How do socio-economic factors and distance predict access to prevention and rehabilitation services in a Danish municipality?

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Abstract

Aim: The aim was to explore the extent to which a Danish prevention centre catered to marginalised groups within the catchment area. We determined whether the district's socio-economic vulnerability status and distance from the citizens' residential sector to the centre influenced referrals of citizens to the centre, their attendance at initial appointment, and completion of planned activities at the centre.

Background: Disparities in access to health care services is one among many aspects of inequality in health. There are multiple determinants within populations (socio-economic status, ethnicity, and education) as well as the health care systems (resource availability and cultural acceptability).

Methods: A total of 347 participants referred to the centre during a 10-month period were included. For each of 44 districts within the catchment area, the degree of socio-economic vulnerability was estimated based on the citizens' educational level, ethnicity, income, and unemployment rate. A socio-economic vulnerability score (SE-score) was calculated. Logistic regression was used to calculate the probability that a person was referred to the

centre, attended the initial appointment, and completed the planned activities, depending on sex, age, SE-score of district of residence, and distance to the centre.

Findings: Citizens from locations with a high socio-economic vulnerability had increased probability of being referred by general practitioners, hospitals, and job centres. Citizens living further away from the prevention centre had a reduced probability of being referred by their general practitioners. After referral, there was no difference in probability of attendance or completion as a function of SE-score or distance between the citizens' district and the centre. In conclusion, the centre is capable of attracting referrals from districts where the need is likely to be relatively high in terms of socio-economic vulnerability, whereas distance reduced the probability of referral. No differences were found in attendance or completion.

Keywords: access; Denmark; distance; inequity; health services; municipality; prevention; rehabilitation; socioeconomic determinants; utilization

Introduction

The pursuit of equality in health and equality of access to health care is an overriding goal and principle in Danish health policy (The Danish Government, 2013). Social inequality in health is defined by a systematic relationship between people's social position in society and their health (Diderichsen *et al.*, 2012: 6). One of the many determinants of social inequalities in health concerns utilisation of health services (Diderichsen *et al.*, 2012: 6-7).

Utilisation of health care may be used as a proxy measure for access to health care (Whitehead, 1997). Utilisation of health services is an important factor that creates social inequality in the consequences of illness including survival, disability, and labour market

participation (Diderichsen *et al.*, 2012: 70). Several studies in countries where health care is universal have found that the use of family physician and hospital services is higher in lower socioeconomic groups (Morris *et al.* 2005*;* Stirbu *et al.* 2011; Veugelers *et al.* 2003), indicating a higher need resulting from their poorer health. The same studies show that specialist services are comparatively less used in lower socioeconomic groups, bearing the potential to widen social inequality in health. In addition, routine health check-ups appear to be taken up inequitably (Dryden *et al.* 2012). Furthermore, non-attenders appear to have greater clinical need or risk factors suggesting that a differential uptake may lead to sub-optimal health gain and contribute to inequalities via the inverse care law (Dryden *et al.* 2012).

Furler (2006) discusses the role of general practice in relation to inequality in health and argues that this material resource is an important social determinant of health, which may mitigate or sustain inequalities. Kelly-Irving et al (2011) found that general practitioners tend to overestimate the health of patients with lower educational level, which could potentially result in lack of advice and referral to prevention for this group. Sørensen et al (2009) observed a socioeconomic gradient in general practitioners ' referral pattern to different sorts of specialised health care in Denmark. The use of both primary and secondary preventive services is socially distorted (Diderichsen *et al.* 2012: 77). However, it is not known whether a socioeconomic gradient exists in referral to preventive and rehabilitative health services.

Distance to health service is another factor that influences utilisation. Grace et al (2008) found in a Canadian study that distance to cardiac rehabilitation affected referral from specialised health care providers and that citizens who reside in rural areas faced geographic barriers in

order to attend rehabilitation. It is interesting whether this relationship between distance and referral and distance and attendance also exists in an urban setting with smaller distances? If there is such a relation it could have implications for where the health services should be located and what efforts should be made in order to make sure that citizens living the furthest away from the services are referred and attend.

The aim of the study was to explore if a Danish prevention centre catered for marginalised groups within its catchment area. The hypothesis was that there was a relative underrepresentation of clients from marginalised groups as well as the geographically more distant localities within the catchment area. The specific objectives were to examine if distance from the citizens' residential district to the centre and the district's socio-economic vulnerability status influenced the utilization of the centre. Utilization is defined as health care providers' referral of citizens to the centre, and, once referred, citizens' attendance to planned preventive and rehabilitative activities.

Material and methods

The Danish Setting

As part of the Health Law coming into effect January 1st 2007, Danish municipalities have taken over the main responsibility for the preventive services to the citizens (§ 119, subsections 1 and 2). These tasks are usually addressed by focusing on risk factors such as unhealthy diet, smoking, excessive alcohol consumption and sedentary lifestyle (Sundhedsstyrelsen, 2008) with the intention to prevent cardiovascular diseases (CVD), type

2 diabetes, chronic obstructive pulmonary disease (COPD and cancer. More than two-thirds of the 98 municipalities have chosen to establish prevention centres or community health centres (Deleuran, 2012) where various programs are offered, either to persons who already have a particular disease, or who are at risk of developing it.

Study area and population

The study was conducted in collaboration with the Prevention Centre Vanløse-Brønshøj-Husum in Copenhagen, Denmark. At the time of the study, the population in the centre area had 56,694 inhabitants aged 18 years or older. The municipality and the centre were purposely selected based on previous collaborative ties and the heterogeneity of the catchment area. The study included all citizens referred to the prevention centre during the period 17th December 2012 to 1th October 2013, who were then followed until 1th April 2014. The only inclusion criterion was permanent residence in the prevention centre's catchment area.

The prevention centre

The prevention centre, which has 15 staff members including physiotherapists, nurses, dieticians, and occupational therapists, provides primary prevention to adult citizens (≥18 years of age) in the catchment area. Primary prevention includes life style counselling based on motivational interviewing (Miller and Rollnick, 2002) in relation to diet, smoking, alcohol and exercise and dialogue based health activities targeting citizens with ethnic minority background. Secondary prevention to citizens with diagnosed risk factors (hypercholesterolemia, hypertension and/or prediabetes) consists of life style counselling

and a twelve week supervised exercise program. Rehabilitation for citizens diagnosed with COPD, CVD or type 2 diabetes includes the above listed programs as well as disease specific patient education and cooking classes. Participation in secondary prevention and rehabilitation require referral from general practitioner, hospital or municipal jobcentre although some persons are admitted by themselves. Citizens referred were supposed to attend an initial appointment and participate in the planned activities agreed upon.

Data sources

The prevention centre provided a list of 347 persons referred to the centre with information on age (in 10-year groups), address, route of referral and whether the person had attended the first, second or later appointment. And whether the planned activities were completed according to the plans made at the initial appointment for each of the clients.

Referral will be examined from four routes of referral: general practice, hospital, jobcentre and self-referral. Attendance (=participation) will be examined as attendance in an initial appointment and as completion of planned activities.

The prevention centre's catchment area is divided into 44 geographically demarcated statistical districts. For each district the degree of 'socio-economic vulnerability' has been estimated based on the inhabitants' educational level, ethnicity, income, and unemployment rate, and a socio-economic vulnerability score (SE-score) aggregating these four variables was defined. A higher score indicates a higher socio-economic vulnerability and a lower socio-economic status. The highest possible SE score is 20 and the lowest possible score is 5. The catchment area of the preventive centre included one district with an SE score of 5 and

several districts with SE score of 20, so that the entire socio-economic spectrum was represented among the 44 districts in the data set. From the statistical office of Copenhagen we obtained the socio-economic scores and the population distribution by sex and age (1-year classes) for each of the districts. For each participant the statistical district in which he or she lived was determined by geocoding (giving each address a location on a digital map) their addresses in a Geographic Information System (ArcGIS 10.2) and identifying within which statistical district it fell. For all statistical districts the Euclidian (as the bird flies) distance from the centroid of the district to the prevention centre was calculated. The shortest distance from a district to the prevention centre was 0.165 km and the longest distance was 3,769 km.

Referral

We created a dataset classified by district, 1-year age-group and sex. Population size was obtained from the statistical office of the town of Copenhagen; distance and socioeconomic score was assigned at district level. Each referral was assigned to one unit of this dataset. We then used the number of referred persons and total number of residents as outcome variable in a logistic regression to describe the probability that a person was referred to the centre, depending on sex, age, socioeconomic score and distance to the centre (from the district of residence). Analyses were also done for each type of referral separately.

Attendance according to appointment

The 347 referred participants were classified as: attending at first appointment (F1); attending at a later appointment (F2); and never attending (I). In the dataset of 347 referred persons we analysed the probability of following events by logistic regression:

a) Attendance at first appointment (F1 vs. F2+I)

b) Any attendance (F1+F2 vs. I) and

c) Attendance at first invitation given attendance (F1 vs. F2)

Program completion

Finally, for the subset of persons actually attending (F1 + F2) we used logistic regression to analyse the probability of completing the planned activities:

d) The probability of completing the planned activities (FF vs. IFF).

Research ethics

The study was registered at the Danish Data Registration Authority. Furthermore, the legal department of the participating municipality approved the use of secondary data for research purposes. Anonymity was ascertained and the project did not have any adverse effect on the study population.

Results

Socio-demographic profile of study participants

A total of 347 participants were referred to the prevention centre during the study period (Table 1). There were fewer males (45%) than females (55%). Participants were referred by one of four sources: General Practitioners (66%), hospital (15%), job centre (7%) and self-referral (11%).

Table 1. Characteristics of the study population (n=347)

	N (%)
Sex	
Men	155 (45)
Women	192 (55)
Age	
≤49 years	75(22)
50-59 years	81 (23)
60-69 years	106 (31)
≥70 years	85 (24)
Attendance	
Attendance at first appointment (F1)	226 (65)
Attendance at a later appointment (F2)	85 (25)
Never attended (I)	36 (10)
Completion	
Completed according to plans (out of all citizens who attended)	199 (64)
Referred from*	
Hospital	52 (15)
General practitioner	227 (66)
Job centre	25 (7)
Self referred	38 (11)

* Means of refferals is missing for 5 citizens

The number of participants reaching the various steps in the sequence of events is shown in Figure 1. A total of 36% (112/311) of the clients who showed up to the initial appointment did not complete the sequence as planned.
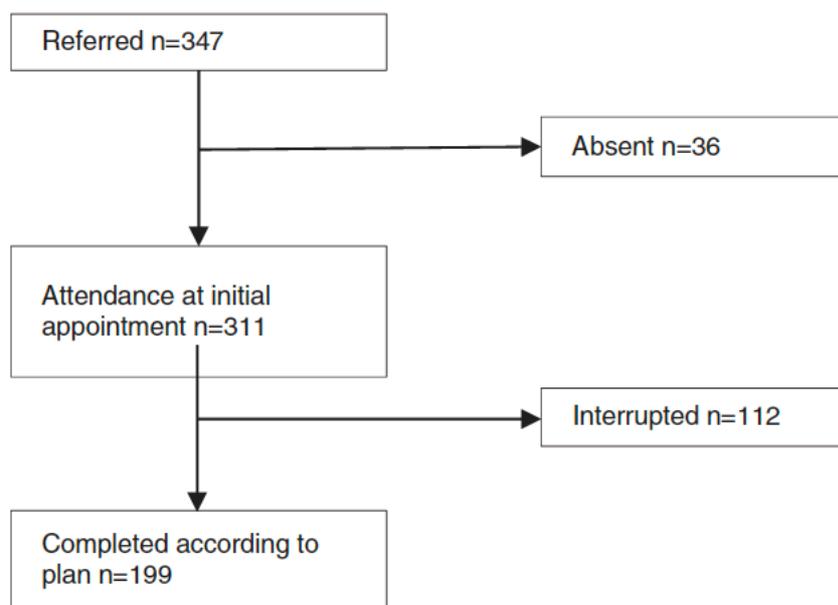
Figure 1 Flow chart of sequence of events for study participants illustrating attendance at initial appointment and completion according to plans

Referrals

The data showed that individuals from locations with a high SE-score (indicating high socio-economic vulnerability) had higher probability of being referred (Table 2). Thus, an increase of five points in the SE-score entailed an increase in the probability of referral of 40% (Table 3). Furthermore, individuals with longer distance to the prevention centre had lower probability of being referred.

Table 2. Analysis of sequence of events. Probability of 1) referral, 2) any attendance, 3) attendance at initial appointment , 4) attendance at initial appointment on attendance and 5) subsequent completion according to plans as a function of SE-score and distance.

	Events	Total	SE-score per point		Distance to centre per km*	
			OR (95 % CI)	p-value	OR (95 % CI)	p-value
Referral	347	58,694	1.07 (1.03; 1.10)	<0.001	0.80 (0.71; 0.92)	<0.001
F1 + F2 vs. I	311	347	0.99 (0.89; 1.10)	0.885	1.19 (0.83; 1.71)	0.353

F1 vs. F2 + I	226	347	1.02 (0.95; 1.09)	0.573	0.96 (0.75; 1.22)	0.742
F1 vs. F2	226	311	1.03 (0.95; 1.11)	0.515	0.89 (0.68; 1.17)	0.409
FF vs. IFF	199	311	0.96 (0.89; 1.03)	0.221	1.15 (0.90; 1.47)	0.271

* In the analysis of referrals, the sector's distance to centre was used. For analysis of subsequent sequence of events, the distance of the individuals' address to centre was used. F1: Attending at first appointment. F2: attending at a later appointment. I: never attending. FF: completed according to plans. IFF: not completed according to plans.

Additional data on routes of referral (Figure 2) showed that the referral dependence on SE-scores were stronger for general practitioner (OR=1.4 per 5), hospital (OR=1.5 per 5), and job centre (OR=2.3 per 5), compared to self-referral (OR=0.9 per 5). Individuals with longer distances to the centre had lower probability of being referred by general practitioner (OR=0.75 for each km further away), whereas the probability of being referred from hospital, job centre or self-referral were not significantly related to the distance from the centre. Women had an almost threefold higher probability of being self-referred (OR=2.8), whereas the probability of being referred from general practitioner, hospital or job centre where not significantly related to sex.
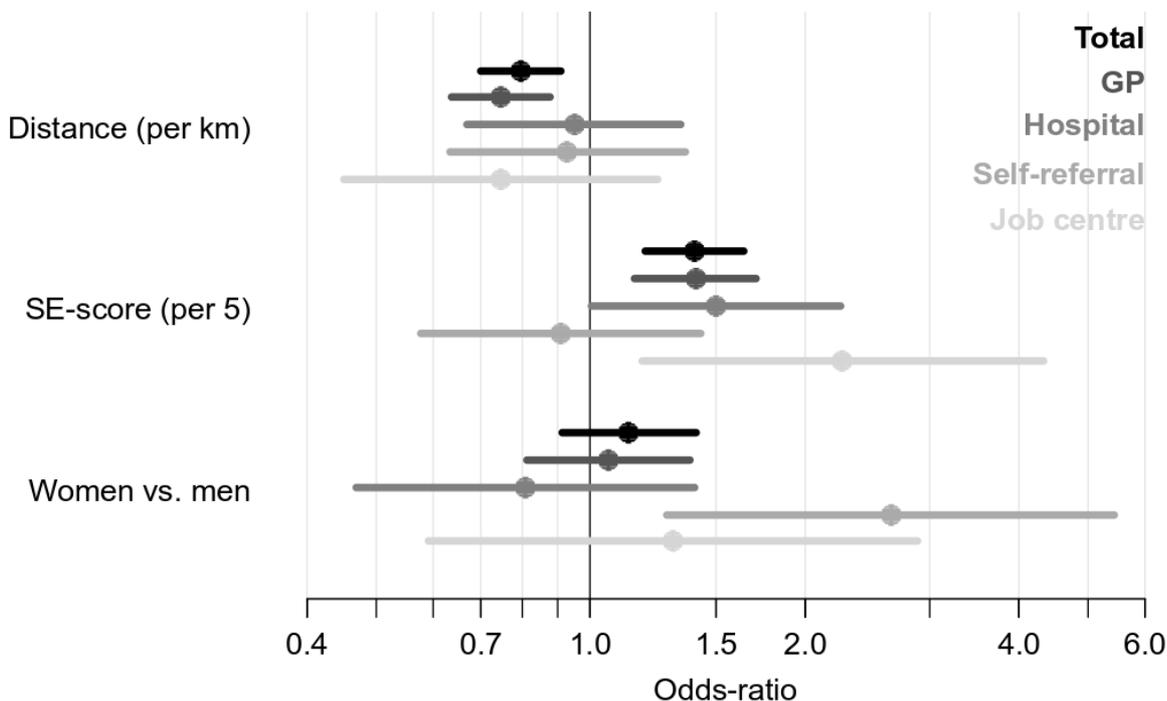
Figure 2 Estimated effects of distance, socio-economic vulnerability score (SE-score) and sex for the four types of referral. The estimated effects can only be compared within and not between the explanatory variables

Attendance and completion

After referral there was no difference in probability of attendance to initial appointment or subsequent completion according to plans as a function of SE-score or distance between the clients' district and the centre (see Table 2).

Table 3. Probability of referral as a function of SE-score.

Changes in SE-score	OR for referral
SE-score per 2 points	OR: $1.07^2=1.14$
SE-score per 5 points	OR: $1.07^5=1.40$
SE-score per 10 points	OR: $1.07^{10}=1.96$

Referred=347, n=58,694 ≥18 years. The model is adjusted for sex, age and distance to the centre.

Discussion

The aim of the present study was to examine the extent to which social factors and distance influenced the utilization of health services at a Danish municipal prevention centre - assessed in terms of probability of referral, attendance to an initial 'health talk' and subsequent completion of planned activities. The study contributes to the sparse number of studies on potential disparities in utilization of health services for CVD, COPD and diabetes risk factors, which is one aspect of health inequity. Data showed that citizens from locations with a high SE-score (i.e. a high socio-economic vulnerability) had increased probability of being referred by general practitioner, hospital, and job centre. This indicates that the centre is capable of attracting referrals from areas where the need is likely to be relatively high. However, the study does not provide an insight into the targets population's actual need of the centre's services.

Women were three times more likely to refer themselves than men, which correspond with the findings of Hoebel and colleagues (2014). Citizens living further away from the prevention centre had a reduced probability of being referred by their general practitioner. The study did not systematically explore whether this reflected that the general practitioners' clinics were also situated relatively further from the centre or whether there were other explanations. However, the results give the prevention centre a concrete possibility of entering a dialogue with the general practitioners in order to review the referral practice or arrange outreach activities.

After referral there were no differences in probability of attending the initial appointment and subsequent completion of planned activities as a function of SE-score or distance. This is an important and somewhat counterintuitive finding as it could have been assumed that socio-economic vulnerability (as indicated by high location SE-score) and relatively long distance to the centre would be associated with lower attendance and completion. Only 64% of the citizens attending the initial appointment subsequently completed the planned activities.

Krasnik (1996) argues that the amount of utilisation is only one of the dimensions of equity regarding health care. Other dimensions are access to available care for equal need and equal quality of care for equal need. In line with this argument, Whitehead (1990) defines equity in health care as: '*equal access to available care for equal need, equal utilization for equal need, equal quality of care for all*'. Guidance is therefore needed as to what we should measure and why when assessing the magnitude of the health gaps and how they change over time in relation to health policies (Braveman, 2006).

Danish municipalities already have access to various data sources with regard to distribution of diseases and risk profiles. Every four years 'health profiles' are constructed nationally (Robinson *et al.*, 2006) providing information on socio-demographic characteristics, health-related quality of life, health behaviour, morbidity, consequences of illness and social relations. The municipalities may use these to guide provision of health services for their target populations. For technical reasons, though, these health profiles aggregate data for relatively large areas (Bak *et al.,* 2011) which means that local health and socio-demographic disparities may be hidden within average figures especially in heterogeneous areas (Bak *et al.*, 2011). For example, the catchment area of the prevention centre included in this study consists of two areas within the national health profile study, whereas it consists of 44 statistical districts within the municipal administrative system.

On a practical level, the results enable the prevention centre to monitor and adjust its recruitment strategies in order to increase general practitioner's referral of citizens from distant locations within the catchment area. Moreover, the study documents that there is scope for increasing the percentage of citizens completing the planned activities thereby increasing the effectiveness of the health services provided.

The study has limitations. It would have been a stronger design if individual socio-demographical background data on all the clients were included. However, this would have entailed a much larger study set up which would be unrealistic for municipalities to conduct independently under real life circumstances. Instead, the study is based on the assumption that a citizen living in a given location is likely to share some of the location's socio-

demographic characteristics as indicated by the SE-score. The study could also have benefited from having individual socio-demographical background data on all inhabitants living in each of the statistical districts as this would have enabled a more precise assessment of vulnerability as it would have made it possible to assess the degree to which the prevention centre reached the people most in need.

The study did not distinguish between citizens referred for primary or secondary prevention or rehabilitation. The very notion of prevention has, according to Starfield et al (2008) expanded so that its meaning in the context of health services is now unclear. They argue that the merits of prevention are a function of its orientation to populations rather than to risk factors for individuals, and that the main focus of prevention ought to be the reduction of socio-economic disparities.

The 44 districts are heterogeneous not only according to variables of direct relevance to health inequity, but also to other variables. For instance the age composition is likely to vary between the locations, and this would have a bearing on need for the prevention centre's services. Moreover, apart from the services provided at the prevention centre, there may have been other agencies (e.g. NGOs) that covered the needs of the populations in some parts of the catchment area.

Conclusion

Overall, the findings from this study suggest that population groups with a higher risk of adverse health are more likely to attend preventive services than their counterparts. The findings indicate that citizens from locations with high SE-score (i.e. high socio-economic

vulnerability) had increased probability of being referred by general practitioner, hospital and job centre.

The study demonstrates how existing municipal data may be used to assess on-going activities and thereby increase effectiveness and reduce potential inequity in health. The municipalities have different strategies for providing health services to the citizens. For municipalities that have chosen to base their preventive strategies on prevention centres, such data will allow them to launch initiatives that cater for to citizens living in marginalised and/or distant parts of the catchment area. For municipalities where rehabilitation and prevention services are mainly outside the centres, the tools will guide the staff to access the citizens who are most in need. The fact that the study municipality had a detailed database on the districts' socio-economic variables provided a unique opportunity not only to conduct the present study, but it also constitutes a resource base for more general monitoring and planning municipal services.

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