The public health workforce: An assessment in the Netherlands

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CHAPTER 7
General Discussion
INTRODUCTION

In this chapter the results of the studies presented in this thesis will be summarised by answering the research questions (paragraph 7.1), followed by a discussion of methodological issues (paragraph 7.2) and a discussion of the results in light of findings from other studies and of public health practice (paragraph 7.3). The chapter ends with a general conclusion (paragraph 7.4) and implications and recommendations for future research, policy and practice (paragraph 7.5).

ANSWERS TO THE RESEARCH QUESTIONS

Here we summarize the contribution of the main findings of the studies presented in this thesis to the answers to the research questions of this thesis.

What is the quantity and quality of the Dutch public health workforce, using existing data sources?

Pooling the available workforce data from 7 reports resulted in a 'best estimate' of the total Dutch public health workforce of 12,000 FTE. The point estimate of 12,000 FTE is inaccurate, mainly because of the different definitions of the public health work field that were used in the various documents. For example, in one report the public health work field was defined as “all municipal health services”, whereas in another report it was defined as “a diverse mix of organizations”. Moreover, the number of functions or roles assessed in the different reports varied between 1 and 15. We concluded that insight in the quantity and quality of the current Dutch public health force is limited and that planning future workforce numbers and educational needs based on the current capacity of the public health workforce in the Netherlands is not possible using the currently existing data.

What are the scope and Essential Public Health Operations of public health in the Netherlands, based on international examples?

Analysis of several authoritative international examples of defined essential public health operations (EPHOS) on country level showed general consensus on the overall role of public health in terms of scope and core functions. This consensus justified definition of the scope of public health in the Netherlands in accordance with the international examples as: ‘To promote health and an equal distribution of health through population based interventions aiming at protecting and promoting health and preventing disease’.

Based on the international consensus on nine core functions of public health we adopted essential public health operations for the Netherlands and added ‘providing a health safety net’ as a typically Dutch EPHO. The ten proposed EPHOs for the Netherlands are: 1. monitoring population health, 2. disease prevention and control, 3. health promotion, 4. health protection, 5. public health emergency response, 6. health safety net, 7. healthy public policies, 8. public health research and development, 9. competent workforce, 10. sustainable organisational structures, quality of (public) health services.

These specifications of the scope of public health and of essential public health operations were the basis to develop a strategy to empirically enumerate the public health workforce. This strategy consists of 1. selection of organisations that provide public health; 2. within these organisations, assessment of educational qualifications and the hours spent on EPHOs by individual workers using an online questionnaire. The online questionnaire was developed based on a review of the literature on workforce enumeration, interviews with public health experts and consultation with other researchers.

What is the feasibility and validity of an EPHO-based strategy to measure the size, composition and qualifications of environmental public health workforce in the Netherlands?

The environmental public health workforce was defined as all workers who contribute to the delivery of environmental public health. We identified organisations involved in providing environmental public health. The questionnaire was distributed among all potential environmental public health workers within the selected organisations in the Netherlands and resulted in data on the environmental public health workforce.

The questionnaire was well accepted and available benchmark data on environmental public health physicians supported the results of this study regarding the medical part of the workforce. Experts on environmental public health recognized the present results on the provision of EPHOs as a reasonable reflection of the actual situation in practice. All EPHOs were provided by an experienced, highly educated and multidisciplinary workforce. 27% of the total full-time equivalents (FTEs) was spent on EPHO ‘assuring governance for health’. Only 4% was spent on ‘health protection’. The total FTEs were estimated as 0.66 /100,000 inhabitants.

We concluded that characterisation of the public health workforce was feasible by identification of relevant organisations and individual workers on the basis of EPHOs, and obtaining information from those individuals by questionnaire. Critical factors include the operationalization of the EPHOS into the field of study, the selection and recruitment of eligible organisations and the response rate within organisations.

What is the quantity and quality of the preventive youth health care [jeugdgezondheidszorg] workforce in the Netherlands and can regional differences in workforce be understood in terms of indicators of youth health care need?

The questionnaire we developed to assess the environmental public health workforce was adapted to preventive youth health care, which basically means that we adapted the accompanying examples of daily practice of each EPHO to preventive youth health care. Distribution among all potential youth health care professionals in the Netherlands resulted in data on the youth health care workforce in total and per region. The preventive
The youth health care workforce is multi-disciplinary, 62% had > 10 years working experience within preventive youth health care and only small regional variations in composition existed. The number of children per youth health care professional varied between regions (range 688-1,007). All EPHOs were provided and could be clustered in an operational or policy profile. The operational profile prevailed in all regions. Regional differences in the number of children per preventive youth health care professional were unrelated to the percentage of children with overweight, living in poverty, referred to youth care or living in deprived areas. The regional differences in size of the preventive youth health care workforce were thus not in line with indicators for preventive youth health care needs.

What are the implications of application of a new conceptualization of health for public health policy?
We performed a secondary qualitative data analysis of 28 focus group interviews with 277 participants involved in public health and healthcare on the future of the Dutch healthcare system. Starting from the conceptualisation of health in terms of adaptation and self-management, participants perceived health as an individual asset, requiring an active approach in the Dutch population towards health promotion and adaptation to a healthy lifestyle. Sectors outside healthcare and public health were considered as resources to support individual lifestyle improvement. Integrating prevention and health promotion in healthcare is also expected to stimulate individuals to comply with a healthy lifestyle. Attention should be paid to persons less skilled to self-manage their own health, as this group may require a healthcare safety net. We conclude that a new concept of health as a basis for changes in the healthcare system offers opportunities to create a health-promoting societal context. However, inequalities in health within the general population may increase when using the new concept as an operationalisation of health. For public health the main challenge is to maintain focus on the collective socioeconomic and environmental determinants of health and disease and, thereby, preserve collective prevention.

METHODOLOGICAL ISSUES
This section offers an overview of the main strengths and limitations of these studies for the internal and external validity of our findings.

A strength of this thesis is the combination of methods used in the various studies. We used quantitative as well as qualitative research methods, which resulted in numbers on the public health workforce as well as in qualitative perspectives on future public health needs. Another strength is that we conducted nationwide studies, which offered the opportunity not only to study the total public health workforce within environmental public health and preventive youth health care, respectively, but also to assess regional variations in capacity for preventive youth health care. A third strong point is the high participation rate of the public health organisations in the enumeration studies (chapter 4 and 5) and the large number of focus groups in the qualitative study (chapter 6).

Internal validity
Enumeration strategy
As existing data sources appeared to be incomplete and did not cover the whole public health workforce, we developed a strategy to collect primary data on the public health workforce. Although these provide more insight in the workforce and the services provided by that workforce than was available before, the internal validity of the proposed strategy may be affected by 1. the selection of organisations, 2. the response rates within organisations, 3. the use of EPHOs and 4. the self-report character of the data.

First the selection of public health organisations. Our estimation of the total capacity was dependent on proper identification of organisations harbouring workers belonging to the public health workforce. In the studies presented in chapters 4 and 5, we explored per EPHO who or which organizations potentially perform that service. If, as an example, the selection of preventive youth health care organisations in Chapter 5 was incomplete, or if the participating organisations cannot be regarded as representative for all the preventive youth health care organisations that we a priori selected for participation, the estimate of the totally available capacity estimated in this study may be an underestimation of the real capacity. However, in de environmental public health study (Chapter 4) we showed that the results on the estimated number of workers were in line with available benchmark data, a finding that supports the validity of our estimate. The number of organisations involved in preventive youth health care (chapter 5) was much higher than in environmental public health (chapter 4). We did our utmost best to include all the preventive youth health care organisations, for example by ensuring support for the study of the professional associations for preventive youth health care physicians, nurses and assistants, which resulted in participation of almost 90% of the organisations. We corrected the total number of workers in environmental public health and preventive youth health care according to the participation rates, assuming that the non-participation at organisational level was
not selective and we assume this has not resulted in significant under- or overestimation. However, further research is needed to confirm if our assumption is correct, for example by verifying the actual number of preventive youth health care employees in the missing organisations.

Second, non-response within organisations. The two enumeration studies we performed showed non-response (30-50%). Non-response is a well-known limitation of questionnaire studies. We cannot assess if the responders within preventive youth health care or environmental public health organisations significantly differed with respect to the variables of interest from the non-responders, e.g. selective non-response. Selective non-response within preventive youth health care or environmental public health organisations may have resulted in under- or overestimation of total workforce capacity. Further study, for example comparing age-, sex and educational profiles of respondents and non-respondents per organisation, or preferably comparing the profiles of EPHOs provided and hours spent per EPHO of respondents and non-respondents is recommended.

Third, we used public health domain specific EPHOs as the basis of our questionnaires. We asked workers to classify their daily tasks according to these EPHOs and to estimate the average time spent on each of these EPHOs per week. Misclassification of tasks by individual workers may have occurred, because of unfamiliarity of public health workers with EPHOs. The EPHOs were only recently introduced in Europe, and not yet in the Netherlands, so workers were not familiar with linking their daily work to the EPHOs yet. Some workers may have classified a specific task to a certain EPHO whereas others classified it to another EPHO. To prevent misclassification at individual level and to shape workers’ mental image of the tasks to be assessed, we added domain-specific examples from daily practice to each of the EPHOs. Eligible examples were selected with help of domain-specific experts and professionals organisations for environmental public health and preventive youth health care. As the EPHO profiles resulting in Chapters 4 and 5 were recognized as reflections of daily practice in environmental public health as well as in preventive youth health care by experts, we assume that significant misclassification was not present at group level. We conducted a pilot study in which we assessed among a small group (n=30) of preventive youth health care workers whether a list of frequently provided tasks within this sector was classified similarly by all the participants. The results showed no substantial misclassification at group level, but the numbers were too small to allow for meaningful statistical analysis. Further study, for example by repeating the pilot study with more participants is required.

Fourth, the data on delivery of EPHOs and the time spent per EPHO were based on self-report. Self-reported data are relatively easy to obtain, however, the disadvantage is that we cannot check whether the reported average time spent per EPHO reflects the actual time spent on this EPHO at individual level. Checks of the total number of working hours reported as spent on separate EPHOs with the total number of working hours per week for individual respondents did not show large discrepancies. Therefore we assume the self-reported data to reflect the actual time spent per EPHO quite accurately at aggregate level. However, validation by empirical evaluations is recommended.

The analysis of preventive youth health care needs

The assessment of the associations of regional differences in preventive youth health care needs and regional differences in the number of preventive youth health care workers was based on available national data on youth health indicators with regional specification. Data on youth health indicators were scarce and insufficient, which may have influenced the internal validity of the results of this analysis. Our results did not provide evidence for an explanation of regional differences in the preventive youth health care workforce by corresponding differences in preventive youth health needs, but the internal validity of this finding is limited by uncertainty about the quality of the data on indicators of need. To improve the validity of this analysis, we strongly recommend to implement a standardized national data collection with epidemiological data on youth health, for example by pooling the standardized data that are collected by youth health care organisations (‘Basis Data set JGZ’).

Public health consequences of a new conceptualisation of health (Chapter 6)

We used focus group data to assess the implications of the new conceptualisation of health for public health. A limitation of this study was that we performed secondary data analysis; the implications of the new concept of health for public health were not the primary focus of the interviews. That may partly explain why some aspects of public health were not addressed during the interviews. However, by means of the various items included in the topic list, respondents were invited to mention the relevance of collective prevention and the wider determinants of health as part of the future health system.

External validity

Generalizability of the results of the enumeration studies to the whole public health workforce

Although we studied different public health domains, i.e. environmental public health and preventive youth health care, the total picture of the public health workforce in the Netherlands is still patchy. In other words, our studies did not provide complete insight in the total public health workforce. The results of the studies into environmental public health and preventive youth health care showed that the workforce in both domains is assessable by using the same strategy. However, the outcomes in terms of training qualifications or EPHO profiles are really different, suggesting that the results of the studies presented in this thesis cannot be extrapolated to estimate the total Dutch public
health workforce capacity. As the first studies showed promising results with regard to the application of the strategy, we first recommend further development and validation of this strategy, including the studies recommended in the internal validity section. Subsequently the other parts of the public health workforce can be assessed using our strategy to complete the national public health workforce picture.

**Generalizability of our strategy to the health care workforce**

The use of EPHOs has proven to allow for workforce enumeration across different organisations and among different professional disciplines within public health. However, the medical care or curative sector also provides public health services. Our strategy offers the opportunity to assess contributions from other healthcare sectors to public health, for example primary care. However, we have not yet applied the methodology to other healthcare sectors. We recommend to start with a pilot study, for example among a group of general practitioners. A first step would be to adjust the examples of daily practice per EPHO to examples of daily practice of general practitioners, as general practitioners are probably less acquainted with the essential operations of public health.

**Generalizability of the results to other countries**

Because of obvious differences in (public) health systems between EU member states, the results on the size and composition of the environmental public health and preventive youth health care workforce cannot automatically be extrapolated to other EU member states. However, as our strategy is based on EPHOs, and WHO’s EPHOs are considered valid for all WHO European member states, the strategy we developed for public health workforce assessment can also be used in other EU member states. WHO Europe launched an action plan for strengthening public health capacities and services in 2012.[1] This action plan proposed the ten EPHOs as unifying and guiding framework for any European health authority to set up, monitor and evaluate policies, strategies and actions for reforms and improvement in public health. The Association of School of Public Health in the European Region (ASPHER), that assessed the exit competences of health professionals in the Netherlands but also internationally, hardly any standards or guidelines were developed that could serve as a framework to group the competencies.[2] Both projects illustrate the applicability of the EPHOs at different levels; for policy as well as training purposes across Europe. Further research is required to develop the international applicability of our strategy. We recommend to start assessing the use of the strategy in a pilot study before applying it to the country wide public health workforce. First, the selection of organisations providing public health services might be different from that in the Netherlands because public health systems differ between member states. Second, it may be that several questions in the questionnaire need some adjustment in wording in order to align with country specific circumstances. An internationally applicable strategy for public health workforce enumeration provides a basis for cross-national comparison of workforce data.

**Sustainability of EPHOs over time**

We proposed EPHOs for the Netherlands on the basis of international examples and by assessing the international examples with the Dutch public health system. EPHOs describe the main tasks of current public health. Whether the EPHOs are sustainable and are still valid when future changes in the health care system are implemented, e.g. a new conceptualisation of health, we do not know. We recommend to evaluate the validity of the EPHOs every several years, for example by assessing the EPHOs with timely policy documents, literature review and interviews with public health and health care professionals.

**REFLECTION ON AND DISCUSSION OF THE RESULTS**

In the following paragraph we reflect on the current public health workforce and public health workforce governance in the Netherlands in the light of our research findings and we discuss the implications of the findings for improving public health workforce governance. We will first give a short overview of the governance of public health workforce in the Netherlands.

**Public health workforce planning in the Netherlands: a short overview**

Public health workers deliver services that contribute to the overall aim and goals of public health. As argued in the introductory chapter of this thesis, a knowledgeable, competent and prepared workforce is essential to achieve the aim and goals.[3-6] Workforce planning, in this case public health human resource planning, tries to anticipate how many and what type of human resources will be necessary in order to maintain and improve the quality, quantity, availability and effectiveness of the public health services provided.[7-9]

Public health workforce planning and development in the Netherlands is governed at different levels: a. the organisations providing public health services, b. the public health physicians, organised within organisations of professionals for physicians [e.g. KAMG] and c. the National government through the Advisory Committee on Medical Manpower planning [Capaciteitsorgaan].

In the Netherlands, the Ministry of Health, Welfare and Sports is responsible for public health. Many public health tasks are decentralized to local governments and provided through local public health services (GGD’en). [10] Besides local public health services, also other local and national organizations provide public health tasks, like academic research groups and the National Institute for Public Health and Environment (RIVM). The delivery of public health services is legally founded in the Public Health Act, but there is no central human resource policy regarding the provision of public health services. [10] In addition, in the Netherlands but also internationally, hardly any standards or guidelines
are available on the appropriate public health workforce size and composition with regard to public health needs and population health outcomes. (11) In The Netherlands, each local public health organisation is responsible for its own human resource management.

The public health physicians, organised in the organisation of professionals for public health physicians [KAMG] are involved in workforce governance regarding the quality and quantity of the group of public health physicians. Examples of tasks of this governance by professionals include to maintain and develop professional practice standards, to contribute to the training of new public health physicians by development of general education plans and to advise the Ministry of Health, Welfare and Sports on the national distribution of training positions for public health physicians.

By government order, the Advisory Committee on Medical Manpower planning [Capaciteitsorgaan], assesses the required training inflow of public health physicians at a national level, every four years. (12) The Advisory Committee on Medical Manpower planning uses a simulation model that basically uses the current number of trained public health physicians within a specific domain as input, and produces estimations on the required inflow of public health physicians within that same domain as output. One of the determinants of the required inflow within the model is the expected public health need. The public health need is operationalized in this model by several indicators, like projected demographic and epidemiological changes in the Dutch general population, task-shifting policies and socio-economic developments in the general population. After confirmation of the estimated training inflow by the Ministry of Health, Welfare and Sports, financial resources are made available for the professional training of public health physicians. However, there is no instrument to ensure that sufficient training positions become available to fulfill the required training inflow of public health physicians. In 2013 the actual training inflow was 37% lower than the advised inflow by the Advisory Committee. (13)

Reflections on public health workforce governance in the Netherlands from the perspective of our results

Reflection on public health workforce governance from the perspective of our results of the two enumeration studies illustrate three main problems of the current system of public health workforce governance in the Netherlands; 1. the mono-disciplinary approach, 2. lack of insight into the number of physicians working in public health, and 3. lack of insight in the background of the distribution of the workforce across the country.

First, estimations on the required expertise or training inflow for public health professionals, as executed by the Advisory Committee of Medical Manpower Planning, are restricted to public health physicians. Our data in Chapter 4 and 5 show that about 22% of the environmental public health workforce and 24% of the preventive youth health care workforce consists of public health physicians. The other professionals are a very multi-disciplinary group, including, among others, public health nurses, speech therapists, toxicologists and policy makers. These disciplines are not included in the estimations of required training inflow. The shortcomings of mono-professional workforce governance have been addressed in previous studies on health human resource planning. (14) We therefore recommend to extend public health workforce governance and integrate all occupations or disciplines into the forecasts of required public health expertise. Broadening this focus is especially relevant when the consequences of recent health policies and changes in the health care system are included in the workforce governance. For example, task shifting from public health physicians to nurses, the shift of specific (public) health care services to local governments, or the other way around, the shift from local services to a national level, e.g. for tuberculosis control. A first step towards integrated workforce planning and development is assessment of the whole public health workforce in terms of size, composition and services provided. Our strategy for empirical enumeration of the public health workforce (Chapter 4 and 5) provides an initial step and can be of great value towards this goal. However, the strategy requires further development and implementation, as described in section 7.2. Important issues that need further study are the operationalization of EPHOs and possible misclassification, and the use of our strategy to assess the contribution of other sectors within the health system to public health.

Second, our data elucidate that only part of the physicians working in public health are formally trained and registered as public health physician within their discipline: about 60% of the physicians who are professionally active in environmental public health and preventive youth health care. Part of the services are currently provided by formally unqualified public health physicians (‘basisartsen’). The numbers of unqualified public health physicians working in public health were previously unknown; our strategy delivered insight in the numbers and we also showed that these positions are being held for many years.

The presence of unqualified public health physicians is not exclusive for public health and happens in medical care as well, but in medical care physicians without a registration as medical specialist or general practitioner can by law only work under supervision of a registered medical specialist / general practitioner. And these positions are usually temporary. In public health it is legally allowed to deliver public health services as a non-trained public health physician without supervision. Whether this situation guarantees a high quality medical contribution to public health is questionable. Despite the general fact that competencies may develop ‘on the job’, unqualified public health physicians have only limited basic knowledge on public health, also because public health is an underrepresented topic in the basic training of physicians at Dutch universities. (15)
Our findings underpin the second shortcoming of the current system of public health workforce governance. The estimation of the training inflow of public health physicians is restricted to formally qualified public health physicians, and does not take into account the delivery of services by formally unqualified physicians (‘basisartsen’). Without data on the contribution of all physicians working in public health, workforce governance on the required quality and quality of medical contribution to public health is insufficient. We therefore recommend to enumerate the public health workforce beyond the existing registries for qualified public health physicians, as a basis for public health workforce governance. Our strategy for empirical enumeration of the public health workforce (Chapter 4 and 5) can be used to assess the whole public health workforce, including training qualifications.

Third, with regard to the distribution of the total capacity of the public health workforce (physicians and other disciplines) across the country, our preventive youth health care study revealed regional differences in workforce capacity across the country (north, east, south, west). These differences were not related to regional differences in population size. In addition, these results did not provide evidence for an explanation of regional differences in the preventive youth health care workforce by corresponding differences in preventive youth health care needs. Regional differences may occur as a result of the governance structure. Each public health organisation is responsible for its own health human resource management. No guidelines exist on the minimum level of FTEs (or competency or profession) required to deliver all services. So, local governments can decide what the population health priorities in their region are and have the possibility to align the public health workforce capacity with local health needs. It might be that for example other health problems than youth health are more pronounced in their region, which may result in relatively less capacity for youth health, compared to other regions with equal youth health status. However, assessing whether regional variations in public health workforce capacity are in line with regional variations in public health needs is not possible without proper data on the public health workforce. Our data provided the opportunity for such comparisons. The so far unexplained regional variations in youth health care workforce (chapter 4) suggest that the regional governance on the preventive youth health care workforce may result in under-serving or over-serving of some youth health populations, however this is a finding that deserves further exploration. Under-serving is difficult to accept from an equity point of view, as preventive youth health care should aim for providing equal chances of optimal health to all children in the Netherlands. Overcapacity is also difficult to accept because of opportunity costs and potential waste of resources. To monitor the background of the distribution of the public health workforce across the country, we recommend to first enumerate the national public health workforce. Our strategy showed to be useful for such enumeration. And second to assess whether regional difference in public health workforce capacity can be justified by regional differences in public health need.

Whether regional differences in capacity also occur in other public health domains is not known, however for some domains, like infectious disease control, guidelines exist on the advisable number of public health physicians and nurses. Whether these guidelines result in regional comparable workforce numbers for infectious disease control requires further study. A recently conducted European study revealed regional differences in the overall quality of public health service delivery in various countries, which was linked to the inadequate availability of public health workforce capacity in general. (16) Another European study showed differences in the capacity for preventive youth health care between the different countries. (17) We recommend to develop national guidelines with regional specifications on the required quality and quantity of the public health workforce. Evaluating the existing guidelines on infectious disease control for general use would be a first step.

Reflection on workforce governance from the perspective of the implications of a new concept of health for public health.

We analysed the implications of a new conceptualisation of health as the ability to adapt and self-manage for public health policy, as an example of assessing future public health priorities. We used the EPHOs as a predefined thematic framework for analysis.

The results in Chapter 6 show that a different conceptualisation of health may result in a change of priorities for public health services and thus in the EPHOs to be delivered. The observation that focus group participants perceived health as an individual asset requiring an active approach in the population towards health promotion and adaptation to a healthy lifestyle will lead to an increase in the need and delivery of EPHO ‘health promotion’, which may impact training needs. Furthermore, an increase of health promotion within the curative sector offered by medical care providers, implies that health promotion must be a key competence for all physicians, including medical specialists and general practitioners. With regard to workforce governance and training needs, this implies an extension of public health training needs towards professionals in the curative sector as well. The need for incorporation of health promotion and public health competencies within the curricula of all physicians has been advocated before, by the Lancet committee on Education of health professionals for the 21st century and also by Levy and Wegman, Plochg and Essink-Bot. (18-21) We recommend to bring public health training for all physicians into practice at universities and follow-up training. We also recommend to include changing public health needs, for example as a result of a new conceptualisation of health, into the public health workforce planning process as this provides important information regarding priorities for public health services and subsequently public health training needs. (9, 22-24) To translate these changes into training needs, the translation of EPHOs into public health competencies would be an important step to support public health workforce planning and training.
The largest burden of disease expressed in years lived with disability in the coming years in the Western world will be attributable to elderly having one or more chronic illnesses. (25-28) The results in Chapter 6 illustrate that these changes may impact the need for public health operations and the corresponding expertise regarding elderly and chronic diseases. However, elderly or chronic diseases are currently not addressed in the existing public health physician domains and the current model for estimating the training inflow for public health physicians addresses only the existing domains (e.g. physician infectious disease control, physician environmental public health). For ‘new’ domains in public health, it is up to the organisations delivering public health services whether they develop new expertise or invest in new domains. We recommend to investigate how future ‘new’ public health needs can be translated into required public health expertise and public health operations, to better support workforce planning for the total public health workforce.

Reflections on public health workforce governance in the Netherlands from the perspective of our results in general

The studies described in this thesis are among the first scientific studies into public health workforce enumeration in the Netherlands and the results contribute to an empirical base for public health workforce planning and development. These studies supported the importance of insight in the quantity and quality of the public health workforce and trends in this workforce in order to improve public health workforce governance to contribute to maintaining and improving population health. However, public health workforce research is not a common research area in the Netherlands. Therefore we emphasize the need for structural research into the development and innovation of the public health workforce in general. Quite some public health research is performed on how to improve population health with regard to specific health topics, like overweight, infectious disease control or socioeconomic inequalities in health. Other groups focus on improving public health practice, for instance by innovations in public health service delivery (‘academische werkplaatsen’). However, research into the more supporting services like ‘assuring a competent workforce’ or health services research of the public health sector is lagging behind and needs further development. Research priorities include further development and validation of our strategy to characterize the public health workforce, and studies into the relationship between public health workforce interventions and population health. These and other studies are needed for providing the evidence on which to base planning and policy decision making both for workforce development and for addressing uncertainties regarding organizing, financing, and delivering effective public health strategies.

CONCLUSION

Insight in the public health workforce in the Netherlands is limited. Increasing insight is an important condition for improvement of public health workforce governance. We showed that multidisciplinary enumeration of the public health workforce is feasible, and that a new concept of health may lead to changes in public health priorities.

Based on our results we identified three recommendations for improvement of the current public health workforce governance in the Netherlands. First, to extend workforce governance from the mono-disciplinary estimation of required public health physicians into workforce governance of the whole multidisciplinary public health workforce. Second, to include public health needs into workforce governance. And third, to develop public health workforce research as an area of scientific research to contribute to the empirical basis for workforce planning and development and thus to population health.
REFERENCES


