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WHO IS RETIRING EARLY: THE WEALTHY OR THE UNHEALTHY?

A quantitative study about the timing of retirement of older adults in the Netherlands between 1985 and 2013 conducted with SHARA data.

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Abstract

Objectives This research is questioning: *" How does health and wealth explain educational differences in retirement timing?".* In almost all OECD countries, the real retirement age is lower than the eligibility retirement age. What drives those individuals to retire before their official retirement age? Socioeconomic status has an influence on health and wealth. This research focusses on the contribution of health and wealth indicators on early, late, or retirement at the official age, and recognizes that there is a strong correlation between health- and wealth-status. Methods The influence of health and wealth status is weighed against each other to determine which of the two has a strong influence on the timing of retirement. Multinomial logistic regression models were used to analyse data from the Survey of Health, Ageing, and Retirement in Europe (SHARE) wave five on the timing of retirement. This research used 555 retired older adults (50+) in the Netherlands between 2012 and 2013. Relative risk ratios (RRR) were calculated to determine whether, relative to those who retired on time, who retired early or late. Results Gender is an essential factor in retirement timing. Females are more likely than males to retire on-time instead of early or late. Education plays an essential role in early retirement decisions. Individuals with high or middle level of education tend to retire earlier than their counterparts with low levels of education. Whit larger household wealth, it is more likely to retire early instead of on time. Previous health status does not have significant influences on early retirement timing. Mobility limitation and chronic disease make it more likely to retire on time instead of early. Conclusions Individuals with lower education are less likely to retire before the official retirement age. That is despite being at worse health at this age and because of insufficient assets. This means that individuals with low socioeconomic status are most affected by the increase of the official retirement age since they have shorter live expectancy and shorter healthy live expectancy. Therefore, individuals with lower socioeconomic status spend less of their retirement time in good health. This inequality is made even worse because, despite being in worse health, they cannot compensate for it by retiring earlier, unlike people with higher education who have the financial means to do so. In the end wealth status is more predictive in retirement timing decisions than health status.

Keywords

Retirement timing · Socioeconomic status (SES) · wealth- and health-status · Dutch pension system

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1. Introduction

During the last two centuries, life expectancy (LE) in the developed world has risen significantly due to better living standards, improvements in health and sanitation conditions, advancements in the medical world and higher educational attainments (Yong and Saito, 2009). This increasing live expectancy leads to an increase in the proportion of older adults. Beside increasing live expectancy, birth rates and migration also participate in the population ageing process (Whitehouse and Quisser, 2007). Multiple European countries are also facing the effects of the baby boom generation born between 1940 and 1965. This results in a relatively high cohort of older adults in the retirement age. The combination of low birth rates, increasing life expectancy, migration and a high cohort of retiring baby boomers causes structural problems concerning public services and pension systems associated with the ageing population, and their labour markets (Whitehouse and Quisser, 2007).The retirement pensions system and the growing demands for public healthcare due to the ageing population are fundamental stresses on the medical and economic system in the Netherlands, as they are in almost all other developed countries. Dutch policymakers are facing financial shortages due to the aging population. Increasing life expectancy (LE), low birth rates, a high cohort of retiring baby boomers, migration and rising dependency ratios have resulted in pension shortages and increasing spending on elderly health care. For these reasons, the Dutch government has undertaken a restructuring of its pension system since 2012. An essential part of this restructuring is the adjustment of the pension eligibility retirement age to increasing life LE (Majer, *et al.* 2010). These policies are needed to decrease the dependency ratio of the not working population on the working population given the large cohort of Baby Boomers and the aging population..

Although the main goal for such restructuring is the financial improvement of the pension systems, these restructurings can have adverse social effects (Chen, *et all*. 2018). The adjustment of the pension eligibility retirement age is the same for everyone in the population. However not everyone is retiring at the same age. This research focusses on individuals who retire early, on time or late. Not everyone in the population is able or want to work longer. There is significant scientific evidence that the timing of retirement is strongly related to socio-economic status (SES). SES in turn affects wealth- and health-status. There is a positive relationship between SES and wealth- and health-status. Individuals whit higher SES are often more likely to have greater wealth- and health-status. If the pension eligibility retirement age increases, the population at the bottom of the socio-economic ladder would be most affected because those individuals have fewer years of good health ahead of them at the time of retirement. For this reason, not everyone can or want work until the eligibility retirement age. Retirement timing depends on both the ability to continue working and the number of years that individuals can still spend in good health after retirement. This is research is focussing on the ability to

work until the eligibility retirement age. Age contribute significant in the ability to work until the eligibility retirement age. Individuals with low SES in the working age display the biggest worsening in health status (Remund, 2019).

The role of the ageing population on health care costs, the increasing burden on retirement systems, and the optimal retirement age have been extensively investigated (See for example, Kallan, 1993; Bloom et al. 2010). However, there are few studies investigating the individual characteristics and the role of wealth and health on the time of retirement. This research is questioning: *''How does health and wealth explain educational differences in retirement timing?".* Both, SES, health, and wealth have influence on the age and timing of retirement, but which indicator contributes more to the retirement timing? In almost all OECD countries, the real retirement age is lower than the eligibility retirement age (OECD, 2018). What drives those individuals to retire before their official retirement age? SES has influence on health and wealth. This research focusses on the contribution of health and wealth indicators on early, late or on time retirement.

Three counteracting hypotheses on the relationship between SES and effective retirement age are tested in this research. The first hypothesis is that SES directly influences retirement timing. Individuals whit high SES are less likely to retire early since they are more satisfied with their jobs and have probably less physical jobs. The second hypothesis is that higher SES leads to increased health. Therefore individuals with higher SES can work longer and are not retiring before their official retirement age. Individuals with lower SES are less healthy and, therefore, not able to work until their official retirement age. The third hypothesis is that a higher SES leads to more wealth, and therefore individuals with a higher wealth status will retire earlier than people with lower SES since wealthier individuals have the resources to retire early . Although wealth and health are strongly related and interacting, there is chosen for two separate hypothesis since this research is interested which of the two hypothesis tested with multivariate regression models is contributing stronger to the timing of retirement. These three hypotheses will be tested in the three sub questions:

I. *What is the direct impact of SES on retirement timing?*
II. *How much of I is explained through the impact of health?*
III. *How much is explained trough the impact of wealth?*

Answering these questions is essential to implement the long-term consequences of the ageing population since it allows the Dutch government, and other national governments to identify the factors that determine the timing of retirement.

This study is subdivided into five chapters. Chapter two is about the current theories and studies about longevity and the role of wealth and health on retirement timings. Also, a short overview of the

Dutch pension systems is given. The third chapter examines the methodology and share data set of this study. Chapter four is about the results gained by multivariate regression models. Lastly, in chapter five the conclusions, and the answer to researches question can be found and the two hypotheses are discussed.

2. Theoretical background

In this chapter an theoretical overview of the following concepts is given. First, definitions of the age at retirement are given in paragraph 2.1. In paragraph 2.2 an overview of the Dutch pension system is given. Finally, in paragraph 2.3, the interrelations between SES, health and wealth, and their effects on retirement are discussed.

2.1 Retirement

2.1.1 Retirement timing

The definition of retirement in this research is based on Feldman's (1994) widely used definition, which states that it is the exit from a career path or organizational position of considerable duration, taken by individuals after the age of 50, and taken with the intention of reduced psychological commitment to work after that. Retirement is a dynamic, complex process, and the retirement age has shifted over time. The retirement age has shifted both in Europe, the United States and other countries (CBS, 2018). There is a trend visible toward increasing retirement age, largely due to policy changes, such as the increase of the eligibility retirement age and the increase of life expectancy and healthy life expectancy, which made it possible to work longer. Table 1 gives an overview of the three different definitions of retirement timing. In paragraph 2.1.2 the definition of the legal retirement timing is discussed. Paragraph 2.1.3 shows the definition of the expected timing. And then in paragraph 2.1.4 an overview of the definition of the effective timing is given.

Table 1. Definitions of Retirement timing

	Early retirement	On time retirement	Late retirement	References
Legal timing	Before the eligibility retirement age	At the eligibility retirement age	After the eligibility retirement age	Shultz, et all. (1998); Blakely and Ribeiro (2008); Madero-Cabib, et al. (2016)

Expected timing	Prior expected or planned retirement age	Same as expected or planned retirement age	After expected or planned retirement age	Desmette and Gaillard (2008); Crawford (2013)
Effective timing	Before mean retirement age in the population	Same as mean retirement age in the population	After the mean retirement age in the population	Feldman (2013)

2.1.2 Eligibility retirement timing

The changes regarding retirement age leads to changes in retirement timing. The timing of retirement has been conceptualized in relative terms, such as ''early retirement'', ''one time retirement", and "late retirement" (Beehr, 1986). There are multiple ways to define early, on-time and late retirement. See table 1 for an overview of different operationalizations of the timing of retirement. In this research the definition of Shultz, et all. (1998); Blakely and Ribeiro (2008); Madero-Cabib, et al. (2016) for retirement timing is used. They define retirement timing regarding the eligibility retirement age. The eligibility age is defined by the official retirement age. From the eligibility retirement age, both social and occupational pensions are paid. For more information about the Dutch pension system regarding occupational and social pension, see paragraph 2.2. Although the eligibility definition of retirement timing is leading in this study, the other two definitions and their contribution are also discussed.

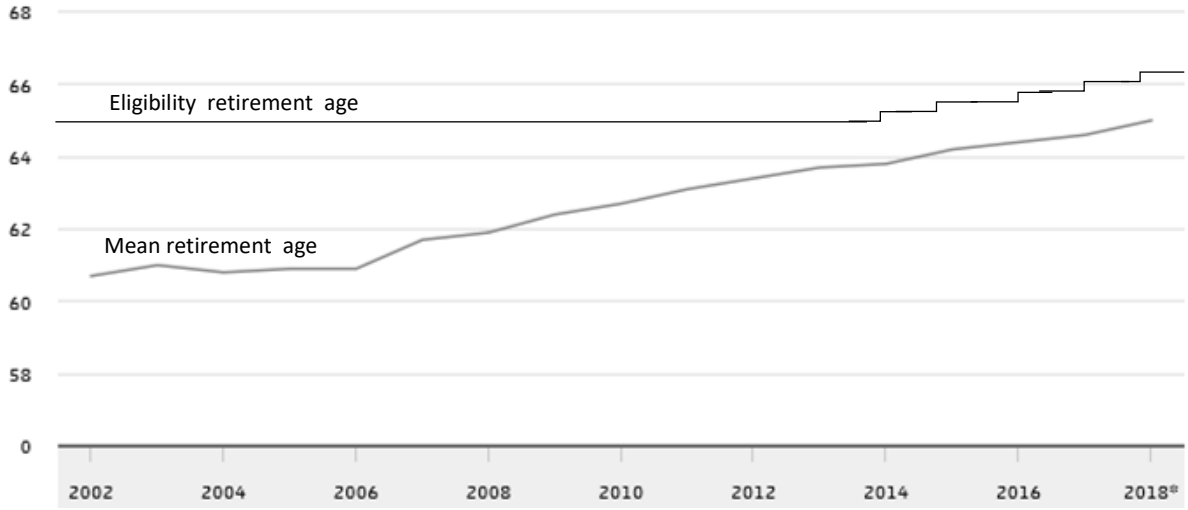
2.1.3 Retirement expectations timing

The second way to define retirement timing is by expectations and planning. The ages associated with on-time, early and late retirement has changed during the last centuries. For example, the ages that were considered on-time, early and late, respectively, are older now. This principle applies for the Netherland and other countries where the eligibility retirement age has been increased. For Dutch cohorts, especially from 1950 until 1960 the increase of the eligibility retirement pronounced in 2012 changed their expectations on their eligibility retirement age and timing. Until 2012 they thought they would retire at the age of 65. After 2012 their expectations changed and multiple studies pointed out that the changing expectations created by the increase of the eligibility retirement age resulted in significantly more early retirement decisions (Mcfall, 2011; Crawford, 2013). Retirement expectations influences retirement decisions. It is therefore necessary to admit the role of retirement expectations when analysing the timing of retirement.

2.1.4 Mean retirement age in the population

Another way to define retirement timing is to look at mean retirement age. Feldman (2013) defined early, late and on time retirement based on the mean effective retirement age in the population. In all European countries, the mean retirement age is lower than the eligibility retirement age. The mean retirement age is the average age individuals retire. The mean retirement age increased from 60 and 7 months in 2002 to 65 in 2018 (CBS, 2018) (see graph 1). The mean age increased before the increase of the eligibility retirement age. The eligibility retirement age started to increase since 2014. During this period the life expectancy and the healthy life expectancy also increased. The increase between 2002 and 2014 is not forced by law, the increase after 2014 is also shaped by the increase of the eligibility retirement age witch started to increase since 2014. Comparing early, on time and late retirement with the mean age of retirement is a suitable way of measuring retirement timing in the population. It answers questions as who are retiring before 65 in 2018 and who are on time.

Figure 1. Mean retirement age compared with on-time retirement in the Netherlands



Source: CBS, 2018.

2.2 The Dutch retirement system

2.2.1 The first pillar

The Dutch retirement system rests on three pillars (Henkens & Solinge, 2014; Vuuren, 2011). The first pillar is the social security system public old-age pensions (AOW). These public old-age pensions are the same for every resident of the Netherlands and do not depend on employment status or work history.

The payment of the social security system starts when the official eligibility retirement age is reached. The only differentiation made in the social security system is the duration of legal residence in the Netherland. To ensure sustainability of the social security system, the eligibility retirement age has increased. Pensions are directly financed by the active individuals of a populations. Increasing the eligibility retirement age has two positive effects on the financial balance. The working population is expanded and at the same time the retired population is reduced. The eligibility retirement age was 65 years of age in the period 1956-2013 and increased since 2014. In 2011 the Dutch government started increasing the eligibility retirement age. In 2020, the eligibility retirement age will reach 66 years and four months of age, followed by a further increase in 2025 to 67 years of age (Vermeer, 2016).

2.2.3 The second pillar

The second pillar includes mandatory occupational pensions. These pensions depend on work history and are different for low paid and high paid occupations. Individuals are able to receive these occupational funded pensions before their official eligibility retirement age. The flexibility of the second pillar enables individuals to retire before their eligibility retirement age. The existence of this second pillar makes it possible for individuals to choose their own retirement age. The function of this second pillar makes the Dutch pension system ranked among the best pension performers worldwide for delivering high financial security keeping contingent liabilities. In 2020, the Netherlands had pensions saving of, on average, 171.4 percent of GDP, the highest of all developed countries (Folger, 2020).

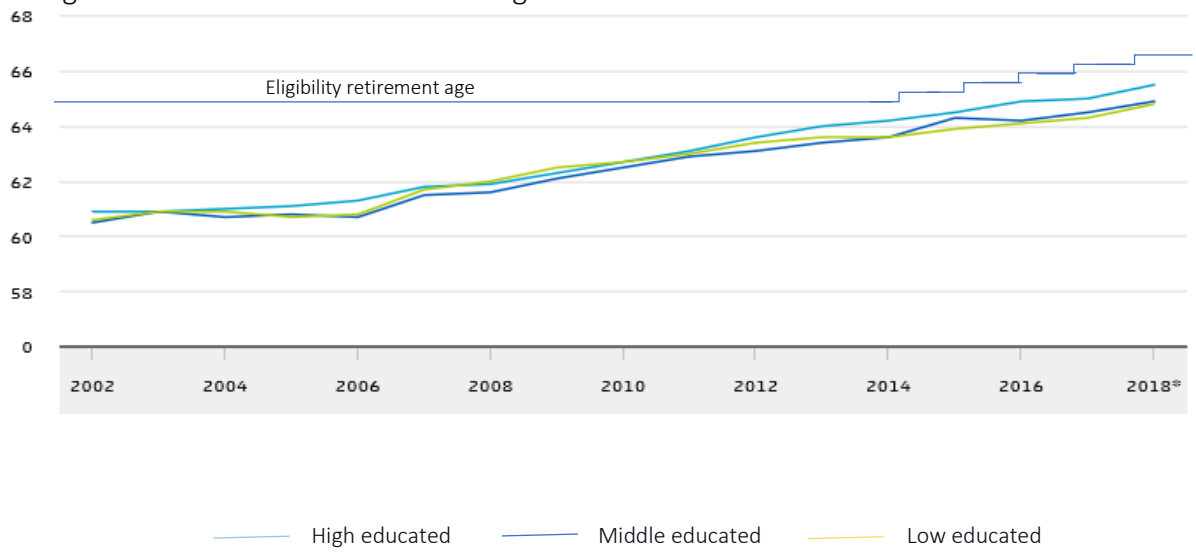
2.2.3 The third pillar

The third pillar consists of individual retirement plans as accumulated savings and annuity insurance (Henkens & Van Solinge, 2014). This pillar is especially important for self-employers who, in general, do not participate in occupational retirement provisions. Only a small percentage of the Dutch population contribute to only the first and the third pillar. Most individuals contribute to the first pillar or to the first and second pillar. Individuals may also have private savings. All those savings also falls under the third pillar. It is therefore, not surprising to get pension income from the third pillar, although there are large differences in assets. The group that only receives pension income from the 1st and 3rd pillar or only from the 3rd pillar is very small in the Netherlands. In countries where the second pillar is less developed, such as Poland, Spain, the United States and Mexico, the share from the third pillar is more important. In the Netherlands, the 3rd pillar is mainly seen as an extra pension in older age, but certainly not as a basic pension as in many other countries.

2.3 Education

Education has direct and indirect influences on retirement timing. The direct influences is measured as job satisfaction since higher educated jobs are related to better working conditions and higher income and more attractive occupations (Potocnik et al. 2009). The indirect influences are based on the influences of education on wealth and health status. Multiple studies has consistently found that previous highest education levels are positively related to wealth and health status. Higher levels of education are related to high wealth- and health-status (Szinovacz et al. 2014). Lower levels of education are related to low wealth- and health-status (Siegrist et al. 2007). On the other hand, individuals with low wealth status have more often not built up enough pension in the second and third pillars to retire earlier than individuals with higher education and higher wages and may therefore not able to retire early. As mentioned before both, health as wealth status influences retirement timing. For the Netherlands, the mean retirement age for individuals with high education is lower than for individuals with middle and low education (see graph 2) (CBS, 2018).

Figure 2. Education and retirement age in the Netherlands



Source CBS, 2018

2.4 Interrelations between SES, health and wealth, and their effects on retirement.

2.4.1 Health status

Health is an essential factor in retirement decisions. The role of health status in relation to the timing of retirement can be explained by the continuity theory. This theory indicates that individuals maintain to seek stability during their life course (Bonsdorff et al. 2009). Poor health status often represents a

source of discontinuity in labor force. This means that health status can preclude individuals from continuing to participate in labor force. Poor health status is the most frequently cited reason for early retirement decisions (Park, 2010; Brouwer et al. 2014). Multiple mechanisms shape the relation between retirement timing and health (French et al. 2017; Blundell et al. 2016). First, poor health conditions may hamper labor productivity and work performance and affect the earnings and labor demand, as persons who have poor health conditions may have fewer labor opportunities. Secondly, it is likely poor health increase the disutility of labor. The negative influences of decreasing health conditions on labor are likely to increase as people age since aging is associated with increased health risks (Ilmakunnas, 2018). Aging is often accompanied by physical limitations (Rose, 2001). This physical limitation ensures that people can no longer function fully on both the physical and psychological levels. The result of this is that it will be impossible for some to practice their profession (Cremer et al. 2004).

Both, individuals with high health status as well as individuals with low health status may have reasons for early retirement. Multiple researchers found health to be an essential determinant of early retirement decisions. (Roberts et al. 2010; Coe & Lindeboom, 2008; Rohwedder, 2010). Several studies have focused on the role of specific health issues on retirement timing. For example, although some individuals experience an unexpected health related event that causes them to retire, other individuals with chronic health conditions expect to retire early (Dwyer, 2001). Health conditions that may lead to early retirement include cardiovascular conditions (e.g.m stroke, heart problems), musculoskeletal conditions (e.g., back pain), and mental illness (e.g., depression or dementia) (Karpansalo et al. 2004). Berg (2010) and Rijn (2014) showed with SHARE data of 8 European countries (Austria, Belgium, Denmark, France, Germany, the Netherlands, Sweden and Switzerland) that poor self-reported health is a strong predictor for early retirement decisions.

On the other hand, the relation between health status and retirement timing is not a linear relationship. Although poor health status is related to early retirement, individuals with a high health status may also choose to retire early in order to pursue non work activities based on leisure while they are in good health (Bonsdorff et al. 2013).

2.4.2 SES and health status

The relation between SES and health has been extensively investigated. Gender, age, income, education, and marital status have significant influence on LE and HE (Harper, 2007; Laaksonen, 2003; Nagelhout, 2012). Numerous studies concluded that there is significant evidence for economic and social inequalities in the health of older people in Europe, Japan, and America (Pikhart et al. 2012; Di Cesare et al. 2013). SES is an essential predictor of mental and physical health status, and leads to

socioeconomic health differences. In this research socioeconomic health differences are defined as the systematic differences in health and mortality between individuals with high and low SES. Older adult with lower SES have more often higher mortality rates (Huisman et al. 2004), More functional limitations (Knesebeck et al. 2003), poor self-rated health (Knesebeck et al. 2003), and lower health related quality of life (Robert et al. 2009). Individuals with lower SES have therefore lower HE and HLE. This results in spending more years in poor health in shorter lives, so the number of years in poor health takes up a higher percentage of the total time of life.

2.4.3 Wealth status

The timing of retirement is affected by financial resources available for retirement (Pienta et al. 2012; Madero-Cabib et al. 2016). The role of wealth status to retirement timing is consistent with the life-cycle model of economics. This theory predicts that individuals will retire when they can afford to do so. (Laitner, 2013). Wealth is defined as the value of all the financial assets owned by a person by taking the total market value. On average, greater wealth is associated with early retirement timing. The possibility of financing an early retirement depends on the second and third pillars of the Dutch pension system. The availability of the second and third pillar depends on the financial resources. In the Netherlands, the first and second pillars are big in comparison to the third pillar. For almost 90 percent of the Dutch population, the first two pillars represent the bulk of retirement benefits. With insufficient credit on the second and third pillar, early retirement is financially difficult. Late retirement means higher pension funds benefits for the remaining time of life, while earlier retirement means lower benefits for the remaining time of life. When individuals have built up little financial stock, they can often not afford to retire early.

Previous studies have shown that income and education play a significant role in the structure of the first and second pillars (Munnell, 2018; Major, 2010). Wealth status is an important indicator for the possibility to retire before the eligibility retirement age. In a study in multiple OECD countries, wealthier older workers were more likely to retire early than less wealthy worker (Gruber, 1999). Wind (2014) conducted al longitudinal study among Dutch worker and found that the ability to retire before the eligibility retirement age predicted early retirement decisions. An explanation for the early retirement decisions can be found in that as the household wealth and incomes increases, individual preferences seem to move toward more time for leisure (Hatcher, 2002), thus the likelihood of early retirement increases. Siegrist (2007) shown using SHARE data that low wealth status is related to early retirement. Those who feel financial secure and are affluent have the opportune to choose for an early retirement (Schils, 2008). Parker (2007) found on the other hand that British older adults with higher incomes retired later due to high opportunity costs. Higher paid jobs are likely to be more stimulating and less

physical demanding , which makes late retirement more appealing. Various studies show that the influence of wealth on retirement timing is very diverse. Both the theory that more wealth causes early retirement (McCarry, 2004) and the theory that more wealth causes late retirement (Fisher et al. 2015) is based on scientific evidence. Much research contradicts one another in this regard.

2.4.4 SES and wealth status

SES is mainly determined by income, education, and occupation. Although these three dimensions of SES are strongly related, each has its specific influence on health- and wealth-status (Bossuyt et al. 2003). It is essential to notice that the individuals of interest, older adults who are retired, don't gain fixed income anymore and are currently also not working. SES is based on last earned income, previous occupation, and highest education gained when the individuals were younger. SES has great influence on the wealth status of individuals. Multiple researches found a strong relation between health and education (Remund, 2019) and wealth and education (Potocnik et al. 2009).

2.5 Conceptual model

From existing literature on retirement timing, three hypotheses are susceptible to explain the apparent relationship between SES and retirement timing(see for example Potocnik et al. 2009; Rohwedder, 2010). Multiple studies show a strong positive relationship between SES and health and its impact on retirement timing; and SES and wealth and its impaction on retirement timing. The first hypothesis is that SES has a direct influence on retirement timing (see pathway A in figure 3). Higher SES leads to more satisfaction with the respondent's last main job. The second hypothesis is that lower SES leads to worser health status and therefore to early retirement (See pathway B in figure 3). Individuals with a low health status can work shorter due to health issues and are retiring before their official date. People with higher SES have a higher health status and, therefore, able to work until their official retirement age. The third hypothesis is that lower SES leads to less wealth, and therefore people with a lower SES will retire on time or later than people with higher SES, since they have less financial resources (see pathway B in figure 3). Both hypotheses find scientific support, but they counteract each other. In this study, the two hypotheses and the associated variables are weighed against each other. In this way, it can be determined which factors are explanatory and decisive in the timing of retirement. Higher SES leads to more satisfaction with the respondent's last main job. In figure 3 the conceptual model shows how SES, health and wealth influences the timing of the retirement based on previous studies. In this

study, the previous theories are tested and compared with each other on a Dutch cohort of individuals from the SHARE data collection. The methodology will consist in estimating the direct and indirect effect of SES on retirement timing, taking into consideration the mediation effect of health and wealth (see method section 3.3.1).

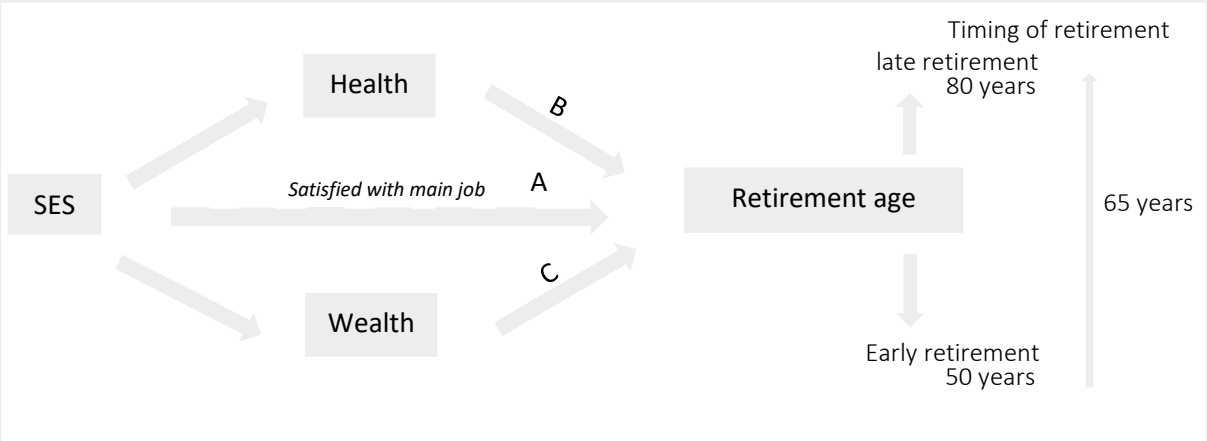


Figure 1: Simple version conceptual model

3 Data and methods

3.1 Data

3.1.1 SHARE

This research uses data from the Survey of Health, Ageing, and Retirement in Europe (SHARE) project. The SHARE project provides representative longitudinal microdata on, among other categories, retirement status, employment status, health issues, and family domain indicators. The broad coverage of those different themes makes it possible to combine different variables of interest in the analyses of this research. The SHARE projects cover 140.000 respondents in 27 European countries. The first wave was conducted in 2004; since then, six other waves were conducted. Since November 2019, work is done on the data collection of wave nine, which will be available for public researchers and policymakers at the end of 2020. In each wave, the initial sample is based on probability household samples where older adults above the age of 50 were interviewed plus their (possibly younger) partners in the household using Computer Assisted Personal Interviews (CAPI) (Börsch-Supan et al. 2013). Easy SHARE is used for this research. Easy SHARE is a simplified HRS-adapted dataset that consist of one single data

set. The main release of the SHARE data sets are stored in more than 100 single data files. For this reason the Easy SHARE data set is less complex and easier to use. For this study, the Easy SHARE set was merged with a data file specialized in retirement and pensions.

3.1.2 Wave five

Although more recent data (wave 7, 2016 – 2017) of SHARE exists, we use wave five (collected 2012–2013). This wave is deemed particularly suitable for an investigation of the determinants of the timing of retirement age in the Netherlands for one main reason. A clear advantage for using wave five over the more recent waves can be linked to this wave's timing. 2014 is an important year in the transition of the Dutch pension policy. This year, a reform of the old pension policy was implemented. An essential part of this reform was the rise of the state pension age. In 2014, it was the last year that the official state retirement age was 65. In the years that followed, the retirement age increased by three months every year. Today, in 2020, the state pension age is 66 and three months (CBS, 2019). The increase of the official retirement age was criticized by many, especially older adults in Dutch society. They long assumed that they would retire at the age of sixty-five. Many older adults have, therefore, retired at the age of sixty-five since 2014 and thus fell under the category "early retirement" (Vermeer et al. 2019). However, the cause for this choice does not fall within the scope of this study. The proportion of the group who retire early because they always thought they would retire at age 65 would distort the results of this study if more recent waves were used. This study is interested in the effects of SES, health, and wealth on the respondent's retirement age. Wave five was conducted just before the reform of the retirement system. The effect of retirement expectations created earlier in life causes hidden reasons to retire early and will lead to misleading results in the analysis conducted in this study. Wave five was collected before the hidden variable "expectations based on the official retirement age of 65 during life" could play a role in retirement decisions.

3.1.3 Respondents

This research restricts the sample to retired Dutch older adults aged 50 years or older who retired between 1985 and 2013. This excludes working people who answered that "self-employed or employed" best describes their current labor situation and includes people who declared themselves "retired". Then, people who retired before the age of 50 were excluded from the sample since retiring before the age of 50 is not common (CBS, 2019). The definition of retirement in this research is based

on Feldman's (1994) widely used definition, which states that it is 'the exit from a career path or organizational position of considerable duration, taken by individuals after the age of 50, and taken with the intention of reduced psychological commitment to work 'after that. Therefore, keeping individuals who retire before the age of 50 would lead to a distorted outcome and do not match with the research definition of retirement.

Since health is fluctuating over time, it is essential to indicate the impact of the time since retirement. This research is mainly interested in individuals who have retired in the past five years. However, a deliberate choice has been made to also include individuals who retired more than 5 years ago in the sample. The reason for this is that in this way the influence of time since retirement can also be measured and that removing all respondents who were retired more than 5 years ago would yield a high decrease in sample size. It is important to notice that health indicators are not stable over time, unlike education and wealth status. Wealth status and education fluctuate less strongly than health status. This means that the current health status of an individual who retired more than five years ago is not a predictive variable for retirement timing. Current wealth status and highest education gained are less fluctuating and therefore predictive for retirement timing, even for individuals who retired more than five years ago. Since this research is focussing on both, health and wealth status, an interaction variable of the health indicators and the time since retirement as continuous time variable is conducted.

Information on the exact birth year, month, and day is available for all the respondents, but information on the exact retirement year and month is available for only 19 percent of the respondents. Creating a variable that consists of both the year and the month of retirement thus yields a high percentage of missing values. While using only the retirement year has limitations, given that over 80 percent of the respondent have missing values for retirement month, it was regarded as the best available solution. Retirement timing is a continuous variable and the month of retirement mattes, therefore, it is worth noting that the results of this research are less precise than when retirement time was based on both, the year and month of retirement. The exclusion of self-employers and employers, respondents who retired before the age of 50, and respondents with missing values for retirement year and month out of the sample results in a total sample of 836 women and 1056 men (n = 1892).

3.2 Measures

3.2.1 Retirement timing

This study's dependent variable is retirement timing, which was created by a combined variable of the respondents' retirement year and month, minus the birth year, birth month, and day of birth. The

variable retirement year was measured according to self-reported retirement. The respondents were asked about their labor status, and the category 'retired' was used to define the retirement year event. Since, information on the retirement month is missing for 80 percent of the sample, some kind of assumption needs to be made about it. When it is available, the retirement month is approximately uniformly distributed. The most frequent month to retire is May (11.5 percent) and the least is November (6.3 percent). On average, individuals retire after 6.2 months in the year, means that the average retirement month is June. This means that it does not seem to introduce a bias to assume that all people whose month of retirement is missing actually retired in June. The final variable retirement time is thus based on information of the exact retirement year, and the observed retirement month is available, or the average retirement month (June) if missing. There was also no information available on the exact retirement day. The absence of the exact retirement day is not considered a problem since an official labor contract is always often terminated on the last day of a month. In this study, it is assumed that all respondents were given contract terminations on the last day of the month. This means that the moment of retirement started on the first day of July

This study's dependent variable is retirement timing. This newly created variable is based on the official age of retirement at age 65, and consists of three values "early retirement (1), "on time retirement" (2), and "late retirement" (3). Early retirement means that individuals retired before the age of 65. On-time retirement means that individuals retired at the age of official age of 65, and late retirement means that individuals retired after the age of 65. 47.12 percent of the respondent in the sample retired at their official age. The tolerance used to identify on time retirement was 64.5 – 65.49.

3.2.2 Sociodemographic factors

In addition to gender, age, and time since retirement, education is included. To measure education, the ISCED-2011 classification is used (UNESCO, 2012). ISCED-11 is a widely-used reference classification for education systems that is maintained and periodically revised by the UIS in consultation with EU Member States and other regional and international organizations. The ISCED classification is based on the highest obtained qualification. The seven-category ISCED variable is grouped into three basic levels. Primary education levels were categorized as "low"; secondary educational levels as "middle"; and tertiary education levels as "high". The variable Partnership is categorized as a binary variable "living with a partner (regardless the marital status)" (1); and "living alone".

3.2.3 Wealth-status

Wealth is measured by two variables. The first variable comprises the household's total net worth, including material wealth (value of residences, own business, own real estate, and cars) and financial wealth (savings and stock value). The variable wealth is appropriate for older populations as a financial indicator because it is based on accumulated savings and not on current income. This is essential for this study since the respondents of interest are retired and do not receive fixed income since they are not employed. This way of indicating the wealth conditions of individuals in high-income countries is widely used. However, there is no complete agreement on what should be counted as wealth. Many studies used net worth as an index measure subsuming heterogeneous factors such as house ownership, depts, health insurances, assets and other financial resources (Polak et al. 2007; Aittomäki et al. 2010; Chubbin et al. 2011). Another method to indicate the wealth conditions of individuals is to analyse indicators of ownership of consumer durables and transport (television, cars, motorbikes), dwelling characteristics (Size, material), and access to services (drinking water, toilet facility, cooking fuel) (Filmer and Pritchett, 2001; Howe et al. 2008). It has been decided not to use these indicators in this study since the Netherlands is a developed country, and most individuals will score high on the selected criteria mentioned (World Bank, 2020). It is not relevant for this study whether a respondent has a car, but it is relevant how expensive that car is. For this reason, the sum of the total belongings gives a good impression of the respondents' wealth status.

The second variable defining wealth is based on home-ownership. This variable depicts whether respondent are owners of an apartment or a house they are currently living in. McCann (2012) showed that homeownership has significant influence on the respondents wealth status. He found that homeownership has more effect on wealth status than the price of the property. For this reason home-ownership is added as an independent variable dichotomous variable (Yes, No).

3.2.4 Pension income

In sum, three measures are used to investigate pension income. The variable *AOW* indicates if respondents contribute to the first pillar of the Dutch pension system. The first pillar exists of AOW pensions to which all Dutch residents are entitled. The variable *occupational pension* indicates if respondents contribute to the second pillar of the Dutch pension system. The second pillar exists of forced and voluntary occupational pension savings, social support, and early retirement pensions. The variable *pension savings* indicates if respondents contribute to the third pillar of the Dutch pension system. The third pillar exists of private pension savings, which mostly occur by self-employees.

3.2.5 Health-status

In section 3.2.1 is already mentioned that health is fluctuating. For this reason using current health indicators to predict previous retirement timing is a challenge. Health status is changing over time, especially when individuals are getting older. Aging is often accompanied by physical and psychological limitations (Rose, 2001). It is possible that the health-status of respondents have changed since the moment of retiring. In this study this effect of time since retirement is controlled by conducting interacting between time since retirement and the health indicators. However, it is still possible that the health status changed in a short period of time. For this reason, I use as main independent health variable the number of chronic diseases (Examples are cardiovascular disease, diabetes, cancer), Which are known to fluctuate less quickly and that individuals often suffer from this for a long time (RVIM, 2018).

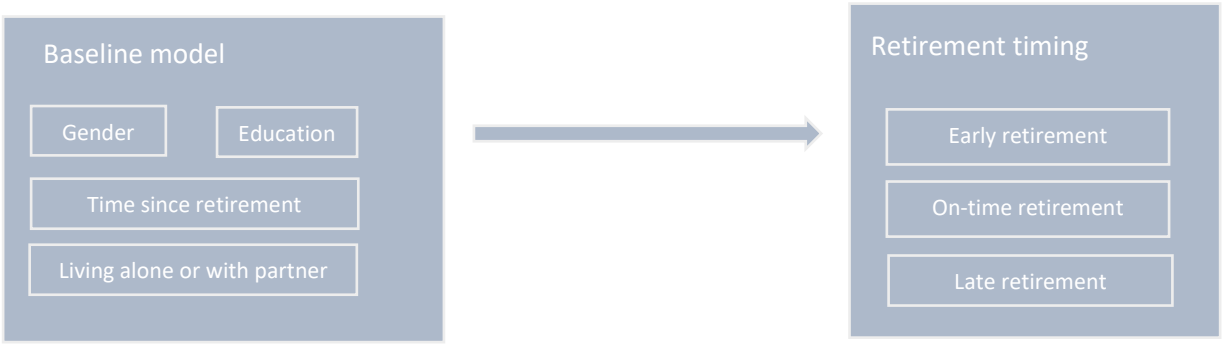
One other indicator of health and well-being is included in the dataset. The measure limitations in mobility are included. These mobility limitations are based on a list of ten difficulties in mobility, fine-tuned motor function, and arm functions (Wahrendroft et al. 2013). A binary variable is created for mobility, where (1) “yes” indicated that respondents face mobility limitations; and (2) “no” indicates that respondents do not face mobility limitations. Multiple studies show a strong positive relation between mobility and health (Nordbakke and Schwanen, 2014; Berg et al. 2014). Both, chronic diseases and mobility limitations are controlled by an interaction with a continuous time variable that takes into account the time since retirement.

3.3 Methods

3.3.1 Multivariate analysis

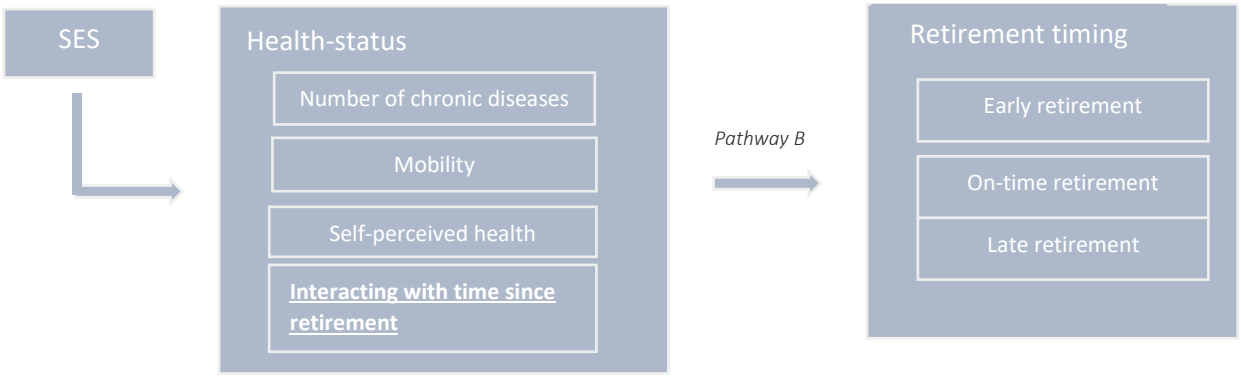
Multinomial logistic regression models were used to analyse microdata on the timing of retirement. Relative risk ratios (RRR) were calculated to determine whether, relative to those in the base category who retired ontime (official date), each independent variable decreased or increased the likelihood of retiring before, or after the official retirement date. A relative risk ratio greater than 1 for respondents in the early retirement category, for instance, would indicate that the associated characteristic increased the likelihood of retiring early relative to retiring at the official data, net of the control variables. Four multinominal logistic regression models were conducted. The first model (Model 1, figure 4) includes only the “baseline” variables, i.e. education level (SES), and basic demographic controls (gender, cohabitation and time since retirement).

Figure 4. Model 1: baseline model



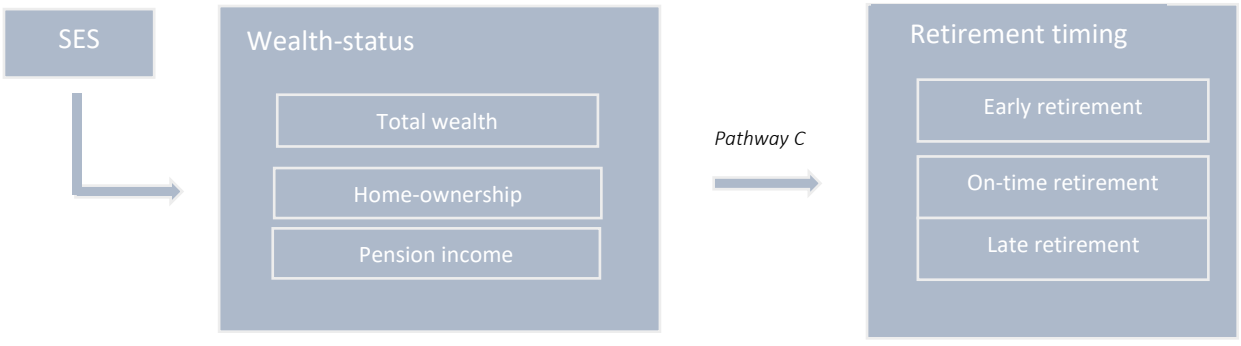
The second model (Model 2, figure 5) is an extended version of the first model, which includes the health indicators of pathway B, including chronic diseases, mobility limitations and self-perceived health.

Figure 5. Model 2: Health model including pathway B



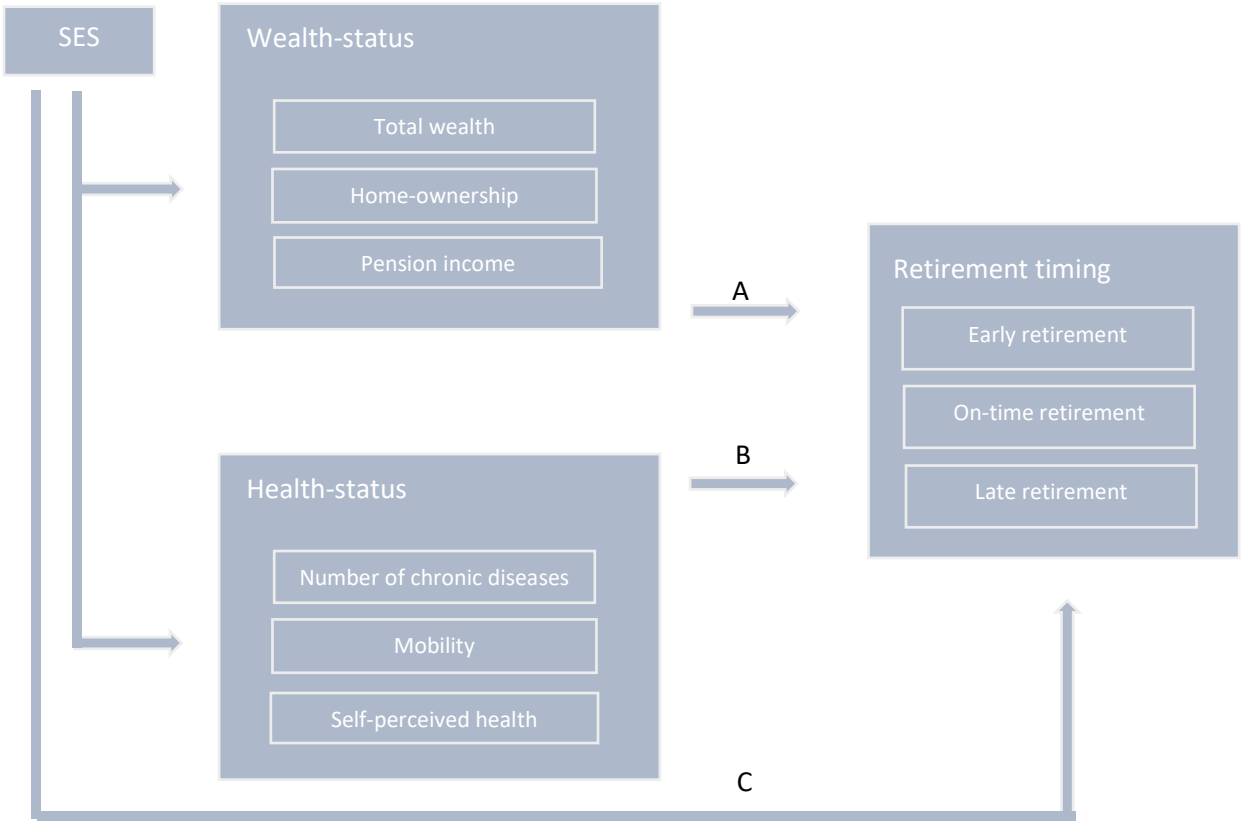
The third model (Model 3, figure 5) is an extended version of the first model, which includes wealth indicators, , including total wealth, home-ownership and type of pensions.

Figure 6. Model 3: Wealth model including pathway C



The fourth model (Model 4, figure 7) is a combination of model 2 and model 3 that includes both, pathway A and pathway B. The purpose of this model is to find out if the SES, health and wealth effects are independent (i.e. remain significant when considered together), or if their previous effect was only reflecting their correlation since multiple studies found a strong correlation between health and wealth indicators (Harper, 2007; Laaksonen, 2003; Nagelhout, 2012). This step-wise process, also known as a mediation analysis, will answer the question whether the differences observed in age at retirement by SES are explained by inequalities in wealth or health. If the effect of SES disappears after controlling for one of these dimensions, it will mean that the effect of SES is mediated (goes through) either health, or wealth, or both.

Figure 7. Model 4: Complex model including pathway A and B



Likelihood Ratio (LR) tests are used to compare the goodness of fit of each model to the first model (Model 1: Baseline model). The purpose of using LR test is to investigate which model contributes the most in explaining retirement timing. The main goal is to find out if health-status contributes more than wealth-status or that is not possible to make conclusion about the one without mentioning the other. Standard errors were calculated with bootstrapping techniques and taking into account the complex survey design. All analyses were conducted using STATA 16 SE.

4 Results

4.1 Descriptive results

4.1.1 Distribution of variables

First, a descriptive analysis looking at the sociodemographic characteristics, wealth indicators and health indicators of the sample was conducted. Table 2 gives a descriptive overview of the measures of the dependent variable (retirement timing) and the independent variables.

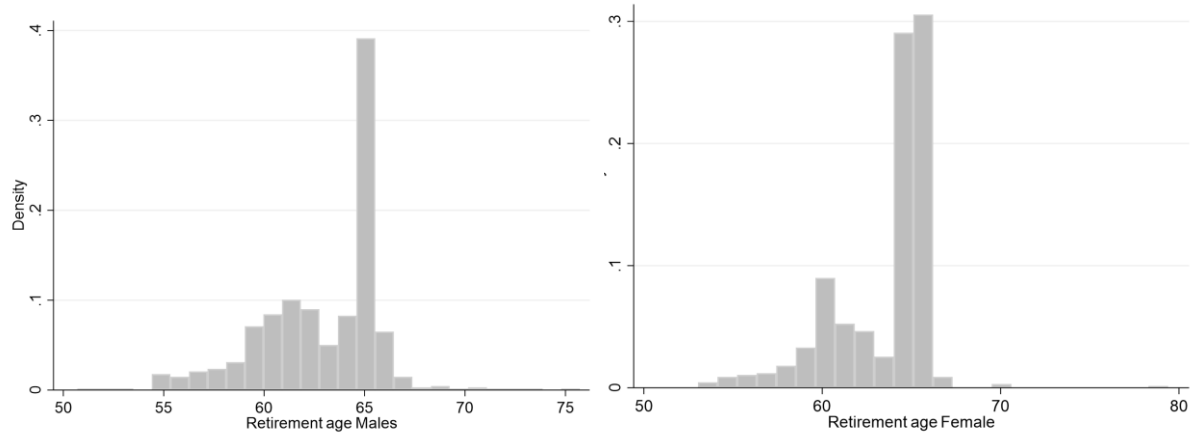
Table 2. Descriptive variables

	Mean (continuous) or Relative frequency (categorical)	*(std. dev.)*
Retirement age (50 – 79)	62.63	3.41
Time since retirement (years)(0 - 27)	9.29	7.03
Retirement timing (%)		
Early retirement	0.49	0.50
One-time retirement	0.43	0.49
Late retirement	0.07	0.26
Age (52 – 77)	72.27	2.30
Gender (female)	0.44	0.49
Partnership status (yes)	0.75	0.43
Education (%)		
Low	0.48	0.49
Middle	0.22	0.42
High	0.36	0.44
Household wealth (0 – 1666217.42)	35755.59	30421
Homeowner		
Yes	0.44	0.49
No	0.25	0.43
Missing	0.31	0.46
Pension system		
First pillar (yes)	0.86	0.34
Second pillar (yes)	0.72	0.45
Third pillar (yes)	0.03	0.18
Mobility limitations (yes)	0.22	0.41
Chronic disease	1.16	1.19

Table 2: Descriptive statistics: Source: SHARE, wave 5, 2012/2013

The average retirement age in the sample is 62.63. This is not representative for the average retirement age (63.7) in the Dutch population in 2013. A t-test showed that the average retirement age in the sample is significantly lower than the average retirement in the Netherlands at the 5 % confidence level. The average retirement age in the sample is ten months lower than the average retirement age in the population. This does not necessarily mean that the data is not representative given the fact that there is no information on the exact day and month of the retirement of the respondents in the sample. The average retirement age is 63.15 for females, and 62.24 for males. See figure 8a for an overview of the retirement age of males and figure 8b for an overview of females' retirement age.

Figure 8a and 8b. Retirement age



Source: SHARE, wave 5, 2013

Besides differences between gender and retirement age. There are also different results for the timing of retirement between genders. Females retire more often on time, and males retire more often early and late (Table 3).

Table 3. Retirement timing and gender

	Early	One-time	late	Total
Total	49.68	42.68	7.45	100
Females	39.11	53.11	7.78	100
Males	58.05	34.75	7.20	100

Source: SHARE: 2013

Most respondents gain pension income from the first pillar or the second pillar. The group that gains income from the third pillar is too small to make relevant conclusions in the analysis of this research. However, this was expected based on information from the CBS (2018) on Dutch pension income. Only a small percentage of the Dutch population gains income out of the third pillar. In 2013, 93.7 % of the Dutch population gained pension income out of the first pillar. A t-test showed that the percentage of respondents who gained income out of the first pillar (90.22 %) in the sample is significantly the same as the average in the Dutch population on a 5 % confidence level. This means that the sample is representative for the Dutch population concerning pension income. The percentage of the sample that gains pension income from the second pillar is also representative of the Dutch population. Most of the respondents, 73.9 percent, gain pension income from both the first and the second pillar.

4.2 Multivariable Findings

4.2.1 Baseline model

Results of the multivariate regression models for the impact of wealth and health indicators on retirement timing are presented in table five and six. Table four presents the results of the baseline model. There is a relationship between gender and retirement timing. The effect of being female is negative and for early ($P<0.01$) and late ($P<0.05$) retirement instead of on time retirement. The relative risk ratio to retire early instead of on time is 0.52 times less likely for women than males. This means that it is more likely that women retire on time instead of early than males. It is also more likely that women retire on-time instead of late than men.

Living together with a partner also has a significant influence on retirement timing. The effect of living with a partner is negative and significant ($P<0.01$) for early retirement and positive and significant ($P<0.05$) for late retirement. This means that individuals living together with a partner instead of living alone are less likely to retire early instead of on time. Individuals living together with a partner instead of living alone are more likely to retire late instead of on time.

Being high educated instead of being low educated is positive and significant ($P<0.01$) for early retirement instead of on-time retirement. Being middle educated instead of being low educated is positive and significant ($P<0.01$) for early retirement instead of on-time retirement. The relative risk ratio for retiring early instead of on-time is 2.02 times higher for highly educated individuals than for low educated individuals. Furthermore, the relative risk ratio for retiring late instead of on-time is 1,38 times more likely for middle educated individuals than for low educated individuals. This means that

high and middle educated individuals instead of low educated people are more likely to retire early than on-time. This is the opposite of expected since it is more common in the Netherlands that high educated individuals are more likely to retire later than middle and low educated individuals. However, there is a explanation for this opposite result. If high educated individuals are more likely to retire early and late instead of on-time, this results in similar averages. There is no significant influence of education on late retirement instead of on-time retirement.

The time since the respondent retired is positive and significant (P<0.01) for retiring early instead of on time. The risk of retiring early instead of on time increases with 1.1 with every year ago that a respondent retired. This means that respondents who retired longer ago are more likely to retire early instead of on time than individuals who retired more recently.

Table 4. Model 1: Baseline model

Base On-time	Early Retirement			late retirement		
	RRR	SR	P>|z|	RRR	SR	P>|z|
Gender (female)	0.52***	0.08	0.000	0.65**	0.12	0.021
Living with partner (yes)	0.62 ***	0.05	0.000	1.53**	0.31	0.036
Low education (ref)						
Middle education	1.38**	0.18	0.011	1.06	0.24	0.803
High education	2.02 ***	0.26	0.000	0.78	0.19	0.321
Time since retired	1.09	0.01	0.000	0.99	0.02	0.758

** Significant level of 90 % (P<0.1) ** Significant level of 95 % (P<0.05) *** significant level of 99 % (p<0.01)*

Source SHARE wave 5, 2013

4.2.2 Health model

Table 5 shows the results of the baseline model and included health indicators. The health indicators are added with an interaction with the variable time since retirement. The baseline model did not change significantly after adding health model variables. The variable mobility limitations are significant (P< 0.01) for retiring early instead of on-time. This means that individuals who have mobility limitations are 0.34 times less likely to retire early instead of on-time as individuals with no mobility limitations. This means that less healthy individuals are less likely to retire early. This is the opposite this study expected. No significant results are found for the effect of mobility on retiring late instead of on-time.

This research expected based on previous studies (Nordbakke and Schwanen, 2014) that mobility limitations will lead to more likely results to retire early instead of on-time.

The variable chronic disease is negative and significant on a confidence level of 90 % (P<0.1) for retiring early instead of on-time. Individuals with chronic diseases are 0.73 times less likely to retire early instead of on-time than individuals who do not have a chronic disease. This also means that less healthy individuals are less likely to retire early. No significant results are found for having a chronic disease on retiring late instead of on time. Interacting both health variable, chronic diseases and mobility limitation with the variables that indicates the time since retirement did not gave significant effects, the effects became even insignificant when interacting the health variable with the time variable. This means that time since retirement is not responsible for the role of health indicators in retirement timing decisions.

The main conclusion drawn from model 2 is that health status has a negative effect on retiring early instead of on-time. This means that individuals whit health or mobility problems are less likely to retire early instead of on-time as individuals with no health or mobility problems.

Table 5. Model 2: Health model (Pathway B)

Base On-time	Early Retirement			late retirement		
	RRR	SR	P>|z|	RRR	SR	P>|z|
Gender (female)	0.56***	0.06	0.000	0.64**	0.12	0.020
Living with partner (yes)	0.66***	0.08	0.001	1.54**	0.32	0.036
Low education (ref)						
Middle education	1.37**	0.18	0.016	1.07	0.25	0.765
High education	1.94 ***	0.26	0.000	0.79	0.19	0.342
Time since retired	1.1 ***	0.02	0.000			
Chronic Dis (yes)	0.73*	0.13	0.084	0.88	0.18	0.526
Mobility limit (yes)	0.34***	0.07	0.000	1.19	0.29	0.416
Chronic # time since retirement (yes)	1.02	0.02	0.502			
Mobility limit # time since retirement (yes)	1.02	0.02	0.489	1.50	0.63	0.331

** Significant level of 90 % (P<0.1) ** Significant level of 95 % (P<0.05) *** significant level of 99 % (p<0.01)*

Source SHARE wave 5, 2013

4.2.3 Wealth model

Table 6 shows the results of the baseline model and included wealth indicators. In model 2, the baseline indicators responded minimally to the addition of the health indicators. Model 3 shows that the basic model reacts strongly to the addition of the wealth indicators. In models 1 and 2, the impact of education was highly significant, and in model 3, it is no longer significant at all. This means that all the effect of SES is mediated by wealth, i.e. channelled through pathway C. Previous studies have already shown that education status and income are closely related. This explains the effect of the wealth indicators on the significance of education status. Also, the impact of gender and living with a partner became less significant. This means that wealth indicators are correlating with gender and living with a partner.

The variable total household wealth is positive and significant (P<0.01) for retiring early instead of on-time. When the total household wealth increases, it becomes 1.14 times more likely to retire early instead of on-time. The total household wealth has no significant influence in retiring late instead of on-time.

The variable that indicates if respondents receive pension income from the first pillar is positive and significant (P<0.01) for retiring early instead of on-time, although the effects are small. Whether an individual receives pension income from the first has no significant effect on retiring late instead of on-time. The variable that indicates if respondents receive pension income from the second pillar is positive and significant (P<0.01) for retiring early instead of on-time. When individuals receive second pillar pension income, they are 1.92 times more likely to retire early instead of on-time than individuals who do not receive pension income from the second pillar. Although both receiving pension income from the first and second pillar is significant, the second pillar's impact is more substantial. This can be explained by the fact that almost everyone in the Netherlands receives a pension from the first pillar. Pension income from pillar 3 has no significant effect on retirement timing.

Being a homeowner has a positive and significant effect on retiring early instead of on-time (P<0.01). Individuals who are homeowners are 1.83 times more likely to retire early instead of on-time than non-homeowners. It is worth noting that respondents with missing values are more likely to retire early instead of on-time than individuals who are no home-owners. After identifying the respondent with missing values it can be concluded that almost all of them are living together with a partner, so it is possible that the partner may be the official homeowner of their house.

Table 6. Model 3: Wealth model (Pathway B)

Base On-time	Early Retirement			late retirement		
	RRR	SR	P>|z|	RRR	SR	P>|z|
Gender (female)	0.59**	0.07	0.000	0.59**	0.12	0.010
Living with partner (yes)	0.93	0.15	0.661	1.62*	0.41	0.060
Low education (ref)						
Middle education	1.12	0.16	0.436	1.02	0.24	0.916
High education	1.21	0.18	0.224	0.76	0.21	0.304
Missing	0.60	0.20	0.122	0.78	0.43	0.656
Time since retired	1.12***	0.01	0.000	0.99	0.02	0.865
Household total wealth	1.14***	0.03	0.000	1.01	0.05	0.771
Home-owner no (ref)						
Yes	1.83***	0.27	0.000	1.16	0.28	0.525
Missing	1.39**	0.23	0.047	0.99	0.03	0.978
P1	0.07***	0.02	0.000	1.41	0.88	0.586
P2	1.92***	0.26	0.000	0.78	0.16	0.230
P3	1.31	0.43	0.399	0.53	0.40	0.407

** Significant level of 90 % (P<0.1) ** Significant level of 95 % (P<0.05) *** significant level of 99 % (p<0.01)*

Source SHARE wave 5, 2013

4.3 LR tests for model fit

To find out which of the four estimated models explains retirement timing the best and which variables contribute strongest, different LR tests are conducted. See table 7 for an overview of pseudo R2. Adding health indicators in model 2 increases the model fit. This means that the health indicators fit the data significantly better than the baseline model. Adding wealth indicators in model 3 increases the model fit. This means that the model with wealth indicators (Model 3) fits the data significantly better than the baseline model (Model 1) and the wealth model (model 2). After this first step can be concluded that both the health indicators in model 2 and the wealth indicator in model 3 fit the data significantly better

than the baseline model, this means that the chosen indicators in this research are contributing to our model. To answer the question which indicators are more important in explaining retirement timing, the pseudo R2 of model 2 and 3 are compared. Model 2 (health model) fits the data significantly, not better than model 3 (Wealth model). This means that the wealth model fits the data better than the wealth model. The wealth indicators contribute more to the explanation of retirement decisions than health indicators. However, in the end, a LR test shows that the complex model (model 4) with both the health and wealth indicators fits the data better than the model 3. This means that both wealth and health indicators contribute to the explanation of retirement timing. However, when comparing the health and wealth model, the wealth model fits the data significantly better on a confidence level of 99.9 percent ($P<0.01$). When wealth is controlled (model 3) the coefficients of SES are affected, this means that mediation only happens through wealth (model 3) and not trough health (model 4).

Table 7. Comparison of the different models

Likelihood-ratio test	Pseudo R2	Prob > chi2
Model 1 (baseline model)	0.0811	0.000
Model 2 (Health model)	0.0901	0.000
Model 3 (wealth model)	0.0934	0.000
Model 4 (health and wealth)	0.0975	0.000

Source SHARE wave 5, 2013

5 Conclusion and discussion

5.1 Conclusion

To answer the research question: "*How does health and wealth explain educational differences in retirement timing?*" multiple multinomial logistic regression models were conducted. There was already scientific evidence for all of the tested hypothesis. The first hypothesis (Pathway B) is that SES has a direct influence on retirement timing. This means that individuals with high SES are more likely to reitre late since they are more satisfied with their job and are often able to work longer since they do not have physical jobs. The second hypothesis (pathway B) is that healthier individuals are more likely to retire on-time or late instead of early since they are healthy enough to work longer. Individuals with poor health are unable to work longer and are therefore more likely to retire early instead of on-time or on-time instead of late. The third hypothesis (pathway C) tested in this research is that more wealth leads

to more likeliness of retiring early since individuals have enough financial resources to make early retirement possible. This means that an increase in wealth status makes it more likely to retire early instead of on-time and less likely to retire late instead of on-time. All of these hypothesis find scientific support based on previously conducted studies. This study also provides evidence for the three hypotheses. This research found that individuals with chronic diseases and mobility limitations are less likely to retire early instead of on-time than individuals without chronic diseases and mobility limitations. This means that bad health-status makes it less likely to retire early. This research expected that individuals with bad health-status would retire more often early instead of on-time. However, good health status makes it more likely to retire on-time instead of early. This result does not provides evidence for the second hypothesis. However this research found support for the third hypothesis. Wealth-status influences retirement timing. When wealth-status increases, individuals are more likely to retire early instead of on time. The impact of the wealth indicators is higher on the impact of the health indicators. Therefore we can conclude that wealth-status plays a more significant role in retirement timing than health-status. Health- and wealth-status are both influenced by SES and therefore correlated and influencing each other. However, in the end, the most critical question is: Am I financially able to retire? and not: Am I healthy enough to retire? The impact of financial resources is the most important indicator. However, this does not mean that health-status does not matter. Health and wealth are connected since they both rely on SES.

This research also found that gender, education-status, and time since retirement are indicators that explain retirement timing. Especially the impact of education provides evidence for the first hypothesis that SES has direct influence on retirement timing. However, once wealth is controlled in the model, education does not have an effect anymore. Females are more likely to retire on-time instead of early or late than males. Individuals with high or middle education status instead of low education status are more likely to retire early instead of on-time. However, education status is highly correlated with wealth indicators. This means that wealth-status and education status influence each other. This is confirmed by multiple other studies about the impact of SES. Individuals with lower education are suffering a triple burden. Since education and health are related, individuals with lower education are often less healthy. This means that those individuals have shorter life expectancy at the official age of retirement. Lower educated individuals have for this reason less healthy life expectancy and general life expectancy at the time of retirement even if they would retire at the same time as high educated individuals. Individuals with low education cannot compensate for the lost years of health and life expectancy by retiring early since they are finically not able to retire early, unlike individuals who have the financial means to do so. So in the end the low educated individuals are affected most by increases in the eligibility retirement age, more than individuals who are middle or high educated.

5.2 Limitations

It is worth mentioning that the effect of health-status is relatively weak. Better results would be conducted when information about the health status at the time of retiring would be available. While the role of education, gender, and wealth is relatively stable, health is not. Health-status is changing over time, especially when individuals are aging. For this reason, the indicator time since retirement was conducted, so the role of time since retirement could be interacted with the health indicators. However, this affected the significant effect of the health indicators and has therefore no contribution to the explanation of the health indicators. Another way to control health is to restrict the study to individuals who retired in the last two or five years. However, the sample was too small to do so. A bigger sample would make it possible to restrict the study to individuals who retired in the past two years, so the health indicators would be more representative of the influence it has on retirement timing.

Another point of discussion is the formula that calculated retirement age. The retirement age in this study is based on the respondents' retirement year since only a few respondents gave up their retirement month. More precise results would be conducted when the retirement month would be available for all respondents. When all respondents for missing values for the retirement month would be dropped out of the sample, the research would have many missing values.

Although, the SHARE data set provides much detailed information about health- and wealth-status; it also has its limitation. A bigger dataset should have allowed restricting the sample with individuals who retired in the past two years and gave up information on their retirement month. This would have led to more precise results and a more reliable indication of health indicators.

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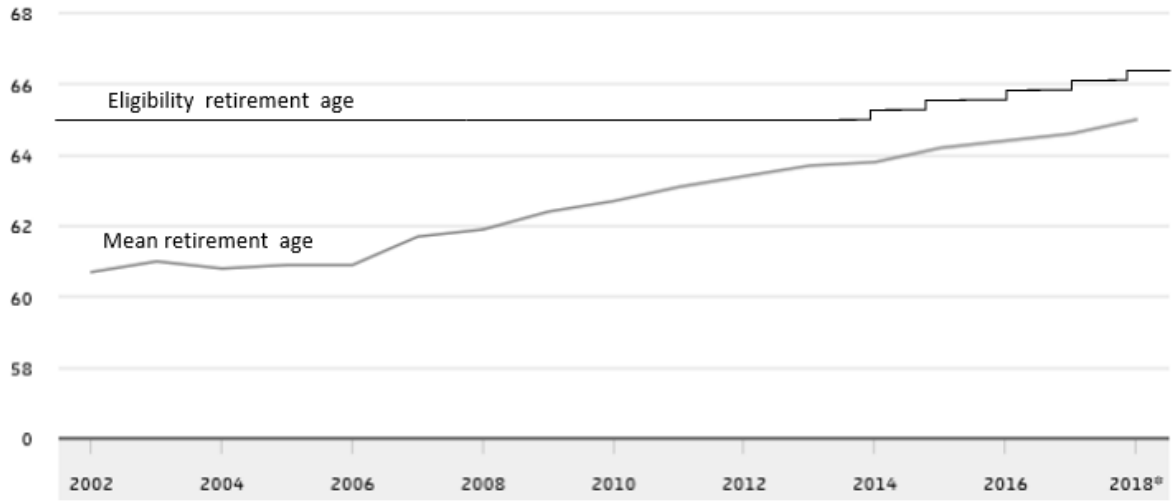
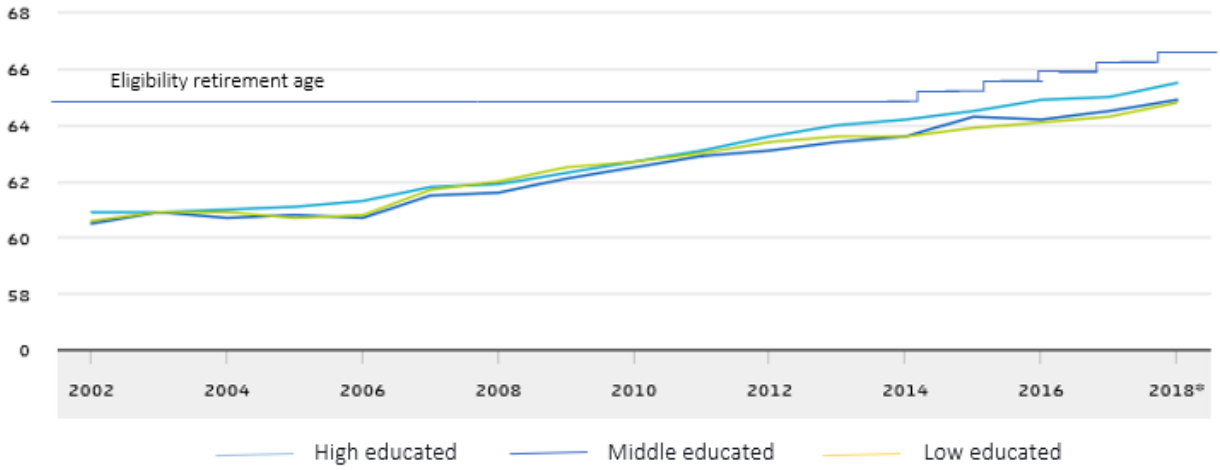
Appendix

- Figure 1



Graph 1: Source CBS, 2018. Mean retirement age compared with on-time retirement in the Netherlands

- Figure 2



Graph 2: Source CBS, 2018: education and retirement age in the Netherlands

- Figure 3

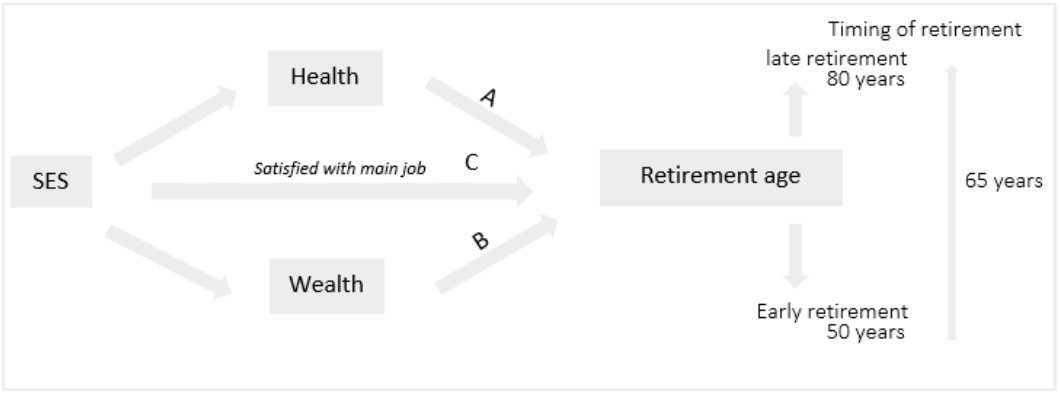


Figure 1: Simple version conceptual model

- Figure 4

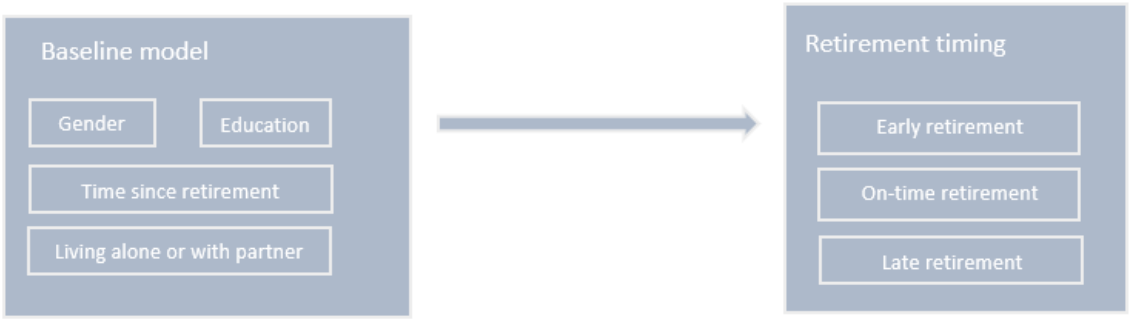


Figure 2| Model 1: baseline model

Figure 5

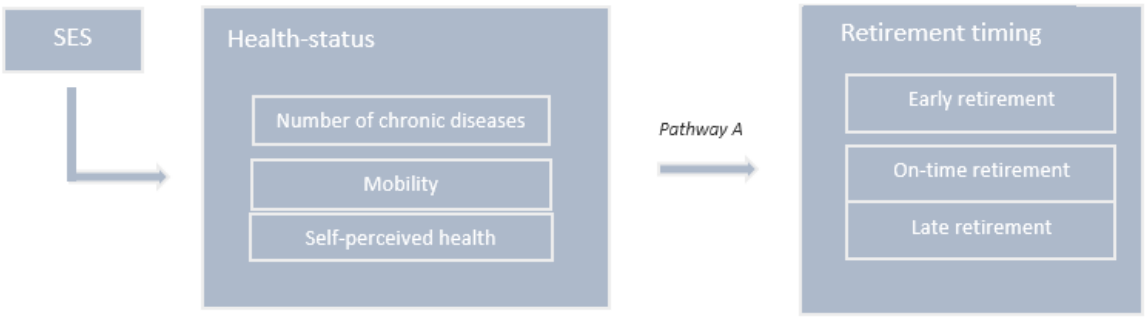


Figure 3: Model 2: Health model including pathway A

- Figure 6

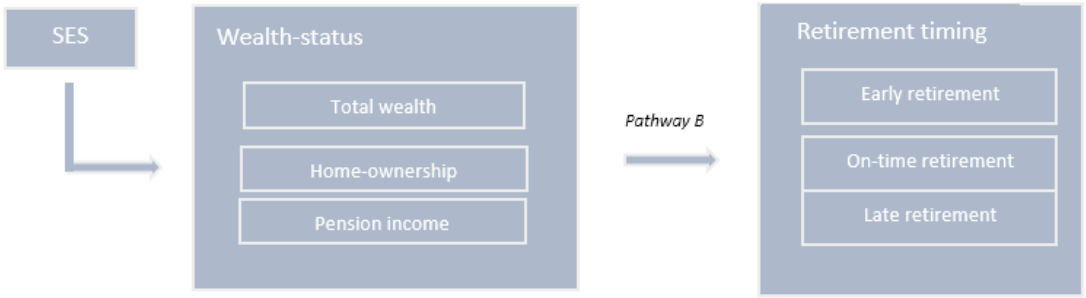


Figure 10: Model 2: Wealth model including pathway B

- Figure 7

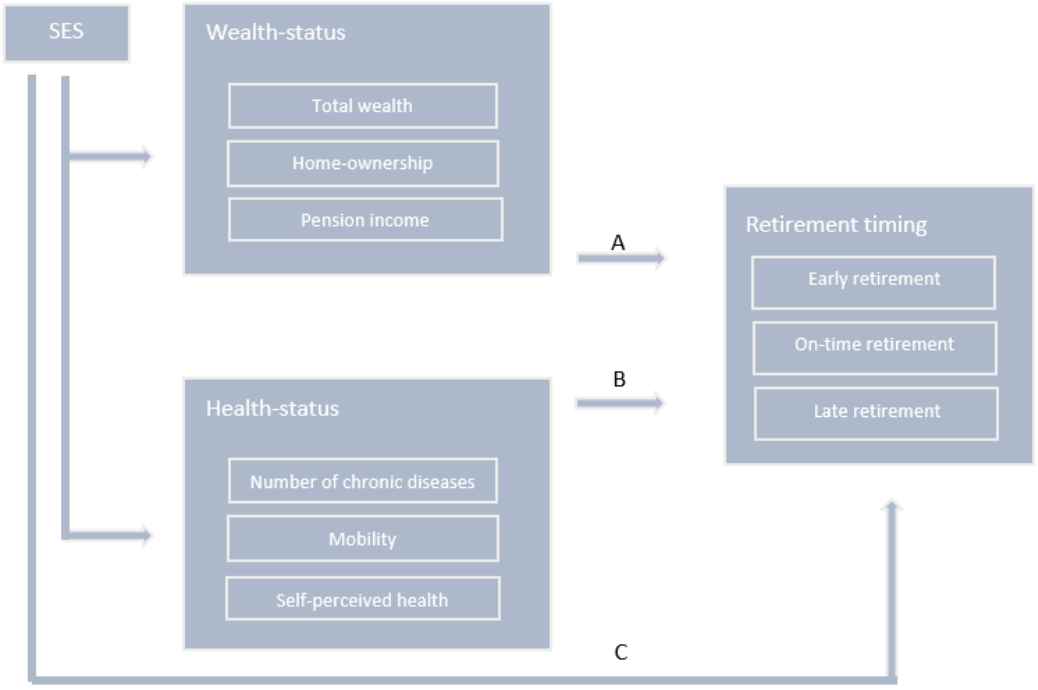


Figure 5: Model 4: Complex model including pathway A and B

- Figure 8

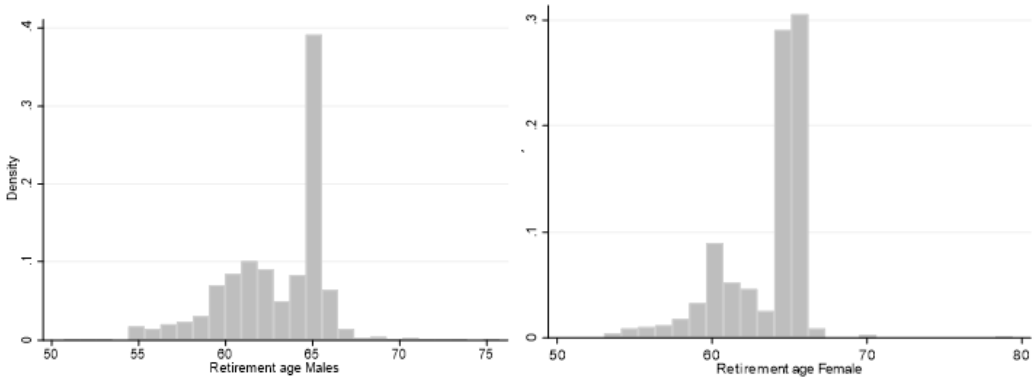


figure 6a and 6b: Retirement age: Source: SHARE, wave 5, 2013

- Table 2

Table 2. Descriptive variables

	Mean (continuous) or Relative frequency (categorical)	*(std. dev.)*
Retirement age (50 – 79)	62.63	3.41
Time since retirement (years)(0 - 27)	9.29	7.03
Retirement timing (%)		
Early retirement	0.49	0.50
One-time retirement	0.43	0.49
Late retirement	0.07	0.26
Age (52 – 77)	72.27	2.30
Gender (female)	0.44	0.49
Partnership status (yes)	0.75	0.43
Education (%)		
Low	0.48	0.49
Middle	0.22	0.42
High	0.36	0.44
Household wealth (0 – 1666217.42)	35755.59	30421
Homeowner		
Yes	0.44	0.49
No	0.25	0.43
Missing	0.31	0.46
Pension system		
First pillar (yes)	0.86	0.34
Second pillar (yes)	0.72	0.45
Third pillar (yes)	0.03	0.18

Mobility limitations (yes)	0.22	0.41
Chronic disease	1.16	1.19

Table 2: Descriptive statistics: Source: SHARE, wave 5, 2012/2013

- Table 3

Table 3. Retirement timing and gender

	Early	One-time	late
Total	49.68	42.68	7.45
Females	39.11	53.11	7.78
Males	58.05	34.75	7.20

Table 3: Source SHARE 2013: Retirement timing and gender

- Table 4

Table 4. Model 1: Baseline model

Base On-time	Early Retirement			late retirement		
	RRR	SR	P>|z|	RRR	SR	P>|z|
Gender (female)	0.52***	0.08	0.000	0.65**	0.12	0.021
Living with partner (yes)	0.62 ***	0.05	0.000	1.53**	0.31	0.036
Low education (ref)						
Middle education	1.38**	0.18	0.011	1.06	0.24	0.803
High education	2.02 ***	0.26	0.000	0.78	0.19	0.321
Time since retired	1.09	0.01	0.000	0.99	0.02	0.758

- ** Significant level of 90 % (P<0.1) ** Significant level of 95 % (P<0.05) *** significant level of 99 % (p<0.01)*
- *Source SHARE wave 5, 2013*

- Table 5

Table 5. Model 2: Health model (Pathway B)

Base On-time	Early Retirement			late retirement		
	RRR	SR	P>|z|	RRR	SR	P>|z|
Gender (female)	0.56***	0.06	0.000	0.64**	0.12	0.020
Living with partner (yes)	0.66***	0.08	0.001	1.54**	0.32	0.036
Low education (ref)						
Middle education	1.37**	0.18	0.016	1.07	0.25	0.765
High education	1.94 ***	0.26	0.000	0.79	0.19	0.342
Time since retired	1.1 ***	0.02	0.000			
Chronic Dis (yes)	0.73*	0.13	0.084	0.88	0.18	0.526
Mobility limit (yes)	0.34***	0.07	0.000	1.19	0.29	0.416
Chronic # time since retirement (yes)	1.02	0.02	0.502			
Mobility limit # time since retirement (yes)	1.02	0.02	0.489	1.50	0.63	0.331

- Table 6

Table 6. Model 3: Wealth model (Pathway B)

Base On-time	Early Retirement			late retirement		
	RRR	SR	P>|z|	RRR	SR	P>|z|
Gender (female)	0.59**	0.07	0.000	0.59**	0.12	0.010
Living with partner (yes)	0.93	0.15	0.661	1.62*	0.41	0.060
Low education (ref)						
Middle education	1.12	0.16	0.436	1.02	0.24	0.916
High education	1.21	0.18	0.224	0.76	0.21	0.304
Missing	0.60	0.20	0.122	0.78	0.43	0.656
Time since retired	1.12***	0.01	0.000	0.99	0.02	0.865
Household total wealth	1.14***	0.03	0.000	1.01	0.05	0.771
Home-owner no (ref)						
Yes	1.83***	0.27	0.000	1.16	0.28	0.525

Missing	1.39**	0.23	0.047	0.99	0.03	0.978
P1	0.07***	0.02	0.000	1.41	0.88	0.586
P2	1.92***	0.26	0.000	0.78	0.16	0.230
P3	1.31	0.43	0.399	0.53	0.40	0.407

- ** Significant level of 90 % (P<0.1) ** Significant level of 95 % (P<0.05) *** significant level of 99 % (p<0.01)*
- *Source SHARE wave 5, 2013*

- Table 7

Table 7. Comparison of the different models

Likelihood-ratio test	Pseudo R2	Prob > chi2
Model 1 (baseline model)	0.0811	0.000
Model 2 (Health model)	0.0901	0.000
Model 3 (wealth model)	0.0934	0.000
Model 4 (health and wealth)	0.0975	0.000

Source SHARE wave 5, 2013