

Master Thesis

# Determinants of soft drink consumption

Differences by socioeconomic status



Vincent Jansen

Wageningen University

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# **DETERMINANTS OF SOFT DRINK CONSUMPTION**

**DIFFERENCES BY SOCIOECONOMIC STATUS**

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Author: Vincent Jansen

Supervisor: Dr. Kirsten Verkooijen

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## Abstract

**Background:** Regular soft drink consumption has been associated with increased health risks. Meanwhile, the consumption level of soft drinks in western societies is still very high. This means that intervention programs targeting regular soft drink consumption could contribute to public health. Interventions would need to target specific determinants of regular soft drink consumption in order to be effective. Research has shown that people with a low socioeconomic status (SES) have a higher intake than people with a high SES. However, little research has been done on determinants of regular soft drink consumption within specific SES groups. By tailoring to specific SES groups, more effective intervention programs for, for example, a low SES community could be devised.

**Objective:** This study aims to gain insight into the possible differences in determinants of regular soft drink consumption between adult SES groups. This will be achieved by mapping out the trends, patterns and determinants that can be currently found in literature, determining if and how the determinants differ per SES group and by using quantitative research to fill in the knowledge gap about SES specific determinants of soft drink consumption that is left after going through the literature.

**Methods:** Literature research was performed, including a literature study which resulted in 24 articles that identified significant determinants for soft drink consumption. The found determinants were then structured within the demographics, individual determinants, social determinants and environmental determinants categories, based on the Main Determinants of Health model by Dahlgren and Whitehead. In addition, an explorative survey study was performed, which used these determinants as items in the survey. The survey was targeted at Dutch speaking adults and a total of 89 men and 179 women ( $n = 268$ ) completed the survey successfully. The survey was available online ( $n = 241$ ) as well as on paper ( $n = 27$ ). Of all participants, 68 belonged to the low SES group and 200 belonged to the high SES group. Independent-Samples T Tests were performed in SPSS to determine the differences in beliefs about the determinants of regular soft drink consumption, between the low and high SES groups. Differences in beliefs about specific determinants could indicate that these determinants affect regular soft drink consumption differently in the low SES group than in the high SES group. In addition, multiple linear regressions were performed in the software program SPSS to determine if the relationships between the determinants found in literature and regular soft drink consumption were also present within the current study population and within the SES groups.

**Results:** A total of 45 determinants for soft drink consumption were identified in the literature study. This resulted in a total of 29 items to be used in the survey questions. The results of the explorative survey showed that adults' beliefs about their own readiness for behavioural change, awareness of

caffeine content, expecting a sugar rush, habitual behaviour, home availability, store accessibility, eating at a restaurant and school/workplace availability were significantly different between the low and high SES groups. Differences in the relationships between determinants and regular soft drink consumption in the low and high SES groups were also found. Awareness of caffeine content correlated negatively with regular soft drink consumption only within the low SES group, while purchasing of fast food, friend consumption and taste enjoyment correlated positively within the high SES group. Home availability and habitual behaviour correlated positively with regular soft drink consumption for both SES groups.

**Conclusion:** Both the availability of regular soft drinks at home and the habit of drinking regular soft drinks showed positive relationships with regular soft drink consumption in both SES groups. Also, people with a low SES more strongly believed that they often have regular soft drinks at home and that drinking regular soft drinks is a habit for them, than people with a high SES. Since the current research is not able to provide any explanations for this, additional research could focus on the matter. With a better understanding, it could help to create effective intervention programs targeting regular soft drink consumption in specific SES groups. When targeting low SES groups, additional research could also focus on how much people know about the caffeine content of regular soft drinks and how important this is in their choice to consume them or not. It can also focus on the readiness of people with a low SES to change their consumption behaviour. When targeting high SES groups specifically, additional research could focus on how much people's regular soft drink consumption is influenced by how much they enjoy the taste of regular soft drinks, the frequency with which they go and buy fast food, what friends think about soft drink consumption and how many soft drinks these friends consume.

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## 1. Introduction

Since 2009 soft drink consumption has steadily stayed above 100 litres per capita per year in the Netherlands (CBS, 2010; FWS, 2013). In 1970 this number was as low as 55.5 litres and in 1995 it was 80.6 litres per capita per year. This currently high consumption level presents a health problem, since soft drink consumption is associated with an increased risk for obesity (Mozaffarian, Hao, Rimm, Willett and Hu, 2011), diabetes type 2 (Malik et al., 2010), coronary diseases (de Koning et al., 2012) and gout (Choi and Curhan, 2008; Choi, Willett and Curhan, 2010). Looking at obesity alone, the World Health Organisation (WHO, 2013) has found that in 2008 globally there were around 500 million adults ages 20 and over with obesity. This number has only grown larger since then. Not only does obesity pose a threat to personal health, it also costs society a large amount of money. A study on the health expenditures of a wide range of countries like the USA, Brazil and China showed that obesity is responsible for up to 2.8% of a country its total healthcare expenditures (Withrow & Alter, 2010). Lowering the amount of soft drinks people consume would help to battle these health and financial problems (Malik, Schulze and Hu, 2006; Dhingra et al., 2007).

In this paper a 'soft drink' will be seen as a beverage that contains water, a sweetener and a flavouring agent. It may also contain other ingredients like caffeine, colourings and preservatives. The alcohol content of a soft drink will never exceed 0.5%. A soft drink is also commonly known as a soda.

Regular soft drinks contain sugar, while light soft drinks contain (calorie free) artificial sweeteners. Bellisle and Drewnowski (2007) reviewed studies into the health effects of drinking light soft drinks. They found that while in theory drinking light soft drinks should result in a weight loss compared to the weight gain from drinking regular soft drinks, recent studies have shown that the positive effect of light soft drinks on a person's health will not be achieved without a proper diet or other outside influence, in addition to drinking light soft drinks. Another study showed an association between high light soft drink consumption and weight gain (Schulze et al., 2004). For the purpose of this research the main focus will lie on regular soft drinks, since their negative impact on health is clear compared to light soft drinks.

In order to lower the amount of soft drinks that are consumed, it is important to understand why people drink them. In western societies, like the Netherlands, there are large differences in socioeconomic status (SES) within the population (RIVM, 2013). Research has shown that people with different SES levels differ in their soft drink consumption. It shows that people with a low SES consume the most, followed by persons with a medium SES and finally people with a high SES consume the least amount of soft drinks (Hulshof, Brussaard, Kruizinga, Telman and Löwik, 2003;

French, Wall and Mitchell, 2010; Mendes, 2013). Given the large differences in soft drink consumption among SES groups, taking a closer look at the reasons for the variation between the SES groups would help to devise strategies to lower the soft-drink consumption in western societies and is therefor one of the aims of this study.

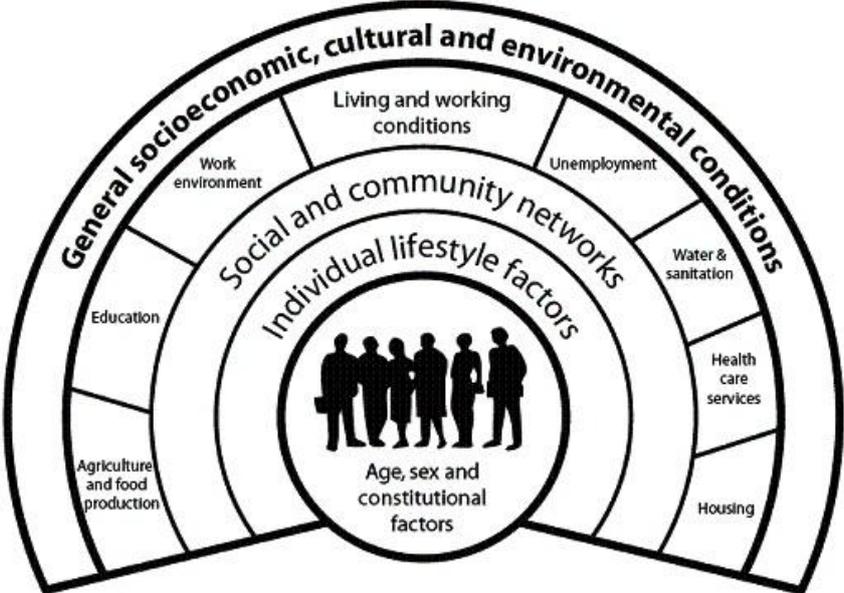


Figure 1: Dahlgren and Whiteheads revised Main Determinants of Health model (Dahlgren and Whitehead, 2007)

Various determinants have been associated with either low or high soft drink consumption. Examples of these determinants found in literature on western societies are age, availability, awareness, educational level, income, gender, race, social setting and taste (Bere, Glomnes, te Velde and Klepp, 2007; FWS, 2013; Hattersley, Irwin, King and Allman-Farinelli, 2008; Hulshof et al., 2003; Mendes, 2013; Ogden, Kit, Carroll and Park, 2011). These determinants can be clustered into categories like personal health beliefs, the intrinsic qualities of the beverage and the social and physical environment. To give further structure to the determinants this study utilized Dahlgren and Whiteheads model, hereafter known as the Main Determinants of Health model, to predict regular soft drink consumption (Dahlgren and Whitehead, 1991). Figure 1 shows the revised version of the model, which is also known as the rainbow model due to its shape. Originally used as a framework to understand different levels of policy development, it has since its inception grown into something more. The model has helped researchers to create many hypotheses about the determinants of health and to explore the relative influence of these determinants on different health outcomes and on the interactions between the various determinants (Speller, 2007). The model is often used as a tool to look at health inequalities in a society (The Scottish Government, 2008; IPH, 2014). For this paper the model was adapted to better fit the research (figure 2). The three full layers of the model were rebranded to encompass determinants of behaviour and formed a category each. Individual

lifestyle factors became individual determinants, social and community networks became social determinants and general socioeconomic, cultural and environmental conditions became environmental determinants. The other layers of the model are combined into the fourth and final category, namely demographics.

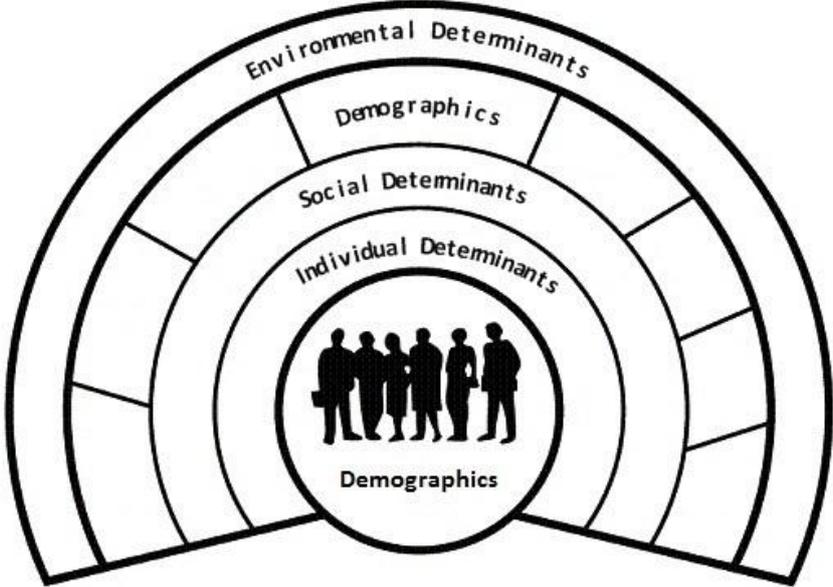


Figure 2: Adapted Main Determinants of Health model

Because there are differences in soft drink consumption between SES groups, there must be variations in their determinants and the influence each determinant has on behaviour to explain these differences. These variations are something that has not extensively been looked at, leaving a knowledge gap in current day literature. The data gained from researching the determinants of each SES sub-population could be used to target the soft drink consumption behaviour of specific SES population groups. Interventions that focus on a select target audience are more effective than those that focus on the population at large, because they can make use of tailor-made groups of determinants which focus specifically on these target audiences (de Vos, Runhaar and Bierma-Zeinstra, 2013).

This thesis aims to gain insight into the possible differences in determinants of regular soft drink consumption amongst adults between SES groups. More specifically it aims to: (1) map out the trends, patterns and determinants of soft drink consumption that can be currently found in literature, to (2) determine if and how the determinants differ per SES group and to (3) use additional research to fill in the knowledge gap about SES specific determinants of soft drink consumption that is left after going through the literature.

These aims form the basis of the research questions. The main and sub-questions are:

Main Research Question:

What are the differences and similarities in determinants of regular soft drink consumption between adults in different SES groups in western societies?

Sub Questions:

1. What are the trends and patterns regarding soft drink consumption in western societies found in literature?
2. What are the determinants leading to soft drink consumption in western societies found in literature?
3. What are the differences and similarities in determinants of regular soft drink consumption between adults in different SES groups?

## 2. Data collection methods

To answer the research questions literature research and a survey were used. Literature research helped to decide which form of additional research would be most useful to find answers for the main research question. After going through the gathered data from the literature, an exploratory survey study was chosen. In the following two sections the process of data collection and analysis through literature research and the survey will be discussed.

### 2.1 Literature research

Literature research was carried out in order to be able to answer the first two sub research questions. Google and Scopus were the main sources used to find relevant information. Literature research helped to identify the determinants, patterns and trends of soft drink consumption in western societies. A literature study was used to look at the differences and similarities in the determinants of soft drink consumption between different SES groups. However, this did not lead to any conclusive results, so the third sub question was answered through additional data collection. Furthermore, literature research was used to determine how the Main Determinants of Health model is currently being used as a tool to understand the individual decision-making process behind soft drink consumption. The collected data was also used to give form to the quantitative data collection.

Google was mainly used to answer the first sub question and to find statistics about soft drink consumption and its related health risks. To find information about the Netherlands, the Dutch search terms “frisdrank consumptie”, “frisdrank gebruik”, “frisdrank gezondheid” and “frisdrank statistieken” were initially used. Out of the first 20 results of each search the most relevant ones were looked at, based on the description given. For international data the Dutch search terms were translated into English (“soft drink consumption”, “soft drink use”, “soft drink health” and “soft drink statistics”), replacing soft drink with soda for a second round of searches. To locate trends search terms with combinations of either “global” or “worldwide”, “soft drink” or “soda” and consumption were entered into Google. The criteria: time - last year was used to only find recent websites and data. The images tab was also looked at with these exact search terms to locate images with relevant (statistical) data on them regarding soft drink consumption. No further images were looked at after there was a chain of around thirty irrelevant images (one full screen). This led to eleven relevant images. These images led to relevant sites with additional information, like MarketWatch.com and data from Euromonitor.com. The webpages of major health organisations and other relevant

organisations were also consulted to find useful data. Websites of the World Health Organisation, Centers for Disease Control and Prevention, the American Heart Association, the Dutch Association for Soft Drinks, Waters and Juices and Statistics Netherlands were looked at. The search terms “SES Nederland” and “sociaal economische status Nederland” were used in Google to find information about the SES levels of the Dutch population. The first hit of the second search term led to the site of the Dutch Ministry of Health, Welfare and Sports which contained relevant information on the subject. Further searches on the site of The Netherlands Institute for Social Research, where part of the data found on the Dutch Ministry website came from, proved fruitless.

A portion of the data, mainly the data concerning health consequences of soft drink consumption and the link between socioeconomic status and soft drink consumption were gathered by going through the references of the articles found during the database searches. When more information about a specific piece of data located in an article or on a website would prove to be useful, the references concerning that piece of data were looked at. These references led to new, often more detailed data, about specific subjects.

Scopus was used to help answer the first sub question by entering the same English search terms used in Google. However, Scopus was mainly used to perform a literature study on the available literature on determinants of soft drink consumption in order to answer the second sub question. Each search was sorted on the amount of times the article was cited, with a minimum requirement of 10 cites. The minimum required cites was kept low in order to exclude as few recent articles as possible, which have not had the time to get cited as often yet. Only articles from the year 2000 and after were looked at. These methods helped to narrow down the amount of articles that showed up after each search. The initial search for soft drink\* led to 1024 hits. The search for soda\* led to more than 2000 hits (Scopus only shows the first 2000 hits). To further specify the search several other terms were used in addition to soft drink\* and soda\*. The first term added was consumption ( $n = 501$  for soft drink\*;  $n = 188$  for soda\*). This still led to a large amount of results. Soft drink\* consumption theory ( $n = 8$ ) and soda\* consumption theory ( $n = 2$ ) led to very few results. In the end soft drink\* theory ( $n = 21$ ), soda\* theory ( $n = 115$ ), determinant\* soft drink\* ( $n = 23$ ) and determinant\* soda\* ( $n = 20$ ) were used. Soda\* theory specifically seemed to give many hits which were irrelevant to the research questions, so extra restrictions were added to the results in Scopus. Only articles with subject areas within social sciences, medicine, decision sciences, multidisciplinary and psychology would be shown for soda\* theory ( $n = 10$ ). To specifically look for relationships between SES and soft drink consumption the search terms socioeconomic status soft drink\* ( $n = 44$ ) and socioeconomic status soda\* ( $n = 16$ ) were used. Using the abbreviation SES instead of socioeconomic status (15 articles in total) led to four relevant articles, all of which were also found through the other searches.

The abstracts of all 134 hits were looked at to determine if the articles had any relevance to this research. Afterwards, the articles which came up multiple times and those of which the full text could not be retrieved were removed. The 42 articles that remained were read and reviewed. In the end, 24 articles contained significant determinants for soft drink consumption.

After it became clear that the differences in determinants for soft drink consumption between SES groups was discussed in only one article it was decided to use the found determinants as the basis for the items used in an exploratory survey study on soft drink consumption among adults. The most significant of the determinants found through the literature study were gathered and divided into categories, based on the Main Determinants of Health model by Dahlgren and Whitehead (1991). These categories were individual determinants, social determinants, environmental determinants and demographic determinants.

## *2.2 Survey*

To be able to answer sub question three, and locate the differences and similarities in the determinants of soft drink consumption between different SES groups, an exploratory survey was used. Since the literature research delivered determinants that could be further explored, the need for interviews or a focus group diminished. A survey on the other hand could be used to gather many responses from people belonging to different SES groups, providing a new data set to work with. Because the literature study resulted in just one article which linked a determinant of soft drink consumption (watching television) to SES, and then specifically for adolescents, it was decided to do an explorative study and gather as much data as possible in order to gain insight into the relationship between determinants and SES groups.

### *2.2.1 Instrument*

Both an online and a paper version of the survey were created. The reason a paper version was used in addition to the more time-efficient online survey was that feedback gathered beforehand from people belonging to the lower SES group suggested that not everyone is comfortable enough with a computer to fill in the survey online or has the equipment to participate. The paper survey is shown in appendix A. The survey was anonymous for participants, to encourage them to answer as open as possible. The basis for the survey questions was the SMILE study (Study of Medical Information and Lifestyle in Eindhoven; Maastricht University, 2003). This is a study amongst Dutch youth about their lifestyle. This study has had several data collection waves, but the 2003 version focussed on soft drink consumption. The framing of some of the questions used in the SMILE study are also used in the current soft drink consumption study. For example, two questions (11 and 13) ask about the

amount of glasses, cans and bottles the participant drinks on average when he or she drinks a soft drink. These questions are an adaptation of questions used in the SMILE study. A 2008 version of the SMILE study amongst adults was used to derive items specific for adults, namely items about marital status, living situation and amount of children (Maastricht University, 2008). The distinction between different income levels was made through looking at income numbers (CBS, 2013), talking to people with vastly different incomes and discussing the topic with colleagues. The numbers from CBS (Statistics Netherlands) showed that the average net household income lies around € 3000 per month and three possible answers were created above and below this amount in addition to options for social security and student grants.

The software program Qualtrics was used to create the online survey and Microsoft Word 2010 was used to create the paper version. The survey contained items on background information, actual soft drink consumption and the determinants of soft drink consumption. It was decided to only use one language (Dutch) for the survey to not lose the meaning of the questions and statements in translation, which could result in skewed answers. For example, the word “gezelliger” used in question 18 has no direct translation in English. Not all participants were native Dutch speakers, but using a survey written in Dutch was believed to provide the highest reliability when taking all participants into account.

Participants were asked some background information like age and gender, together with questions about their SES and soft drink consumption. All determinants found through the literature research, which were categorized into demographics, were applied as single or multiple items in the questionnaire. The determinants in the other three categories of the Main Determinants of Health model were also used as items. All 45 determinants and 29 survey items can be found in section 3.2 of the report in tables 3 and 4 respectively. The items were used in statements with Likert-type scales (1-5) and the participants were asked how much they agreed with these statements. A five point scale was chosen, because this was also used in the SMILE study. All statements related to regular soft drink consumption. Regular soft drink consumption was chosen instead of light soft drinks or all soft drinks, because regular soft drinks form a more prominent and clear health problem. An additional five items focussed on the participants’ opinion about regular soft drinks compared to light soft drinks. These were derived from the determinants identified in the literature and statements from experts in the field of public health. A small scale pilot-test among family and friends helped to refine the questionnaire further.

Convenience sampling was used to gather as many participants, aged 18 years or older, as possible. To ensure enough relevant data was gathered participants were recruited from different SES groups.

The researcher used his personal (email) contacts and online network to find participants, along with a database of people who said they would be willing to participate in online surveys, held by the Marketing and Consumer Behaviour department of the Wageningen University. The online survey ran from January 23th, 2014 until March 10th, 2014 and resulted in a total of 265 responses. After removing the incomplete and faulty entries 241 useful responses remained. The paper survey was used to reach out to people with a low SES, who might not be as experienced with computers or do not have the facilities to fill in an online survey. It was distributed in a relatively poor area in the city of Zutphen and amongst the parents of children who attend elementary school in a relatively poor area in the city of Utrecht. A total of 30 questionnaires were returned. Of these 30 entries, 27 remained after removing the incomplete and faulty entries. This made for a total of 268 data entries.

### *2.2.2 Measures*

By dividing the respondents into two SES groups (low and high), the data could be analysed to find out what the differences and similarities in determinants of soft drink consumption between these SES groups were. It was decided that only educational level would be used to determine SES. There was insufficient data available in literature about how household income in the Netherlands correlates with educational levels to form SES. It would also make the data entries of participants who did not give a household income number unusable when comparing items between SES groups. Educational level was split into two groups. "Low SES" consisted of the answers "basisonderwijs", "VMBO/MAVO", "HAVO" and "Middelbaar Beroepsonderwijs", while "high SES" consisted of the answers "VWO/Gymnasium", "Hoger Beroepsonderwijs" and "Universiteit". Using these measurements a total of 68 participants (25.4%) belonged to the "low SES" group, while the other 200 participants (74.6%) belonged to the "high SES" group. Using two SES levels also helped to ensure that the groups would be large enough for statistical analysis. This could not be guaranteed with three or more SES levels.

The Body Mass Index (BMI) of the participants was determined by height and weight with the BMI formula:  $BMI = \text{weight (kg)} / \text{height}^2 \text{ (m)}$

Another variable that was created from the data was the amount of soda that is consumed per week. A glass was counted as having a volume of 0.25l, a can was 0.33l and a small bottle was 0.5l in size. By counting a glass as 1, a can as 1.3 and a small bottle as 2 a fixed amount of glasses could be measured. This number was multiplied by the amount of times the participant drank soft drinks each week. If it was indicated that soft drinks were consumed less than one day per week, then the fixed amount of glasses was multiplied by 0.5. For example, one participant said he or she drank regular soft drinks two days per week and drank two glasses and one small bottle on those occasions. The

formula for the fixed glasses of regular soft drinks this participant drinks per week would be:  
 $2 \text{ (glasses)} \times 1 + 1 \text{ (small bottle)} \times 2 = 4. 4 \times 2 \text{ (times per week)} = 8 \text{ fixed glasses per week}$

Inconsistencies arose with the answers to the question about how people compare regular and light soft drinks. From observations and feedback from participants it appeared that the meaning of the different possible answers was unclear. This resulted in incorrect use of the answers totally disagree, disagree and equal. For example, when the statement was that regular soft drinks taste better than light soft drinks, a participant who believed they both taste equally good would still answer with totally disagree instead of equal. Therefore, to not harm the validity of the gathered data it was decided that these three answers would be combined into one. In addition to the other two answers, agree and totally agree, this resulted in three possible answers in the results instead of five.

### *2.2.3 Data analysis*

For the survey data analysis the software program IBM SPSS Statistics 22 was used. The raw data from Qualtrics was exported to SPSS and further processed. Of the 268 viable data entries, 89.9% ( $n = 241$ ) was filled in online and 10.1% ( $n = 27$ ) was filled in on paper. Reasons for exclusion were incomplete or incoherent answer sets ( $n = 25$ ) and participants being below 18 years of age ( $n = 2$ ). When only a few answers were missing ( $n < 5$ ), the other answers would still be used. When people filled in “anders, namelijk” (other, namely) the researcher standardized the answers where possible. For example, one participant filled in “gepromoveerd” (promoted) when asked about their educational level. This answer can also be read as “Universiteit” for the sake of this research project, so it was replaced with the “Universiteit” answer.

In SPSS several analyses were performed to process the data. For each of these tests the study population was divided into a low and a high SES group. The methods used were descriptive statistics, independent-samples T tests and multiple linear regressions models. Crosstabs were used within descriptive statistics to locate differences in demographics between the SES groups. Independent-samples T tests helped to identify significant differences in soft drink consumption between the low and high SES groups. Furthermore, they also helped to locate significant differences in soft drinks consumption beliefs between the low and high SES groups. The results of the independent-samples T tests are shown in tables 7, 9 and 11. Multiple linear regression was used to examine which determinants predicted regular soft drink consumption. Separate regressions were performed on the three determinant categories from the Main Determinants of Health model (individual, social and environmental) to be able to find out how much of the variance within regular soft drink consumption can be explained by the determinants within the categories and by the categories themselves. Regular soft drink consumption was the dependent variable in each of the

three regressions. The ten items within the individual determinants category, five items within the social determinants category and ten items within the environmental determinants category were used as the independent variables. Since a representative study population was not guaranteed the items gender, age and ethnicity (Dutch heritage or not) were tested as confounders in each of the three regression analyses. This was done by adding all three items to the regression analyses and looking at their significance. Any item that had a significant relationship with regular soft drink consumption ( $p \leq 0.05$ ) in at least either the low SES group or the high SES group was kept as a confounder, while the other items were removed. New regressions analyses were then performed with only the original items and significant confounders within each of the three categories. The results of these analyses were used to answer the research questions and are shown in tables 8, 10 and 12. For both individual determinants and environmental determinants age was the only significant confounder and thus the only one added to their respective regressions. For social determinants both age and ethnicity were significant, so they were both added to that regression analysis.

### 3. Results: Literature research

In this chapter the results of the literature research will be presented. First, sub-question one will be answered by explaining the trends and patterns regarding soft drink consumption and socioeconomic status that can be found in literature and online. Then the results of the literature study will be presented. Finally, the items, that are used in the survey and were created by refining the determinants identified in the literature, are shown.

#### 3.1 Trends and patterns

In this section trends and patterns of both soft drink consumption and socioeconomic status will be discussed. First, both global regular and light soft drink consumption and statistics for the Netherlands will be presented. Then the development of SES differences and the impact these differences have on (public) health and health promotion will be discussed.

##### 3.1.1 Soft drink consumption

Worldwide the consumption of soft drinks is on the rise (The Coca-Cola Company, 2012). Between 1991 and 2011 the consumption of products sold by The Coca-Cola Company has more than doubled. However, this trend is mainly caused by the increase in soft drink consumption in non-western countries. For example, the consumption levels of The Coca-Cola Company products in Bolivia have increased by over 350% between 1991 and 2011 and in Mexico this growth was over 150%.

**Table 1: Soft drinks consumption in litres, per capita, per year, in the Netherlands. (FWS, 2013; CBS, 2013)**

	1970	1980	1985	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012
Litres	55.5	59.0	57.8	71.0	80.6	97.1	94.3	99.0	96.7	98.9	102.7	101.8	102.6	101.9

Western societies, like the USA, Great Britain and the Netherlands, show no growth in soft drink consumption anymore (British Soft Drinks Association, 2013; CBS, 2013; FWS, 2013; MarketWatch, 2013). The trend has changed from growth to stability and even a small decrease in soft drink consumption. Table 1 shows that between 1970 and 2000 the soft drink consumption in the Netherlands kept increasing. From that point onwards, the consumption levels have shown small fluctuations, with 2012 (101.9 litres) having lower consumption levels than 2009 (102.7 litres). In 2008, 67.6% (66.9l) of the soft drinks consumed in the Netherlands were regular soft drinks and 32.4% (32.0l) were light soft drinks (FWS, 2013). In 2012 the gap between the two types of soft drinks increased to 69.0% (70.3l) and 31.0% (31.6l) respectively, showing that the Dutch have started to drink more regular soft drinks and a little less light soft drinks in recent years. American research has

shown that in the USA in the last 10 years there has been a decline in soft drink consumption (MarketWatch, 2013). In 2002, Americans drank an average amount of 200.1 litres of soft drinks per capita, while in 2011 that number had dropped to 167.1 litres per capita. Figure 3 shows that the decrease in soft drink consumption gets balanced by an increase in spirits, wine and mainly bottled water consumption. The latter increased by over 55% between 2001 and 2011 to almost 100 litres per capita per year. The main reason cited for the growth in bottled water consumption is that bottled water is a healthier alternative to soft drinks (MarketWatch, 2013). In the Netherlands there has been no such increase in bottled water consumption over the last five years (FWS, 2013).

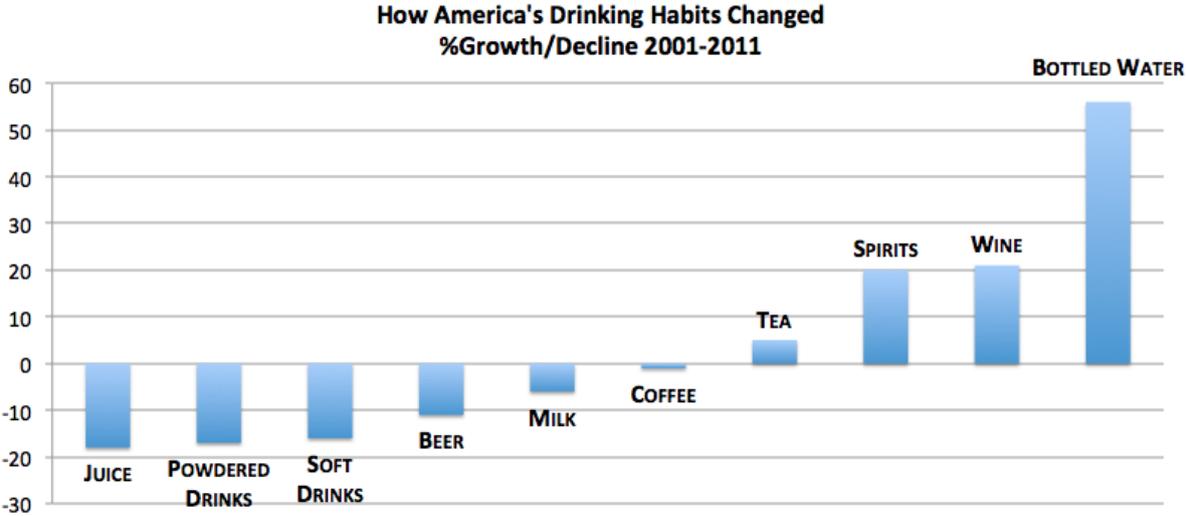


Figure 3: How America's Drinking Habits Changed. Percentages Growth/Decline between 2001 and 2011. (Beverage Information Group, 2013)

While the numbers may indicate that the soft drink consumption levels are stable (the Netherlands) or even declining (USA) this does not mean that the soft drink consumption in these countries is low. With 167.1 litres per capita in 2011 the USA is still world leader in soft drink consumption (Check, Dodson and Kirk, 2012). Twelve out of the twenty countries with the highest amount of soft drink bought per person are western countries, while six countries are in Middle and South America. The other two countries in the top twenty are Israel (15) and Serbia (18). Table 2 shows that while the Netherlands does not have the highest soft drink consumption (which includes sweetened ice tea and energy drinks in this table) of all western European countries, the numbers are far above average. Worldwide the Netherlands ranked number 20 in 2011, which is lower than for example Belgium (6) and the United Kingdom (14), but much higher than countries like Italy (44), Portugal (46) and France which ranked 48<sup>th</sup> (Check et al., 2012).

**Table 2: Soft drinks consumption in litres, per capita, in 2012 in Western European countries (FWS, 2013)**

<b>Year: 2012</b>	<b>per capita in litres</b>
<b>Austria</b>	112.5
<b>Belgium</b>	132.2
<b>Denmark</b>	101.7
<b>Finland</b>	66.7
<b>Germany</b>	145.5
<b>Greece</b>	53.0
<b>Ireland</b>	88.7
<b>Italy</b>	59.1
<b>Netherlands</b>	112.4
<b>Poland</b>	96.6
<b>Portugal</b>	64.9
<b>Spain</b>	96.2
<b>Sweden</b>	84.1
<b>United Kingdom</b>	106.4

*Note.* Includes sweetened ice tea and energy drinks

### **3.1.2 Socioeconomic status**

Large gaps in SES affect societies as a whole. According to the American Psychological Association inequities in wealth distribution, resource distribution, and quality of life are increasing both in the United States and globally (APA, 2014). People in lower socioeconomic groups are more likely to experience chronic ill-health and die earlier than those with a higher SES, because of a higher frequency of diseases like cancer (Siegel, Naishadham and Jemal, 2013; IPH, 2014). In all the EU countries the amount of highly educated citizens has increased, while the amount of low educated citizens has decreased (RIVM, 2014). In 2011 the frequency of persons with a high educational level was highest amongst young people and females in all EU countries. While the average SES of western societies has increased over the years, the relative differences in SES have also increased (APA, 2014). For example, this can happen when the top earners in high SES groups gain higher relative pay raises than those in low SES groups. While both groups will earn more, because of the larger increase in the high SES group the relative differences also increase. Even though the Netherlands has a below average SES gap within the EU, the health impact on lower SES groups is large here as well and requires attention (RIVM, 2014).

Research has shown that people with different SES levels differ in their soft drink consumption. The higher the SES of a person is, the lower their soft drink consumption will be (Hulshof et al., 2003; Rey-López et al., 2011; Han and Powell, 2012). However, in rising economies this can be different. In China, soft drinks are considered more of a luxury item. They are only widely available to the rich, so people, and especially adolescents, with a high SES who live there drink more soft drinks than the Chinese with a low SES (Shi et al., 2005). People with a low SES in the Netherlands not only consume more soft drinks than those with a high SES, but also smoke more and are more often overweight

(RIVM, 2014). These gaps have increased between 1990 and 2008, because more people with a high SES have quit smoking than people with a low SES and the amount of people with obesity has risen faster in the low SES group than in the high SES group. So not only is the divide in SES within populations (like the Dutch population) increasing, but the divide in health differences between SES groups is increasing as well. This double burden makes narrowing the SES gap and targeting low SES groups when creating and implementing interventions all the more important when battling public health issues, like soft drink consumption.

### *3.2 Determinants of soft drinks consumption*

In this section the determinants of soft drink consumption will be presented. All 45 of the determinants found in the 24 articles gathered through the literature study are shown in table 3. They were put into four categories and explained. The categories are demographic, individual, social and environmental determinants from the Main Determinants of Health model (Dahlgren and Whitehead, 2007). Where needed, the determinants were also refined so they could be used as items in the survey. The frameworks and the participants of the studies performed in the articles differ greatly from one another, so the found determinants cannot simply be linked together to form a conclusion. Instead, the determinants form the basis for the items used in the explorative survey study on determinants of soft drink consumption. Many of the articles used either existing cross-sectional survey data to perform their data analyses, or gathered their own data through a survey. Four articles deviated from this data collection method. The articles by Coon, Goldberg, Rogers and Tucker (2001) and Vereecken and Maes (2006) gathered data through a dietary recall schedule in addition to a survey. Hattersley, Irwin, King and Allman-Farinelli (2009) made use of focus groups, while de Bruijn, Kremers, de Vries, van Mechelen and Brug (2007) used a longitudinal questionnaire. Three of the articles utilized school children as their study population. A majority of fifteen articles used adolescents for their research and three focussed on adults. The other three articles each used a different study population: children aged 2 – 18, everyone aged 2 – 24 and all ages. At the end of this section all survey items are shown in table 4. This list includes several determinants which were added in addition to the ones found in literature, because experts in the field of public health believed they could be relevant to the study.

**Table 3: Determinants of soft drink consumption found through a systematic literate review**

Demographics	Individual	Social	Environmental
Age	Watching television (+)	Friends (+)	Home – accessibility (+)
Gender (male +)	Watching television during meals (+)	Parents (+)	Home – availability (+)
Ethnicity – Non-whites (+)	Time spent doing homework (-)	Family (+)	Store accessibility (+)
Ethnicity – African Americans (+)	Soft drinks make you feel healthy (+)	Doctor’s attitude (+)	School availability (+)
Educational Level – Mother (-)	Physical activity (-)	Teachers and/or coaches’ attitude (+)	Carrying enough cash to buy soft drinks (+)
Educational Level – Parents (-)	Quenching of thirst (+)		Eating at a restaurant (+)
Educational Level – Own (-)	Taste (+)		Purchasing of fast food (+)
Educational Level – Future (-)	Awareness of potential health impact (-)		Setting in which alcohol is consumed, while you are not allowed to drink alcohol (+)
Income (- and neutral)	Awareness of sugar content (-)		Family meals (-)
Household Income (-)	Awareness of caffeine content (+)		Advertisements (+)
BMI (women +)	Expecting a sugar rush (+)		Branding (+)
	Pricing (-)		Family rules (-)
	Readiness for behavioural change (-)		School rules (-)
	Habitual behaviour (+)		
	Agreeableness with family rules		
	Association with treats and rewards (+)		

Note. (+) positive influence, (-) negative influence. When no equation sign is shown the relationship was non-linear.

### 3.2.1 Demographics

**Age:** Older children and young adults have the highest levels of soft drink consumption of all age groups, with soft drink consumption rising during childhood and declining during adulthood among children in Australia (Rangan, Randall, Hector, Gill and Webb, 2008), adults in Australia (Rangan, Schindeler, Hector, Gill and Webb, 2009), children in the USA (Evans, Springer, Evans, Ranjit and Hoelscher, 2010) and people of all ages in the USA (Han and Powell, 2012).

**Gender:** Boys from Spain (Aranceta, Pérez-Rodrigo, Ribas and Serra-Majem, 2003), China (Shi, Lien, Kumar and Holmboe-Ottesen, 2005), Norway (Bere et al., 2007), Australia (Rangan et al., 2008; Hattersley et al., 2009), the USA (Evans et al., 2010), the Netherlands (Wouters, Larsen, Kremers, Dagnelie and Geenen, 2010) and all across Europe (Rey-López et al., 2011) drink significantly more soft drinks than girls of the same age. Adult men from the Netherlands (Hulshof et al., 2003), the USA (Rehm, Matte, van Wye, Young and Frieden, 2008) and Australia (Rangan et al., 2009) also drink significantly more soft drinks than women of the same age.

**Ethnicity:** Four articles presented that white people drink less soft drinks than people with other ethnicities. Two of these four articles found that American non-white middle school children (Evans et al., 2010) and people of all ages (Han and Powell, 2012) drink more soft drinks than whites. Two other articles named African-Americans as drinking more soft drinks than their white American peers among adults (Rehm et al., 2008) and high school students (Arcan, Kubik, Fulkerson and Story, 2009).

**Educational level:** Findings on the relationship between educational level and soft drink consumption differ from article to article. Aranceta et al. (2003) found that the educational level of a mother had a negative correlation with the soft drink consumption of her children in Spain. Nilsen, Krokstad, Holmen and Westin (2009) found the same association, but in Norway. They also measured a significant but weaker association with the father's educational level. Han and Powell (2012) measured the same relationships in the USA, but found no significant differences for the gender of the parent. For (young) adults from Norway (Rehm et al., 2008) and the Netherlands (Wouters et al., 2010) their own educational level has a negative impact on their soft drink consumption. Plans for future education decreased soft drink consumption for Norwegian adolescents (Bere et al., 2007)

**Income:** There does not seem to be a consensus on how income relates to soft drink consumption. Income is studied in three articles and all of them have different outcomes. Han and Powell (2012) found that the higher the personal income of Americans of all ages is, the lower their soft drink consumption will be. Rehm et al. (2008) found the same association, but for household income of American adults. However, Nilsen et al. (2009) found no difference in soft drink consumption between different income levels for Norwegian adolescents.

**BMI:** According to Rehm et al. (2008), American adult women with a high BMI have a higher soft drink consumption level than women with a low BMI.

### *3.2.2 Individual determinants*

**Watching television:** The most frequently studied determinant of soft drink consumption is watching television. This is also the only determinant of which the impact on soft drink consumption was studied specially for different SES levels, showing that European adolescents with a low SES drink more soft drinks while watching television than adolescents with a high SES (Rey-López et al., 2011). The more children watch television, the more soft drinks they consume. This was investigated in the USA (Utter, Neumark-Sztainer, Jeffery and Story, 2003; Rehm et al., 2008), all of Europe (Vereecken, Todd, Roberts, Mulvihill and Maes, 2005) and specifically in Belgium (Vereecken and Maes, 2006) and the Netherlands (De Bruijn and van den Putte, 2009). Two more articles showed the same results, but then for watching television for over two hours per day for Spanish children and adolescents

(Aranceta et al., 2003) and European adolescents (Rey-López et al., 2011). Coon et al. (2001) researched how eating their meals while watching television affected the consumption patterns of children in the USA. They found that children who eat their meals while watching television consume more soft drinks than those who do not.

**Doing homework:** American adolescents who spent an above average amount of time doing homework were shown to consume less soft drinks than their peers who spent their time doing other things (Utter et al., 2003).

**Need to feel and be healthy:** Norwegian adolescents, who believe that they feel healthier after they have consumed a soft drink and those who do not pay much attention to their health, consume more soft drinks than their peers who do not feel healthy after consuming a soft drink and those who pay a lot of attention to their health (Bere et al., 2007). Kassem, Lee, Modeste and Johnston (2003) and Kassem and Lee (2004) found the same results for American adolescents. Rehm et al. (2008) found that American adults who spend at least part of their time being physically active consume less soft drinks than those who do not spend any, or very little, time being physically active. Also, Norwegian adolescents drink less regular soft drinks and more light soft drinks when they are dieting (Bere et al., 2007).

**Quenching of thirst:** Three articles reported that adolescents, who believe consuming a soft drink will quench your thirst, have a higher consumption level than adolescents who believe soft drinks do not quench thirst. Two of the articles gathered their data in the USA (Kassem et al., 2003; Kassem and Lee, 2004) and one in Norway (Bere et al., 2007).

**Taste enjoyment:** According to Bere et al. (2007), Norwegian adolescents with a taste preference for a certain type of soft drink have a higher consumption level than those who do not have any preference or have a preference for drinks other than soft drinks. American (Kassem et al., 2003; Kassem and Lee, 2004) and Australian (Hattersley et al., 2009) adolescents who enjoy the taste of soft drinks will consume more soft drinks than those who do not.

**Awareness:** American female adolescents who believe they are aware of the potential health impact of consuming soft drinks tend to have a lower soft drink use than their peers who are not aware (Kassem et al., 2003). Their main concern is that you can gain weight from drinking soft drinks. The female adolescents also consumed more soft drinks when they knew you could get, and were expecting, a sugar rush from drinking soft drinks. An example of this behaviour is that a female student would drink soft drinks, because she wanted to get a sugar rush to keep on studying through the night. Hattersley et al. (2009) obtained somewhat different results from their Australian based

research in which they did not distinguish between men and women. They found that adolescents who believe they are aware of the sugar content of a soft drink consume less of them than adolescents who do not know the sugar content, while adolescents who believe they are aware of the caffeine content of a soft drink actually consume more of them than adolescents who believe they do not know the caffeine content (Hattersley et al., 2009).

**Pricing:** Hattersley et al. (2009) discovered that Australian adolescents find the price of soft drinks important. When prices drop either permanently or for a promotion, soft drink consumption rises. The relative price compared to other drinks also matters. When for example soft drinks become cheaper than bottled water, the consumption level of those soft drinks will rise.

**Readiness for change:** Dutch adolescents who have the intention to consume less soft drinks, in fact do consume less than those who do not have this intention (De Bruijn and van den Putte, 2009; Ezendam et al., 2009). Furthermore, Australian adolescents who show a readiness for change in their drinking behaviour also consume less soft drinks (Hattersley et al., 2009)

**Habit:** De Bruijn and van den Putte (2009) surmised in their article that Dutch adolescents who believe consuming soft drinks is a habit for them have a higher consumption level than adolescents who do not believe consuming soft drinks is a personal habit.

**Agreeableness with family rules:** De Bruijn et al. (2007) performed their research among Dutch adolescents to determine that when an adolescent shows high or low levels of the character trait agreeableness, the effect of family rules that restrict soft drink consumption diminish. Adolescents with low agreeableness tend to ignore the rules more often and those with high levels of agreeableness can be more easily persuaded by their friends to drink soft drinks, even where/when it is not allowed.

**Association with treats and rewards:** Young Australian children who associate soft drinks with treats and rewards were shown to consume more soft drinks than children who do not associate them with treats and rewards (Hattersley et al., 2009).

### **3.2.3 Social determinants**

**Social network:** There are many people within one's social network who can have an impact on soft drink consumption. This was studied in Australian (Hattersley et al., 2009), Dutch (Wouters et al., 2010), Norwegian (Bere et al., 2007) and American (Kassem et al., 2003; Kassem et al., 2004) study populations. The amount of soft drinks an adolescent's friends (Bere et al., 2007; Hattersley et al., 2009; Wouters et al., 2010), parents and family (Bere et al., 2007; Hattersley et al., 2009) consume

have a positive effect on the consumption level of the adolescents. Furthermore, it is also important what the beliefs of these friends about soft drinks are. When friends (Kassem et al., 2003; Kassem and Lee, 2004; Wouters et al., 2010) or parents (Kassem et al., 2003; Kassem and Lee, 2004) for example believe drinking a lot of soft drinks is bad, then the adolescent will be more likely to turn down soft drinks as well. American male adolescents were also shown to listen to and act on what their doctor, teachers and coaches tell them about soft drinks (Kassem and Lee, 2004).

### **3.2.4 Environmental determinants**

**Accessibility and availability:** The higher the accessibility of soft drinks at home, the more soft drinks Norwegian adolescents were shown to drink (Bere et al., 2007). The accessibility can for example be hindered by parents only allowing their children to drink soft drinks in the weekends. Availability of soft drinks at home also has a positive relationship with soft drink consumption for adolescents in the USA (Kassem et al., 2003; Kassem and Lee, 2004), the Netherlands (Ezendam et al., 2009) and Australia (Hattersley et al., 2009). The more soft drinks are present in the house, the more soft drinks an adolescent tends to drink. Availability at schools has the same effect (Wouters et al., 2010) on Dutch adolescents. The distance to the nearest store where soft drinks are sold also matters for adolescents. The closer a store is located to their school or home, the higher their consumption level was shown to be for adolescents in Norway (Bere et al., 2007) and Australia (Hattersley et al., 2009). American female adolescents who always carry enough cash with them to be able to buy soft drinks drink also drink more soft drinks than their peers who do not (Kassem et al., 2003).

**Consumption setting:** American male adolescents, who often eat at a restaurant, were shown to be more likely to drink soft drinks than those who do not go to restaurants often (Kassem and Lee, 2004). Also, Australian adolescents who often purchase fast food and those who visit locations where others consume alcohol, while they are still under the age limit, have a higher soft drink consumption level than their peers (Hattersley et al., 2009). Family meals are on a decline in the USA, with adolescents eating with their friends or grabbing a quick bite as most common alternatives (Neumark-Sztainer, Hannan, Story, Croll and Perry, 2003). However, the more adolescents consume their meals with their family at home, the less soft drinks they tend to drink. The researchers do not know what the exact reasons for this consumption pattern are.

**Advertisement:** Advertisements are commonplace for many products and soft drinks are no exception. The promotion of a specific soft drink by the manufacturer or the store increases the amount adolescents drink in Australia (Hattersley et al., 2009). Furthermore, advertisements seen by American male adolescents, like television commercials or sponsoring of sport teams, increases their soft drink consumption level as well (Kassem and Lee, 2004).

**Rules:** Strict rules regarding soft drinks, which are enforced by adolescent's parents, help to reduce Dutch adolescent's soft drink consumption at home (De Bruijn et al., 2007; Ezendam, Evans, Stigler, Brug and Oenema, 2009). When these strict rules are enforced at school, they helped to reduce Norwegian adolescent's soft drink consumption at home (Bere et al., 2007).

### *3.2.5 Survey items*

Not all the determinants shown in table 3 would make good items for the survey. Therefore, these 45 determinants have been critically looked at and refined into 29 useable and relevant items. The determinants of doing homework, home accessibility, association with treats and rewards, visiting a setting where others are allowed to drink alcohol while you are not, the frequency of family meals, family rules restricting soft drink consumption, agreeableness (with family rules) and school rules restricting soft drink consumption were not used, because all of them only pertain to children and/or adolescents and not to adults. Several other determinants were changed to accommodate the current study population, adults. Income was specified as household income to get the same results from e.g. both a stay-at-home mother and her working husband. Otherwise, it would seem the husband has more money to spend than the mother while this is not the case. School availability was changed into school/workplace availability to be able to reach working adults. The determinants ethnicity and educational level both formed one survey item. The determinants soft drinks make you feel healthy and physical activity were combined into one overarching item, the need to feel and be healthy. Lastly, because the relationship between watching television, SES and soft drink consumption is already established in other literature, data about these relationships was not gathered through the survey. The other 24 determinants were directly translated into survey items.

All 29 determinants that resulted from the literature study and were used as items in the survey are shown in table 4. Two determinants, stated in bold letters, were added to this list, namely eating food that makes you thirsty and stress. Both determinants were added as a result of discussions between the researcher and experts in the field of public health, who within their expertise believed that these items could also be significant determinants for soft drink consumption within different SES groups.

**Table 4: Determinants of soft drink consumption to be used as items in the survey**

<b>Demographics</b>	<b>Individual</b>	<b>Social</b>	<b>Environmental</b>
<i>Age</i>	<i>Need to feel and be healthy</i>	<i>Friends</i>	<i>Home availability</i>
<i>Gender</i>	<i>Quenching of thirst</i>	<i>Parents</i>	<i>Store accessibility</i>
<i>Ethnicity</i>	<i>Taste enjoyment</i>	<i>Other family</i>	<i>School/workplace availability</i>
<i>Education level</i>	<i>Awareness of potential health impact</i>	<i>Doctor's attitude</i>	<i>Carrying enough cash to buy soft drinks</i>
<i>Household Income</i>	<i>Awareness of caffeine content</i>	<i>Teachers and/or coaches attitude</i>	<i>Eating at a restaurant</i>
<i>Body Mass Index</i>	<i>Awareness of sugar content</i>		<i>Purchase fast food</i>
	<i>Expecting a sugar rush</i>		<i>Advertisements</i>
	<i>Pricing</i>		<i>Branding</i>
	<i>Readiness for behavioural change</i>		<b>Eating food that make you thirsty</b>
	<i>Habitual behaviour</i>		<b>Stress</b>

*Note.* The *cursive* determinants are gathered through the literature study, while the **bold** determinants were added by the researcher

## 4. Results: Survey

In this chapter the results of the soft drink consumption survey will be presented. First, the sample will be described in terms of demographics. Following this, the consumption levels for regular and light soft drinks are presented, followed by the differences in determinants of regular soft drink consumption between the low SES group and the high SES group. Then, the results of the linear regression analyses that aimed to identify significant determinants of regular soft drink consumption will be reported. The chapter ends with a paragraph presenting the beliefs of the participants about the differences and similarities between regular and light soft drinks.

### 4.1 Demographics

A summary of the study populations demographics are shown in table 5. The survey was completed by 89 men and 179 women ( $n = 268$ ). This high proportion of female respondents can be explained by the high number of female students who had registered to the email database used for spreading the survey. Ages ranged from 18 to 89 years old, with a mean age of 39. A total of 8 people were underweight (BMI below 18.5), 153 participants had a normal weight (BMI between 18.5 and 25.0) and 83 were overweight (BMI between 25.0 and 30.0). A further 24 people were obese with a BMI higher than 30.0. The mean BMI was 24.5. Of all participants, 239 people had a Dutch heritage, while 10 were Moroccan, 5 Turkish, 2 German, 2 Surinamese, 1 Afghan, 1 Belgian, 1 Bosnian, 1 British, 1 Chinese, 1 Egyptian, 1 Latvian and 1 was Norwegian (1 answer missing and 1 person did not specify which foreign nationality he or she had). Of all participants, 42.9% ( $n = 115$ ) were married, 47.4% ( $n = 127$ ) were not married and had never been married before, while 9.3% ( $n = 25$ ) were divorced and 1 was a widower. When asked about their living situation, 57.8% of the participants ( $n = 155$ ) answered that they live with their partner. Furthermore, 9.7% of them ( $n = 26$ ) had a partner, but did not live together with him or her. Almost a quarter of the participants (24.6%,  $n = 66$ ) lived on their own. This amount also includes students who live in a group home with other students. A total of 6.7% of the people ( $n = 18$ ) lived with their parents, while 2 were living in the house of one of their children. The proportion of people with children ( $n = 129$ ) and those without ( $n = 137$ ) was almost even (2 answers missing).

There were large differences in demographics between the low SES group and the high SES group (table 5). For example, in the low SES group 70.6% of the participants were married and 83.6% had children. In the high SES groups these percentages were respectively 33.5% and 36.7%. The low SES group also had a higher percentage of female participants (75.0% vs 64.0%) and foreign nationalities (25.0% vs 5.5%).

**Table 5. Demographics of participants, divided by SES**

Demographics	Low SES		High SES		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender						
Male	17	25.0	72	36.0	89	33.2
Female	51	75.0	128	64.0	179	66.8
BMI						
<18.5	3	4.4	5	2.5	8	3.0
18.5 – 25.0	27	39.7	124	62.6	151	56.8
25.0 – 30.0	26	38.2	56	28.3	82	30.8
> 30.0	12	17.6	13	6.6	25	9.4
Dutch Heritage						
Yes	51	75.0	188	94.5	239	89.5
No	17	25.0	11	5.5	28	10.5
Marital status						
Married	48	70.6	67	33.5	115	42.9
Not married and never been married	10	14.7	117	58.5	127	47.4
Divorced	9	13.2	16	8.0	25	9.3
Widow(er)	1	1.5	0	0.0	1	0.4
Living Situation						
With partner	51	75.0	104	52.3	155	58.1
Has a partner, but does not live with him/her	2	2.9	24	12.1	26	9.7
Single	12	17.6	54	27.1	66	24.7
With parents	3	4.4	15	7.5	18	6.7
At child's home	0	0.0	2	1.0	2	0.7
Nursing Home	0	0.0	0	0.0	0	0.0
Children						
Yes	56	83.6	73	36.7	129	48.5
No	11	16.4	126	63.3	137	51.5

#### 4.2 Soft drink consumption

Almost one fifth (19.8%,  $n = 53$ ) of the participants reported they never drink either regular or light soft drinks. A further 7.5% ( $n = 20$ ) did drink some amount of light soft drinks, but no regular soft drinks, and 36.2% ( $n = 97$ ) did drink regular soft drinks, but no light. Both regular and light soft drinks were consumed by 36.6% of the participants ( $n = 98$ ). Looking at the total soft drink consumption, 44.8% of the people ( $n = 120$ ) drank an average of one or less glasses per week and 22.4% ( $n = 60$ ) drank an average of seven or more glasses per week. The exact percentages for soft drink consumption per week (regular, light and total) for the total sample, and by SES group, can be found in appendix B. As seen in table 6, participants with a low SES drank an average of 6.62 glasses of regular, 2.29 glasses of light and 8.91 total glasses of soft drinks per week. Participants with a high SES drank an average of 2.23 glasses of regular, 1.77 glasses of light and 4.00 total glasses of soft drinks per week. The differences in the means for regular soft drink consumption and total soft drink consumption between the SES groups were significant ( $p \leq 0.001$ ), while the difference in means for light soft drinks was not significant. When looking at the standard deviations, it can be observed that

the consumption of soft drinks varies between participants (especially with respect to regular soft drinks among the low SES group). The percentages of total regular and light consumption are 63.7% and 36.3% respectively compared to the 69.0% and 31.0% found by the FWS for 2012.

**Table 6. Soft drinks consumption in glasses per week, divided by SES**

Glasses per week	Low SES		High SES		t	p	Total	
	Mean	SD	Mean	SD			Mean	SD
Regular	6.62	10.34	2.23	3.86	5.071	0.000	3.34	6.45
Light	2.29	5.25	1.77	5.26	0.698	0.486	1.90	5.25
Total	8.91	11.64	4.00	6.65	4.264	0.000	5.24	8.46

### *4.3 Determinants of regular soft drink consumption*

An independent-Samples T Test, with a confidence interval of 95%, was performed to determine if there were significant differences between the scores on specific determinants in the low and the high SES groups. The results are shown in tables 7, 9 and 11. Multiple linear regression analyses were performed with soft drink consumption as the dependent variable and the 25 studied determinants as the independent variables. The regression analyses were conducted on the different SES groups separately and on the total sample. The confounders gender and ethnicity (Dutch heritage or not) were added to the final regressions whenever they proved to have a significant relation with regular soft drink consumption in that particular model. The results are shown in tables 8, 10 and 12. The results of these tests will be presented in the following three paragraphs. The paragraphs are structured by the three other (besides demographics) determinant categories from the Main Determinants of Health model (individual, social and environmental).

#### *4.3.1 Individual determinants*

Of the ten investigated individual variables, four had a significant difference in mean between the low and high SES groups (table 7). These variables were readiness for behavioural change ( $p \leq 0.05$ ), awareness of caffeine content ( $p \leq 0.05$ ), expecting a sugar rush ( $p \leq 0.05$ ) and habitual behaviour ( $p \leq 0.05$ ). All four of the variables had a higher mean in the low SES group. It must be noted that they are all below 3.00, meaning that even in the low SES group the beliefs about how relevant these determinants are to them personally was low.

**Table 7. Differences in regular soft drink consumption beliefs related to individual determinants between SES groups**

Individual Determinants	Low SES		High SES		<i>t</i>	<i>p</i>
	Mean	<i>SD</i>	Mean	<i>SD</i>		
Need to feel and be healthy	4.26	0.59	4.10	0.66	1.866	0.063
Taste enjoyment	3.09	1.16	3.21	1.06	- 0.783	0.434
Quenching of thirst	2.67	1.23	2.69	1.00	- 0.154	0.877
Awareness of potential health impact	3.79	0.98	3.99	0.81	- 1.606	0.110
Awareness of sugar content	4.26	0.73	4.24	0.77	0.164	0.870
Price	2.46	1.06	2.63	1.02	- 1.150	0.251
Readiness for behavioural change	2.94	1.31	2.55	1.16	2.289	0.023
Awareness of caffeine content	2.37	1.30	2.01	1.04	2.356	0.019
Expecting a sugar rush	2.51	1.38	2.08	1.15	2.498	0.013
Habitual behaviour	2.28	1.36	1.89	1.09	2.422	0.016

For individual determinants, age was the only significant confounder and it was only significant in the low SES group. Of the ten individual variables, five were significantly associated with regular soft drink consumption (table 8). The need to feel and be healthy was significant when the total sample was studied ( $p \leq 0.05$ ), but not when the low and high SES groups were examined separately. Furthermore, taste enjoyment had a significant positive relationship with consumption within the high SES group ( $p \leq 0.05$ ), but not within the low SES group. Readiness for behavioural change ( $p \leq 0.05$ ) was a positive indicator, and awareness of caffeine content ( $p \leq 0.05$ ) a negative indicator, for regular soft drink consumption within the low SES group, but not within the high SES group. Habitual behaviour was the only determinant that showed a positive relationship with consumption in both groups. In the high SES group ( $p \leq 0.001$ ) this correlation was strong ( $\beta = 0.488$ ) and for the low SES group ( $p \leq 0.05$ ) it was moderate ( $\beta = 0.272$ ). The explained variance ( $R^2$ ) for the low SES group was 0.521, for the high SES group it was 0.391 and for the total sample it was 0.349.

**Table 8. Linear regression analysis of individual determinants influencing regular soft drink consumption, divided by SES**

Individual Determinants	Low SES ( $R^2 = .521$ )		High SES ( $R^2 = .391$ )		Total ( $R^2 = .349$ )	
	$\beta$	$p$	$\beta$	$p$	$\beta$	$p$
Need to feel and be healthy	.124	.262	-.030	.656	.119	.039
Taste enjoyment	.192	.136	.164	.033	.108	.102
Quenching of thirst	.192	.172	-.070	.315	.055	.374
Awareness of potential health impact	-.008	.948	-.028	.719	-.076	.243
Awareness of sugar content	-.011	.936	-.076	.313	-.047	.474
Price	-.042	.697	.037	.544	-.047	.382
Readiness for behavioural change	.237	.045	-.020	.746	.059	.278
Awareness of caffeine content	-.393	.011	-.109	.142	-.162	.018
Expecting a sugar rush	.101	.482	.047	.529	.023	.730
Habitual behaviour	.272	.049	.477	.000	.453	.000
Age	-.269	.021	-.098	.107	-.074	.170

#### 4.3.2 Social determinants

Five social determinants were investigated (table 9). None of them proved to be significantly different between the low and the high SES group. Family consumption comes closest, but even this determinant had a  $p$ -value of 0.169.

**Table 9. Differences in regular soft drink consumption beliefs related to social determinants between SES groups**

Social Determinants	Low SES		High SES		$t$	$p$
	Mean	$SD$	Mean	$SD$		
Friends' consumption	3.26	0.97	3.11	0.97	1.128	0.260
Parents' consumption	2.23	1.00	2.06	0.96	1.234	0.218
Family (other than parents) consumption	3.24	0.96	3.05	1.02	1.379	0.169
Doctor's attitude	2.12	1.16	2.21	0.90	-0.633	0.527
Teachers and/or coaches' attitude	2.05	1.12	2.22	0.92	-1.236	0.218

For social determinants, both age and ethnicity were significant confounders. They were both significant in the low SES group, while only age was significant in the high SES group and neither of them was significant in the total population. The linear regression analyses showed that two of the five variables significantly correlated with regular soft drink consumption, as shown in table 10. Friends had a strong ( $\beta = 0.270$ ) and significant ( $p \leq 0.001$ ) association with consumption in the high SES group. The determinant parents' consumption had a negative relationship with regular soft drink consumption within the low SES group ( $p \leq 0.05$ ). The  $R^2$  for the low SES group was 0.268, for the high SES group it was 0.125 and for the total sample it was 0.070.

**Table 10. Linear regression analysis of social determinants influencing regular soft drink consumption, divided by SES**

Social Determinants	Low SES ( $R^2 = .268$ )		High SES ( $R^2 = .125$ )		Total ( $R^2 = .070$ )	
	$\beta$	$p$	$\beta$	$p$	$\beta$	$p$
Friends' consumption	.133	.354	.270	.001	.209	.003
Parents' consumption	-.277	.044	-.008	.914	-.107	.120
Family (other than parents) consumption	-.055	.695	-.012	.877	-.001	.994
Doctor's attitude	.132	.434	.140	.371	.100	.359
Teachers and/or coaches' attitude	-.059	.724	-.219	.162	-.122	.257
Age	-.441	.001	-.147	.044	-.113	.077
Ethnicity	-.272	.041	-.004	.950	.034	.566

### 4.3.3 Environmental determinants

Of the ten investigated environmental variables, four showed a significantly different mean in the low compared to the high SES group (table 11). These variables are home availability ( $p \leq 0.01$ ), store accessibility ( $p \leq 0.01$ ), eating at a restaurant ( $p \leq 0.05$ ) and school/workplace availability ( $p \leq 0.05$ ). Home availability scored higher in the low SES group, while store accessibility, eating at a restaurant and school/workplace availability scored higher in the high SES group. Store accessibility had a mean score above 4.0 in both SES groups, showing that the perceived accessibility of soft drinks was high.

**Table 11. Differences in regular soft drink consumption beliefs related to environmental determinants between SES groups**

Environmental Determinants	Low SES		High SES		$t$	$p$
	Mean	$SD$	Mean	$SD$		
Home availability	3.29	1.44	2.72	1.48	2.778	0.006
Store accessibility	4.19	0.96	4.51	0.78	- 2.669	0.008
Eating at a restaurant	3.19	1.32	3.53	1.14	- 1.978	0.049
School/Workplace availability	3.09	1.41	3.65	1.31	- 2.943	0.004
Advertisements	3.69	1.08	3.54	1.04	1.023	0.307
Branding	2.63	1.10	2.72	0.80	- 0.707	0.480
Eating food that makes you thirsty	2.78	1.02	2.94	0.90	- 1.228	0.221
Stress	2.75	1.24	2.77	1.01	- 0.124	0.901
Purchasing of fast food	2.19	1.00	2.06	0.77	1.134	0.258
Carrying enough cash to buy soft drinks	3.43	1.12	3.39	1.30	0.242	0.809

For environmental determinants, age was the only significant confounder in all three groups (low SES, high SES and total). When looking at the relationships between the ten environmental determinants and regular soft drink consumption, two of them appeared significant (table 12). Home availability had a significant relationship with consumption for those with a high SES ( $p \leq 0.001$ ) and a low SES ( $p \leq 0.01$ ). Home availability also had the strongest relationship with regular soft drink

consumption of all environmental variables within both the low SES group ( $\beta = 0.361$ ) and the high SES group ( $\beta = 0.380$ ). Purchasing of fast food also correlated positively with the consumption among the high SES group ( $p < 0.01$ ), but not with the low SES group. The explained variance ( $R^2$ ) for the low SES group was 0.344, for the high SES group it was 0.288 and for the total sample it was 0.228.

**Table 12. Linear regression analysis of environmental determinants influencing regular soft drink consumption, divided by SES**

Environmental Determinants	Low SES ( $R^2 = .344$ )		High SES ( $R^2 = .288$ )		Total ( $R^2 = .228$ )	
	$\beta$	$p$	$\beta$	$p$	$\beta$	$p$
	Home availability	.361	.005	.380	.000	.380
Store accessibility	.159	.227	-.018	.785	.016	.790
Eating at a restaurant	-.083	.568	-.140	.056	-.109	.100
School/Workplace availability	.061	.652	.011	.876	-.005	.940
Advertisements	-.024	.850	-.013	.856	-.003	.967
Branding	-.030	.813	.025	.699	.007	.909
Eating food that makes you thirsty	.081	.617	-.021	.755	-.009	.883
Stress	-.148	.254	-.121	.058	-.088	.130
Purchasing of fast food	.111	.497	.196	.003	.180	.004
Carrying enough cash to buy soft drinks	-.092	.507	.095	.150	-.001	.980
Age	-.306	.040	-.359	.000	-.253	.000

#### 4.3.4 Summary

Tables 13 and 14 show summaries of all statistically significant findings. A total of eight variables, four individual and four environmental, were found to have significant differences in means between the two SES groups. Nine determinants had a significant relationship with regular soft drink consumption. Five of the determinants do so within the low SES group, five in the high SES group and six in the total sample. When looking for overlap between determinants that have significant differences in means between the high and the low SES groups, and determinants with a significant influence on regular soft drink consumption, two determinants emerged. These two determinants are home availability (low SES, high SES and total) and habitual behaviour (low SES, high SES and total).

**Table 13. Determinants with significant differences in means between SES groups**

Individual	Environmental
Readiness for behavioural change*	Home availability**
Awareness of caffeine content*	Store accessibility**
Expecting a sugar rush*	Eating at a restaurant*
Habitual Behaviour*	School/Workplace availability*

Note. \*  $p \leq 0.05$ , \*\*  $p \leq 0.01$ , \*\*\*  $p \leq 0.001$

**Table 14. Significant correlates of regular soft drink consumption by SES group**

Low SES	High SES	Total
		Need to feel and be healthy* (+)
	Taste Enjoyment* (+)	
Readiness for behavioural change* (+)		
Awareness of caffeine content* (-)		Awareness of caffeine content* (-)
Habitual behaviour* (+)	Habitual behaviour*** (+)	Habitual behaviour*** (+)
	Friends' consumption*** (+)	Friends' consumption** (+)
Parents' consumption* (-)		
Home availability** (+)	Home availability*** (+)	Home availability*** (+)
	Purchasing of fast food** (+)	Purchasing of fast food** (+)

Note. \*  $p \leq 0.05$ , \*\*  $p \leq 0.01$ , \*\*\*  $p \leq 0.001$ , (+) positive influence, (-) negative influence.

The linear multiple regressions showed that the ten studied individual determinants and its confounder age together explained 52.1% of the variance ( $R^2$ ) for the low SES group, 39.1% for the high SES group and 34.9% for the total study population. For social determinants these numbers are 26.8%, 12.5% and 7.0% respectively after adding the confounders age and ethnicity. Lastly, for the environmental determinants category the numbers are 34.4%, 28.8% and 22.8% after adding the confounder age. Even though only the regression analysis of the social determinants made use of the confounder ethnicity, the explained variances of the different categories can still be compared to one another since the effect of ethnicity on the explained variance of the other two categories is negligible. The results indicate that the ten items listed under individual determinants are the best predictor for regular soft drink consumption, followed by environmental determinants and finally social determinants.

#### 4.4 Regular vs Light

Since it was gathered from the survey feedback and observations that the questions about the feelings of the participants towards regular and light soft drinks were not understood by everyone, the results from these items must be interpreted with caution. The results can be observed in table 15. The only statistically significant difference in means between the SES groups appeared when asked which type of soft drink is more sociable (“gezelliger” in Dutch, which has no direct translation in English;  $p \leq 0.05$ ). The adults from the low SES group found regular soft drinks more sociable than light soft drinks, in comparison to their peers in the high SES group. The statement that regular soft drinks taste better than light soft drinks had the highest mean of all five variables in both the low SES group ( $M = 3.66$ ) and the high SES group ( $M = 3.64$ ).

**Table 15. Beliefs of the differences and similarities between regular and light soft drinks by SES group**

Regular soft drinks...	Low SES		High SES		<i>t</i>	<i>p</i>	Total	
	Mean	<i>SD</i>	Mean	<i>SD</i>			Mean	<i>SD</i>
Taste better	3.66	0.66	3.64	0.75	0.263	0.793	3.64	0.72
Are worse for your health	3.37	0.62	3.41	0.59	- 0.443	0.658	3.40	0.60
Are cheaper	3.18	0.52	3.18	0.38	0.069	0.945	3.18	0.42
Are consumed more often in my social environment	3.49	0.68	3.34	0.55	1.901	0.058	3.37	0.59
Are more sociable	3.16	0.48	3.06	0.25	2.360	0.019	3.08	0.33

*Note.* A 3-point scale was used for this data. 3 = totally disagree, disagree, equal, 4 = agree, 5 = totally agree

## 5. Conclusion

In this chapter the (sub) research questions will be answered.

1. *What are the trends and patterns regarding soft drink consumption in western societies found in literature?*

Worldwide the consumption of soft drinks is on the rise. However, this is mainly caused by the increased consumption in non-western countries. In most western societies like the Netherlands soft drink consumption has either stabilized or a small decline was measured. In the USA this decline has been compensated mainly by an increase in bottled water consumption, marking an increase of over 55% between 2001 and 2011. No such increase has been measured in the Netherlands however. Even with the decline in soft drink consumption, twelve of the top twenty countries (ranked by the amount of soft drinks purchased per country) are western countries. Of all western countries the Netherlands ranked above average (20<sup>th</sup>). Regular soft drink consumption has increased in recent years, while light soft drink consumption has slightly dropped. In 2008, 67.6% (66.9l) of the average amount of soft drinks consumed in the Netherlands was regular soft drinks and 32.4% (32.0l) was light soft drinks. In 2012 the gap between the two types of soft drinks increased to 69.0% (70.3l) and 31.0% (31.6l) respectively. This shows that regular soft drink consumption is still a relevant issue and health concern.

Many studies have shown that SES correlates negatively with soft drink consumption. People with a low SES drink the highest amount of soft drinks, while people with a high SES drink the least amount of soft drinks. People in lower socioeconomic groups are also more likely to experience chronic ill-health and die earlier than those with a higher SES. While the average socioeconomic status of the population in western countries is increasing, the differences in wealth and health between different SES levels are also increasing. This makes narrowing the SES gap and targeting low SES groups when creating and implementing interventions all the more important when battling public health issues, like soft drink consumption.

2. *What are the determinants leading to soft drink consumption in western societies found in literature?*

From the 24 articles selected for the literature study, a total of 45 significant determinants for soft drink consumption were retrieved, as shown in table 3. In the articles six different age groups were used as the study population, with a majority of fifteen articles focussing on adolescents. Only one of the determinants was linked to SES, namely watching television (Rey-López et al., 2011). Adolescents

from families with a lower SES drank more soft drinks while watching television than their peers from higher SES groups. Several articles reported contrasting results on the effect of some of the determinants on soft drink consumption. SES was mostly found to correlate negatively with consumption, but was also shown to have a positive effect (Arcan et al., 2009). Nilsen et al. (2009) did not find any differences in soft drink consumption between different income levels, while other articles found either a negative association between income and consumption levels (Han and Powell, 2012) or between household income and consumption levels (Rehm et al., 2008). Two of the determinants have non-linear relationships with soft drink consumption. Age has a positive relationship with soft drink consumption from a young age until early adulthood. Then the relationship starts to stabilize until it turns into a negative relationship, with a person's consumption decreasing the older they get. The other determinant with a non-linear relationship with soft drink consumption is agreeableness with family rules. Research by de Bruijn et al. (2007) showed that adolescents with either a very low or very high agreeableness level are more likely to not adhere to these rules and consume more soft drinks. This is caused by the adolescent simply not willing to follow the rules (low agreeableness) or because they are easily persuaded by peers into consuming soft drinks (high agreeableness). High agreeableness does cause them to follow the rules set by their parents, but when they are in the presence of their peers they get easily persuaded to break the rules as well.

### 3. What are the differences and similarities in determinants of regular soft drink consumption between adults in different SES groups?

The results of the survey showed that there were significant differences in regular soft drink consumption beliefs, between participants belonging to the low and the high SES groups, for eight of the researched determinants. Readiness for behavioural change, awareness of caffeine content, expecting a sugar rush, habitual behaviour and home availability all had a higher mean within the low SES group. Store accessibility, eating at a restaurant and school/workplace availability scored higher within the high SES group. The other seventeen determinants within the individual, social and environmental categories showed no significant differences in means. Readiness for behavioural change (positive relationship,  $p \leq 0.05$ ), parents' consumption (negative relationship,  $p \leq 0.05$ ) and awareness of caffeine content (negative relationship,  $p \leq 0.05$ ) correlated with regular soft drink consumption only within the low SES group, while purchasing of fast food (positive relationship,  $p \leq 0.01$ ), friends' consumption (positive relationship,  $p \leq 0.01$ ) and taste enjoyment (positive relationship,  $p \leq 0.05$ ) did the same within the high SES group. Home availability and habitual behaviour correlated with regular soft drink consumption for both SES groups. Within the low SES

group home availability had a positive relationship and a  $p$ -value of 0.01 or less, while habitual behaviour showed a positive relationship and a  $p$ -value of 0.05 or less. Within the high SES group both relationships are positive as well, with  $p$ -values of 0.001 or less for both correlates.

## 6. Discussion

Previous research has shown that people with a low SES consume more soft drinks than people with a high SES (Hulshof et al., 2003; French et al., 2010; Mendes, 2013), while regular soft drink consumption has been associated with increased health risks (Malik et al., 2010; Mozaffarian et al., 2011; de Koning et al., 2012). This study aimed to gain insight into the trends and patterns of soft drink consumption, as well as the possible differences in determinants of regular soft drink consumption between adults in low and high SES groups.

In this chapter the results will be discussed and interpreted. Then the research methods and its limitations will be looked at. Finally, recommendations for possible future research will be presented.

### *6.1 Interpretation of the results*

When crosschecking the amount of soft drinks consumed in the Netherlands with the percentages of regular and light soft drinks consumed it was found that while the consumption levels seem to have stabilized, there has actually been an increase in the use of regular soft drinks. Regular soft drinks have been shown to cause health problems and the increase in consumption gives this type of research extra validation. It is also worth noting that while western countries still face most health problems from soft drink consumption, the use in other countries is quickly rising. Mexico ranked second in 2011 and five other Middle and South American countries were part of the top twenty as well (Check et al., 2012). A publication by the Food and Agriculture Organisation (FAO, 2013) about the state of food and agriculture showed that in 2008 the percentage of obese citizens in Mexico (32.8%) surpassed those in the United States (31.8%), which ranked number one in soft drink consumption in 2011. In recent years soft drink consumption has started to shift from being mainly a western problem to a global public health issue and is therefore constantly becoming more relevant.

The literature research helped to identify the determinants, patterns and trends of soft drink consumption in western societies and to find out what information is available about the differences and similarities in determinants of soft drink consumption between different SES groups. This led to one article about watching television, which showed that adolescents from low SES groups drink more soft drinks while watching television than their peers from higher SES groups (Rey-López et al., 2011). The determinants of soft drink consumption that were looked at in this study were (parents') SES and time spent watching television. In contrast, the scope of the current paper was broad and explorative, because of a lack of articles about determinants of soft drink consumption in different SES groups. When translating the 45 found determinants into 29 useable items for the survey, some of the determinants were excluded. Most of the exclusions were a result of the determinants only

applying to children and/or young adults (e.g. family rules and association with treats and rewards). The main reason for excluding watching television was that its relationships with SES and soft drink consumption were already proven in another article. It also seemed to apply only to adolescents.

When looking at the soft drink consumption of the participants, the low SES group consumed more of both regular and light soft drinks than the high SES group, just like what other studies with a seemingly more representative study population have shown (Hulshof et al., 2003; French et al., 2010; Mendes, 2013). The participants drank less regular compared to light soft drinks (63.7% vs 36.3%) than the Dutch population did in 2012 (69.0% vs 31.0%; FWS, 2013). This could be caused by the amount of time that passed between the data collection moments, but a more probable explanation is that this is caused by differences in demographics between the study participants and the population at large.

The linear multiple regressions that were performed to analyse the survey data showed that the ten studied individual determinants and its confounder age together explained 52.1% of the variance ( $R^2$ ) for the low SES group, 39.1% for the high SES group and 34.9% for the total study population. For social determinants these numbers are 26.8%, 12.5% and 7.0% respectively, after adding the confounders age and ethnicity. Lastly, for the environmental determinants category the numbers are 34.4%, 28.8% and 22.8% after adding the confounder age. At first glance it looks like the determinants affect regular soft drink consumption more in the low SES group than in the high SES group. However, the different percentages within the three categories can at least partially be attributed to the fact that the confounders have a stronger relationship with regular soft drink consumption in the low SES group than in the other categories. This could have been caused by the demographics of the low SES group (table 5), which are not representative of the Dutch population at large. If the demographics would have been representative of the population at large, then the confounders used to perform the regression analyses would not have as large an influence on the results as they currently do. It was interesting to see that gender was not a significant confounder in any of the regressions, while many studies named gender as a determinant for soft drink consumption (e.g. Rangan et al., 2008; Evans et al., 2010; Rey-López et al., 2011). This would seem to indicate that the variables that were used in this survey study are not significantly related to the gender of the participant. Because confounders which are not significant have only a very limited effect on the explained variance in regular soft drink consumption ( $R^2$ ) of the three categories, the results of the three multiple regression analyses can still be compared to one another, even though different confounders were used. Another explanation for the different explained variance percentages is the difference in group sizes ( $n = 68, 200$  and  $268$  respectively). The greater the sample size, the closer  $R^2$  is to its real value. Low sample sizes are biased towards a higher  $R^2$ ,

compared to higher sample sizes (Reisinger, 1997). This means the  $R^2$ 's for the different SES groups are most likely much more similar than the percentages seem to indicate. The results also indicate that the ten items listed under individual determinants are the best predictor for regular soft drink consumption, followed by environmental determinants and finally social determinants. This shows when looking at significant correlates of regular soft drink consumption in the different SES groups as well. The strongest correlates could be found within the individual determinants category ( $n = 5$ ), followed by environmental determinants ( $n = 2$ ) and social determinants ( $n = 2$ ). Two individual and two environmental determinants each had significant differences in means between SES groups, meaning that the beliefs about these determinants the participants in the low SES group had are different from the beliefs of those in the high SES group. While home availability and habitual behaviour had a higher mean score in the low SES group, they had significant positive correlations with regular soft drink consumption in both SES groups.

The survey scores for home availability are especially interesting. When asked about how often they have regular soft drinks at home, the participants with a low SES generally answered that they often have soft drinks at home ( $M = 3.29$ ), while the high SES group said they did not ( $M = 2.72$ ). This indicates that the availability of regular soft drinks at your home is of larger concern when battling (regular) soft drink consumption in low SES populations. The results on home availability are in line with research done on the relationship between home availability and other types of consumption, like family meal and home-prepared dinner consumption (Appelhans, Waring, Schneider and Pagoto, 2014), fruit and vegetable consumption (Rasmussen et al., 2006) and alcohol consumption (Spijkerman, Van Den Eijnden and Huiberts, 2008). When you have to put in extra effort in order to consume a product, like going to a store, it becomes less tempting to consume that product. Furthermore, most people rely at least partially on other members of their household to do their groceries shopping for them (Private Label Manufacturers Association, 2013). This means that the people who do not do their own shopping every time, only have limited influence on the home availability of food and drink products. This is an important factor to keep into consideration when focussing on home availability.

Even without the results of the survey it seems logical that people who have the habit of consuming regular soft drinks will consume more of them than people who do not have this habit. When a habit involves consumption of a product that can have adverse effects on your health it becomes a concern. In literature and in the media bad habits tend to focus on smoking (e.g. Doll, Peto, Boreham and Sutherland, 2004; Robinson and Smith, 2014) and alcohol consumption (e.g. Zhu, St-Onge, Heshka and Heymsfield, 2004; Smith, Robinson and Segal, 2014). In general these two habits are more dangerous for one's health than the habit of regular soft drink consumption, but that does not

mean the habit of regular soft drink consumption should be overlooked. Habits also tend to be difficult to change, especially without outside help (McGonigal, 2010). If you are not sure why you are changing, do not fully believe you are making the right choice, or question whether what you are doing will work, you are likely to settle back on your automatic behaviours. However, when habits change, the behaviour associated with the habit also changes greatly. This means it is usually worth the time and effort to change habits (Duhigg, 2012). This could very well also apply to regular soft drink consumption.

Of the five statements about the differences and similarities between regular and light soft drinks only one resulted in significantly different answers between both SES groups. People within the low SES group indicated that they find regular soft drinks more sociable (“gezelliger” in Dutch) than light soft drinks. This could mean that they are more inclined to drink soft drinks, when they want to create or enjoy a pleasant atmosphere, than their peers in the high SES group. In literature sociable drinking is often linked to alcoholic beverages (e.g. Smith, Abbey and Scott, 1993; Törrönen and Maunu, 2007), so it seems plausible that the same relationship exists for regular soft drinks. The findings could possibly be linked to the association of soft drinks that children have with treats and rewards that was found in the literature (Hattersley et al., 2009). Thinking of soft drinks as a treat or reward is also a method of making consumption more enjoyable or in this case, more sociable. Although this has only been proven to be significant for children, it could have the same effect for adults within the low SES group.

## *6.2 Limitations of the research*

The criteria of a minimum of 10 cites for articles to be included in the literature study was used in order to only find articles that were good or interesting enough to be cited by other articles, and thus had a higher chance of containing relevant data for this study. By using this method relevant recent articles could have been excluded, because they had not been available long enough yet to gather 10 cites. In order to minimize the amount of articles missed, the number of required cites was intentionally kept low.

Just 3 of the 24 articles used in the literature study targeted adults specifically. This means many of the found determinants were not proven for adults. Many of the articles also did not distinguish between regular and light soft drinks. An exploratory study could help to find out which determinants might apply to adults and regular soft drinks. Because an exploratory study was used, it was important to gather many determinants and participants. The participants were gathered with convenience and snowball sampling. This had as a consequence that there were large differences in demographics between the low SES group and the high SES group. This is especially noticeable in the

low SES group where 70.6% of the participants were married and 25.0% did not have a Dutch heritage, while around 50% of the general Dutch adult population was married and around 20.0% did not have a Dutch heritage in 2013 (CBS, 2014). The SES groups also differed greatly in size. The low SES group ( $n = 68$ ) was almost three times as small as the group with the high SES ( $n = 200$ ). Because this is an exploratory study, these differences are not problematic. However, this should always be taken into account when looking at the data and results. The results of this research can help to give direction to future research, but not be used as definitive conclusions.

Initially, only an online survey would be created. However, based on feedback during the pilot-test of the survey among potential participants it was decided to add a paper version. The paper survey was identical to the online version in questions and wording. The paper survey was especially effective in reaching low SES participants with 22 out of 27 paper data entries belonging to this group. In comparison, 46 of the 241 online responses were part of the low SES group. Since one of the aims of the survey was to reach a reasonable amount of participants from both SES groups adding the paper survey proved successful. One of the obstacles of creating the survey was the translation from the English determinants into Dutch items. When processing the results, they had to be translated into English again. Despite using the most proper translations available, there is always the chance some meaning has been lost in translation.

After gathering the survey data and reading the feedback on the survey it became clear that some of the questions were not interpreted the same by everyone. One question asked the participants if they believe that their parents drink a lot of regular soft drinks. It was meant to indicate current or, when the parents have passed away, past consumption. However, multiple participants indicated that their parents had passed away and thus replied they totally disagree with the statement no matter if they did drink a lot of soft drinks when they were alive or not. This makes the responses to this item unreliable. The results indicate that parents soft drink consumption correlates with soft drink consumption within the low SES group, however since the reliability cannot be guaranteed for all participants it is recommended to interpret this result with caution. Another potential issue that came up through the feedback included the question (17) about the differences and similarities between regular and light soft drinks. The question provided five statements in the line of “regular soft drinks [.....] than light soft drinks” with five different items added in between the brackets. Participants could choose between five possible answers: totally disagree, disagree, equal, agree, and totally agree. For example, when participants believed light soft drinks taste much better than regular soft drinks they should fill in totally disagree if the statement was “regular soft drinks [taste better] than light soft drinks”. When they found the taste for both about the same they should fill in equal. However, from the feedback and results it could be gathered that a portion of the participants

filled in totally disagree or disagree, even when they found regular and light soft drinks to be equal. To compensate for this discrepancy it was decided to give the answers ‘totally disagree’, ‘disagree’ and ‘equal’ the score three, while ‘agree’ counted as four and ‘totally agree’ as five. This helped to preserve the reliability of the answers to the question. It also caused the results to become less detailed, since there were only three potential answers left. A possible solution to this problem is to restructure the question and put regular soft drinks on one end of a scale and light soft drinks on the other end, with several answer options in between. Probably, the participant can then better interpret the answer options.

### *6.3 Recommendations for future research*

The availability of regular soft drinks at home and the habit of drinking regular soft drinks correlated positively with regular soft drink consumption in both SES groups. Also, people with a low SES more strongly believed that they often have regular soft drinks at home and that drinking regular soft drinks is a habit for them, than people with a high SES. Since the current research is not able to provide any explanations for this, additional research could focus on the matter. With a better understanding, it could help to create effective intervention programs targeting regular soft drink consumption in specific SES groups. When targeting low SES groups, additional research could also focus on how much people know about the caffeine content of regular soft drinks and how important this is in their choice to consume these drinks or not. It can also focus on the readiness of people with a low SES to change their consumption behaviour. Although it is logical that people who drink more soft drinks are more inclined to want to change this behaviour than those who drink few soft drinks, it is curious why this same relationship is not present within the high SES group. When targeting high SES groups specifically, additional research could focus on how much peoples’ regular soft drink consumption is influenced by how much they enjoy the taste of regular soft drinks, the frequency with which they go and buy fast food, what friends think about soft drink consumption and how much these friends consume. Any follow-up study should make use of a representative study population, to discover if the relationships also hold within the population at large. Not only could such research and the development of intervention programs targeting specific SES groups help battle the public health problems in western societies, but it also becomes more and more relevant for non-western countries like Mexico as time passes.

## References

- American Heart Association (2013). Heart Disease and Stroke Statistics—2013 Update. A Report From the American Heart Association. *Circulation*, Vol. 127, pp. 6-245.
- APA; American Psychological Association (2014). *Work, Stress, and Health & Socioeconomic Status*. Retrieved on 27-05-2014 from <http://www.apa.org/pi/ses/resources/publications/factsheet-wsh.aspx>.
- Appelhans, B.M., Waring, M.E., Schneider, K.L. and Pagoto, S.L. (2014). Food preparation supplies predict children's family meal and home-prepared dinner consumption in low-income households. *Appetite*, Vol. 76, pp. 1-8.
- Aranceta, J., Pérez-Rodrigo, C., Ribas, L. and Serra-Majem, L.I. (2003). Sociodemographic and lifestyle determinants of food patterns in Spanish children and adolescents: The enKid study. *European Journal of Clinical Nutrition*, Vol. 57, Issue supplement 1, pp. s40-s44.
- Arcan, C., Kubik, M.Y., Fulkerson, J.A. and Story, M. (2009). Sociodemographic Differences in Selected Eating Practices among Alternative High School Students. *Journal of the American Dietetic Association*, Vol. 109, Issue 5, pp. 823-829.
- Bellisle, F. and Drewnowski, A. (2007). Intense sweeteners, energy intake and the control of body weight. *European Journal of Clinical Nutrition*, Vol. 61, Issue 6, pp. 691-700.
- Bere, E., Glomnes, E.S., te Velde, S.J. and Klepp, K. (2007). Determinants of adolescents' soft drink consumption. *Public Health Nutrition*, Vol. 11, Issue 1, pp. 49-56.
- Beverage Information Group (2012). *How America's Drinking Habits Changed*. Retrieved on 25-11-2013 from <http://www.theatlantic.com/business/archive/2013/01/how-america-drinks-water-and-wine-surge-cheap-beer-and-soda-crash/267153/>.
- British Soft Drinks Association. (2013). *The 2013 UK soft drinks report*. Retrieved on 22-4-2014 from <http://www.britishtsoftdrinks.com/PDF/2013UKsoftdrinksreport.pdf>.
- de Bruijn, G., Kremers, S.P.J., de Vries, H., van Mechelen, W. and Brug, J. (2007). Associations of social–environmental and individual-level factors with adolescent soft drink consumption: results from the SMILE study. *Health Education Research*, Vol. 22, Issue 2, pp 227-237.
- de Bruijn, G. and van den Putte, B. (2009). Adolescent soft drink consumption, television viewing and habit strength. Investigating clustering effects in the Theory of Planned Behaviour. *Appetite*, Vol. 53, Issue 1, pp. 66-75.
- CBS; Centraal Bureau voor Statistiek; Statistics Netherlands (2010). *Voedings- en genotmiddelen; consumptie per Nederlander*. Retrieved on 15-10-2013 from <http://statline.cbs.nl/StatWeb/publication/?VW=T&DM=SLNL&PA=37154&D1=a&D2=0-1,11,21,31,41,51,61,71,81,86,91,96,101-110,l&HD=120530-1657&HDR=G1&STB=T>.

CBS; Centraal Bureau voor Statistiek; Statistics Netherlands (2013). *Bevolking; kerncijfers*. Retrieved on 29-05-2014 from <http://statline.cbs.nl/StatWeb/publication/?VW=T&DM=SLNL&PA=37296ned&D1=a&D2=0,10,20,30,40,50,60,%28l-1%29,l&HD=130605-0924&HDR=G1&STB=T> .

CBS; Centraal Bureau voor Statistiek; Statistics Netherlands (2013). *Gemiddeld inkomen; particuliere huishoudens naar diverse kenmerken*. Retrieved on 17-12-2013 from <http://statline.cbs.nl/StatWeb/publication/?DM=SLNL&PA=70843ned&D1=a&D2=0&D3=0&D4=a&HDR=G1,G2,G3&STB=T&VW=T> .

Check, D., Dodson, M. and Kirk, C. (2012). *Americans Drink More Soda Than Anyone Else*. Original data from Euromonitor International. Retrieved on 20-11-2013 from [http://www.slate.com/articles/health\\_and\\_science/map\\_of\\_the\\_week/2012/07/map\\_of\\_soda\\_consumption\\_americans\\_drink\\_more\\_than\\_anyone\\_else\\_.html](http://www.slate.com/articles/health_and_science/map_of_the_week/2012/07/map_of_soda_consumption_americans_drink_more_than_anyone_else_.html) .

Choi, H.K. and Curhan, G. (2008). Soft drinks, fructose consumption, and the risk of gout in men: prospective cohort study. *British Medical Journal*. Vol. 336, Issue 7639, pp. 309-312.

Choi, H.K., Willett, W. and Curhan, G. (2010). Fructose-rich beverages and risk of gout in women. *JAMA: The Journal of the American Medical Association*. Vol. 304, Issue 20, pp. 2270-2278.

Coon, K.A., Goldberg, J., Rogers, B.L. and Tucker, K.L. (2001). Relationships between use of television during meals and children's food consumption patterns. *Pediatrics*, Vol. 107, Issue 1, pp. E7.

Dahlgren, G. and Whitehead, M. (1991). *Policies and Strategies to Promote Social Equity in Health*. Stockholm, Sweden: Institute for Futures Studies.

Dahlgren, G. and Whitehead, M. (2007). *Policies and Strategies to Promote Social Equity in Health. Background document to WHO – Strategy paper for Europe*. Stockholm, Sweden: Institute for Futures Studies.

Doll, R., Peto, R., Boreham, J. and Sutherland, I. (2004). Mortality in relation to smoking: 50 Years' observations on male British doctors. *British Medical Journal*, Vol. 328, Issue 7455, pp. 1519-1528.

Duhigg, C. (2012). *The power of habit*. New York, NY: Random House.

Evans, A.E., Springer, A.E., Evans, M.H., Ranjit, N. and Hoelscher, D.M. (2010). A descriptive study of beverage consumption among an ethnically diverse sample of public school students in Texas. *Journal of the American College of Nutrition*, Vol. 29, Issue 4, pp. 387-396.

Ezendam, N.P.M., Evans, A.E., Stigler, M.H., Brug, J. and Oenema, A. (2010). Cognitive and home environmental predictors of change in sugar-sweetened beverage consumption among adolescents. *British Journal of Nutrition*. Vol. 103, Issue 5, pp. 768-774.

FAO; Food and Agriculture Organisation (2013). *The state of food and agriculture. Food systems for better nutrition*. Rome, Italy: Food and Agriculture Organisation of the United Nations.

French, S.A., Wall, M. and Mitchell, N.R. (2010). Household income differences in food sources and food items purchased. *International Journal of Behavioral Nutrition and Physical Activity*, Vol. 7, Issue 77.

FWS; Nederlandse Vereniging Frisdrank, Waters, Sappen; Dutch Association for Soft Drinks, Waters and Juices (2013). *Drankenconsumptie in Nederland. Inzicht in de Nederlandse drankenconsumptie op basis van de Voedselconsumptiepeiling 2007-2010*. The Hague, The Netherlands: Dutch Association for Soft Drinks, Waters and Juices.

FWS; Nederlandse Vereniging Frisdrank, Waters, Sappen; Dutch Association for Soft Drinks, Waters and Juices (2013). *Kerngegevens. Basic Statistical Information 2012*. The Hague, The Netherlands: Dutch Association for Soft Drinks, Waters and Juices.

Han, E. and Powell, L.M. (2013). Consumption Patterns of Sugar-Sweetened Beverages in the United States. *Journal of the Academy of Nutrition and Dietetics*. Vol. 133, Issue 1, pp. 43-53.

Hattersley, L., Irwin, M., King, L. and Allman-Farinelli, A. (2008). Determinants and patterns of soft drink consumption in young adults: a qualitative analysis. *Public Health Nutrition*, Vol. 12, Issue 10, pp. 1816-1822.

Hulshof, K.F.A.M., Brussaard, J.H., Kruijzinga, A.G., Telman, J. and Löwik, M.R.H. (2003). Socio-economic status, dietary intake and 10y trends: the Dutch National Food Consumption Survey. *European Journal of Clinical Nutrition*, Vol. 7, pp. 128-137.

IPH; Institute of Public Health in Ireland (2014). *Health inequalities*. Retrieved on 27-05-2014 from <http://www.publichealth.ie/healthinequalities/healthinequalities> .

Kassem, N.O., Lee, J.W., Modeste, N.N., and Johnston, P.K. (2003). Understanding soft drink consumption among female adolescents using the Theory of Planned Behavior. *Health Education Research*, Vol. 18, Issue 3, pp. 278-291.

Kassem, N.O. and Lee, J.W. (2004). Understanding soft drink consumption among male adolescents using the Theory of Planned Behavior. *Journal of Behavioral Medicine*, Vol. 27, Issue 3, pp. 273-296.

de Koning, L., Malik, V.S., Kellogg, M.D., Rimm, E.B., Willett, W.C. and Hu, F.B. (2012). Sweetened beverage consumption, incident coronary heart disease, and biomarkers of risk in men. *Circulation*. Vol. 125, Issue 14, pp. 1735-1741.

Maastricht University (2003). SMILE. Vragenlijst Jongeren. November 2003. Maastricht, *Stichting Gezondheidscentra Eindhoven and Maastricht University*. Retrieved on 4-12-2013 from <http://smile-research.unimaas.nl/SMILE-CMS/g1/1349-SMILE.html> .

Maastricht University (2008). SMILE. Vragenlijst Volwassenen. November 2008. Maastricht, *Stichting Gezondheidscentra Eindhoven and Maastricht University*. Retrieved on 4-12-2013 from <http://smile-research.unimaas.nl/SMILE-CMS/g1/1347-SMILE.html> .

Malik, V.S., Schulze, M.B. and Hu, F.B. (2006). Intake of sugar-sweetened beverages and weight gain: a systematic review. *American Journal of Clinical Nutrition*. Vol. 84, Issue 2, pp. 274-288.

Malik, V.S., Popkin, B.M., Bray, G.A., Despres, J.P., Willett, W.C. and Hu, F.B. (2010). Sugar-sweetened beverages and risk of metabolic syndrome and type 2 diabetes: a meta-analysis. *Diabetes Care*. Vol. 33, Issue 11, pp. 2477-2483.

Marketwatch (2013). *Milk: Out. Wine: In. Plus 8 other drink trends*. Retrieved on 15-11-2013 from [http://www.marketwatch.com/story/milk-out-wine-in-plus-8-other-drink-trends-2013-01-10?link=MW\\_home\\_latest\\_news](http://www.marketwatch.com/story/milk-out-wine-in-plus-8-other-drink-trends-2013-01-10?link=MW_home_latest_news).

McGonigal, K. (2010). *Why Habits Are Hard to Change (And Printers Hard to Buy)*. *When the decider in your mind is puzzled, the doer in your mind is paralyzed*. Retrieved on 31-5-2014 from <http://www.psychologytoday.com/blog/the-science-willpower/201003/why-habits-are-hard-change-and-printers-hard-buy>.

Mendes, E. (2013). *Regular Soda Popular With Young, Nonwhite, Low-Income*. Gallup. Retrieved on 4-10-2013 from <http://www.gallup.com/poll/163997/regular-soda-popular-young-nonwhite-low-income.aspx>.

Mozaffarian, D., Hao, T., Rimm, E.B., Willett, W.C. and Hu, F.B. (2011). Changes in diet and lifestyle and long-term weight gain in women and men. *The New England Journal of Medicine*, Vol. 364, Issue 25, pp. 2392-2404.

Neumark-Sztainer, D., Hannan, P.J., Story, M., Croll, J. and Perry, C. (2003). Family meal patterns: Associations with sociodemographic characteristics and improved dietary intake among adolescents. *Journal of the American Dietetic Association*, Vol. 103, Issue 3, pp. 317-322.

Nilsen, S.M., Krokstad, S., Holmen, T.L. and Westin, S. (2010). Adolescents' health-related dietary patterns by parental socio-economic position, the Nord-Trøndelag health study (HUNT). *European Journal of Public Health*, Vol. 20, Issue 3, pp. 299-305.

Ogden, C.L., Kit, B.K., Carroll, M.D. and Park, S. (2011). *Consumption of Sugar Drinks in the United States, 2005–2008. NCHS data brief, no 71*. Hyattsville, MD: National Center for Health Statistics.

Private Label Manufacturers Association (2013). *Today's primary shopper*. New York, NY: Private Label Manufacturers Association.

Rangan, A.M., Randall, D., Hector, D.J., Gill, T.P. and Webb, K.L. (2008). Consumption of 'extra' foods by Australian children: Types, quantities and contribution to energy and nutrient intakes. *European Journal of Clinical Nutrition*, Vol. 62, Issue 3, pp. 356-364.

Rangan, A.M., Schindeler, S., Hector, D.J., Gill, T.P. and Webb, K.L. (2009). Consumption of 'extra' foods by Australian adults: Types, quantities and contribution to energy and nutrient intakes. *European Journal of Clinical Nutrition*, Vol. 63, Issue 7, pp. 865-871.

Rasmussen, M., Krølner, R., Klepp, K., Lytle, L., Brug, J., Bere, E. and Due, P. (2006). Determinants of fruit and vegetable consumption among children and adolescents: A review of the literature. Part I: Quantitative studies. *International Journal of Behavioral Nutrition and Physical Activity*, Vol. 3, Article nr. 22.

Rehm, C.D., Matte, T.D., Van Wye, G., Young, C. and Frieden, T.R. (2008). Demographic and behavioral factors associated with daily sugar-sweetened soda consumption in New York City adults. *Journal of Urban Health*, Vol. 85, Issue 3, pp. 375-385.

Reisinger, H. (1997). The impact of research designs on  $R^2$  in linear regression models: an exploratory meta-analysis. *Journal of Empirical Generalisations in Marketing Science*, Vol. 2, pp. 1-12.

Rey-López, J.P. , Vicente-Rodríguez, G., Répásy, J., Mesana, M.I., Ruiz, J.R., Ortega, F.B., Kafatos, A., Huybrechts, I., Cuenca-García, M., León, J.F., González-Gross, M., Sjöström, M., De Bourdeaudhuij, I. and Moreno, L.A. (2011). Food and drink intake during television viewing in adolescents: The Healthy Lifestyle in Europe by Nutrition in Adolescence (HELENA) study. *Public Health Nutrition*, Vol. 14, Issue 9, pp. 1563-1569.

RIVM; Rijksinstituut voor Volksgezondheid en Milieu; Dutch Ministry for Health, Welfare and Sports (2013). *Sociaal Economische Status 2010*. Retrieved on 3-10-2013 from <http://www.zorgatlas.nl/beinvloedende-factoren/sociale-omgeving/ses/sociaaleconomische-status/#breadcrumb> .

RIVM; Rijksinstituut voor Volksgezondheid en Milieu; Dutch Ministry for Health, Welfare and Sports (2014). *Wat is de omvang van sociaaleconomische gezondheidsverschillen?* Retrieved on 27-05-2014 from <http://www.nationaalkompas.nl/bevolking/segv/huidig/> .

Robinson, L. and Smith. M.A. (2014). *How to Quit Smoking. A Guide to Kicking the Habit for Good*. Retrieved on 31-05-2014 from [http://www.helpguide.org/mental/quit\\_smoking\\_cessation.htm](http://www.helpguide.org/mental/quit_smoking_cessation.htm) .

Schulze, M.B, Manson, J.E, Ludwig, D.S., Colditz, G.A., Stampfer, M.J., Willett, W.C. and Hu, F.B. (2004). Sugar-sweetened beverages, weight gain, and incidence of type 2 diabetes in young and middle-aged women. *Journal of the American Medical Association*, Vol. 292, Issue 8, pp. 927-934.

Shi, Z., Lien, N., Kumar, B.N. and Holmboe-Ottesen, G. (2005). Socio-demographic differences in food habits and preferences of school adolescents in Jiangsu Province, China. *European Journal of Clinical Nutrition*, Vol. 59, Issue 12, pp. 1439-1448.

Siegel, R., Naishadham, D. and Jemal, A. (2013). Cancer statistics, 2013. *CA Cancer Journal for Clinicians*, Vol. 63, Issue 1, pp. 11-30.

Smith, M.J., Abbey, A. and Scott, R.O. (1993). Reasons for drinking alcohol: Their relationship to psychosocial variables and alcohol consumption. *International Journal of the Addictions*, Vol. 28, Issue 9, pp. 881-908.

Smith, M.A., Robinson, L. and Segal, J. (2014). *Alcohol Addiction Treatment & Self-Help. How to Stop Drinking and Start Recovery*. Retrieved on 31-5-2014 from [http://www.helpguide.org/mental/alcohol\\_abuse\\_alcoholism\\_help\\_treatment\\_prevention.htm](http://www.helpguide.org/mental/alcohol_abuse_alcoholism_help_treatment_prevention.htm) .

Speller, V. (2007). *Collective and individual responsibilities for health, both physical and mental*. Retrieved on 25-05-2014 from <http://www.healthknowledge.org.uk/public-health-textbook/disease-causation-diagnostic/2h-principles-health-promotion/responsibilities-health-physical-mental> .

Spijkerman, R., Van Den Eijnden, R.J.J.M. and Huiberts, A. (2008). Socioeconomic differences in alcohol-specific parenting practices and adolescents' drinking patterns. *European Addiction Research*, Vol. 14, Issue 1, pp. 26-37.

The Coca-Cola Company (2012). *Per capita consumption of company beverage products*. Retrieved on 20-11-2013 from <http://sustainingstarter.wordpress.com/2013/05/20/two-coca-cola-documents-for-your-consideration/> .

The Scottish Government (2008). *Equally well. Report of the ministerial task force on health inequalities. Volume 2*. Edinburgh, United Kingdom: Crown.

Törrönen, J. and Maunu, A. (2007). Light transgression and heavy sociability: Alcohol in young adult Finns' narratives of a night out. *Addiction Research and Theory*, Vol. 15, Issue 4, pp. 365-381.

Utter, J., Neumark-Sztainer, D., Jeffery, R. and Story, M. (2003). Couch potatoes or French fries: Are sedentary behaviors associated with body mass index, physical activity, and dietary behaviors among adolescents? *Journal of the American Dietetic Association*, Vol. 103, Issue 10, pp. 1298-1305.

Vereecken, C.A. and Maes, L. (2006). Television viewing and food consumption in Flemish adolescents in Belgium. *Sozial- und Präventivmedizin*, Vol. 51, Issue 5, pp 311-317.

Vereecken, C.A. , Todd, J., Roberts, C., Mulvihill, C. and Maes, L. (2006). Television viewing behaviour and associations with food habits in different countries. *Public Health Nutrition*, Vol. 9, Issue 2, pp. 244-250.

de Vos, B.C., Runhaar, J. and Bierma-Zeinstra, S.M. (2013). Effectiveness of a tailor-made weight loss intervention in primary care. *European Journal of Nutrition*, published online on February 22th, 2013.

Withrow, D. and Alter, D.A. (2010). The economic burden of obesity worldwide: a systematic review of the direct costs of obesity. *Obesity Reviews*, Vol. 12, Issue 2, pp. 131-141.

WHO; World Health Organisation (2013). *Obesity and Overweight. Factsheet Nr. 311*. Retrieved on 16-10-2013 from <http://www.who.int/mediacentre/factsheets/fs311/en/index.html> .

Wouters, E.J., Larsen, J.K., Kremers, S.P., Dagnelie, P.C. and Geenen, R. (2010). Peer influence on snacking behavior in adolescence. *Appetite*, Vol. 55, Issue 1, pp. 11-17.

Zhu, S., St-Onge, M., Heshka, S. and Heymsfield, S.B. (2004). Lifestyle behaviors associated with lower risk of having the metabolic syndrome. *Metabolism: Clinical and Experimental*, Vol. 53, Issue 11, pp. 1503-1511.

## Appendix A

### Vragenlijst frisdrank consumptie

*Deze vragenlijst is onderdeel van een Master Scriptie onderzoek aan de Wageningen Universiteit naar frisdrank consumptie onder volwassenen. De vragenlijst is anoniem. Ook als u geen frisdranken drinkt levert uw deelname nuttige informatie op.*

*De vragenlijst bestaat uit 21 vragen en het kost ongeveer 10 minuten om hem in te vullen.*

*Voor vragen over het onderzoek kunt u contact opnemen per email via: [kirsten.verkooijen@wur.nl](mailto:kirsten.verkooijen@wur.nl).*

#### Algemene Vragen

**1. Wat is uw geslacht?**

- Man
- Vrouw

**2. Wat is uw leeftijd in jaren?**

\_\_\_\_\_ jaar

**3. Wat is uw lengte in centimeters (cm)?**

\_\_\_\_\_ cm

**4. Wat is uw gewicht in kilogrammen (kg)?**

\_\_\_\_\_ kg

**5. Bent u van oorsprong Nederlander?**

- Ja
- Nee, namelijk \_\_\_\_\_

**6. Wat is uw burgerlijke staat?**

- Getrouwd
- Niet getrouwd en nooit getrouwd geweest
- Gescheiden
- Weduwe / weduwnaar

**7. Welke situatie is op dit moment op u van toepassing?**

- Ik woon samen met mijn partner / echtgenoot / echtgenote
- Ik heb een langdurige relatie, maar woon niet samen met een partner
- Ik ben alleenstaand
- Ik woon bij mijn ouder(s)
- Ik woon bij mijn kind(eren)
- Ik woon in een verzorgings- / verpleeghuis
- Anders, namelijk \_\_\_\_\_

**8. Heeft u kinderen?**

- Ja
- Nee

*Als u vraag 8 met "Nee" heeft beantwoord dan kunt u vraag 9 overslaan.*

**9. Hoeveel kinderen heeft u en welke leeftijd hebben deze?**

	Aantal thuiswonend	Aantal uitwonend
Kind(eren) van 0 t/m 3 jaar		
Kind(eren) van 4 t/m 12 jaar		
Kind(eren) van 13 t/m 17 jaar		
Kind(eren) van 18 jaar of ouder		

## Vragen over frisdrank

Voor de volgende vragen maken we een onderscheid tussen gewone frisdranken en light frisdranken.

Voorbeelden van gewone frisdranken (inclusief energy drinks met veel suiker) zijn: Cola, Fanta, 7-Up, Spa Fruit, Ice Tea, Dubbelfris, Red Bull en AA drink.

Voorbeelden van light frisdranken zijn: Cola light, Coca-Cola zero, Fanta light, Crystal Clear en Rivella.

### 10. Hoe vaak drinkt u gemiddeld gewone frisdranken?

- Nooit
- Minder vaak dan 1 dag per week
- 1 dag per week
- 2 dagen per week
- 3 dagen per week
- 4 dagen per week
- 5 dagen per week
- 6 dagen per week
- Elke dag van de week

Als u vraag 10 met "Nooit" heeft beantwoord dan kunt u vraag 11 overslaan.

### 11. Als u gewone frisdranken drinkt, hoeveel glazen, blikjes en flesjes drinkt u dan meestal op die dag? Het gaat hier om een gemiddelde.

	Glazen	Blikjes	Flesjes
Aantal			

Voorbeelden van *light* frisdranken zijn: Cola light, Coca-Cola zero, Fanta light, Crystal Clear en Rivella.

**12. Hoe vaak drinkt u gemiddeld light frisdranken?**

- Nooit
- Minder vaak dan 1 dag per week
- 1 dag per week
- 2 dagen per week
- 3 dagen per week
- 4 dagen per week
- 5 dagen per week
- 6 dagen per week
- Elke dag van de week

Als u vraag 12 met "Nooit" heeft beantwoord dan kunt u vraag 13 overslaan.

**13. Als u light frisdranken drinkt, hoeveel glazen, blikjes en flesjes drinkt u dan meestal op die dag? Het gaat hier om een gemiddelde.**

	Glazen	Blikjes	Flesjes
Aantal			

**14. Hoeveel frisdrank denkt u dat een gemiddeld persoon per week drinkt, gemeten in aantal glazen?**

\_\_\_\_\_ glazen

**15.** Geef voor elke uitspraak aan in hoeverre u het hiermee eens bent. Kruis maximaal 1 rondje achter iedere uitspraak aan.

Let op: het gaat hier alleen om gewone frisdranken (dus geen light frisdranken).

	Totaal oneens	Oneens	Neutraal	Eens	Totaal eens
<b>Ik heb vaak frisdrank in huis</b>	<input type="radio"/>				
<b>Waar ik woon is een nabijgelegen winkel waar frisdrank wordt verkocht</b>	<input type="radio"/>				
<b>Ik bezoek vaak eetgelegenheden waar frisdrank wordt verkocht</b>	<input type="radio"/>				
<b>Op mijn werk/school kan ik gemakkelijk frisdrank krijgen/kopen</b>	<input type="radio"/>				
<b>Ik zie vaak reclame voor frisdrankmerken</b>	<input type="radio"/>				
<b>In mijn omgeving laten veel sport clubs zich sponsoren door frisdrank merken (bijvoorbeeld op de shirtjes van een voetbalploeg)</b>	<input type="radio"/>				
<b>Ik eet vaak gerechten waar ik dorst van krijg</b>	<input type="radio"/>				
<b>Ik heb vaak last van stress</b>	<input type="radio"/>				
<b>Ik eet vaak fastfood (bijvoorbeeld patat of pizza)</b>	<input type="radio"/>				
<b>Ik draag vaak contant geld bij me als ik de deur uit ga</b>	<input type="radio"/>				

**16.** Geef voor elke uitspraak aan in hoeverre u het hiermee eens bent. Kruis maximaal 1 rondje achter iedere uitspraak aan.

Let op: het gaat hier alleen om gewone frisdranken (dus geen light frisdranken).

	Totaal oneens	Oneens	Neutraal	Eens	Totaal eens
<b>Mijn vrienden drinken vaak frisdrank</b>	<input type="radio"/>				
<b>Mijn ouders drinken vaak frisdrank</b>	<input type="radio"/>				
<b>Mijn familieleden (andere dan ouders) drinken vaak frisdrank</b>	<input type="radio"/>				
<b>Mijn huisarts/dokter wil niet dat ik frisdrank drink</b>	<input type="radio"/>				
<b>Mijn leraren en/of (sport)coaches willen niet dat ik frisdrank drink</b>	<input type="radio"/>				

**17.** Geef voor elke uitspraak aan in hoeverre u het hiermee eens bent. Kruis maximaal 1 rondje achter iedere uitspraak aan.

Let op: het gaat hier alleen om gewone frisdranken (dus geen light frisdranken).

	Totaal oneens	Oneens	Neutraal	Eens	Totaal eens
Ik vind het belangrijk dat ik zo gezond mogelijk leef	<input type="radio"/>				
Ik vind frisdrank lekker	<input type="radio"/>				
Frisdrank lest de dorst	<input type="radio"/>				
Ik ben me bewust van de gezondheidsgevolgen van frisdrank	<input type="radio"/>				
Ik ben me bewust van de hoeveelheid suiker die in frisdrank zit	<input type="radio"/>				
De prijs van frisdrank is belangrijk voor me	<input type="radio"/>				
Ik heb me voorgenomen om minder frisdrank te drinken	<input type="radio"/>				
Het is belangrijk voor me of er veel cafeïne in een frisdrank zit	<input type="radio"/>				
Het is belangrijk voor me of je hyper (over) actief kan worden van een frisdrank	<input type="radio"/>				
Het is een gewoonte van me om frisdrank te drinken	<input type="radio"/>				

**18.** Geef voor elke uitspraak aan in hoeverre u het hiermee eens bent. Kruis maximaal 1 rondje achter iedere uitspraak aan.

Als u vindt dat er geen verschil zitten tussen normale en light frisdranken, kies dan voor de middelste optie: beiden gelijk.

	Totaal oneens	Oneens	Beiden gelijk	Eens	Totaal eens
Gewone frisdranken smaken beter dan light frisdranken	<input type="radio"/>				
Gewone frisdranken zijn slechter voor de gezondheid dan light frisdranken	<input type="radio"/>				
Gewone frisdranken zijn goedkoper dan light frisdranken	<input type="radio"/>				
Gewone frisdranken worden in mijn sociale omgeving meer gedronken dan light frisdranken	<input type="radio"/>				
Het drinken van gewone frisdranken is gezelliger dan het drinken van light frisdranken	<input type="radio"/>				

## Achtergrond informatie

**19. Wat is uw hoogste behaalde of huidige opleidingsniveau?**

- Basisonderwijs
- VMBO/MAVO
- HAVO
- VWO/Gymnasium
- Middelbaar beroepsonderwijs (MBO)
- Hoger beroepsonderwijs (HBO)
- Universiteit (WO)
- Anders, namelijk \_\_\_\_\_

**20. Heeft u betaald werk?**

- Ja, een voltijd baan
- Ja, een deeltijd baan
- Nee, met pensioen
- Nee

**21. Als u alles bij elkaar optelt, wat is dan het maandelijkse netto inkomen van uw totale huishouden?**

*Voorbeelden hiervan zijn: uw eigen inkomen + het inkomen van uw partner; uw studiefinanciering + het inkomen van een bijbaantje*

- Ik ontvang alleen studiefinanciering
- Ik ontvang alleen een uitkering
- Tot 1.000 Euro
- 1.000 tot 2.000 Euro
- 2.000 tot 3.000 Euro
- 3.000 tot 4.000 Euro
- 4.000 tot 5.000 Euro
- Meer dan 5.000 Euro
- Weet het niet

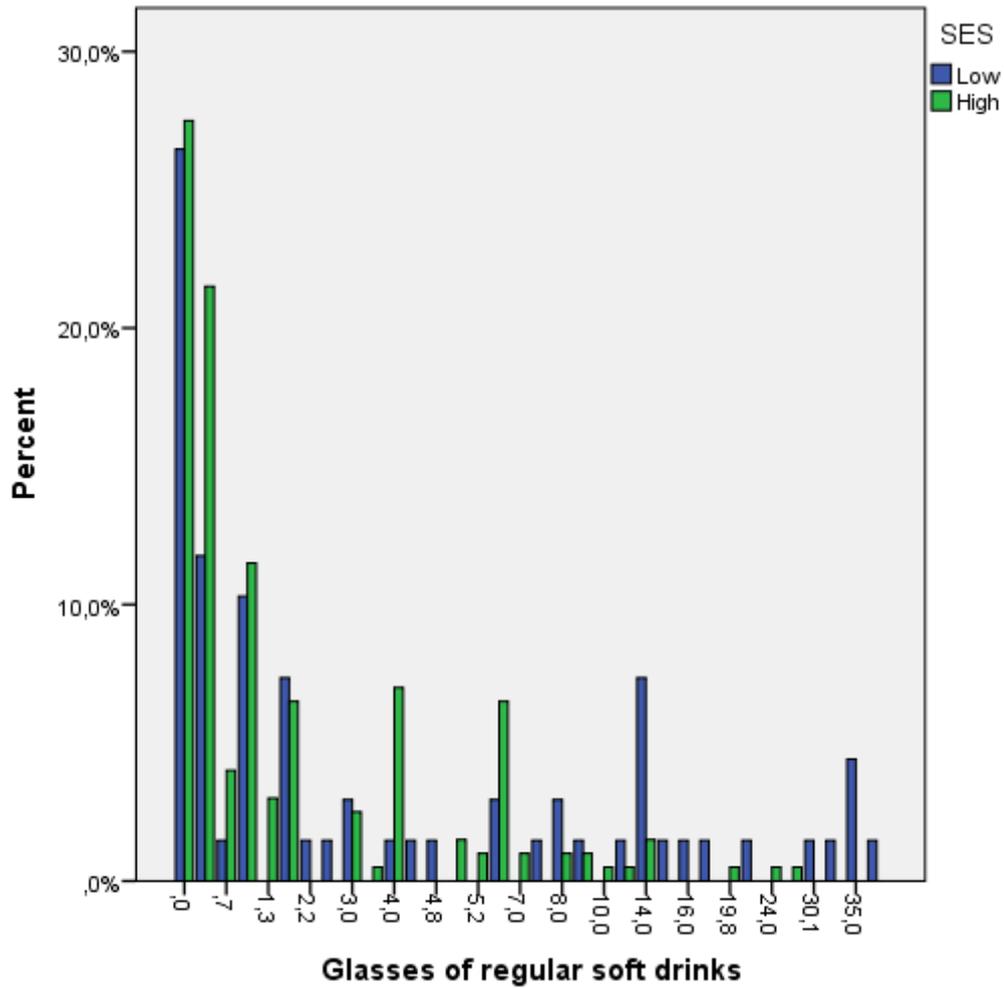
**Heeft u verder nog opmerkingen?**



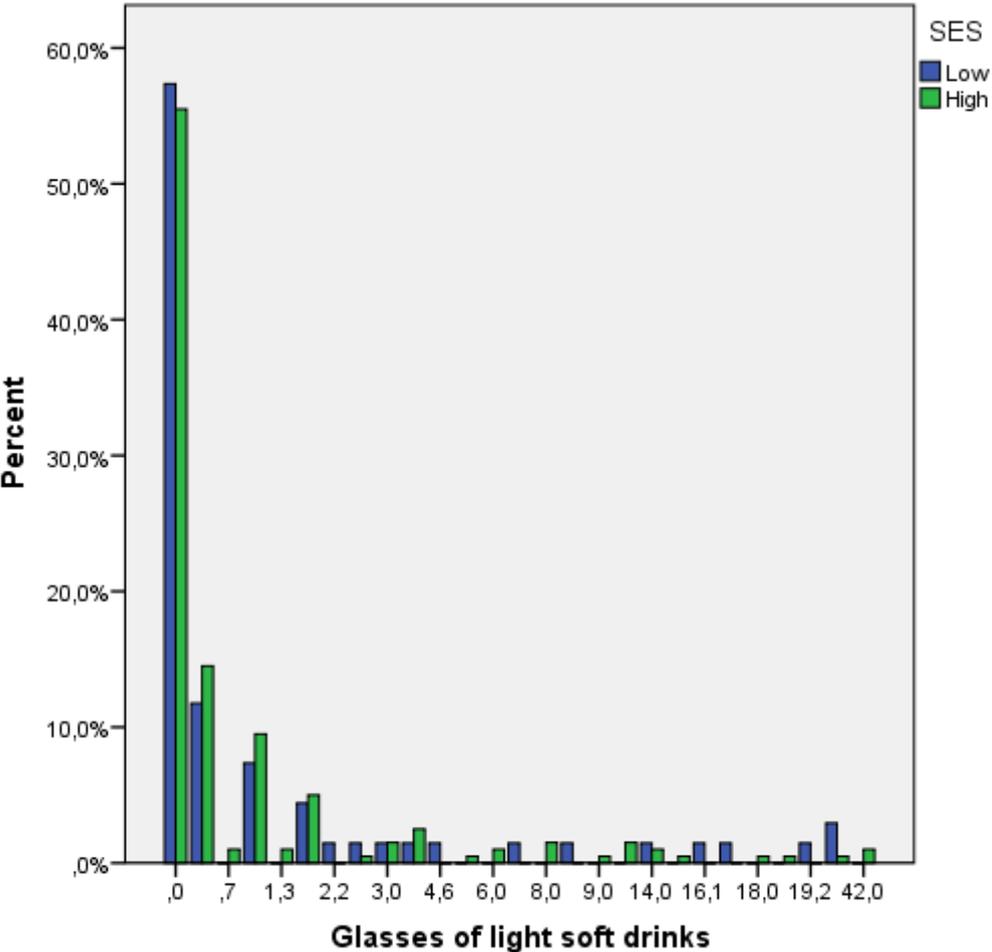
***Dit is het einde van de vragenlijst. Hartelijk dank voor uw medewerking aan dit onderzoek!***  
*Voor vragen over dit onderzoek kunt u contact opnemen per email via: [kirsten.verkooijen@wur.nl](mailto:kirsten.verkooijen@wur.nl).*

## Appendix B

Total amount of glasses of regular soft drinks consumed per week, divided by SES, as the percentage of participants with the same amount of consumption, within the low/high SES group



Total amount of glasses of light soft drinks consumed per week, divided by SES, as the percentage of participants with the same amount of consumption, within the low/high SES group



Total amount of glasses of soft drinks consumed per week, divided by SES, as the percentage of participants with the same amount of consumption, within the low/high SES group

