

# Thesis Health Science

Which factors can explain actual usage of WMO services?

Name: M. Kleisen

Student number: 1540793

Email: [m.kleisen@student.utwente.nl](mailto:m.kleisen@student.utwente.nl)

First Supervisor: P.M. Carrera

Second Supervisor: S. Donnelly

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## Summary

With the passage of the Social Support Law (*Wet Maatschappelijke Ondersteuning, WMO*), since 2015 Dutch municipalities have assumed more responsibilities for providing social (support) services which was previously the remit of the national government. To carry out these responsibilities, municipalities receive money from the national government. The national government distributes the budget that is available for all municipalities in the Netherlands by using a distribution model. However, research shows that the expected use of WMO services based on this distribution model only explain 52% of the actual use of WMO services. The main research question of this paper was: "How can we explain the actual usage of WMO service in the Netherlands?". To answer this question, the usage of WMO services for each municipality in the Netherlands was investigated. This data shows that the percentage of citizens that use WMO services in a municipality differs from 1,28% to 10,02%. A literature research was conducted to find new factors that could contribute to the WMO services usage. Three main factors have been investigated in this research, namely, loneliness, BMI and wealth. The effect of these factors was tested by conducting a linear hierarchical regression. In this regression, the factors that were included in the distribution model of the government were used for the basic model. Data for WMO services use which was available for 212 municipalities of the in total 390 municipalities in the Netherlands were analyzed. Results showed that the following factors, which were found in the literature research, significantly contribute to the actual usage of WMO services: citizens with obesity, citizens that experience social loneliness and people having difficulties with meeting ends. These factors, together with the factors of the basic model, explain 55,7% of the actual WMO services use in the Netherlands.

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# Chapter 1: Introduction

## 1.1 Introduction

Since 2015 local governments in the Netherlands are responsible for more tasks within the social domain following the passage of the Social Support Law 2015 (Wet Maatschappelijke Ondersteuning (WMO) 2015) [1]. The WMO 2015 is meant for citizens who cannot (sufficiently) take care of themselves or participate in society with help from others. For these citizens help from the government is organized, so they can keep participating in the society. [2] Municipalities must arrange support for the citizens in such a way that they can stay in their own living environment, if possible. This social support needs to be of sufficient quality, and it needs to be continuous.

According to the law the municipality needs to take care of several aspects in their policy plans. First, there needs to be social coherence, which refers to accessibility of services; promoting services and spaces for people with disabilities; increasing safety and quality of life in the municipality and preventing and combating domestic violence. Secondly, the municipality should enable informal caregivers and volunteers to keep performing their tasks. Thirdly, the municipality must determine at an early stage whether citizens need social support; however, they must also ensure that citizens are not dependent on social support. Fourth, the municipality must offer tailor-made facilities to support the self-reliance and participation of the citizen, in which the personal strength of the citizen and his environment is considered. Finally, municipalities must implement the agreements made by the New York Convention on the Rights of Persons with Disabilities. [2]

The support that is arranged by the WMO 2015 is very broad. Citizens can get help to clean their house and make it livable, they can also get tools to help them move in and around their home. Furthermore, the municipality can help them to arrange practical matters, for example help with finances and the municipality helps citizens with social contacts and structure in their daily lives. Lastly, travelling within the municipality and the region is also arranged by the WMO 2015 [3].

The municipalities receive some money from the national government, so they can carry out their responsibilities. The national government had a budget of €6,8 billion for the WMO 2015 and the youth law in 2019 [4]. This money needs to be distributed among 355 municipalities in the Netherlands [5]. The government uses a distribution model to divide the WMO money. The model takes into account several aspects, namely: the total amount of citizens, the amount of citizens that is older than 65, the amount of one person households, the amount of citizens receiving payment from the government, the amount of citizens receiving a Wajong payment<sup>1</sup>, the amount of households with a low income, the amount of people that use medicines for a long term, the local client potential, the amount of >500 addresses that are close together and the urbanity of a city. All these aspects have an amount per unit. For example, for each citizen of a given municipality, the municipality gets 9,75 euro. [6]

This results in the following average amount per citizen per non-administrative region, as shown in figure 1. In this figure it is shown that the average amount for citizens that is available for social support is 500 euro. In the non-administrative region 'Noord-Friesland' the amount per citizen is the highest, namely 651 euro. Whereas in the non-administrative region 'Zuid west-Gelderland' the amount per citizen is the lowest, with 320 euro. [7]

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<sup>1</sup> Wajong is a payment from the government for people starting from the age of 18. These people have a handicap or illness before the age of 18 or during their studies, which prevents them from working without supervision, or prevents them from working at all. [8]

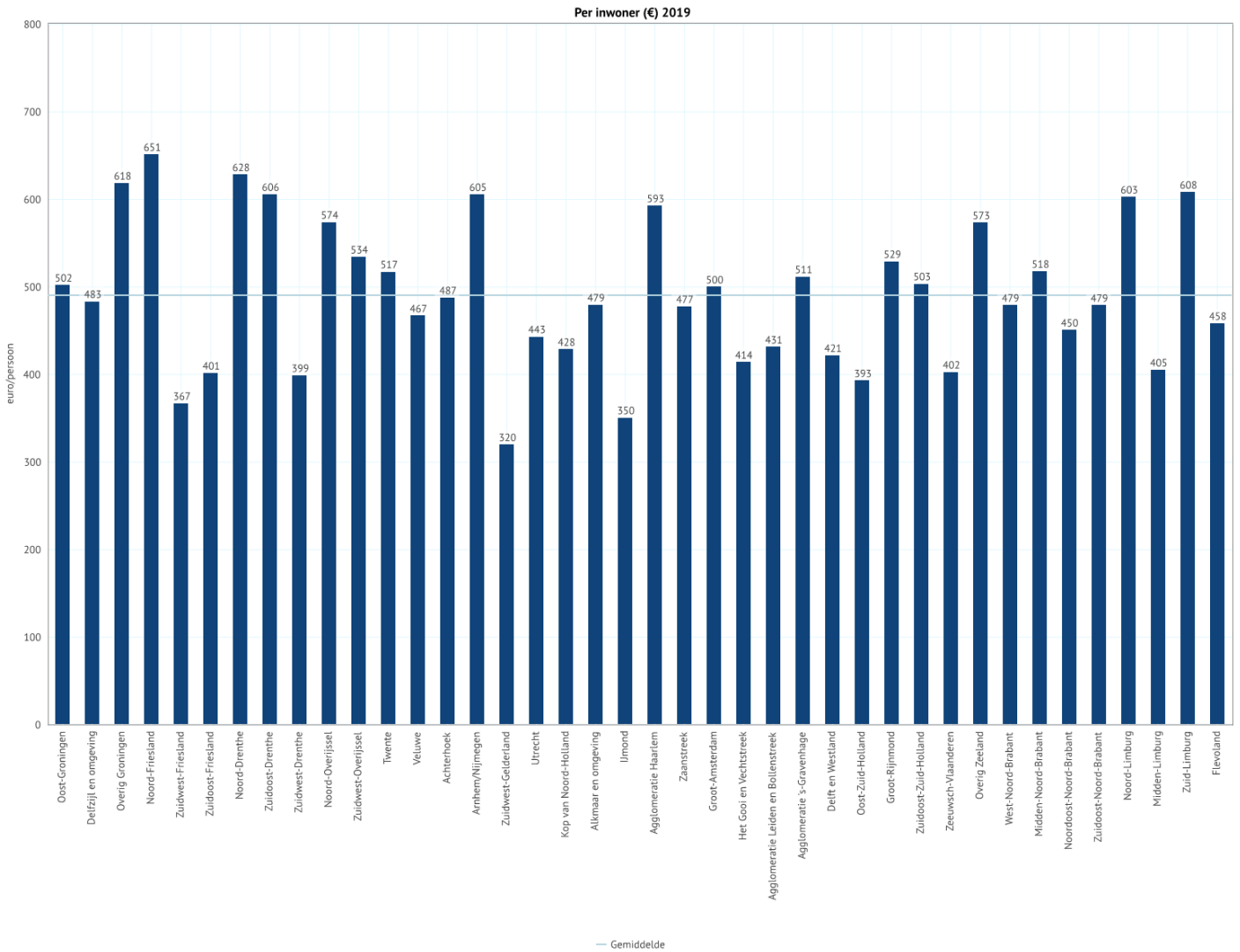


Figure 1: The average amount per citizen available for social support, per non administrative region [7]

The municipality is bound to the rules that are laid down in the WMO 2015, however they can organize the access to help and care themselves. Therefore, the access and implementation of help and care can differ per municipality. Municipalities use general facilities and customized facilities to support citizens. General facilities are freely available, collective and as much as possible temporary and arranged by professional parties. Examples are daycare or support from social worker. Customized facilities are individual customized services where you get support from a professional. The citizens can only get this support after an indication and the services are performed by organizations that are contracted by the municipality. Examples are help in the household or receiving a mobility scooter. [9]

## 1.2 The problem

As described above, municipalities get money from the government, based on a distribution model, to carry out their responsibilities. This model mostly looks at the social and demographic risk profile of a municipality. Based on these risk profiles the expected use of WMO 2015 services is calculated. However, the expected use differs from the actual usage of citizens of WMO 2015 facilities. Research have been done in explaining the actual use of WMO services. Most research that is done so far is at a non-administrative regional level, by comparing these non-administrative regions [10].

Knowledge- and network organization 'Platform 31' has found some other factors that can explain the actual use of the WMO 2015 services. In a qualitative research among several municipalities, new factors that could explain the usage of WMO services were suggested. These factors cover the cultural, economic, institutional and physical contexts. Cultural factors in this research are linked to the mentality of the citizens, such as the percentage of citizens that profess faith and the percentage of citizens that is content with life. Economic factors are linked to the economic growth or stagnation, such as the percentage of citizens that is working and the percentage of citizens that is pleased with their economic position. Institutional factors are linked to the functioning of institutions and organizations, such as the percentage of citizens working in a care organization and the share of general practitioners in group practices. The physical factors are linked to the shrinkage and urbanization of municipalities, such as the population density. [10]

Further research is done into these factors by the Social and Cultural Planning agency. The Social and Cultural Plan agency (SCP) concluded that these factors could only explain a relative extra 4% of the actual use of WMO 2015 services, at the non-administrative regional level. With the basic model and these factors, 48% of causes that influence usage of services remain unexplained. This means that in this model the factors that contribute to the usage of the WMO are still missing. So, further research into explanations of usage of WMO services is necessary. [10]

## 1.3 Relevance of the study

If factors that contribute to the usage of WMO service are found, the distribution model could be improved. This could help to get the money where it is needed the most and make health care services from the WMO 2015 more equitable distributed for each municipality. Furthermore, factors that influence the causes of utilization differences can be tackled. This can be done by focusing on these factors when making policies or arrangements.

This study will also be built forward on the studies from Platform 31 and the SCP and tries to find (new) factors that could explain the actual usage of WMO services, that were not found in the qualitative study of Platform 31 among municipalities [10]. Whereas previous research mostly focusses on comparing different non-administrative regions, this research will focus on explaining the actual usage at a national level. By doing this it is possible to test multiple factors in the analysis. More municipalities are needed to do a multiple linear regression that has generalizable outcomes. Furthermore, the effects of the factors could be described best when testing these on a larger population (municipalities).

#### 1.4 Research questions

The main question of this research is: How can we explain the actual usage of WMO service in the Netherlands?

To answer this main question, the following sub questions will also be answered:

- What could be factors that could explain the usage of WMO services in a municipality according to literature?
- What is the use of WMO services for each municipality in the Netherlands?
- Do the factors, found in the literature, explain the actual usage of WMO services in the Netherlands?
- Based on the results of the analysis of the contribution of the factors, are there any recommendations for changing the distribution model from the WMO?

## Chapter 2: Theoretical framework

### 2.1 Factors that influence the use of WMO 2015 services

The WMO offers support to citizens who have physical, psychological or psychosocial limitations or problems. Furthermore, the WMO offer support to vulnerable citizens. Municipalities need to make sure that these citizens can still take care of their own household and have social contacts. [11] Therefore, it is expected that people who are less healthy and have less social contact or family are more likely to use the services of the WMO 2015. In figure 2 an overview is given of factors that have an influence on the health and social contact of citizens. In the figure, the literature that indicates the correlation between the factors is also shown. In this chapter more information about this literature will be provided.

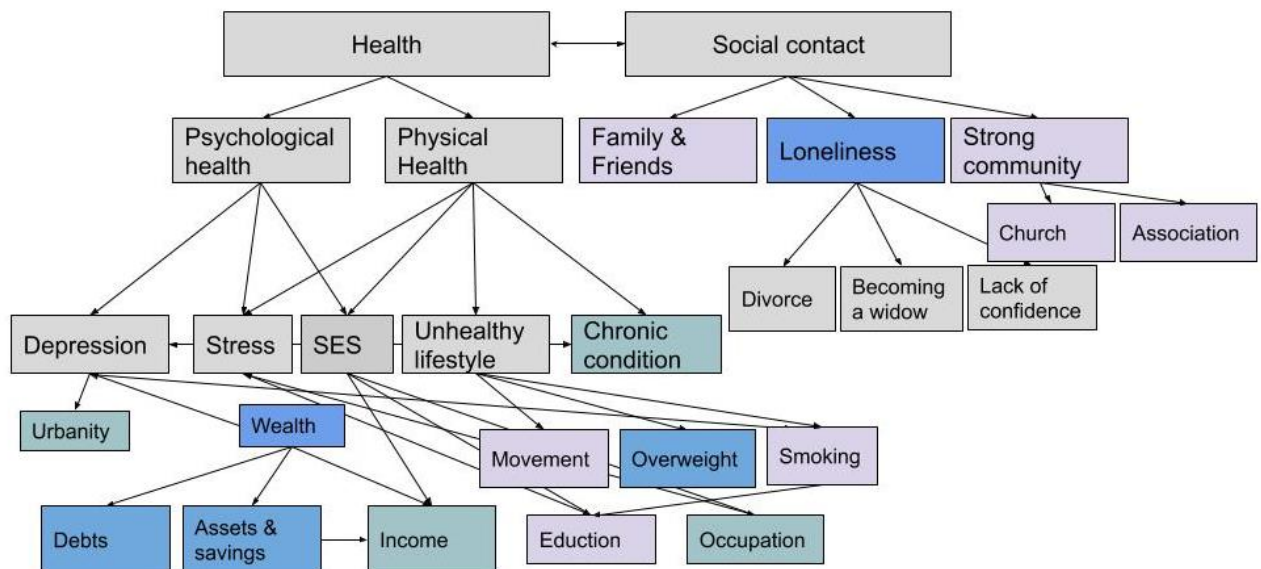


Figure 2: factors explaining utilization of WMO services  
[10];[11];[12];[13];[14];[15];[16];[17];[18];[19];[20];[21];[22];[23];[24]

#### The model

The model that is shown in figure 2 is simple, in the literature more factors will be provided that have an influence on the health and social contact of people. However, by showing more factors, the figure will also be harder to explain. Therefore, health is only explained by physical and psychological health. In the report about health and its determinants of the central government from the department of Public Health and Environment, the physical and psychological health are highlighted as well [19].

In figure 2 the factors have different colors. The purple colored factors were investigated by the SCP and Platform 31. The green colored factors are indicated in the distribution model of the government. The blue colored factors are not yet investigated. The grey colored factors are overlapping or could be explained by multiple factors that are investigated in different studies. In this chapter the purple and blue factors will be discussed.



#### Purple factors: previous research

As mentioned before the SCP investigated factors in the cultural, economic, institutional and physical context. Some of the factors they used are also indicated in figure 2. Such as factors that influence an unhealthy lifestyle. In the research of the SCP two factors that can influence an unhealthy lifestyle are considered, namely smoking and movement. For smoking they took the percentage of smokers and for movement they took the percentage of people who meet the norm for necessary movement each day (FITNORM). [10] They also looked at the number of citizens that feel healthy or have a physical limitation [10]. Movement has an influence on the health of an individual and the speed in which one gets physically older. If one does not move enough, this can lead to an energy crisis which increases the risk of getting sick or premature death. [17]

Next to the health of an individual, the amount of social contact a person is experiencing is also related to the utilization of WMO services. The amount of social contact depends on the presence of and contact with family and friends, the feeling of loneliness that is experienced by an individual and the strength of the community [11]. The presence of family and friends and the relation with the utilization of WMO services is researched by the SCP. They looked at daily contact with family and weekly contact with friends, for both factors they did not find a correlation with the utilization of WMO services. [10] The SCP also investigated the strength of the community. They defined this as people being involved in a (sport) association and/or people visiting a church. For daily or weekly contact at an association, no correlation was found with the utilization of WMO services. Just as the percentage of citizens practicing faith had no influence on the utilization of WMO services. [10]

The level of education is also considered in the report of the SCP [10]. The level of education, together with the income level and the occupation are considered as the Social Economic Status (SES) of a person. This SES will be elaborated upon under the blue factors part of this chapter.

#### Blue factors: new factors

##### *Wealth & Income:*

An article of Schneiderman et al. (2005) indicates the relation of stress on both psychological and physical health. Stress is caused by stressors, and if these stressors are present for a longer period, they can have long-term effects on the health of an individual. The effect the stressor has on the health of an individual depends on several other factors, which are not shown in figure 2, such as learned patterns of coping, the number of stressors and someone's biological vulnerability. [20]

A stressor that can cause stress is the wealth of an individual. Wealth consists of the debts, assets and savings and the income of a person [21]. Various articles have described the relationship between debts and health. It can lead to psychological distress and poor mental and physical health. In the research of Clayton et al. (2015) across 17 European countries, it was found that long-term aggregate household debts have a negative effect on health outcomes [22].

Assets are different than income, income is a flow of resources that people receive for their labor, where assets are stocks of resources that people hold over time. Assets and savings can be used as sources of security against contingencies. So, when a person loses his job or when financial setbacks appear, assets and savings can make sure that financial problems do not occur directly. Assets can also raise the income of an individual indirectly, for example if someone owns a car. This car has an influence on the job opportunities of an individual, which could increase the income. Furthermore, assets can also be used for dividends, interest and capital gains, which has a direct effect on the income. [23]

The income of an individual is linked to wealth, but also to the social economic status (SES) of a person. The SES is linked to the income, education and occupation of an individual [12]. A lower SES has

an influence on the health of the population [12]; [13]. It is known that people with a higher SES have a lower prevalence of chronic disease. Furthermore, a strong and consistent SES gradient is discovered for cardiovascular disease, diabetes, metabolic syndrome, arthritis, tuberculosis, chronic respiratory disease, gastrointestinal disease, and adverse birth outcomes as well as for accidental and violent deaths. Furthermore, there are complicated relations between SES and cancer. However, some questions raised about the relation between SES and health: influences SES the health status, or influences the health status the SES? The causal direction of the SES gradient can be both ways around. [24]

In European countries with a high income the percentage of people with psychological disorders, cancer and respiratory and sensory disorders is higher than for countries with a low and middle income. However, for the percentage of people with heart and vascular disease, this relation is the other way around. [19] It is known that people with a high income live around 14 years longer than people with a low income. When education is added to the comparison, the life expectancy difference increases to 17 years. [19]

The education level alone also has an influence on the health of an individual. The life expectancy of people with a high education level is 15 years higher than people with a low education level [41mk]. Occupation is linked to the education and income of a person. It is linked to the skills that are needed for a job and prestige that comes with a job. However, it is also linked to the dangerous substances, risks and stress that someone is experiencing in a job. [13]

In the distribution model of the government the amount of people with a low income are considered. However, as discussed above the wealth of a person consist out of more things than only income. Debts for example can have a big influence on the circumstance of a citizen. Therefore, this might be a better factor to predict usage of WMO services than only the income of a citizen.

### *Overweight*

As discussed before the SCP already considered smoking and movement as factors that influence an unhealthy lifestyle. However, here they missed an important factor that is related to an unhealthy lifestyle and has an influence on health: The Body Mass Index (BMI). A BMI above 25 is an indicator of overweight when the BMI is 30 or more it is indicated as obesity. A high BMI can influence the health status. Persons with a BMI over 25 have a higher chance of developing cardiovascular diseases, high blood pressure, diabetes, osteoarthritis and some cancers. [14]; [15]; [16] Because the BMI can influence the health of an individual, it might also be a factor that could predict the usage of WMO services.

### *Loneliness*

The feeling of loneliness that is experienced by an individual and the relationship with the utilization of WMO services is not investigated yet. Research shows that 8% of people over the age of 19, living in the Netherlands is feeling very lonely. It is estimated that 6% of the people over the age of 18 is living in a social isolation. [18] Being divorced, widow or having a lack of confidence can increase the chance of being very lonely or socially isolated [18]. If people are feeling lonely this could mean that they have less social contact or are less likely to seek social contact [18]. Therefore, the percentage of people who are feeling lonely in a municipality might be a better indicator to predict the usage of WMO services than the contact with family and friends or having a strong community.

## 2.2 Hypothesis

In the previous chapter, all factors that influence the health or social contacts of citizens are discussed. In this research the blue factors mentioned above will be investigated. For these factors, the following hypotheses are formulated:

Psychological health:

- a. The higher the net debt per citizens in a municipality, the higher the use of WMO 2015 facilities
- b. The higher the percentage of people who have difficulties with to make ends meet in a municipality, the higher the use of WMO 2015 facilities

Physical health:

- a. The higher the number of citizens with overweight in a municipality, the higher the use of the WMO 2015 facilities
- b. The higher the number of obese citizens in a municipality, the higher the use of WMO 2015 facilities

Social contact:

- a. The higher the number of citizens feeling social lonely in a municipality, the higher the use of the WMO 2015 facilities
- b. The higher the number of citizens feeling emotional lonely in a municipality, the higher the use of WMO 2015 facilities

## 2.3 Conceptualization and Operationalization

Some of the variables that are used in the hypotheses above need to be conceptualized, before the hypotheses can be tested. In the hypotheses which are linked to psychological health, the net debt per citizens in a municipality is used as a variable. The VNG (Vereniging Nederlandse Gemeenten) defines debts as follows: "Sum of private loans, other fixed debt, short-term debt and accrued liabilities minus long-term exposures, short-term receivables and exposures, cash (cash, bank, giro) and accrued assets (negative sign is not a debt)" [25].

In the hypotheses which are linked to physical health, the variable overweight and obesity are used as variables. These variables have a clear conceptualization, namely: overweight people have a BMI higher than 25 kg/m<sup>2</sup> and obese people have a BMI higher than 30 kg/m<sup>2</sup> [15]; [16].

Lastly, the hypotheses which are linked to social contact use variables that are linked to feeling lonely. In research of the RIVM on loneliness in the Netherlands, they conceptualized loneliness as followed: "Loneliness is defined as the experience of an unpleasant or intolerable lack of certain social relationships." There may be emotional loneliness or social loneliness. Emotional loneliness is conceptualized as followed: "A person can have many people around them, however there is a lack of close, emotional bond with these people." Social loneliness is conceptualized as followed: "people have less contact with others than they wish." [26]

## Chapter 3: Research Method

### 3.1 Research design

This study is a quantitative research in which several factors are tested to see if these factors can explain some of the actual use of WMO services. For this study data is used, that gives insight in the factors of the distribution model of the government, actual usage of WMO services, the feeling of loneliness of citizens in a municipality, the overweight and obesity percentage of citizens in a municipality, the net debts of citizens per municipality, the percentage of people who have difficulties meeting ends per municipality and the amount of vehicles in each municipality. The data that is used is retrospective and is available through statline, the RIVM and the national government.

### 3.2 Data collection

For this study different sources are used to collect the data. In table 1 an overview is given of the data that was needed. In this table the source of the data is also mentioned.

Table 1: Overview of required data

	<b>Factor (per municipality)</b>	<b>Source</b>
<b>Independent variable</b>	Citizens with support from the WMO	[27] Waarstaatjegemeente.nl
<b>Distribution model (basic model)</b>	Total citizens	[28] Rijksoverheid
	65+ year old citizens	[28] Rijksoverheid
	Percentage 1-person households	[28] Rijksoverheid
	Percentage of citizens that do not feel healthy	[26] Volksgezondheid.info
	total amount of citizens receiving government payment	[28] Rijksoverheid
	Low income households	[28] Rijksoverheid
	Local client potential	[28] Rijksoverheid
	>500 addresses close to each other	[28] Rijksoverheid
<b>BMI</b>	Percentage of overweight citizens	[29] Volksgezondheid.info
	Percentage of obese citizens	[29] Volksgezondheid.info
<b>Loneliness</b>	Percentage of severe lonely citizens	[26] Volksgezondheid.info
	Percentage of social lonely citizens	[26] Volksgezondheid.info
	Percentage of emotional lonely citizens	[26] Volksgezondheid.info
<b>Wealth</b>	Net debt per citizen	[30] Waarstaatjegemeente.nl
	Percentage of citizens having difficulties meeting ends each month	[26] Volksgezondheid.info

Not all the accessible data is gathered yearly. For example, research into the percentage of people that is feeling lonely comes from 2016. This also applies for the percentage of overweight and obese citizens per municipality. Therefore, the choice was made to gather all the data for the year 2016, because for this year data for all factors is available.

In table 1 a few factors are missing which are in the distribution model, namely: the Wajong receivers, the long-term medicine use and the urbanity [6]. The choice was made to leave out the Wajong receivers, because these numbers are already included in the total amount of citizens receiving government payment. The urbanity is related to the amount of >500 addresses which are close to each other. The factor of urbanity has a categorical scale and needs to be adjusted to a dichotomous number. Therefore, the choice was made to leave the urbanity scale out of the analysis. Lastly, there is the number of citizens that use medicines for a long term. This data was not available for 2016 and can therefore not be used in the analysis. However, there are numbers available about the percentage of citizens per municipality that do not feel healthy. This is somewhat related to long term medicine use, but more important it fits in the theoretical framework of this research. Therefore, the choice was made to use this percentage for the basic model in the analysis.

Furthermore, not for all municipalities in the Netherlands data is kept for the number of citizens that is using WMO services. It is seen that this data is missing for 170 municipalities in the Netherlands.

### 3.3 Data processing

The data is put in an excel file, which is imported in IBM SPSS Statistics version 24. All factors are either numbers or percentages. This makes the data suitable for a linear regression. The independent variable, the amount of WMO services use, is transformed into a percentage. This percentage was also needed to compare the results with the results of the SCP.

However, the missing data needed to be filtered out. The data for the independent variable needed to be available for municipalities, so the 170 municipalities with missing data are left out the data set. This means that there are 220 municipalities left. However, for the feeling of loneliness there are four more municipalities with missing data. This is caused because the islands that belong to the province of Friesland are one municipality in the data about loneliness instead of four different municipalities as in the other data. This means that 216 municipalities are left after filtering for these municipalities. Lastly, there is missing data about the net debt for 48 municipalities. However, from these 48 municipalities there are only 4 municipalities from which all the other data is available. This means that the total data set consisted of 212 municipalities.

### 3.4 Data analysis

First, the data that was gathered about the WMO services use per municipality is analyzed. The missing data is identified and shown on a map of the Netherlands. By doing this the missing data is visualized and it is possible to see if all the missing data is in the same province or region, or if the missing data is spread across the entire Netherlands. Furthermore, the data that is available is investigated as well. For this data the percentage of citizens that utilize WMO services is calculated. By doing this municipalities that have a high usage of WMO services and municipalities that have a low usage of WMO service are identified. These results are compared to the results (on a regional level) from the SCP [10].

To get the wanted answer to the third research question, the data is analyzed by using a hierarchical multiple linear regression. For this regression the number of citizens that receive support from the WMO was the independent variable. All the other factors are dependent variables. The factors from the distribution model of the government served as the basic model for this regression. This means that these factors are put in the hierarchical linear regression in the first block. Then the other dependent factors are put in the second block. This is done by doing three separate hierarchical linear regressions. The only difference in these regressions are the dependent variables that are put into the second block of the hierarchical linear regression. In the first regression the two factors that are related

to BMI are put into the second block. In the second regression the three factors that are related to loneliness are put in the second block. Lastly, in the third regression the factors that are related to wealth are put in the second block.

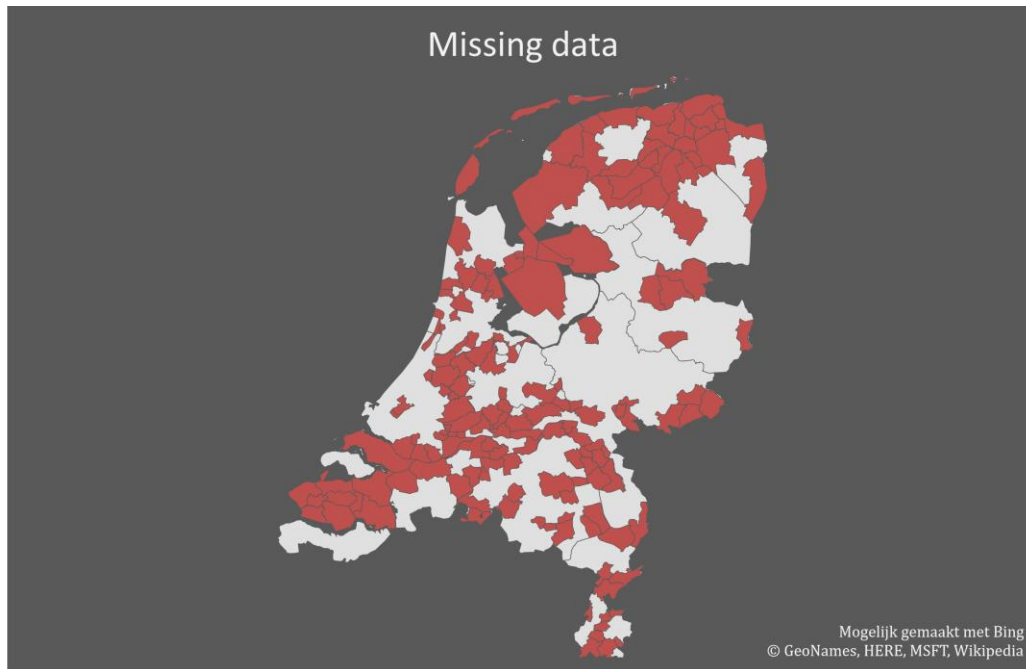
By analyzing the data by performing three separate hierarchical regressions the influence of each of the related factors can be studied best. If all these dependent factors were put in the same hierarchical linear regression, by using four blocks, the model would control for the factors from the previous block. In the literature the influence of BMI, loneliness and wealth is not established yet, so it is not known yet if controlling for these variables is justified.

For the analysis of the regression the R-square and the adjusted R-square is studied. The p-value for each dependent factor is described in the results section, because this says something about the generalizability of the results. If the p-value is <5% the results are generalizable for the whole population, namely all the municipalities in the Netherlands. If this is the case the dependent variable is discussed further.

## Chapter 4: Results

### 4.1 Missing data

As mentioned in the method section for some municipalities data is missing. In total 178 municipalities are missing data. This means that 45,6% of all municipalities, according to the division of 2016, are not investigated in this paper. Figure 3 shows municipalities with missing data. This figure shows that municipalities with missing data are mostly located in the province of Friesland and the province of Zeeland. Whereas the province of Overijssel and Gelderland barely have municipalities with missing data.

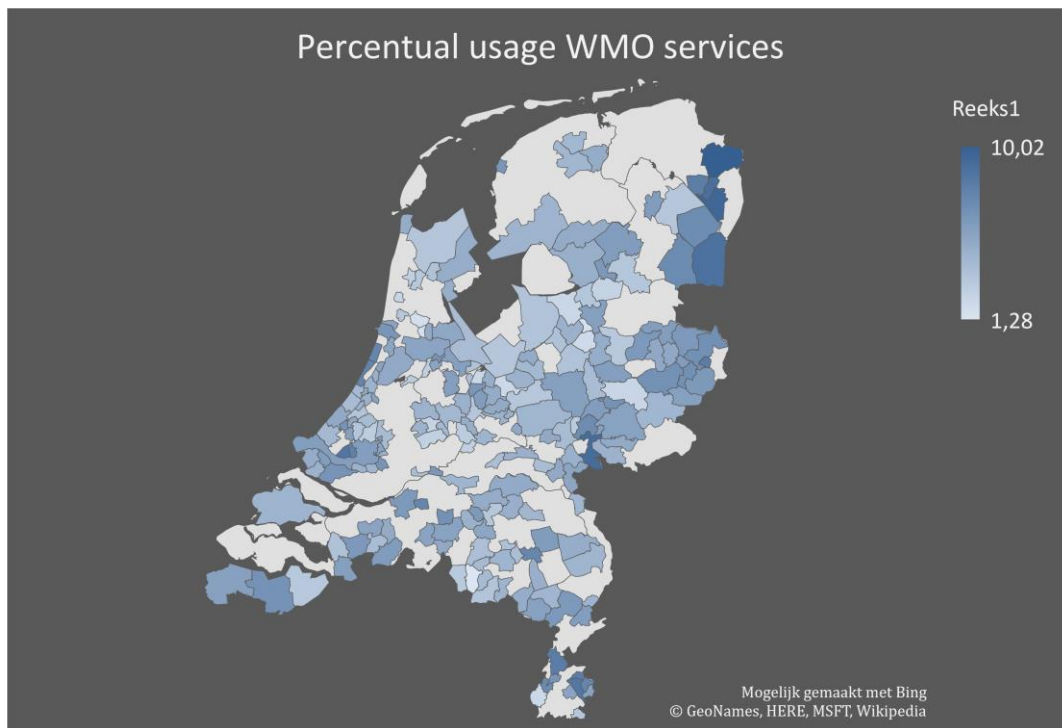


*Figure 3: Municipalities with missing data*

### 4.2 Usage of WMO services in the Netherlands

For all municipalities which have complete data, the usage of WMO services is calculated. Analysis shows that the lowest percentage of citizens that use WMO services is in Bladel, namely 1,28%. Whereas the highest percentage of usage is in Oldambt, namely 10,02%. The average percentage of usage for all 213 municipalities is 4,97%.

In figure 4 the usage of WMO services is shown in a map. The different colors in this map show the percentual usage. The darker the color, the higher the percentual usage of WMO services.



*Figure 4: percentual usage WMO services*

The SCP also made a map of usage per COROP-region<sup>2</sup>. In this map they made a distinction between very low, low, average, high and very high. Wherein very high are all percentages below 3,7. Low is the percentage between 3,7-4,2. Average is the percentage between 4,2 and 4,5. High the percentage between 4,5-5,4. And lastly very high are all percentages above 5,4. [7] The figure of the SCP is shown in figure 5.

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<sup>2</sup> The COROP regions are developed based on the nodal principle (a 'core' with a regional function), whereby commuter flows have served as the basis. In total there were 40 COROP regions in 2016.



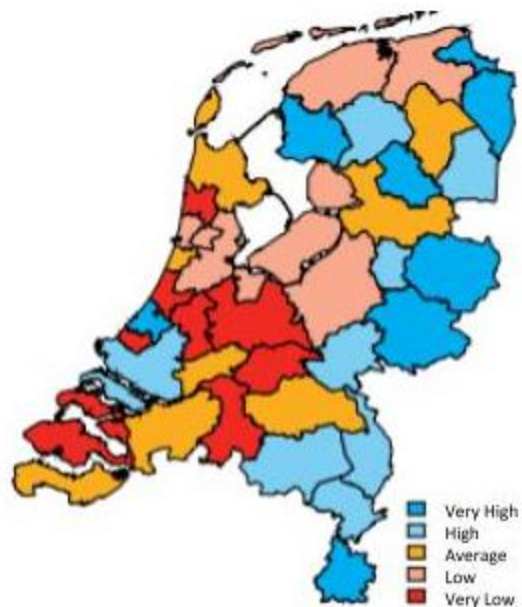


Figure 5: Use of WMO services in the Netherlands [7]

To compare their figure with the data that is used for this research, the data is adjusted according to the very low to very high distinction of the SCP. In figure 6 this is shown.

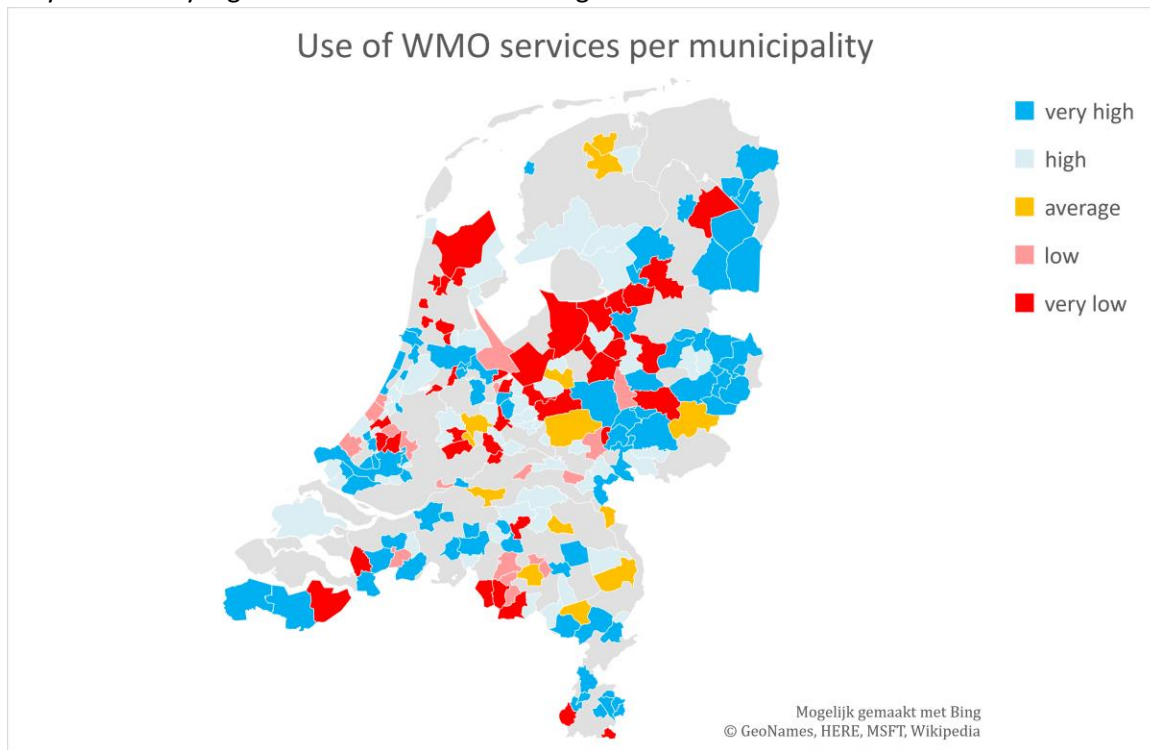


Figure 6: Use of WMO services in the Netherlands according to data from 2016

When comparing figure 5 and 6 the results are somewhat the same. In figure 6 the colors are shown per municipality, whereas figure 5 shows the average color of all municipalities in the same COROP region. When taking this into account, the most noticeable difference is seen in the bottom of Zeeland and in some regions in Brabant. In figure 6 the color blue is mostly shown, which means the usage in this area is very high, whereas figure 5 shows the color red for this areas, which means the usage in these areas is very low and the color yellow, which refers to an average usage.

#### 4.3 Results hierarchical linear regression

In total four regressions were executed. The first regression used all the variable of the basic model as input for block 1 and in block 2 the BMI variables were added. In table 2 the results of this regressions are shown.

Furthermore, the R and R square of the model were studied. The R value for model 1 was 0,347 and model 2 0,497. The R square for model 1 was 0,120 and for model 2 0,248. The adjusted R square for model 1 was 0,086 and for model 2 0,210.

Table 2: Hierarchical linear regression BMI

Model	B	Std. Error	Beta ( $\beta$ )	T	Sig (p)
WMO use	4,891	0,838		5,836	0,000*
Total amount of citizens	-3,812 E-5	0,000	-2,017	-1,519	0,130
One person households	1,338 E-5	0,000	0,192	0,308	0,759
65+ citizens	0,000	0,000	1,191	2,536	0,012*
Citizens receiving payment from the government	0,000	0,000	1,627	1,703	0,090
Citizens that do not feel healthy	-0,006	0,034	-0,012	-0,0175	0,861
Local client potential	-5,011 E-6	0,000	-0,300	-0,226	0,822
Low income households	-6,025 E-5	0,000	-0,563	-0,405	0,686
>500 addresses close to each other	-0,009	0,050	-0,012	-0,183	0,855
WMO use	-0,733	1,645		-0,445	0,656
Total amount of citizens	-3,856 E-5	0,000	0,929	1,534	0,108
One person households	6,485 E-5	0,000	1,324	2,975	0,127
65+ citizens	0,000	0,000	1,324	2,975	0,003*
Citizens receiving payment from the government	0,000	0,000	0,695	0,767	0,444
Citizens that do not feel healthy	0,014	0,031	0,028	0,444	0,657
Local client potential	3,367 E-6	0,000	0,201	0,159	0,874
Low income households	0,000	0,000	-0,945	-0,716	0,475
>500 addresses close to each other	-0,007	0,047	-0,009	-0,140	0,889
BMI overweight	0,062	0,040	0,183	1,570	0,118
BMI obese	0,141	0,065	0,241	2,170	0,031*

\*Significance level is under 5%

In table 2 all the outcomes per variable are shown. All variable that are significant are indicated by an \*. There are two variables that are significant, which are the 65+ citizens from the basic model and the percentage of citizens with obesity from the second model. Both variables have a positive beta.

In the second regression the variables for block 1 remained the same, namely the variables from the basic model. However, the variables in block 2 changed into the variables that belong to loneliness. The R value is the same as for the first regression and has a value of 0,347 for model 1. For model 2 it changes to 0,433 instead of 0,497. The R square has the value 0,120 for model 1 and 0,187 for model 2. The adjusted R square is 0,086 for model 1 and 0,143 for model 2. The R square and the adjusted R square are both lower than in the first regression. In table 3 the results per variable are shown. For the second regression the same outcomes for the basic model in block 1 are seen as in the first regression. For the variables that belong to loneliness it is seen that social loneliness is significant and has a positive beta. Furthermore, the amount of 65+ citizens is no longer significant in the second model of this regression.

Table 3: Hierarchical linear regression Loneliness

Model	B	Std. Error	Beta ( $\beta$ )	T	Sig (p)
WMO use	4,891	0,838		5,836	0,000*
Total amount of citizens	-3,812 E-5	0,000	-2,017	-1,519	0,130
One person households	1,338 E-5	0,000	0,192	0,308	0,759
65+ citizens	0,000	0,000	1,191	2,536	0,012*
Citizens receiving payment from the government	0,000	0,000	1,627	1,703	0,090
Citizens that do not feel healthy	-0,006	0,034	-0,012	-0,0175	0,861
Local client potential	-5,011 E-6	0,000	-0,300	-0,226	0,822
Low income households	-6,025 E-5	0,000	-0,563	-0,405	0,686
>500 addresses close to each other	-0,009	0,050	-0,012	-0,183	0,855
WMO use	-1,455	2,187		-0,665	0,507
Total amount of citizens	-1,513 E-5	0,000	-0,801	-0,584	0,560
One person households	-2,613 E-6	0,000	-0,037	-0,060	0,953
65+ citizens	0,000	0,000	0,730	1,488	0,138
Citizens receiving payment from the government	0,000	0,000	0,991	1,001	0,318
Citizens that do not feel healthy	-0,014	0,33	-0,028	-0,432	0,666
Local client potential	-1,494 E-5	0,000	-0,894	-0,668	0,505
Low income households	2,981 E-6	0,000	0,028	0,019	0,958
>500 addresses close to each other	-0,002	0,049	-0,003	-0,042	0,967
Extreme loneliness	-0,132	0,191	-0,174	-0,693	0,489
Social loneliness	0,131	0,060	0,295	2,178	0,031*
Emotional loneliness	0,077	0,110	0,177	0,702	0,483

\*Significance level is under 5%

The third regression has the variables that belong to wealth in block 2. The R for model 1 is 0,347 and for model 2 0,503 in this regression. The adjusted R square for model 1 is 0,120 and for model 2 0,254. The adjusted R square is 0,086 for model 1 and 0,217 for model 2. Both the R, R square and the adjusted R square have a higher value than in regression 1. In table 4 the values for each variable are shown. In the third regression the percentage of citizens who have difficulties meeting ends is significant. This regression shows that the amount of 65+ citizens in a municipality is no longer significant in the second block.

Table 4: Hierarchical linear regression Wealth

Model	B	Std. Error	Beta ( $\beta$ )	T	Sig (p)
WMO use	4,891	0,838		5,836	0,000*
Total amount of citizens	-3,812 E-5	0,000	-2,017	-1,519	0,130
One person households	1,338 E-5	0,000	0,192	0,308	0,759
65+ citizens	0,000	0,000	1,191	2,536	0,012*
Citizens receiving payment from the government	0,000	0,000	1,627	1,703	0,090
Citizens that do not feel healthy	-0,006	0,034	-0,012	-0,0175	0,861
Local client potential	-5,011 E-6	0,000	-0,300	-0,226	0,822
Low income households	-6,025 E-5	0,000	-0,563	-0,405	0,686
>500 addresses close to each other	-0,009	0,050	-0,012	-0,183	0,855
WMO use	1,310	0,996		1,315	0,190
Total amount of citizens	-1,262 E-5	0,000	-0,668	-0,531	0,596
One person households	2,836 E-7	0,000	0,004	0,007	0,994
65+ citizens	8,723 E-5	0,000	0,622	1,398	0,164
Citizens receiving payment from the government	1,803 E-5	0,000	0,094	0,101	0,919
Citizens that do not feel healthy	0,010	0,031	0,020	0,327	0,744
Local client potential	-2,216 E-5	0,000	-1,326	-1,066	0,288
Low income households	0,000	0,000	1,074	0,817	0,41
>500 addresses close to each other	-0,004	0,047	-0,005	-0,085	0,923
Citizens who have difficulties meeting ends	0,204	0,037	0,483	5,534	0,000*
Net debt per municipality	7,901 E-5	0,000	0,068	1,028	0,305

\*Significance level is under 5%

In the last regression all the variables are put into the same regression. In the first block only the variables for the basic model were included. In the second block the variables that belong to BMI were added, in the third block the variables for loneliness were added and in the fourth block the variables for wealth were added. In table 5 the numbers per block and variable are shown.

The R increases for each block. In block 1 the R value is 0,347, in block 2 0,497, in block 3 0,519 and for block 4 0,557. The same applies to the R square, for block 1 it has a value of 0,120, for block 2 0,248, for block 3 0,269 and for block 4 0,310. The adjusted R square is 0,086 for block 1, 0,210 for block 2, 0,222 for block 3 and 0,258 for block 4.

In the second block, the same results are seen as in the second regression. The amount of 65+ citizens and the percentage of citizens with obesity are significant. In the third and fourth block the amount of 65+ citizens remains significant. In the fourth block the percentage of people who have difficulties meeting ends is also significant.

Table 5: Hierarchical linear regression all variables

Model	B	Std. Error	Beta ( $\beta$ )	T	Sig (p)
WMO use	4,891	0,838		5,836	0,000*
Total amount of citizens	-3,812 E-5	0,000	-2,017	-1,519	0,130
One person households	1,338 E-5	0,000	0,192	0,308	0,759
65+ citizens	0,000	0,000	1,191	2,536	0,012*
Citizens receiving payment from the government	0,000	0,000	1,627	1,703	0,090
Citizens that do not feel healthy	-0,006	0,034	-0,012	-0,0175	0,861
Local client potential	-5,011 E-6	0,000	-0,300	-0,226	0,822
Low income households	-6,025 E-5	0,000	-0,563	-0,405	0,686
>500 addresses close to each other	-0,009	0,050	-0,012	-0,183	0,855
WMO use	-0,733	1,645		-0,445	0,656
Total amount of citizens	-3,856 E-5	0,000	0,929	1,534	0,108
One person households	6,485 E-5	0,000	1,324	2,975	0,127
65+ citizens	0,000	0,000	1,324	2,975	0,003*
Citizens receiving payment from the government	0,000	0,000	0,695	0,767	0,444
Citizens that do not feel healthy	0,014	0,031	0,028	0,444	0,657
Local client potential	3,367 E-6	0,000	0,201	0,159	0,874
Low income households	0,000	0,000	-0,945	-0,716	0,475
>500 addresses close to each other	-0,007	0,047	-0,009	-0,140	0,889
BMI overweight	0,062	0,040	0,183	1,570	0,118
BMI obese	0,141	0,065	0,241	2,170	0,031*
WMO use	-3,313	2,480		-1,336	0,183
Total amount of citizens	-2,388 E-5	0,000	-1,264	-0,953	0,342
One person households	4,849 E-5	0,000	0,695	1,112	0,267
65+ citizens	0,000	0,000	1,008	2,126	0,035*
Citizens receiving payment from the government	7,841 E-5	0,000	0,407	0,427	0,670
Citizens that do not feel healthy	0,007	0,032	0,014	0,224	0,823
Local client potential	-3,983 E-6	0,000	-0,238	-0,183	0,855
Low income households	-5,574 E-5	0,000	-0,521	-0,367	0,714
>500 addresses close to each other	-0,003	0,047	-0,004	-0,072	0,943
BMI overweight	0,070	0,040	0,205	1,767	0,079
BMI obese	0,096	0,068	0,164	1,415	0,159
Extreme loneliness	0,040	0,186	0,052	0,214	0,831
Social loneliness	0,061	0,060	0,137	1,025	0,307
Emotional loneliness	0,003	0,106	0,007	0,030	0,976
WMO use	-1,381	2,489		-0,555	0,580
Total amount of citizens	-2,783 E-5	0,000	-1,473	-1,133	0,259
One person households	5,390 E-5	0,000	0,772	1,264	0,208

65+ citizens	0,000	0,000	1,005	2,168	0,031*
Citizens receiving payment from the government	2,012 E-5	0,000	0,105	0,111	0,912
Citizens that do not feel healthy	0,020	0,031	0,040	0,656	0,513
Local client potential	-5,736 E-6	0,000	-0,343	-0,269	0,788
Low income households	-1,341 E-5	0,000	-0,125	-0,090	0,928
>500 addresses close to each other	-0,001	0,045	-0,002	-0,027	0,978
BMI overweight	0,061	0,039	0,180	1,579	0,116
BMI obese	0,072	0,067	0,122	1,069	0,286
Extreme loneliness	0,062	0,184	0,082	0,337	0,736
Social loneliness	0,018	0,060	0,041	0,305	0,761
Emotional loneliness	-0,084	0,108	-0,191	-0,776	0,438
Citizens who have difficulties meeting ends	0,165	0,054	0,391	3,035	0,003*
Net debt per municipality	8,978 E-5	0,000	0,078	1,176	0,241

\*Significance level is under 5%

## Chapter 5: Discussion and conclusion

### 5.1 Conclusion

Based on the results of this research, the research questions can be answered. The first sub question was: “What is the use of WMO services for each municipality in the Netherlands?” In this research we saw that the percentual usage of WMO services differs for municipalities within the range of 1,28 and 10,02%. When this data is transformed to categories from very low to very high use, in the areas of Overijssel, Drenthe, Groningen and Zeeland the use is very high. In the areas around the province of Flevoland the use is very low. Furthermore, most data is missing for the province of Friesland which makes it not possible to say something about the use of the municipalities in this province.

The second sub question “What could be factors that could explain the usage of WMO services in a municipality according to literature?” is answered in the theoretical part of this research. In figure 2 a summary of factors that influence the usage of WMO services is provided. In this research factors that are related to loneliness, BMI and Wealth are investigated.

The third research question “Do the factors, found in the literature, explain the actual usage of WMO services in the Netherlands?” is answered by doing a linear hierarchical regression. It appears that some of the factors found in literature do significantly contribute to the WMO services use, namely the citizens who are obese, citizens who feel social loneliness and citizens who have difficulties meeting ends. This last factor seems to contribute the most for WMO services use, because the R went up with 15,6% after introducing this factor, whereas the increase of the R was lower for the other factors respectively 15% and 8,6%. Based on these results the hypotheses belonging to these variables are assumed to be true: the higher the number of citizens with obesity, citizens with the feeling of social loneliness and/or citizens who have difficulties meeting ends, the higher the usage of WMO services in a municipality.

The fourth research question was as followed: “Based on the results of the analysis of the contribution of the factors, are there any recommendations for changing the distribution model from the WMO?”. Based on the results of the regressions, the three factors that are found in literature can explain the WMO services use with an additional percentage of 21% according to the final regression. Additional research into these factors is necessary to decide if these factors can be included in the distribution model.

All the results of the sub research question make it possible to answer the main research question: “How can we explain the actual usage of WMO service in the Netherlands?”. The factors that are investigated in this paper can explain 55,7% of the actual WMO services use. From which the percentage of 65+ citizens in a municipality, the percentage of obese citizens in a municipality, the number of citizens who feel social loneliness and the percentage of citizens who have difficulties meeting ends do significantly contribute to the WMO services use in a municipality.

### 5.2 Discussion

In this research the R that is found for the distribution model of 34,7% differs from the percentage that is described in the report of the SCP of 48% [10]. In the report of the SCP it was not clearly mentioned which method they used to get to these results. They briefly mention a linear regression, but do not clearly indicate how they did this and which factors they used [10]. In the appendix of their research the variables that are used in their report are mentioned. This list shows that the variables come from different years (2012 to 2016) [10], whereas the data that is used in this research are all from the year

2016. By using data from different years, results can be distorted. This could explain some of the difference in the outcomes.

Furthermore, in the report of the SCP it was not mentioned where they got the data from that is related to the usage of services. It seems that they only used a categorical scale that ranges from very low to very high in their research. In this research actual numbers are used instead of a categorical scale, which could also explain some of the differences in the outcomes. The values of the betas from the SCP and from this research look similar when looking at the size of the number.

Another difference with this research and research of the SCP is the number of municipalities that are included. The SCP only looked at the data for each COROP region, which are 40 in total. For these COROP regions the numbers are an average of the municipalities that are included in this region. By looking at the data for each municipality separate, the effects of the factors in the model on the actual usage of WMO can be tested more precisely.

In this research the data of 178 municipalities is missing. Most of this missing data can be explained by the division of municipalities. In 2016 there were 390 municipalities, nowadays there are only 355 left. Due to reclassification of municipalities, the number has shrunk. [31] Some of the databases that were used in this research, had data according to the old division of municipalities in 2016, whereas other data bases used the division of 2019. In the divisions that happened over these 3 years, 53 municipalities disappeared, and 16 new municipalities were founded [31]. This provides an explanation for 69 municipalities with missing data. Furthermore, it is seen that some data bases consider the island of the Netherlands (Waddeneilanden) as separate municipalities, whereas another data base considered these as one municipality. This explains 4 more municipalities with missing data, which counts to 73 municipalities.

Municipalities are not obliged to gather data about how many citizens are using the WMO. The VNG encourage municipalities to gather this data and share this with them. They publish this data in a monitor on the website "waarstaatjegemeente.nl". Municipalities can use this to compare their results with other municipalities in the Netherlands. The VNG states that for the year 2018 312 of the 380 municipalities handed in data about the WMO related details for the monitor. [32] In 2016 municipalities just started with the execution of this law and less municipalities gathered the data. This could explain the missing data for the other 105 municipalities.

However, the sample size that was left to use for this research, 212 municipalities, was enough to execute a linear regression. The formula to test this is as followed:  $50+8m$ , in which  $m$  is the number of independent variables [33]. In this research the distribution model consisted of eight independent variables. The independent variables for the second block differed from 2 to 3. In the case of 11 independent variables, 138 municipalities needed to be included as a minimum to have a large enough sample size for the regression. In the fourth regression in this paper all the independent variables were put in at the end. This sums up to 15 independent variables. This would mean that 215 municipalities would need to be included to have a large enough sample size. In the sample size of this research there were only 212 municipalities, which means that the sample size was too small to execute the last regression.

The large number of municipalities that is needed to execute a regression is one of the reasons for the simplified theoretical framework and factors that are picked from this framework. As already mentioned in the theoretical framework section, there are more relations in literature that influence health and social contact. Furthermore, there are also some associations which are described in literature between factors in the model, that are not described in the theoretical framework. For



example, in the literature stress is also indicated as a factor that could influence the BMI of an individual. Stress is correlated with weight gain [34], but also with weight loss [35]. However, literature also shows that this association is hard to describe, because the factors that influence overeating or not eating enough are broader than only stress related factors [35]. So, stress is one of the co-factors to influence BMI. The choice has been made not to include or describe co-factors in this research, because this would be too comprehensive to include in the regression model.

However, there is still a shortcoming in the data that was available for this linear regression. Not all factors that were used in this regression had the same unit. Some of them were described with a percentage of citizens, whereas others were described as a total number of citizens [26]-[30]. It was not possible to transform all these factors into the same unit, because some of the factors described the total amount of citizens, whereas other factors of the distribution model of the government were described in the total number of households. For the linear regression it is not a problem to use factors that have a different unit, however it is seen that the regression gives different outcomes when using the total amount of citizens that use WMO services in a municipality than using the percentage of citizens that use WMO services. When using the total number of citizens in a municipality as the independent variable, the R value increases to 0,990. This high R suggests that the factors of the distribution model explain the actual use of WMO services. These results do not suit the literature that is found. When using the percentage of citizens using WMO services, the results are more comparable with the literature.

Lastly, in this research it was chosen to test the relationship for debts and WMO service usage. However, the actual data that is used to indicate the debt, is the net debt per municipality. All the other variables indicate a total number of citizens or a percentage of citizens. For the debts there was not such a number or percentage available in one of the data bases. Therefore, it was chosen to use the net debt per municipality to see if a relationship for debts and WMO services usage is present. Because of the lack of other data, this variable is assumed to be a good proxy to measure the relationship.

### 5.3 Recommendations

#### *For research*

For further research it would be interesting to further dive into the differences in outcome from this research and the research of the SCP. To do so, the SCP needs to be contacted to see which data they used for their research and which method they used to get to the results as described in their report.

Furthermore, in this research the net debt per municipality has a significance level of 30,5%. However, as mentioned in the discussion the net debt per municipality is not the best variable there is to test the relation between debts and WMO usage. A better variable would be the amount of debt per citizen in a municipality. Then the debts for citizens who do not use WMO services could be compared with debts for citizens who do use WMO services, by using an ANOVA analysis. Then the real impact of debts on WMO usage could be measured. The data that is needed for this research still needs to be gathered.

It is also interesting to repeat this research with data from other years. By doing this, trends could be discovered in the WMO usage per municipality. This could also contribute to better measure the actual contribution of factors to the actual usage of WMO services. When redoing the research for other years, and maybe for 2016 as well, it will be best to transform the data in such way that all the factors have the same units. It might be easiest to use percentages as a unit. For the factors that are now described per households, this could be transformed to the percentage of citizens living in a one-person household for example. The same applies for the number of citizens that live in a low-income

household. The local client potential is in some cases higher than the total amount of citizens. This can be explained by the size of a municipality. Sometimes it is the case that a large municipality has more to offer than a smaller municipality and it can be that these municipalities collaborate to offer the services to their citizens. This means that the local client potential could be transformed to a percentage that is sometimes larger than 100% or could be left out from the regression.

In 2020 the 'abonnementstarief' is introduced in the WMO. This means that the contribution that citizens must pay for WMO services is lowered. Where they first paid 7,50 per hour for help in their households, citizens now pay 19 euros a month. This development can influence the number of citizens that make use of WMO services, so it will be interesting to do some research to see how the number of citizens making use of WMO services evolves.

*For the Ministry of Health, Welfare and Sport*

A lot of municipalities are struggling with the high costs in the social domain, which WMO services are part of. In 2017 municipalities spend on average 2,4% more on WMO services than budgeted [36]. By investigating factors that contribute to actual WMO services use not only the distribution model can be improved, the factors can also explain if the raise in costs is logical or not. Are the raising costs caused by developments in society or can municipalities do more to better organize the (access to) care?

Furthermore, municipalities voted against the 'abonnementstarief' that is introduced by the national government unanimously [37]. Municipalities argue that this will increase the demand of citizens of WMO services. This suggests that financial considerations play a role in the actual use of WMO services as well. When it is proved that this is indeed the case, decisions about changing this 'abonnementstarief' can be made.

Therefore, for the national government it is important to know which factors influence WMO services use, so this can be used to improve policies, steer municipalities and make budgeting decisions. Therefore, the recommendation is to use available data to do (more) analyses on the WMO services use in the Netherlands.

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