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Health in All Policies: a cross-sectional study of the Public Health Coordinators' role in Norwegian municipalities

Abstract

Aims: Public Health Coordinator (PHC) is a municipal-government position in Norway whose role is to organize and oversee municipal policies and functions to support national public-health goals. This cross-sectional study investigates conditions associated with use of PHCs by Norwegian municipalities in the period immediately before the new Public Health Act came into effect in 2012, decentralizing responsibility for citizen health to the municipal level. This study provides descriptive baseline data regarding Norwegian municipalities' use of PHCs in this time –a marker for municipal engagement with inter-sectorial collaboration –before this policy was nationally mandated, and explores whether municipal characteristics such as structure, socioeconomic level, and extent of Health in All Policies (HiAP) implementation were associated factors. *Methods:* All Norway's municipalities (N= 428) were included. We combined Norwegian register data with survey data. Descriptive analyses and bi- and multivariate logistic regression analyses were performed. *Results:* 76% of Norwegian municipalities employed a PHC in the period just before 2012. 22% of the PHCs were employed full-time and 28% were located within the staff of the chief executive office. Our study indicates that partnership for health promotion with county councils (OR 7.78), development of a health overview (OR 3.53), collaboration with non-government sectors (OR 2.85), and low socioeconomic status (OR .46) are significantly associated with Norwegian municipalities having a PHC. *Conclusions:* This study suggests that the municipality's implementation of HiAP, as well as lower socioeconomic indicators, is associated with the use of PHCs in Norway, but not factors related to municipal structure.

Key Words: *Public health, health promotion, public health coordinator, governance for health, implementation, health in all policies, inter-sectorial collaboration, inter-sectorial coordination, Norway*

Introduction

The World Health Organization's (WHO) Health Promotion (HP) effort emphasizes the need for effective governance with regard to the social determinants of health and the principle of Health in All Policies (HiAP) as key strategies for building a healthier world [1-3]. In Norway public-health work is strongly influenced by the HP tradition [4]. Since 2003 policies to implement the principles of HiAP and reduce social inequalities in health have been highly prioritized [5-7], goals also reflected in Norway's new Public Health Act, which took effect in 2012 [8]. The HiAP approach emphasizes a high level of inter-sectorial coordination of HP activities [9-11]— within and between public, private, and voluntary sectors —with the aim of improving synergies, reducing fragmentation, and decreasing duplication [9]. The Public Health Act gives Norwegian municipalities —in their roles as planning authorities, community developers, and service providers —the main responsibility for HP. This responsibility includes ensuring and managing inter-sectorial coordination to achieve HiAP [8, 12, 13], and toward this end the central government recommends that municipalities establish the position of Public Health Coordinator (PHC) [6, 8].

The role of a PHC is to “glue together” inter-sectorial HP in the municipalities. The role of the PHC —a single position which can be full-time or some portion thereof —is to coordinate diverse sectors in the HP chain when municipalities undertake classical HiAP policies such as health overviews, health-impact assessments, and sustainable actions to address the social determinants of health [6]. The HiAP approach recommends situating PHCs high in the political chain of command, such as in the staff of the chief executive officer, to facilitate involvement in setting the overall policy agenda, including municipal planning [6, 8].

Establishing PHCs in municipalities was first recommended in 2003 in the white paper “Prescription for a healthier Norway” [6]. The central government funded county councils to initiate HP partnerships with municipalities within their region, with funding a municipal

PHC potentially an aspect of these agreements. By 2007 all county councils had initiated such agreements with the central government, and started to establish these municipal partnerships [14].

Norwegian municipalities –which range from 216 to about 600 000 inhabitants –enjoy great autonomy in adapting central policies to local conditions. Especially after the Public Health Act of 2012, this goes also for HP policy and activities. The HiAP approach is realized through horizontal and vertical coordination of HP activities/initiatives as well as coordination of municipal initiatives with activities performed in the private and voluntary sectors [15].

Such coordination presupposes a high awareness of the HiAP approach. The Norwegian authorities have developed several strategies to implement the approach, such as partnerships for HP and the project Health in Planning, which aimed to raise the profile of HP in municipal planning.

Norwegian municipalities are self-governed systems that vary in terms of political profile, administrative structure, socioeconomic characteristics, and access to resources. Some studies have suggested that variation in *municipal structural factors* (such as size, revenues, political profile) and *municipal socioeconomic factors* (such as degree of social assistance, level of unemployment, and level of education) determine how municipalities implement HiAP [14, 16-18]. Worldwide, there is a call for research related to inter-sectorial coordination in relation to HiAP [9, 11, 19, 20]. There exists some research on PHCs in Norway [16], but knowledge on associations between employment and use of PHCs and characteristics of the Norwegian municipalities is lacking.

This study had two main aims. First, we wanted to provide descriptive baseline data regarding Norwegian municipalities' use of PHCs immediately before the new Public Health Act was enforced in 2012. We wanted to investigate:

- the employment of PHCs in Norwegian municipalities
- whether the PHC worked full-time, or if part-time, what proportion of full-time
- whether the PHCs were located within the staff of the municipal chief executive officer
- to what extent the PHCs were involved in municipal planning

Second, we wanted to explore whether municipal characteristics such as *municipal structure* (e.g., size and organization of government), *municipal socioeconomic status* (e.g., citizens' education and income), and extent of *municipal HiAP implementation* (e.g., health impact assessments and partnership) were associated with the four PHC variables listed above.

Materials and methods

Material

This cross-sectional study is part of the SODEMIFA project [21] investigating the implementation of policies to even-out the social health gradient at the national, regional, and local levels in Norway. All 428 municipalities in Norway were included in the study. Data on municipalities were collected from three different sources: Statistics Norway (SSB), the municipal database administrated by Norwegian social scientific data services (NSD), and the Norwegian Labour and Welfare Administration (NAV). In addition, data were collected by use of two questionnaire studies: the “Municipal Organization 2012” [22] and the “Baseline study” [16]. Both questionnaires were sent electronically to official e-mail addresses in all the municipalities in Norway, with the first addressed to the administrative manager and the second addressed to the chief executive officer. All municipalities in Norway have a unique identification code and all data from the different sources were linked by use of this code.

Data were collected during autumn 2011 and spring 2012; that is, immediately before the implementation of the new Public Health Act.

Data from the registries were more or less complete for all the municipalities (n=428-375, Table I). The response rate for the “Municipal Organization 2012” study was 79%. For the “Baseline study” a total of 58% of the municipalities completed the entire questionnaire and 87% of the municipalities responded to parts of it. Compared to the first part, the last part of the total questionnaire had more missing values. In this study, we included only answers from the former. Both questionnaires were evaluated for content validity by reviewing relevant literature, consulting relevant professionals and making comparisons with relevant past surveys.

Variables

Structural factors of the municipalities

The size of the municipalities (SSB) was categorized into five categories: <3000 inhabitants (0), 3000-4999 inhabitants (1), 5000-9999 inhabitants (2), 10000-34999 inhabitants (3) and >35000 inhabitants (4). The *political profile* was constructed by obtaining the political affiliations of all the municipal mayors (NSD). Based on these data we grouped the municipalities into: right-wing (0), centre (1) and left-wing (2) political orientation. To describe the *organization of government*, we included the following question from the “Municipal Organization 2012”; “How many management levels are there between the level of administration and heads of executive services?” The response alternatives were: no level (1), one level (2), two levels (3), several levels (4), and varies between services (5). We recoded the variable into: varies between services (0), several levels (1), two levels (2), one level (3) and no level (4). *Municipal revenues* (SSB) were registered in Norwegian kroner

(NOK) (1 euro equals about NOK 8 (2011), and divided into 3 categories: <40000 NOK (0), 40001-55000 NOK (1) and >55000 NOK (2).

The socioeconomic factors of the municipalities

We used four variables to describe what we label the socioeconomic status of municipalities: the percentage of the municipality's population receiving *social assistance* (SSB) and *unemployment benefits* (NAV) and the citizens' *educational level* (SSB recorded as the percentage of citizens with higher education than secondary school). Finally, we categorized the *median income of the citizens* (SSB) into: <260 000 NOK (0), 260 001-290 000 NOK (1), 290 001-320 000 NOK (2), 320 001-350 000 NOK (3) and >350 001 NOK (4).

Municipal implementation of HiAP

Five questions from the "Baseline study" that operationalize the *implementation of HiAP principles* were chosen. The first four were: "Has the municipality developed an overview of the inhabitants' health status?", "Has the municipality conducted impact assessments in the past year where the measures' impact on public health was addressed?", "Has the municipality participated in the project Health in Planning," and "Has the municipality established partnership for Health Promotion with the county council?" The response alternatives for all four questions were: yes (1), no (2) and do not know (3). We recoded them all into no/do not know (0) and yes (1). The last question was: "To what extent does the municipality collaborate with the private and voluntary sectors?" Possible answers were: do not know (1), not relevant (2), to a small degree (3), to a moderate degree (4) and to a great extent (5). We recoded categories 1 and 2 as missing, while to a small degree, to a moderate degree and to a great extent were recoded as respectively 0, 1 and 2.

PHC

We included four questions regarding the PHCs from the “Baseline study”. The first was “Does the municipality have a PHC?” Response categories were yes (1), no (2) and do not know (3). We combined category 2 and 3, and recoded the whole variable into “no” / “do not know” (0) and “yes” (1). The second question we included was “What proportion of full-time is the PHC's position? The response alternatives were; 10-20% (1), 30-40% (2), 50-60% (3), 70-80% (4), 90-100% (5) and other (6). We collapsed all the categories < 70% into one category (0), and $\geq 70\%$ into another (1) as 70% of full-time is considered to be a relatively large position in Norway (SSB). The third question was “Who is the PHC's immediate superior?” The response alternatives were chief executive officer (1) (28%), head of culture (2) (11%), head of health / municipal medical officer (3) (38%), head of adolescence (4) (4%), head of planning (5) (3%) and other (6) (16%). We dichotomized this variable into chief executive officer (1) and all other superiors (0). The last question we included was “Is the PHC involved in the municipal planning?” The response categories were; yes (1), no (2) and do not know (3). We recoded the response alternatives into no/do not know (0) and yes (1).

Statistical analysis

Descriptive analyses were performed for all the included variables. To investigate associations between the municipal characteristics and the employment and use of the PHC we used bi- and multivariate logistic regression analyses. By use of bivariate correlations analysis (Pearson's r) we checked for high inter correlation (>0.7) [23] without finding any indications of multicollinearity. Since the variables are related, we entered all simultaneously into the regression model by using Enter Methods to examine the contribution of each of them

when controlling for the other variables. The strengths of association are presented as odds ratio (OR) with 95% confidence intervals (95% CI).

To ensure that a sufficient number of cases were included in the multivariate logistic regressions we gave missing values from the “Baseline study” the score 0, the same score as given for “no” / “do not know”. This missing substitution does not affect the conclusions in any important way since we are concerned with the positive “yes” responses (=1), and will not overestimate the significant effect for the “yes” responses. The significance level was set at $p < 0.05$, and all tests were two sided. The SPSS 21.0 computer package was used for the statistical analyses.

Ethics

The Norwegian Social Science Data Service (NSD) approved this study. The participants in the “Municipal Organization 2012” and the “Baseline study” gave their written informed consent by returning the questionnaire. The rest of the data are obtained from open public registries.

Results

Descriptive data concerning the PHC

In this study, 252 (76%) of the municipalities in Norway ($n = 332$) responded that they had employed a PHC (Table I). Of these, 55 (22%) had employed PHCs full-time ($\geq 70\%$) and 70 PHCs (28%) had a chief executive officer as their immediate superior. A total of 133 PHCs (49%) were involved in the local government's overall municipal planning processes.

Table I. Descriptive data on Norwegian municipalities and Public Health Coordinators.

Factors	No. (%)	Mean ±standard deviation
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Municipal structural factors

Size	n= 428	1.38± 1.30
<3000 inhabitants	162 (38)	
3000-4999 inhabitants	70 (16)	
5000-9999 inhabitants	88 (21)	
10000-34999 inhabitants	88 (21)	
≥35000 inhabitants	20 (4)	
Political profile	n= 375	
Right orientation	124 (33)	
Centre orientation	104 (28)	
Left orientation	147 (39)	
Municipal hierarchy	n= 335	
Varies between services	53 (16)	
Several levels	3 (1)	
Two levels	39 (12)	
One levels	121 (36)	
No levels	119 (35)	
Municipal revenues	n= 418	1.11± 0.58
<40000 NOK	48 (12)	
40001-55000 NOK	275 (65)	
>55000 NOK	95 (23)	

Municipal socioeconomic status

Social assistance (NOK)	n=428	2.40 ± 1.03
Unemployment benefits (NOK)	n=427	1.16 ± 0.52
Citizens education level (Years)	n=426	21.30 ± 5.81
Citizens median income (NOK)	n=426	1.81 ± 0.66

Municipal implementation of HiAP

Health overview	n= 296	
No/ do not know	243 (82)	
Yes	53 (18)	
Health impact assessment	n= 271	
No/ do not know	239 (88)	
Yes	32 (12)	
Participation in Health in Planning	n= 247	
No/ do not know	204 (83)	
Yes	43 (17)	
Partnership with county councils	n= 256	
No/ do not know	56 (22)	
Yes	200 (78)	
Collaboration with private and voluntary sector	n= 219	
Small degree	70 (32)	
Moderate degree	110 (50)	
Great extent	39 (18)	

Public Health Coordinator (PHC)

Employment of PHC	n= 332	
No/ do not know	80 (24)	
Yes	252 (76)	
Proportion of full-time for PHC	n= 252	
<70	197 (78)	
≥70	55 (22)	
Location of PHC	n= 251	
Other supervisor	181 (72)	
Chief executive officer	70 (28)	
PHC involvement in community planning	n= 251	
No/ do not know	137 (51)	
Yes	133 (49)	

NOK= Norwegian Kroner

Associations between characteristics of the municipalities and employment of the PHC

The bivariate analyses (Table II) show that employment of a municipal PHC was significantly associated with a low median income among the municipality's citizens (OR= 0.75; CI: 0.52-1.10), municipality's participation in the Health in Planning project (OR= 4.84, CI: 1.46-16.11), and having established partnership for HP with the county council (OR= 8.78; CI: 4.86-15.88). The significant association for participation in the Health in Planning project disappeared when controlling for the effect of the other variables in the multivariate analyses, whereas the relatively strong association for partnership for HP was only slightly reduced (OR=7.78; CI: 3.57-16.94). The significant association between low median income and having employed a PHC was also retained in the multivariate analysis (OR= 0.46; CI: 0.24-0.89).

Table II. Logistic regression analyses between characteristics of the Norwegian municipalities and Public Health Coordinators.

Factors	Employment of PHC		Proportion of full-time for PHC		The administrative location of the PHC		Involvement of PHC in community planning	
	<u>Bivariate</u> OR (95 % CI)	<u>Multivariate</u> OR (95 % CI)	<u>Bivariate</u> OR (95 % CI)	<u>Multivariate</u> OR (95 % CI)	<u>Bivariate</u> OR (95 % CI)	<u>Multivariate</u> OR (95 % CI)	<u>Bivariate</u> OR (95 % CI)	<u>Multivariate</u> OR (95 % CI)
<i><u>Municipal structural factors</u></i>								
Size	1.11 (0.91-1.33)	1.06 (0.67-1.66)	1.83 (1.42-2.37)	1.60 (0.95-2.68)	0.78 (0.63-0.97)	1.13 (0.79-2.06)	1.33 (1.10-1.60)	1.13 (0.75-1.71)
Political profile								
<i>Right orientation</i>	1.00		1.00	1.00	1.00	1.00	1.00	1.00
<i>Centre orientation</i>	0.51 (0.26-1.01)	0.59 (0.24-1.44)	0.96 (0.44-2.30)	0.80 (0.31-2.12)	0.76 (0.36-1.58)	0.89 (0.34-2.35)	0.84 (0.45-1.58)	0.89 (0.34-2.02)
<i>Left orientation</i>	0.72 (0.37-1.38)	0.79 (0.32-1.92)	0.71 (0.35-1.48)	0.62 (0.25-1.53)	0.88 (0.46-1.70)	1.45 (0.62-3.37)	0.84 (0.47-1.49)	0.79 (0.38-1.65)
Municipal hierarchy	0.88 (0.70-1.11)	0.95 (0.71-1.26)	1.08 (0.84-1.38)	1.15 (0.87-1.50)	1.23 (0.96-1.58)	1.29 (0.97-1.71)	0.95 (0.78-1.16)	1.07 (0.85-1.34)
Municipal revenues	1.00 (0.64-1.55)	1.90 (0.82-4.38)	0.55 (0.32-0.96)	1.12 (0.46-2.76)	1.78 (1.07-2.96)	2.41 (0.99-5.85)	0.62 (0.40-0.96)	1.01 (0.53-2.28)
<i><u>Municipal socioeconomic status</u></i>								
Social assistance	0.91 (0.72-1.15)	0.84 (0.55-1.28)	0.97 (0.70-1.34)	0.86 (0.51-1.44)	1.21 (0.91-1.62)	1.22 (0.80-1.85)	0.95 (0.74-1.22)	0.90 (0.62-1.30)
Unemployment benefits	1.11 (0.64-1.92)	1.94 (0.67-5.64)	1.37 (0.72-2.59)	2.32 (0.72-7.49)	0.55 (0.29-1.08)	0.64 (0.24-1.77)	1.31 (0.76-2.27)	1.90 (0.71-5.05)
Citizens educations level	1.01 (0.99-1.01)	1.12 (1.02-1.23)	1.08 (1.03-1.13)	1.01 (0.96-1.13)	0.95 (0.90-1.00)	0.97 (0.89-1.05)	1.04 (0.99-1.08)	0.99 (0.92-1.07)
Citizens median income	0.75 (0.52-1.10)	0.46 (0.24-0.89)	1.49 (0.95-2.34)	0.89 (0.43-1.87)	0.57 (0.36-0.89)	0.86 (0.44-1.69)	1.06 (0.73-1.53)	1.00 (0.56-1.79)
<i><u>Municipal implementation of HiAP</u></i>								
Health overview	2.28 (0.98-5.25)	1.03 (0.36-2.98)	2.09 (1.03-4.24)	1.85 (0.76-4.51)	1.26 (0.62-2.55)	1.56 (0.63-3.88)	3.19 (1.56-6.16)	3.53 (1.51-8.29)
Health impact assessment	3.21 (0.95-10.85)	1.34 (0.25-7.23)	2.21 (0.96-5.12)	1.88 (0.62-5.72)	0.68 (0.26-1.75)	0.47 (0.12-1.87)	3.55 (1.53-8.22)	2.14 (0.72-6.40)
Participation in Health in Planning	4.84 (1.46-16.11)	1.89 (0.44-8.22)	2.25 (1.08-4.68)	0.81 (0.30-2.18)	0.87 (0.40-1.90)	0.76 (0.24-2.46)	2.45 (1.23-4.88)	1.38 (0.56-3.44)
Partnership with county council	8.78 (4.86-15.88)	7.78 (3.57-16.94)	1.46 (0.72-2.97)	1.84 (0.69-4.87)	1.13 (0.61-2.12)	0.82 (0.36-1.83)	3.91 (2.14-7.16)	4.41 (2.01-9.33)
Collaboration with private and voluntary sector	1.28 (0.81-2.01)	1.07 (0.50-2.27)	0.98 (0.59-1.65)	1.07 (0.56-2.03)	2.19 (1.33-3.61)	2.85 (1.42-5.70)	1.23 (0.84-1.81)	1.22 (0.74-2.02)

OR = Odds ratio
 CI = Confidence interval
 Significant associations in **bold**

Associations between characteristics of the municipalities and the proportions of full-time of the PHC position

The bivariate analyses (Table II) show that municipalities with many inhabitants (OR= 1.83; CI: 1.42-2.37) and receiving low municipal revenues (OR= 0.55; CI: 0.32-0.92) were significantly associated with employing a PHC full-time. Having provided a municipal health

overview (OR= 2.09; CI: 1.03-4.24) and participating in the Health in Planning project (OR= 2.25; CI: 1.08-4.68) were also bivariately associated with employing a PHC full-time. In the multivariate analysis, none of the significant associations were retained.

Associations between characteristics of the municipalities and the administrative location of the PHC

Bivariately, small municipalities (OR= 0.78; CI: 0.63-0.97), high municipal revenues (OR= 1.78; CI: 1.07-2.96), low median income (OR= 0.57; CI: 0.36-0.89), and collaboration with private and voluntary sectors (OR= 2.19; CI: 1.33-3.61) were significantly associated with having located the PHC within the staff of the municipal chief executive officer (Table II). Only the association between collaboration with the private and voluntary sectors and location of the PHC was retained in the multivariate analysis (OR= 2.85; CI: 1.42-5.70).

Associations between characteristics of the municipalities and the involvement of the PHC in community planning

The bivariate analyses (Table II) show that six of the municipal characteristics were significantly associated with involvement of the PHC in the municipal planning, but only the associations of the two “implementation of HiAP” variables –health overview, and partnership with the county councils –were retained in the multivariate analysis with odds ratios of respectively 3.53 (CI: 1.51-8.29) and 4.41 (CI: 2.01-9.33).

Discussion

We were interested in how Norwegian municipalities employed and used the PHC immediately before the implementation of the new Public Health Act. This study shows that

over three-quarters of the municipalities had employed a PHC. A total of 22% of the PHCs were employed full-time, and 28% of them were located within the staff of the chief executive officer. Our study shows that partnership for HP with county councils, collaboration with private and voluntary sectors, development of a health overview and low median income are significantly associated with the employment and use of PHCs in Norway.

Municipalities with partnership for HP with county councils have employed PHCs

We found that 76% of the Norwegian municipalities had employed a PHC, which is an increase from the 62% reported in 2009 [17] and in line with Norwegian policy that recommends and highlights this function for inter-sectorial work [6, 8]. We found that municipalities that had entered into vertical partnerships with the county council were nearly 8 times more likely to have employed a PHC than other municipalities. Those partnerships involve a combination of county funding support for a PHC position with the corresponding obligation on the part of the municipality to establish a PHC and share in the cost, to foster local government “ownership” of the PHC. In contrast to previous research, we found that structural factors of the municipalities such as size, political profile, or revenues were not associated with the municipalities’ use of PHCs. One could have expected the opposite: According to a previous study [24], larger municipal size was associated with employment of PHCs, and the literature [25, 26] emphasises that HP initiatives generally are associated with left-of-center governments.

Gap between intentions and practises of the PHC

Norwegian central government policy documents and earlier studies have pointed out that the PHC should increase the municipal administrative capacity to engage in inter-sectorial HP [6,

8, 14, 17], and establishing the PHC as full-time and situated higher in the administrative hierarchy can be seen as conditions for such an increase. The PHC is identified as an “inter-sectorial facilitator” whose role is to be a collaborative link between different municipal sectors [9]. We found that only 22% of the PHCs in the municipalities were employed full-time ($\geq 70\%$ of full-time). When 78% of the Norwegian municipalities have employed the PHC part-time ($< 70\%$) there is reason to believe that a gap exists between intentions and practise. When PHCs have low part-time positions, it may be hard to fulfil the intention of inter-sectorial facilitation in complex municipal organisations. Our study did not find associations between municipal characteristics and the proportion of full-time for the PHCs in the multivariate analysis, but bivariate analyses indicated that larger municipalities were nearly twice more likely to have employed a PHC full-time. This finding is in accordance with suggestions of previous Norwegian studies [16, 24].

This study indicates that few municipalities have PHCs in positions where they have an optimal overview of the planning process and decision-making, since only 28% of the PHCs were located within the staff of the chief executive officer. Another Norwegian study found that 46% of the PHCs were located in the health sector, under the leadership of the municipal medical officer, and argued that this is a traditional location [18]. This tendency to locate the PHCs away from the level of decision-making is found as well in a qualitative study exploring HP work in municipalities [27]. Our study shows that municipalities collaborating to a great extent with the private and voluntary sector had located the PHC within the staff of the chief executive officer. Such public / private coordination is emphasized by HiAP principles, which assert that health is created in all sectors and not in the health sector alone [11, 28]. Research has emphasised that such coordination is complex [15]. Whether situating the PHC high in the

administration encourages heightened collaboration or is an expression of a culture where collaboration is valued –or some combination –remains an open question.

On the right track

Our study found that 49% of the municipalities had involved the PHC in the municipal master plans by participation in the planning process. Municipalities having signed HP partnerships with county councils were more than four times more likely than other municipalities to involve the PHC in the community planning. Furthermore, municipalities with a health overview were approximately three-and-a-half times more likely to involve the PHC in the same process compared to the other Norwegian municipalities. Partnerships, health overviews, and involvement in municipal planning are considered to be a manifestation of the HiAP principles [19], and therefore it is not surprising that these associations occur. One study of Norwegian municipalities suggested that failure to implement HiAP may be explained by lack of competence [14]. Our findings indicate that the municipalities that developed overviews of health determinants and worked through partnerships with the county council also are the municipalities that most easily will involve their PHCs in the planning process to improve HP. This may be because they have achieved the needed competence to actually apply the strategy.

Methodological strengths and limitations

The major strength of our study is that it is the first to examine all Norwegian municipalities' employment and use of PHCs. Registry and survey data were combined with the aim of examining associations between municipal characteristics and this question.

The most important limitation is that conclusions about causality cannot be drawn because of the cross-sectional design. One can assume that the variables included as municipal structural factors are not influenced by the PHCs, and this goes probably also for the variables defined as municipal socioeconomic status. But the variables defined as "municipal implementation of HiAP" obviously may influence employment and use of PHCs, while as well, employing PHCs could influence municipalities' implementation of HiAP. For example, a municipality's development of a health overview may be influenced by having involved the PHC in municipal planning process, who could be expected to promote such a measure. On the other hand, in light of having developed a health overview, the need for involving the PHC in master plans may be clearer. Still, the close association highlighted in our results may be useful when it comes to developing future HP policy. The importance of making HiAP part of a municipality's institutional culture and discourse is strongly highlighted in the literature [9, 13, 15] as a factor in realizing the coordination of aims that underlies realizing the goals of HiAP. Our results underscore these findings in that they indicate that municipalities' ability to foster inter-sectorial cooperation is associated with employment and use of PHC –results that may help actors shape more effective policy in their HP work.

Other limitations follow from the fact that the online questionnaires from the "Municipal Organization 2012" and the "Baseline study" were addressed, respectively, to the administrative manager and the chief executive officers, but since they were sent to official e-mail addresses of the municipalities, the person responding on behalf of the municipality is unknown. Therefore, the respondents might possess varying knowledge and insight with respect to the questions in the surveys, which in turn might influence the reliability and

validity of our results. However, based on previous comparable surveys [17], the response seems trustworthy. Finally, the “Baseline study” was specially developed for the SODEMIFA project, and needs further evaluations of validity and reliability. We have confidence, however, that the results of our study are applicable to Norwegian municipalities generally, since data from 87% of these municipalities are included in this study. More broadly, this study has relevance for other Nordic countries as well, since culture and policies are related [29].

Conclusions

This study shows that over three-quarters of the Norwegian municipalities had employed a PHC immediately before Norway’s new Public Health Act came into effect in 2012, a law that passed central responsibility for public health to municipalities. Based on our results, we suggest that the central government’s policy on funding county councils to initiate HP partnerships with municipalities has been successful for the employment of municipal PHCs, who play a key role coordinating inter-sectorial governance of public health goals. We found that PHCs positioned closer to the municipal executive correlated with greater inter-sectorial collaboration for public health. Nevertheless, most of the PHCs in the period we studied were not positioned close to level of decision-making because they are organized outside the staff of the chief executive officer. Overall, we found that municipal structure was not associated with employment and use of PHCs, whereas implementation of HiAP principles was strongly associated (or that the employment of a PHC furthers that implementation), with a municipality's low socioeconomic status being a factor as well.

These results offer baseline data for future studies investigating the effects of Norway’s Public Health Act of 2012, and more generally can help policy makers refine HP strategies- and the role of the PHC in realizing them –for the Norwegian context and beyond –

especially in cases where public-health responsibility is devolved to the municipal level. Further research can explore how municipalities organize their HP work, how those efforts cohere with the principles of HiAP, and the factors associated with effective promotion of HP by PHCs in general and, in particular, inter-sectorial coordination.

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Conflict of interests

None declared

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