. This was done using an electronic questionnaire consisting of primary quantitative

measures supported by some qualitative measures. The questionnaire was developed and administered via the software 'Relationwise'.

The sub-study was carried out in all Danish municipalities (n = 98) in May 2007 using the managers of municipal health administrations as respondents. A fairly high response rate was obtained (81 %). This may be explained by the fact that a telephone call was made to all respondents before sending out the questionnaire. In this telephone call, the aim of the investigation was briefly explained and the appropriate respondents were identified.

Design of the questionnaire

In paper 1 in the Appendix the details on the contents of the questionnaire are given. In summary, the questionnaire contained questions in following categories:

1. The health managers' understanding of the concept of evidence: eight statements were presented and the health managers were asked to estimate their level of agreement
2. Consistency between the health managers' understanding of the concept of evidence and a presented definition
3. Level of evidence use in three parts of the policy process (prioritisation, planning and implementation)
4. Municipality characteristics with possible association to the use of evidence: 1) health managers' educational background, 2) size of municipalities, 3) level of emphasis on the use of evidence from health managers, 4) level of emphasis on the use of evidence from political management, 5) level of evidence capacity in health administrations.
5. Future use of evidence: desire for greater use of evidence, desire for generation and publication of evidence in future, and perceived barriers and facilitators for these or these.

A definition of evidence in relation to public health work was presented in the questionnaire. This definition (also presented in the theoretical framework) was adopted from work done by the National Board of Health in Denmark (Skovgaard et al. 2008) and it reads: "Evidence in public health includes both research-based knowledge (e.g., results of research studies) and non-research-based knowledge based on scientific methods (e.g. meta-analysis, evaluation reports and quality assurance systems). Evidence can be classified into three categories: Type I: Descriptions and analyses of the determinants of health and disease and their distribution. Type II: Assessments of the relative effectiveness of interventions. Type III: Accounts of the best possible design and implementation of interventions in specified contextual circumstances".

For questions in category 1-3 and partly category 4 (no 3-5), a seven-point Likert item scale was used (1 = not at all, 7 = to a great extend). In combination with this, yes/ no/do-not-know categories, and open questions were used. The open questions provided qualitative data such as written statements from the respondents to support their quantitative answers.

Testing of the questionnaire

The questionnaire was tested in several steps. Firstly, the questionnaire was tested by four relevant professionals from the public health field who were not included in the study population. The aim of this testing was to identify any missing components and/or any included but irrelevant components. The questionnaire was adapted according to the comments.
Secondly, the questionnaire was tested on four respondents from the study population. The aim of this testing was to find out if the questions were understandable and clear to the target group. Subsequently, adjustments were made and the group of professionals tested the final questionnaire again. The aim of this final testing was to make sure that the adjustment made after the second round of testing did not influence the scientific level of the questionnaire.

Data analysis

The statistical software STATA was used for the analysis of the data. The seven-point Likert item scale answers were grouped: 1, 2 = not at all; 3, 4, 5 = neutral; 6, 7 = to a great extent. This merging of answers was done to make sure that all categories contained an acceptable number of people and to increase the visibility of tendencies.

For working with research question 1 (how do municipal health managers understand the concept of evidence?) a simple column diagram was produced illustrating the distribution of respondents' level of agreement in eight proposed statements on the concept of evidence. Furthermore, the respondents' agreement with the proposed definition of evidence in relation to public health work was measured using the Likert item scale as explained above.

For working with research question 2 (to which level is evidence used when prioritising, planning and implementing public health work in the municipalities?) the respondents' answers for the three processes were measured separately also by grouping the answers on the Likert item scale as explained above.

For working with research question 3 (which contextual factors have an association to the level of evidence use), the respondents' answers concerning the municipal characteristics were first grouped as described above (for characteristic 3-5). Following this, the association between municipality characteristics and the level of evidence use was calculated using Kendall tau rank correlation coefficient and corresponding p values.

For working with research question 4 (what are the intentions for future use and production of evidence in municipal health administrations?) a simple table showing the distributions of yes/no/do not know categories of answers was developed.

For working with research question 5 (what do the health managers perceive as barriers and facilitators for future use of evidence?) the qualitative answers provided to the open questions were summarized and categorised.

Paper 2 - methods

The overall aim of paper 2 was to form a basis for and obtain knowledge about the second part of the thesis' study area: use of intersectoral collaboration in local public health work in Denmark, since no evidence on this issue was present. As explained earlier, this was done using the case study as a research method.

Case identification

Varde Municipality was chosen as a case. The choice of the case was based on the fact that the municipality was developing and implementing an intersectoral health policy, because of an already established collaboration between the municipality and the author of this thesis, and because of the fact that Varde Municipality supported the conduction of the thesis.

Data collection and analysis

The case study was carried out during spring 2011. The author of this thesis contacted employees of the municipal health department in Varde Municipality and asked them to provide in-depth information on the process of development and implementation of the intersectoral health policy and to provide access to documentation.

For working with research questions 1 and 2 (1. what were the key actions in development phase?; 2. what were the key actions in implementation phase?), the following data collection and analysis strategy was used: Using the internal document system of the municipality, approximately 500 pages of documents from the time period of 2007-2011 including minutes of meetings, working papers, newspaper articles etc. were identified and found relevant to include in the case study. Three persons carefully and systematically reviewed the documents individually (the first, third and fourth author of the paper 2) and analysed the contents using content analysis, as justified earlier. A coding system was used to code all indications of intersectoral collaboration and actions in relation to internal meetings, public information and general project planning. After the individual coding, comparison was made and a final coding was agreed on.

For working with research questions 3 and 4 (3. what were the main challenges for intersectoral collaboration?; 4.what were the main facilitating factors for intersectoral collaboration?), semi-structured interviews were carried out with nine stakeholders/key informants representing all sectors involved in developing and implementing the intersectoral health policy. These informants were selected based on their participation in the development and implementation of the health policy. The informants are presented in Table 6.

Table 6: Positions and affiliations of the informants in paper 2

Position	**Affiliation**
Mayor	Head of City Council
Politician	Head of Committee for Social affairs and Health
Manager	Finance and Personnel
Manager	Children and Youth
Consultant	Planning, Culture and Technique
Manager	Social affairs and Health
Student assistant	Social affairs and Health
Consultant	Social affairs and Health
Consultant	Social affairs and Health

Two persons did the interviews (the first and third author of paper 2). The first author did the interviewing and the third author took notes during the interviews. Each interview was carried out in a municipal office and lasted from 30 minutes up to one hour. The interviews were recorded and a comprehensive written resume of each interview was made. Data were again analysed with content analysis and by using a coding system. All comments concerning challenges and facilitators related to the intersectoral collaboration were marked. In addition, comments on key actions and organisation of collaboration in the development and implementation phase of the intersectoral health policy were marked.

Paper 3 - methods

The overall aim of paper 3 was to develop and test a set of criteria for assessing public health activities in a municipality to support the overview of activities and hence facilitate the use of evidence and intersectoral collaboration. The starting point was taken in the theoretical model of types of public health work (Bauer, Davies et al. 2006) identifying four types: Health Promotion, Health Protection, Disease Prevention, and Health Care. Several methods were used in this paper as the aim was twofold: developing and testing. Because of that, the mixed methods approach was used in this sub-study. The research method was used in a sequential way, because the use of one method led to the use of another in a continuing development of the research carried out.

Case identification

Varde municipality was chosen as the test setting since collaboration with this municipality had already been established and the analysis of the public health work in the municipality was already going on.

Data collection and analysis

For working with research question 1 (how can a set of assessment criteria for the four types of public health work be developed?), a comprehensive synthesis of knowledge from research, interviews with key informants, a focus group discussion and a questionnaire administered to experts via e-mail, was carried out. Firstly, an exploratory study among the key informants working with public health at all organizational levels in Denmark (five informants from the municipal level representing different sectors, one informant from the regional level representing the health sector, and three informants from the state level representing the health sector) was completed. Informants were in-

terviewed (by the third and fourth author of paper 3) and were asked to explain how they interpreted the four types of public health work. The results of this sub-study were published as a paper in itself (paper 6). Secondly, a synthesis of knowledge from research was conducted to identify definitions or characteristics of the four types of public health work and to identify a relevant model for assessing the types. Thirdly, based on findings from the interviews and knowledge synthesis, a set of criteria describing four dimensions (approach, priority population, focus, methods) of each type of public health work (Health Promotion, Health Protection, Disease Prevention, and Health) were developed. The contents of the criteria were discussed via focus group discussion at a seminar for PhD students within the field of public health. Comments and recommendations from this focus group discussion were incorporated into the criteria. Finally, the contents of the criteria were tested using an electronically administered questionnaire to the members of the international EIRA network (University of Southern Denmark, 2011). Comments made via the questionnaire were incorporated in the final set of criteria.

For working with research question 2 (how can the public health activities taking place in Varde Municipality be assessed using the developed criteria?), the data collection was performed followed by an assessment of the reported data using the developed criteria. For the data collection, a template to describe public health interventions was developed. It contained questions on: name of the intervention, priority population, setting, actions and objectives/goals. The template with guidance notes was sent to all departments of Varde Municipality in spring 2009. They were asked to complete one template for each of their public health related interventions taking place from the day they received the information in the following three months. Assistance with the completion of templates was offered whenever questions occurred. After the three months of reporting public health interventions, all completed templates were collected. To validate the data collection, the municipal budget was browsed to see if any interventions were mentioned here, but not reported. No additional interventions were identified. Based on the developed criteria, three persons (the first, second and fourth author of paper 3) individually carried out the assessment of all the reported public health interventions into the four categories using the developed assessment criteria. Results of the three assessments were compared and any inconsistencies clarified via discussion. A short description of the reasons for inconsistency and for the final agreement was noted.

Paper 4

The overall aim of paper 4 was to get more detailed insight into the use of knowledge and inclusion of stakeholders in three different types of public health work at the local government level in Denmark and to discuss possible strategies for improving the use of evidence from research. As explained earlier, this was done using the case study as research method (using document analysis and interviews) and content analysis as the method of analysis. The sub-study was carried out with the starting point in the conceptual model of the various types of knowledge and contextual factors influencing public health work (Satterfield, Spring et al. 2009). Thus, this model guided the coding of the documents and the areas of discussion in the interviews.

Case identification

Varde municipality was chosen as the case since the assessment of public health work carried out in this municipality in relation to paper 3 formed the basis for the selection of the interventions for analysis in this sub-study. Interventions for the analysis were identified using the following criteria:

1. One intervention from each category (Health Promotion, Health Protection, and Disease Prevention) should be chosen (to ensure for inclusion of each type of public health interventions).
2. The intervention periods should be of more than one month (to ensure for a certain amount of intervention content).
3. The intervention should have a potential for intersectoral collaboration (to ensure for the possibility of inclusion of different stakeholders).

The list of all public health interventions was reviewed using these criteria. In the Health Promotion category three interventions met the criteria, in the Health Protection category one intervention met the criteria, and in the disease prevention category two interventions met the criteria. From this, interventions with different aims and targets groups were chosen for the analysis to strengthen the possibility of getting most diversity in the results. The following interventions were chosen for analysis:

- Health Promotion: "Time out"; an intervention aiming at improving well-being among youngsters

- Health Protection: "Traffic Safety Plan"; an intervention aiming at providing a safe traffic environment
- Disease Prevention: "Step by Step"; an intervention aiming at preventing diseases among overweight persons via exercise and nutrition guidance.

Data collection and analysis

The case study was carried out during winter 2012. The author of this thesis contacted the relevant employees in Varde Municipality and asked them to provide access to in-depth information on the three interventions and to participate in interviews. Using the municipality's internal document system, all relevant documents on the three interventions were identified and filed. These documents included meeting minutes, working papers and intervention plans. In addition, semi-structured interviews were carried out with the persons responsible for planning and implementing the interventions under investigation (three persons in total). The author of this thesis carried out the interviews, which took place in a municipal office and lasted about one hour each. Interviews were recorded and transcribed.

The documents were analysed using content analysis as explained earlier. The document analysis was performed before carrying out the interviews, which made it possible to discuss and further elaborate findings from the document analysis during the interviews. To provide the basic information on the three interventions under the analysis, the documents were first reviewed for identifying descriptions of the interventions' contents including aim, intervention period, method(s) and evaluation plans. Furthermore, this information was discussed and details were uncovered during the interviews.

For working with research question 1 (which kind of knowledge was used for working with three different public health interventions?), following indications of knowledge use were coded based on the various types of knowledge described in the conceptual model: 1) search for and use of best available research evidence; 2) search for and use of population characteristics, state, needs, values, and preferences; and 3) search for and use of resources including practitioner's expertise. In addition, the findings were discussed and elaborated during the interviews.

For working with research question 2 (which kind of stakeholders were included in the planning and implementing the three different public health interventions?), the documents were reviewed and

coded for indications of inclusion of various stakeholders in planning and implementing the three different public health interventions. In addition, the finding were discussed and elaborated during the interviews.

For working with research question 3 (what were the barriers and facilitators for use of evidence from research?), perceived barriers and facilitators in searching for and using evidence from research were discussed during the interviews.

Potential strategies for future improvement of the use of evidence from research were discussed based on the knowledge from current literature.

Results

In this chapter the results of the study will be presented. The results of papers 1-4 will be presented separately and will be structured according to the research questions related to the papers.

Paper 1 - results

Understanding of the concept of evidence

A large variation in perception of the concept of evidence was found among the health managers in municipal health administrations in Denmark. Figure 1 in paper 1 in the Appendix presents an overview of the level of agreements in eight statements about the concept of evidence.

Health managers reported most agreement with statement 3 (evidence can be results of evaluation reports, literature reviews, monitoring and quality assurance systems constructed with use of scientific methods) (n = 55; 70%) and statement 8 (evidence is derived from both quantitative and qualitative studies) (n = 54; 68%). Relatively fewer health managers expressed that statement 1 (evidence is knowledge solely derived from randomised controlled studies) (n = 18; 23%) and statement 2 (evidence is knowledge solely derived from other kinds of research based studies) (n = 19; 24%) matched their own perception of the concept of evidence.

When asked to assess to what extent the presented definition of the concept of evidence was consistent with health managers' own perceptions of evidence, 80% responded "to a great extent" (6 and 7 of Likert scale), 18% responded in the neutral category (3, 4, 5 of Likert scale), while only 3% answered "not at all" (1, 2 of Likert scale). However, several health managers commented that they - and their work places - are not explicitly aware of how they understand the concept of evidence.

Level of evidence use

The health managers reported following levels of evidence use in relation to the three stages of policy making in local public health work (priority setting, planning and implementation of interventions):

- In relation to prioritisation (selection of areas/issues to intervene in) 44% responded "to a great extent" (6 and 7 of Likert scale), 54% responded in the neutral category (3, 4, 5 of Likert scale) and 1% answered "not at all" (1, 2 of Likert scale).

- In relation to planning (designing the intervention) 48% responded "to a great extent" (6 and 7 of Likert scale), 51% responded in the neutral category (3, 4, 5 of Likert scale) and 1% answered "not at all" (1, 2 of Likert scale).
- In relation to implementation (organising how to put the intervention into action and maintaining activities) 42% responded "to a great extent" (6 and 7 of Likert scale), 47% responded in the neutral category (3, 4, 5 of Likert scale) and 1% answered "not at all" (1, 2 of Likert scale).

Conditions with possible association to use of evidence

Table 1 in paper 1 presents correlations showing the association between various municipality characteristics and the level of evidence use in determining priorities, planning interventions and implementing interventions. Following statistically significant correlations were found:

Correlation between the level of use of evidence in prioritisation between interventions and

- health managers' level of emphasis on evidence use (correlation coefficient: 0.272, p-value 0.006)
- Political desire for evidence use (correlation coefficient: 0.226, p-value 0.017)

Correlation between the level of use of evidence in planning interventions and

- political desire for evidence use (correlation coefficient: 0.262, p-value 0.006)
- evidence capacity (correlation coefficient: 0.257, p-value 0.007)

Correlation between the level of use of evidence in implementing interventions and

- political desire for evidence use (correlation coefficient: 0.193, p-value 0.038)
- evidence capacity (correlation coefficient: 0.264, p-value 0.005)

No statistically significant correlation was found between any of the uses of evidence and

- health managers' educational background
- size of municipalities.

Future use of evidence

Table 2 in paper 1 presents the presence of political and administrational desire for more use of evidence in the future as well as desire for generating and publicising evidence through evaluation of

municipal initiatives and interventions within public health work. The results showed that the most of the health managers perceived that the municipalities' politicians and administrators wanted to use more evidence in the future. Thus 76 % reported a political desire for more use of evidence in the future (11 % reported no desire for this and 13 % reported that they did not know if there was such a desire) and 79 % reported an administrational desire for more use of evidence in the future (11 % reported no desire for this and 10 % reported that they did not know if there was such a desire). Furthermore, 80 % of the health managers reported an intention to contribute to development of evidence in the future (10 % reported no intention for this and 10 % reported that they did not know); 68 % of the health managers reported that they were already doing evaluations of local public health work (17 % reported that they did not and 15 % report that they did not know), however only 59 % of these evaluations have been published on for example the municipalities webpages (17 % reported that they have not been published and 24 % that they did not know).

Facilitators and barriers for the use of evidence

Several health managers used the open questions in the questionnaire to explain barriers for the use of evidence and to propose actions with potential for increased use of evidence. The barriers reported were all related to the lack of access to evidence and lack of time and skills to identify and apply evidence. The proposed actions for promoting the use of evidence consisted of more time, more staff and recruitment of resource persons to facilitate evidence use. Several health managers also suggested education and upgrading the skills of employees as crucial actions for increased evidence use. Collaboration among municipalities and with research institutions consisting of knowledge exchange and advising were also mentioned as actions to increase the use of evidence. Finally, several health managers stated that national bodies could contribute to increase the level of evidence use by means of publication of guidelines and descriptions of best practice for evidence use.

Paper 2 - results

Key actions in the development phase of the intersectoral health policy

All sectors of Varde municipality (Figure 2 in paper 2) were involved in the development process of the health policy; a project group to steer project development was formed from a mix of managers and administrators. The main project leadership was placed in the Social Affairs and Health sector (hereafter "health sector"). Employees of this sector did most of the background analysis and writing; other sector employees contributed at meetings, commented and approved drafts of the policy.

According to the informants, the main reason for developing the intersectoral health policy in Varde was the public sector reform. The health sector suggested making the policy intersectoral due to the fact that many social, economic and environmental determinants of health pertain to other sectors. The document analysis and interview process revealed that the involvement of other sectors from the beginning was triggered by the assumption that employees from other sectors would feel more ownership of the policy if they took part in developing it. Moreover, all sectors would get the opportunity to form the policy in a way that would fit their existing sector policies.

A public meeting was organized to get inputs from the citizens, and the results of a local health profile assessment were analysed. Based on these inputs, the health sector employees formulated a draft, which the project group commented, giving special attention to the topics that involved their own sectors. The draft was also presented to all the political committees and all operating and administrative units of the municipality requesting inputs and comments. Moreover, the policy was accessible on the municipal webpage and citizens were encouraged to give comments. From 2 April to 19 May 2008 the project group received many statements from municipal employees, private companies, local institutions, sports associations, patient organizations and many other representatives of the citizens, including ethnic minority groups, persons with disabilities, and persons with mental health conditions.

Many statements pointed out that the policy was a comprehensive document, which led to production of an "easy-to-read" version. The City Council's Committee for Planning and Technique found a lack of prioritization between policy objectives and demanded a framework for follow-up of the intersectoral collaboration and projects. The City Council approved the policy in summer 2008, and an information brochure was formulated and delivered to all citizens.

Key actions in implementation phase of the intersectoral health policy

After the policy had been accepted by the City Council, the health sector employees mapped all health activities to highlight the importance of the involvement from all sectors, and to identify any possible gaps in the activities carried out. This mapping did not achieve the expected result due to the fact that many of the operating and administrative units did not see the importance of describing their health activities, did not find time to do so, or did not consider their activities as health-related. At the same time, it was difficult to convince the project group to take action on implementation of the policy. This led to a shift in process; the project group was given the responsibility to set the agenda and the health sector employees served as facilitators. From October 2009 to March 2011,

the project group has convened on a regular basis to formulate an implementation strategy and to support its implementation.

One of the concrete outputs towards the end of the implementation process was the establishment of a "Fund for Health", with an initial amount of DDK 1,000,000 (app US$ 200,000) to support intersectoral health projects. The fund awards grants to intervention proposals on an annual basis. All operating and administrative units could apply for funding. As the criteria, projects had to be carried out in collaboration between at least two sectors. Another concrete output of the implementation strategy discussions was the formation of "Health Networks". The aim of these networks was to disseminate knowledge from the project group to all units in the municipality and to facilitate collaboration across sectors.

Main challenges identified

The following challenges for intersectoral collaboration in developing and implementing the intersectoral health policy were identified:

- The municipal structure with vertical sectors:
  This type of sector organisation meant that each sector manager had the responsibility for their own sector; targets, budgets and outcomes were all set and measured within this vertical silo. Therefore sector managers did not necessarily have the incentive to take care of intersectoral issues such as health.
- The health policy was perceived as an extra task:
  Employees of other than health sector felt that they had to give priority to health at the expense of other important issues. On the other hand, informants from the health sector felt that other sectors did not involve themselves in the development of the policy as much as expected. Sector representatives thus appeared to have uneven expectations and ambitions towards the policy.
- Lack of funding:
  There was no funding directly allocated to implementation of the health policy until the "Fund for Health" was established. Because of this, resources had to be taken from elsewhere and that caused frustration.
- Lack of ownership to the policy:
  The organization of the project group was changed over time, complicating development of ownership feelings.

- Lack of clear objectives in the policy and lack of baseline measures:
  Managers were used to working in a goal oriented rather than a process oriented manner. Some of the stated objectives in the policy were difficult to follow up mainly due to the fact that there was no baseline information.
- Lack of active involvement of politicians and the community throughout the process;
  It was difficult to maintain active involvement of the politicians and the community in implementation of the health policy. A challenge was to find the right channels for keeping political and public attention.

Main facilitators identified

The following facilitators for intersectoral collaboration in developing and implementing the intersectoral health policy were identified:

- Political support:
  It was particularly important in the development phase, where local politicians had an active role in discussing and enhancing improvements to the policy document. Unfortunately, the political attention seemed to slightly recede during the implementation phase.
- Involvement of community:
  Ensuring public involvement and participation by inviting citizens, patient associations and civil society organizations to a dialogue meeting was a facilitator. At this meeting a platform for future work with the intersectoral health policy was created. At the development stage, the draft policy was also accessible on the municipal webpage, where the citizens had the possibility to comment on it. In the implementation phase the public involvement decreased and became more of an one-way communication of information from municipality to citizens.
- Collaboration with local media
  Local media was used to disseminate information about the policy. Media coverage was very important for the image of the policy and has introduced municipal employees as well as citizens to the complexity of the term "health" and "what health is/what health includes".
- Actions taken during the process of implementation:
  The two specific outputs of the intersectoral health policy were establishment of the "Fund for Health" and the "Health Networks"; both of which played a significant role to improve chances of successful policy implementation. The Fund for Health - through which funding for intersectoral projects was given - was a tangible motivation for the different sectors to

collaborate and find intersectoral solutions. Moreover, the stakeholders expected that the newly established Health Networks would play an important role in promoting intersectoral action for health, because members of the network should ensure that information is diffused throughout their respective sectors. This may increase awareness of which interventions are related to health, and initiate collaboration between sectors in future.

- Collaboration with research:
  Several stakeholders stated that collaboration with researchers had provided the policy more visibility and a higher priority in the municipality.
- Intersectoral project groups:
  By getting employees from different backgrounds together in dialogue meetings or in project groups, common issues between sectors were revealed. This would not necessarily be easy to achieve in a traditional municipality structure, which is laid out in a rather inflexible parallel or vertical formation.

Furthermore, it was proposed by the informants that having the HiAP approach accepted in all municipal sectors could enhance its use, as this would provide a clear mandate to engage in intersectoral collaboration.

Paper 3 - results

Development of assessment criteria for the four types of public health work

The knowledge synthesis resulted in the development of assessment criteria for the four types of public health work (Health Promotion, Health Protection, Disease Prevention, Health Care) divided into four dimensions: approach, priority population, focus and methods. The criteria are depicted in Table 1 in paper 3.

From the interviews, the main perception was that Health Promotion is a broad term, mainly focusing on healthy individuals and the establishment of settings to promote healthy ways of living. Several informants mentioned that resources and competences were essential in relation to health promotion. To most of the informants the term Health Protection was unknown. One informant found the term difficult to use in a Danish setting and felt that it was a paternalistic term. In contrast, several other informants perceived health protection – including restrictions and regulations – as very

relevant to promoting public health in the future. Disease Prevention was perceived as interventions aiming at reducing risk factors and preventing disease. However, most informants did not differentiate health promotion and disease prevention interventions. In relation to the term Health Care the informants agreed that this referred to treatment of disease or "repair" of an injury. Applying knowledge from research made it possible to add the theoretical issues underpinning the four terms; for example, the division of disease prevention into primary, secondary and tertiary disease prevention was added. Based on the comments from the focus group discussion and questionnaires it was possible to specify and finalize the criteria taking into account relevant theoretical and practical viewpoints.

Assessment of reported public health interventions in Varde Municipality

The respondents (n=40) from the departments in Varde Municipality reported a total number of 154 public health interventions. Reported public health interventions were stratified according to the following sectors: Social and Health (n=75); Children and Youth (n=73); and Planning, Culture and Technique (n=6). Most of the interventions were encapsulated in a one-sector approach, but a few (n=11) interventions were carried out in collaboration between two sectors. The interventions primarily focused on the priority areas defined in the health policy of Varde Municipality, with most emphasis on lifestyle related factors (nutrition, smoking, alcohol and physical activity, n=54) and on health issues of vulnerable groups (n=23).

Table 2 in paper 3 shows the result of categorizing interventions into the four different types of public health work using the assessment criteria defined in Table 1 in paper 3. This categorization shows that more than half of the interventions were using Health Promotion approach; around a third was using a Disease Prevention approach and the rest a Health Protection approach. This means that in total 57 % of the interventions were implemented within a salutogenic approach and 43 % of the interventions within a pathogenic approach. No interventions were categorized as health care as this was not a responsibility of municipalities in Denmark.

Table 3 in paper 3 shows the agreement and disagreement between the three persons carrying out the assessment exercise separately and comparison. Agreement was highest in relation to the Health Promotion interventions and more disagreement occurred with the Health Protection and Disease Prevention interventions. The reason for the disagreement in relation to Health Protection interventions was primarily related to different understanding of whether the interventions used methods of a legislative or regulatory character. The reason for the disagreements in relation to the Disease Prevention was mainly related to the definition of the priority population and the method adopted. Once this was clarified, agreement could be attained.

Paper 4 - results

Description of the three interventions

Table 1 in paper 4 explains the aims, intervention periods, methods and evaluation plans for the three interventions. Given the fact that the interventions were of various types, these contents of the interventions were also very different. The Health Promotion intervention aimed at empowering a large group of youngsters to gain control over various life situations through guidance by a social worker. The Health Protection intervention provided a plan for increasing traffic safety for all citizens in the municipality through physical changes in roads and paths. The Disease Prevention intervention aimed at helping a group of overweight persons to gain a healthier lifestyle through education in healthy diet and physical activity (both theory and practice), hence preventing them to get ill because of overweight.

The effects of the interventions have not yet been evaluated; however, a process evaluation has been made of the Disease Prevention intervention. This process evaluation resulted in a decrease of mandatory gatherings, because the participants reported that not all gatherings were relevant for all of them.

Knowledge used in working with the three different public health interventions

Table 2 in paper 4 summarises the characteristics of the types of knowledge used in the three different interventions. The only intervention using best available research evidence was the Health Protection intervention. The evidence used was research on how to prevent traffic accidents by making physical changes in roads and paths. In the Disease Prevention intervention, guidelines developed by the National Board of Health in Denmark were used as basis information for developing the intervention. These guidelines were developed based on the evidence from research, so in that way evidence from research was indirectly used in this intervention as well.

In all three interventions knowledge about population characteristics was used. In the Health Promotion intervention, the information on wellbeing among high school students was derived from a national investigation and hence not specific for the intervention's target group. In the Disease Prevention intervention, both national and local data on prevalence of obesity were used as justification for implementing the intervention. The Health Protection intervention used information on previous traffic accidents in the municipality to identify priority areas for actions. In this intervention, the needs and preferences of the population were also taken into account since statements from citizens

concerning dangerous spots in traffic contributed to the prioritisation of the focus areas and target groups in the Traffic Safety plan.

The use of practitioners' expertise was very significant in the Health Promotion and Disease Prevention interventions. In fact, this kind of knowledge provided crucial input to how the two interventions were carried out. In the Health Promotion intervention, the practitioner expertise mainly came from the social worker in charge of the intervention. Her expertise was based on her main education as social worker and from her experiences in working with youngsters and the main issues associated to their wellbeing. Besides this, other practitioners (an abuse consultant and a psychotherapist) had provided their professional expertise in the development of the intervention. In the Disease Prevention intervention, the practitioner expertise was provided by the involved practitioners' experiences. This mainly included their professional education as nurses, dietician and physiotherapist and their respective experiences in working with obesity. In the Health Protection intervention there was no indication of use of practitioners' expertise, however in this intervention the available resources in relation to manpower and money were included in the intervention plan. This was not the case for the two other interventions.

Stakeholders included in working with the three different public health interventions

Table 3 in paper 4 displays the involved stakeholders in the three different public health interventions. In general, the interventions included various types of stakeholders from both inside and outside the municipal organisation. These were e.g. the target group of intervention, politicians and non-governmental organisations.

Barriers and facilitators for the use of evidence from research

Results from interviews showed that the perceived barriers and facilitators for using the best available research evidence was the same in all three types of public health interventions. The main barriers for this were lack of access to reported research, and lack of time and competences to identify, adapt and apply the most relevant research evidence. Furthermore, the informants stated that they found it difficult to determine how much emphasis to put on the message from research evidence if the messages from other sources of knowledge did not match this. The perceived facilitators for using evidence from research were access to summaries of research results or guidelines based on research, and collaboration with researchers.

Discussion

This discussion chapter will start by summing up the main study findings. Following that, a discussion - taking the starting point in the following questions - will be provided.

- What is evidence in relation to public health work?
- Why is it so difficult to use evidence in practice?
- How can intersectoral collaboration facilitate EIPH?
- How can practice get an overview of their public health work?
- What can be done in future?

Finally the strengths and limitations of the study will be considered and reflections on challenges in doing practice-based research will be provided.

Main study findings

In this section the main results of the four papers will be summarised, related to each other and to relevant issues from the theoretical framework.

In the theoretical framework it was explained that use of evidence in public health work is a generally recognised challenge due to several reasons, including e.g. the fact that public health interventions are complex and depending on the context and that practitioners are not used to apply evidence from research.

Paper 1 provided information on the general use of evidence in working with public health in Danish Municipalities. It was shown that the managers of municipal health administrations had varying understandings of what constitutes evidence in public health; hence a confusion of the term existed. It was also shown that evidence is not always used when prioritising, planning and implementing public health work in the municipalities – less than half of the health managers reported that evidence was used "to a great extend". Furthermore it was shown that some contextual factors (emphasis on evidence use from the health manager and from politicians, and the level of evidence ca-

pacity in the administration) had an influence on whether evidence is used or not. Besides this, it was shown that many of the municipalities wanted to use more evidence in their future work and also to contribute to the production of evidence. Finally, the sub-study showed that the main barriers for using evidence were connected to the lack of time and competences, whereas the facilitators for this were collaboration among municipalities and with research institutions and publication of guidelines and descriptions of the best practices for evidence use.

In the theory chapter it was suggested that intersectoral collaboration in relation to public health work is a way of improving EIPH work, since determinants of health can be affected via actions in other sectors besides the health sector. Furthermore, this collaboration increases the chance of inclusion of relevant knowledge from different sources.

Paper 2 provided information on the challenges and facilitating factors for having an intersectoral collaboration in working with a health policy in a Danish municipality. The main challenges were the municipal structure with vertical sectors, the fact that the health policy was perceived as an extra task, lack of funding and ownership to the policy, lack of clear objectives and baseline measures in the policy, and lack of active involvement of politicians and the community throughout the process. The main facilitating factors were political support, involvement of community, collaboration with local media, establishment of a "Fund for Health" and "Health Networks", collaboration with research, and intersectoral project groups.

In the theory chapter it was argued, that the basis for working evidence-informed with public health is to have an overview of the public health interventions and activities taking place in e.g. a municipality. Such an overview could also facilitate an understanding of the roles of different sectors and the importance of intersectoral collaboration.

Paper 3 provided information of how to get an overview on public health work in a municipality and how to identify the various types of public health interventions taking place. The sub-study provided a set of assessment criteria for dividing public health interventions into the types Health Promotion, Health Protection, Disease Prevention and Health Care, based on the EUHPID model (Bauer, Davies et al. 2006). The assessment criteria were tested using Varde Municipality as case and 154 public health interventions were categorised (Health Promotion: 88 (57%), Health Protection: 15 (10%), Disease Prevention: 51 (33%)).

With the starting point in the results of papers 1-3 a more in-depth analysis of the use of evidence and knowledge and inclusion of stakeholders was performed in paper 4. Analysis was carried out on one of each type of public health interventions as defined in paper 3. It was shown that various types of evidence and knowledge were used (including knowledge on population characteristics and knowledge based on involved practitioners' expertise), however, the use of research evidence was limited in the Health Promotion and Disease Prevention interventions. It was also shown that several stakeholders were included in working with all interventions; hence knowledge and inputs from various sources influenced the work. The identified barriers and facilitators for the use of evidence from research were very much in line with those found in paper 1. Barriers were identified as the lack of access, time, and competences to identify, adapt and apply research evidence. Furthermore, it was found that practitioners had difficulties in determining how much emphasis to put on research evidence if it was not consistent with other sources of knowledge applied. The perceived facilitators identified were access to summaries of research results or guidelines based on research, and collaboration with researchers.

Following this summary of results, the next sections will provide a discussion of main study results and related issues.

What is evidence in relation to public health work?

In this thesis, a general uncertainty about what constitutes evidence in relation to local public health work in practice was found among the health managers in Danish municipalities (paper 1). This uncertainty of the contents of EIPH work was probably related to the fact that the concept evidence, as well as the public health tasks, were fairly new to the municipalities at the time of the study (Andersen and Jensen 2010). However, the uncertainty about the term evidence is not only limited to the practice sector – also within research a debate on this issue is going on. Researchers within different disciplines related to public health work have various understandings of the contents of evidence and how evidence is produced. Thus, parts of the research sector adhere to the traditional evidence hierarchies inspired by EBM, while others prefer more wide standards also rating evidence from e.g. qualitative studies high (Brownson, Baker et al. 2003, Aro, Smith et al. 2008, Brownson, Fielding et al. 2009). This mirrors very well the results from this thesis showing that several health

managers in Danish municipalities agreed in the statements "evidence is knowledge solely derived from randomised controlled studies" and "evidence is knowledge solely derived from other kinds of research based studies" (paper 1).

The inconsistent message from research sector is probably one of the reasons for confusion in practice sector. For providing an understanding of the contents of evidence and evidence use in practice, it could be beneficial to have consensus about this within research.

A recent debate paper provided by Nutley, Powell et al. (2012) asks the question "What counts as good evidence?" (Nutley, Powell et al. 2012). The authors examine various types of evidence hierarchies and argue that study design has long been used as a key marker for evidence quality. Such hierarchies of evidence raise many issues and have remained contested. By extending the hierarchies so that they also consider the quality of study conduct or the use of underpinning theory, have enhanced their usefulness in practice but this has also lead to new debates in research societies. More broadly, the authors recognise that hierarchies of evidence have seen most use in addressing the evidence for effectiveness of intervention (type 2 evidence) (Nutley, Powell et al. 2012). Hence, type 1 evidence on e.g. prevalence of diseases/determinants and type 3 evidence on e.g. implementation issues are somewhat overlooked. As argued in the theory chapter, these types of evidence are crucial within public health work for prioritising (type 1) and for improving the chance of intervention success (type 3) since contextual factors are so important for this.

The conclusion of the debate paper by Nutley, Powell et al. (2012) is that there is no simple answer to the question of what counts as good evidence. It depends on what purposes, and in what contexts the evidence is going to be used. Furthermore, the authors state that even though there is a need to debate standards of evidence, researchers should be realistic about the extent to which such standard-setting will shape complex, politicized decision-making in practice (Nutley, Powell et al. 2012). From the contents of this very recent debate paper, it must be recognized that the research sector still needs to work on being clearer on what constitutes evidence in public health work. Even though, evidence is "only" one source of input to public health policy processes, the chance of evidence getting to have an influence on public health decision-making might be increased by being able to disseminate a shared understanding of the contents and understanding of research evidence to practice. This could help practice sector in being clearer on what evidence from research actually is.

In paper 4 a multidisciplinary model for EBP was applied as the analysis tool (Satterfield, Spring et al. 2009). This model identifies the different sources of evidence and knowledge that need to be taken into consideration when making decisions in public health practice work. In this model, evidence from research is one of the contributing sources, but also local knowledge on the target population for the intervention and the available resources are pointed out as crucial for decision making. The results of paper 4 showed that the different types of evidence and knowledge were included in working with the analysed interventions. However, the Health Protection intervention was the only one with the direct use of evidence from research. This might be because of an established tradition to use research evidence in preventing traffic accidents and the fact that the research within this area is not questioned but instead understood as a solution to promote traffic safety. Though, this is only an assumption and no supporting evidence has been found in the literature. In the Disease Prevention intervention, evidence from research was indirectly used via use of general guidelines based on results from research. The challenge connected to this is that such guidelines can be out-dated; however in this sub-study (paper 4) such a guideline seemed to be the reason for research evidence being included at all.

Based on the above, results from this thesis confirmed the use of evidence and knowledge from various sources (paper 4). It was shown that especially knowledge on the characteristics of the target group for the intervention and the involved practitioners' expertise was crucial for the way the public health interventions were performed. This fits very well the issues pointed out by Nutley et al (2012). Using the model for EBP (Satterfield, Spring et al. 2009) as the conceptual framework for combining the evidence from research, other sources of evidence, and knowledge from practice work, could be a way of getting a shared understanding of use of evidence between research and practice. In that way, the research sector would acknowledge the fact that the practice sector have to balance different inputs to policy processes and that research evidence should not dictate policy processes.

In addition to applying the EBP model (Satterfield, Spring et al. 2009), a definition of evidence in relation to public health that is understandable and operationalisable within practice work needs to be disseminated to practice sector. Integrating the views of practice sector in defining research evidence might be the way to do this. In paper 1 it was shown that most of the health managers could agree in the suggested definition of evidence in relation to public health work. The suggested definition was:

"Evidence in public health includes both research- based knowledge (e.g., results of research studies) and non- research-based knowledge based on scientific methods (e.g. meta-analysis, evaluation reports and quality assurance systems). Evidence can be classified into three categories; Type I: Descriptions and analyses of the determinants of health and disease and their distribution. Type II: Assessments of the relative effectiveness of interventions. Type III: Accounts of the best possible design and implementation of interventions in specified con- textual circumstances." (Skovgaard, Nielsen et al. 2008)

A definition like this one combined with identified sources of evidence and knowledge defined in the model for EBP might be basis for discussion between research and practice to develop shared understanding of what constitutes evidence in public health work. The involvement of practice sector in this could also be a step in itself to promote the use of evidence in practise since it would strengthen the collaboration between research and practice. Moreover the collaboration could facilitate more practice-based research which would potentially increase the uptake of research evidence in practice work. More discussion on collaboration between research and practice will be provided later. First, a discussion on why it is so difficult to use evidence in practice will be offered.

Why is it so difficult to use evidence in practice?

Results from this thesis showed that evidence is only partly used when prioritising, planning and implementing public health work in the municipalities (paper 1 and 4). This might be partly because of the lack of a clear understanding of what constitutes evidence in relation to local public health work, as discussed in the previous section. In addition to this, several barriers – but also facilitators - for the use of evidence in practice were found (paper 1 and 4). The findings in the two papers were fairly consistent and did also mirror what is found in the literature (McKenna, Ashton et al. 2004, Grimshaw, Eccles et al. 2012, Bowen and Graham 2013). Furthermore, contextual factors such as emphasis on evidence use from the health manager and from politicians, and the level of evidence capacity in the administration, were found to have an association to the level of evidence use in public health work (paper 1). In this section, the issues will be discussed adding important issues pointed out in the literature. The discussion will take the starting point in following themes:

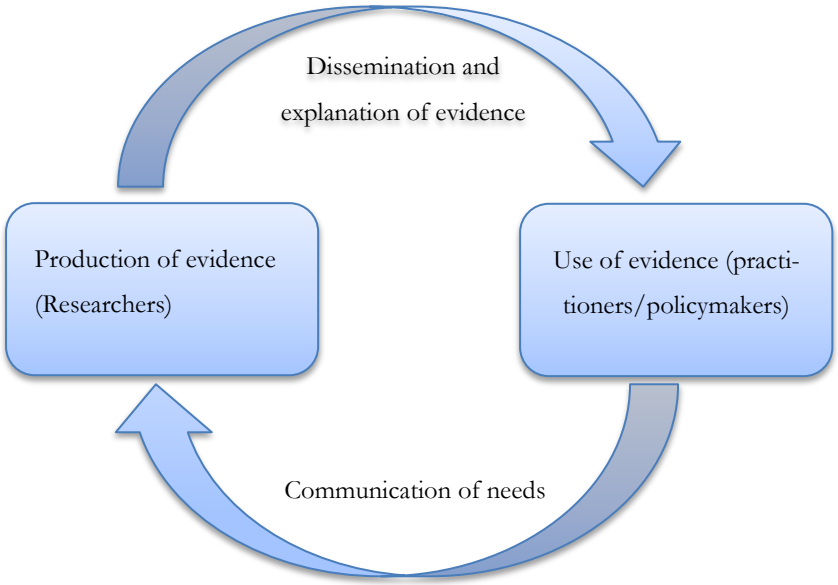
- Ideal interaction

- Barriers and facilitators
- The process of EIPH

Ideal interaction

The ideal interaction between production and use of research evidence can very simply be described via the following figure:

Figure 12: Ideal interaction between production and use of research evidence



Adapted from: Nutley, 2007

The figure describes how the production and use of evidence should be done in a circular process in which there is constant interaction between the two sides of the process (research and practice). In reality, there are several factors, which can problematize this continuous process.

Barriers and facilitators

The barriers for uptake of research evidence in practice work found in this thesis (paper 1 and 4) were: lack of access to research evidence, and lack of time and competences to identify, adapt and apply research evidence in local public health work. In addition, facilitators for the use of research evidence in local public health work were identified to be: collaboration among municipalities and with research institutions and publication of guidelines and descriptions of best practices for evi-

dence use. Several other studies have been conducted with the aim to identify the barriers and facilitators for using evidence in public health work (McKenna, Ashton et al. 2004, Nutley 2007, Wang, Saldana et al. 2010, Grimshaw, Eccles et al. 2012, Bowen and Graham 2013). In summary, these are factors related to:

- Characteristics of the evidence
- Characteristics of and links between users (policy makers and practitioners) and producers (researchers) of the evidence.

Characteristics of the evidence

The quality of evidence is a very important factor for its use. Evidence seems to be used more if its quality is assessed high. However, this relationship is difficult to measure and assess as it largely depends on what is perceived as "good quality evidence" as discussed previously. Timing is also crucial in relation to the use of evidence in practice. Policymakers and practitioners are more likely to use evidence if they are exposed to it at the time where it is most relevant. This is a challenge, since development of evidence most often is a time consuming process, and practice needs evidence from day to day (Nutley et al, 2007). The credibility of the evidence is also an important determinant of its use. Evidence will be used more if it comes from a credible source such as a recognized research institution or organization. Finally, evidence that is "ordered" by policymakers or practitioners is often used. This kind of evidence is developed with a direct link to a specific problem, and can therefore easier be understood, processed and implemented by policy makers and practitioners (McKenna, Ashton et al. 2004, Nutley 2007, Wang, Saldana et al. 2010, Grimshaw, Eccles et al. 2012, Bowen and Graham 2013).

In this thesis, none of these characteristics were directly found as being barriers or facilitators. However, the reported barriers of lack of access, time and competences to identify, adapt and apply research evidence in local public health work, could possibly by handled by providing high quality, timely relevant, credible evidence to practice work. In this regard, high quality evidence needs be understood as evidence that is suitable for the purpose of its use in practice.

Characteristics of and links between users and producers of evidence

Personal characteristics of policymakers and practitioners such as e.g. education can have an impact on the use of evidence. Thus, the literature reports a tendency for people with longer educations being more likely to use evidence from research in practice. Furthermore, individual attitudes can affect the use of evidence. Individuals may be reluctant to change current practice, or desire solu-

tions that are not supported by evidence (McKenna, Ashton et al. 2004, Nutley 2007, Wang, Saldana et al. 2010, Grimshaw, Eccles et al. 2012, Bowen and Graham 2013).
In this thesis (paper 1), no association was found between the health managers' educational level and the level of evidence use. Instead, the health managers' and the politicians' attitudes towards use of evidence in practice was found to have an association to the actual level of evidence use. This indicates that in relation to the use of evidence in local public health work in Denmark, attitudes might be more important than educational level. Stating this, it is important to take into account that one of the reported barriers was lack of competences to identify, adapt and apply research evidence in local public health work (papers 1 and 4). This barrier might be broken down via further education of practitioners and policymakers in relation to the use of evidence. Furthermore, an association between the level of evidence capacity in local public health administrations and the level of evidence use was found in the way that more capacity lead to more use (paper 1). This emphasises the importance of the presence of sufficient competences and time in the local public health administrations for identifying, adapting and applying relevant evidence.

Lack of access to evidence from research is reported as a major barrier for evidence use ion practice both in this thesis (paper 1 and 4) and in the literature (McKenna, Ashton et al. 2004, Nutley 2007, Wang, Saldana et al. 2010, Grimshaw, Eccles et al. 2012, Bowen and Graham 2013). Poor dissemination of evidence within and between organizations can mean that evidence from research never reaches the practice settings, which may apply the evidence. Most often results of research are published in high-level scientific journals, which are not read by practitioners and policymakers. A solution could be to provide incentives for researchers to be more active in also communication via channels also applicable for practice. Furthermore, a problem could be that useful (applicable to practice) evidence "drown" in the total amount of evidence. A facilitator for use of evidence found in this thesis was increased collaboration between research and practice (papers 1 and 4). Such collaboration could be a way of increasing the dissemination and use of relevant evidence in practice as earlier suggested. Furthermore, actions could be taken in relation to development of guidelines for use of evidence in practice as this was also suggested as a facilitator for the use of evidence in public health work (papers 1 and 4). This could be done with starting point in the model for EBP (Satterfield, Spring et al. 2009) as suggested in the previous section.

The process of EIPH

In addition to the actions suggested above for tackling barriers and promoting facilitators for use of evidence in public health work, the working process of EIPH (Figure 6) should also be taken into

account when discussing why the use of evidence in practice is difficult. The described working process is inspired by the model for rational policy making (Figure 8), even though it is stated that the process of EIPH can go fourth and back in the included steps of working. In the theoretical framework of this thesis, other types of more limited rational policy making processes were described, and different ways of using evidence in the processes were displayed. Figure 9 summarized this, and illustrated how evidence can be used both in a conceptual and instrumental way. This means that evidence can be used both to establish a general knowledge base and for defining a concrete action. One important challenge for public health work in practice might be that the various sources of evidence and knowledge do not necessarily suggest the same interventions or solutions. Based on this, it can be discussed whether the model for the working process of EIPH it is too simple and would benefit from including aspects of the more limited rational model for policy making. It might be a facilitator for the use of evidence in local public health work if also conceptual use of evidence somehow could be clarified. Again, using the model for EBP (Satterfield, Spring et al. 2009) could be a possible way to go about it, since the evidence used for establishing a general understanding in relation to a public health problem could be visualized in this model even if the final decision would not be according to the message of the evidence.

Summing up, the reasons for why it is so difficult to use evidence in practice are all related to the contents of Figure 12. Some of them belong to either the producers of evidence (researchers) or the users of evidence (practitioners and policymakers) and some belong to the collaboration between the two groups illustrated in the arrows of the figure. On the research side, mainly the lack of dissemination of research evidence to practice is a barrier. On the practice side, mainly lack of access, time and competences are barriers. In between the two groups, lack of collaboration and links are barriers, which means that research is carried out without taking practice needs into consideration and results from research are not disseminated and adapted to practice. Finally, the process of working with public health in practice might be more complicated than described by the model for EIPH, and thereby the use of evidence might not be as straightforward as proposed by this model.

How can intersectoral collaboration facilitate EIPH?

In the theoretical framework (part 7), it was stated that intersectoral collaboration in local public health work is important for dealing with the fact that determinants of health go beyond the respon-

sibilities of the health sector (Ståhl, Wismar et al. 2006, WHO and Australia 2010, Ollila 2011). Furthermore, the literature states that one of the aims of using intersectoral collaboration in relation to public health work is to provide EIPH (Ståhl, Wismar et al. 2006). However, in the literature it is yet to be clarified how exactly the strategy can improve EIPH. An assumption could be:

Evidence shows that determinants of health are related to conditions both inside and outside the health sector (Dahlgren G 1991) → Evidence shows that policies concerning these conditions can have an effect on population health (Ståhl, Wismar et al. 2006) → Intersectoral collaboration is a strategy that tries to include issues on health and determinants on health in non-health sector policies and work, and to include non-health sectors in public health work (WHO and Australia 2010, Ollila 2011)→ Therefore, using intersectoral collaboration as a working strategy can be a way of improving the use of relevant evidence in public health work.

Despite this theoretical assumption of intersectoral collaboration being a facilitator for EIPH, very limited experiences from practice exist. In this section, the working process as well as the challenges and facilitators for intersectoral collaboration in local public health work as identified in this thesis (paper 2) will be discussed. The discussion will take its starting point in the following themes:

- Funding
- Objectives and baseline measures
- Stakeholders
- Ownership

Funding

Results from this thesis indicated that lack of funding for working with an intersectoral health policy was an important challenge for the success of intersectoral collaboration (paper 2). Non-health sectors felt that they needed to cut down own sector initiatives for being able to work with public health issues. This is related to the fact that the case municipality is organised with vertical sectors having own and not shared responsibilities. The establishment of a "Fund for Health" showed to be a way of overcoming this challenge of financing. Because of that it might be relevant to recommend shared budgeting when establishing intersectoral collaboration in relation to local public health work. Shared budgets could potentially help improving accountability across and between sectors

and in that way strengthen the incentives to work together on public health issues. This might also help mitigating the problem of "sectoral silos".

Objectives and baseline measures

Lack of clear objectives and baseline measures for the intersectoral health policy were identified as being challenges in relation to the intersectoral collaboration (paper 2). Non-health sectors had difficulties in identifying public health issues relevant for their sector activities and to assess achievements. Hence, they felt that they had to deliver work without visible benefits. The literature shows that benefits are often more difficult to calculate than immediate costs and this can hinder project development – clear common objectives based on solid baseline measures could help overcome this obstacle (Ståhl, Wismar et al. 2006). However, a municipality is often operating with the focus on rather short-term profits and results, and intersectoral collaboration requires time for reflection. Because of that, it should be recommended to formulate shared objectives for intersectoral collaboration in relation to local public health work, but also leaving room for reflections and change in objectives during the working process. Before introducing an intersectoral health policy, action needs be taken to evaluate the compatibility of sector interests. Without setting common goals, sectors do not have incentives for taking care of intersectoral issues, such as public health work. Collaboration with research was suggested as a facilitator for intersectoral work. Such collaboration could include development of relevant baseline measures, formulation objectives and follow-up on these, since researchers might have more experience in relation to this.

Stakeholders

Results indicated that the involvement of local politicians, citizens, and local media in the process of intersectoral collaboration was somewhat decreased over the years of working with the health policy (paper 2). However, involvement of those stakeholders was seen as a facilitator for intersectoral collaboration in relation to ensuring sustainability of the policy, adequate and continuous disclosure of knowledge, and availability of feedback channels. Because of that, more attention should be given to the role of stakeholder inclusion in working with public health via intersectoral collaboration. When analysing three specific interventions in the case municipality, it was also shown that several stakeholders were involved in the process (paper 4). For being able to include knowledge from these stakeholders in the intersectoral work, they need to be included in the full policy process (Satterfield, Spring et al. 2009). The role of stakeholder inclusion in carrying out public health work is very sparsely described in the literature. Some studies states the importance of stakeholder inclusion (Kothari, Birch et al. 2005, Dobbins, Jack et al. 2007, Gagliardi, Fraser et al. 2008, Barwick, Peters et

al. 2009, Hanbury, Wallace et al. 2009, Beeckman, Clays et al. 2012, Larsen M Unpublished), and a few investigate the effect of e.g. carrying out a shared process of intervention development and reporting (Kothari, Birch et al. 2005, Gagliardi, Fraser et al. 2008). Based on this thesis, it can be recommended to ensure involvement of relevant stakeholders throughout the processes of development and implementation of local public health policies and specific interventions. Furthermore, it would be important to evaluate the inclusion of stakeholders in relation to the success of collaboration and the use of knowledge from stakeholders. This would add to the limited evidence base and provide foundation for further improvements.

Ownership

Results showed that in the developing phase of the intersectoral health policy, employees from the health sector were leading the work and getting input from representatives from the other sectors involved (paper 2). This organisation was changed when entering the implementation phase, since it was recognized that other sectors than the health sector needed to have responsibility to achieve ownership of the intersectoral health policy. Still, the health sector employees were very actively involved as they served to facilitate the work from other sectors. However, at this stage the intersectoral health policy was already formulated and ownership was hard to achieve. From this it can be suggested that the collaboration itself should be addressed in an intersectoral way, starting from the initial stages of policy development and continuing through the stages of implementation and evaluation, instead of the health sector dominating with its view on health issues. In that way, ownership across and between sectors might be easier to reach. Furthermore, results showed that establishing "Health Networks" in all sectors provided a flow of information on intersectoral collaboration in relation to public health issues to all levels of the municipal organisation (paper 2). Hence, establishment of such networks could be recommended to be done from the beginning of the intersectoral collaboration.

It was shown that the general recognition of the importance of integrating public health issues in the work of other sectors increased in the case municipality after the intersectoral policy was formulated. Moreover, it was revealed that having the intersectoral health policy approved by the City Council eased the intersectoral collaboration as sectors then had an official mandate to work intersectorally. To facilitate more intersectoral collaboration in relation to public health work it might be beneficial from the national level to recommend intersectoral collaboration (e.g. via government policies). A way to do this could be to suggest more use of Health Impact Assessment (HIA) as a tool for integration of public health issues in all policies and activities (Ståhl, Wismar et al. 2006). Using HIA can

help clarify that dealing with health issues is not necessarily an extra task for non-health sectors, but it may facilitate sustainable policies and interventions in all sectors that will also have long-term positive health impacts (Ståhl, Wismar et al. 2006).

Another relevant issue in relation to the establishment of ownership across and between sectors could be to make it easier for all sectors to identify public health interventions relevant for the work that they are already carrying out or possible gaps. An assessment of public health interventions in a local setting - as tested in this thesis (paper 3) - could be a way to provide an overview to all sectors. This will be discussed further in the next section.

How can practice get an overview of their public health work?

The theoretical framework (part 8) in this thesis explained that an overview of public health work in practice is important for facilitation EIPH and intersectoral collaboration. In this section it will be discussed how to establish such an overview based on the results of this thesis (paper 3). The discussion will take its starting point in the following themes:

- Assessment criteria
- Common language

Assessment criteria

In this thesis (paper 3), a set of assessment criteria for four types of public health interventions were developed based on the EUHPID model (Bauer, Davies et al. 2006). When applying the criteria on a case setting of local public health work, they demonstrated usefulness in dividing the local public health interventions into the four different types. However, it could be discussed whether public health interventions can be categorized as strictly as it was done. Public health interventions could be described in more detail using, e.g. the 10 Essential Framework (CDC 2013). Furthermore, interventions are often more complex in design and consist of elements from more than one approach targeting different levels of a health impact pyramid (Frieden 2010). Still, using the developed assessment criteria could make it possible to obtain a useful overview of the various types of public health work taking place in a local setting, their interrelationship and possible gaps.

Following the assessment exercise in paper 3, examples of interventions were identified where it was not obvious which category they belonged to. Nevertheless, it was often conditions related to the priority population that determined the final categorization of the interventions. If the priority popu-

lation related to a group of people with an already established disease/condition that influenced their health status, an intervention was categorized as tertiary Disease Prevention. In contrast, if an intervention focused on a group of fully healthy people, it was categorized as a Health Promotion intervention. Hence, the priority population was critical in relation to defining the type of public health intervention.

The EUHPID model (Bauer, Davies et al. 2006) and the developed assessment criteria in this thesis could be a basic tool for providing an overview of interventions in local public health (WHO and Australia 2010). In interviews with the key informants, it became clear that some informants did not differentiate between Health Promotion and Disease Prevention interventions. This fits very well with the belief that the public health debate and funding in Denmark often is limited to Disease Prevention and the pathogenic perspective; Health Promotion approach being therefore somehow neglected. The result of the assessment exercise demonstrated that there are numerous examples of both types of interventions taking place and it is therefore relevant to support both approaches. The case municipality, Varde Municipality, has a "Centre for Health Promotion" that carries out many public health interventions within the municipality. Despite the name of this Centre, the assessment exercise clearly demonstrated that the main thrust of their interventions has a Disease Prevention character. This is due to the fact that they are carrying out interventions for special priority populations, for example, people who smoke, are overweight, have a lifestyle disease, etc. Hence, the interventions are categorized as tertiary disease prevention. Most Health Promotion interventions are taking place in schools, day care facilities, and in leisure time activity places because the priority populations there consist of groups of healthy individuals. The assessment exercise demonstrated that health protection interventions constituted a minor part of the total effort. This was somewhat expected since the term was not known by the key experts consulted in the phase of developing the assessment criteria. Furthermore, the term is not commonly used in the Danish public health debate. Using the assessment criteria could be a way to make this regulatory approach more visible and show the possibilities in using the approach in combination with others.

Common language

Based on this thesis, it can be proposed that using the types of public health work presented in the EUHPID model (Bauer, Davies et al. 2006) and the set of criteria for categorizing them, could help facilitating a common language in relation to public health work in practice. In relation to this, the research society may have a role as well. The confusion about the terms applied for different types of public health work is namely not only limited to practice sector. In addition to the previously dis-

cussed confusion about the term "evidence" in relation to public health work, confusion about terms as e.g. Health Promotion and Disease Prevention seems to exist. A debate on this was started via an editorial in the journal Health Promotion International where the editor stated that researchers should be clearer on what terms they are using and what the content of these terms was (de Leeuw 2010). However, the editorial did not suggest any ways of approaching this issue. In paper 5, a respond to this editorial written by the author of this thesis is provided. In this letter to the editor, it was suggested to use the EUHPID model (Bauer 2002) and the categorization criteria as a basis for developing a common language for types of public health work. More work needs to be done in relation to this and hopefully this thesis can provide a starting point for discussion on further initiatives.

What can be done in future?

In the previous sections, the main findings of this thesis have been discussed. In the following, possible actions for further work within public health research and practice will be considered.

Though limited use of evidence in local public health work was found in this thesis, a motivation for more use of evidence was identified in practice settings (paper 1). Still, several barriers need to be handled for doing so. Very little research has been carried out to investigate how to overcome the barriers for the use of evidence as found in this thesis (Larocca, Yost et al. 2012). However, the recent ones suggest strategies that might be beneficial in relation to local public health work with inclusion of various types of evidence and knowledge from different stakeholders. Basically, the literature shows that to make an impact on the uptake of evidence in working with public health in practice, actions launched must be of an active character (Dobbins, DeCorby et al. 2004, Larsen M Unpublished). This means that an active collaboration between research and practice needs to take place. Actions that seem to be effective are tailored, targeted, and timely relevant messages from research to practice developed via an integration of practice needs in research, and inter-professional collaboration as e.g. workshops with participation from both research and practice (Kothari, Birch et al. 2005, Gagliardi, Fraser et al. 2008). Furthermore organizational changes to provide the time for working with evidence from research in practice potentially can enhance the use of this in working with public health in practice (Dobbins, Jack et al. 2007). Actions that do not seem to have an impact on the uptake of research evidence in practice are of more passive character. These includes e.g. to provide practice with printed information (Di Noia, Schwinn et al. 2003, Dobbins, DeCorby et al.

2004, Gagliardi, Fraser et al. 2008) or to provide practice access to online research evidence resources (Buchan, Lourey et al. 2009). Hence, it is not sufficient only to overcome the barrier of lack of access to evidence for practice. Instead, collaboration between research and practice is needed. When using these recommendations, it is important to take into account that the studies behind are conducted within a Health Care setting. Hence, the need for studies conducted in relation to public health work is prevalent.

In addition to the active collaboration between research and practice, also actions within practice setting could be recommended to facilitate the use of evidence in local public health work. In this thesis it was shown that intersectoral collaboration could be a way of improving the process of EIPH work. To facilitate a successful collaboration, the findings suggest that it is important to: 1) ensure sufficient funding, 2) to formulate clear objectives and carry out baseline measurements, 3) actively involve various stakeholders, and 4) establish ownership across and between involved sectors. To facilitate some of these factors, getting an overview of local public health work and establishing a common language might be beneficial. In this thesis it was shown that such an overview can be provided using the EUHPID model combined with the criteria for assessing public health interventions as developed in paper 3.

Several times in the previous parts of the discussion chapter, it has been suggested to make use of the model for EBP (Satterfield, Spring et al. 2009) to define the contents of evidence in relation to local public health work and to provide a framework for use of research evidence in combination with other types of evidence and knowledge when working in a intersectoral collaboration with public health. As mentioned, this could be the starting point for establishing sustainable collaboration between research and practice within local public health work in Denmark. It would be interesting to adapt the model to Danish setting and study its usefulness as an overall planning tool for EIPH work.

Following this discussion of the main study findings, the next section will provide a discussion of the strengths and limitation of the study.

Methodological considerations

Methodological considerations of the study will be presented via describing the new knowledge gained, strengths and limitations of the study, and perceived challenges in doing practice-based research.

New knowledge gained

This thesis provides new knowledge in relation to understanding the use of evidence in local public health work in Denmark. It does that by presenting results on perceptions of the term evidence, level of evidence use and related factors as barriers or facilitators. Even though some of the results are not original seen from an international point of view, this thesis is the first to produce this evidence in the Danish context. Furthermore, the thesis provides argumentation for why intersectoral collaboration can enable EIPH work, and offers suggestions for important issues to take into consideration for ensuring successful collaboration across and between practice sectors when working with public health. Moreover, the thesis makes a set of assessment criteria for getting an overview of public health work in a local setting available. Finally, the thesis demonstrates the possibilities in using the EBM model (Satterfield, Spring et al. 2009) as a way of identifying various sources of evidence and knowledge from several stakeholders in different public health interventions.

Strengths and limitations

In paper 1 a questionnaire was used to collect data on how and on which level evidence is used in policy processes related to local public health work in Denmark. The questionnaire was designed taking starting point in literature and it was tested in several rounds by both experts in the field and representatives from the group of respondents. Hence, the internal validity and the reliability of the study are assumed to be sufficient. The response rate was fairly high (81 %) and no significant difference between represented and non-represented municipalities was found. Hence, the results are assumed to be generalizable within the Danish setting. Whether the results of the sub-study can be generalized to settings outside Denmark can be questioned and depends on the e.g. organizational factors.

In papers 2 and 4 the case study method was used. Using this method the main aim was not to produce generalizable results, but instead to generate in-depth evidence on specific phenomenon in specific contexts. Nevertheless, the results of papers 2-4 applied to Varde Municipality in Denmark

might be generalizable to other Danish municipalities because the characteristics of the public health work carried out is comparable and the organizations of the work only vary to a limited extent. The generalizability would have been improved by doing case studies in several municipalities or via discussion the results with representatives from other municipalities.

In the case studies carried out in papers 2 and 4, two sources of data were used (document analysis and interviews) and informants reviewed drafts of the research protocol with the aim of strengthening the construct validity. Doing more interviews might have increased the construct validity even more. In paper 2 data were coded by two researchers individually and compared to ensure internal validity of the findings. In paper 4 only one researcher did the coding. Using more individual coding and comparison might have increased the internal validity of the studies. The reliability of these case studies was ensured using case study protocols and databases for the collected data.

In paper 3 several methods were used. Firstly, criteria for the four categories of public health work as defined by the EUHPID model were developed. This was done via synthesis of literature, interviews with practitioners, focus group discussion with PhD students within the field of public health and a questionnaire to public health experts from research. The aim of using these various sources of evidence and knowledge was to ensure the construct validity. However, more interviews could have been done and potentially improved the formulation of criteria. After definition of criteria, information on all public health interventions in the case municipality was collected within a three-month period. This was done using a template for description of interventions to ensure collection of consistent and needed information on all interventions. In addition, the municipal budget was reviewed to identify potential interventions not described. This use of two sources of information on interventions carried out helped ensuring the construct validity. Finally, the reported interventions were assessed using the developed criteria. The assessment was done individually by three researchers and afterwards compared and agreed on. This process was done to ensure the internal validity of the results. Involving practice sector in this assessment could potentially have increased the internal validity. In general, paper 3 included various research activity and different methods. It might have been relevant to report the whole sub-study as more sub-studies instead, but since the activities was so interlinked a shared reporting paper was chosen.

In addition to the strengths and limitations described, a perceived strength of this thesis is that it is carried out in close collaboration with practice. The challenges of doing so will be described in the next section.

Challenges in doing practice-based research

As previously mentioned, this thesis is a result of collaboration between practice and research. This means that the aims of the research carried out have been influenced by the needs of practice. The involved Danish municipality – Varde Municipality – has not only served as case in papers 2-4, but central stakeholders from the municipality have contributed to developing the research protocol, hence the research carried out has been determined by both current research evidence and knowledge from practice.

Such collaboration between research and practice has of course both advantages and disadvantages/challenges. In paper 6 in Appendix the experiences of this collaboration (and two other related collaborations) are reported. The main perceived advantages are related to an easier access to dialog and exchange of working methods, while the main perceived disadvantages/challenges are related to the lack of time to collaborate, different timescales (practice needs input from day to day and research takes time), different "languages" used within the two settings. Furthermore, it is difficult to evaluate an immediate effect on public health status as a result of the collaboration.

In addition to these experiences, the tradition of evaluation of research activities is as a barrier for effective research-practice collaboration seen from the researchers' point of view. Research is mainly evaluated based on publications in scientific peer-reviewed journals. This is of course relevant in relation to ensuring a sufficient quality of the research carried out. However, these journals are not read by practitioners and the way that scientific papers are formulated does not meet the needs of practitioners. In this project, the thesis author has – in addition to the scientific papers – developed non-publishable reports for the collaborating municipality to use. This was necessary and ethically correct since the municipality needed to get knowledge in return for the time spend contributing to the research. Developing such reports takes time, and it might be a facilitating factor for doing so if it somehow was a part of the way that research activities are evaluated.

Following this discussion the strengths and limitation of the study, the next section will provide the conclusion of the thesis and perspectives on further research and practice.

Conclusions

Conclusions from this thesis

The overall aim of this thesis was to analyse the use of evidence and intersectoral collaboration in local public health work in Denmark. This was done via a national questionnaire study and case studies.

A general confusion about the term evidence was found among practitioners and it was shown that evidence is not always used in local public health work in Denmark. The confusion about the term evidence showed not only to be limited to the practice sector, since a debate on the contents of evidence within public health is going on among researchers. This may hinder appropriate use of evidence in practice and a shared understanding of the term evidence in relation to public health work should be carried out.

The found barriers for use of evidence in practice were consistent with other research findings and identified to be lack of access, time and competences in the municipalities. The municipalities suggested collaboration among municipalities and with research institutions and publication of guidelines as facilitators for their use of evidence. Moreover, it was shown that the level of evidence use in practice was associated to the level of emphasis on evidence use from the health managers and the politicians, and the level of evidence capacity in the municipalities.

An active and sustainable collaboration between research and practice was suggested to be the most appropriate way of overcoming the barriers for evidence use in practice. This suggestion was supported by the fact that practice sector also suggested such collaboration as a facilitator for use of evidence, and reported motivation for more use of evidence in their practice work. In addition, it was proposed that the process of working with evidence in practice might be more complex than illustrated via the model for Evidence Informed Public Health (EIPH) because of the various sources of evidence and knowledge that needs to be taken into account when making decisions in a contextualised practice setting. It was shown, that using a model for Evidence Based Practice (EBM)

(Satterfield, Spring et al. 2009) could be a way of identifying the various types of evidence and knowledge from different stakeholders in local public health interventions.

Another way of improving an evidence-informed working process in relation to local public health work could be to establish intersectoral collaboration within local practice settings. In doing so, significant factors for successful collaboration between and across sectors were identified to be: ensuring sufficient funding, formulating clear objectives and carrying out baseline measurements, actively involve various stakeholders, and establishing ownership across and between involved sectors. Furthermore, to facilitate these actions, establishment of an overview of the local public health work was suggested. Criteria for assessing on-going public health interventions was developed taking starting point in the four types of public health work (Health Promotion, Health Protection, Disease Prevention, and Health Care) as presented by The European Community Health Promotion Indicator Development Model (EUHPID model) (Bauer, Davies et al. 2006). Using the criteria showed to be a way of establishing an overview of the total public health work and potentially facilitating a shared language across and between involved sectors.

In summary, following recommendations are proposed:

- A clear and operationalisable definition of evidence in relation to local public health work should be made. The definition should be formulated in collaboration between research and practice and take into account the context that evidence is used in within public health work in practice. The definition used in this thesis (Skovgaard, Nielsen et al. 2008) and the model for Evidence Based Practice (EBP) (Satterfield, Spring et al. 2009) could be a starting point.

- More active and sustainable collaboration between research and practice should be launched. This collaboration would facilitate production of evidence with starting point in practice needs, dissemination of evidence from research to practice, and uptake of evidence in practice work. Within this collaboration it would be important for researchers to acknowledge the various other sources of knowledge that needs to be taken into consideration when doing public health work in practice, and the complex process of carrying out public health work in practice. Again, the model for EBP (Satterfield, Spring et al. 2009) could serve as a framework for this complexity.

research results to practice (Aro and Absetz 2009), and in Canada regional centers for competence development in relation to knowledge exchange within health are established (Edwards, Webber et al. 2009). Although these initiatives could potentially provide relevant experiences for use in the Danish setting, it is still open for discussion how to establish a fruitful and "worth the effort" collaboration between research and practice.

An ongoing research program "REsearch into POlicy to enhance Physical Activity" (REPOPA) funded by EU's Seventh Framework Programme (FP7) is investigating this (REPOPA 2013). REPOPA is a five-year project (2011-2016) and aims at integrating scientific research evidence, expert know-how and real world policy making process to increase synergy and sustainability in promoting health and preventing disease, and to promote physical activity in structural policy making, by:

- Building on evidence and experiences on policy making processes
- Studying innovative 'win-win' ways to collaborate between academia and policy makers
- Establishing structures and best practices for future health promotion.

Representatives from both research and practice in Denmark are participation in the project. Hence, it will be interesting to follow the process and see the results of this research program to get more evidence on the possibilities in close collaboration between research and practice in relation to use of evidence both in Denmark and internationally.

In general, further research and practice needs to be better interlinked with the aim of improving the use of evidence and intersectoral collaboration in local public health work. More research needs to be done on how this link is established and maintained. This thesis provides a starting point and further steps can be taken by implementing the recommendations made and initiating research to evaluate the proposed actions.

Returning to the quote presented at the very beginning of this thesis, researchers need to understand the complex process of working with public health in practice. "Our opinion" is only one amongst others… Could an ambition for future be that we - in collaboration with practitioners and policy makers – find a way to produce relevant and high quality evidence and use it in a way that makes room for other sources of inputs as well? This thesis might open the debate.

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Appendix

In the Appendix the four main papers of the thesis can be found. In addition, three supplementing papers are also enclosed.

1. Use of evidence in local public health in Denmark.

2. Intersectoral Action for Health – the experience of a Danish municipality.

3. Assessing types of population health intervention practices in a Danish municipality: application of the European Community Health Promotion Indicator Development (EUHPID) Model.

4. Use of knowledge and inclusion of stakeholders in three public health interventions at local government level in Denmark

5. How can we as researchers promote a clear discourse in public health research, practice and policy?

6. Ny europæisk model til tværsektorielt sundhedsarbejde. (English translation: New European model for intersectoral health work)

7. Gode erfaringer med brobygning mellem forskning og praksis i folkesundhed. (English translation: Good experiences with bridge-building between research and practice in public health).

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