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# Use of healthcare services in the residence and workplace neighbourhood: The effect of spatial accessibility to healthcare services



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## ABSTRACT

This study investigated the effect of spatial accessibility to healthcare services (HS) in residential and workplace neighbourhoods on the use of HS. Questionnaire data from the RECORD Study (2007–2008) were merged with administrative healthcare and geographic data. A novel method was developed to assess clustering of visits to HS around the residence/workplace. We found clustered use of HS around the workplace for few participants (11%). Commuting from suburbs to Paris and commuting distance were associated with a higher use of HS around the workplace. No associations were found between the spatial accessibility to and the use of HS.

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## 1. Introduction

### 1.1. Societal and scientific background

Accessibility to healthcare services has been a concern for researchers and policy makers for several decades (Penchansky and Thomas, 1981). A lack of accessibility to healthcare services is one of the major reasons for underusing or misusing healthcare services (Syed et al., 2013; Parchman and Culler, 1999). It has implications for the patient's health and for the regulation of the healthcare system (Briggs et al., 1995; Chaix et al., 2005b). A better accessibility to healthcare services is thus believed to have an effect on health outcomes through the use of healthcare services.

In previous literature, many definitions of accessibility were proposed, also because of the many dimensions of accessibility (Charreire et al., 2010; Garrett et al., 2012; Gould, 1969). A useful definition was provided by Penchansky and Thomas (1981) who distinguished five sub-dimensions: accessibility; availability; acceptability; accommodation and affordability. The present work focuses on the spatial dimensions accessibility and availability (Fortney et al.,

2000). Accessibility refers to the distance to the nearest healthcare service and in this article is referred to as proximity to avoid ambiguity with other definitions of accessibility. Spatial availability is defined as the amount of healthcare services available in a predefined area.

In health geography, spatial accessibility has been found to be an important determinant of treatment seeking behaviour (Fortney et al., 2000; Syed et al., 2013). Since people tend to limit the use of healthcare services to a relatively small area around their residence, area differences in spatial access barriers have been found to have an effect on healthcare use. Carr-Hill et al. (1996) found this to be true for in the general population, whereas others reported comparable findings in an elderly population (Chaix et al., 2005b; Okoro et al., 2005). An influence on healthcare use of spatial accessibility to services was not only documented in rural, but also in urban and well-served areas (Chandola, 2012). However, some studies that focused on specialty care did not confirm the existence of a spatial accessibility effect (Earle et al., 2002; Salloum et al., 2012) or did so only for a specific subpopulation [e.g., for men only (Chaix et al., 2005a)].

Apart from the residential neighbourhood, people are exposed to various non-residential environments that may also be relevant to health outcomes (Inagami et al., 2007; Chaix et al., 2012c, 2013). To our knowledge, no research has been conducted on the spatial accessibility to healthcare services in both residential and non-residential neighbourhoods and on its effect on the use of healthcare services.

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## 1.2. Objectives of the study

In epidemiological studies on neighbourhood and health related behaviour, it has been found that people seek resources in their residential neighbourhood (Casey et al., 2012; Karusisi et al., 2012; Stafford et al., 2005) and workplace neighbourhood (Christian, 2012). Here, we hypothesise that people may access healthcare services in both their residential and workplace neighbourhoods. More specifically, a first aim was to examine the clustering of the use of healthcare services in the vicinity of the residence and/or workplace.

In earlier research, associations have been documented between the spatial accessibility to healthcare services and the use of these services. However, most of the previous research in western societies has compared rural to urban areas (Briggs et al., 1995; Rosenthal and Fox, 2000; Saag et al., 1998). Building on findings of Chandola (2012), we examine whether the variation in spatial accessibility to care within an urban and peri-urban area has an influence on the use of healthcare services, even in the relatively well-served region of Ile-de-France. Moreover, if it turns out that people use healthcare services in the vicinity of their workplace (previous objective), it then becomes relevant to investigate whether spatial accessibility to healthcare services around the workplace is associated with a person's use of healthcare services.

We cannot make the assumption that spatial accessibility to healthcare services has the same effect on the use of all types of healthcare services. It can be hypothesised that low spatial accessibility is more easily overcome for more serious health conditions that need more specific interventions (Gesler and Meade, 1988). However, Chaix et al. (2005a) and Saag et al. (1998) associations were found between the spatial accessibility to specialised healthcare services and the use of these services, perhaps because specialty care services tend to be located further away from people's residence than primary care services. Therefore, our hypotheses were tested for four types of healthcare services separately; two frequently used services, viz. general practitioners and gynaecologists and two services related to more specific conditions and treatments, viz. cardiologists and psychiatrists.

## 2. Methods

### 2.1. Participants

We used data from the first wave of the RECORD Cohort Study (Residential Environment and CORonary heart Disease, [www.record-study.org](http://www.record-study.org)) (Chaix et al., 2011, 2012a; Karusisi et al., 2012, 2013; Leal et al., 2011; Leal and Chaix, 2011). The RECORD Cohort Study was established to investigate environmental determinants of territorial disparities in health (Chaix et al., 2012b).

Data from the first wave of the RECORD Cohort Study (Chaix et al., 2012b) were used in cross-sectional analyses. Overall, 7290 participants, between 30 and 79 years old, were recruited between March 2007 and February 2008 during free preventive medical examinations in four centres of the IPC Medical Centre located in the Paris metropolitan area (Chaix et al., 2010, 2012b; Leal et al., 2011). The medical examinations are offered every five years by the French National Health Insurance System for Salaried Workers to all working and retired employees and their families. People not insured by the National Health Insurance System for salaried workers could not be recruited for the RECORD Study: self-employed occupations (lawyers, architects, etc.), shopkeepers, craftsmen, farmers, and salaried farm workers. However, in the Ile-de-France region, working and retired employees and their families represent almost 95% of the population.

No a priori sampling of individuals was performed in the general population as a basis for inviting potential participants to the healthcare centre. We recruited participants among people

visiting the healthcare centres for a reason independent of the study, i.e., we established a convenience sample. The employed, unemployed, or retired workers or their families visiting the healthcare centres for a preventive check-up either came on their own, or were sent by their family physician or work physician, or were referred to the centre by various associations.

A priori, 10 (out of 20) administrative districts of Paris and 111 other municipalities of the Paris Ile-de-France region were selected for the study. The selection favoured districts and municipalities of which it was expected that relatively many inhabitants would visit one of the four IPC medical centres during the recruitment period. The selection also ensured the inclusion of areas with different socio-economic backgrounds and from urban and peri-urban areas. Of the persons contacted for participation during their visit at the IPC medical centres, 83.6% agreed to participate and completed the data collection protocol. The French Data Protection Authority approved the study protocol.

Only a selection of these 7290 participants was retained for the present study. People were excluded when they were not working ( $n=2787$ ) or when they were living closer than 2 km away from their work following the street network ( $n=440$ ). The latter exclusion was necessary to clearly distinguish between the spatial accessibility to services in the vicinity of the residence and to those in the vicinity of the workplace. For people living closer than 2 km away from their workplace, healthcare services could be closer than 1 km away from both the workplace and the residence. People working outside of Ile-de-France ( $n=124$ ) had to be excluded since we only had information on the location of healthcare services for Ile-de-France. Finally, participants were excluded from the analyses when their workplace could not be located ( $n=48$ ), when we had no information on their use of healthcare services ( $n=64$ ), or if data were missing for one or more of the self-reported variables used in the analyses ( $n=113$ ). All analyses were performed for the sample for which full information was available in order to have a constant sample size and a stable sample throughout all the analyses. This final sample consisted of 3777 participants in 641 TRIRIS neighbourhoods. TRIRIS neighbourhoods were formed by the French National Institute of Statistics and Economic Studies (INSEE) by aggregating three contiguous IRIS neighbourhoods from the same municipalities (IRIS neighbourhoods were created for the census). The 641 TRIRIS neighbourhoods represented in the sample comprised a median of 5 participants (interquartile range: 3, 8).

### 2.2. Data sources

An interviewer administered a survey questionnaire to the participants at baseline. The participants were invited to report information on personal and neighbourhood characteristics. Additionally, the data from a medical survey and medical tests performed by the IPC medical centres were available to the RECORD Study.

The National Information System of Health Insurances (SNIIR-AM) provided data on the use of healthcare services reimbursed by the National Health Insurance System from 2006 to 2011. The data contain information on the health professionals consulted by the participants and on the date of each consultation. We used data from the Institute of Land use Planning and Urbanism of Ile-de-France (IAU-IdF) on the location of all healthcare services in Ile-de-France. Linking the SNIIR-AM and the IAU-IdF data, it was possible to know for each participant which healthcare services were used, how many times they were used, and where these healthcare services were geographically located (geographic coordinates).

The National Old Age Insurance System (CNAV) provided the business identification code for the companies where the participants worked, as well as their salaries. The file received from CNAV gave us yearly information on the participants. It indicated the

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