The public health workforce: An assessment in the Netherlands

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ABSTRACT

Objectives
The progress in workforce planning in preventive youth health care (YHC) is hampered by
a lack of data on the current workforce. This study aimed to enumerate the Dutch YHC
workforce. To understand regional variations in workforce capacity we compared these
with the workforce capacity and the number of children and indicators of YHC need per
region.

Methods
A national survey was conducted using online questionnaires based on WHO essential
public health operations among all YHC workers. Respondents (n=3220) were recruited
through organisations involved in YHC (participation: 88%).

Results
The YHC workforce is multi-disciplinary, 62% had > 10 years working experience within
YHC and only small regional variations in composition existed. The number of children
per YHC professional varied between regions (range 688-1007). All essential public health
operations 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 YHC professional were unrelated to the indicators of YHC need.

Conclusion
The essential public health operations provided by the YHC workforce and the regional
variations in children per YHC professional were not in line with indicators of YHC needs,
indicating room for improvement of YHC workforce planning. The methodology applied
in this study is probably relevant for use in other countries.

INTRODUCTION

The services provided by the preventive youth health care (YHC) workforce are pivotal
to current youth and future population health. (1, 2) A recent study reported an inverse
association between public health staffing and provision of preventive services to women
and children on the one hand and infant mortality rates on the other (3); this finding
confirmed similar results from earlier research. (4, 5) Insight into the capacity of the YHC
workforce, and the services provided in relation to youth health needs, is required to
support health human resource planning and to maintain and/or improve youth health.
This also applies to countries with relatively good youth health. Although the health of
youth in the Netherlands is among the best in Western Europe, promoting youth health
remains a continuous challenge for the YHC workforce. Adverse trends over time in
behavioural risk factors (e.g. overweight, and an uneven distribution of health across
socioeconomic groups) may affect youth health and warrant continuous attention. (6)
YHC is preventive care focusing on the growth and development of the child to prevent
severe health problems, and is the largest discipline within the public health field in
countries in Western Europe. (7)

Workforce planning, or health human resource planning, consists of activities to bring
the quantity and/or quality of the health human resources to a desired level. (8, 9) Most
countries in the WHO European region (WHO Eur), except for Albania, Spain and the
Netherlands, make use of guidelines on the size of the YHC workforce in terms of a
desired ratio between the numbers of children per YHC professional: ranging from e.g. 1
nurse per 350 children in Armenia to 1 nurse per 2000 children in Cyprus. (10) However,
standards on the appropriate size and composition of the YHC workforce in relation to
youth health needs are absent in WHO Eur countries. Also lacking is adequate insight
into the size and composition of the YHC workforce and the services provided, also in
the Netherlands.

It is essential to fill this gap in knowledge to support YHC health human resource planning
and policy development. Therefore, this study enumerates the YHC workforce and
services provided in the Netherlands. In the absence of standards on the appropriate
size of the YHC workforce, we examine whether regional variations in the workforce
capacity can be understood in terms of the number of children per region and variations
in indicators of youth health care need. We assumed to find more YHC workers in regions
with more children and more YHC workers in regions with e.g. a higher prevalence of
children with overweight, as indicator of youth health care need.
**METHODS**

**General study design**
In 2013 we assessed the environmental public health workforce in the Netherlands using a newly developed strategy. This strategy showed that characterisation of the public health workforce and the services provided is feasible by 1. identification of relevant organisations and individual workers, and 2. obtaining information from those individuals via a questionnaire addressing the essential services provided. As this 2-step approach earlier appeared to be feasible and valid, we used this same strategy to assess the YHC workforce. (11)

For the essential services we used the 10 essential public health operations (EPHOs) as defined by WHO Eur in 2012. (12)

For the present study, a national cross-sectional survey was performed. The YHC workforce was defined as all workers who contribute to the delivery of YHC. This definition was operationalised as all those who consider YHC as part of their job and who are responsible for providing any of the EPHOs. We specified the WHO’s EPHOs for YHC and assessed the individual respondent’s involvement in these by means of an online questionnaire.

Every effort was made to adequately inform all participants and to protect their privacy. According to Dutch law, formal ethical approval was not required for this study.

**Development of the questionnaire**
For specification of the EPHOs to YHC existing policy documents were used, e.g. from the professional organisation of YHC physicians and documentation on the basic duties package which municipalities have to fulfil according the Public Health Act. (13) We also involved a group of 7 national YHC experts who agreed on the resulting specifications. Based on the documents and the expert opinions, we added two services: ‘management and team leadership’ and ‘providing a youth health safety net’ as this is a specific public health operation in the Netherlands.

Table 1 presents a description of youth public health and the related EPHOs in the Netherlands. The YHC questionnaire contained 20 items divided into three sections: i) Eligibility and socio-demographic variables, ii) job characteristics, and iii) EPHOs.

After some adaptations based on a pre-test of this questionnaire among 30 YHC workers, the questionnaire took about 10 min to complete.

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**Table 1 | Essential public health operations and Essential youth health care operations in the Netherlands**

<table>
<thead>
<tr>
<th>Essential public health operations, WHO*</th>
<th>Essential youth health care operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Surveillance of population health and wellbeing</td>
<td>1 Surveillance of youth health and wellbeing</td>
</tr>
<tr>
<td>2 Monitoring and response to health hazards and emergencies</td>
<td>2 Monitoring and response to psycho-social incidents and emergencies</td>
</tr>
<tr>
<td>3 Health protection including environmental occupational, food safety and others</td>
<td>3 Youth health protection</td>
</tr>
<tr>
<td>4 Health promotion including action to address social determinants and health inequity</td>
<td>4* Youth health promotion, addressing social determinants, health inequity and including advocacy communication and social mobilisation for health</td>
</tr>
<tr>
<td>5 Disease prevention, including early detection of illness</td>
<td>5 Disease prevention, including early detection of illness</td>
</tr>
<tr>
<td>6 Assuring governance for health and wellbeing</td>
<td>6 Promote, develop and support youth health public policy</td>
</tr>
<tr>
<td>7 Assuring a sufficient and competent public health workforce</td>
<td>7 Assuring a sufficient and competent YHC workforce</td>
</tr>
<tr>
<td>8 Assuring sustainable organisational structures and financing</td>
<td>8 Assuring access to YHC and quality of YHC</td>
</tr>
<tr>
<td>9 Advancing public health research to inform policy and practice</td>
<td>9 Advancing YHC research to inform policy and practice</td>
</tr>
<tr>
<td>11 Management and team leadership</td>
<td>10 Assuring a YHC safety net</td>
</tr>
</tbody>
</table>

YHC: Preventive youth health care


** EPHO ‘Health promotion’ and ‘Advocacy communication and social mobilisation for health’ in the Netherlands were for YHC combined into “Youth health promotion”
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Recruitment of participants
All organisations likely to conduct YHC tasks were identified, i.e. all local public health services, other local YHC organisations, national public health organisations, and universities. Within these, we invited all workers considered to be involved in youth EPHOs.

To enhance recruitment of as many employees substantially involved in YHC, e.g. to recruit respondents involved in EPHOs ‘monitoring’ and ‘health promotion’ outside the departments of YHC, all workers from the divisions of epidemiology and health promotion of the local public health services were approached. Similarly, all workers from specific research institutes and departments of public health of universities were approached to recruit workers involved in EPHO ‘advancing public health research’ and ‘assuring a sufficient and competent public health workforce’.

The mailing list was composed in collaboration with YHC experts and with support from the national association of organisations of the local public health services and one other national YHC organisation. This latter organisation supports YHC practice, policy and research from a national perspective and maintains a good overview of the national YHC networks.

Data collection strategy
The survey was performed in May 2014. The invitation to participate in the survey was distributed by e-mail to all organisations that agreed to participate, i.e. all local public health services (n=26) and 73% of the other YHC organisations (n=16) and, within these organisations, to >7000 workers. The invitation emphasised voluntary participation and confidentiality. The e-mail contained a link to a secured website where participants could complete the electronic questionnaire. In the week after the invitation, two reminders were sent to the non-responders. After two weeks the database was closed, data were downloaded, and the analyses were performed with SPSS 14.0.

Analysis
1. Composition and size of the YHC workforce
We characterised the composition of the workforce in terms of age, gender, educational level and medical or non-medical training, years of working experience in the current job title, and skills mix. The skills mix was expressed by the ratio physicians/nurses per region. This was calculated based on the educational background of the respondents (medical or nursing training completed).

The size of the workforce was characterised as the absolute number of full-time equivalents (FTEs), number of children to be treated per YHC professional, and the number of children aged < 5 years per YHC professional.

For a tentative estimation of the total FTEs of the national and regional YHC workforce, we assumed that YHC workers among the non-responders spent a similar number of working hours on youth EPHOs as the respondents. In the Netherlands, 36 working hours/week constitutes 1 FTE.

To assess regional differences in size and composition of the workforce, the country was divided in 4 regions to assure the anonymity of individual organisations: North (provinces of Groningen, Friesland, Drenthe; approx. 1.7 million inhabitants), East (provinces of Flevoland, Gelderland, Overijssel; approx. 3.5 million inhabitants), South (provinces of Noord-Brabant, Limburg; approx. 3.5 million inhabitants) and West (provinces of N-Holland, Z-Holland, Utrecht, Zeeland; approx. 7.9 million inhabitants). Each YHC organisation was assigned to one of the regions. When organisations provided services in two or more regions, the organisation was assigned to the dominant service region (this was the case for only one organisation).

For analysis of regional variations in the size and composition of the YHC workforce, we selected the workforce of the local YHC organisations and excluded the workforce in national institutions (n=29 respondents or 0.9% of the total number of respondents), as these institutions are located in one specific region but support the total workforce. The total FTE per region was calculated as the sum of the estimated FTEs per youth health organisation allocated to that region.

2. Essential Public Health operations provided
To gain insight into the services provided by the professionals, we assessed which EPHOs they provided and for how many hours per week. The distribution of FTEs over the EPHOs per region was calculated as the sum of all the hours spent per EPHO, per region, divided by 36.

Principal component analysis (PCA) was used to identify EPHO patterns among the respondents. PCA was performed with 11 components (EPHOs) and we used a Kaiser-Meyer-Olkin measure of 0.8, an eigenvalue >1 and orthogonal rotation (varimax).

Distribution of EPHO profiles per region was calculated based on the outcomes of the PCA analysis.

3. Association between the size of the workforce, services provided and indicators of youth health care needs
Dutch YHC professional guidelines recommend frequent scheduled contacts with the YHC organization, and routine screenings and vaccinations for all children aged < 5 years. For children aged 5-19 years, much less frequent visits are scheduled. Therefore, the number of children aged <5 years can be considered a need indicator for YHC. Our hypothesis was that there would be an association between regional variations in the numbers of children aged < 5 years and the size of the YHC workforce, expressed in the number of children aged < 5 years per YHC professional. (13)
Reducing inequalities in the distribution of determinants of health and child health is one of the tasks of the YHC workforce. Therefore, the percentages of children 1) living in deprived areas, 2) being referred to youth care, 3) living in poverty, 4) lagging behind at school and 5) with overweight, can be considered as need indicators for YHC. An association was assumed between indicators of YHC need per region and the size of the workforce expressed as the number of children per YHC professional.

We examined whether regional variation in indicators of need are in concordance with regional variations in workforce size.

RESULTS

Of the 48 YHC organisations throughout the Netherlands, 42 (88%) participated in this study. Within the organisations, the response rate was 51%. In total, data from 3220 YHC employees could be used for the analysis, of which 29 were from national institutions.

Size and composition of the workforce

Table 2 shows the composition and the size of the workforce. About 2/3 of the workers had >10 years of working experience within YHC. Workers had different educational backgrounds: 19% had secondary school or intermediate vocational education, 44% were trained as a professional nurse, and 24% were university trained as physician. In the North workers were older and the percentage of workers with education to secondary school or intermediate vocational education was higher. For the other characteristics, no or only small differences were found between the regions. In all regions, the number of nurses is about two times the number of physicians, reflecting the skills mix.

The total size of the workforce was estimated at 7000 YHC workers, corresponding to 4934 FTEs. The absolute number of YHC workers ranged from 524-2649 per region. The number of children per professional ranged from 688-1007. The absolute and relative workforce size was highest in the West of the Netherlands. Similar to the pattern of the number of children per professional, the number of children per professional for children aged <5 years ranged between regions from 163-223, with the lowest number of children aged <5 years per professional in the North (Table 2).
Enumerating the preventive youth health care workforce: size, composition and regional variation in the Netherlands

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Services provided
Figure 1 shows the distribution of the total FTEs across the different EPHOs. All EPHOs were provided; most FTEs were spent on the essential operations ‘Surveillance’, ‘Health promotion’ and ‘Disease prevention’ and the least FTEs were spent on the EPHOs ‘Health protection’ and ‘Psycho-social health incidents’. As the EPHO patterns were almost the same in all regions, only the overall picture is presented here.

Figure 1 | Percentage of full time equivalents per YHC essential public health operation

<table>
<thead>
<tr>
<th>Essential public health operations</th>
<th>% FTEs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Surveillance of youth health and wellbeing</td>
<td>35</td>
</tr>
<tr>
<td>2. Monitoring and response to psycho-social incidents and emergencies</td>
<td>30</td>
</tr>
<tr>
<td>3. Youth health protection</td>
<td>25</td>
</tr>
<tr>
<td>4. Youth health promotion, addressing social determinants, health inequity and including advocacy communication and social mobilisation for health</td>
<td>20</td>
</tr>
<tr>
<td>5. Disease prevention, including early detection of illness</td>
<td>15</td>
</tr>
<tr>
<td>6. Promote, develop and support youth health public policy</td>
<td>10</td>
</tr>
<tr>
<td>7. Assuring a sufficient and competent YHC workforce</td>
<td>5</td>
</tr>
<tr>
<td>8. Assuring access to YHC and quality of YHC</td>
<td>0.5</td>
</tr>
<tr>
<td>9. Advancing YHC research to inform policy and practice</td>
<td>-</td>
</tr>
<tr>
<td>10. Assuring a YHC safety net</td>
<td>-</td>
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<tr>
<td>11. Management and team leadership</td>
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</table>

PCA identified two EPHO profiles (Table 3). The first indicates involvement in preventive and other operational services (EPHO 1 monitoring, 4 health promotion, 5 prevention, 7 assuring a competent workforce, and 10 health safety care net). The second profile is characterised by employees involved in governance for health and management (EPHO 6 governance for health, 9 research and development, 8 assuring access and quality, 11 management and team leadership, 3 health protection). Of all respondents, 78% could be assigned to either one of the EPHO profiles, about 50% to the prevention or ‘operational’ profile, about 25% to the governance for health or ‘policy profile”; nearly 25% could not be assigned to a specific profile, with only small variations between regions. The operational profile was slightly more prevalent in the East, corresponding to the higher percentage of nurses in the East.

Table 3 | Principal component analysis (Varimax rotation) - components and factor loadings of Essential Public Health Services

<table>
<thead>
<tr>
<th>Practice profile</th>
<th>Policy profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Disease prevention</td>
<td>0.83</td>
</tr>
<tr>
<td>4 Health promotion, advocacy communication</td>
<td>0.73</td>
</tr>
<tr>
<td>5 Health safety net</td>
<td>0.72</td>
</tr>
<tr>
<td>7 Assuring competent workforce</td>
<td>0.70</td>
</tr>
<tr>
<td>10 Surveillance, monitoring of youth health</td>
<td>0.58</td>
</tr>
<tr>
<td>6 Promote, develop public policy</td>
<td>0.74</td>
</tr>
<tr>
<td>2 Advancing Research &amp; Development</td>
<td>0.70</td>
</tr>
<tr>
<td>3 Assuring access to and quality of YHC</td>
<td>0.59</td>
</tr>
<tr>
<td>9 Management and team leadership</td>
<td>0.54</td>
</tr>
<tr>
<td>11 Health protection</td>
<td>0.46</td>
</tr>
<tr>
<td>8 Psycho-social incidents</td>
<td>-</td>
</tr>
</tbody>
</table>

Variation in indicators of preventive youth health care needs
The regional variation in the proportion of children with overweight was small. Because the other indicators of YHC need also showed small regional variation (children in deprived areas, referral to youth care, lagging behind at school), the regional variations in workforce size were not reflected in regional variations in need. However, in the North, the percentage of children living in poverty was high and the workforce size relatively low.
and hours spent per EPHO of respondents and non-respondents is recommended. The second limitation is that the data are self-reported; therefore, it is unknown whether the outcomes, e.g., the average time spent per EPHOs, reflect the actual time spent on EPHOs at individual level.

Third, classification into four regions might have diluted a possible association between higher YHC needs in the larger cities, e.g., due to more ethnic diversity, and the services delivered. Unfortunately it was not possible to perform the analysis on smaller regions as we had to guarantee the anonymity of individual organisations. We recommend to analyse possible associations between workforce capacity and indicators of youth health care needs in smaller regions, for example at the level of YHC organisations.

Finally, our results did not provide evidence for an explanation of regional differences in YHC workforce by corresponding differences in YHC 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 implementing a standardized national data collection with epidemiologic data on youth health, for example by pooling the standardized data collected by YHC organisations. Furthermore, empirical evidence on the relation between health needs and requirements of the workforce is lacking and also needs further study. However, the indicators used are relevant determinants for population health needs. Moreover, the epidemiological and socio-cultural factors we used are elements of the health human resource planning model applied in the Netherlands to estimate the training inflow of YHC physicians. (15-17)

**Interpretation**

Our study clearly demonstrates the multi-disciplinarity of the workforce. About half of the workforce consisted of YHC nurses, about a quarter was YHC physician and the remainder had various educational backgrounds, such as dieticians, medical assistants, and speech therapists. The current health human resource planning model used in the Netherlands by the Advisory Committee on Medical Manpower planning (’Capaciteitsorgaan’) is a mono-professional model to estimate the training inflow of physicians, including YHC physicians. (17) Taking our results into account, implies that central workforce planning is only targeting 25% of the total YHC workforce. To address the whole workforce and to include the dynamics of e.g. task-shifting policies, health human resource planning should be integrated and, at least, include YPH nurses in the workforce planning. (9)

No regional variations were found in the EPHO patterns. This could be a reflection of the existing practice guidelines for YHC, i.e. the basic duties package. This package is offered to all children and includes schedules on the number of YHC visits and health checks that should be performed (13). We observed regional variations in the size of the workforce that could not be explained by regional variations in the indicators of YHC need. Wide variations in staffing levels across local public health systems have
been reported and might be explained by differences in the size of the public health organisation. (18, 19) However, our data do not support a relationship between YHC organisational size and workforce size, as three large YHC organisations are located in the West where the highest workforce size was found. Ideally, we would expect the levels of YHC need in the youth population to be congruent with the YHC workforce in terms of size, composition and services provided. (8, 20, 21) However, our study does not support this expectation, which suggests that some youth populations are under-served or over-served, indicating room for improving YHC workforce planning. The present study used a strategy that was previously developed and tested. Despite some limitations, we think the use of this strategy to enumerate the public health workforce is an improvement on current practice and can support YHC workforce planning. Central and structured workforce planning in the Netherlands is limited to the estimation of training inflow of qualified public health physicians, including YHC physicians. However, our results on the YHC workforce revealed that about a quarter of the YHC workforce consists of YHC physicians. Examples of other disciplines within the workforce were public health nurses, speech therapists, health promotion specialists and policy makers. For these disciplines no registers and no central workforce planning exist. Previous work on human resource planning in health care, addressed the shortcomings of mono professional planning. (8) Integration of different occupations into health workforce planning was mentioned as a need to improve health human resource planning. A change from mono-professional public health workforce planning to planning of the whole workforce, is necessary to optimize the contribution to population health. A first step towards integrated workforce planning and development is the 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 supports this, but requires further development and implementation.

Because of obvious differences in (public) health systems between EU member states, the results on the size and composition of the preventive youth health care workforce cannot just 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 Eur member states, the strategy we developed for public health workforce assessment might also be applicable in other EU member states. Nevertheless, further research is required to develop the international applicability of our strategy. A strength of this strategy is that it allows enumeration across different organisations and among different professional disciplines. (7, 10) Another strength is that the strategy allows to assess not only the size and composition of the workforce but also the services provided. However, as YHC is organised differently within the EU countries, existing standards on the required children-to-provider ratio are difficult to compare.

**CONCLUSIONS**

This study provides insight into the national YHC workforce and regional variations in the size, composition and services provided. The essential public health operations provided by the YHC workforce and the regional variations in children per YHC professional were not in line with indicators of YHC needs, indicating room for improvement of YHC workforce planning. Insight in the public health workforce is an important condition for improvement of public health workforce planning. Our strategy, based on essential public health services offers promising results to enumerate the public health workforce in general, as a starting point to improve the empirical basis for workforce planning and development. However further development and validation of our strategy to characterize the public health workforce are needed. Additional research is needed to elucidate the associations between workforce size, composition and YHC needs, to support workforce planning to optimally promote, prevent and protect youth health.
REFERENCES


