Dental care utilization for examination and regional deprivation

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Abstract

[Objectives] Receiving proper dental care plays a significant role in maintaining good oral health. We investigated the relationship between regional deprivation and dental care utilisation.

[Methods] Multilevel logistic regression was used to identify the relationship between regional deprivation level and dental care utilisation purpose adjusting for individual-level variables, in adults aged 19+ in the 2008 Community Health Survey for Korean (n=220,258).

[Results] Among Korean adults, 12.8% used dental care for examination and 21.0% visited a dentist for other reasons. In the final model, regional deprivation level showed significant variations in dental care utilisation for examination (p<0.001). However, this relationship was not shown at the final model of dental care utilisation for other reasons.

[Conclusions] This study suggests that policy interventions should be considered to reduce regional variations in rates of dental care utilization for examination.

Keywords Utilization; Dental Care; Dental Health Surveys; Residence Characteristics; Multilevel Analysis
Introduction

Using suitable dental care services is a vital component of good oral health management [1]. The population subgroup with a high socioeconomic status pays significantly more frequent visits to the dentist, which is directly correlated with a higher status of oral health [2, 3]. Furthermore, the population subgroup with a high quality of life with respect to oral health is known to visit the dentist for asymptomatic care; the higher the status of regional deprivation, the higher the tendency toward symptomatic visits rather than regular dental check [4, 5]. In other words, going to the dentist for check-up purposes in asymptomatic care, rather than need-driven symptomatic visits, is closely related to oral health and, above all, crucial for the early detection of oral disease.

Additionally, many studies have shown that various community-specific environments and socioeconomic characteristics influence the health index of the residents of that community [6]. Likewise, oral health markers such as perceived oral health status and dental care, as well as dental care utilisation, are known to be influenced by the socioeconomic characteristics of the local community and its socioeconomic performance [5, 7, 8].

What is then the relationship between visits for dental check-up and the material deprivation of the local community independently from individual oral health? To explore this relationship, it is essential to understand regional socioeconomic characteristics distinguished from individual characteristics.

To better understand the regional contextual effect, a large number of recent studies dealing with interlocal health inequalities have used a multilevel analysis [9-12]. Two errors could be introduced when analyzing data with multilevel structures, namely an individual and a regional level. First, if data are analyzed only at an individual level without considering regional differences in dental care utilization, characteristics of regions with a higher number of samples could excessively influence the dependent variable of dental care utilization.
Second and conversely, if only the correlation between regional deprivation index and the dependent variable of regional dental care utilization rate is analyzed, without considering individual dental care utilization, a significant correlation could emerge, even though individual dental care utilization is not related to regional deprivation index in reality.

Multilevel analysis is rated as a highly useful tool in studying the correlation between individual health and regional socioeconomic characteristics, in that it interlinks lower and higher status and allows an analysis in one model [13, 14]. Thus, it is reasonable to use a multilevel analysis method to calculate the correlation between the material deprivation of a local community, individual dental care utilisation for examination, and the contextual effect thereof.

The deprivation index is a representative variable of regional socioeconomic characteristics that is conceptualized as a multidimensional phenomenon reflecting a regional approach to material resources and a lack of social participation. The deprivation index has a broad spectrum of applications from the replacement of a simple individual-level socioeconomic index to regional-level variables representing regional socioeconomic characteristics. Its association with oral health has already been proved by many studies [15-17]. Indices of deprivation such as the Townsend Index and the Carstairs Index have been used, mainly in the UK; in South Korea, an adapted Korean version has been developed [18-20].

A study on individual- and regional-level factors for dental care utilisation for examination, which has a crucial impact on oral health and the related quality of life, will be useful for making policies that promote the oral health of community residents and establish a more equitable system of medical service utilisation. Thus, this study has been conducted to investigate whether regional deprivation is associated with dental care utilisation, especially for examination.
Materials and Methods

Data sources

We used data set from the 2008 Community Health Survey (CHS) in this study. The CHS is Korea’s only statistical survey on the health status of local residents at the units of city (si), county (gun) and district (gu); it is conducted every year and targets adults aged 19 and above. It provides information on the residents’ health level, healthy life habits, and use of medical services. The 2008 CHS was conducted from September 1 to November 30 [21].

Considering the type of housing and the regions, the community health survey sample was intended to include about 800 individuals for each of the 251 districts. However, because of the adjustment of districts in Korea, the survey was performed in 247 districts, and the final number of subjects after the survey was 220,258. As for the community health survey, well-trained interviewers visited and conducted interviews at each household in 247 districts.

Regional-level variable

This study used the deprivation index for South Korea. This index was developed in 2009 by Shin et al. [20] using 2% of the sample survey data from the 2005 Population and Housing Census, along with the data provided at the administrative units of city (si), county (gun), and district (gu). Table 1 shows the subordinate composition indexes included in this index. The final index value was calculated as the average Z-score of the composition indexes of the cities and rural regions. These regional variables were found to have sufficient validity by Shin et al., [20] and thus were integrated and analysed along with the data from the 2008 CHS.

- Position of table 1 -

Individual-level variables
Individual characteristics were collected through the CHS data. Age and gender were selected as demographic variables, while education level, income level, economic activity status, and cohabitation with spouse were used as variables reflecting socioeconomic status. Education level was divided into ‘uneducated’, ‘elementary school graduate’, ‘middle/high school graduate’, and ‘university and higher’; income level was divided into five levels according to respondents’ ‘monthly average household equivalent income’, which was calculated by dividing household income by the square root of the number of household members.

**Outcome variables**

For the outcome variables, we created two variables according to the purpose of the dental utilisation—‘dental care utilisation for examination’ and ‘dental care utilisation for other reasons’—using the CHS data. Among people who responded that they had visited the dentist within the past year (assessed by the question, ‘Have you visited dental clinics in the past year’), those who responded ‘yes’ to the question, ‘Have you received an oral examination in the past year for purely examinational purposes’, were classified as having used dental care ‘for examination’ while those who responded ‘no’ were classified as having used dental care ‘for other reasons’. Since this study focused on the purpose of the dental utilisation, the actual type of the treatment received was not considered.

**Statistical analysis**

To examine the influence of the deprivation index on dental care utilisation purpose and study the regional contextual effects, this study integrated the deprivation index for Koreans into the CHS data and conducted a multilevel logistic regression analysis, using HLM 7.0 for Windows (SSI, Inc., Chicago, IL, U.S.A.). First, a two-level random intercepts model was fit into the outcome of dental care utilisation (Null model). We then added the deprivation index for Koreans to the Null model in order to evaluate the association between dental care utilisation and regional-level variables (Model 1). Deprivation index was divided into 5 categories (Dep 1 = least deprived, Dep 5 = most deprived). Model 2 evaluated the association between dental care utilisation and individual-level variables. Age,
gender, economic activity status (yes = 1), cohabitation with spouse (yes = 1), education level (edu 1 = uneducated, edu 2 = elementary school graduate, edu 3 = middle/high school graduate, edu 4 = university and higher), and income level (income 1 = lowest income, income 5 = highest income) were used as individual-level socioeconomic variables (Model 2). Finally, to examine how regional-level variable contribute to interregional variations in dental care utilisation including individual-level variables, the deprivation index was added to Model 2 (Model 3). A total of 184,405 individuals nested within 247 districts were used for the main analysis.

The multilevel analysis results were presented as adjusted odds ratios, with 95% confidence intervals (CI) and intra-class correlation (ICC). The ICC represents the level of common experience (group homogeneity) shared by individuals who are temporally and spatially close, and it may be interpreted as a proportion of the variation in the outcome variable by higher-level unit [22].

Results

Table 2 shows the distribution in dental care utilisation purpose according to the sociodemographic characteristics and regional deprivation level of the 2008 CHS respondents. The percentage of Korean adults who used dental care for examination was 12.8%, which was lower than the percentage of those using dental care for other reasons (21.0%). There was a difference in the sociodemographic distribution and regional deprivation level of survey participants according to the dental care utilisation purpose. Dental care utilisation for examination was significantly higher among people of younger age (excluding the 19–29 age group), those living with their spouse, those engaged in economic activities, those with higher income, those with higher education levels, and those with lower deprivation index group. However, there was no upward or downward trend among groups by income, education, and RDI deprivation index in the percentage of dental care utilisation for other reasons.
The association between regional deprivation and dental care utilisation for examination

The average percentage of dental care utilisation for examination in survey participants was 12.8% (Table 2). In particular, when rates of dental care utilization for examination were compared depending on regional material deprivation index variable, the difference in the rates of dental care utilization for examination was 12.3% between the region with the highest deprivation level and the region with the lowest deprivation level.

In the Null model, the estimated ICC was 0.111 (i.e., 11.1% of variance was significantly explained by the regional level variables; Table 3). When other variables were not considered, the relationship between dental care utilisation for examination and regional deprivation was significant (p < 0.001; Model 1). However, the reduction in the ICC between the Null model and Model 2 (from 0.111 to 0.077, respectively) implies that some of the regional variations are related to the clustering of individual socioeconomic characteristics. In Model 2, all factors except for age (i.e., gender, education, cohabitaion status, and income) were significantly related to dental care utilisation for examination. In the final model (Model 3), regional deprivation level showed significant relationships in dental care utilisation for examination, and the ICC was 0.063 (p < 0.001).

The association between regional deprivation and dental care utilisation for other reasons

The percentage of dental care utilisation for other reasons among the survey participants was 21.0%, and there was no clear difference according to the regional deprivation level (Table 2). In the Null model, the ICC was 0.041, which indicated that there were differences in dental care utilisation for other reason across regions (Table 4). Unlike dental care utilisation for examination, dental care utilisation for other reasons did not show a significant relationship with regional deprivation in Model 1. In Model 2, we found that age, cohabitaion status, and low education level significantly decreased
participants’ odds of using dental care for other reasons, while gender, economic activity status, and income level did not show significant relationships. In the final model, which included both regional and individual variables, the regional deprivation index did not show a significant relationship with dental care utilisation for other reasons; furthermore, the ICC was 0.040, which was not much different from that in the Null model (0.041; p < 0.001).

- Position of table 4 -

Discussion

Main finding of this study

The results of this study showed that there were clear disparities in dental care utilisation for examination among regions of South Korea, and such regional differences were independent from the individual level socioeconomic factors. Korean adults living in regions without severe regional deprivation were more likely to use dental care for oral examination than were those living in regions with severe regional deprivation, indicating that context has a clear effect on dental care utilisation for examination. On the contrary, there were no regional variations in dental care utilisation for other reasons, and individual socioeconomic factors had relatively little influence on this variable.

What is already known on this topic

Researchers in many countries have verified the association between regional deprivation and dental care utilisation in adults [5, 23]. Locker and Ford [23] reported that regional differences influence dental care utilisation of Americans aged 50 and above, independently from their socioeconomic status. Lang et al. showed that disparities in regional dental care utilisation differ according to the reason (asymptomatic/symptomatic) [5].

A study in Korea also reported that the dental care utilisation of senior citizens aged 65 and above living in Seoul showed regional disparities according to material deprivation level [24]. However, no prior study has measured whether regional deprivation level has a contextual effect on dental care
utilisation purpose, independent of the effect of individual socioeconomic status, and particularly targeting all adults in South Korea, which this study aimed to accomplish.

**What this study adds**

This is the first study to examine the association between dental care utilisation for examination or other reasons and regional deprivation level across all districts in South Korea. This study aimed to examine how dental care utilisation purpose was differently affected by contextual effects, by dividing dental care utilisation purpose into ‘examination’ and ‘other reasons’. This study used multilevel analysis to reveal that differences in dental care utilisation for examination between regions are caused by compositional effects (i.e., individual-level socioeconomic gaps) as well as by the contextual effect of regional level. It showed that asymptomatic dental care use such as oral examinations and general dental care utilisation were differently influenced by these variables, which is similar to the research findings of Lang et al., conducted in Scotland [5].

Dental care utilisation is affected by various factors such as individual concern, dental expenses, belief in the importance of regular attendance of dental examinations, household income, education level, unemployment, and other individual socioeconomic variables, as well as regional deprivation level [5, 25-27]. The results of the analysis for the two categories of dental care showed the following differences. Individual demographic characteristics and regional deprivation level lead to variations in dental care utilisation for oral examination, but have no significant influence on dental care utilisation for other reasons. These differing results may be because of the influence of National health insurance service coverage on individuals’ attitudes towards dental care utilisation. South Korea has universal health insurance, but only 17% of the total cost of dental care is covered, thus, dental expenses would be a considerable financial burden for most people [28]. Consequently, this high financial burden leads to individual variations in preventive dental care utilisation. However, for general dental care utilisation, actually requiring treatment for oral diseases with symptoms may have acted as the most important factor, rather than individual socioeconomic characteristics.
While regional level had little influence over dental care utilisation, it clearly had an independent influence from individual socioeconomic characteristics, which matches previous research findings [5]. In particular, dental care utilisation for examination showed a relatively high ICC in the multilevel analysis, indicating that regional level has a clear effect independent from individual socioeconomic environment. Using multilevel analysis, we could improve on the limitations of previous analytic tools that could not identify whether the differences in dental care utilisation by regional level were due to compositional or contextual effects.

**Limitations of this study**

First, this study is limited in that it combined data collected across different time periods. Our study data was a combination of the CHS conducted in 2008 in South Korea and the deprivation index for Koreans extracted from the population census of 2005. It is because regional deprivation index was calculated based on data from the Population and Housing Census, which is conducted every 5 years. However, because there has been no recent rapid social change in Korea, the regional level has not likely changed within a short period, and thus the error may not be significant. In future, the correlation between regional deprivation index calculated using the population census data from 2010 and the dental care utilization data from the regional social health survey in the same year should be analyzed; these results should then be compared with those of the present study. Otherwise, a follow-up study should be conducted to analyze changes in correlation between regional variables and dental care utilization using longitudinal studies.

Second, in case of dental care utilization with general purposes, regional deprivation index might have a different significance depending on number of visits and type of care. Unfortunately, there were no data available on care type or number of visits due to the limitations of the CHS data. However, the present study intended to investigate the correlation between regional deprivation with “dental examination without symptoms” and “dental care utilization for general purposes other than examination” through separation of dental care utilization by purpose. It was determined that the
purpose of dental care utilization should be an indication as important as type of care and number of visits, due to the characteristics of dental diseases that require immediate pain relief.

Conclusions

Regional deprivation showed different associations according to the type of dental care utilisation purpose. In particular, unlike dental care utilisation for other reasons, dental care utilisation for examination showed that regional deprivation level had a contextual effect independent from the effect of individual socioeconomic status. These suggest that policy interventions should be considered to decrease regional differences in rates of dental care utilization for examination.
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| Variables                                  | Definition                                                                 |
|-------------------------------------------|---------------------------------------------------------------------------|
| Ratio of poor residential environments    | Ratio of houses with no separate kitchen, no water supply, no hot water for the bathroom, and no flushing toilet |
| Ratio of aging population                 | Ratio of elderly individuals 65 years or older in the total population     |
| Ratio of people with academic backgrounds lower than high school | Ratio of individuals with education level below high school graduation among the population of 25-64 years old |
| Ratio of lower class members of households | Ratio of all households in a family that belongs to lower than V class on the basis of the family member with the highest social class in terms of the classification of social level of families |
| Ratio of apartment households             | Ratio of apartment residences                                             |
| Ratio of single occupant households       | Ratio of single-occupant households                                       |
| Ratio of female householders              | Ratio of families with women as head of household                         |
| Ratio of households without cars (city)   | Ratio of households without a car (passenger car) for commuting            |
| Ratio of households without cars (rural area) | Ratio of households without any car (including passenger car, van, or truck/other) |
Table 2 Demographic and socioeconomic status of subjects in relation to dental care utilisation purpose

|                        | Total | For oral examination | For other reasons |
|------------------------|-------|----------------------|-------------------|
|                        | N(%)  | p                    | N(%)              | p                  |
| **Individual level**   |       |                      |                   |
| Age                    |       |                      |                   |
| 19-29                  | 26,074| 3,735(14.3)          | 5,101(19.6)       | <0.0001            |
| 30-39                  | 40,047| 6,767(16.9)          | 7,610(19.0)       | <0.0001            |
| 40-49                  | 44,837| 7,208(16.1)          | 9,215(20.6)       |                  |
| 50-59                  | 39,078| 5,254(13.4)          | 9,071(23.2)       |                  |
| 60-69                  | 35,766| 3,480(9.7)           | 8,581(24.0)       |                  |
| 70<                   | 34,456| 1,850(5.4)           | 6,711(19.5)       |                  |
| Gender                 |       |                      |                   |
| Male                   | 101,358| 13,007(12.8)        | 21,220(20.9)      | 0.394              |
| Female                 | 118,900| 15,287(12.9)        | 25,069(21.1)      |                  |
| Cohabitation status with spouse* |     |                      |                   |
| Yes                    | 151,447| 21,116(13.9)        | 33,045(21.8)      | <0.0001            |
| No                     | 37,101| 2,989(8.1)          | 7,514(20.3)       |                  |
| Economic activity status* |      |                      |                   |
| Yes                    | 132,811| 18,626(14.0)        | 28,127(21.2)      | 0.024              |
| No                     | 87,389| 9,657(11.1)         | 18,157(20.8)      |                  |
| Income*                |       |                      |                   |
| Low                    | 36,712| 2,288(6.2)          | 7,669(20.9)       | 0.032              |
| Middle-low             | 34,542| 3,040(8.8)          | 7,414(21.5)       |                  |
| Middle                 | 37,498| 4,632(12.4)         | 7,842(20.9)       |                  |
| Middle-high            | 37,347| 5,749(15.4)         | 8,095(21.7)       |                  |
| High                   | 35,911| 7,595(21.1)         | 7,662(21.3)       |                  |
| Education*             |       |                      |                   |
| Uneducated             | 22,562| 863(3.8)            | 3,857(17.1)       | <0.0001            |
| Elementary school      | 42,566| 2,875(6.8)          | 9,510(22.3)       |                  |
| Middle/high school     | 92,624| 11,724(12.7)        | 20,138(21.7)      |                  |
| University and higher  | 62,435| 12,821(20.5)        | 12,773(20.5)      |                  |
| Regional level (deprivation) | N   | (%)  | Chi-square test | p-value | N   | (%)  |
|-----------------------------|-----|------|-----------------|---------|-----|------|
| Dep1                        | 42,179 | 8,455 (20.0) | <0.0001 | 9,163 (21.7) | <0.0001 |
| Dep2                        | 46,780 | 7,048 (15.1) |         | 9,555 (20.4) |         |
| Dep3                        | 43,989 | 5,439 (12.4) |         | 9,601 (21.8) |         |
| Dep4                        | 43,525 | 3,994 (9.2)  |         | 9,263 (21.3) |         |
| Dep5                        | 43,785 | 3,358 (7.7)  |         | 8,707 (19.9) |         |
| **Total**                   | 220,258 | 28,294 (12.8) |         | 46,289 (21.0) |         |

Data are represented in N(%), Chi-square test, p<0.05.

*non-response data excluded
| Fixed effect       | Null model | Model 1 | Model 2 | Model 3 |
|-------------------|------------|---------|---------|---------|
|                   | OR 95% CI  | OR 95% CI | OR 95% CI | OR 95% CI |
| Intercept         | 0.13 0.12-0.14** | 0.24 0.22-0.27** | 0.27 0.25-0.29** | 0.39 0.35-0.43** |
| Age               | 1.00 1.00-1.00 | 1.00 1.00-1.00 | 1.00 1.00-1.00 | 1.00 1.00-1.00 |
| Gender            | 1.16 1.13-1.20** | 1.16 1.13-1.20** | 1.16 1.13-1.20** | 1.16 1.13-1.20** |
| Cohabitation      | 0.85 0.80-0.89** | 0.84 0.80-0.89** | 0.84 0.80-0.89** | 0.84 0.80-0.89** |
| Economic activity | 0.93 0.89-0.97** | 0.92 0.89-0.96** | 0.92 0.89-0.96** | 0.92 0.89-0.96** |
| Edu1              | 0.21 0.19-0.23** | 0.21 0.19-0.24** | 0.21 0.19-0.24** | 0.21 0.19-0.24** |
| Edu2              | 0.34 0.32-0.37** | 0.35 0.32-0.37** | 0.35 0.32-0.37** | 0.35 0.32-0.37** |
| Edu3              | 0.59 0.56-0.61** | 0.59 0.56-0.61** | 0.59 0.56-0.61** | 0.59 0.56-0.61** |
| Income1           | 0.66 0.61-0.71** | 0.66 0.61-0.71** | 0.66 0.61-0.71** | 0.66 0.61-0.71** |
| Income2           | 0.69 0.64-0.74** | 0.69 0.65-0.74** | 0.69 0.66-0.74** | 0.69 0.65-0.74** |
| Income3           | 0.78 0.73-0.82** | 0.78 0.74-0.82** | 0.78 0.74-0.82** | 0.78 0.74-0.82** |
| Income4           | 0.90 0.86-0.94** | 0.90 0.86-0.94** | 0.90 0.86-0.94** | 0.90 0.86-0.94** |
| Dep2              | 0.70 0.61-0.83** | 0.78 0.67-0.91** | 0.78 0.67-0.91** | 0.78 0.67-0.91** |
| Dep3              | 0.55 0.47-0.65** | 0.67 0.57-0.79** | 0.67 0.57-0.79** | 0.67 0.57-0.79** |
| Dep4              | 0.39 0.32-0.47** | 0.56 0.47-0.67** | 0.56 0.47-0.67** | 0.56 0.47-0.67** |
| Dep5              | 0.30 0.24-0.37** | 0.50 0.41-0.62** | 0.50 0.41-0.62** | 0.50 0.41-0.62** |
| **Random effect** | **         | **       | **       | **       |
| Intercept         | 0.410**    | 0.229**  | 0.274**  | 0.220**  |
| (variance)        | **         | **       | **       | **       |
| ICC               | 0.111      | 0.065    | 0.077    | 0.063    |
| Deviance          | 622205.60  | 622095.40 | 529831.60 | 529877.40 |
| Reliability       | 0.969      | 0.946    | 0.947    | 0.935    |

** p < 0.01, * p < 0.05

Reference groups: gender, male; cohabitation with spouse, yes; economic activity, yes; education, university and higher (edu4); income, high (income5); deprivation, low (Dep1).
**Table 4** Random intercepts model for dental care utilisation for other reasons

| Fixed effect        | Null model OR (95% CI) | Model1 OR (95% CI) | Model2 OR (95% CI) | Model3 OR (95% CI) |
|---------------------|------------------------|--------------------|--------------------|--------------------|
| Intercept           | 0.26 (0.25-0.27)**     | 0.27 (0.25-0.30)** | 0.27 (0.26-0.29)** | 0.28 (0.26-0.31)** |
| Age                 | 1.01 (1.01-1.01)**     | 1.01 (1.01-1.01)** | 1.01 (1.01-1.01)** | 1.01 (1.01-1.01)** |
| Gender              | 1.01 (0.99-1.03)       | 1.01 (0.99-1.03)   | 1.01 (0.99-1.03)   | 1.01 (0.99-1.03)   |
| Cohabitation        | 0.94 (0.91-0.97)**     | 0.94 (0.91-0.97)** | 0.94 (0.91-0.97)** | 0.94 (0.91-0.97)** |
| Economic activity   | 0.98 (0.95-1.01)       | 0.99 (0.96-1.02)   | 0.99 (0.96-1.02)   | 0.99 (0.96-1.02)   |
| Edu1                | 0.67 (0.62-0.71)**     | 0.67 (0.62-0.72)** | 0.67 (0.62-0.72)** | 0.67 (0.62-0.72)** |
| Edu2                | 0.96 (0.91-1.00)       | 0.96 (0.91-1.01)   | 0.96 (0.91-1.01)   | 0.96 (0.91-1.01)   |
| Edu3                | 1.02 (0.98-1.06)       | 1.02 (0.98-1.06)   | 1.02 (0.98-1.06)   | 1.02 (0.98-1.06)   |
| Income1             | 1.03 (0.98-1.08)       | 1.03 (0.98-1.08)   | 1.03 (0.98-1.08)   | 1.03 (0.98-1.08)   |
| Income2             | 1.04 (0.99-1.09)       | 1.04 (0.99-1.09)   | 1.04 (0.99-1.09)   | 1.04 (0.99-1.09)   |
| Income3             | 1.00 (0.96-1.05)       | 1.00 (0.96-1.05)   | 1.00 (0.96-1.05)   | 1.00 (0.96-1.05)   |
| Income4             | 1.03 (0.99-1.07)       | 1.03 (0.99-1.07)   | 1.03 (0.99-1.07)   | 1.03 (0.99-1.07)   |
| Dep2                | 0.90 (0.78-1.04)       | 0.92 (0.79-1.06)   | 0.92 (0.79-1.06)   | 0.92 (0.79-1.06)   |
| Dep3                | 1.00 (0.89-1.14)       | 1.03 (0.91-1.17)   | 1.03 (0.91-1.17)   | 1.03 (0.91-1.17)   |
| Dep4                | 0.97 (0.86-1.09)       | 0.97 (0.86-1.10)   | 0.97 (0.86-1.10)   | 0.97 (0.86-1.10)   |
| Dep5                | 0.85 (0.72-1.01)       | 0.86 (0.73-1.02)   | 0.86 (0.73-1.02)   | 0.86 (0.73-1.02)   |

**Random effect**

|              | Null model (variance) | Model1 (variance) | Model2 (variance) | Model3 (variance) |
|--------------|-----------------------|-------------------|-------------------|-------------------|
| Intercept    | 0.142**               | 0.141**           | 0.137**           | 0.136**           |
| ICC          | 0.041                 | 0.041             | 0.040             | 0.040             |
| Deviance     | 623434.00             | 623467.60          | 533804.00          | 533836.80          |
| Reliability  | 0.951                 | 0.950             | 0.942             | 0.941             |

**p <0.01, * p <0.05**

Reference groups: gender, male; cohabitation with spouse, yes; economic activity, yes; education, university and higher (edu4); income, high (income5); deprivation, low (Dep1).