Health Policy 120 (2016) 81–88

Contents lists available at ScienceDirect

Health Policy

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

Cohort effects on the need for health care and implications for health care planning in Canada

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ARTICLE INFO

Article history:
Received 6 October 2014
Received in revised form 2 June 2015
Accepted 16 October 2015

Keywords:
Need
Cohort
Health care planning
Ageing

ABSTRACT

The sustainability of publicly funded health care systems is an issue for governments around the world. The economic climate limits governments' fiscal capacity to continue to devote an increasing share of public funds to health care. Meanwhile the demands for health care within populations continue to increase. Planning the future requirements for health care is typically based on applying current levels of health service use by age to demographic projections of the population. But changes in age-specific levels of health over time would undermine this 'constant use by age' assumption. We use representative Canadian survey data (Canadian Community Health Survey) covering the period 2001–2012, to identify the separate trends in demography (population ageing) and epidemiology (population health) on self-reported health. We propose an approach to estimating future health care requirements that incorporates cohort trends in health. Overall health care requirements for the population increase as the size and mean age of the population increase, but these effects are mitigated by cohort trends in health—we find the estimated need for health care is lower when models account for cohort effects in addition to age effects.

1. Background

Historically, planning for future health care expenditures and health human resources has rested on applying current levels of workforce supply and/or service use to expected changes in the size and demographic profile of the population, with little attention given to the needs for health care within populations and the changes in those needs over time (see for example, Nova Scotia Health Research Foundation [1] and MacKenzie et al. [2]) even though the objectives of publicly funded health care systems often concern meeting needs for care and ensuring health care resources are used in ways that maximise the impact on population health. Numerous stakeholders have highlighted the importance of incorporating needs explicitly in health care planning models and the limitations of assuming implicitly that needs for care remain constant over time within age and gender subgroups of the population [3–6].

Birch et al. [3] developed an analytical framework for determining health care service requirements – and their associated health human resource requirements – based on measures of population health needs. In this framework, health care service requirements are a function of the size and age-sex distribution of the population, the need for health care within that population, and planned levels of service provision by level of need, measured in terms of some type of health status. In this paper, we focus attention

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http://dx.doi.org/10.1016/j.healthpol.2015.10.007
0168-8510/

on the need for health care component of this model, and consider how changes in health care needs can be analysed and factors underlying those changes modelled in order to inform planning for future health care services. We analyse the differences in health among different cohorts in the Canadian population over time and discuss the implications of these differences for health care planning by addressing two research questions:

Does the need for health care differ significantly among population cohorts after allowing for the age distribution of each cohort?

After allowing for cohort effects, what is the expected level of need for health care in the future and how does that compare with estimates of the future demand for health care using traditional non-needs-based models?

Our focus on needs, as distinct from demands is important because of the underlying nature of the demand for health care. Unlike many other commodities, health care consumers know little about the services they consume and rely heavily on the suppliers of care to recommend what services to 'demand' in order to achieve their desired changes in health. As a result demand for care is not independent of supply, and planning based on demands, measured by levels of utilisation or expenditures on care, will therefore incorporate (and hence perpetuate) any unmet needs for care as well as any service overutilisation. If health care systems are to pursue objectives about meeting population needs, human resource planning (as well as service and expenditure planning) must adopt such needs-based approaches [7].

2. Material and methods

2.1. Data

We use data from the Canadian Community Health Survey (CCHS) for 2001, 2003, 2005, 2007, 2010 and 2012. The CCHS is a cross-sectional survey, whose survey samples were constructed to provide reliable cross-sectional data on the health of the Canadian population, and include data on family physician and hospital utilisation as well as self-reported measures of health problems such as chronic and acute conditions. We weigh all analyses using the CCHS sampling weights which aim to ensure the sample represents the Canadian population at the time of each survey.

In order to analyse cohort effects, we use data on age, birth year, year of observation (i.e., survey year) and health status (a proxy for health care need). Age is recorded in five-year age bands for ages 15–79 with additional age categories of 12–14 and 80+. Birth year is given by subtracting age from the year of observation. Since age is banded, only birth year intervals can be derived.

Fig. 1 shows how cohorts progress over age groups in the CCHS survey period. Because time between surveys was not consistent birth year intervals do not always match with cohort intervals. For example, in Fig. 1, the age group 15–19 in 2001 covers two cohort periods (1980–1984 and 1985–1994). We assign individuals to specific cohorts based on the highest proportion of the possible birth year among the two cohort bands. For age group 15–19, this assigns the cohort of 1980–1984 in 2001 as this cohort covers 60% of the age group in that year. In 2003, age group 15–19 are assigned the 1985–1989 cohort as this covers 80% of the age group in that year. Only age group 12–14 have a 100% cohort assignment (in 2001, 2005 and 2010). Whilst this is a limitation, such an approach may be justified on the basis that differences between neighbouring cohorts are likely to be smooth and any approach to assign cohorts imposes a jump et either tail of the cohort band that may be unfounded with more detailed data on birth date.

This produces 16 cohorts covering mutually exclusive five-year birth ranges from 1920–1924 through to 1995–1999. Calendar year is given by the year of the survey used.

Our proxy for general health is based on the individual's response to the question: "In general, how would you describe your health?" Response categories are "Excellent", "Very Good", "Good", "Fair" and "Poor". We use a binary indicator for low self-assessed health (SAH) covering responses of "Fair" or "Poor". All other responses are combined into high SAH. This general measure of health was chosen as an indicator of the relative level of need for health care generally in the population as opposed to need for particular types of care at the individual level and has been used in many other studies as a proxy for need for health care in populations. We do not assume that the population reporting good health has no need for health care, only that it has less need for health care than the population reporting fair or poor health. In this way, we can analyse changes in the distribution of need for care within age groups over time (i.e., cohort effects) as a basis for estimating needs for health care in the future.

To test the sensitivity of our results to the measure for low SAH, we replicate our analysis using four different specifications: SAH "Poor" as the only cut off; SAH "Good", "Fair" and "Poor" as the cut-off; SAH as a cardinal variable (level of SAH). Respondents are also asked, "Because of any condition or health problem, do you need the help of another person in (a) preparing meals, (b) shopping for groceries or other necessities, (c) doing normal everyday housework, (d) household chores, (e) personal care such as washing, dressing or eating, (f) moving about inside the house and (g) personal finances help". The CCHS derive a health restricted activity measure for any positive responses to the options given. However, response category (d) was dropped from the survey for 2003 and response category (g) was added for 2007. We therefore derived a measure of health (Health restricted activity) based on a positive response to any of the five categories used in all surveys (a–c, e, f) as an alternate proxy for the need for health care. However, the restricted activity measure may be a more appropriate measure of need for social care and for that reason we retain self assessed health as our primary proxy for health care need.

2.2. Modelling the need for health care

Traditionally in health care planning, the future need for health care has been estimated implicitly by modelling the association between age and health care use and applying this association to the expected demographic structure of