Health and Place 53 (2018) 34–42

Contents lists available at ScienceDirect

Health & Place

journal homepage: www.elsevier.com/locate/healthplace

Longitudinal deprivation trajectories and risk of cardiovascular disease in New Zealand

Nichola Shackleton[a,*], Frances Darlington-Pollock[b], Paul Norman[c], Rodney Jackson[d], Daniel John Exeter[d]

[a] Centre of Methods and Policy Application in the Social Sciences (COMPASS), Faculty of Arts, The University of Auckland, Auckland, New Zealand
[b] School of Environmental Sciences, University of Liverpool, UK
[c] School of Geography, University of Leeds, UK
[d] Section of Epidemiology & Biostatistics, School of Population Health, The University of Auckland, Auckland, New Zealand

ARTICLE INFO

Keywords:
Mobility
Deprivation
Cardiovascular disease
Trajectories
New Zealand

ABSTRACT

We used longitudinal information on area deprivation status to explore the relationship between residential-deprivation mobility and Cardiovascular Disease (CVD). Data from 2,418,397 individuals who were: enrolled in any Primary Health Organisation within New Zealand (NZ) during at least 1 of 34 calendar quarters between 1st January 2006 and 30th June 2014; aged between 30 and 84 years (inclusive) at the start of the study period; had no prior history of CVD; and had recorded address information were analysed. Including a novel trajectory analysis, our findings suggest that movers are healthier than stayers. The deprivation characteristics of the move have a larger impact on the relative risk of CVD for younger movers than for older movers. For older movers any kind of move is associated with a decreased risk of CVD.

1. Introduction

Migration is an inherently selective process. It redistributes populations differentiated by stage in the lifecourse, socioeconomic status and ethnicity, to give a few examples (Boyle et al., 1998; Morrison and Nissen, 2010; Mosca and Wright, 2010; Simpson and Finney, 2009). This selective sorting is one mechanism through which neighbourhood level inequalities in health can emerge or are maintained (Boyle, 2004; Norman et al., 2005). This is a well-established area of investigation, capturing a multitude of geographies, health outcomes and populations. Yet the evidence for persistent social and spatial inequalities in health demonstrates the need to better understand the complexities of the relationship between health and migration.

Age is the strongest and most consistent predictor of migration (Plane, 1993): we are most mobile as young adults. At our most mobile, moves are commonly associated with entering higher education, seeking (graduate) employment, partnering and family formation (Fotheringham et al., 2004). In early childhood, moves may be prompted by changing housing needs while moves in later life are often associated with retirement or seeking (in)formal care. Thus, the factors governing a migration event vary with age, as does the relationship with health (Norman et al., 2005).

Young adult migrants tend to be healthier compared to young adult non-migrants, whereas older migrants tend to be less healthy than older non-migrants (Bentham, 1988; Norman et al., 2005). The apparent age- and health-selectivity of migration is complicated by wider socio-demographic attributes, individual circumstances and experience of particular health outcomes. Movers are not a homogenous group and aggregate summaries of their characteristics (e.g. their better health) are misleading (Larson et al., 2004). For example, Tunstall et al. (2014) found lower rates of poor general health and higher rates of poor mental health in aggregate analysis. But when stratified by age group, movers of all ages had equivalent or higher rates of poor general health and poor mental health relative to stayers.

The evidence for differences in health between movers and stayers varies depending not only on the health outcome in question (Boyle et al., 2002), but also the nature of the migration event. In the context of health, moves need to be defined in terms of frequency and the socio-spatial trajectory of the move. Frequent movers have the greatest risk of poor health outcomes (Geronimus et al., 2014), but highly mobile groups are disproportionately excluded from analysis given the difficulties in tracking them over time (Morris et al., 2018). Therefore, less is known about the experience of highly mobile groups. The relationship between health and migration varies depending on the socio-spatial trajectory of a move, which is important in terms of the role of selective sorting in contributing to health inequalities between areas.

* Correspondence to: COMPASS Research Centre, The University of Auckland, Private bag 92019, Auckland 1142, New Zealand.
E-mail address: N.shackleton@auckland.ac.nz (N. Shackleton).

https://doi.org/10.1016/j.healthplace.2018.07.010
Received 2 October 2017; Received in revised form 31 May 2018; Accepted 16 July 2018
1353-8292/

The health of those moving from less to more deprived areas tends to be poorer than the health of those moving in the opposite direction (Norman et al., 2005).

Although the strength of the association varies depending on the time-frame investigated, the choice of health outcome, and the measure of deprivation. For example, a study in England and Wales covering a twenty-year time period found that selective migration could contribute to widening area level health inequalities for mortality and limiting long-term illness (Norman et al., 2005). In contrast, when looking at first change of address during a 10 year time period in the Netherlands, the influence of selective migration was found to be too small to contribute to neighbourhood inequalities in health and health-related behaviours (Van Lenthe et al., 2007). More recently, a UK-based study concluded that moves towards a more socioeconomically deprived area were associated with poorer general and mental health relative to more favourable socio-spatial trajectories, however this patterning did not hold for deprivation in the physical environment (Tunstall et al., 2014). Similarly, in New Zealand, risk of hospitalisation for a cardiovascular event was found to be higher for people moving to less deprived areas than for those moving in the opposite direction (Exeter et al., 2015).

It is notable that research into the socio-spatial trajectories of a move tends to determine change through combinations of area deprivation at the start and end points of the study period. However, for individuals who move several times over the observed period, this may not be representative of their experiences of deprivation. Furthermore, new residents in an area may not have been settled long enough for aspects of that area to have an influence on their health and health behaviours (Clarke et al., 2013; Curtis et al., 2004). Estimated associations between deprivation and health for those who move near the start or end of the observed period may therefore be biased.

This paper utilises a temporally-rich, morbidity-specific dataset to gain further insights into the complexities of the health-migration relationship. We focus on cardiovascular disease (CVD), an outcome of interest for a number of reasons. Firstly, CVD is the leading cause of death globally. In New Zealand (NZ) CVD is the largest single cause of death, which for many people would be premature or preventable (Ministry of Health, 2015). Secondly, a plethora of international evidence demonstrates a consistent association between neighbourhood-level socioeconomic factors with CVD (Chan et al., 2008; Cubbin et al., 2006; Grey et al., 2010; Pujades-Rodriguez et al., 2014; Ramsay et al., 2015). For example, Chan et al. (2008) found that in NZ, people living in more deprived areas were between 1.5 and 2.5 times more likely to have CVD than people living in the least deprived areas, depending upon age. The nature of the local labour market (e.g. unemployment, instability, job-related stress), smoking uptake, healthcare provision are environmental risk factors associated with risk of CVD (Lang et al., 2012) and vary markedly by level of area deprivation. Thus, movement within and between different neighbourhoods will be pertinent to CVD risk: whether through the accumulation of exposure to pathogenic environments (Wannamethee et al., 2002), disrupting access to healthcare (Jelleyman and Spencer, 2008), influencing uptake of risky health-related behaviours, or through the complex interplay between the stress of a migration event (Oishi, 2010) combined with the stressors necessitating this move.

This paper extends existing research into the health-migration relationship in a number of ways. First, we test whether conclusions are enhanced when using a more nuanced measure of socio-spatial trajectories than differences between the first and last recorded experience of deprivation. Second, we contribute to literature examining the mechanisms driving inequalities in CVD in New Zealand, important given the prevalence of CVD-related preventable, premature deaths in the country (Ministry of Health, 2015). We use trajectory analysis to group individual's patterns of movement across deprivation quintiles in order to: i) determine the optimal number of trajectory groupings which captures the variability in movement patterns across the observed time period; and ii) model the association between these trajectories and risk of first CVD event, comparing these results with those participants who either move within the same deprivation quintile, or do not move during the study period.

Trajectory analysis has been used across different disciplines to categorise individuals into groups (Choi et al., 2012; Muthen and Muthen, 2000; Nagin and Land, 1993; Nagin and Odgers, 2010). This approach can reduce potential bias caused by loss to follow-up, and improve the efficiency of the statistical analyses by using all the available data from multiple time points rather than the first and last observations (Kenward and Carpenter, 2007; Little and Rubin, 2002). Trajectory analysis is therefore a useful tool that could offer important insights into whether specific deprivation trajectories increase the risk of CVD. To account for any existing selection effects and establish a cohort of similar risks, excluding those participants in poor health at the start of the study period is common practice (Boyle, 2004; Darlington-Pollock et al., 2016; Exeter et al., 2015; Norman et al., 2005). Following Darlington-Pollock et al.'s (2017) approach to establishing directional effects, we compare the risk of CVD for those who move prior to their first CVD event with risk of CVD for those who do not move prior to their first CVD event.

2. Data and methods

A cohort of participants was identified using an encrypted unique health identifier assigned to the majority of NZ residents enrolled in any Primary Health Organisation (PHO). These identifiers were used to link patient records in four national routine health databases: Enrolment with a Primary Health Organisation (PHO), hospital discharges, mortality records and pharmaceutical dispensing claims from community pharmacies. The cohort and sample have been described in detail elsewhere (Darlington-Pollock et al., 2016). Fig. 1 details the selection of the analytic sample. Participants were eligible for inclusion in this analysis if they were enrolled in any PHO within NZ during at least 1 of 34 calendar quarters between 1st January 2006 and 30th June 2014, were aged between 30 and 84 years (inclusive) at the start of the study period. The cohort was censored such that people who had a CVD event and then moved were counted as stayers up to the event. Participants with a prior history of CVD at 1st January 2006, or prior to joining the cohort thereafter, were also excluded from the analysis. Those who were missing any address information were removed from the sample, leaving an analytic sample of 2,418,397 individuals.

3. Ethics

Ethical approval for this study was first granted by the Multi-Region Ethics Committee in 2011 (ref: MEC/11/EXP/078) with subsequent approvals from the Health and Disabilities Ethics Committee.

4. Measures

4.1. Cardiovascular events

First major CVD event was defined by ICD-10-AM codes as a hospitalisation or death from: ischaemic heart disease; ischaemic or haemorrhagic cerebrovascular events, transient ischaemic attacks; peripheral vascular disease, congestive heart failure, other atherosclerotic CVD deaths (Wells et al., 2015). For ICD-10-AM codes see Appendix 1. Of the analytic sample, 6.93% had their first CVD event during the 34 calendar quarters observed.

4.2. Demographic measures

Age in years was treated as a continuous variable ranging from 30 to 84 (mean = 49.08, SD = 13.40). Patient's self-identified ethnicity was prioritised according to national protocols to ensure each individual was assigned to one ethnic group. This study reports results by ethnicity