What Lies Beneath -
A Comparison of Long-Term Care Use in France and the Netherlands

Thesis
MSc Health Economics, Policy and Law

Author
E.L.A. (Elin) van Duin
Student number
585717
Supervisor
M. (Marianne) Tenand, PhD
Word count
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Abstract

Background: This study compares long-term care (LTC) use in France and the Netherlands. These two countries have both responded to the projected rise in the demand for LTC and the pressure to decrease LTC expenditure by stimulating ageing in place. France and the Netherlands have been shown to have different LTC use patterns in terms of the prevalence of informal and formal care use. This study aims to understand these differences in utilization by relating them to differences in the characteristics of the LTC systems. Both countries have a well-developed set of formal home-care services, but differ in their eligibility assessment and the co-payments required from users.

Methods: Comparable survey data from France and the Netherlands is used to document the LTC utilization rates. A Blinder-Oaxaca decomposition is used to partition the between-country differences in LTC use into a part that is due to differences in the population characteristics of the samples and a part that is due to differences in the association of these population characteristics.

Results: The decomposition reveals that the observed difference in formal LTC use would have been very different if the French and the Dutch sample had the same population characteristics. The descriptive statistics show that, on average, the Dutch sample is in better health and experiences less limitations than the French sample. We would therefore expect to see relatively more formal LTC use in the French sample. The reason that we do not observe this due to the between-country differences in the association between the population characteristics and LTC use. A differential association is found, amongst other, between variables that indicate whether someone lives with their partner and formal LTC use. This reflects a difference in the eligibility assessment, as in the Netherlands eligibility depends on the absence of an informal caregiver. We also see that mild cognitive impairment is associated with more formal LTC use in France, where it is an explicit part of the eligibility assessment. Both differences in the distribution of the population characteristics and the differential association of these population characteristics contribute positively to the observed difference in informal care use. The decomposition difference in no LTC use reveals a similar pattern as we see for formal care use.

Conclusion: These findings suggest that policymakers should not only rely on forecasts of LTC use that are based on trends in determinants such as disability and age, as trends in determinants can be offset by the association between these determinants and LTC use. Furthermore, by not only comparing observed use between countries but also explaining these differences using a decomposition method, new insights can be gained.

Keywords: Long-term care; informal care; decomposition analysis; SHARE

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1. Introduction

Long-term care (LTC) policy is a focal point for governments in Europe. LTC encompasses all (formal and informal) care that is received by people who need long-term support in their daily functioning because of a physical or cognitive impairment (Colombo et al., 2011). When LTC is provided by friends or family members it is referred to as informal care. Formal LTC is provided by professionals.

The demographic trend of an ageing population and the related increase in disability means that the demand for LTC is rising (Colombo et al., 2011). The ratio of people aged 65 or above relative to those aged 15-64 is expected to grow from 29.6% in 2016 to 51.2% in 2070 (European Commission, 2018). The concurrent trends of decreasing family sizes and higher participation rates of females in the (formal) labour market mean that there is less projected availability of informal carers (Colombo et al., 2011). These aforementioned trends are likely to increase the expenditure on formal LTC systems, which governments are trying to counteract by cost-containment measures.

The tension between the pressure to contain costs and the rising demand for care has led to LTC policy reforms. A common policy trend in Europe is to promote home-care to decrease the number of people who are institutionalized in care homes (Spasova et al., 2018). LTC needs are not completely covered by public provision, even in those countries that have a relatively comprehensive publicly financed LTC system. This means that those in need of LTC must appeal to their social environment to meet their care needs. Promoting home-care impacts the balance between the amount of care that is provided by family and friends of the dependent individual on the one hand and professional workers on the other hand. This phenomenon is also called the familization and the de-familization of care, referring to the relative amount of responsibility that is placed on the family and conversely on the State for the provision of care (Ranci & Pavolini, 2015). The (re)familization of care has implications for the accessibility of care and can lead to socioeconomic inequalities in care use (Floridi et al., 2021).

This thesis focuses on a comparison of LTC use, both formal and informal, in France and the Netherlands. Utilization can be seen as a proxy of access: between-country differences in use can therefore be a reflection of differences in the accessibility of LTC systems (Levesque et al., 2013). A comparative analysis of the accessibility of LTC systems is especially relevant given that LTC systems vary extensively in their breadth and depth of coverage of LTC needs (Ilinca et al., 2017).

France has traditionally been characterized by a familialist approach to elderly care, whereas the Netherlands has been de-familized for longer (Floridi et al., 2021; Le Bihan, 2018). Recent LTC policy reforms in both countries have increasingly emphasized “aging in place”, i.e. home-based care. France and the Netherlands both have a well-developed set of home-based services (Spasova et al., 2018). However, the countries have a markedly different LTC system, both in terms of their conditions for eligibility and their (public) coverage, i.e. the extent to which LTC services are publicly financed. This means that it is possible that a Dutch and French person who have the exact same need for LTC could have a higher chance of receiving formal care in, for instance, France. Furthermore, it could be the case that French people who have a low income rely more on (exclusively) informal care compared to people with low income in the Netherlands, after controlling for need. I will use a dataset that was specifically designed for cross-country comparisons, and therefore it allows me to document the proportion of formal and informal care users using a consistent definition of what constitutes informal and formal care use.

1.1. Objective and research questions

This study aims to add to the growing scientific literature that goes beyond merely describing cross-country variation in LTC use and differences in LTC systems, by employing quantitative methods that combine these two elements (Albertini & Pavolini, 2017; Bakx et al., 2015; Brugiavini et al., 2017; Carrieri et al., 2017; Carrino et al., 2018; Floridi et al., 2021). With the exception of Bakx et al. the studies cited in the previous sentence compare more than two (clusters of) countries and/or regions. There are two ways in which differences in LTC systems are incorporated in the analyses in these studies (excluding Bakx et al.). The first way is by estimating separate LTC utilization models for each country and then (qualitatively) relating the differences in the results to differences in the characteristics of the LTC systems (Albertini & Pavolini, 2017). The second way is by focusing on one aspect of the LTC system: e.g. the degree of de-familization as assessed by the number of LTC beds per 1000 inhabitants (Floridi et al., 2021) or a synthetic eligibility index that captures individuals' eligibility status based on the LTC system implemented in their region or country (Carrino et al., 2018). This thesis aims to expand on the aforementioned studies by incorporating more dimensions of the LTC systems, without resorting to the method of Albertini and Pavolini (2017) in which between-country differences in LTC utilization are only described and not quantitively explained.

Employing a similar methodology as Bakx et al. (2015), differences in LTC use between France and the Netherlands will not just be documented in this study but explained by quantifying: (i) the proportion of the difference in LTC utilization that is due to differences in population characteristics (e.g. need and income) and (ii) the proportion that is due to between-country differences in the association between these population characteristics and LTC use. The research question therefore has two parts: firstly, which institutional factors can explain the between-country differences in LTC use? This will be assessed through literature research. The second part will be addressed empirically: which part of the observed between-country differences in LTC use is due to differences in population characteristics, and which part can be explained by the differential effect that these characteristics have on LTC use? My hypothesis is that the differences in LTC use between the Netherlands and France can partly be explained by institutional differences in the comprehensiveness of the LTC systems and the eligibility conditions for formal LTC. Specifically, I hypothesize that the institutional differences between the two countries will affect how individual and household characteristics relate to LTC use. It is important to note that I do not aim to establish a causal relationship between institutional differences and LTC use, rather I seek to explain the between-country differences in LTC use.

1.2. Overview of the following chapters

The structure of the thesis is as follows. In the following chapter I describe the theoretical framework that underlies my analyses. The theoretical framework includes a summary of the French and Dutch systems for long-term home-care. Chapter 3 presents the data and outlines the empirical strategy. Chapter 4 reports the results, and the final chapter discusses these results and concludes.

2. Theoretical framework

2.1. Defining long-term care

Long-term care is defined "as a range of services required by persons with a reduced degree of functional capacity, physical or cognitive and who are consequently dependent for an extended period of time on help with basic activities of daily living (ADL)" (OECD & European Union, 2013, p. 10). In this thesis I focus on LTC that is provided to the ageing population. LTC can be provided at home or in an institutionalized setting such as a nursing home. Because the SHARE survey that I will be analysing (see Chapter 3) focuses on individuals who reside at home, I will only look at home-based care.

LTC can be formal or informal. Formal care is regulated and requires a contractual relationship between the caregiver (an institution or an individual) and the care receiver (Brugiavini et al., 2017, p. 3). Informal care is not provided on the basis of formal employment but by a person with whom the care receiver has a (pre-existing) social relationship (Spasova et al., 2018). Formal care and informal care can complement and substitute each other. Informal care has been shown to substitute formal care, but the extent to which this substitution effect occurs depends on the level of disability of the dependent and differs between countries (Bolin et al., 2008; Bonsang, 2009).

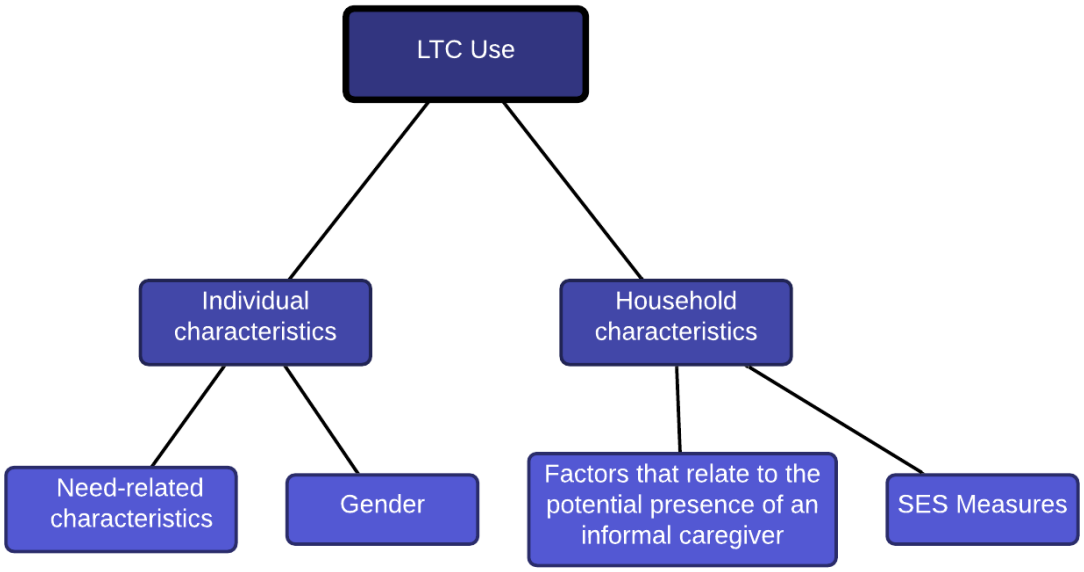
2.2. Determinants of LTC use

Previous studies have modelled LTC use as a function of need-related characteristics and household characteristics (Bakx et al., 2015; Blomgren et al., 2008; Broese van Groenou et al., 2006; Ilinca et al., 2017; Rodríguez, 2014). Need-related characteristics are the most important determinants of care utilisation, and comprise several measurements of disability, health status and age. Household characteristics include measures of socio-economic status (SES) and characteristics that affect the availability of a potential informal caregiver, such as whether someone shares a home with their partner. The extent to which this potential for informal care is in actualized is likely to depend on the extent to which the LTC system is de-familiarized (see paragraph 2.3.2) and the cultural norms surrounding the responsibility of family members in relation to providing care to dependent family members (Albertini & Pavolini, 2017).

With regard to SES both income and wealth are relevant, because for an older population wealth could be a better SES measure than income as it is said to capture the accumulated effect of an individual's education, employment and income during their lifespan (Rodrigues et al., 2018). Income is a resource that can be used to buy care on the market. In theory, so is wealth, although this depends on the degree to which wealth can be easily mobilized (i.e. if the wealth is liquid or not) to buy care services (Albertini & Pavolini, 2017). The extent to which individuals have to spend their own income and/or wealth to meet their care needs depends on: (i) the costs of the care that is received, (ii) the degree of cost-sharing that exists in the LTC system, and (iii) whether the cost-sharing calculation is based on means testing. In a LTC system that uses means testing criteria it could be the case that being in the top of the income and/or wealth distribution negatively affects the likelihood of using formal care. In a LTC system that is not based on means testing and does not have a universal coverage of LTC need we would expect that being on the bottom of income and/or wealth distribution translates into less formal care use, and therefore these individuals would be more likely to rely exclusively on informal care (Floridi et al., 2021).

Figure 1 is a graphical representation of the main determinants of LTC use. A figure with more determinants is included in appendix A.

***Figure 1** Main determinants of LTC Use*



2.3. Institutional characteristics of the LTC systems in the Netherlands and France

In this paragraph I will provide an overview of the French and Dutch LTC systems for the ageing population who live at home. I will focus on the characteristics of the LTC systems as they existed during my study period: 2013.

2.3.1. The Dutch LTC system

At the time, care for the elderly in the Netherlands was financed and organised through two complementary schemes. The Dutch population had been insured for long-term care under the Exceptional Medical Expenses Act (Algemene Wet Bijzondere Ziektenkosten, AWBZ) since 1968. This mandatory public insurance covered a broad range of long-term care services for both home-care and institutionalized care, not only for the elderly but also for the (chronically) disabled of a younger age. The AWBZ covered domestic help until 2007, when this responsibility was transferred to the Social Support Act (Wet Maatschappelijke Ondersteuning, Wmo). The Wmo is executed by municipalities who are also responsible for the eligibility assessment. Domestic help includes housekeeping, meals on wheels, and home adjustments (Mot, 2010). Of all home-care provided in the Netherlands, domestic help was the most prevalent as it accounted for 40% of home-care (Kattenberg & Bakx, 2021). Elderly people in the Netherlands often use multiple types of formal home-care: 50% of the elder population who receive personal care or nursing care (provided by the AWBZ) also receive domestic help (Kattenberg & Bakx, 2021).

Eligibility for care financed by the AWBZ was assessed by an independent agency (Centrum Indicatiestelling Zorg, CIZ). The CIZ has no financial incentive to keep costs down (Mot, 2010). AWBZ

eligibility requires the presence of either (i) a somatic, psycho-geriatric or psychiatric disorder or limitation or (ii) an intellectual, physical or sensory disability (Beleidsregels indicatiestelling AWBZ 2014, 2014). There is no standardized scale on which the applicants are scored: the CIZ determines the LTC need for each applicant individually. This determination is based on detailed national guidelines that dictate which factors need to be included in the assessment (Beleidsregels indicatiestelling AWBZ 2014, 2014). The guidelines prescribe a 'funnel model' through which the applicant's needs and circumstances are assessed, resulting in the decision whether the applicant is entitled to AWBZ care and if so, which services. The assessment of the circumstances of the applicant includes the availability of informal care. Household members are expected to provide the so-called 'usual care' (*gebruikelijke zorg*) for the applicant, only care that exceeds this 'usual care' can be classified as informal care. The CIZ takes inventory of the informal care that is currently provided and asks whether the informal carer is willing to keep providing that care. Informal carers are not obliged to do so, in principle the applicant can get an AWBW indication for the care (provided it exceeds the 'usual care') that is currently provided by an informal carer. However, if the applicant and the informal carer both want to continue with the current set-up, then the informal care is subtracted from the gross determined need for AWBZ care, resulting in a net determined need for AWBZ care (Beleidsregels indicatiestelling AWBZ 2014, 2014).

Municipalities have had considerable degrees of freedom within the implementation of the Wmo, which means that there were regional differences in the assessment procedures and the required financial contributions (co-payments) from clients (Kelders & de Vaan, 2018). The law explicitly stipulates that the ability of friends and family to provide care needs to be taken into account by the eligibility assessor (Nieuwe regels betreffende maatschappelijke ondersteuning (Wet maatschappelijke ondersteuning); Memorie van toelichting, 2005). The law also recognizes that it is complex to quantify the capability to provide informal care, and therefore states that the assessor needs to make an estimation of informal care availability on an individual basis. As mentioned before, the municipalities are free to design their assessment procedure, as long as the municipalities fulfil their responsibility to 'adequately' compensate for the functional limitations of the applicant to ensure that the applicant can continue living independently for as long as possible (Mot, 2010). The municipality can choose to contract out the assessment procedure. In 2008 52% of municipalities performed the assessment procedure together with the CIZ or another assessment organisation, 28% of municipalities performed it themselves, and 21% had completely outsourced the procedure to the CIZ or another assessment organisation (Mot, 2010).

Municipalities are incentivized to keep costs down: they receive a grant from the central government to provide domestic help, if the municipality exceeds this budget then they will need to reallocate funds from other municipality portfolios to meet the costs. Furthermore, if the municipality does not fully spend the grant that has been allocated to them, they are free to spend it on other goals (Kattenberg & Vermeulen, 2018)

Both the Wmo and the AWBZ have a form of cost-sharing. On average, 9% of the AWBZ and 20% of the Wmo care is funded through cost-sharing (Kattenberg & Bakx, 2021).

Co-payments for home-care are dependent on: the type and amount of care received; gross income and wealth[1]; the composition of the household; the applicant's age and, specifically for Wmo care, the municipality in which the dependent resides (CAK, 2013). The co-payment amount is set jointly for the

[1] Until 1st of January 2013 only 4% of the dependent's wealth was taken into account, after this date an additional 8% would be taken into account (Meeuwissen, 2012).

Wmo and the AWBZ by one governmental agency (CAK). In 2011 the median co-payment for home-care financed through the AWBZ and Wmo was €185, which corresponded to 1% of the net income (Bakx et al., 2020). Co-payments are capped to ensure that an individual never pays more than 30% of the total cost of the received home-care. Furthermore, a minimum co-payment is in place. Regardless of the amount of home-care that was used, in 2010 single individuals paid at least €17.60 per four weeks, and households of 2 people or more paid at least €25.20 (Meeuwissen, 2012). Only when people's income exceeds a certain threshold (*opbouwgrens*) they would pay more than the minimum co-payment.

In summary, the Dutch LTC system[2] is relatively centralized, has a high level of public spending, co-payments are required but dependent on income and wealth and capped so people never pay for more than 30% of the total cost of the received care. The eligibility assessment for AWBZ care is standardized. For Wmo care the municipalities are free to design their assessment procedure, as long as they fulfil their responsibility to 'adequately' compensate for the functional limitations of the applicant. The laws governing AWBZ and Wmo care both prescribe that informal care capacity is taken into account when determining the (net) need for formal care.

2.3.2. The French LTC system

The LTC system in France is fragmented, involving several levels of governance (the state, regions, decentralized local authorities, and municipalities) and regulated by a variety of legislations (Brugiavini et al., 2017; Le Bihan, 2018). Since 1997 the LTC system has been split into two separate areas: the *handicap* policies for disabled people who are younger than 60 years old and the *dependence* policies for the disabled elderly (Tenand, 2018). Public coverage of care for the elderly is (mostly) financed by three schemes: (i) the sickness insurance scheme; (ii) pension schemes and (iii) the personal allowance for autonomy (APA, *Allocation Personnalisée d'Autonomie*) (Brugiavini et al., 2017, p. 43). The APA scheme contributes the most to care for the elderly as it can be used to pay for personal care and assistance both at home and in an institutionalized setting. The APA is managed by decentralized local authorities (*départements*). Seniors whose health status does not qualify them for APA can apply to another scheme to finance home help: the Social Assistance to seniors (*Aide sociale aux personnes âgées)*, which is funded through pension schemes.

In France individuals can apply either for the at-home APA program or for a nursing home stay. There is no assessment procedure in place to ensure that the least costly option is chosen (Tenand, 2018). Eligibility for the APA scheme is assessed on the AGGIR (*Autonomie Gérontologique—Groupes Iso-Ressources*) scale. AGGIR is a nationally standardized needs assessment tool that helps to determine the level of dependency of an individual, by rating limitations in ADL and iADL (the latter however does not contribute to the final score) (Brugiavini et al., 2017, p. 44). The scale ranges from GIR 1 (the most dependent) to GIR 6 (autonomous). The AGIRR score is also dependent on the cognitive functioning of the individual, as coherence and orientation are part of the scored variables (Brugiavini et al., 2017, p. 45). Regardless of how many ADL limitations are reported, if the individual is cognitively impaired, they will be assigned to at least GIR 2.

The assessment is performed by a team of social workers and nursers who visit the applicant at home (Tenand, 2018). The applicant needs to be qualified as at least moderately disabled (GIR 4) in order to be eligible for APA (Tenand, 2018). If the applicant is deemed eligible, then a personalised care plan is devised by the assessor (Le Bihan & Martin, 2013). The APA is designed to (partly) finance this care

[2] As it existed in 2013

plan. For each GIR level a maximum monetary allowance has been set at the national level. The extent to which the applicant receives this allowance depends on their income (Brugiavini et al., 2017, p. 47). Wealth is not considered when the co-payment amount is set. The co-payment is calculated based on the equivalised spousal income and increases linearly with income[3]. Individuals who earn less than €740 a month are exempt from paying a co-payment. Those who have a monthly income above €2945 pay the maximum co-payment rate of 90% (Tenand, 2018).

To conclude, the French system is relatively decentralized, with the APA program being the most relevant for care for the elderly. Eligibility criteria for APA are set nationally and prescribe the use of the AGIRR scale The budget that is allocated to individuals through APA is determined on the basis of the individual's health status and their level of disposable income (Le Bihan, 2018). The maximum co-payment rate is 90%.

2.3.3. Comparative research into the Netherlands and France

Comparative research into LTC systems has generated several classification systems. In the introduction I highlighted one of these typologies, that focuses on the degree of de-familization of the LTC systems (Ranci & Pavolini, 2015). An example of this typology is the division of LTC systems into three categories, depending on the actor that is primary responsible for meeting care needs: the individual (Scandinavian model); the nuclear family (Continental model) or the extended family (Mediterranean model) (Pommer et al., 2007). This typology further states that the more responsibility lies with the individual and not with their family (i.e. the more de-familized the system is), the more the government plays a role in providing LTC. Traditionally, the Netherlands has been placed in the Scandinavian model, and France in the Continental model.

Another typology derived from a European Commission study (Kraus et al., 2010) categorizes LTC systems based on two characteristics: organisational depth and financial generosity. The authors call this the organizational approach. Organisational depth is synthesized from measurements that indicate accessibility of care, quality of care and the availability of cash benefits. Financial generosity is assessed based on two metrics: the degree of cost-sharing and the public expenditures on LTC as a share of GDP. Table 1 displays these two metrics for France and the Netherlands. Using this typology, Kraus et al. (2010) place France and the Netherlands in the same cluster together with the Scandinavian countries and Belgium. This cluster shows both a high degree of organizational depth and of financial generosity. France and the Netherlands are scored the same on organizational depth, but in terms of financial generosity the Netherlands is placed on a higher level than France. This is expected, as public spending on LTC is higher in the Netherlands, and the private expenditure on LTC is higher in France (see table 1).

[3] The co-payment calculation has been changed in 2016. Because my empirical data predates this change, I will not discuss the reform.

Table 1 *Characteristics of the French and Dutch LTC Systems and attitudes towards informal care*

	France	**The Netherlands**
Total public spending on LTC as % of GDP (in 2010)[^]	2.2%	3.8%
Private expenditure on LTC as a share of total public spending on LTC (as % of GDP, and corrected for the share of persons aged ≥ 65)[*]	30%	10%
Formal care use by persons aged 65 and older (as a share of the population aged ≥ 65)[*]	13.8%	21.4%
Informal care use by persons aged 65 and older (as a share of the population aged ≥ 65)[*]	27.4%	6.7%
In case an elderly parent becomes frail, the best option would be:		
they should live with their children (% agree)[#]	18%	4%
public or private service providers should visit their home and provide them with appropriate help and care or the parent should move to a nursing home (% agree)[#]	58%	70%
In case a close relative becomes frail, care should be provided by close relatives, even if that means they have to sacrifice their career to some extent (% agree)[#]	17%	13%
[^] Data source: European Commission, 2012		
[*] Data source: Kraus et al., 2010		
[#] Data source: Eurobarometer, 2007. Definition of categories derived from Carrera et al., 2013 and Albertini & Pavolini, 2017		

In the same study the authors derive a different typology based on quantitative data on use and financing of LTC. The relevant metrics for the Netherlands and France are displayed in table 1. France and the Netherlands are assigned to different clusters in this typology. The Netherlands is part of a cluster characterized by its high public spending and low private funding, and a high use of formal care accompanied by a relatively low use of informal care. The cluster with France has moderate public spending, high private funding, moderate formal care use and high informal care use.

It is important to note that typologies such as the ones outlined in this section are dependent on the definitions used to classify concepts such as informal care and accessibility of systems. Informal care can be defined and empirically assessed in many ways, and therefore typologies that incorporate informal care can vary in their clustering depending on the definition used.

The role of cultural norms such as the responsibility of children to take of their parents is difficult to disentangle from the way the LTC system is organized. Is informal care by family members important because the State does not generously fund formal care? In other words, is a low rate of public spending on LTC a cause of a high use of informal care, or is the high use of informal care an expression of a cultural norm? Empirical studies have found some evidence of a North-South gradient in European LTC systems: in Southern countries with traditionally stronger family ties informal care to a greater extent substitutes formal care (Bolin et al., 2008; Kohli et al., 2005). According to these authors, the

North-South gradient reflects cultural, and therefore institutional differences.

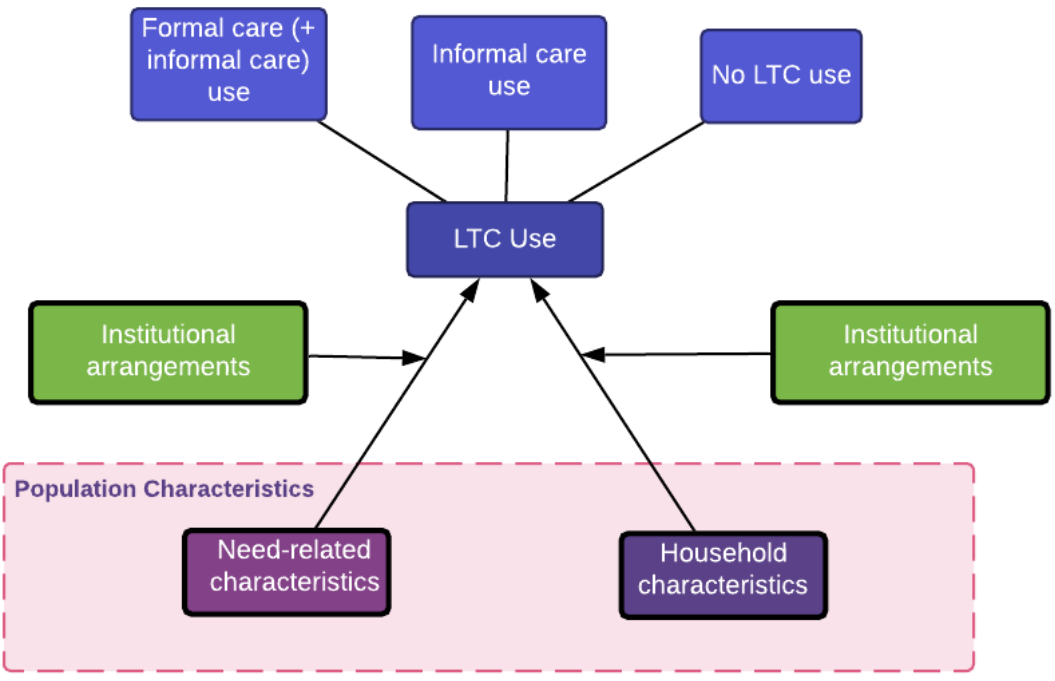
Table 1 includes statistics on attitudes towards informal care from a 2007 Eurobarometer. In comparison with the Netherlands, more French people are in favour of their parents moving in with their children when they become dependent. This could be seen as a reflection of cultural norms that place more importance on the role of the family in meeting LTC need. These cultural norms might have arisen because (the perception of) the quality of LTC is lower in France, and therefore family members might be more inclined to take care of their elderly relatives. It could also be a response to the fact that in France the out-of-pocket expenditure is higher for formal LTC than in the Netherlands.

2.4. Influence of institutional characteristics on LTC use

Differences in LTC use between countries can be explained in various ways. One potential reason is that the need for LTC differs between countries, as the proportion of elderly who are in need of LTC can vary from country to country. A second potential reason is that the effects of the determinants of LTC (see section 2.2) on LTC use can vary between countries. In this section I will explore these two reasons.

My hypothesis is that the institutional arrangements in France and the Netherlands affect the relationship between (some of) the LTC determinants and LTC use. This conceptual framework is depicted in figure 2.

Figure 2 *The relationship between population characteristics, institutional arrangements and LTC Use*



As is shown in figure 1, population characteristics such as need indicators and household characteristics are determinants of LTC use. However, the effect of a particular determinant on LTC use can differ between countries. The differential effect of determinants can (partly) be ascribed to differences in the institutional characteristics of the LTC systems.

I highlight two differences between the LTC systems of France and the Netherlands. Both the eligibility conditions and the financial contribution that is required from LTC users differ between the two countries. A simplified model of the LTC arrangements is displayed in figure 3.

Figure 3 *Institutional arrangements in France and the Netherlands for home-care*

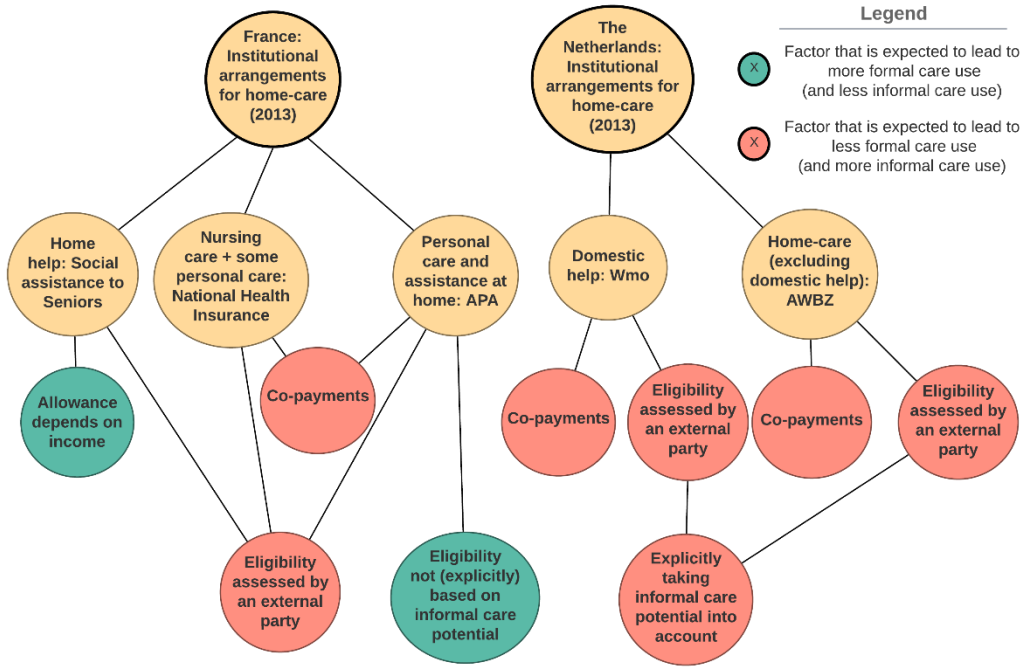


Figure 3 also depicts factors related to eligibility and comprehensiveness that I expect to result in more (indicated with green) and less (indicated with red) formal care use. As shown in figure 2, I expect this to occur because the institutional arrangements influence the association between LTC determinants and LTC use. My hypotheses are as follows. First, the association between LTC use and the LTC determinants related to the availability of an informal carer, such as whether someone lives with their partner, will differ between France and the Netherlands. This is because, as depicted in figure 3, the potential availability of an informal carer is explicitly part of the eligibility assessment in the Netherlands (for both Wmo and AWBZ care) and not in France. This means that having a spouse living in the same home as the dependent and/or having children is expected to be associated with more formal LTC use in France compared to the Netherlands. Second, because the out-of-pocket expenditure on formal LTC is on average higher in France than in the Netherlands, I expect to see a stronger income gradient in formal LTC use in France than in the Netherlands. Even though both countries have means-tested co-payments, cost-sharing on average is higher in France than in the Netherlands.

2.5. Evidence from previous studies

In this section I summarise the findings from the 2015 study from Bakx et al., because, as outlined in my introduction, their study is closely related to the set-up of this thesis. The authors compared LTC use in Germany and the Netherlands and sought to expand on the existing literature by not just describing the differences in LTC use but also explaining the differences by investigating the impact of institutional differences on LTC use. They chose Germany and the Netherlands because these two countries have to a large extent similar LTC systems in terms of organisation and financing, yet they differ in the observed mix of formal and informal LTC use. Bakx et al. hypothesized that the observed differences in LTC use could (partly) be linked to the differences in the design of the LTC system, because even though the LTC systems are comparable, they differ in certain aspects. Bakx et al. highlighted two salient design differences: (i) whether the spouse's ability to provide informal care was taken into account in the eligibility assessment for formal care and (ii) the financial contribution (i.e co-payments) required from formal care users. The authors hypothesized that these two features could mean that Germany and the Netherlands differ in terms of (i) the effect of spouse characteristics on LTC use and (ii) the effect of income on LTC use.

To assess the potential influence of these design differences on LTC use, the authors performed a decomposition analysis. The authors used SHARE survey (see chapter 3) data from 2004 and 2006 that they pooled (i.e. they did not use a longitudinal design). The decomposition of the between-country differences in LTC use showed that these mostly stem from differences in the effect of population characteristics rather than differences in the population characteristics themselves. In line with their first hypothesis, the differences in the effects of population characteristics can be related to the differences in eligibility rules. Specifically spousal disability was demonstrated to significantly increase the probability of formal care use in the Netherlands, where the potential for informal care is part of the eligibility assessment, but not in Germany. The effect of income on LTC use also differed as hypothesized: in Germany co-payments are higher and people of lower incomes were shown to be less likely to use formal care in Germany compared to the Netherlands.

3. Data and empirical strategy

3.1. Data and sample selection

My data source is the Survey of Health, Aging, and Retirement in Europe (SHARE). SHARE is a cross-national panel database that includes people aged ≥50 and their spouses. SHARE provides microdata on health, SES and other personal and household characteristics. I focus on home-care use, as the SHARE data only includes some responses from people who live in care homes and is therefore not representative for that population (Floridi et al., 2021).

The survey includes information on the use of home-care from both formal and informal providers. I use data from Wave 5, for which responses were collected in 2013, from France (4506 respondents) and the Netherlands (4168 respondents). Data from subsequent SHARE waves (6 and 7) are available for these two countries. I however chose not to use the more recent waves because these datasets were less complete compared to wave 5. This incompleteness stems from two reasons:
1) In the Netherlands a different methodology was used for data collection in waves 6 and 7 compared to previous waves. In waves 6 and 7 respondents replied to the questionnaire online at their own convenience (de Bruijne & Kalwij, 2018). The researchers adapted the questionnaire to align with this method, which means that several independent variables that I would need for my analysis are missing from the Dutch dataset of waves 6 and 7.
2) In France the respondents of wave 7 that had not taken part in wave 3 only answered a limited subset of questions. This subset did not contain the questions on informal care receipt, which is part of my dependent variables. If I were to include only the respondents who answered the full questionnaire, I would have a sample that is too small for the statistical analysis.

For wave 5 the method for data collection was the same in both the Netherlands and France: face-to-face at the respondent's home through a computer-assisted personal interviewing program (CAPI).

In order to be selected in my analysis, respondents have to be at least 60 years old. I exclude respondents who reside permanently in a nursing home. Furthermore, only respondents who did not have any missing values for the dependent variables and explanatory variables are selected. I restrict the sample to individuals who report some form of disability, as I am interested in care use within a population that is expected to have (some) need for care (Floridi et al., 2021). Only respondents are included who report difficulties in one (or more) of the following: activities of daily living (ADL); instrumental ADL (IADL) or mobility items (see appendix B for the list of mobility items).

This results in a sample of 1266 Dutch respondents and 1674 French respondents.

I use the software package Stata, version 16.1, to construct the variables and perform the statistical analyses.

3.2. Outcomes

The dependent variable in my analysis is the self-reported use of home-care. The SHARE respondents have indicated what care they have received during the 12 months preceding the interview, and who gave this care. I use these responses to construct three mutually exclusive binary outcomes: 1) no care use; 2) exclusively informal care use provided by someone within and/or outside the household; and 3) formal care use with possible additional informal care use. A category of exclusively formal care use

is not useful, as formal home-care is generally accompanied by some amount of informal care: in wave 5, just 20% of the French and Dutch respondents who received formal care did not use any form of informal care.

Formal care use is defined in the survey as the utilisation of professional or paid services at home. These services include help with personal care, domestic tasks and other activities. Meals on wheels use is also part of this category. Informal care is defined as receiving personal care, practical household help or help with paperwork from anyone inside or outside the household. The person delivering informal care does not do so in a professional capacity.

The survey responses for the receipt of informal care from someone outside the household did not explicate if the respondents themselves received the care or if it was (also) received by another household remember. For the households consisting out of more than one person I only attribute this type of informal care to the respondent if they had reported any ADL or IADL limitations. If the respondent did not report any ADL or IADL limitations I assume that another household member was the recipient of this type of informal care.

3.3. Explanatory variables

As outlined in my theoretical framework, LTC use is determined by both individual characteristics and household characteristics. This section provides an overview of the explanatory variables that are included in my analysis and explains how they were derived from the SHARE survey responses. Table 2 provides a summary of the included variables and their coding.

3.3.1. Demographics

I use two variables to capture general demographical information for each respondent in order to control for predisposing factors (Andersen & Newman, 1973). Age is an existing SHARE variable that records the respondent's age at the time of the interview in years, rounded to one decimal place. Gender is an existing SHARE variable that is coded 1 if the respondent is female, and 0 if the respondent is male.

3.3.2. Mild cognitive impairment

SHARE respondents perform two tasks that measure cognitive performance: one related to episodic memory, and the other related to verbal fluency. In the memory task participants are asked to memorise a list of ten common words that the interviewer reads to them (Sutin et al., 2020). Their recall is measured at two moments in time: directly after the participants have heard the list (immediate recall) and again at the end of the cognitive function module (delayed recall) (Lugo-Palacios & Gannon, 2017). This results in two memory scores (range 0-10) for each participant. To determine whether someone should be classified as mildly cognitively impaired based on their performance on the memory task, age-graded means are calculated for both the immediate and delayed recall scores. These age-graded means are calculated for the French and Dutch respondents of wave 5 who are aged 60 and over. Because there is no a priori reason to assume that respondents in either of the countries would perform worse the French and Dutch data memory scores are pooled to calculate the age-graded means.

When a participant performs at least 1.5 standard deviation (SD) below the age-graded mean on either one of the recall tasks they are coded as 1, and all others are coded as 0 (Lugo-Palacios & Gannon, 2017; Sutin et al., 2020). For people aged 75 and over a different classification method is used. Because there are relatively less observations per age in this age group, the mean and standard deviation is calculated for the whole age group, in line with the approach of Lugo-Palacios and Gannon (2017). In addition, for this age group individuals are seen as impaired and therefore coded as 1 when they perform (at least) one SD below the age group mean.

In the verbal fluency task participants had one minute to name as many zoo animals in one minute as they could think of (Formanek et al., 2019). Participants get one point for each unique zoo animal that they named. Not being able to name more than 14 animals is seen as an indication of mild cognitive impairment (Lugo-Palacios & Gannon, 2017). Participants are therefore coded as 1 when they have named 14 or less animals, and are coded as 0 when they have named 15 or more.

The scores on the memory task and the verbal fluency task are combined to create a single dummy variable that identifies someone as mildly cognitively impaired (coded as 1) when they have underperformed (i.e. coded as 0) on both the memory and the verbal fluency task (Sutin et al., 2020).

3.3.3. Health and Disability

I include several variables to capture a range of health indicators and (dis)ability levels. Firstly, given that ADL and IADL limitations are an important indicator of dependency, I will use the reported ADL and IADL limitations to construct a disability scale comprised of three levels. Epidemiological studies have shown that functional losses tend to occur in a set chronological order, resulting in a hierarchy of limitations (Barberger-Gateau et al., 2000; Edjolo et al., 2016). The baseline level is made up of respondents who have not reported any ADL or IADL limitations. The first level of disability is assigned to respondents who have reported one or more IADL limitations, but no ADL limitations. The second level corresponds to moderate dependency, which is assigned when respondents report one or more ADL limitations. The most severe level of dependency corresponds to respondents who have indicated that they either cannot eat, use the toilet, or get in or out of bed (i.e. transfer) alone. I create four dummy variables for the four levels (the baseline level and the three disability levels), and assign a 1 when a respondent belongs to that level, and 0 if not. Note that the levels are mutually exclusive, so a respondent who has indicated difficulties in e.g. eating alone is only assigned to the third disability level, and not also to the second.

Secondly, I incorporate the mobility limitations that respondents have indicated. Because I expect that mobility limitations do not have a linear effect, I distinguish three levels, for which I create separate dummy variables. The first level is the baseline that is made up of respondents who have not reported any mobility limitations. The second level is assigned to respondents who have one or two mobility limitations. The third and final level is assigned to respondents who have reported three or more mobility limitations. Again, the dummy variables are coded 1 when respondents are assigned to that specific level, and 0 if not.

Thirdly, I look at the chronic diseases that SHARE respondents have reported. The survey asked respondents to indicate whether they were currently suffering from a list of conditions: heart attack or other heart problems; high blood pressure; high cholesterol; stroke; diabetes or high blood sugar; lung disease; cancer (all kinds); ulcer (any kind); cataract; hip fracture or femoral fracture; rheumatoid arthritis; osteoarthritis. These conditions are all qualified as chronic. A positive response means that the respondent has been told by a doctor that they have that specific condition, and that they are

either in treatment or bothered by this condition (Börsch-Supan et al., 2013). A dummy variable is created that sums the positive responses to the mentioned question in order to produce a single score. Because the impact of going from no chronic disease to one chronic disease on LTC use is expected to be different from the impact of going from five to six chronic diseases (i.e. a non-linear effect is expected), I construct three dummy variables to account for three levels (Bakx et al., 2015). The first corresponds to having no chronic diseases, the second indicates respondents have one or two chronic diseases and the third indicates that respondents have three or more chronic diseases.

Fourthly, I include two separate variables for the presence of Parkinson's disease and Alzheimer's disease. Parkinson disease and Alzheimer's disease (plus other forms of dementia) are both likely to correlate with the measure of cognitive impairment. However the measure that I use of cognitive impairment is an indication of mild cognitive impairment, whereas Alzheimer's disease and Parkinson disease do not just (potentially severely) affect cognitive functioning but also lead to other limitations that result in a high need for care. When respondents have indicated that they have been diagnosed with Parkinson disease a dummy variable is scored 1. When respondents have indicated that they have been diagnosed with Alzheimer's disease or another form of dementia, they are scored 1 in another separate dummy variable.

The final health measure I incorporate relates to the self-assessed health status that the SHARE participants have reported. Self-assessed health has been shown to strongly predict morbidity (Carrieri et al., 2017). Participants were asked to assess their health on a five-point scale, ranging from poor to excellent. A dummy variable is coded as 1 when the participants have rated their health as poor, all other responses are coded as 0.

3.3.4. Socio-economic Status

For each individual their position in the national distribution of equivalent household incomes is determined (Albertini & Pavolini, 2017). To do so, at the household level all income components are summed and equivalised using the square root scale (OECD, 2013). Net household wealth is incorporated in the same way: the household net wealth is equivalised using the square root scale. The SHARE survey includes a financial section intended to provide a detailed overview of respondent's financial resources, however these questions have a high non-response rate. I therefore use income and wealth measures that have been imputed by SHARE using the methodology outlined by De Luca et al. (2015). The SHARE survey provides five imputed values for household net wealth for each individual, because there is no a priori reason to prefer one imputation method over the other I use the mean of the five imputed net wealth values.

In order to account for nonlinear relationships between economic resources and LTC use, a dummy is created for each income and wealth quintile (Albertini & Pavolini, 2017). The quintiles for both wealth and income are determined before the sample selection takes place. The quintiles are determined for France and the Netherlands separately, this means that there is no need to adjust for purchasing power parity.

3.3.5. Availability of informal carers

The (potential) availability of informal care is incorporated in two ways. Firstly, I use dummy variables to distinguish between 1) respondents who are single or whose partner does not live in the same household, 2) respondents who live with a partner who is younger than 75 years old and 3) respondents who live with a partner who is 75 years or older. These dummy variables are coded as 1

when the respondents belongs to that specific category. The reason I distinguish between living with a relatively younger or older partner, is that it can be expected that an older partner is less able to provide informal care. The age of the partner is therefore included as a proxy of their health and hence their capacity to provide informal care.

Secondly, a measure of the proximity of children is included. This is assumed to be a driver of informal care, as children who live further away from their parents are less likely to provide informal care compared with children who live closer (Balia & Brau, 2014; Bonsang, 2009). Three dummy variables are included to represent whether respondents could potentially rely on their children for informal care. The first includes respondents who do not have any children, the second includes respondents whose children live at least one kilometre away, and the third includes respondents who have at least one child who lives either in the same building or less than one kilometre away. The dummy variables are coded 1 if the respondent belongs to that category.

Table 2 *Description of the variables and their coding*

Variable	Definition / Assigned values
Dependent variables	
Formal care use	1 if the respondent used professional or paid services at home during the 12 months before the interview, 0 otherwise
Exclusively informal care use	1 if the respondent received personal care, practical household help or help with paperwork from anyone inside or outside the household in the 12 months previous to the interview, 0 otherwise
No LTC use	1 if the respondent has not used formal nor informal care (as defined above) in the 12 months before the interview, 0 otherwise
Independent variables	
Gender	1 if female, 0 if male
Age	Age at interview (in years)
Cognitive impairment	1 if mild cognitive impairment was indicated by their performance on two tests, 0 otherwise
IADL/ADL Limitations Levels	
Level 0: No ADL and no IADL limitations	1 if the respondent did not report any ADL nor IADL limitations, 0 otherwise
Level 1: One or more IADL limitations, no ADL limitations	1 if the respondent reported one or more IADL limitations and no ADL limitations, 0 otherwise
Level 2: One or more ADL limitations	1 if the respondent reported one or more ADL limitations, 0 otherwise
Level 3: Inability to either eat, toilet or transfer alone	1 if respondent reported to be unable to either eat, use the toilet, or transfer alone, 0 otherwise
Mobility limitations	
No mobility limitations	1 if the respondent did not report any mobility limitations, 0 otherwise
One or two mobility limitations	1 if the respondent reported one or two mobility limitations, 0 otherwise
Three or more mobility limitations	1 if the respondent reported three or more mobility limitations, 0 otherwise
Chronic diseases	
No chronic diseases	1 if the respondent did not suffer from any chronic diseases, 0 otherwise
One or two chronic diseases	1 if the respondent suffered from one or two chronic diseases, 0 otherwise
Three or more chronic diseases	1 if the respondent suffered from three or more chronic diseases, 0 otherwise
Parkinson disease	1 if the respondent suffered from Parkinson disease, 0 otherwise
Alzheimer's disease, dementia, or senility	1 if the respondent suffered from Alzheimer's disease, dementia, or senility, 0 otherwise
Poor self-assessed health	1 if the respondent assessed their health status as poor, 0 otherwise
Equivalised household net income	The summation of all net income components at the household level, equivalised using the square root scale
Income quintile n (n = 1, 2, 3, 4 or 5)	1 if the respondent was part of the n^{th} income quintile in their respective country, 0 otherwise
Equivalised household wealth	The summation of all financial and real assets at the household level, minus debts, equivalised using the square root scale

Wealth quintile n (n = 1, 2, 3, 4 or 5)	1 if the respondent was part of the n^{th} wealth quintile in their respective country, 0 otherwise
Partner characteristics	
No partner in household	1 if the respondent did not live with a partner in the household or if the respondent was single, 0 if they did live with a partner in the household
Younger partner in household	1 if the respondent lived with a partner who was younger than 75 years, 0 otherwise
Older partner in household	1 if the respondent lived with a partner who was 75 years or over, 0 otherwise
Family network	
Childless	1 if the respondent had no children, 0 otherwise
All children live further away	1 if all children of the respondent lived more than one kilometre away, 0 otherwise
At least one child lives nearby	1 if the respondent had at least one child who lived in either in the household, the same building or less than one kilometre away, 0 otherwise

3.4. Statistical analysis

The analysis is informed by the design used by Bakx et al. in 2015. Descriptive statistics will be produced for the French and Dutch samples to:
1. Quantify between-country differences in outcomes
2. Quantify between-country differences in the explanatory variables
If the results of the second step would show that the means of those explanatory variables do not differ, then the differences in LTC use (the result of step one) would be entirely explained by the differential effect of those determinants on LTC use (see figure 2).

Furthermore, I will use a Blinder-Oaxaca decomposition. This decomposition method was first applied in labour economics to decompose gaps in wages in order to estimate the level of discrimination. The Blinder-Oaxaca decomposition has since been applied to a variety of issues, as it can be used to study group differences in any outcome variable. The application of this method will be explained in the next section.

3.5. Model

My thesis focuses on analysing the observed differences in LTC use between France and the Netherlands. I differentiate between differences that are due to population characteristics (such as age and measures of disability) and differences that are due to the differential effect that these characteristics have on LTC use. Note that when I use the term effect in this section and following sections I do not mean a causal effect, rather I use this term to describe the association between a particular population characteristic and LTC use.

To analyse the between-country differences in LTC use, I need to first compose a model that predicts LTC use for an individual person. For this purpose, I start with two simple linear regression models:

$$Y_i^{NL} = \beta_{0i}^{NL} + \beta_{1i}^{NL} X_{1i}^{NL} + \varepsilon_i^{NL} \quad (3.1)$$

$$Y_i^{FR} = \beta_{0i}^{FR} + \beta_{1i}^{FR} X_{1i}^{FR} + \varepsilon_i^{FR}$$

Where FR and NL refer to France and the Netherlands respectively, Y is a form of LTC use, β_0 is an intercept, X_1 is an explanatory variable and β_1 is its coefficient, and ε_i is the error term that captures the unobservable variables. The coefficient β_1 expresses the change in Y I expect when X_1 is changed by one unit.

I now move from the individual level to the country level, as that is the unit of analysis in my study. The mean outcomes for the two countries are expressed in the following models:

$$\bar{Y}^{NL} = \hat{\beta}_0^{NL} + \hat{\beta}_1^{NL} \bar{X}_1^{NL} \quad (3.2)$$

$$\bar{Y}^{FR} = \hat{\beta}_0^{FR} + \hat{\beta}_1^{FR} \bar{X}_1^{FR}$$

The bar on top of a variable denotes the mean.

I assume that on a country level the Netherlands and France have a different mean outcome. This difference is equal to:

$$\bar{Y}^{NL} - \bar{Y}^{FR} = (\hat{\beta}_0^{NL} - \hat{\beta}_0^{FR}) + (\hat{\beta}_1^{NL} \bar{X}_1^{NL} - \hat{\beta}_1^{FR} \bar{X}_1^{FR}) \quad (3.3)$$

Which can be expressed as:

$$\bar{Y}^{NL} - \bar{Y}^{FR} = G_0 + G_1 \quad (3.4)$$

This means that the difference in average LTC use between the Netherlands and France can be expressed as the differences in: 1) the intercepts (G_0) and 2) X_1 and β_1 (G_1) (O'Donnell et al., 2008). Say the explanatory variable X_1 is income. Then G_1 expresses that part of the difference between LTC use in France and the Netherlands that is due to differences in (mean) income (X_1) between the two countries, and differences in the effects of income (β_1). G_0 expresses the difference in the intercepts. The intercepts in 3.2 can be interpreted as capturing features that are common to all observations in that specific country but not part of the explanatory variables.

The models in equation 3.1 can be expanded with more explanatory variables (X_2, X_3 etc.), which would then translate into an extension of equation 3.4 with terms G_2, G_3 etc.

To answer my research question, I need to move beyond just describing the difference between France and the Netherlands as expressed in equation 3.4. I apply a method that unpacks the G_i terms and shows what part of the between-country differences is due to differences in the mean of an explanatory variable X_i and what part is due to the differences in the coefficients of that variable (β_i). This method is known as an Blinder-Oaxaca decomposition. The Blinder-Oaxaca decomposition explains the difference in mean outcomes between two groups by decomposing that difference into "that part that is due to group differences in the magnitudes of the determinants of the outcome in question, on the one hand, and group differences in the effects of these determinants, on the other" (O'Donnell et al., 2008, p. 147).

The decomposition can be expressed as:

$$\bar{Y}^{NL} - \bar{Y}^{FR} = \Delta\bar{X}\hat{\beta}^{FR} + \Delta\hat{\beta}\,\bar{X}^{FR} + \Delta\bar{X}\Delta\hat{\beta} \quad (3.5)$$

$$= E + C + CE$$

In which $\Delta\bar{X} = \bar{X}^{NL} - \bar{X}^{FR}$ and $\Delta\hat{\beta}$ is $\hat{\beta}^{NL} - \hat{\beta}^{FR}$.

The between-county difference in mean outcomes is decomposed in three parts:
1) a part E that is due to differences in the means of the explanatory variables X. The means of the explanatory variables are referred to as (the population) endowments;
2) a part C that is due to differences in the coefficients (including the intercept);
and 3) a part CE that is due to the interaction of endowments and coefficients.

It is common in decomposition analyses to refer to part E as the "explained" part, and to part C as the "unexplained" part (Jann, 2008). Depending on the decomposition model that is used, the interaction term CE is either assigned to the explained or the unexplained part. For my analysis I use the decomposition model that is proposed by Reimers (1983), which uses averages of the coefficients and the endowments to weight the contributions of the differences in endowments and coefficients respectively (Jann, 2008; O'Donnell et al., 2012). In this model, half of the interaction term is assigned to the explained part and half is assigned to the unexplained part.

4. Results

4.1. Descriptive statistics

Table 3 shows summary statistics for both the Netherlands and France for all explanatory variables and dependent variables included in the decomposition analysis. The probability of using formal care is very similar in both countries (around 28%), in France there is on average just a 0.57 percentage point higher chance of using formal care. The difference in the average probabilities of exclusively using informal care is quite small too: the probability of using informal care is only 1.43 percentage point higher in France (10.51%) than in the Netherlands (9.08%). The probability of not using any LTC is 2.01 percentage points higher in the Netherlands (62.88%) than in France (60.87%). The differences in LTC use are on average not significantly different (at the 10% level) between the two countries.

The between-country differences in means of the explanatory variables are a first indication as to how much the differences in these population characteristics contribute to the observed differences in LTC use. If the means of the explanatory variables are exactly the same, then the observed differences in LTC use must be entirely due to between-country differences in the coefficients. Conversely, if the means in the explanatory variables are strikingly different, then we would expect that they contribute to a larger extent to the between-country differences in LTC use.

Table 3 shows that between-country differences in the means of many of the explanatory variables are statistically significant at conventional levels[4]. The level of disability is lower in the Netherlands: when we look at the share of people with no ADL and no IADL limitations, this share is significantly higher in the Netherlands. The same applies to the level of disability as determined by mobility limitations, again the share of people with no mobility limitations is significantly higher in the Netherlands than in France. The proportion of people without chronic diseases is significantly higher in the Netherlands too. In France the share of people who are classified as cognitively impaired is significantly higher on average than in the Netherlands. In addition, the share of people in the French sample who assess their health status as poor is 9.3 percentage point higher than in the Dutch sample. Taken together, this would suggest that the French sample would on average have a higher care need than the Dutch sample. A partial explanation of these differences in health and disability is that the French sample is on average 2 years older.

When we look at the variables that indicate the potential availability of informal care, it is notable that both the share of people without children and the share of people who live without a partner are higher in the French sample (a 2.59 percentage point and a notable 14.05 percentage point difference respectively).

The Dutch and French sample do not differ significantly in terms of the equivalised household net income. They do differ significantly in equivalised household net worth, the average household wealth is higher in France than in the Netherlands.

[4] As assessed by an independent group T-test

Table 3 *Descriptive statistics*

	The Netherlands Mean	**France** Mean	**Difference in means (NL - FR)**
Dependent variables			
% Formal care use	28.04	28.61	-0.57
% Exclusively informal care use	9.08	10.51	-1.43
% No LTC use	62.88	60.87	2.01
Explanatory variables			
Age at interview (in years)	72.37	74.73	-2.35***
% Female	63.19	65.65	-2.46
% Cognitively impaired	11.06	17.92	-6.86***
% With no ADL and no IADL Limitations	60.43	56.09	4.34**
% With no ADL limitations and one or more IADL Limitations	22.75	18.28	4.47***
% With one or more ADL limitations	10.19	16.91	-6.72***
% With severe ADL limitations	6.64	8.72	-2.08**
% With no mobility limitations	5.45	3.17	2.28***
% With one or two mobility limitations	53.79	45.40	8.39***
% With three or more mobility limitations	40.76	51.43	-10.67***
% Having no chronic diseases	18.48	11.95	6.53***
% Having one or two chronic diseases	52.13	54.66	-2.53
% Having three or more chronic diseases	29.38	33.39	-4.01**
% Having Parkinson disease	1.11	1.85	-0.74
% Having Alzheimer's disease, dementia or senility	1.82	2.15	-0.33
% Having poor self-assessed health	10.35	19.65	-9.30***
Equivalised Household Net Income[#]	23177.18	31775.69	-8598.51
Equivalised Household Wealth[#]	140686.68	231067.14	-90380.46***
% Living without a partner in household[^]	32.07	46.12	-14.05***
% Living with a younger partner	48.97	33.09	15.88***
% Living with an older partner	18.96	20.79	-1.83
% With no children	9.48	12.07	-2.59**
% With at least one child living nearby	20.38	23.72	-3.34**
% With all children living further away	70.14	64.22	5.92***
N (sample)	1266	1674	

[^] This includes single people

[#] Expressed in euros. Income = annual income

* p < 0.10, ** p <0.05, *** p < 0.01

4.2. Decomposition results

As outlined in section 3.5, before performing the decomposition, two country-specific models are estimated for each outcome (corresponding to equation 3.2). The first outcome I will discuss is formal care use, followed by exclusively informal care use and no LTC use.

4.2.1. Decomposition of the difference in formal LTC use

Table 4 shows the results of the regression analyses that have been run for the formal care use outcome. There are several between-country differences in the coefficients that can be related to differences in eligibility rules, as they have been outlined in chapter two. Firstly, ceteris paribus, cognitive impairment has a significant positive effect in France on the probability of formal care use, and a non-significant negative effect in the Netherlands. Even though cognitive functioning is taken into account in the assessment procedure in the Netherlands, in France cognitive impairment automatically translates into a higher dependence rating, and therefore more need for LTC. Cognitive impairment as it is measured in this dataset indicates mild cognitive impairment (see section 3.3.2), whereas Alzheimer's and Parkinson disease can lead to severe cognitive impairment (see section 3.3.3). For Alzheimer's disease we see that the coefficients have a different pattern than for cognitive impairment: Alzheimer's disease has a significantly positive association with formal care use in the Netherlands, whereas in France it has a smaller and non-significant association with formal care use. The Parkinson disease coefficients are mirrored to those of Alzheimer's: a significantly positive effect in France, and a smaller, non-significant effect in the Netherlands. The between-country difference between the coefficients is smaller for Parkinson than for Alzheimer's. Overall, this could mean that the French LTC system is more sensitive to mild cognitive impairment than the Dutch LTC system, whereas in the Netherlands someone with Alzheimer's disease, and therefore likely suffering from worse cognitive impairment, is more likely to receive formal care than in France.

Living with a partner (regardless of their age) is associated with a lower chance of using formal LTC in both countries compared to not living with a partner or being single, notably this decrease is stronger in the Netherlands than in France. This too could reflect the eligibility rules, as the availability of informal care (within the household) is an explicit part of the eligibility assessment in the Netherlands and not in France.

The coefficients of the income quintiles are nearly similar in both countries. For wealth we see that in both countries being in a higher wealth quintile is associated with less formal care use compared to belonging to the first wealth quintile, except in France for the top wealth quintile who have a higher probability of formal care use. In France the coefficients are not-significant. In the Netherlands only the coefficient for the second wealth quintile and the fourth wealth quintile are significant, and compared to France, we see that the negative effect of being in a higher wealth quintile is stronger. The stronger negative effect of wealth in the Netherlands could be a reflection of the fact that in the Netherlands wealth is part of the co-payment calculation, which means that an increase in wealth leads to a higher co-payment, whereas in France wealth does not influence the co-payment.

As for the other explanatory variables, the signs are expected: ADL and IADL limitations are associated with higher formal care use in both countries, as are the other explanatory variables that indicate worse health or disability.

Table 4 *Results of the linear regression models of formal LTC use*

	Formal Care Use		
	France	**Netherlands**	**Difference (FR - NL)**
	Coefficient	**Coefficient**	
Female	0.063***	0.111***	-0.047
Age	0.013***	0.012***	0.001
ADL/IADL Limitations			
No ADL or IADL limitations	Ref.	Ref.	-
One or more IADL limitations	0.146***	0.121***	0.025
One or more ADL limitations	0.141***	0.319***	-0.178
Severe ADL limitations	0.254***	0.336***	-0.083
Cognitive impairment	0.091***	-0.011	0.102
Chronic diseases			
No chronic diseases	Ref.	Ref.	-
1-2 chronic diseases	0.005	0.011	-0.007
≥ 3 chronic diseases	0.015	0.047	-0.032
Poor self-assessed health	0.113***	0.058	0.055
Alzheimer's disease	0.082	0.199**	-0.117
Parkinson disease	0.159**	0.098	0.061
Mobility			
No mobility limitations	Ref.	Ref.	-
1-2 mobility limitations	0.072	0.140***	-0.068
≥ 3 mobility limitations	0.148**	0.191***	-0.043
Living with a partner			
Living without a partner	Ref.	Ref.	-
Living with a younger partner	-0.123***	-0.265***	0.142
Living with an older partner	-0.114***	-0.220***	0.106
Family network			
No children	Ref.	Ref.	-
Child nearby	-0.073**	-0.036	-0.037
No children nearby	-0.053*	-0.031	-0.022
Income			
Income quintile 1	Ref.	Ref.	-
Income quintile 2	0.050*	0.023	0.027
Income quintile 3	0.057*	0.034	0.023
Income quintile 4	0.062*	0.059*	0.003
Income quintile 5	0.063*	0.043	0.020
Wealth			
Wealth quintile 1	Ref.	Ref.	-
Wealth quintile 2	-0.024	-0.059**	0.036
Wealth quintile 3	-0.016	-0.055	0.040
Wealth quintile 4	-0.021	-0.071**	0.050
Wealth quintile 5	0.020	-0.037	0.057
Intercept	-0.899***	-0.715***	-0.184

* p < 0.10, ** p <0.05, *** p < 0.01. NB: The significance level was only assessed for the country coefficients, and not for the difference between countries. Ref. = Reference category

The descriptive statistics show that the difference in formal care use between the Netherlands (28.04%) and France (28.61%) is only 0.57 percentage points. The twofold decomposition into explained and unexplained (table 5) shows that of this 0.005 difference (= 0.5 percentage points), 0.101 (= 10.1 percentage points) can be attributed to the explained part and -0.096 (= -9.6 percentage points) to the unexplained part. The positive sign of the observed difference is therefore the result of the relatively larger positive contribution of the explained part. If it were not for the explained part, then formal care use would have been 9.6 percentage points *lower* in France than in the Netherlands, as evidenced by the negative contribution of the unexplained part to the observed difference.

The explained part corresponds to the difference in average formal LTC use that can be attributed to differences in population characteristics between the two countries. This means that if the Dutch sample had the same population characteristics as the French sample, the average probability of formal care use would be 10.1 percentage points higher in the Netherlands.

The unexplained part quantifies the difference in average formal care use that cannot be attributed to differences in population characteristics and arises due to the differential effect of the population characteristics across the two countries. If the French coefficients were applied to the Dutch sample, then the average probability of formal care use would be 9.6 percentage points *lower* in the Netherlands.

It is important to acknowledge that one half of the interaction term is assigned the explained part and the other half to the unexplained part (see section 3.5). This means that the correct description of the unexplained and the unexplained part includes an acknowledgement of the contribution of the interaction term. However, because this would make for a convoluted description of the decomposition, I choose not to mention the interaction term in my explanation in this section and the following sections.

Table 5 presents the results of the detailed decomposition, which shows for each explanatory variable its contribution to the explained and the unexplained part. Note that the intercept is by definition only included in the unexplained part, as it is not a measured population characteristic that is included in my dataset.

Table 5 *Twofold Reimers decomposition results for formal care use (use France – use Netherlands)*

	Explained		Unexplained	
	Coefficient	**S.E.**	**Coefficient**	**S.E.**
Female	0.002	0.002	-0.031	0.020
Age	0.030***	0.005	0.085	0.153
ADL/IADL limitations				
No ADL or IADL limitations	Ref.	-	Ref.	-
One or more IADL limitations	-0.006***	0.002	0.005	0.008
One or more ADL limitations	0.015***	0.003	-0.024***	0.007
Severe ADL limitations	0.006**	0.003	-0.006	0.005
Cognitive impairment	0.003*	0.002	0.015**	0.006
Chronic diseases				
No chronic diseases	Ref.	-	Ref.	-
1-2 chronic diseases	0.000	0.001	-0.004	0.022
≥ 3 chronic diseases	0.001	0.001	-0.010	0.014
Poor self-assessed health	0.008***	0.002	0.008	0.007
Alzheimer's disease	0.000	0.001	-0.002	0.002
Parkinson disease	0.001	0.001	0.001	0.002
Mobility				
No mobility limitations	Ref.	-	Ref.	-
1-2 mobility limitations	-0.009**	0.004	-0.034	0.038
≥ 3 mobility limitations	0.018***	0.005	-0.020	0.035
Living with a partner				
Living without a partner	Ref.	-	Ref.	-
Living with a younger partner	0.031***	0.005	0.058***	0.016
Living with an older partner	-0.003	0.003	0.021***	0.008
Family network				
No children	Ref.	-	Ref.	-
Child nearby	-0.002	0.001	-0.008	0.012
No children nearby	0.002	0.002	-0.014	0.031
Income				
Income quintile 1	Ref.	-	Ref.	-
Income quintile 2	0.000	0.001	0.007	0.010
Income quintile 3	0.000	0.001	0.005	0.009
Income quintile 4	0.002	0.001	0.000	0.008
Income quintile 5	0.001	0.001	0.002	0.006
Wealth				
Wealth quintile 1	Ref.	-	Ref.	-
Wealth quintile 2	0.000	0.001	0.008	0.009
Wealth quintile 3	-0.001	0.001	0.007	0.008
Wealth quintile 4	0.000	0.001	0.009	0.008
Wealth quintile 5	0.000	0.001	0.009	0.008
Intercept			-0.184	0.178
Sum	0.101		-0.096	

* p < 0.10, ** p < 0.05, *** p < 0.01

Ref. = Reference category

The results from table 5 are visualized in the following figures 4 and 5. For the variables that belong to a category (e.g. ADL/IADL limitations) the contributions of the individual variables are summed to generate the grouped contribution. Figure 4 shows that the (grouped) variables all contributed positively to the explained part, apart from wealth which has a (small) negative contribution. Figure 5 shows that the negative sign of the unexplained part is mostly due to the difference in the intercept between France and the Netherlands. The difference in the intercept captures systematic differences in LTC use determinants between the two countries that cannot be attributed to differences in the explanatory variables that are included in my model. These systematic differences in LTC determinants could be related to tastes and preferences that are not measured in SHARE, e.g. people in France might be a priori less likely to appeal to formal care because they have less faith in (the quality of) the LTC system compared to the Netherlands. Another potential systematic difference could be that the LTC system in France is relatively harder to navigate due to its fragmentation (see section 2.3.2) and therefore French people could be on average less likely to apply for formal care, compared to the Netherlands. Other large negative contributors to the unexplained part are mobility and ADL/IADL limitations. Age and the effect of having a partner in a household contribute positively, however, these positive contributions are not large enough to offset the negative contributions.

Figure 4 *Contributions of the explained part to the between-country difference in formal LTC use*

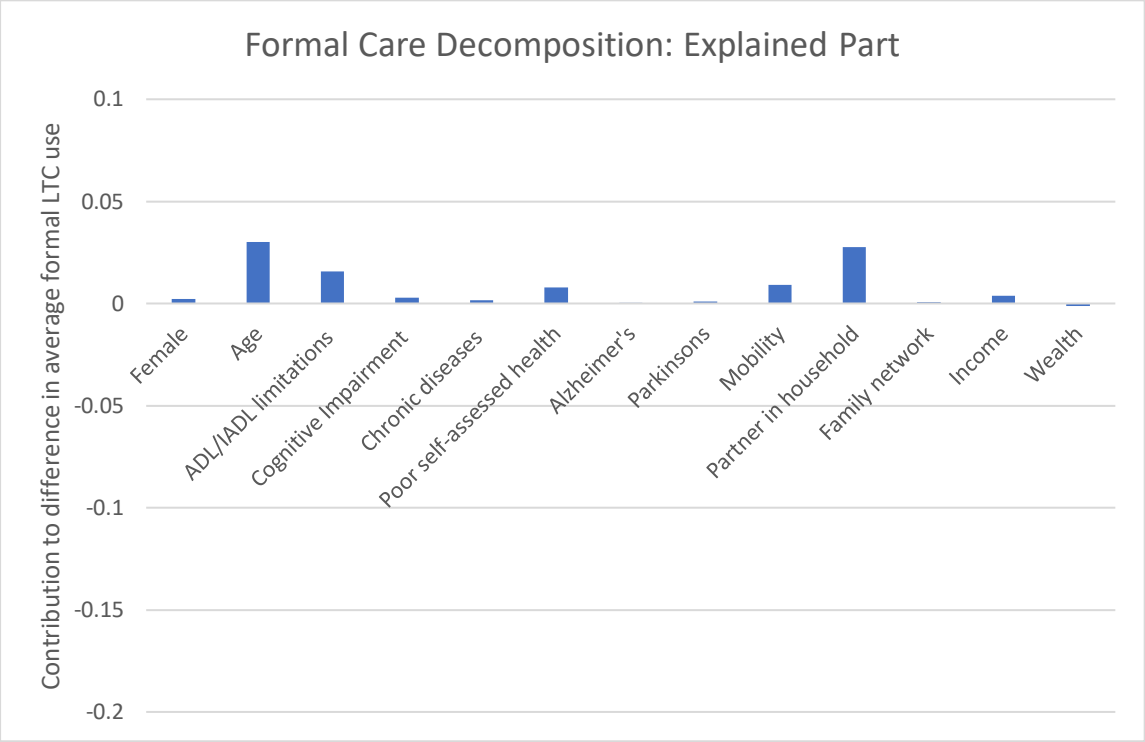
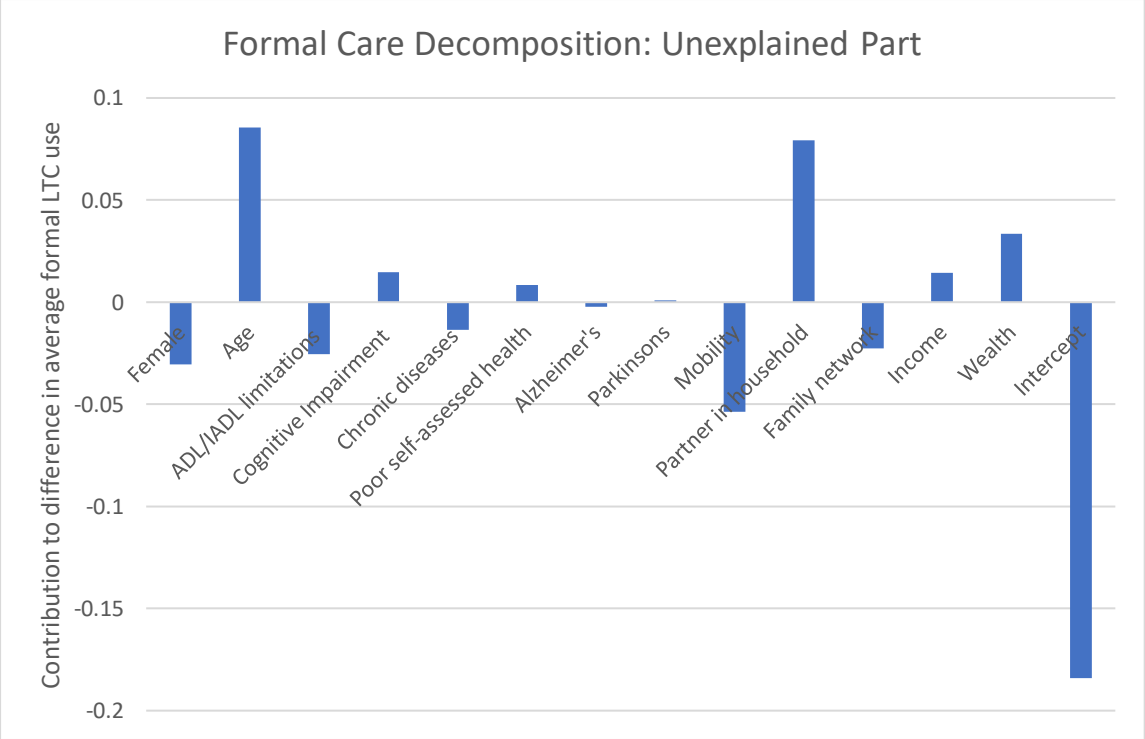


Figure 5 *Contributions of the unexplained part to the between-country difference in formal LTC use*



4.2.2. Decomposition of the difference in exclusively using informal LTC

Tables 6 shows the results of the regression analyses that have been run separately for both countries for the 'exclusively informal care use' outcome. In both countries we see that having one or more IADL limitations is significantly associated with an increase in exclusively informal care use, compared to having no ADL or IADL limitations. However, when we go further up the disability scale (see section 3.3.3.), an increase in disability level continues to have a significant positive effect on exclusive informal care use in France, in contrast to the Netherlands where this positive effect is no longer significant, and the highest disability level has a non-significant negative effect on this outcome. This can suggest that in the Netherlands a relatively higher disability level is more likely to result in formal care use compared to France, meaning that people no longer rely exclusively on informal care.

A noticeable difference between the two countries is the effect of age. In France, an increase in age has a small but positive and significant effect on using informal care exclusively. In the Netherlands, an increase in age has a (small) negative and significant effect. This would suggest that in the Netherlands as people age, they become more likely to use (some) form of formal care compared to France, where people would exclusively use informal care longer.

Another difference worth highlighting is that in France being cognitively impaired has a significant negative effect on exclusively using informal care, whereas in the Netherlands this negative is non-significant and negative. This is aligned with the effect of cognitive impairment on formal care use (see the previous sub-section): if cognitive impairment in France is positively associated with formal LTC use, then it follows that cognitive impairment is negatively associated with exclusively using informal LTC.

In the Netherlands we see that people who self-asses their health as poor are, ceteris paribus, significantly more likely to exclusively use informal care. In France the coefficient is negative and non-significant. Self-assessed health is considered a predictor of morbidity (see section 3.3.3). It could be argued that as the descriptive statistics showed, the Dutch sample is in relatively better health than the French sample, and therefore this measure picks up morbidity and thus LTC need that has not yet manifested as ADL/IADL limitations or in the other health and disability measures in my model.

A curious result is that in the Netherlands living with a younger (<75 years old) or older partner is negatively associated with exclusively using informal care, compared to living without a partner. This negative association is only significant for living with a younger partner. The negative effect of living together with a partner on the informal care use is unexpected. A potential explanation could be that people who receive care from their partner do not perceive this as informal care, instead they might perceive it as what the Dutch AWBZ law calls "usual" care that is expected from a household member. This could mean that despite receiving care from a household member, they would not respond positively to the SHARE survey question that asks whether they regularly received help with personal care from someone within the household. People who do not live with a partner and have a need for care that is fulfilled by someone outside of the household could be more aware of the effort that the informal carer is making, and could therefore be quicker to acknowledge that they receive informal care. Another explanation could be that people who receive informal care from their partner are more empowered to also seek formal care, and therefore are less likely to exclusively rely on informal care. The partner can provide the dependent person with social support and thereby aid their application for formal care, and could also advocate on the behalf of the dependent person (Auslander & Litwin, 1990). In France the effect of living with a younger partner is positive but quite small and therefore

not practically meaningful nor statistically significant. Living with an older partner is in France also negatively associated with exclusively using informal care, but not statistically significant.

Having children who live nearby has a significant positive effect on this outcome in France, and having children who live further away is positively associated with this outcome but not significantly, compared to not having children. In the Netherlands, the effect of having children who live nearby is negative and not significant, compared to not having children. Having children who live further away has a positive but not significant effect in the Netherlands. Overall, the larger positive association between having children and exclusively using informal care in France could be seen as a reflection of a stronger cultural norm that children should care for their parents, compared to the Netherlands (see chapter 2.2.3). To further substantiate this claim a study with more statistical power should be conducted to see if the effect of having children who live nearby remains negative and/or becomes statistically significant.

In both countries being in a higher wealth quintile has a positive effect on exclusively using informal care, compared to being in the first wealth quintile, with the exception of the third wealth quintile in France. This positive effect is only significant for the third wealth quintile in the Netherlands. This would suggest that overall having more wealth means that people are more likely to exclusively use informal care. It could be argued that wealth provides an incentive for informal care by relatives as it could increase the likelihood of receiving intergenerational transfers (Norton et al., 2013; Rodrigues et al., 2018).

Table 6 *Results of the linear regression models of exclusively informal LTC use*

	Exclusively Informal Care Use		
	France	**Netherlands**	**Difference (FR - NL)**
	Coefficient	**Coefficient**	**Coefficient**
Female	-0.027	-0.010	-0.017
Age	0.002*	-0.003**	0.005
ADL/IADL Limitations			
No ADL or IADL limitations	Ref.	Ref.	-
One or more IADL limitations	0.063***	0.083***	-0.019
One or more ADL limitations	0.116***	0.027	0.089
Severe ADL limitations	0.074**	-0.033	0.107
Cognitive impairment	-0.049**	-0.019	-0.030
Chronic diseases			
No chronic diseases	Ref.	Ref.	-
1-2 chronic diseases	0.019	-0.032	0.051
≥ 3 chronic diseases	0.036	-0.020	0.057
Poor self-assessed health	-0.019	0.083***	-0.102
Alzheimer's disease	0.114**	0.053	0.061
Parkinson disease	-0.097*	-0.045	-0.051
Mobility			
No mobility limitations	Ref.	Ref.	-
1-2 mobility limitations	0.012	0.060	-0.048
≥ 3 mobility limitations	0.020	0.104	-0.084
Living with a partner			
Living without a partner	Ref.	Ref.	-
Living with a younger partner	0.008	-0.052**	0.059
Living with an older partner	-0.013	-0.024	0.011
Family network			
No children	Ref.	Ref.	-
Child nearby	0.050*	-0.011	0.061
No children nearby	0.035	0.021	0.014
Income			
Income quintile 1	Ref.	Ref.	-
Income quintile 2	-0.003	0.012	-0.015
Income quintile 3	-0.060**	0.030	-0.090
Income quintile 4	-0.023	0.011	-0.034
Income quintile 5	-0.022	0.040	-0.062
Wealth			
Wealth quintile 1	Ref.	Ref.	-
Wealth quintile 2	0.032	0.044	-0.012
Wealth quintile 3	-0.002	0.020*	-0.023
Wealth quintile 4	0.039	0.006	0.033
Wealth quintile 5	0.011	0.036	-0.025
Intercept	-0.117	0.189*	-0.306

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Ref. = Reference category

The descriptive statistics show that the difference in exclusively informal care use between the Netherlands (9.08%) and France (10.51%) is 1.43 percentage points. The twofold decomposition into explained and unexplained (table 7) shows that of this 0.0143 difference, 0.008 (= 0.8 percentage points) can be attributed to the explained part and 0.006 (= 0.6 percentage points) to the unexplained part. Between-country differences in population characteristics and in the effects of these population characteristics therefore both contribute positively to the observed difference in exclusive informal LTC use. This means that if the Dutch sample had the same distribution of population characteristics as the French sample, we would expect that this outcome would increase by 0.8 percentage points in the Netherlands. If the Dutch sample had the same coefficients as the French, then this outcome would increase by 0.6 percentage points in the Netherlands.

Table 7 *Twofold Reimers Decomposition of exclusively informal LTC Use (use France – use Netherlands)*

	Explained		Unexplained	
	Coefficient	**S.E.**	**Coefficient**	**S.E.**
Female	0.000	0.000	-0.011	0.016
Age	-0.001	0.002	0.334***	0.121
ADL/IADL limitations				
No ADL or IADL limitations	Ref.	-	Ref.	-
One or more IADL limitations	-0.003**	0.001	-0.004	0.007
One or more ADL limitations	0.005***	0.002	0.012**	0.005
Severe ADL limitations	0.000	0.001	0.008**	0.004
Cognitive impairment	-0.002*	0.001	-0.004	0.005
Chronic diseases				
No chronic diseases	Ref.	-	Ref.	-
1-2 chronic diseases	0.000	0.000	0.027	0.017
≥ 3 chronic diseases	0.000	0.001	0.018	0.011
Poor self-assessed health	0.003*	0.002	-0.015***	0.005
Alzheimer's disease	0.000	0.000	0.001	0.002
Parkinson disease	-0.001	0.000	-0.001	0.001
Mobility				
No mobility limitations	Ref.	-	Ref.	-
1-2 mobility limitations	-0.003	0.003	-0.024	0.030
≥ 3 mobility limitations	0.007*	0.003	-0.039	0.028
Living with a partner				
Living without a partner	Ref.	-	Ref.	-
Living with a younger partner	0.003	0.003	0.024*	0.013
Living with an older partner	0.000	0.000	0.002	0.006
Family network				
No children	Ref.	-	Ref.	-
Child nearby	0.001	0.001	0.013	0.009
No children nearby	-0.002	0.001	0.009	0.025
Income				
Income quintile 1	Ref.	-	Ref.	-
Income quintile 2	0.000	0.000	-0.004	0.008
Income quintile 3	0.000	0.000	-0.018***	0.007
Income quintile 4	0.000	0.001	-0.006	0.006
Income quintile 5	0.000	0.000	-0.007	0.005
Wealth				
Wealth quintile 1	Ref.	-	Ref.	-
Wealth quintile 2	0.000	0.001	-0.003	0.007
Wealth quintile 3	0.000	0.000	-0.004	0.006
Wealth quintile 4	0.000	0.000	0.006	0.007
Wealth quintile 5	0.001	0.001	-0.004	0.006
Intercept			-0.306**	0.141
Sum	0.008		0.006	

* p < 0.10, ** p <0.05, *** p < 0.01

Ref. = Reference category

The figures below show the (grouped) contributions of the variables to the explained and unexplained parts. In the explained part we do not see one (grouped) variable that sticks out from the rest. All contributions are relatively small, and most are positive, thereby generating a net positive. The pattern within the unexplained part is different: here the net positive result stems from several opposing contributions. We see a large negative contribution of the intercept, similar to what we saw in the formal care decomposition. This time however the negative contribution of the intercept is offset by a large positive contribution of age. As we saw in the results of the linear regression, the effect of an increase in age on using informal care exclusively was positive in France, and negative in the Netherlands.

Figure 6 Contributions of the explained part to the between-country difference in the exclusive use of informal LTC

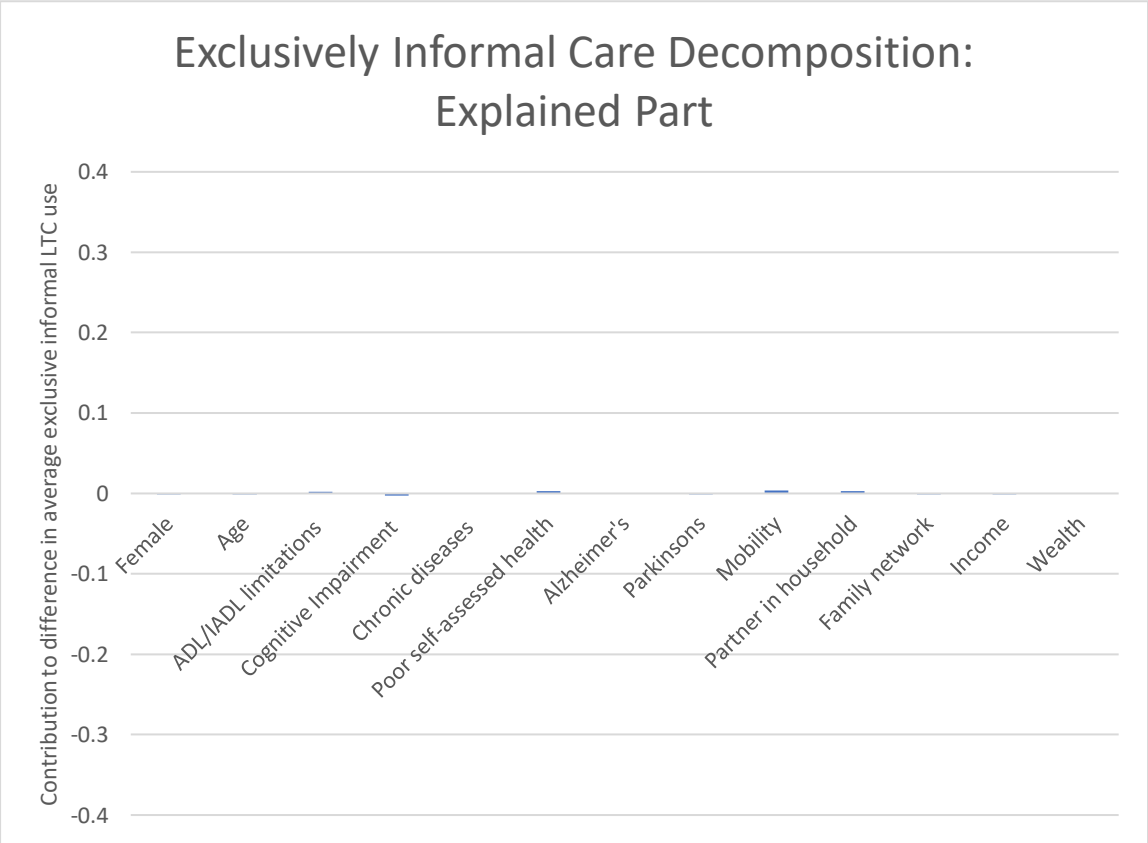
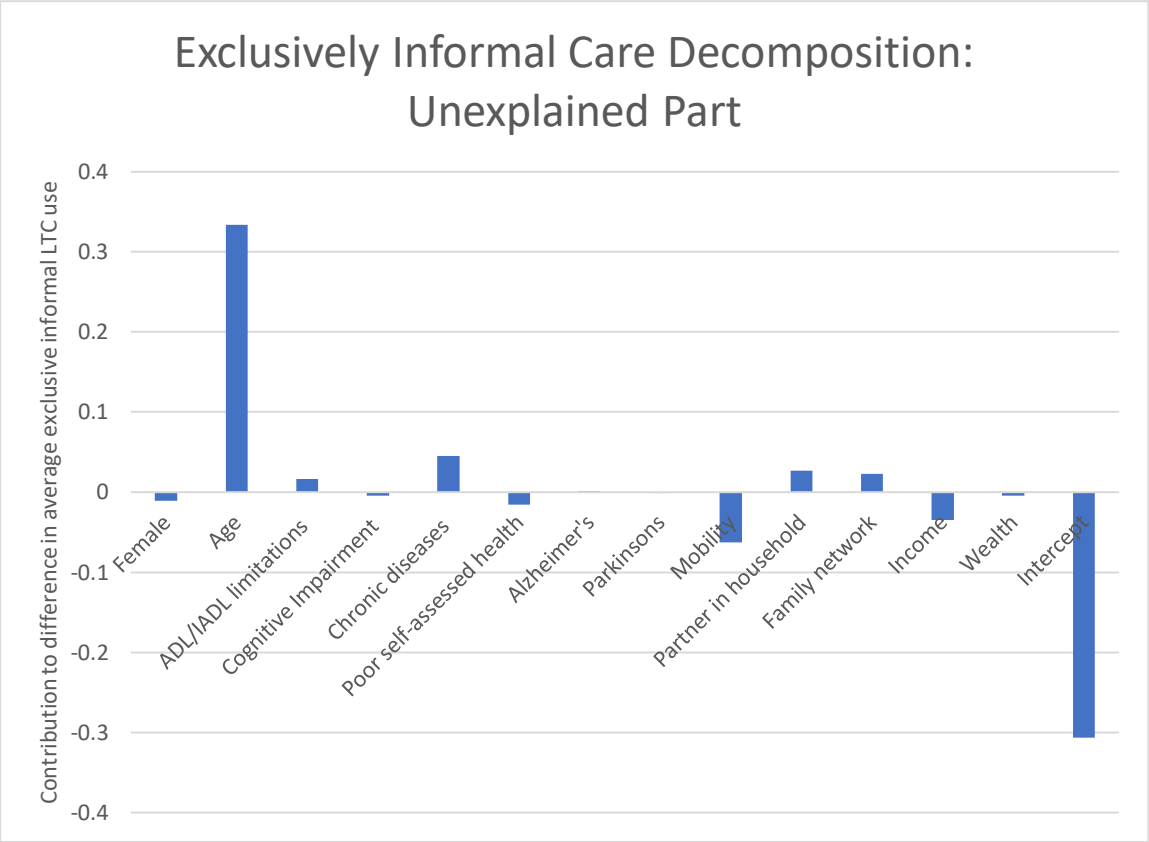


Figure 7 *Contributions of the unexplained part to the between-country difference in the exclusive use of informal LTC*



4.2.3. Decomposition of the difference in no LTC use

In table 8 the coefficients are shown that result from the separate regression analyses for the two countries for the no LTC use outcome. Compared to the previous two outcomes, we need to be more cautious about relating the between-country differences in coefficients to differences in eligibility rules between the respective LTC systems. Using no LTC means that neither informal nor formal care is used, which can have several reasons, amongst them: no need for LTC; no availability of informal carers and no access to formal care due to e.g. a strict eligibility system, or not being able to afford the co-payments.

Unsurprisingly, in both countries having ADL and IADL limitations are significantly associated with a decrease in the no LTC use outcome, compared to having no ADL an IADL limitations. Again, we see a difference between the two countries in the sign of the cognitive impairment coefficient: in the Netherlands the sign is positive, and in France it is negative, which would suggest that in France mild cognitive impairment is more likely to result in formal and/or informal LTC use, compared to the Netherlands. However, the coefficients for these estimates are both not-significant at the 10% significance level. A study with more statistical power would be needed to be able to firmly state that cognitive impairment decreases or increases the probability of not using LTC in France and Netherlands respectively.

As for the other explanatory variables related to health and disability, the signs are as expected: being in a worse health state or more disabled has a negative effect on the probability of using no LTC.

In the coefficients of the explanatory variables related to the potential informal care availability we see unexpected signs in both countries: ceteris paribus, living with a partner, younger or older, significantly increases this probability, compared to not living with a partner. Having children, either nearby or further away, is also positively associated with this outcome, but not significantly. The positive effect of these explanatory variables is unexpected when we assume that these explanatory variables would translate into more informal care use and therefore would decrease the likelihood of the no LTC use outcome. It could however also be argued that people without children and people who live alone have relatively more access to the formal LTC system, and are therefore comparatively less likely to not use any LTC. This latter explanation could indicate that the LTC systems in both France and the Netherlands are designed to "protect" people with less informal care resources by increasing their access to formal care (Albertini & Pavolini, 2017). It would therefore be worthwhile to test the effect of having children in a study with a larger sample size to see if this finding is replicated and if the statistical significance increases.

In both countries the effect of being in a higher income quintile compared to being in quintile 1 is mostly negative. Only in the Netherlands this effect is significant, for quintiles 3, 4 and 5. This indicates that people who are in income quintile 1 have a relatively lower probability of using formal and/or informal LTC. This finding suggest that there is socio-economic horizontal inequity in LTC use, meaning that individuals with an equal need for care but a different socio-economic status do not receive equal care (Rodrigues et al., 2018). In this case the inequity would favour the rich, as they have a higher probability of using LTC. Tenand et al. (2020) assessed socioeconomic inequity in in formal long-term home-care (AWBZ) use in the Netherlands, using administrative and survey data from 2012. They showed that elderly who are poorer (in terms of income) receive more formal home-care on average than richer elderly with similar needs. Given their results, and assuming that the SHARE sample and the sample of Tenand et al. are consistent and that Wmo care would show a similar pattern, this would suggest that the observed inequity in my sample arises because informal care alone is used less often by the bottom quintile of the income distribution.

When looking at wealth instead of income we see that this pattern is reversed: those who are placed in wealth quintile 1 have a relatively higher probability of using some form of LTC. This is only significant for wealth quintile 4. In France we see that, similar to income, being in a higher wealth quintile increases the probability of using some form of LTC, compared to being in wealth quintile 1, however these effects are not significant.

Table 8 *Results of the linear regression models of no LTC use*

	No LTC Use		
	Netherlands	**France**	**Difference (NL - FR)**
	Coefficient	**Coefficient**	**Coefficient**
Female	-0.101***	-0.037*	-0.064
Age	-0.010***	-0.015***	0.006
ADL/IADL limitations			
No ADL or IADL limitations	Ref.	Ref.	-
One or more IADL limitations	-0.203***	-0.209***	0.006
One or more ADL limitations	-0.346***	-0.258***	-0.089
Severe ADL limitations	-0.303***	-0.328***	0.025
Cognitive impairment	0.030	-0.042	0.073
Chronic diseases			
No chronic diseases	Ref.	Ref.	-
1-2 chronic diseases	0.020	-0.024	0.045
≥ 3 chronic diseases	-0.026	-0.051	0.025
Poor self-assessed health	-0.141***	-0.095***	-0.047
Alzheimer's disease	-0.252***	-0.196***	-0.056
Parkinson disease	-0.052	-0.062	0.010
Mobility			
No mobility limitations	Ref.	Ref.	-
1-2 mobility limitations	-0.200***	-0.085	-0.116
≥ 3 mobility limitations	-0.295***	-0.167***	-0.128
Living with a partner			
Living without a partner	Ref.	Ref.	-
Living with a younger partner	0.316***	0.115***	0.201
Living with an older partner	0.244***	0.127***	0.117
Family network			
No children	Ref.	Ref.	-
Child nearby	0.047	0.023	0.023
No children nearby	0.010	0.018	-0.008
Income			
Income quintile 1	Ref.	Ref.	-
Income quintile 2	-0.035	-0.047	0.012
Income quintile 3	-0.064*	0.003	-0.067
Income quintile 4	-0.070*	-0.039	-0.031
Income quintile 5	-0.083**	-0.041	-0.042
Wealth			
Wealth quintile 1	Ref.	Ref.	-
Wealth quintile 2	0.015	-0.008	0.023
Wealth quintile 3	0.035	0.018	0.017
Wealth quintile 4	0.065*	-0.018	0.083
Wealth quintile 5	0.002	-0.031	0.032
Intercept	1.526***	2.017***	-0.491

* p < 0.10, ** p < 0.05, *** p < 0.01

Ref. = Reference category

The descriptive statistics show that the difference in not using any LTC between the Netherlands (62.88%) and France (60.87%) is 2.01 percentage points. The twofold decomposition into explained and unexplained (table 9) shows that of this 0.0201 difference, 0.109 can be attributed to the explained part and -0.089 to the unexplained part. Similar to the formal care use outcome this means that the observed difference in not using any LTC is due to the explained part. If the French sample had the same population characteristics as the Dutch sample, the average probability of not using LTC would be 10.9 percentage points higher in France. If the Dutch coefficients were applied to the French sample, then the average probability of not using any LTC would be 8.9 percentage points *lower* in France.

Table 9 *Twofold Reimers Decomposition of No LTC Use (use Netherlands – use France)*

	Explained		Unexplained	
	Coefficient	**S.E.**	**Coefficient**	**S.E.**
Female	0.002	0.001	-0.041**	0.021
Age	0.029***	0.005	0.419**	0.162
ADL/IADL limitations				
No ADL or IADL limitations	Ref.	-	Ref.	-
One or more IADL limitations	-0.009***	0.003	0.001	0.009
One or more ADL limitations	0.020***	0.004	-0.012*	0.007
Severe ADL limitations	0.007**	0.003	0.002	0.005
Cognitive impairment	0.000	0.002	0.011	0.007
Chronic diseases				
No chronic diseases	Ref.	-	Ref.	-
1-2 chronic diseases	0.000	0.001	0.024	0.023
≥ 3 chronic diseases	0.002	0.001	0.008	0.015
Poor self-assessed health	0.011***	0.003	-0.007	0.007
Alzheimer's disease	0.001	0.001	-0.001	0.002
Parkinson disease	0.000	0.001	0.000	0.002
Mobility				
No mobility limitations	Ref.	-	Ref.	-
1-2 mobility limitations	-0.012***	0.004	-0.057	0.040
≥ 3 mobility limitations	0.025***	0.006	-0.059	0.037
Living with a partner				
Living without a partner	Ref.	-	Ref.	-
Living with a younger partner	0.034***	0.005	0.082***	0.017
Living with an older partner	-0.003	0.003	0.023***	0.009
Family network				
No children	Ref.	-	Ref.	-
Child nearby	-0.001	0.001	0.005	0.012
No children nearby	0.001	0.001	-0.005	0.033
Income				
Income quintile 1	Ref.	-	Ref.	-
Income quintile 2	0.001	0.001	0.003	0.010
Income quintile 3	0.000	0.000	-0.013	0.009
Income quintile 4	0.001	0.001	-0.005	0.008
Income quintile 5	0.001	0.001	-0.005	0.007
Wealth				
Wealth quintile 1	Ref.	-	Ref.	-
Wealth quintile 2	0.000	0.000	0.005	0.010
Wealth quintile 3	-0.001	0.001	0.003	0.008
Wealth quintile 4	0.000	0.000	0.015*	0.009
Wealth quintile 5	0.000	0.001	0.005	0.008
Intercept			-0.491**	0.189
Sum	0.109		-0.089	

* p < 0.10, ** p < 0.05, *** p < 0.01

Ref. = Reference category

The results from table 9 are visualized in the following figures 8 and 9. Figure 8 shows that the largest contributors to the explained part are age and having a partner in the household. Except for the contributions of the family network and wealth all contributions are positive.

Figure 9 shows that the negative sign of the unexplained part is mostly due to the difference in the intercept between France and the Netherlands. Another negative contributor is mobility. The other (grouped) contributions are mostly positive, with age being the largest positive contributor.

Figure 8 *Contributions of the explained part to the between-country difference in no LTC use*

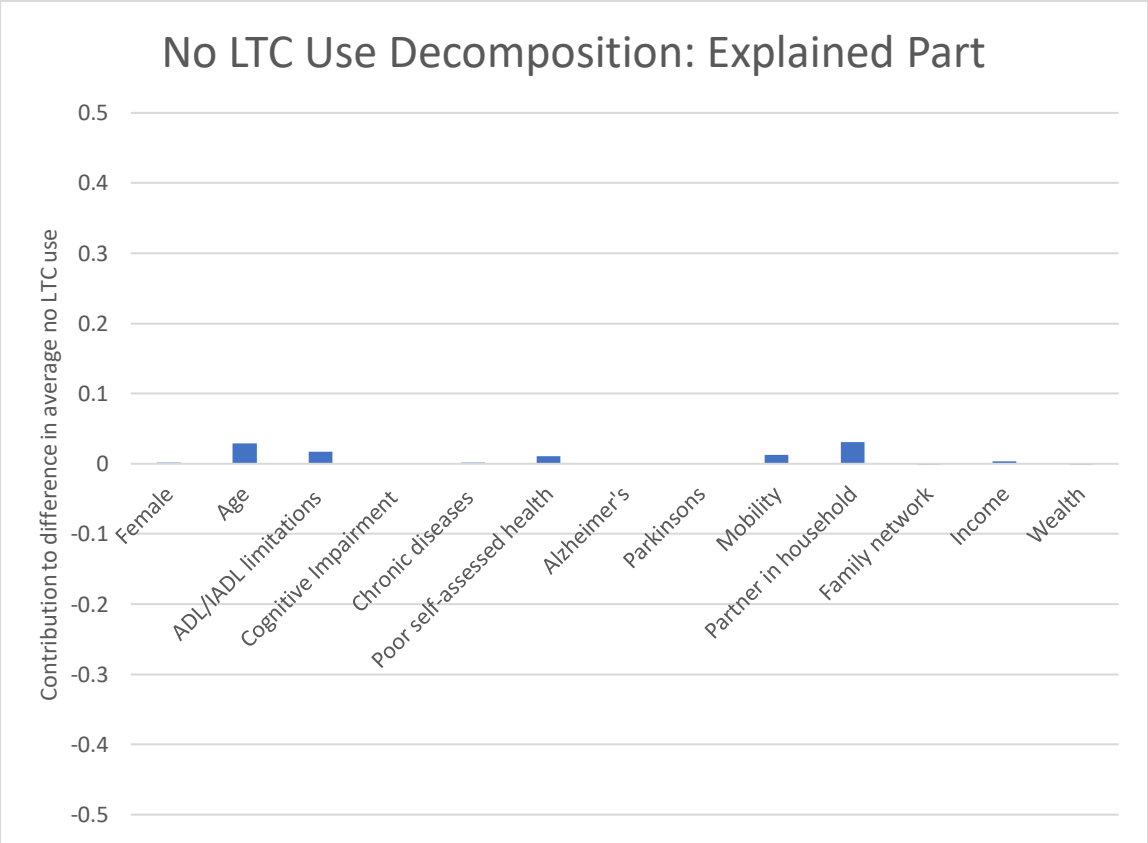
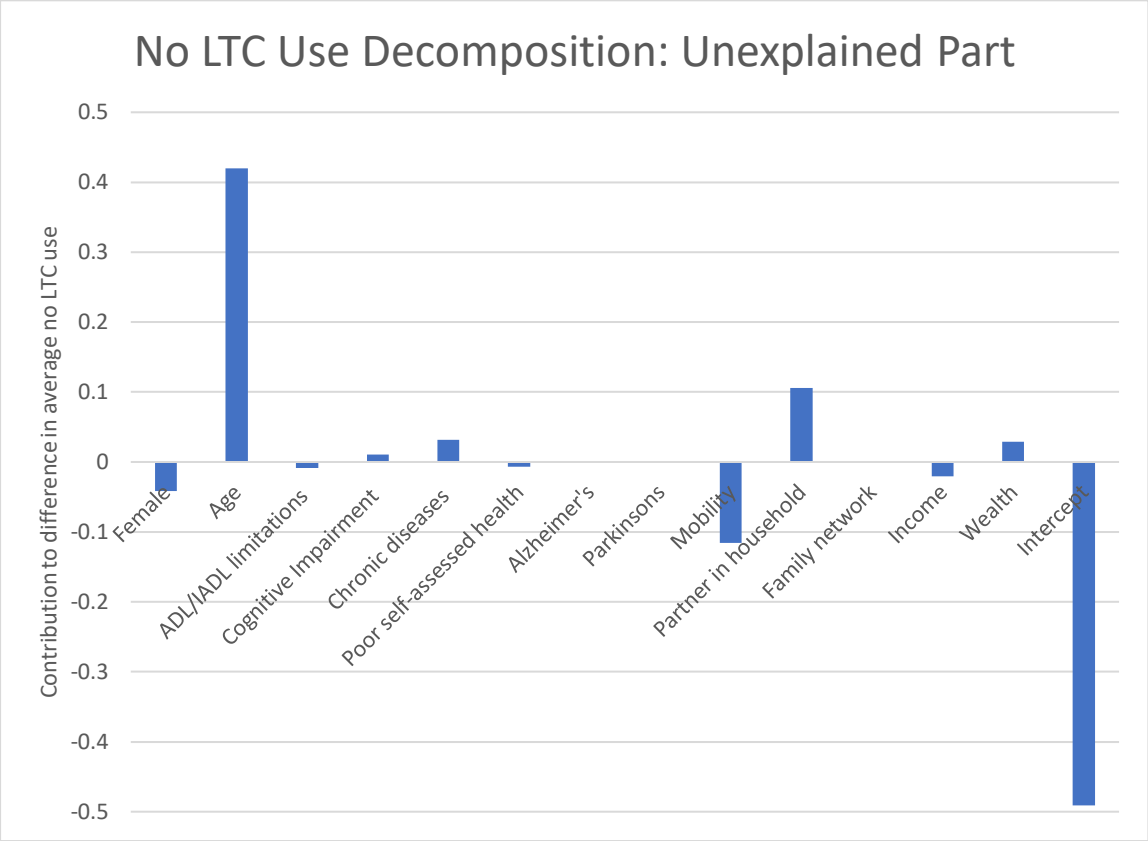


Figure 9 *Contributions of the unexplained part to the between-country difference in no LTC use*



5. Discussion and conclusion

Previous studies have shown considerable variation within Europe in formal and informal care use by the ageing population (Bolin et al., 2008; Kraus et al., 2010; Pommer et al., 2007). This thesis explored the difference between two countries that have previously been described as having different LTC usage patterns and whose LTC systems have been typified as belonging to different categories. The Netherlands has been, together with the Scandinavian countries, characterized as a country with relatively high formal care use at home, and some degree of informal care use. France has been characterized as a country where adults often receive a combination of formal and informal care use. Recent LTC policy interventions in both countries have emphasized "ageing in place", which arguably has tipped the scale of care responsibility more towards the family, versus the State. This also suggests that the LTC systems in these two countries could (slowly) be converging due to similar policy incentives.

This thesis exploited the availability of the rich SHARE dataset, which means that LTC use in France and the Netherlands can be analysed using the exact same definition of what counts as formal and informal LTC use. This is an advantage, as the results of comparative studies that lack a consistent measure of (especially informal) LTC use can be skewed. The application of a Blinder-Oaxaca type decomposition allows us to explain the difference in observed average LTC use between France and the Netherlands. The decomposition quantifies both the proportion of the difference that is due to differences in the distribution of determinants of LTC use and the proportion that is due to differences in the association between these determinants and LTC use.

5.1. Main findings

This study has led to the following findings. Firstly, the difference in formal LTC use between the two countries was relatively small in my study population. Formal care use was on average only 0.57 percentage points higher in France (28.61%) compared to the Netherlands (28.04%). However, the decomposition showed that this outcome would have been very different if the French and the Dutch sample had the same population characteristics. The descriptive statistics showed that, on average, the Dutch sample was in better health and experienced less limitations than the French sample. If the Dutch sample had the same population characteristics as the French sample, and was therefore in a worse overall health and disability state, their use of formal LTC would be 10.1 percentage points higher on average. Given that the French sample is on average in a worse health state, we might have expected their use of formal LTC to be higher than observed. The so-called unexplained part of the decomposition shows that we do not observe this due to the differential effect of the population characteristics. If the Dutch sample had the French coefficients, then their formal LTC use would be 9.6 percentage points lower on average. The detailed decomposition showed that it is mostly the intercept, and the contributions of the variables related to mobility and ADL/iADL limitations that contributed negatively. This could imply that the Dutch formal LTC system is more responsive to disability and ADL/iADL limitations compared to the French. Contrary to my hypothesis, I did not find a stronger income gradient in France compared to the Netherlands.

Another noticeable difference between the two countries is the effect of (mild) cognitive impairment. In France being mildly cognitive impaired is significantly associated with more formal LTC use, whereas in the Netherlands this association is negative and not significant. This could reflect differences in the eligibility assessment between the two countries: in France mild cognitive impairment always results

in a higher dependence rating by the assessor, and therefore increases people's access to formal care services. In the Netherlands cognitive functioning is part of the assessment, but impairment does not necessarily result in more access to formal care services.

Differences in eligibility rules could also be said to be embodied in the coefficients of the variables that indicate whether someone lives with their partner. In both countries living with a partner is negatively associated with formal care use, however in the Netherlands this effect is stronger. This is in line with my hypothesis, as the presence of a (potential) informal caregiver is an explicit part of the eligibility assessment in the Netherlands and not in France.

Secondly, exclusively using informal care was more prevalent in France (10.51%) than in the Netherlands (9.08%). In contrast to formal LTC use, both the differences in the distribution of the population characteristics and the differential effect of the coefficients contributed positively to this 1.43 percentage point difference. A closer look at the composition of the unexplained part revealed that the net positive contribution is (mostly) the result of a large positive contribution of age, which is partly offset by a large negative contribution of the intercept. The linear regression models that were run for each country individually revealed that in France an increase in age is positively associated with exclusively using informal care, whereas in the Netherlands it is negatively associated with this outcome.

Thirdly, when decomposing the difference in not using any LTC, we saw that a similar pattern emerges as for formal care use. In the Netherlands 62.88% of respondents did not use any LTC, compared to 60.87% in France. The decomposition shows that difference in population characteristics contributed positively. If the French had the same distribution of population characteristics as the Dutch, then the probability of not using any LTC would increase by 10.9 percentage points in France. The fact that the observed difference between France and the Netherlands is much smaller than that is due to the negative contribution of the differential effects of the population characteristics.

5.2. Implications for LTC policy

Overall, these findings suggest that policymakers should not only rely on forecasts of LTC use that are based on trends in determinants such as disability and age, as trends in determinants can be offset by the effects of these determinants. An example of a forecast that relies on trends in determinants is the way the OECD (2020) projects an increase in the demand for formal LTC services in most countries because, amongst others, less informal caregivers will be available as "birth rates have been declining over the past few decades; more mobility is observed across society; there are more nuclear families; and the number of working women has been growing" (p. 41). A projection like neglects the fact that there can be substantial differentiation between countries in the association between the availability of informal caregivers and formal LTC use depending on the LTC system, as was shown in this study.

Another OECD paper by de la Maisonneuve and Oliveira Martins (2014) forecasts expenditure on public health and LTC for the 34 OECD countries plus Brazil, China, India, Indonesia, Russia and South Africa by projecting demographic (e.g. age structure) and non-demographic drivers for each country. In their projection of public health expenditure, the authors acknowledge that "the features of health institutions and policies" are part of the "residual" expenditure growth, but that it is "not feasible at this stage to project these drivers individually" (p. 69). I would argue that their conceptual framework could be improved by not seeing the features of health institutions and policies as separate growth drivers, but that institutional differences in fact alter the relationship between determinants such as

the demographic factors in their model and care use and therefore expenditure.

My results showed that age was a large contributor to the "unexplained" part of the decompositions of LTC use (see figures 5, 7 and 9), i.e. France and the Netherlands differed in terms of the effect of age on (i) formal care use, (ii) exclusively using informal care and (iii) not using LTC. De la Maisonneuve and Oliveira Martins (2014) acknowledge that the effect of population ageing on health care is "far from straightforward" (p. 68), yet in their demographic driver of LTC expenditure they include dependency ratios (number of dependants by age group) that are assumed to be "broadly uniform across countries" (p. 80). Here too I would urge more caution in assuming that age and dependency have a uniform effect across countries.

Curiously enough, in their model of the determinants of long-term care expenditure institutional features are not incorporated at all (p. 80). Informal care supply *is* included in this model, this time as part of the "non-demographic drivers" where it is "proxied by the evolution of labour force participation of women aged 50-64". Again, I would argue that the differential effect of determinants such as informal care supply should be acknowledged, as institutional differences between countries can alter the relationship between determinants and LTC use and therefore costs.

The European Commission Ageing Report (2015) *has* acknowledged the role of policy (change) in their LTC expenditure projections. Notably, this 2015 report featured a projection of LTC spending for the Netherlands that contrasted a scenario in which the 2015 policy reform would not take place with a scenario in which the reform did take place (p. 153).

By not only comparing observed use between countries but also explaining these differences using a decomposition method, new insights can be gained. One might be inclined to assume that countries with similar LTC use patterns are similar in both population characteristics and their association with observed LTC use, the decomposition method can demonstrate, as it did in my study, that these similar patterns belie very different distributions of population characteristics and differential associations with LTC use.

5.3. Limitations

There are some limitations of this study that have arisen due to the used dataset and the methodological approach. This study was conducted at the so-called extensive margin: did someone use formal or informal care or not? The SHARE dataset that was used does not allow for an analysis at the intensive margin, which requires that the hours of formal or informal care that are received are quantified. For policymakers insights into use at the intensive margin are valuable. When it comes to informal receipt, it is useful to know the composition of that informal care, both in terms of how many hours of informal care were received (the intensity), and the type of care received. Knowing the composition of the informal care received would allow insights into the burden that that care is associated is with. For instance, a study using SHARE wave 1 data (2004)[5] showed that whilst Denmark was the country in which the likelihood of receiving informal care was the highest, simultaneously it was the country in which the intensity of the informal care was the lowest and so was the probability of receiving the most time-demanding form of social support: help with personal care (Albertini et al., 2007). This means that comparative research using data that concerns the extensive margin can hide

[5] In this SHARE wave the survey contained questions about the intensity of informal care. These questions were dropped in subsequent waves, including the one I use.

stark differences in the intensity of informal care. Providing informal care can come at a cost, e.g. because people are able to work less, or because they experience adverse health effects (Bom & Stöckel, 2021). The cost of informal care depends (amongst others) on the intensity of that care. It would be worthwhile if future research into the impact of institutional arrangements on LTC use would incorporate the intensive margin. The costs of formal care also depend on the intensity of the care received, so studies that project LTC expenditure should not only rely on data on the amount of people who receive LTC.

In addition, SHARE does not include individuals that receive LTC in an intramural setting. I therefore cannot analyse the effects of institutional LTC arrangements on the use of intramural LTC. Furthermore, differences in the institutional arrangements regarding intramural LTC between the two countries can generate differences in the at-home LTC use composition I observed in France and the Netherlands. For instance, stricter eligibility conditions for intramural LTC in one country could mean that I observe more use of extramural formal care and/or informal care that would otherwise have been substituted by intramural care. In 2013 (my study period) France had 964 LTC beds in nursing and residential care facilities per 100.000 inhabitants, and the Netherlands had 1423 LTC beds per 100.000 inhabitants (Eurostat, 2021). The amount of LTC beds has been shown to be positively correlated with public expenditures on both nursing care and formal home-care (Floridi et al., 2021). This is in line with the differences between France and the Netherlands in terms of public expenditure on LTC (see table 1).

Next to need-related characteristics and household characteristics, the demand for LTC is also influenced by preferences, tastes and information (Eckert et al., 2004; Lehnert et al., 2019; Wolff et al., 2008). These are not part of the SHARE dataset and their effect could therefore not be quantitatively assessed.

A methodological limitation is that linear regression models were used for the decomposition. Linear models suffer from the identification problem: when using dummy variables, the choice of the omitted group (in my results denoted as the reference group) influences the coefficients that are estimated for the dummy variables that are included in the detailed decomposition (Yun, 2005). This means that if the reference group and comparison groups are switched, the results would change. Therefore, a follow-up study could use non-linear models (e.g. probit or logit models, see Yun, 2004) for the decomposition as a robustness check for my results and conclusions.

Another methodological limitation of this study is that decomposition results cannot be interpreted causally. The results therefore should be interpreted as associations, and not causal effects. The scope of this study was not to identify the causal effect of characteristics of LTC systems (e.g. the eligibility assessment) on LTC use. However, studies that aim to estimate causal effects of LTC characteristics would be a useful follow-up to this study, to assess if the inferences that I made about the effect of institutional characteristics can be substantiated.

To conclude, this study adds to the understanding of between-country differences in home-based LTC use both for researchers and policy makers. First, my results indicate that both differences in population characteristics and the association of those population characteristics with LTC use drive between-country differences in observed LTC use. Moreover, the differences in the association between population characteristics and LTC use can be argued to (partly) reflect differences in LTC institutions, especially when it comes to the eligibility assessment that is used to determine access to formal LTC.

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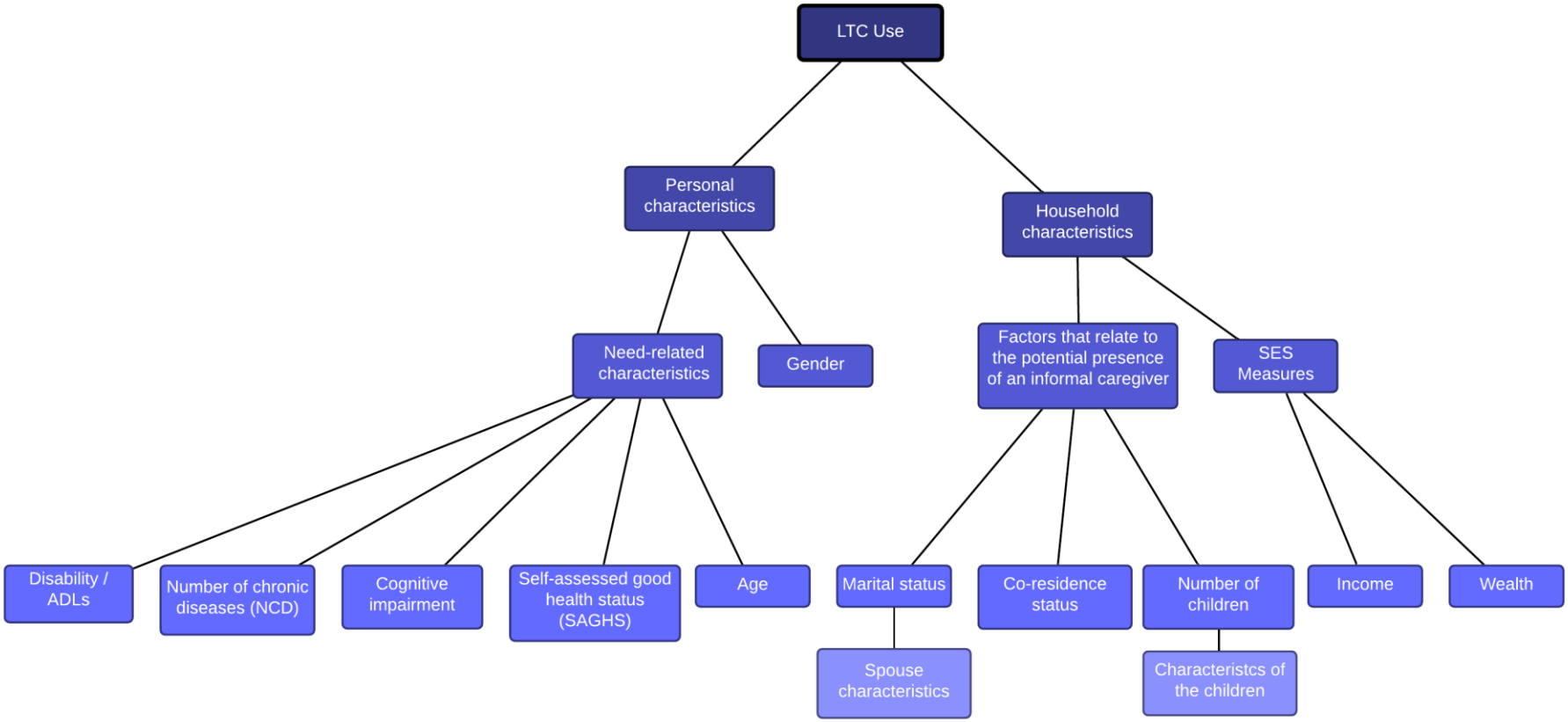
Appendix A – LTC Determinants

Figure 10 *Extended graphical representation of LTC determinants*



Appendix B – Mobility Items

SHARE respondents are asked to report whether they experience difficulties in:

- Walking 100 metres
- Sitting for about two hours
- Getting up from a chair after sitting for long periods
- Climbing several flights of stairs without resting
- Climbing one flight of stairs without resting
- Stooping, kneeling, or crouching
- Reaching or extending arms above shoulder level
- Pulling or pushing large objects
- Lifting or carrying weights over 10 pounds/ 5kg
- Picking up a small coin from a table