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The influence of municipal characteristics on the use of informal home care and home care services by the elderly Flemish

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Background: When explaining the use of care, the context of the care gains importance. This article focuses on the influence of the municipality on the lives of the elderly regarding the usage of different forms of care, whereas controlling for the effect of individual characteristics. **Methods:** Two databases on the individual characteristics of elderly Flemish people living at home were combined with a database on municipal characteristics. The effect of municipal characteristics was measured through multi-level logistic regression. **Results:** A higher mean income per inhabitant and a lower number of inhabitants/100 km² have a positive effect on the use of informal home care. The use of home care services is positively influenced by a higher family care index and an increasing relative number of hours of domestic care provided in the municipality. Receiving care from a general practitioner, medical specialist, dentist, emergency department, community nurse, physiotherapist, home aid, day-care centre or hospital with overnight stay is not influenced by the municipality's characteristics. The use of public welfare services, meals-on-wheels programs or hospital outpatients' services, however, are affected by the municipality, but cannot be fully explained by the model. **Conclusion:** The municipality that an elderly person lives in has an impact on the amount and the types of care an elderly person receives. Persons with similar care needs and similar individual characteristics can receive very different care when they live in different municipalities. This is quite a challenging finding for researchers, as well as for care providers and policy makers.

Introduction

The ageing of the Western-European population is becoming stale news. In Flanders, the oldest age group is expected to grow fastest: the proportion of people >80 years is predicted to rise from 3% in 2000 to 11% in 2060.¹ An important factor concerning the future demand for and use of care is the steady increase in the number of elderly people living alone. Between 2007 and 2021, the number of people >80 years living alone will increase by 49%.²

The ageing of a group of people of this magnitude is both enriching and challenging for the Flemish society. As the short

outline above illustrates, the future will bring more and more elderly people with different kinds of needs and demands. Several forecasts show an increasing number of elderly people with limited capabilities (among others).^{3–5} As a consequence of this and other factors, the expenditure of care will augment.

There is a good deal of data on the influence of individual characteristics^{5–9} on elderly people's use of care. Information about the influence of the context in which the elderly person resides is seen as important,^{10–19} but is not as well documented. Therefore, this article focuses on the influence of municipal characteristics on the use of care. We control for individual characteristics, even though some may seem to be municipal characteristics when they are shared by

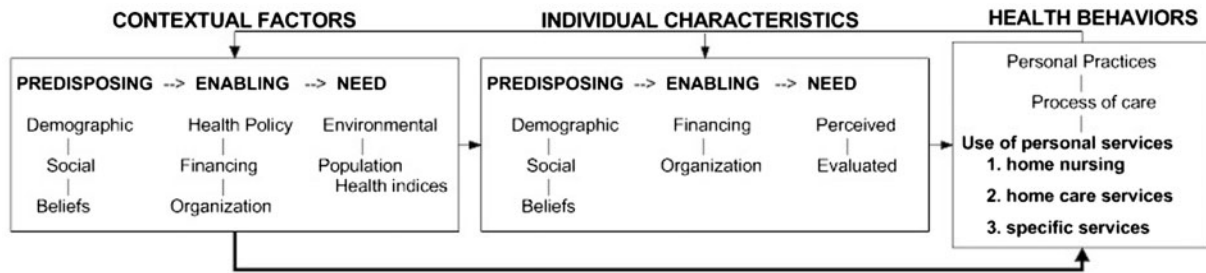


Figure 1 Behavioural model of health services use (in attachment) Source: Andersen²³; edited by authors

many people in the population. The article is not limited to one form of care: determinants of both informal home care and formal home care service use were investigated. Moreover, specific welfare and health services used by the elderly people were examined.

The central research question is whether or not the municipal context of the elderly person explains the use of care after controlling for the individual characteristics of the person. This main research question can be subdivided into three subquestions, visualized in figure 1:

- Which municipal characteristics determine the use of informal home care (non-professional care)?
- Which municipal characteristics determine the use of home care services (formal, professional care)? and
- Which municipal characteristics determine the use of specific services (welfare and health)?

Methods

Selection and description of participants

Data from the study concerning the life situation and needs of Flemish elderly people (LOVO) gives information about the use of informal home care and home care services. In the years 2001–02, 2462 persons in 100 municipalities were interviewed. The sample is representative of the Flemish regional level and also on the municipal level.²⁰ The Belgian Health Survey was used to itemize the formal care into specific welfare and health services.³⁷ Here, 1510 elderly in 99 Flemish municipalities were interviewed during the year 2004. The sample is representative on the Flemish level, but not necessarily on the municipal level.⁷ From the LOVO and the Health Survey, only people aged >60 years and living at home in Flanders were selected. Both databases were separately combined with the database Local Statistics.

The municipal variables are derived from the database Local Statistics,²¹ developed by the Research Centre of the Flemish Government. The data that originated from different sources, are mostly administrative databases. They are not sample-based, but cover the whole population of the municipalities. The data are available per year in such a way that data from 2001 could be linked with the LOVO-database, whereas data from 2004 were linked with the Health Survey data. However, for some variables, data for 2001 or 2004 were not available. In those cases, data from the nearest year available were used.

Technical information

Dependent variables

The term ‘informal home care’ refers to the use of non-professional care one receives from relatives (spouse/partner, children, parents, siblings, etc.) and non-relatives (neighbours, friends and acquaintances, others). In contrast, the term ‘home care service’ refers to the

use of professional services (including private services like a domestic caterer or an independent nurse).

Independent variables

For the selection of the independent variables, we made use of the Andersen ‘Behavioural Model of Health Services Use’, a central point of reference in theoretical research into the use of health care. The model, displayed in figure 1, was recently remodelled^{22–25} by adding municipal variables to the original individual characteristics.

The determinants of access to and use of care at the individual level can be attributed to three categories of factors, as seen in figure 1.^{23,25} First, the ‘predisposing factors’ precede the disease. In this study, the predisposing factors are: age, sex and civil status, educational level, occupational status, household size and care preferences.

The ‘enabling factors’ refer to the means that people have at their disposal. In this study, this refers to being able to manage financially, owner vs. tenant, the perceived quality of the social network, participation in clubs and societies, loneliness, the number of services known, whether or not one has someone to confide in and the present use of formal and informal care.

The ‘need factors’ concern the need for care, in this study the subjective health, the (un)well-being, the need for help in activities of daily living (ADL) and household activities (IADL). A person is limited when always in need of help for at least one activity of daily life (ADL or IADL). Other need factors are the need for help in transportation, individual’s health status and functional restrictions. We selected the variables suggested by the Behavioural Model from the LOVO database and the Health Survey database.^{23–26–29}

Subsequently, a number of contextual characteristics were selected from the Local Statistics database. These were also classified according to the Anderson model.^{30,31} Similar to the individual characteristics noted in figure 1, the contextual characteristics are divided into the same three clusters: ‘predisposing’, ‘enabling’ and ‘need’ factors.²² The ‘predisposing factors’ contain the family care index, the amount of single households compared with the total number of inhabitants, the amount of long-term job-seekers who apply for unemployment benefits, the amount of thefts and extortions per 1000 inhabitants, the index of satisfaction with health-care services and the index of satisfaction with the condition and safety of streets in the neighbourhood.

The ‘enabling factors’ refer to the municipal politics of health and care, the financing of the services and the manner in which the services themselves are organized. In this study, we use the number of existing beds in nursing homes, the number of service flats, the number of places in day-care centres and in respite care and the hours of professional household care provided. All these are relative to the number that should be realized in the municipality according to national policy planning, and according to the age structure of the municipality. Other enabling factors are the number of hours of cleaning services, the total taxable net income (divided by the mean population divided by 100), the proportion of beneficiaries of income benefits for elderly people (per 1000

Table 1 The estimation and significance of the municipality-level variance

	Zero-model Municipal variance and significance	Model 1 Municipal variance and significance	Model 2 Municipal variance and significance
Informal home care	0.3625***	0.2675*	0.3091
Home care services	0.4736***	0.1694*	0.1127
Specific services			
General practitioner	0.1691*	0.0576	/
Specialist	0.1643*	0.1956	/
Dentist	0.2468*	0.2360	/
Emergency department	0.0852	/	/
Community nurse	0.1181	/	/
Physiotherapist	0.1050	/	/
Home aid	0.1821	/	/
Day-care centre	0.8395	/	/
Public welfare services	0.7472**	1.8645*	4.0884*
Meals-on-wheels programs	0.7545**	1.3831*	2.5342*
Hospital with overnight stay	0.0325	/	/
Outpatients' services in hospital	0.3166*	0.4587*	0.7721*

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$

/ = not measured (as the municipality-level variance of the previous step was not significant)

inhabitants aged ≥ 65 years), the proportion of people who receive benefits and the number of inhabitants/100 km² (both per 1000 inhabitants), and the index of satisfaction with the supply of public transportation.

The 'need factors' contain the needs within the municipality. Here, Andersen refers to the population indices concerning health, well-being and environmental factors. In this study, the need factors are the proportion of beneficiaries of dependency-related benefits for elderly people (per 1000 inhabitants aged ≥ 65 years), the proportion of widows, orphans or people with disabilities who receive extra benefits in social security and the proportion of beneficiaries with limited financial means who receive increased reimbursement in health insurance (both per 1000 inhabitants).

Statistical methodology

A multi-level logistic regression analysis was performed with the Glimmix procedure in SAS 9.2. Since the research focuses on elderly people (level 1) in municipalities (level 2), a multi-level analysis was used.

To determine which municipal characteristics influence the use of informal home care, home care services and specific services, the following strategies of analysis were followed: (i) estimating the zero-model, (ii) estimating the model with only individual-level variables, (iii) estimating the model with both individual and municipality variables and (iv) estimating the final model by means of log odds and odds ratios.

First, a zero-model containing only the dependent variable was estimated. It determines whether or not municipal characteristics have any influence on the use of care. The municipality-level variance measures the degree to which the municipalities differ. Whether or not they differ significantly is tested by means of a chi-square test (table 1). If the variance is not significant, the municipal characteristics do not influence the dependent variable. If that is the case, the analysis ends here. However, if the municipality-level variance is significant, then municipal characteristics tend to influence the use of care. The first step disregards the effect of individual or municipal characteristics, such as the individual need for care or the municipal supply of care.

For step two (Model 1), all the individual characteristics described above are added to the zero-model. Again, the chi-square test is performed to check the significance of the municipality-level variance. In this way, we can determine whether municipal

characteristics still significantly influence the use of care after controlling for individual characteristics (see Model 1 in table 1). Here too, the analysis ends when the significance disappears. If this is not the case, a third analysis follows.

In the third step (Model 2), we try to determine which municipal characteristics account for the use of care. To this end, all municipal characteristics described above are added to Model 1. As before, the significance of the municipality-level variance is tested by means of a chi-square test (see Model 2 in table 1).

The final model is presented in the fourth step. For reasons of model parsimony, only the municipal characteristics with a significant influence on the dependent variable and the dependent variables that are influenced by the municipality remain.

Results

As to the use of care, informal, as well as formal care are measured in LOVO by asking who performs the majority of the 17 domestic activities (e.g. heavy domestic work, laundry and ironing or cooking a meal), personal care activities (such as washing, dressing and putting on shoes), and 'special' activities (such as financial administration or management of medication). Measured in this way, 79% of the LOVO respondents use informal home care, and 38% use home care services.^{21,26} For informal home care, it is possible that this distinction is not always an issue of care, but instead is sometimes a case of the division of tasks within the family. In that case, the percentage of elderly people making use of informal home care is overestimated.⁸

In the Health Survey, the use of formal welfare and health services was measured by the use of different service providers. Respondents were asked whether, in the preceding 2 months, they had been in contact with a general practitioner (74.0%), specialist (25.0%), dentist (11.5%) or emergency department (3.3%) or in the last year with a community nurse (22.1%), home aid (12.0%), day-care centre (0.7%), public welfare services (6.1%), meals-on-wheels programs (4.6%), physiotherapist (19.6%), hospital with an overnight stay (19.0%) or hospital with outpatients' treatment (7.5%).²¹

As to the impact of individual and/or municipal characteristics, the analyses confirm what has already been reported elsewhere: both influence elderly people's use of care.^{11,31} The influence of the municipality differs according to the specific type of home care services. For a clear overview, we return to the research questions.

(i) Which municipal characteristics determine the use of informal home care (informal, non-professional care)?

The municipality-level variance for informal home care no longer remains significant after adding individual and municipal variables. The model presented thus explains all municipal variation. The mean income per inhabitant (odds ratio: 1.015) and the number of inhabitants/100 km² (odds ratio: 0.963) are the only municipal variables with a significant ($P < 0.05$) effect on the use of informal home care. The odds of using informal care increases with 1.5% per increase of 100 euro in a city's average income. At the same time, the odds decreases with 3.7% per increase of the city's population with 1000 inhabitants.

(ii) Which municipal characteristics determine the use of home care services (formal, professional care)?

The municipal variation in the use of home care services is also fully explained by the model. Here too, the municipality-level variance is no longer significant after individual and municipal variables have been added. The influential municipal variables ($P < 0.05$) are the family care index (odds ratio: 1.027) and the realized hours of domestic care relative to the programmed hours of domestic care

(odds ratio: 1.747). Thus, an increase of the proportion of people aged >80 years (in relation to people aged 50–59 years), relates to an increase of the odds of using formal home care services. An increase in the proportion of realized hours of domestic care (relative to the programmed hours) corresponds to a (relatively high) increase of the odds of using home care services.

(iii) Which municipal characteristics determine the use of specific (welfare and health) services?

Where the use of a general practitioner, specialist, or dentist is concerned, the municipal influence disappears in Model 1. For the use of an emergency department, community nurse, physiotherapist, home aid, day-care centre or hospital with overnight stay, this is already the case in the zero-model. Regarding the use of public welfare services, meals-on-wheels programmes and the use of hospital outpatients' services, however, the municipality-level variance remains significant even after adding individual and municipal variables. This implies that the variables added to the model do not (fully) explain the municipal influence.

Discussion

Informal home care

Informal home care is influenced by the mean income per inhabitant and the number of inhabitants/100 km². This entails that elderly people living in richer municipalities are more likely to use informal home care than elderly people living in poorer communities.

People who live in densely populated municipalities make less use of informal home care than elderly people who live in less densely populated municipalities. We are not aware of literature either corroborating or contradicting these results. Surprisingly, the family care index—which is an index of the number of elderly people in a potential need of care in relation to the number of potential informal caregivers—shows no influence whatsoever, on the use of informal home care.

Muramatsu and Campbell³¹ confirm our findings: the presence of supply—such as residential services and the levels of domestic care and cleaning help available in a municipality—does not influence the use of informal home care.

Home care services

The use of home care services is influenced by municipal characteristics. The number of elderly people aged >80 years in relation to the number of people between 50 and 59 years of age (the family care index) influences the use of professional services, as was already suggested by Auchincloss *et al.*¹¹. The more the family care index increases, the higher the probability that individuals in the municipality will make use of home care services. The influence of the hours of domestic care realized is consistent with the findings of Muramatsu and Campbell.³¹ The higher the ratio, the higher the use of home care services. Other supply-indicators, such as the number of programmed nursing home beds realized, the number of service flats and the availability of cleaning services, do not influence the use of home care services. The same goes for the number of inhabitants/100 km², in contrast with the findings of Auchincloss *et al.*¹¹

Specific (welfare and health) services

The use of a general practitioner, specialist, dentist, emergency department, community nurse, physiotherapist, home aid, day-care service, or hospital with overnight stay was not influenced by municipal characteristics. This can be explained by the fact that the policies of most of these services are organized on either a regional or national level, thereby falling within a larger geographical scope than the municipality. The fact that day-care

use is not influenced by the municipality may be a consequence of the fact that very few people ($N=10$) in the sample frequented day-care.

Services that are organized per municipality, such as public welfare services or meals-on-wheels programmes, however, are probably influenced by the municipality. Since the municipality-level variance is still significant after adding all the variables in the model, the variables do not explain all the municipal or individual influences. Moreover, none of the added municipal characteristics have a significant influence on the use of these forms of care.

Unmeasured individual or municipal characteristics may explain the municipal coherence. For example, we consider the municipal governance, which is an important element in the Anderson model.²² Unfortunately, certain aspects of governance are hard to quantify and, as such, are not included in the Local Statistics. A municipality that emphasizes prevention and the promotion of movement for elderly people may contribute to the avoidance or delay of the need for care. Environmental factors or town and country planning can also play their part.³²

A service which was not organized municipally, but which did experience municipal influence, is the use of hospital outpatients' services. Here too, the variables in the model do not explain all of the influences (the municipality-level variance stays significant), and once again, none of the added municipal characteristics have any effect. Thus, other individual or municipal characteristics may also be of importance here. An omitted individual characteristic that may influence the need for care is, for example, the suffering from chronic pain and/or a chronic disease.³³ Psychosocial and coping characteristics—being able to cope with disease and a diminished range of action at older age—also influence the functional status³⁴ and thus probably the need for care as well. An unhealthy lifestyle, poor nutritional habits, and low-quality housing may also have a negative influence on the physical health,³² which may in turn result in a higher use of care. Depression was also not measured (although loneliness and subjective health were included). These, and similar characteristics, are not included in the model. Because the research focuses on elderly people, one can probably suppose that hospital outpatients' services mainly entail the use of geriatric day-care hospitals. Geriatric day-care hospitals were not available in all municipalities at the time the data were gathered (2004). This could also explain the difference in use per municipality. Possibly, elderly people who live in a municipality without a nearby geriatric day-care hospital are more often admitted to a regular hospital.

It is noticeable that the use of home services as a whole is municipally influenced, whereas the specific services (as with a community nurse or a home aid) do not experience this municipal influence. Meals-on-wheels programmes do experience a municipal influence, but not of the family care index and the realized hours of domestic care that influence the use of home services in general.

Weaknesses of the model and the study

Although the Andersen model experienced diverse changes based on critiques and empirical feasibility,^{22,23} certain gaps still remain prominent. The most significant gap is the absence of informal home care. Not only are the predisposing, enabling and need factors of the informal caregiver lacking,³⁵ informal care is also not used to explain the use of home care services.³⁶ Here, we tried to meet these limitations by using informal use of care as an independent, as well as a dependent variable.

One of the weaknesses of the study is in the fact that the data from the three data sets were not gathered at the same point in time. However, combining different large databases of different sources also makes this study unique. In other studies, local variations in care for older persons was studied,³⁸ without taking into account individual characteristics. In others, only a limited number of

individual and municipal characteristics are included, in order to explain one form of care use.³⁹

A second weakness concerns the fact that these kind of analyses do not allow to fully take into account the variation between older people. Even older people who share many characteristics, can show differences in their care preferences. The individual history of a person of course also has an influence (e.g. Gelberg *et al.*'s study,⁴⁰ in which the Andersen model is also used).

Conclusion

In conclusion, the municipality an elderly person lives in, has an impact on the amount (number of hours) and the various types of care such a person receives. Elderly people who have similar care needs and similar individual characteristics can have very different care if they live in different municipalities. This is quite a challenging finding, for researchers, as well as for care providers and policy makers. For researchers, this implies that studies into care should be multi-level and take into account municipal characteristics, as well as individual characteristics. Further research with other and more municipal and individual characteristics is necessary. As to care providers, based on the results of this study, they may take account of municipal characteristics for organizational planning. Policy makers can use this information to study inequalities in care based on municipal characteristics and to take account of this for policy making. For both researchers and policy makers, this implies a need for good data at all levels, which at this moment is quite a challenge. Only then, a detailed analysis of municipal characteristics is possible, which in turn can feed policy decisions. For example, insight in differential use of services according to financial means, will help policy makers to make decisions that promote equity.

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Conflicts of interest: None declared.

Key points

- Elderly people who are very much alike as to their care needs and their individual characteristics can have very different care if they live in different municipalities.
- The mean income per inhabitant and the number of inhabitants/100 km², both have an effect on the use of informal home care.
- The use of formal welfare services is influenced by the family care index and the relative number of hours of domestic care in the municipality.
- Receiving care from a home aid, general practitioner, a medical specialist, a dentist, an emergency department, a community nurse, a physiotherapist, a hospital with overnight stay, or making use of a day-care centre is not influenced by the municipality's characteristics.
- Use of public welfare services, meals-on-wheels programs and hospital outpatients' services are affected by the municipality, but cannot be fully explained by our model.

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