



## Continuity of care with general practitioners in New Zealand: results from SoFIE-Primary Care

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### Abstract

Continuity of care has been defined as seeing the same health care provider over time, and has been shown to be associated with positive health outcomes, high quality care, high patient satisfaction with care and with lowering health care costs. While the benefits of continuity of care with a primary care provider are well documented, relatively little is known about those patients who receive or do not receive continuity of care. Using data from SoFIE-health, which is an add-on to the Statistics New Zealand-led Survey of Family, Income and Employment, this paper aims to construct a summary measure of continuity of care and to contribute to an enhanced understanding of the prevalence of continuity of care in New Zealand. We used the Primary Care Assessment Tools (PCAT) to create a mean score of continuity of care.

We found continuity of care is high in New Zealand. Overall, our data provide some support for the hypothesis that people with high health needs have higher mean continuity of care scores (e.g. the elderly, Pacific and Asian ethnic groups, those in the low income tertile, and those with one or more chronic conditions). The authors propose that continued incentives to develop and sustain affiliation with a primary care provider and continuity of care are important for maintaining the quality and cost-effectiveness of primary health care.

Continuity of care (COC) has been defined as seeing the same health care provider over time, and is one of the four main domains of primary care.<sup>1</sup> Continuity of care presupposes the existence of a regular source of care over time, regardless of the presence or absence of disease or injury. It is intended to help the provider and the patient build a long-term relationship in order to foster mutual trust between provider and patient, and knowledge of both parties' expectations and needs.<sup>2</sup>

Studies, mainly from the US, have shown that increased continuity of care is associated with positive health outcomes,<sup>3</sup> high quality care,<sup>4</sup> better medication and appointment compliance, enhanced physician recognition of the patient's health needs,<sup>5</sup> and high patient satisfaction with the care.<sup>6,7</sup> Research has also suggested that having a regular and consistent source of care is associated with lowering health care costs<sup>3</sup> by decreasing use of emergency services<sup>8,9</sup> and hospitalisations,<sup>10,11</sup> particularly for ambulatory-care-sensitive conditions (conditions that are more amenable to primary care interventions).

The hypothesized benefits of continuity of care with a primary care provider (PCP) are based on the accrued mutual knowledge, trust and communication between patients and providers that arises from repeated contact.<sup>1-3</sup> Hence, there is considerable policy interest in defining the characteristics of people who receive continuity of care from their PCPs.

While the benefits of continuity of care with a primary care provider are well documented, relatively little is known about those patients who receive continuity of care. Studies which have looked at patients who did not receive continuity of care noted that they were typically younger, female and had relationship problems.<sup>12,13</sup> Our goal in this study is to construct a summary measure of continuity of care and to enhance understanding of the prevalence of continuity of care in New Zealand (NZ).

While defining the characteristics of those who receive continuity of care is of interest in its own right, it is particularly important in the NZ context, mainly because the different attributes of primary care have not been studied to the same extent as in countries such as the US, leading to a paucity of evidence that grounds the NZ experience in the international context. Moreover, studies from the US mainly focus on a single State, clinic/provider or hospital, or non-elderly population thus restricting the generality of the results.

Other studies focus on continuity of care at the level of the whole system, rather than at an individual patient level. This may, in part, be due to the challenge of collecting information at the individual level about aspects of primary care, or the inability of consumers to be valid judges of primary care quality.<sup>14</sup>

This study extends the current literature on continuity of care by using a large national survey and by including a variety of demographic, socioeconomic, health behaviour and health variables. We hypothesise that those who have greater need for care will experience a higher mean continuity of care score.

## Methods

### Data

This research used SoFIE-Health data, which is part of the Statistics New Zealand-led Survey of Family, Income and Employment (SoFIE). SoFIE is a single fixed panel and is the largest longitudinal survey ever run in New Zealand. It is a nationally representative study of about 22,000 adults, drawn by random sampling of households, interviewed face-to-face. All adults in the original sample are followed for a maximum duration of eight years starting from October 2002, even if their household or family circumstances change. It collects information once a year from the same individuals on income levels, sources and changes; together with the major influences on income such as employment and education experiences, household and family status and changes, demographic factors and health status.

The SoFIE-Health module is comprised of 20 minutes of questionnaire time in waves 3 (2004-05), 5 (2006-07) and 7 (2008-09), in the following health-related domains: SF-36 (Short-Form health survey), Kessler-10 (K-10), perceived stress, chronic conditions (heart disease, diabetes, and injury-related disability), tobacco smoking, alcohol consumption, health care utilisation, access and continuity of primary health care, and an individual deprivation score. The health module is administered to the original sample members (OSM).

### Main outcome variable

The main outcome measure used for this work was an index of continuity of care which is assessed by the following four questions in SoFIE-Health.

Q1: Would the *same doctor* or nurse take care of you every time you go?

Q2: If you called them, could you talk to the person that *knows you best*?

Q3: Do you think they *know you very well as a person*?

Q4: Do you think they *know what medical problems* are most important to you?

The response categories include definitely, probably, probably not and definitely not and are coded/scored as 4,3,2,1 respectively so that a higher total score indicates higher continuity of care. We based our method on the Primary Care Assessment Tools (PCAT) in order to translate the concept of continuity of care into characteristics that can be measured.<sup>15,16</sup>

The Primary Care Assessment Tools were developed to collect and analyse information needed to describe primary care services needed, provided and experienced by the population. Following PCAT, we excluded those individuals who refused to answer any of Q1 - Q4 above. Individuals who responded "not sure, don't remember" to more than 2 questions were also excluded. For those who responded "not sure, don't remember" to only one of the 4 questions, we replaced "not sure, don't remember" with "probably"

The mean continuity of care score for an individual was calculated by summing the score of the four questions for each individual and dividing this sum by the number of questions (4 in this case). For a detailed example of the creation of the score, see Jatrana et al (2008a).<sup>17</sup>

## Independent variables

We included sociodemographic, health risk behaviour and health status variables as covariates. Independent variables chosen for analyses were based on our review of the literature and our research questions served as a guide in the selection of variables to include in the model of continuity of primary care. Sociodemographic variables in this analysis are age, gender, marital status, ethnicity, family structure, household equivalised income, labour force status, highest level of education achieved, NZDep (area deprivation), and NZiDep (individual deprivation). Health behaviour and health included current smoking status, Kessler-10 and number of chronic conditions. Categories for the various measures are shown in Table 1. A description of these variables is as follows:

**Age**—Age was calculated at the Wave 3 interview date and categorised into the following age groups: 15-24, 25-44, 45-64, and 65+.

**Ethnicity**—This paper uses the 'prioritised' concept of ethnicity. With the 'prioritised' concept, each respondent was assigned to a mutually exclusive ethnic group by means of a prioritisation system commonly used in New Zealand: Māori, if any of the responses to self-identified ethnicity was Māori; Pacific, if any one response was Pacific but not Māori; Asian, if any one response was Asian but not Māori/Pacific; the remainder non-Māori non-Pacific non-Asian (nMnPnA). The nMnPnA category mostly comprises New Zealanders of European descent, but strictly speaking is not an ethnic group.

**Marital status**—Marital status relates to legal marital status and is categorised into currently married, previously married (separated/divorced/widowed) and never married.

**NZDep2001**—NZDep2001 is a census-based small-area index of socioeconomic deprivation [24]. The Deprivation index score of dwelling location is derived from NZDep and assigned to the small area of the dwelling. NZDep2001 deprivation scores apply to *areas* rather than individual people. The index scale used here is from 1 to 5, where 1 = the least deprived 20% of areas and 5 = the most deprived 20% of areas.

**NZiDep**—The NZiDep index is a tool for measuring socioeconomic deprivation for individuals and is based on eight simple questions which take about 2 minutes to administer [25]. The final deprivation score was coded into the following five ordinal categories. Relatively few people have the largest number of deprivation characteristics.

1 = no deprivation characteristics

2 = one deprivation characteristic

3 = two deprivation characteristics

4 = three or four deprivation characteristics

5 = five or more deprivation characteristics

**Income**—In SoFIE, income is collected from every individual over 15 years at every wave. Household income was derived by totalling adult annual personal income (before tax) from all sources received, consumer price index (CPI) adjusted for the quarter ending December 2001 (the first reference quarter of the study), equivalised for household economies of scale using a NZ-specific equivalisation index [26], and categorized into tertiles: low (<\$26,109), medium (\$26,109 to \$43,015) and high (≥\$43,016). For the analyses in this paper, equivalised household income at wave 1 was used.

**Education**—The education variable used in this analysis was the highest level of education at Wave 3, categorised as no qualification, school qualification, and post-school qualification.

**Smoking**—A current smoking status variable was created from responses to questions “Do you smoke cigarettes”, and “Have you ever been a regular smoker” and is coded into three categories: current smoker, ex-smoker and never smoker.

**Kessler-10 scale**—The Kessler-10 (K-10) is a scale measuring non-specific psychological distress [27, 28]. The K-10 consists of ten questions about non-specific psychological distress and seeks to measure the level of current anxiety and depressive symptoms based on questions about negative emotional states a person may have experienced in the four weeks prior to interview. The scores were grouped into four levels according to the criteria developed by Andrews and Slade (2001): low (10-15), moderate (16-21), high (22-29), and very high (30+) [29, 30].

**Chronic diseases**—As part of the health module each respondent was asked “have you ever been told by a doctor that you had”: Asthma, High Blood Pressure, High Cholesterol, Heart Disease, Diabetes, Stroke, Migraines, Chronic Depression, Manic Depression or Schizophrenia.

These data were coded into a co-morbidities index: 0, 1-2, >2 co-morbid diseases.

## Statistical analysis

This paper provides cross-sectional analyses of wave 3 data. The sample used in the analyses consist of 18,320 adult (15 years and above) OSMs. Analyses were carried out using means and 95% confidence intervals (CI) to evaluate the bivariate associations between continuity of care scores and other variables. Ordinary Least Square (OLS) regression was used to adjust for covariates, including age, sex, marital status, ethnicity, household equivalised income, labour force status, small area deprivation, individual deprivation, education, smoking and health (self-assessed health, K-10 and number of chronic conditions).

The population used in the regression analyses was 11,915 adult OSMs at wave 3 who had complete information on all the socioeconomic, health behaviour and health characteristics. All counts presented in this paper are random rounded (up or down) to the nearest multiple of 5, with a minimum value of 10, as per the Statistics New Zealand confidentiality protocol. All analyses were performed on unit level data using SAS version 8.2 within the Statistics New Zealand data laboratory.

## Results

Table 1 presents the associations between mean continuity of care scores and demographics, socioeconomic, health and health behaviour characteristics of the respondents. The mean score for continuity of care was 3.10 (95%CI: 3.09–3.11) with a range of 1.0–4.0. As the age of the respondents increased, so did the mean continuity of care score, with older respondents aged 75 and above reporting a mean score of 3.48 (95%CI: 3.45–3.51) as compared to younger respondents aged 15–24 (2.86, 95%CI: 2.83–2.89). There was little variation in the mean score for continuity of care with respect to sex, however, sex CIs do not overlap. Statistically significant variability of continuity of care was also observed for marital status and ethnicity.

Income was negatively associated with continuity of care score. For example, those in the lowest income tertile had a mean continuity of care score of 3.23 (95%CI: 3.21–3.25) and those in the highest income tertile had a mean continuity of care score of 3.02 (95%CI: 3.00–3.04). Statistically significant variability of continuity of care was observed for labour force status: those not working had a higher mean continuity of score (3.24, 95%CI: 3.22–3.26) as compared to those who were working (3.02, 95%CI: 3.01–3.03). There was little evidence for significant variation of continuity of care with NZDep, NZiDep, or education. In contrast, significant variability was observed for the smoking covariate.

**Table 1. Demographic, socioeconomic and health characteristics of study population by mean continuity of care score: SoFIE-Health, 2004–05<sup>1</sup>**

Characteristics	N	Mean (95% CI)
<b>All</b>	16630	3.10 (3.09–3.11)
<b>Age</b>		
15-24	2255	2.86 (2.83–2.89)
25-44	5550	2.95 (2.93–2.97)
45-64	5725	3.17 (3.15–3.19)
65-74	1695	3.38 (3.35–3.41)
75+	1400	3.48 (3.45–3.51)
<b>Sex</b>		
Male	7365	3.07 (3.05–3.09)
Female	9270	3.13 (3.12–3.14)
<b>Marital status</b>		
Currently married	8980	3.16 (3.15–3.17)
Previously married	3020	3.24 (3.22–3.26)
Never married	4625	2.91 (2.89–2.93)
<b>Ethnicity</b>		
NZ/European	13160	3.11 (3.10–3.12)
Māori	1780	3.01 (2.98–3.04)
Pacific	695	3.20 (3.15–3.25)
Asian	725	3.11 (3.06–3.16)
Others	270	2.97 (2.88–3.06)
<b>Income tertiles</b>		
1	5835	3.23 (3.21–3.25)
2	4650	3.05 (3.03–3.07)
3	6150	3.02 (3.00–3.04)
<b>Employment status</b>		
Working	10700	3.02 (3.01–3.03)
Not working	5925	3.24 (3.22–3.26)
<b>NZDep</b>		
NZDepQ1 (least deprived)	3220	3.08 (3.06–3.10)
NZDepQ2	3255	3.10 (3.08–3.12)
NZDepQ3	2970	3.10 (3.08–3.12)
NZDepQ4	3490	3.11 (3.09–3.13)
NZDepQ5 (most deprived)	3160	3.13 (3.11–3.15)
Missing	540	
<b>NZiDep</b>		
No Dep	11935	3.12 (3.11–3.13)
1 Dep	2540	3.10 (3.07–3.13)
2 Dep	990	3.02 (2.98–3.06)
3-4 Dep	880	2.98 (2.93–3.03)
5 + Dep	275	3.08 (2.99–3.17)
<b>Education</b>		
No education	215	2.83 (2.74–2.92)
School	4415	3.06 (3.04–3.08)
Post-school vocational	5730	3.11 (3.09–3.13)
Degree or higher	2260	2.97 (2.94–3.00)
<b>Smoking</b>		
Current	3285	3.06 (3.04–3.08)
Ex	4400	3.17 (3.15–3.19)
Never	8935	3.08 (3.07–3.09)
<b>Kessler 10 groups</b>		
Low (10-15)	12820	3.11 (3.10–3.12)
Moderate (16-21)	2495	3.11 (3.10–3.12)
High (22-29)	880	3.07 (3.04–3.10)
V. High (30+)	285	3.13 (3.08–3.18)
<b>Co-morbidity index (%)</b>		
0	7155	2.99 (2.97–3.01)
1-2	7685	3.15 (3.14–3.16)
>2	1790	3.35 (3.32–3.38)

Note: <sup>1</sup>Total N may not sum up to 16630 because of random rounding.

Ex-smokers had the highest mean continuity of care scores (3.17, 95%CI: 3.15–3.19) while current smokers had the lowest score (3.06, 95%CI: 3.04–3.08). Mean scores for continuity of care do not differ with the levels of psychological distress (Kessler-10). However, there is an increasing trend in continuity of care with increasing numbers of co-morbid diseases. Those reporting no co-morbid conditions had a lower mean continuity of care score (2.99, 95%CI: 2.97–3.01) than those reporting 2 or more co-morbid conditions (3.35, 95%CI: 3.32–3.38).

To check the effect of controlling simultaneously for all covariates, we performed an OLS regression analysis. Table 2 presents results from the OLS regression analysis, in which different predictors are regressed on continuity of care simultaneously controlling for demographic, socioeconomic, health behaviour and health factors. We sequentially added demographic, socioeconomic and health and health behaviour variables to the model but, for brevity only, the results from the final model are presented.

Results from this analysis show that the estimated coefficients for all the demographic factors were significant. Individual coefficient estimates suggested that age was significantly associated with an increase in continuity of care, while male sex and never married were associated with a reduction in continuity of care. Continuity of care increased by 0.19 and 0.06 points for the Pacific and Asian ethnicities, by 0.09 points for those in the lowest income tertile, by 0.06 for those not working, and by 0.14 points for those with 1 or more co-morbid conditions compared with their respective reference categories (see Table 2). However, continuity of care decreased with an increase in individual deprivation characteristics. It is important to note that OLS results are consistent with the bivariate results shown in Table 1.

**Table 2. Estimates from OLS for continuity of care, adjusting for effects of demographic, socioeconomic, health behaviour and health variables: SoFIE-Health, 2004-05<sup>1</sup>**

Characteristics	Estimates	Standard error	p-value	Type III p-value
<b>Age</b>				<b>&lt;.0001</b>
15-24	0.00			
25-44	0.03	0.022	0.142	
45-64	0.22	0.025	<.0001	
65+	0.40	0.0308	<.0001	
<b>Sex</b>				<b>&lt;.0001</b>
Male	-0.06	0.012	<.0001	
Female	0.00			
<b>Marital status</b>				<b>&lt;.0001</b>
Currently married	0.00			
Previously married	-0.01	0.017	0.465	
Never married	-0.08	0.017	<.0001	
<b>Ethnicity</b>				<b>&lt;.0001</b>
NZ/European	0.00			
Māori	-0.02	0.021	0.258	
Pacific	0.19	0.032	<.0001	
Asian	0.06	0.027	0.014	
Others				
<b>Income tertiles</b>				<b>&lt;.0001</b>
1	0.09	0.017	<.0001	

2	0.02	0.014	0.072	
3	0.00			
<b>Employment status</b>				<b>&lt;0.0001</b>
Working	0.00			
Not working	0.06	0.016	<.0001	
<b>NZDep</b>				<b>0.9709</b>
NZDepQ1 (least deprived)	0.00			
NZDepQ2	0.002	0.017	0.889	
NZDepQ3	0.008	0.018	0.652	
NZDepQ4	-0.002	0.018	0.886	
NZDepQ5 (most deprived)	0.008	0.021	0.683	
<b>NZiDep</b>				<b>&lt;0.0001</b>
No Dep	0.00			
1 Dep	-0.046	0.017	0.010	
2 Dep	-0.108	0.027	<.0001	
3-4 Dep	-0.177	0.030	<.0001	
5 + Dep	-0.093	0.053	0.078	
<b>Education</b>				<b>0.2276</b>
No education	-0.045	0.049	0.364	
School	0.016	0.013	0.206	
Post-school vocational	0.00			
<b>Smoking</b>				<b>0.3793</b>
Current	0.023	0.016	0.171	
Ex	0.002	0.014	0.891	
Never	0.00			
<b>Kessler 10 groups</b>				<b>&lt;0.5580</b>
Low (10-15)	0.00			
Moderate to V. High (16+)	0.008	0.015	0.558	
<b>Co-morbidity index</b>				<b>&lt;0.0001</b>
0	0.00			
1 or more	0.104	0.012	<.0001	
R-Square (Max-rescaled)	0.10			

**Note:** <sup>1</sup>SoFIE= Survey of Family, Income and Employment

## Discussion

Overall, our data provide some support for the hypothesis that people with high health needs have higher mean continuity of care score (e.g., the elderly, Pacific and Asian ethnic groups, those with low incomes, and those with one or more chronic conditions). The finding that older people had a higher continuity of care mean score probably reflects an increase in chronic conditions and other morbidities with age.

Although this research raises several important findings related to continuity of care to primary health care using national survey data, there are several limitations to this study that must be considered when interpreting the results. First, this study reports cross-sectional associations which prohibit drawing causal inferences. Follow up data (Wave 5) may allow more progress in deducing causal relations. Second, given that continuity of care was measured on self-reported data not confirmed by a physician/administrator, our estimates may be subject to reporting error and recall bias not accounted for by statistical adjustments. Third, Asian and Pacific ethnicity did not take into account cultural variations within these large, heterogeneous groups.

Another limitation is attrition in the data. In Wave 3 of the SoFIE study, 83% of the original sample members were re-interviewed,<sup>18</sup> which combined with the household response rate at Wave 1 of 77% gives an estimated effective response rate of 64%. While attrition within the SoFIE study is low compared with other population-based

longitudinal panel surveys,<sup>19 20</sup> selection bias might arise in our analyses if individuals drop out of the survey in a non-random manner (i.e., the more unhealthy may be more likely to not participate in follow-up years). It is not possible to estimate whether such bias occurred. This would require selective attrition within strata of key covariates, which seems unlikely.

It is also important to note that the coefficient of determination for the continuity of care estimator was small,  $R^2=0.10$ , indicating the model did not account for much of the observed variation in continuity of care. Hence, the model has little predictive power. The same caveats apply to models applied separately to each of the questions that comprise the continuity of care measure. This may be due to the overall high and relatively invariant levels of continuity of care in New Zealand.

Despite these limitations, the results presented here are important in several ways. This study uses a large, original, national survey in creating a continuity of care index at individual patient level. Few previous studies in New Zealand have focussed on primary care attributes at an individual patient level. This may, in part, be due to the challenge of collecting information at the individual level about aspects of primary care or the inability of consumers to be valid judges of primary care quality.<sup>14</sup>

Our results have important implications for health care policy, especially as cost containment and cost effectiveness has become increasingly important. Continuity of care has been found to be associated with lowering health care costs<sup>3</sup> among patients by decreasing use of emergency services<sup>8 9</sup> and hospitalisation<sup>10 11</sup> and also because primary care physicians provide care that is less costly than secondary care.<sup>21</sup> Thus it can be argued that encouraging and motivating patients to form a consistent relationship with their PCP may result in reducing costs of health care.

The current Primary Health Care Strategy requires individuals to be enrolled/registered with a Primary Health Organisation / General Practitioner (GP) in order to be eligible for lower GP consultation fees. In 2003-04, nearly 92% of the NZ adult population was affiliated with a PCP.<sup>23</sup> High affiliation with a PCP may lead to high continuity of care. The authors propose that continued incentives to develop and sustain affiliation with a PCP and continuity of care are important for maintaining the quality and cost-effectiveness of primary health care.

**Competing interests:** None.

**Statistics New Zealand Security Statement:** Access to the data used in this study was provided by Statistics New Zealand in a secure environment designed to give effect to the confidentiality provisions of the Statistics Act, 1975. The results in this study and any errors contained therein are those of the authors, not Statistics New Zealand.

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