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# MASTER THESIS

## Societal preference for the inclusion of lifestyle-related interventions in the Dutch basic health insurance package: a discrete choice experiment approach

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# Abstract

## Background

Healthcare priority setting is a sensitive topic and preventive lifestyle policies are gaining interest among policymakers and the general population because it is seen as ‘’a determinant of sustainable human development’’ (Goryakin et al., 2019), as well as of the need to tackle the burden of chronic diseases. The present study aims to explore societal preferences regarding lifestyle-related health interventions related to other healthcare to be covered by the basic health insurance. A secondary objective is to investigate whether a covid-19 contamination affect preferences for the coverage of lifestyle-related health interventions.

## Methods

An empirical quantitative study had been performed and data was collected by an online questionnaire survey including a discrete choice experiment (DCE). Six attributes, representing the insurance package, were included: specialist medical care, pharmaceutical care, general practitioners care, mental healthcare, prevention, premium change (monthly). Each respondent received 12 choice tasks. Mixed logit regression estimated the degree of preferences [β] and relative importance scores of the included attributes were estimated as well.

## Results

The questionnaire was filled out by 238 Dutch people, among which 80 were contaminated with covid-19. Average age was 35 years (range 18-79), majority women (69%). All attributes contributed to the value of a basic healthcare package. Lifestyle-related health interventions had the most impact; 10% prevention (1.154; $p<0.05$) and 0% prevention (-2.443; $p<0.05$). Moreover, respondents prefer to increase all the six types of care at the expense of other care. Interactions effects were not found, showing that there was no additional effect regarding prevention preference for people contaminated with covid-19. However, those coefficients became lower; 10% prevention (0.320; $p>0.05$) and 0% prevention (-0.926; $p<0.05$). When zooming in on different type of prevention; it is striking that mental healthcare is considered very important.

## Conclusion

This study suggests that according to the Dutch public, lifestyle-related health interventions should be taken more into consideration when making priority decisions regarding covered care within the basic health insurance package. It underlined the positive attitudes towards lifestyle interventions and prevention The study also revealed no disagreement in opinion between population subgroups based on a covid-19 contamination. However, limitations and important considerations must be considered. Future research alongside a DCE is required.

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# Chapter 1. Introduction

## 1.1. Background

Covid-19 is an infectious disease caused by a newly discovered coronavirus by the end of 2019 in China. The virus has rapidly spread, showing capability to infect populations worldwide. Over 105.4 million cases and over 2.3 million deaths have been reported since the start of the pandemic (WHO, 2021a). Most people contaminated with covid-19 experience mild to moderate respiratory symptoms and recover at home without further treatment (WHO, 2021a). Others recover with supportive care and those with severe symptoms are hospitalized. Many uncertainties remain in understanding its management but older people, those with underlying medical problems and those with an unhealthy lifestyle are more susceptible to develop serious illness (WHO, 2021b). Apparently, an unhealthy lifestyle is linked with unfavorable outcomes in covid-19 (Rajesh et al., 2020). This is an observation also identified with other diseases. For example, ''physical inactivity and a poor diet contribute to the development of chronic diseases and explain part of the variation in premature mortality'' (Molema et al., 2019, p. 2). The importance of a healthy lifestyle is emphasized by the covid-19 pandemic.

Chronic disease morbidity and premature mortality related to unhealthy lifestyle are nowadays a major threat to public health worldwide (Rappange & Brouwer, 2012). The following is said about lifestyle:

> [Lifestyle is the way individuals] choose to live, this being referred to their economic, occupational level, and type of activities they practice during leisure. Lifestyle can be healthy or unhealthy. . . . A healthy lifestyle is correlated with good health and a high perception of well-being, while unhealthy behaviours such as smoking, alcohol abuse, overeating, in combination with stress, lead short and long term to many diseases. (Dima-Cozma et al., 2014, p. 116)

Furthermore, there is a vast amount of evidence showing that lifestyle interventions contribute to improved resistance to viral infections and a reduced risk of a serious course of disease (Van Ommen et al., 2020). Thus, building a healthy lifestyle will have numerous health benefits, the most important being cardio metabolic (Dima-Cozma et al., 2014). Awareness and attention to this in the Netherlands is therefore growing. That is why the minister of health, welfare, and sports (VWS), together with more than 70 social organizations has initiated the national prevention agreement (NPA) in 2018. It contains more than 200 agreements to contribute to better public health in the Netherlands in 2040 (Rijksoverheid, 2018). The ambition is to focus more on prevention and less on care. Within the NPA, interventions targeting tobacco use, obesity and alcohol are prioritized as ways to improve the lifestyle of the public. However, in order to achieve these ambitions with the agreed

package of actions and targets, additional measures seems necessary according to an initial assessment by the national institute of public health and the environment (RIVM, 2018). The prevalence of important risk factors, such as obesity and smoking is still high (Rappange et al., 2009). Experts also argue that more can and should be done; science and practice together advocate structural investments in lifestyle, lifestyle medicine and living environment (Van Ommen et al., 2020). This is amplified by the current crisis, making smart investments now can strengthen public-health systems to reduce the chance of future pandemics (Craven et al., 2020). ''Current investments in preventive lifestyle interventions are relatively low, despite the significant impact of unhealthy behaviour on population health'' (Rappange & Brouwer, 2012, p. 243). Hence, it raises the question whether prevention should deserve a more central position in healthcare package.

Thus far, the Dutch healthcare system has not integrated lifestyle interventions into basic healthcare package. Resources available are finite and typically insufficient to fulfil all the healthcare demands (Van Exel et al., 2015). Cost-effectiveness is one of the criteria that is applied in the decision process whether interventions will be included in the healthcare package (Van der Wulp et al., 2012). ''An intervention is cost-effective when health gains . . . avoided cost below a monetary reference value. When the cost of the new intervention and associated future health costs are lower than the current costs, an intervention is considered to be cost saving'' (Van der Vliet et al., 2020, p. 2). The cost of prevention within the Dutch Health Insurance Act (Zvw) are accounted as regular healthcare costs and thereby from a financial perspective, it is not always attractive to invest in prevention (Soeters & Veroeks, 2015). It is important to stress this since life-prolonging prevention is less likely to result in cost savings than often expected or hoped. Additional costs in life years gained due to unrelated diseases in the long run may offset possible savings in related diseases in the shorter run (Rappange et al., 2009). ''However, prevention may still be a cost-effective way to improve public health, even when it does not result in cost savings'' (Rappange et al., 2009, p. 440). Goryakin et al. (2019) state that:

> In general, prevention policies with the most attractive cost-effectiveness profile are those reaching the largest number of individuals, although even they should take into account various characteristics. At the same time, more targeted policies can also make a strong impact, although their effectiveness is typically improved when higher higher-risk groups are targeted. (pp. 128-129)

Therefore, the relative value of health gain through prevention like lifestyle interventions need to be considered in order to completely judge whether prevention and lifestyle yield value for money, as suggested by earlier studies (Rappange et al., 2009).

In conclusion, preventive interventions can incentivize individuals to adopt a healthy and responsible lifestyle. Currently, preventive lifestyle policies are gaining interest among the population because it is seen as ''a determinant of sustainable human development'', as well as of the need to tackle the burden of chronic diseases (Goryakin et al., 2019). Previous studies provide some insights regarding the public support for these interventions, but little is known about the preferences of the general population with respect to priority setting and healthcare reimbursement decisions. Given the growing pressure on budgets and the need for rationing it is important to have information regarding public preferences on this topic.

This information enables policymakers to make difficult (implicit and explicit) trade-offs involving questions regarding the aim and value of healthcare. Only with such knowledge can policymakers reflect or be responsive to actual societal values (Van Exel et al., 2015). This thesis hopes to contribute to that aim by offering insights into general population reactions to various health package choice and reactions to different features of the basic health package. Therefore, the main objective of this study was to investigate societal preferences regarding the coverage of lifestyle-related health interventions relatively to the current basic health insurance package. To address this, one research question was:

***''What is the strength of societal preferences for lifestyle-related health interventions related to other healthcare to be covered by the basic health insurance?''***

Furthermore, preferences are not homogeneous but vary systematically across the population. It is well known that different factors and characteristics drive individuals to make choices, revealing preference heterogeneity. As emphasized by another author, ''research investigating presence of differences between potentially relevant subgroups could therefore be of importance'' (Cornelissen et al., 2020, p. 86). During the current pandemic, health system changes and have shifted people approaches to disease but people's perspective on how covid-19 has change healthcare utilization and decision making remain elusive. But, from a previous study, it is known that ''health service usage is a complex behaviour affected by many factors, and the preferences of individuals may change as a function of one's health status'' (Jiang et al., 2020, p. 9). Thus, this thesis sought to understand if and how a covid-19 contamination affected preferences regarding lifestyle-related health interventions. The hypothesis is that a covid-19 contamination would cause people to favor a more conscious and healthier lifestyle, resulting in a more important role for prevention. Therefore, the second objective of this study is to compare the weight of these relative preferences for lifestyle-related health interventions related to other healthcare between people contaminated and people not contaminated by covid-19. This allows to examine and further proclaim the degree of heterogeneity among the population. The goal is to get insights in the public value and a sufficiently differentiated idea of their preferences with respect to reimbursement decisions in healthcare. The following second research question was therefore addressed:

**''To what extent is there a difference in the relative strength of preferences for the coverage of lifestyle-related health interventions between people who were and were not contaminated by covid-19?''**

## 1.2. Thesis outline

The following content of this thesis is structured in 3 chapters. Chapter 2 introduces the theoretical framework including a description of the main features of the Dutch healthcare system and the key conducted research on prevention and societal preferences. Subsequently, Chapter 3 describes the applied research method for this research. Successively, Chapter 4 presents the results. Finally, Chapter 5 concludes with the main findings of the research including its key strengths & limitations and it provides suggestions for further research.

# Chapter 2.
# Theoretical framework

This chapter sets out all the relevant theoretical background used in this thesis. Section 2.1 introduces the Dutch healthcare system and describes how the legally defined package of basic benefits is established according to the principles laid out by the Dekker commission. That said, it is not self-evident, and the reimbursement or not of prevention illustrated this. In section 2.2, prevention and its role in healthcare are therefore explained in more detail. Given the ever-present need to make choices in healthcare and the fact that there can never be a solution to the rationing problem, decisions should reflect, to the extent possible, societies' prevention preferences and values. Section 2.3 describes the concept of societal preferences for priority setting which will be the underlying valuation method used in this thesis.

## 2.1. Features of the Dutch healthcare system

The Dutch healthcare system has been shaped by a few developments; the key features are described in table 1. In 2006, the health insurance act (Zvw) came into operation. It is a single statutory insurance regime covering all residents in the country and funded by income-related contributions, public funding, and nominal premiums.

Table 1: Features of the Dutch healthcare system

| Law | Explanation |
|---|---|
| Long-term care (Wlz)<br>Social support (Wmo)<br>Young health services (Jeugdwet) | Ensure all residents against major medical risks, defined as a national social insurance built on public law. |
| Zorgverzekeringswet (Zvw) | Legally defined, comprehensive basic health insurance package fulfilled by private competitive healthcare providers and insurers. |
| Complementary insurance | Voluntary supplementary private insurance |

The government determines annually the content of the basic package. Priority-setting is inevitable in this process due to rising healthcare expenditures and limited budgets. Therefore in 1990 the Dunning committee was set up to assess which criteria could be used to determine which treatments are eligible for reimbursement (Roscam Abbing, 1991). Figure 1 shows the funnel with the consecutive filters: efficacy, efficiency, own account, and responsibility. Everything that does not pass one of the filters, is not eligible for the basic package.

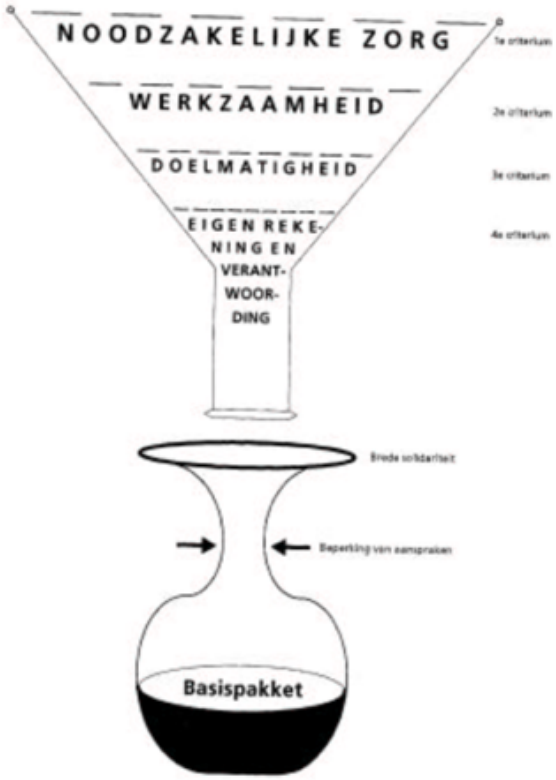



Figure 1: Dunning funnel (Boot, 2013)

Applying the criteria own account and responsibility is not straightforward. Healthcare qualifies for own account if the costs are bearable for the individual patient and when exclusion from reimbursement doesn't lead to undesired substitution effects. Different arguments plea to include lifestyle in the healthcare package. For example, people in vulnerable positions are unable to bear low costs and are faced with cumulation of costs. If we do not reimburse these costs, people may forego (preventive) treatment and symptoms may worsen. This harms the individual and bears additional costs for society (Zorginstituut Nederland, 2017). So, from a paternalistic motive, one may decide to protect individuals from their own account. On the other hand, including relatively cheap treatments and moral hazard drives up costs and thereby the premium become unnecessarily high. Friction between own account and solidarity arises around the coverage of lifestyle-related conditions (Bijlmakers et al., 2020).

Furthermore, the committee argues that if you take individuals seriously as autonomous and empowered beings, it is logical and reasonable they should also be held responsible for the consequences of their behavior. But social, genetic and psychological factors have such a great influence on lifestyle that one can question whether there is such a thing as full own responsibility (Horstman & Houtepen, 2005). In many situations people are not rational decisionmakers who can thoroughly weigh all information in order to make the best choice (Van der Horst & De Jong, 2013). Another contributing factor is health literacy. Health literacy refers to ''the degree to which individuals have the capacity to process, obtain and understand basic health information needed to make appropriate health decisions and preventive lifestyle behavior'' (Ratzan and Parker, 2000, as cited in Nielsen-Bohlman et al., 2004, p. 2). Sen's capability approach states that in a just basic healthcare package policy (López Barreda et al., 2019), the government must ensure that the conditions for making a free choice are the same

for everyone (Timmermans, 2013).

## 2.2. Prevention

People can transition from a relatively good to a bad health state. Preventive actions can be defined as ''interventions directed to averting the emergence of diseases, reducing their incidence and prevalence in populations'' (Czeresnia, 1999, p. 705). In addition, it aims to reduce the risk of degenerative diseases and control the further transmission of infectious diseases. ''Health prevention . . . is structured by scientific knowledge and normative recommendations to change habits'' (Czeresnia, 1999, p. 705). Conventionally, prevention is divided into primary, secondary and tertiary prevention (Psaltopoulou et al., 2010). Primary preventions focus on avoiding the development of disease in healthy individuals like encouraging less consumption of sugar. The goal of secondary prevention is detecting early disease in order to prevent the worsening of the disease or minimize complications. Screening for breast cancer in an example of secondary prevention. Tertiary prevention aims to reduce the negative impact of a disease and improve the quality of life for people with disease (CDC, n.d.). Tertiary prevention includes for instance insulin therapy for type II diabetes. Table 2 summarize the different types of prevention according to Centers for Disease Control and Prevention (CDC, n.d.):

Table 2: Type of prevention by stage of illness

| Type of prevention | Definition |
|---|---|
| Primary prevention | Intervening before health effects occur. |
| Secondary prevention | Screening to identify diseases in the earliest stage and reduce its impact. |
| Tertiary prevention | Managing disease by soften its impact or stop its progression. |

Lifestyle interventions as determinants to health could be defined as ''the application of medical, environmental, motivational and behavioral principles'' (Egger et al., 2009, p. 143) to clinical and therapeutic management of health problems related to lifestyle (Charlier et al., 2017). A healthy lifestyle is the cornerstone of prevention (Piepoli & Villani, 2017). Thereby, its promotion should be promoted by all. Promoting a healthy lifestyle includes behaviour change through amongst others nutrition, weight management, smoking cessation and physical activity. The national prevention agreement initiated by the Ministry of Health, Welfare and Sport is in line with this. The agreement was concluded with parties, such as patient organizations, care providers, health insurers, municipalities, sports associations, companies, funds, education, social organizations, and the national government in order to improve public health by 2040. Every year, 35.000 Dutch people die from smoking, obesity, or alcohol abuse. Together they are the largest cause of preventable illness in the Netherlands. Addressing these three issues improves the health of many people. The first goal is to reduce the number of smokers and thereby co-smokers, striving for a smoke-free generation by 2040. That means that children will no longer start smoking, pregnant women no longer smoke and that the number of adults smoking decrease from 23% to no more than 5%. Second goal is to reduce overweight and obesity among the population. Both are the second most important cause of disease in the Netherlands after smoking and almost half of the Dutch population aged 20 years and older is overweight. The aim for 2040 is no more than 38% of the adult population is overweight. Last goal is curbing alcohol use by reducing the number of adults

who drink too much to a maximum of 5% (is now 8.8%), young people and pregnant women do not drink alcohol anymore (Rijksoverheid, 2018). Thus, integrating lifestyle interventions into basic healthcare package could be a manner to achieve the goals set by the NPA as they are effective in preventing or delaying preventable illness.

Currently, there are three Combined Lifestyle intervention programmes (CLI) accepted for inclusion in the basic healthcare package in the Netherlands. CLIs have proved to be effective in reducing overweight and obesity and in changing and maintaining behavioral lifestyle changes (Van Rinsum et al., 2018). These have been evaluated in clinical and real-world setting. CLIs targets only people who are obese or overweighted with an increased risk of developing cardiovascular diseases or type II diabetes (Van Rinsum et al., 2018). Those programmes are available to every adult who meets the inclusion criteria. In addition, check-ups and screenings of pregnant women, preventive dental check-ups for young people, preventive advice, and information from maternity services to young parents and finally smoking cessation and diet advice. However, prevention from the basic healthcare package is limited. Further preventive healthcare is offered mostly by private parties and are not covered within the basic healthcare package. Insurers are thereby allowed to screen for risk factors, but this is a supplementary voluntary insurance covering a range of preventive services such as lifestyle checks and lifestyle programmes, dental care, physiotherapy, eyeglasses and lenses, alternative medicine, and contraceptives.

## 2.3. Societal preferences for priority setting

A preference refers to the choice of one thing over another with the idea it will result in greater value, satisfaction, capability, or improved performance of the individual (Stern et al., 1995). Earlier studies revealed three key findings related to health preferences: 1) plurality exists between preferences of actual patients and physicians (Stern et al., 1995), 2) people's preferences for healthcare is highly heterogeneous, and 3) societal views on prioritizing healthcare vary (Van Exel et al., 2015). There are various views on how to allocate healthcare resources. Thus, societal preferences concerning healthcare priority setting are among others related to characteristics of healthcare beneficiaries, characteristics of the disease and characteristics of interventions (Reckers-Droog et al., 2018). In addition, the authors describe different societal viewpoints on healthcare priority setting in the Netherlands: 1) the view ''equal right to healthcare'' comprises an egalitarian view on healthcare, 2) the view ''limits to healthcare'' consider health-related quality of life to be an important outcome of treatment, whereas 3) the view ''effective and efficient healthcare'' consider healthcare maximization as the most important criterion (Reckers-Droog et al., 2018). Furthermore, the values underlying preferences may change as patients get sicker or after facing unimaginable situations (Epstein & Peters, 2009). Moreover, health beliefs may be influenced by patients whose illness is characterized by progressive deterioration or by episodic fluctuation in the severity and frequency of symptoms. So, being aware of health preferences can enable more efficient healthcare systems and these findings imply that no single equity principle can be used to underpin priority setting.

Priority setting in healthcare is inevitable. Making these choices is a rather sensitive topic because the healthcare system is publicly financed. Everyone contribute through taxes and is

directly affected, as it influences which healthcare needs are met. Thus, it is reasonable to argue that policymakers could enhanced well-being by giving priority to health programs that best satisfy societal preferences. If this is not the case, opposition from the public is unavoidable. Moreover, as societal and patient welfare are objectives of providing a comprehensive healthcare package, public values should play a role in approval, utilization, reimbursement, and pricing decisions (Stern et al., 1995). In addition, the trust in a healthcare system might be affected if people do not share the values on which priority setting decisions are based and thus decision rule knowledge, operationalization and transparency appears to be indispensable. Consequently, there is interest among decisionmakers to include multiple perspectives and views and to be open about healthcare priority decisions. Both scientific evidence and social value judgements are important to consider (Rawlins, 2005). Social input can be particularly valuable in complex cases like integrating lifestyle interventions into basic healthcare package.

Concluding this section, societal preference in healthcare priority setting can be explored in different ways. It can, for example, be obtained by preference-elicitation methods with the following objectives: 1) elicit societal preferences on reimbursement decisions, 2) anticipate and meet the needs of the population and 3) improve policy adherence in the society (Berendsen et al., 2015). In the next chapter the research method employed is discussed.

# Chapter 3.
# Research methods

This study aims to evaluate people's preferences through a discrete choice experiment (DCE). In a DCE people make trade-offs between competing options described in terms of a fixed set of attributes differing in their levels. This is a cross-sectional study with a quantitative character. Three students were involved and formed a research group which allowed to collaborate on methods. Data analyses were done individually as different study populations were used and thereby different research questions were formulated. This chapter describes all the methodological steps of this study.

## 3.1. Study population

Respondents were recruited in three ways. Firstly, respondents were selected through the snowball and convenience sampling method. Thereby, friends, family and colleagues who were at least 18 years old and Dutch were asked if they would be willing to take part in the survey. These people were also asked if they had any household members, colleagues, friends who may be interested in taking part in the survey. This way, it starts small but ''snowballs'' into a larger sample through the course of the study. Moreover, the survey link was published on social media channels like LinkedIn.

Secondly, in combination with the above method, respondents were selected through the purposive sampling method by the research group. This involves ''identifying and selecting individuals that are especially knowledgeable about or experienced with a phenomenon of interest'' (Palinkas et al., 2013, p. 2). In this study, purposive sampling was used in order to access people tested positive with COVID-19 the past year and a half. This sampling method enabled to reach mostly people recovered from covid-19 without supportive care.

At last, potential participants were approached from one hospital located in Rotterdam, after receiving ethical approval (see section below for process). This did not offer a representative sample, but only included people who were rehabilitating from covid-19. In total 12 respondents were included this way, accounting for 5% of the total study population, and 15% of the covid population.

## 3.2. Ethical approval

On 22 April 2021, ethical approval was granted to approach former patients. The Medical research Ethics Committees United (MEC-U) concluded that ''the Medical Research Involving Human Subjects Act does not apply to this study and that formal testing by medical ethical committee was not necessary'' (appendix 1), as covid-19 patients were only required to complete anonymous survey once, which is in accordance with the guidelines laid down in the Declaration of Helsinki (World Medical Association, 2018).

After receiving ethical approval, a meeting with the rehabilitation doctor followed in order to discuss how to approach and include those covid-19 patients. Consent on three different approaches was reached whereby an information letter was given or emailed beforehand to each potential participant. This information letter ensured that potential participants were truly informed and gave them a chance to consider their participation in the research. The other approaches are listed below:

1. Patients currently treated by a physiotherapy colleague are verbally approached before/after treatment on location,
2. Patients who came for an intake interview with the rehabilitation doctor were verbally approached and finally,
3. Patients currently treated by a physiotherapy practice that treats covid-19 patients referred by the rehabilitation doctor were approached.

# 3.3. Discrete choice experiment

A DCE is a quantitative method used in healthcare to elicit preferences from respondents without directly asking them to state their preferred option (Kjaer, 2005). The theory behind DCEs assumes that every product, situation, and service can be described by a set of characteristics, commonly referred to as ''attributes'' with each attribute consisting of various ''levels''. So, DCEs are used to quantify individual preferences by asking respondents to state their preferred choice between, in this study, three competing scenarios, each of which consists of a combination of these attributes/levels. When making a choice, respondents are making trade-offs between attributes and levels weighting them against each other (De Bekker-Grob et al., 2019). DCEs consider the ''relationship between key social value and judgements relevant in a priority-setting context'' (Green & Gerard, 2009, p. 954) and therefore are a rich data source for economic evaluation and decision making.

Conducting a DCE involves the three phases listed below in figure 2 and explained in more detail in the subsequent sections.

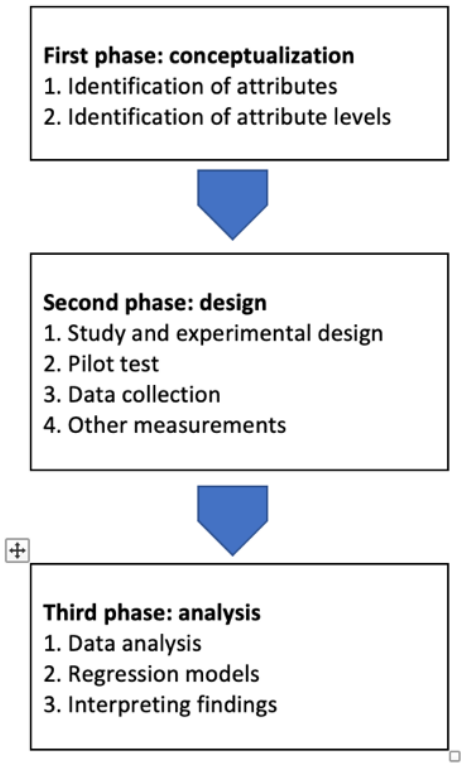



Figure 2: conducting a DCE

# First phase

## 3.4. Conceptualization

**Identification of attributes**

The attributes, which together describe the basic health insurance package, included in the current study were determined in a stepwise manner. Firstly, a literature review was conducted. The search was conducted using databases like PubMed and ScienceDirect. The literature review aimed to synthesize evidence on the healthcare content covered by the basic insurance that influenced health insurance preferences. Secondly, different lists of healthcare covered by the Dutch basic health insurance were compared and compiled, based on (policy) documents. The current content of the basic package is listed in appendix 2 and represents the framework used for the attribute selection.

''Too many attributes in a DCE increases complexity of the tasks for the respondents which, in turn, results in increased error variance, attribute non-attendance and inconsistent responses across choice tasks'' (Obadha et al., 2019, p. 5). Therefore, the research group screened all the attributes to ensure that only the most important ones for the decision-making process were included. ''Multiple criteria such as relevance to study objectives and decision context, correlation between attributes, plausibility, and capability of being traded were used'' (Obadha et al., 2019, p. 5). Subsequently, the list of potential attributes was further adjusted. Attributes were ranked based on expenditure relative to total expenditure within the health insurance sector in 2015 (Zorginstituut Nederland, 2021). Attributes with the highest costs were then selected. The research group held in total three meetings to review the decisions with two experts (supervisors). This is ''the recommended method when one needs to reduce the number of attributes'' (Obadha et al., 2019, pp. 4-5). This process led to the inclusion of four attributes next to the attribute ''prevention/lifestyle related care'': specialist medical care, pharmaceutical care, mental healthcare and general practioners care. In addition, a cost attribute was added which represents the premium change per month. In this way, the design included the interest rate (cost attribute) whereby an estimation for willingness to pay (WTP) can be produced in the analysis. This is important in order to understand the relative importance given to the different attributes.

**Identification of attribute levels**

The levels of the attributes referred to percentages that show how much of the total healthcare package is spent on that specific type of care (attributes). Appropriate levels needed to be assigned to the selected attributes. ''The levels determine the utility respondents will attach to a particular characteristic of an intervention, and hence, their choices or preferences'' (Abiiro et al., 2014, p. 2). On the one hand, levels should be realistic behaviorally but on the other hand, a wide level range is statistically preferred. In this study

attributes and levels were defined within realistic levels that are potentially actionable by policy. ''In essence, there is no point offering respondents one type of care that is so high it is unrealistic, nor nonmonetary benefits that cannot be implemented at the policy level'' (World health organization, 2021, p. 16). Consequently, three levels per attribute were chosen: a status quo level, a positive and a negative level relative to the status quo. In this way, there was no difference in framing between the attributes and up or downward bias was avoided, as well as lexicographic behavior. In addition, respondents were then able to indicate positive or negative preferences for all the attributes.

The attribute levels were chosen in accordance with the total expenditure within the health insurance act based on 2015 estimates. The total expenditure within the health insurance act in 2015 was ~€40 billion (Zorginstituut Nederland, 2020). From there, levels were ranked according to expected preferences to enable guess estimating the level of the attributes. Furthermore, level percentages were adjusted based on the feasibility in practice and based on the opinion of the research group. For example, the expenditure of mental healthcare within the health insurance act in 2015 was ~€3 billion which represents approximately 8,2% of the total expenditure. This was rounded off to ~10% and represents the status quo level. So, the ''mental healthcare'' attribute consists of the levels ''5%, 10% and 15%''. Below are all the attributes with the associated levels displayed (table 3).

Table 3: Attributes and levels that were included in the DCE

| **Attributes** | **Levels** |
|---|---|
| Specialist medical care | 20% |
| | 25% ** |
| | 30% |
| Pharmaceutical care | 5% |
| | 10% ** |
| | 15% |
| Mental healthcare (GGZ) | 5% |
| | 10% ** |
| | 15% |
| General practitioner care | 5% |
| | 10% ** |
| | 15% |
| Preventive/lifestyle related care | 0% |
| | 5% ** |
| | 10% |
| Premium change (monthly) | -5 euro |
| | 0 euro ** |
| | +5 euro |

The percentage (levels) indicates how much of the total basic package consists of that type of care (attributes).
Ex: the first row means that 20% of the basic package consists of specialist medical care
**: status quo (current situation)

The different compositions of the basic package presented to respondents were not a comprehensive description of the basic package. There is still a lot of care that falls within it

that was not directly included in this study, like dentalcare. The remaining percentages therefore concerned other care and could vary between 15-65% depending on the attribute level composition chosen by the respondent. This information was given to the respondents.

# Second phase

## 3.5. Study design

### 3.5.1. Experimental design

The experimental design refers to ''the process of generating specific combinations of the developed attributes and levels that respondents evaluate in the choice questions'' (Johnson et al., 2013, p. 4). One option would be to present respondents all possible choices (i.e., all possible combinations) which is known as a full factorial design. With such a design all main effects on utility and all interaction effects between the attributes can be calculated. From the six three-level attributes, slightly over 34Mn (18^6) different alternatives could be generated, that subsequently could be combined into ~600.000Bn (34.012.224*(34.012.224-1)/2) choice sets. Obviously, this is often not feasible, since it generates too many choice sets. It would lead to an extremely large fatigue and cognitive burden for respondents (Ryan et al., 2008). Therefore, a fractional factorial design has been conducted. As its name suggests, this is ''a fraction of the total number of possible choices sets and is derived using experimental design method'' (World health organization, 2021, p. 20).

Furthermore, the experimental design was optimized based on the D-efficiency criterion, while making use of Bayesian efficient design methods after data collection. ''D-efficiency can be interpreted as minimizing the determinant of the covariance matrix. This ensures minimum variation around the parameter estimates by minimizing the estimated standard errors'' (World health organization, 2021, p. 24). The software programme Ngene (ChoiceMetrics, version 1.1.1.) was used for designing the choice experiment.

Moreover, to generate a design that allows for statistical identification of every parameter of interest (Johnson et al., 2013), a choice model specification with a codification of all the parameters is required. No linear relationship between the different levels was assumed. Therefore, the model has been estimated considering all variables categorical (Figure 3). Also, Ngene allows to define constraints within the design. In this study, a couple of rejections has been added to the experimental design in order to balance statistical efficiency against respondent efficiency. So, levels of attributes that cannot go together where rejected. In this way, the choice sets seem more realistic to the respondents because we excluded the alternative in which all attribute levels were at their lowest and the alternative in which all attribute levels were equal to the status-quo.

Priors need to be set in forehand. ''Experimental designs that incorporate informative priors can be statistically more efficient than designs that assume priors equal to zero'' (Johnson et al., 2013, p. 9). Consequently, the required Bayesian priors for the experimental design

generation were initially taken as uniform, which reflected the prior uncertainty about people's preferences. The prior estimates incorporated into the model were based on the opinion of the research group on each attribute's relative importance. In addition, to generate a balanced efficient design which means that each level appears equally often within an attribute and, at the same time, ensuring statistical efficiency while keeping the response efficiency, a labeled design with 36 choice sets divided over three versions of the questionnaire was chosen (D-error: 0.265892). Thus, each respondent was presented with 12 choice sets.

```
design
;alts=altA,altB,altC
;eff=(mnl,d,mean)
;bdraws=halton(300)
;rows=36
;block=3
;alg=mfederov
;reject:
altA.MSZ=25 and altA.FZ=10 and altA.GGZ=10 and altA.HZ=10 and altA.PZ=5,
altB.MSZ=25 and altB.FZ=10 and altB.GGZ=10 and altB.HZ=10 and altB.PZ=5,
altA.MSZ=20 and altA.FZ=5 and altA.GGZ=5 and altA.HZ=5 and altA.PZ=0,
altB.MSZ=20 and altB.FZ=5 and altB.GGZ=5 and altB.HZ=5 and altB.PZ=0
;model:
U(altA)= b1.dummy[(u,-0.15,-0.05)| (u,0.05,0.15)]          *MSZ [20,30,25]
        + b2.dummy[(u,-0.15,-0.05)|(u,0.05,0.15)]          *FZ [5,15,10]
        + b3.dummy[(u,-0.15,-0.05)|(u,0.05,0.15)]          *GGZ [5,15,10]
        +b4.dummy[(u,-0.15,-0.05)|(u,0.05,0.15)]           *HZ [5,15,10]
        +b5.dummy[(u,-0.15,-0.05)|(u,0.05,0.15)]           *PZ [0,10,5]
        +b6.dummy[(u,0.05,0.15)|(u,-0.15,-0.05)]           *P [-5,5,0]
/
U(altB)= b1.dummy*MSZ
        + b2.dummy*FZ
        + b3.dummy*GGZ
        + b4.dummy*HZ
        + b5.dummy*PZ
        + b6.dummy*P
/
U(altC)= 0
$
```

Figure 3: pilot experimental design model in Ngene

### 3.5.2. Choice tasks

In this study, choice sets consisting of three alternatives including an status quo opt-out (current situation) were used. The opt-out avoided biases with respect to parameter estimates and simulate a more realistic scenario. That is, respondents may prefer neither healthcare package 1 nor healthcare package 2 as basic healthcare package depending on the combinations. Not considering the opt-out may results in an overestimation of the likelihood that respondents would chose healthcare package 1 or 2 (Campbell & Erdem, 2019). In addition, the consideration of the opt-out option was encouraged given that one objective was to look at WTP estimates and thereby the probability of take-up.

### 3.5.3. Visual presentation of choice tasks

Color coding, applied to text, was used to reduce task complexity as well as attribute non-attendance. Shades of purple were used because they ''do not prompt natural or perceived

value judgements, as opposed to for example traffic light color coding'' (Himmler et al., 2021, p. 5). The darkest purple was used to denote the lowest and lighter purple was used to denote the highest levels (Jonker et al., 2019). In addition, the symbols ''↓, =, ↑'' were used to highlight changes in level compared to the status quo. The rationale behind this color coding and use of symbols is that ''it helps respondents to identify differences between the alternatives and the levels while it does not introduce bias in the choices and does not affect the relative importance of attributes'' (Himmler et al., 2021, p. 2). Figure 2 shows an example of choice set as presented in the online survey. Finally, in order to improve the visual presentation of the choice tasks more, ''attribute descriptions appeared merely as mouseovers on the attribute levels'' to reduce the amount of text visible (Himmler et al., 2021, p. 5).

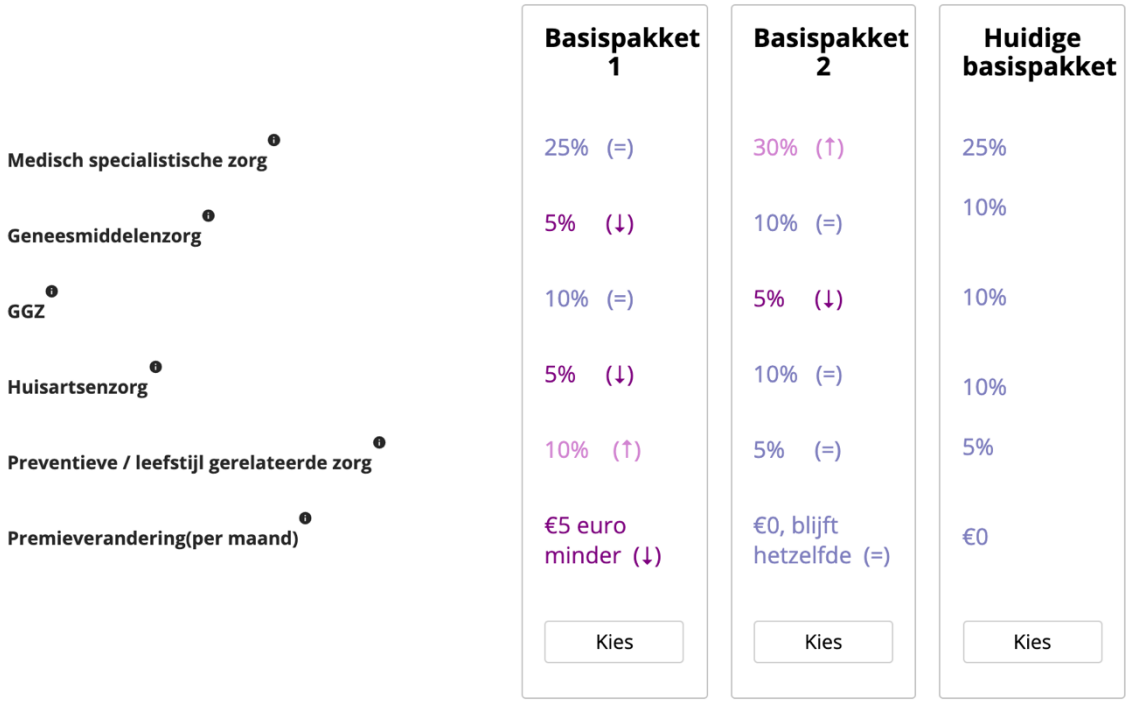



Figure 4: choice set example

# 3.6. Pilot test

### 3.6.1. Think aloud

It is important to pilot the questionnaire to determine the clarity and appropriateness of the choice set and the understandability and length of the choice set (Hunston & Oakey, 2020). Therefore, think-aloud pilot tests (n=6) were conducted first. This way it was possible to obtain insights into respondents' approach when answering the choice tasks and questionnaire in general. ''The think aloud method can be used to investigate differences in problem-solving abilities between people, differences in difficulty between tasks, effects of instruction and other factors that have an effect on problem-solving'' (Van Someren et al., 1994, p. 9).

After consent, the interview was recorded and the participants were stimulated to think out loud, stating directly what they think. Specific attention was paid to the issue of interpretation

of the use of percentages, the color-coding, and the price attribute. The research group reviewed the results of the think aloud study, respondent's comments, and made modifications to the DCE questionnaire. A change in attribute levels was deemed necessary for the attribute specialist medical care and preventive/lifestyle related care based on the comments and the levels of the premium attribute have been made wider. The research group agreed on the survey design and final list of attributes and levels for the main DCE survey.

#### 3.6.2. Prior estimation

Next, the questionnaire was pilot tested among a subgroup (n=76) of the study population to ensure correct interpretation by the target population and face validity. These results were also included in the main analysis later. No changes in attributes and/or levels were deemed necessary based on the results and feedback. The pilot data was analyzed using a conditional logit model. As a result, initial uniform priors were updated when the coefficients were statistically significant, and the sign and relative magnitude made sense. The significant level chosen was 5%. Thus, the uniform priors were then updated by implementing the following rule of thumb: $\boldsymbol{SD}=|\boldsymbol{\beta}|/\mathbf{1.9}$ to ensure that 95% of the parameter values had the correct sign. When the coefficients were not statistically significant, the research group placed relatively more weight to the prior expectations and thereby were not changed. The updated design as the results from the conditional logit model can be found in appendix 3.

## 3.7. Data collection

The data collection was done by uploading the survey to the Sawtooth online survey platform. The data collection was carried out in two stages: the pilot survey and the post-pilot survey. The first stage ran from the 26$^{th}$ of April 2021 until 4$^{th}$ May 2021. The second stage ran from 7$^{th}$ of May 2021 until the 22 of May 2021.

The online survey contained three parts. The first section was an introduction to familiarize respondents with scarcity, the problem of setting fair priorities and the study objectives. This was followed by a detailed description of the attributes and levels to give comprehensive guidance on how to answer the choice tasks. The respondents were next made familiar with the DCE choice tasks by warming up questions. The second part of the online survey were the DCE exercises. This part was split into two blocks of six choice tasks with in between an evaluation question. After having completed the choice tasks, in the last section, background information was asked. Some of these questions were not relevant for this research but necessary to add for the analysis of the other members of the research group. The relevant questions for this study are described in the next paragraph. Moreover, the questionnaire translated to English can be found in its entirety in appendix 4.

## 3. 8. Other measurements

In order to organize respondents' characteristics and allow for broader, possible more meaningful comparisons, other measurements were added to the questionnaire. This allowed discussion about the possible influence of differences in health-related norms and attitudes.

First, sociodemographic characteristics were collected such as age, sex, highest educational attainment, relationship status, living situation, employment status and household income per month. Information about covid-19 was collected as well. A contamination with covid-19 was measured using an ordinal question ''Have you tested positive and been contaminated with covid-19 in the past?''. Response possibilities were: ''no, I have not been contaminated'', ''yes, I have been contaminated and had a mild course of disease'', ''yes, I have been contaminated and had a severe course of disease''. If people were contaminated with covid-19 a follow-up question followed about inabilities to perform daily activities due to covid-19 where respondents answered on a 5-point scale ranging from 1 = no inability to 5 = longer than 6 weeks.

Information on health and health behaviors was collected as well. For example, self-related health, weight status, smoking habits, physical activity. Self-perceived health reflects judgements about one's own health. It is the subjective summary of all relevant health aspects for the individual (Kriston et al., 2012). According to the WHO, health is more than the absence of somatic disease, it included ''mental and social well-being, putting emphasis on the need for investigating individual's self-perceived health'' (Heiestad et al., 2020, p. 1). Several studies have shown that low self-perceived health may be a valid predictor of mortality and morbidity of various diseases and it is also associated with being sick-listed and frequent use of healthcare services (Vingard et al., 2004; Heiestad et al., 2020)). So, this study further explored the effect of a covid-19 contamination on self-perceived health. Self-perceived health was measured using the single question, ''How is your health in general?'', respondents were then asked to answer it on a ratio scale ranging from 0 to 10. Another measurement was about chronic diseases. People with a chronic disease and/or physical disability must deal with changed care, self-management behavior and living situations. This can have a great impact and influence their preferences regarding the basic health insurance package. By conducting research, it was possible to get a more complete picture of the situation of this group of people. Therefore, the questionnaire contained the following question: ''Do you have one or more long-term or chronic diseases?'' where respondent had the following response options ''I have no long-term or chronic illness'', ''I have one long-term or chronic illness'' or ''I have several long-term or chronic diseases''.

Finally, information about survey comprehensiveness, satisfaction and knowledge about the basic healthcare package and opinions with respect to prevention statements were collected as well. Therefore, 5-point Likert scales (ordinal, closed-ended survey questions) were used that allowed participants to indicate the extent to which they agree with a statement. The response options were as follows: 1- strongly disagree, 2- disagree, 3- neutral, 4- agree and 5- strongly agree. In addition, the survey ended with a ranking exercise where respondents were asked to rank different type of prevention in order of preference. The types of prevention were interventions aimed at nutrition and overweight, interventions aimed at physical activity, interventions aimed at mental health and interventions aimed at addiction. This background information might be useful to understand if and how respondents gave different responses, and a link can be made to the DCE by confirming results.

# Third phase

## 3.9. Statistical tests

Once data from the DCE have been collected discrete choice analysis can begin. Statistical analyses were conducted in STATA-software version 16. A significance level of $\alpha = 0.05$ was used for the various analyses. Descriptive statistics were used as a preliminary exploration of the data. By performing these analyses, in which numbers and percentages were calculated, an insight was gained into the characteristics of the study population.

Subsequently, non-parametric and/or parametric tests were conducted to see whether there was statistical independence or association between two or more variables. All the variables used where presented in section 3.8. Independent t-tests were run for continue variables and thus used to compare the averages of two groups. The chi-square test was run for binary, nominal, or ordinal variables. To get an overview of ordinal data as well, frequency distribution tables were created that tells how many times each response was selected. In complement, weighted average scores were calculated for the ranking exercise in order to make comparisons.

After this, testing for multicollinearity was perfomed with the Variance Inflation Factor (VIF) to examine the extent to which there was a relationship between the different variables. The VIF score was interpretated as follow: 1= not correlated, between 1 and 5= moderately correlated and greater than 5= highly correlated. The general rule of thumb was that VIFs exceeding 4 warrant further investigation, if not, further regressions can be proceed (O'brien, 2007). The regression models are presented in section 3.11.

## 3.10. Data analysis

The DCE was analyzed by taking each choice among the three options (two basic health packages and a current basic health package) as an observation. World Health Organization (2021) describes the random utility model as follows:

The random utility model provides the theoretical underpinning for analysis of the DCE data. In this framework individual n is assumed to choose between J alternative jobs, opting for the one associated with the highest utility. Thus, individual n will choose job I over J if and only if:

$$Uni > Unj \qquad \forall i \neq j \in$$

where U is the utility for a given job.

The random utility model assumes that the utility (U) associated with a particular job is made up of two components. The deterministic component Vni is a function of m job attributes (x1, … , xm), which are observed and the random component, εni, which is a function of unobserved job attributes and individual-level variation in tastes. The utility, V, to individual n associated with job I can in this study be specified as:

$$Un = Vn + \varepsilon n = \alpha 1 + \beta 1\, x1n + \beta 2\, x2n + ... + \beta m\, xmni + \varepsilon n$$

where the betas, β, provide quantitative information on the strength of preference for each attribute level, as well as trade-offs, monetary values, and predicted take-up of posts. (p. 35)

Assuming that all attributes have an independent influence on basic health package preference, the following model was estimated (De Bekker-Grob et al., 2008):

$$V = \beta_0 + \beta_1 * MSZ\_20 + \beta_2 * MSZ\_30 + \beta_3 * FZ\_5 + \beta_4 * FZ\_15 + \beta_5 * GGZ\_5 + \beta_6 * GGZ\_15 + \beta_7 * HZ\_5 + \beta_8 * HZ\_15 + \beta_9 * PZ\_0 + \beta_{10} * FZ\_10 + \beta_{11} * P\_5 + \beta_{12} * P\_-5$$

Where:

- $\beta_0$ is a constant reflecting the respondent's preference for a basic health package relative to the current basic health package.
- $\beta_1$ to $\beta_{12}$ are coefficients indicating the relative importance of each attribute (Table 1) (De Bekker-Grob et al., 2008).
- $\beta_1$ to $\beta_{12}$ are dummy variables, with respective 25%, 10%, 10%, 10%, 5%, 0€ as the base levels.

V represents the measurable utility derived for the basic health packages as opposed to the current basic health packages, and its value is depicted in the utility scale which has no direct interpretation (Louviere et al., 2000). A statistically significant coefficient indicates that the respondent considered the attribute important, and therefore it has an impact on the probability of choosing an alternative (Ryan et al., 2008).

# 3.11. Models

In this section, several regression models that employ maximum likelihood techniques that can be used to estimate utility function parameters are discussed. Parameter estimates are the final outcomes of a DCE. Their interpretation is what allows a further understanding of the

behavioral processes that define preferences. A significance level of <0.05 was regarded as statistically significant as well for those analysis. The most appropriate method was determined empirically comparing the performance of different model specifications based on the model fit and the research questions (Ryan et al., 2008). The attribute's relative importance was determinate by exploring the beta's magnitude for each attribute based on the model output.

The first model estimated was the conditional logit model, which estimates average preferences assuming that all respondents have identical health package preferences. It is the most commonly used method to analyze DCE data but it does not account for systematic variations in preferences across respondents (Hauber et al., 2016). This, however, is an unrealistic assumption regarding real world preferences for health. Not accounting for heterogeneity in preferences can lead to biased estimates of the coefficient values. Two models that circumvent the limitations of the conditional logit model are the mixed logit model (MXL) and the latent class model (LCM). If the expectation is that preferences vary greatly between respondents, the MXL is preferred while the LCM is preferred when respondents are assumed to be categorized in homogeneous latent groups (Ammi & Peyron, 2016). That said, MXL informs about ''how heterogeneity is distributed relative to each attribute'' (Ammi & Peyron, 2016, p. 4). whereas LCM provides information on the heterogeneity among latent subgroups of respondents. So, both models were run.

The second model estimated was the mixed logit model which allows to measure heterogeneity within the entire sample (Dahlberg & Eklof, 2003). The model is based on choice probabilities at the individual level. It allows respondents to have their own preferences. More specifically, each respondent n has his own vector of parameters βn. ''The variation is measured by a random parameter characterized by mean and standard deviation of the error term. If the standard deviation is significantly different from zero, it can be interpreted as high preference heterogeneity among respondents for that level'' (Cornelissen et al., 2020, p. 87). The estimation was conducted using 1000 Halton draws. All attributes were analyzed using dummy coding and the status quo level was used as the reference value. A positive beta coefficient suggest that respondents prefer an increase of a level within an attribute, whereas a negative beta coefficient suggest the opposite (Cornelissen et al., 2020). In addition, beta parameter estimates from mixed logit model were used to determine the part-worth utility for each attribute. This way interpretation of the coefficients was facilitated. Part-worth utilities (attribute importance) were calculated by taking the absolute value of the difference between beta parameter estimates for the best and worst levels within an attribute. These values represent the relative impact or weight an attribute had on choice and are represented as the percentage of total utility. Furthermore, subsequently another mixed logit model was estimated using interaction terms to investigate significant difference among people contaminated and not contaminated with covid-19. Besides the estimation of the main effects, a mixed logit model with interactions was performed as well. This allowed to answer the second research question about covid-19 characteristics. However, it was not possible to run all the interaction terms with the mixed logit model because of the limited number of degrees of freedom. Therefore, only the interaction of interest between prevention and a covid-19 contamination were added to the model.

The third estimate model was a latent-class model. Research question two was concerned with establishing whether groups of people have similar preferences. ‘’The models presented previously were aggregated models which may hide underlying variation in preferences. The estimation of latent-class models allowed identification of subgroups with similar preferences by investigating preference heterogeneity amongst responses to the DCE’’ (Vass, 2015, p. 103). With other words, this model assumes that there are classes of respondents with identical preference weights within one class and those preference weights are systematically different from other classes. Within each class, the preference weights are estimated using a conditional logit model (Hauber et al., 2016). To obtain the most appropriate number of classes, a range of classes were tested based on sample size and information criteria. ‘’This are measures of the goodness of fit for maximum likelihood estimation models. The most widely used information criteria are the Akaike Information Criteria (AIC), the Bayesian Information Criterion (BIC) and Consistent Akaike Information Criterion (CAIC)’’ (Vass, 2015, p. 104). All three of them can be interpreted in the same way: the model with the lowest comparative value is considered to have the greatest likelihood or best fit. The CAIC is the most conservative. In this study the CAIC was therefore used. As an extra validation, the probability of the class membership was estimated. If the class probability was higher than 90% it was considered high, and the model was deemed appropriate.

# Chapter 4.
# Results

This chapter summarizes the findings to answers the research questions stated in chapter one. This study used several different estimation models because choosing the optimal model to describe the respondent's preferences was not immediately obvious. Nevertheless, the mixed logit model was judged the most appropriate and the results presented in this chapter are based on it. However, a summary of the main findings from the latent class model are presented in appendix 5. There was no need to elaborate on these results further here; these were exploratory analyses. So, section 4.1 describes the demographic and health characteristics. In section 4.2 the estimates from both the main effect and interaction model from the DCE task are presented. Section 4.3 summarize the results from the prevention statements and questions.

## 4.1. Demographic characteristics

During data collection the research group observed that several respondents did not complete the questionnaire. All incomplete questionnaires were excluded from analysis to avoid missing values. The complete return rate was 55% (n=238). Most of the respondents found the introduction clear and choice tasks clear. However, challenges with completing the choice tasks were communicated by several respondents who inserted comments in the space provided at the end of the survey: ''*the choice between the different basic health packages presented were difficult*'', ''*you have to keep your mind on it to be able to answer the questions correctly*'', ''*the first two parts are quite tough to get through*'', ''*long an many numbers*''.

Table 4 shows the respondents characteristics for several key variables, for all respondents and the covid-19 subsamples. Respondents characteristics regarding age, gender, education, and income were mostly not representative of the Dutch population (CBS, 2020) Most respondents were female (67%) and ages ranged from 18-to-79, with an average age of 35 years old (SD ±15.85). Respondents had predominantly a modal income, attained a bachelor's degree or higher (80%), were mostly employed (51%) or students (34%). In addition, the table shows the distributed of health-related variables. Respondent's characteristics regarding self-perceived health were higher but representative of the Dutch population (CBS, 2021). The respondents reported the presence of an average of 1.15 (SD ±0.004) chronic health conditions, with 2% reported having multiple long-term or chronic health conditions. A more detailed breakdown of the covid-19 characteristics can be found in appendix 6. In total 80 respondents were contaminated with covid-19. Of these, 12 recovered with supportive care, also more than half of them experienced inabilities to perform daily activities due to covid-19. Approximately a quarter of respondents contaminated with covid-19 and recovered without supportive care were men and more than half of respondents contaminated with covid-19 and recovered with supportive care were men. Finally, they rated their knowledge of the basic health package as neutral with a mean of 3.04 (SD ±1.03) and were also neutral regarding how satisfied they were with the current composition of the basic health package with a mean of 3.25 (SD ±0.73).

Table 4: Respondent's characteristics (n=236)

| Demographics | Overall | | Contaminated with covid-19 | |
|---|---|---|---|---|
| | n | % | n | % |
| **Gender** | | | | |
| Female | 157 | 67% | 57 | 71% |
| Male | 79 | 33% | 23 | 29% |
| **Age groups** | | | | |
| 18 – 25 | 113 | 48% | 37 | 46% |
| 26 – 35 | 40 | 17% | 19 | 24% |
| 36 – 55 | 41 | 17% | 15 | 19% |
| 56 or older | 42 | 18% | 9 | 11% |
| **Education level** | | | | |
| Secondary education | 29 | 12% | 10 | 12.5% |
| Vocational secondary education | 19 | 8% | 11 | 14% |
| Bachelor's in applied science | 62 | 27% | 24 | 30% |
| University bachelor's degree | 53 | 22% | 16 | 20% |
| University master's degree | 73 | 31% | 18 | 22.5% |
| Doctorate | 8 | 3% | 1 | 1% |
| **Employment status** | | | | |
| Employed | 121 | 51% | 50 | 63% |
| Self-employed | 16 | 7% | 5 | 6% |
| Student | 81 | 34% | 25 | 29% |
| Unemployed | 7 | 3% | 2 | 2% |
| Retired | 11 | 5% | 0 | 0% |
| **Net household income per month (euros)** | | | | |
| 0 – 1,499 | 81 | 34% | 27 | 34% |
| 1,500 – 2,999 | 94 | 40% | 32 | 40% |
| 3,000 – 4,499 | 40 | 17% | 14 | 17% |
| 4,500 + | 10 | 4% | 3 | 4% |
| I prefer not to say | 11 | 5% | 4 | 5% |
| **Self-perceived health** | | | | |
| Very bad (0-2) | 1 | 1% | 0 | 0% |
| Bad (3-4) | 5 | 2% | 5 | 6% |
| Neutral (5-6) | 16 | 6% | 7 | 9% |
| Good (7-8) | 137 | 58% | 42 | 52% |
| Very good (9-10) | 78 | 33% | 26 | 33% |
| **Chronic disease** | | | | |
| No chronic disease | 206 | 87% | 70 | 88% |
| One chronic disease | 25 | 11% | 9 | 11% |
| Multiple chronic diseases | 5 | 2% | 1 | 1% |
| **Severity of covid-19 contamination** | | | | |
| Contaminated and recovered without supportive care | 68 | 29% | 68 | 85% |
| Contaminated and recovered with supportive care | 12 | 5% | 12 | 15% |
| **Inability to perform daily activities due to covid-19** | | | | |

| | | | | |
|---|---|---|---|---|
| No inability | | | 10 | 12% |
| < 1 week | | | 25 | 31% |
| 1 to 3 weeks | | | 26 | 33% |
| 3 to 6 weeks | | | 11 | 14% |
| > weeks | | | 8 | 10% |
| **Work in healthcare sector** | | | | |
| Yes | 63 | 27% | 36 | 45% |
| No | 173 | 73% | 44 | 55% |
| **Knowledge basic healthcare package** | | | | |
| Very little | 12 | 5% | 6 | 7% |
| Little | 69 | 29% | 20 | 25% |
| Neutral | 66 | 28% | 24 | 30% |
| Good | 74 | 32% | 28 | 35% |
| Very good | 15 | 6% | 2 | 3% |
| **Satisfaction with content basic healthcare package** | | | | |
| Very unsatisfied | 4 | 2% | 2 | 3% |
| Unsatisfied | 27 | 11% | 10 | 12% |
| Neutral | 112 | 47% | 41 | 51% |
| Satisfied | 91 | 39% | 26 | 33% |
| Very satisfied | 2 | 1% | 1 | 1% |

Additionally, an independent t-test was run on the study population to determine if there were differences in self-perceived health based on covid-19, consisting of people contaminated with covid-19 (n=80) and people not contaminated with covid-19 (n=156). The results showed that respondents contaminated with covid-19 had a statistically significantly lower self-perceived health score (8.76 ± 0.03) compared to respondents not contaminated with covid-19 (9.03 ± 0.15), p = 0.000. Below, these findings are shown in a graphic (figure 5).

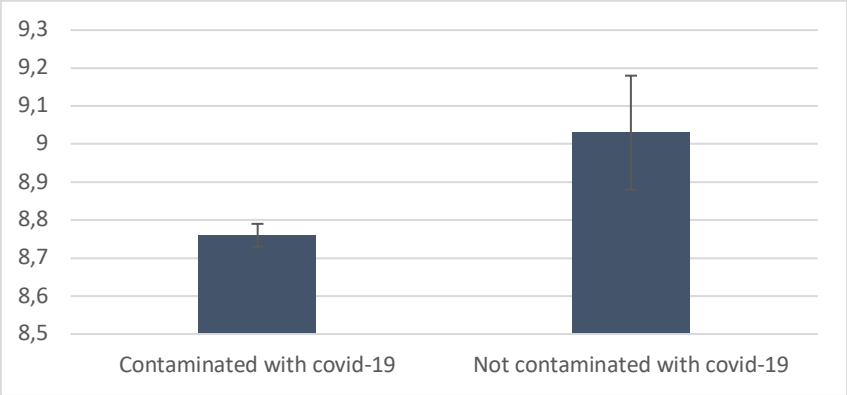



Figure 5: Mean self-perceived health (+/- 1 S.D.)

# 4.2. Mixed logit model results

The mixed logit model results are shown in table 5. All attributes significantly influenced respondent's basic healthcare package choices, except 30% specialist medical care and -5€ premium change (monthly), which were not statistically significant. This indicates that respondents preferred a healthcare package with 30% specialist medical care covered over

20%, but the difference between a healthcare package covering 20% and 25% was not significant. Same holds for premium change.

The results show the attribute coefficients from the mixed logit were in line with a priori expectations with all attributes having negative and statistically significant coefficients when the type of care is reduced compared to the current basic package. All of them are contributors to the social value of healthcare intervention, meaning that none of them is considered irrelevant to priority setting. The perceived value of a basic healthcare package was higher when it had more pharmaceutical care, general practitioners care, mental healthcare, and prevention. The lowest coefficients are seen with 0% prevention (-2.443; 0.254) and 0% general practitioner (-2.347; 0.185). The highest positive coefficients are seen with 10% prevention (1.154; 0.145) and 15% pharmaceutical care (0.336; 0.119). Thus, respondents preferred higher levels of these two attributes the most. Moreover, the negative coefficient of the opt-out (-0.385; 0.183) indicates the less likely a respondent was to choose this alternative. Furthermore, the significant coefficient of the standard deviation of the attributes indicated that there was indeed a high preference heterogeneity among respondents concerning the type of care they wanted to be covered through the basic healthcare package.

Table 5: Results of the mixed logit model

| **Attributes** | **Level** | **Mean (SD)** | **SE (SE)** | **P (P)** | **95% conf. interval (95% conf. interval)** |
|---|---|---|---|---|---|
| Specialist medical care | 20% | -1.491 (1.590) | 0.177 (0.225) | 0.000*** (0.000)*** | -1.803, -1.143 (1.148, 2.031) |
| | 25% | -- | | | |
| | 30% | 0.088 (0.897) | 0.123 (0.156) | 0.473 (0.000)*** | -0.153, 0.330 (0.591, 1.204) |
| Pharmaceutical care | 5% | -1.143 (1.461) | 0.168 (0.190) | 0.000*** (0.000)*** | -1.473, -0.814 1.088, 1.834 |
| | 10% | -- | | | |
| | 15% | 0.336 (0.762) | 0.119 (0.191) | 0.005** (0.000)*** | 0.102, -0.569 0.386, 1.138 |
| General practitioners care | 5% | -2.347 (1.341) | 0.185 (0.216) | 0.000*** (0.000)*** | -2.710, -1.983 (0.917, 1.765) |
| | 10% | -- | | | |
| | 15% | 0.299 (0.358) | 0.110 (0.247) | 0.007** (0.147) | 0.082, 0.516 (-0.125, 0.842) |
| Mental healthcare | 5% | -1.365 (2.048) | 0.210 (0.236) | 0.000*** (0.000)*** | -1.777, -0.953 (1.583, 2.512) |
| | 10% | -- | | | |
| | 15% | 0.322 (1.200) | 0.128 (0.142) | 0.012* (0.000)*** | 0.070, 0.575 (0.921, 1476) |
| Prevention/lifestyle related care | 0% | -2.443 (2.309) | 0.254 (0.223) | 0.000*** (0.000)*** | -2.942, -1.944 (1.871, 2.747) |
| | 5% | -- | | | |
| | 10% | 1.154 | 0.145 | 0.000*** | 0.869, 1.438 |

| | | | | | |
|---|---|---|---|---|---|
| | | (1.533) | (0.164) | (0.000)*** | (1.211, 1.856) |
| Premium change (monthly) | -5€ | 0.192 | 0.129 | 0.138 | -0.062, 0.446 |
| | | (1.064) | (0.140) | (0.000)*** | (0.789, 1.339) |
| | 0€ | -- | | | |
| | +5€ | -0.933 | 0.146 | 0.000*** | -1.219, -0.647 |
| | | (0.984) | (0.224) | (0.000)*** | (0.545, 1.424) |
| Opt-out | | -0.385 | 0.183 | 0.036* | -0.744, -0.025 |
| | | (1.569) | (0.181) | (0.000)*** | (1.214, 1.924) |

-- reference category, *P<0.05, **P<0.01, ***P<0.001

The relative importance, based on ranking of attribute coefficients for highest versus lowest levels, pointed that prevention was the most important consideration to increase the money off in the basic healthcare package. Figure 6 illustrated these magnitudes and relative importance's in decreasing order of magnitude based on the part-worth utilities calculations.

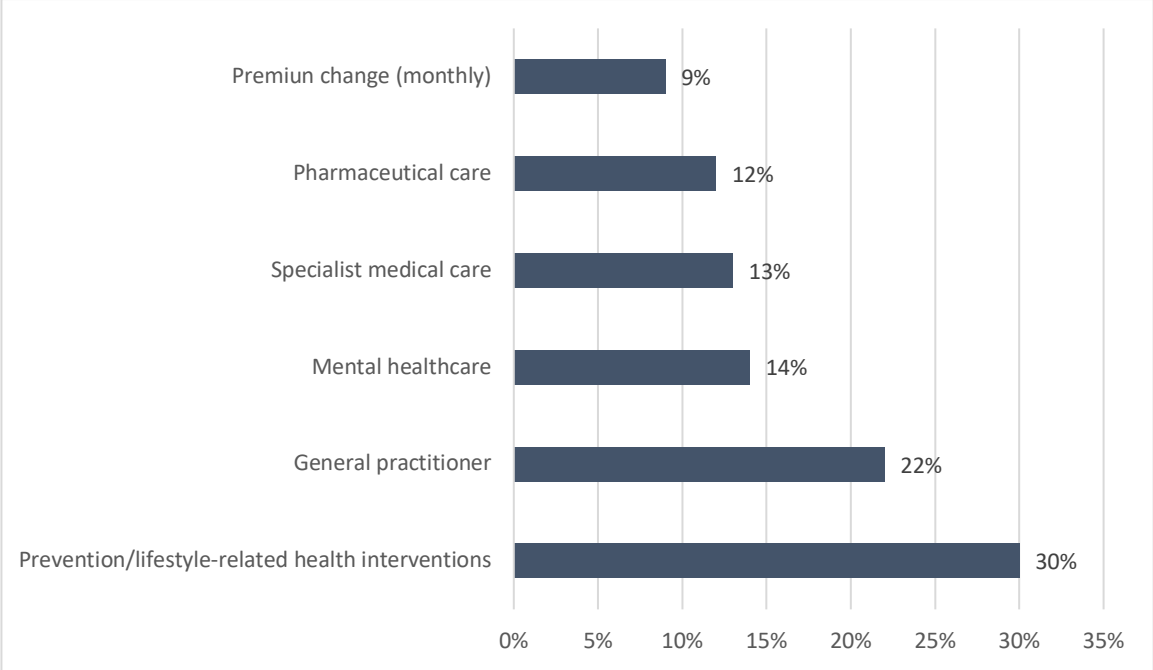



Figure 6: Relative importance scores of attributes

Figure 7 below shows based on the mixed logit model results the preference proportion for the basic healthcare package compared to the current healthcare package. The results showed that respondents prefer to increase all the six types of care at the expenses of other care.

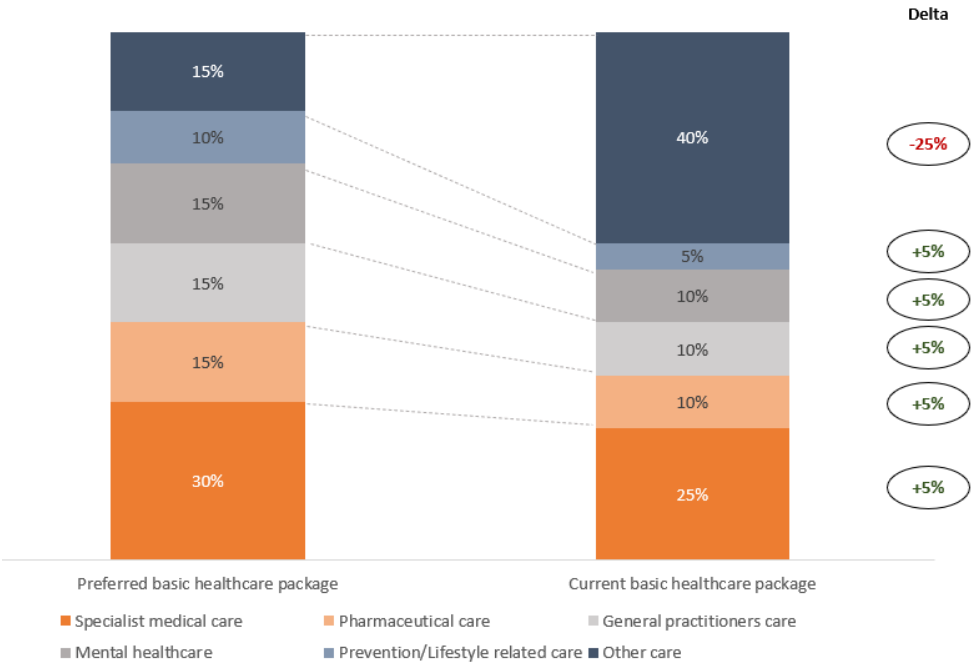



Figure 7: Current and preferred basic healthcare package according to respondents

Finally, a more sophisticated model, the mixed logit model with interactions, was estimated to determine the degree to which an explanatory variable such as covid-19 could be used to describe differences in preferences and thereby answers subsequent research question. Estimation results from the mixed logit model with interactions are presented in appendix 7.

The results showed that there was no additional effect for people who have been contaminated with covid-19. The signs and magnitudes of the interaction coefficients were in line with the ones of people not contaminated with covid-19; ''covid_prevention0%'' (-0.926; 0.467) and ''covid_prevention10%'' (0.320; 0.232). However, those coefficients were lower in comparison with the ones of people not contaminated with covid-19. Moreover, the interaction term ''covid_prevention0%'' was statistically significant and there was no evidence of interaction of 10% prevention with covid-19.

As the interaction term ''covid_prevention0%'' generated by the mixed logit model revealed a statistically significant value, consequently, it was tested against the null hypothesis ($h_0$): ''people contaminated with covid-19 don't care about the attribute level ''0% prevention''. The p-value (p= 0.000) was significant meaning that people contaminated with covid-19 do not care about less prevention other than people not contaminated with covid-19.

# 4.3. Prevention statements and preferences

An overview of the main findings of the prevention statements and questions is summarized and discussed below. These results showed contemporaneous insights into respondent's prevention beliefs and thereby the DCE results can be compared to it.

First, the prevention statements with corresponding results are displayed in figure 8. Overall, most of the respondents agree or strongly agree with the statements. The most significant

one was if a treatment can prevent complaints later in life, 93% believed that it is a reason to reimburse the treatment. Besides, the chi-square tests (appendix 9) indicate a significance smaller than the significance level α 0.05 for each statement. There seems to be a difference in the statements agreement between people contaminated and not contaminated with covid-19. Furthermore, results show that respondents contaminated with covid-19 were statistically significant in favor of making more money available for preventing conditions rather than curing them (4.225 ± 0.013) compared to respondents not contaminated with covid-19 (4.173 ± 0.010), p = 0.0018. Furthermore, they considered that a treatment should be eligible for reimbursement if it can prevent diseases later in life (2.850 ± 0.191) compared to respondents not contaminated with covid-19 (2.628 ± 0.150), p = 0.000. This was statistically significant as well. Plus, they considered that measures contributing to lifestyle awareness should be eligible for reimbursement as well (3.825 ± 0.163) compared to respondents not contaminated with covid-19 (3.685 ± 0.0123), p = 0.000. Finally, they argued that if lifestyle played a role in the occurrence or continuation of a disease, this may be a reason not to reimburse the treatment (4.2 ± 0.012) compared to respondents not contaminated with covid-19 (4.192 ± 0.009). However, this was an even smaller difference and this one was not statistically significant, p = 0.608.

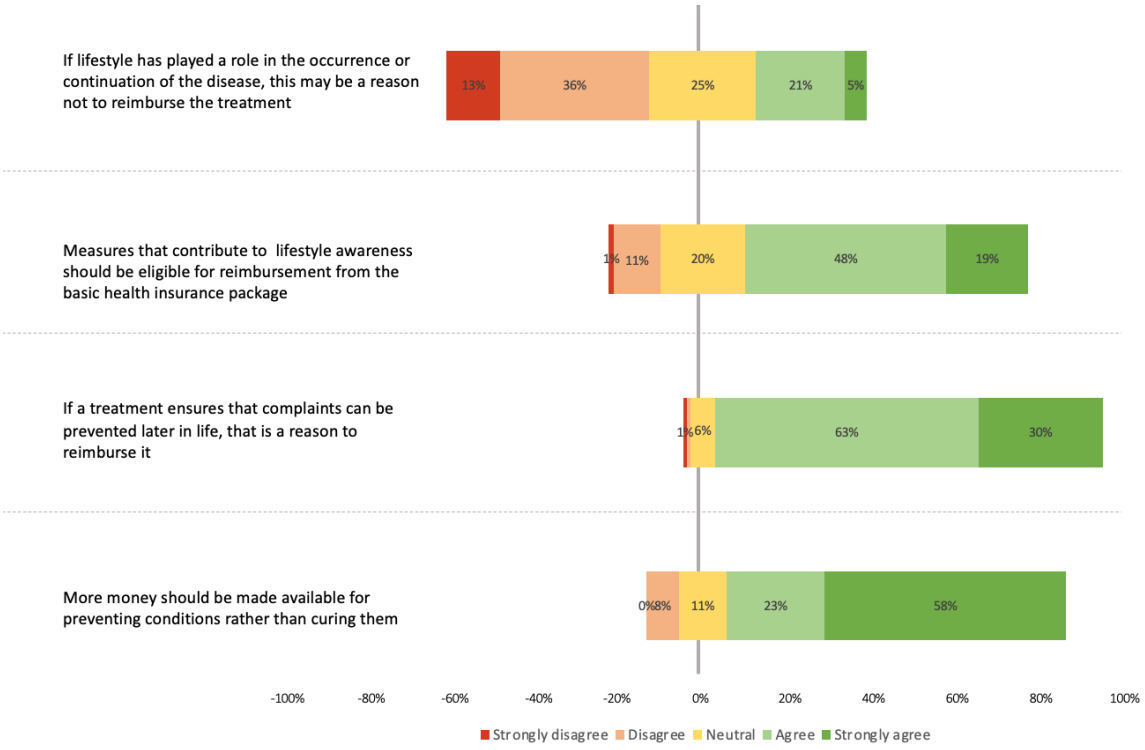



Figure 8: Respondents opinion about prevention statements (in %)

Secondly, the weighted average scores (appendix 8) suggests that ''nutrition and overweight'' and ''mental health'' were the most important type of interventions related to prevention and they were equally important to the general population. Both are followed closely by ''physical exercise and activity'' preventive interventions. Interventions aimed at addiction such as alcohol and smoking were seen as least important to respondents. In contrast, the results differed slightly for respondents contaminated with covid-19. It suggests that ''physical exercise and activity'' was the most important type of interventions related to prevention. It

was closely followed by ‘’mental health’’. Next most important type of preventive interventions were the ones related to ‘’nutrition and overweight’’. Intervention aimed at addiction were seen as least important to respondents.

# Chapter 5.
# Discussion and conclusion

This study explored societal preferences for lifestyle-related health interventions (prevention) related to other healthcare to be covered by the basic health insurance. Secondly, it investigated whether a covid-19 contamination affected respondent's choices or utilities, for the coverage of lifestyle-related health interventions, in a DCE. The results provided evidence that the DCE is valid, with many respondents trading the attributes presented and results showing significance.

The main findings will further be discussed in section 5.1, where the results are compared to the existing literature as well. Subsequently, the strengths and limitations of the study are discussed in section 5.2. The implications for policy and future research more generally are highlighted in section 5.3.

## 5.1. Main findings

**Preferences general population**

Research question one was investigated through a mixed logit analysis. Results suggest lifestyle-related health interventions (prevention) being the most important attribute to increase the money off when considered alongside specialist medical care, pharmaceutical care, general practitioners care, mental healthcare, and premium change. Plus, the presence or absence of lifestyle-related health interventions (prevention) in the basic health package appeared to be the biggest concern of respondents. Thereby, it can be concluded according to this results that the Dutch citizen is willing to invest in the protection of health, the prevention of diseases and their consequences for daily functioning from the basic health insurance and most of all it underlined the positive attitudes towards lifestyle interventions and prevention. While the study approach is different, as others paid attention to the difference between cure and prevention, these results are consistent with prior DCE studies which also found a preference for prevention (Mortimer & Segal, 2008) (Bosworth et al., 2010). That said, all types of care included in the DCE were important to increase the money off, meaning that none of them is considered irrelevant to priority setting. Similar results have been found in another study which demonstrated that people were more likely to choose the alternative with less costly and more effective interventions (Mortimer & Segal, 2008). They concluded that it is an adjustment to simple health maximization that is required, rather than an outright rejection.

Interestingly, results from the ranking exercise were almost in line with the DCE data, which estimated mental health to be one of the most important type of prevention according to the general population. In contrast, mental healthcare in the DCE data was the third important attribute to increase the money off. This would mean that the general population do not value curative mental healthcare, but they want to prevent it. A further exploration of these relationships is required to explain the differences in preferences observed.

**Prevention preferences people contaminated with covid-19**

A covid-19 contamination did not significantly influence thoughts on prevention. The results of the mixed logit model with interactions found that the interaction term between a covid-19 contamination and 0% prevention was significant. However, it also found that the interaction term between a covid-19 contamination and 10% prevention was insignificant. The results were confirmed in the latent class analysis which found that a covid-19 contamination was not a significant predictor of class membership. These results answer research question two: preferences for lifestyle-related health interventions are not affected by a covid-19 contamination. More importantly, there was no statistically significant difference between people contaminated and not contaminated with covid-19 in the importance placed on various types of care attributes. Thus, the importance of lifestyle-related health interventions and prevention didn't become higher with the impact of a covid-19 contamination.

However, the coefficients of the interactions terms became lower as suggested by the DCE results. This is, in some respects, surprising. An explanation could be that through the contamination, people experienced that the impact on their health has not been too bad. This is confirmed by the fact that despite they had a lower average score on the self-perceived health question than people not contaminated with covid-19, the score was still above Dutch average, and they were not that long limited in daily activities. So, the seriousness of the disease burden wasn't that bad, or it was not correctly measured in the questionnaire. As a result, they would place less value on prevention and lifestyle-related health interventions. At the same time, they ranked prevention higher than people not contaminated with covid-19 when it came purely to prevention, but when compared to other types of care such as the ones in the DCE, prevention loses some of its interest and a lower weight was attributed to it.

Due the novelty of covid-19, no DCEs have yet studied preferences for lifestyle-related health interventions of people contaminated with the disease. As these studies have been done for people with chronic conditions, this study will use the preferences of people with chronic conditions to contrast the findings of this research. Interestingly, one study investigating Dutch preferences and choices for care and health insurance found that ''there was no statistically significant difference between high and low risk consumers (defined according to presence or absence of a chronic condition) in the importance place on various plan attributes'' (Van den Berg et al., 2008, p. 2455), where one attribute was ''your insurer reimburses prevention activities''. So, the study results appear to be in line with earlier findings.

# 5.2. Strenghts and limitations

The present study had several strengths. Firstly, this study aimed to investigate preferences for the coverage of lifestyle-related health intervention / prevention related to other care. As respondents were not aware of the overall goal of the study, the potential influence of socially desirable answers can be discounted. Social desirability bias occurs when respondents choose politically correct or socially acceptable answers rather than their real thoughts or beliefs. In

addition, complete response rates for self-administrated DCEs have been reported to be as low as 18% and as high as 89% (Ryan et al., 2001). The complete response rate (55%) is consistent with these findings and the total number of respondents was adequate to perform analysis. Another key strength of this study is its novelty, as this is the first study to examine lifestyle-related health intervention (prevention) preferences related to other care in Dutch adults (contaminated with covid-19) using a quantitative DCE and definitions of type of care were provided to help minimize subjectivity of how attributes were understood by respondents (Livingstone et al., 2020).

The present study had also several limitations that should be acknowledged. First, DCEs can identify the preference heterogeneity. However, they are ''unable to discover the underlying behavior reasons in depth and can be better explained through qualitative methods'' like interviews or focus groups (Liu et al., 2019 as cited in Jiang et al., 2020, p. 9).

Secondly, the selection of attributes was difficult. Not all the care covered in the basic health package was selected for this study and thereby omitted variable bias may have occurred. This was introduced in the questionnaire however one must wonder to what extent respondents still took this into account once they made trade-offs as it was not included as an attribute in the choice tasks themselves. This may have generated higher positive utilities for each alternative, thus overestimations and hence misleading results. So, face validity could be threatened when respondents interpreted items differently as intended (Netemeyer et al., 2012). Do you really measure what you intent to measure? As stated before, results may be confounded due to insufficient interpretations of terminology and concepts used in the questionnaire or lack of familiarity with the basic healthcare package in general. But it could also be that the results are correct, and the expectations were wrong. Thereby, the results are affected but other variables outside the scope of this study.

Another limitation related to the selection of attributes concerned general practitioner's care. General practitioners care is fully reimbursed by the basic health insurance unlike the other chosen attributes. Thus, it could have been replaced by another type of care in order to avoid confusion. Nevertheless, it was decided to keep it. Attributes were namely chosen based on total healthcare costs (chapter 2, method) and the next closest care were also fully reimbursed. The first best alternative was paramedics, but it was not a robust alternative based on total care costs. Plus, it didn't come up as an issue during the think-aloud sessions even when explicitly asked for it. Nevertheless, it remains a discussable point. Respondents needed to make choices under certain circumstances and the choice of attribute and levels may have impacted the ranking of it. As suggested by others, ''future research should consider piloting the use of the attributes and levels in the target group prior to designing the DCE'' (Livingstone et al., 2020, p. 10).

Third, a high drop-out rate was visible. To begin, the task complexity was high. Respondents struggled to complete the choice tasks. The number of choice tasks and/or attributes were, in retrospect, too high. The warm-up exercise attempted to reduce interpretation issues by introducing the attributes and levels and allowing to ''practice'' before. Besides, the use of percentage levels (5%, 10%, 15%) was arguably not easy to visualize and the range may not have been large enough to accurately capture preferences. This also deprived respondents of having a very high increase or decrease preference for certain type of care. Wide level range

is statistically preferred, but levels should also be realistic behaviorally. This study combined an unusual survey about a subject respondents might not be familiar with which are important limitations. Other explanations might include time constraints, embarrassment over having difficulty completing the choice tasks or the emotional challenge of the questionnaire. Challenges with completing the choice tasks were namely communicated by several respondents as shown in the results.

Fourth, this study aimed to investigated preferences in a self-selected sample resulting in a study sample skewed towards more young adults, especially females, highly educated and those with good overall health. However, in the Netherlands, only 33% of adults in the general population is highly educated (OCW, 2019). One reason for this might be the fact that DCEs have been shown to be cognitively challenging and therefore educated people are more likely to complete the questionnaire. The level of education observed may also be a phenomenon of sample selection bias in which the research group mostly consulted their own networks. It was noteworthy that 62% judged their knowledge of the basic health package and health insurance as not good and almost half of the respondents (47%) had no opinion about how satisfied they were with the current composition of the basic health package. An earlier Dutch study found that the knowledge of healthcare is insufficient, even among highly educated people (De Jong et al., 2017). Thus, the government has not sufficiently succeeded in making the healthcare system comprehensible; there may be an opportunity here.

Fifth, in terms of covid-19, the study population represented all subtypes expected (not contaminated, contaminated with and without supportive care). Nonetheless, the duration question in which respondents were not able to perform daily activities due to covid-19 brought surprising responses. Long recovery time occurred less frequently than expected, which makes one wonder how ‘’daily activities’’ has been interpreted. The mean duration was 4 weeks against 2.5 weeks for people recovered without supportive care. This is not consistent with research so far, however, research also shows that little is known about this group and the short- and long-term effects of covid-19 that they experience and therefore more research is needed (Nivel, n.d.). In this study the total share of people contaminated with covid-19 and recovered with supportive care was too low to conduct separate analysis and it was not possible to split the respondents contaminated with covid-19 in significant subgroups based on their inability to perform daily activities. Therefore, analyses were done based on people contaminated with covid-19 and people not contaminated with covid-19.

In addition, the recruitment of people (especially the ones contaminated with covid-19) was constrained by resources and time. Sample selection bias occurred as the probability of an individual agreeing to complete the questionnaire was related to the construct under investigation. This led to non-generalizability of the results. In addition, 45% of people contaminated with covid-19 was working in the healthcare sector and 27% of the overall population was working in the healthcare sector. However, it has been acknowledged that patients’, the public’s and health professional’s preferences differ (Vass, 2015), and this has not been carefully and enough considered when collecting data.

Finally, the one point in time data collection didn’t enable to examine possible changes in societal preferences over time. However, viewpoints may change over time. Thereby it was, for example, not possible to obtain underlying causal mechanisms of a covid-19 contamination

on preferences for the coverage of lifestyle-related health intervention / prevention related to other care. It may be possible that this group already had a lower appreciation of prevention. Finally, the question whether people contaminated with covid-19 were the most appropriate sample to elicit preferences from must also be addressed. This also included the question of whose preferences for type of care and health outcomes matter the most in the context of a publicly financed health system.

## 5.3. Implications for future research and policy

Future work pertaining to this research question would involve further understanding demographic variables shown to influence peoples' preferences. As mentioned earlier, qualitative methods would offer a distinctive approach to build on these findings and further understand what is most important to people and why. In addition, further studies could investigate the difference between covid-19 contamination as it was not possible to investigated it here due to a too small number of respondents contaminated with covid-19 and recovered with supportive care. Plus, administering this DCE to a sample of people from other social classes or people with other (chronic) diseases could provide more evidence as to the validity, transferability, and generalizability of outcomes. In doing so, simple changes to the questionnaire could upgrade attribute and level framing. Without exploring further some of the methodological issues surrounding this DCE, a level of consistency in the quality of the questionnaire will not be achieved. Subsequently, the impact of this research method as a true force in the field of decision-making will remain limited.

The use of a DCE helps take the guesswork of basic healthcare package design. By offering insights into general population reactions to various health package choice and reactions to different features of the basic health package, the results presented in this study can help policymakers optimize allocation of healthcare resources. They can use this knowledge to further promote the most desirable features of the existing basic health package and provide public opinion with the appropriate insight. In addition, communicating decisions if controversial. And in turn, it could improve public support and overall healthcare knowledge. Alternatively, they can modify the level of existing benefits. For example, the coverage of more lifestyle-related health interventions (prevention), as it was generally perceived as the most important type of care to increase the money off. This way, policymakers may attempt to better align their public health policies with the opinion of the general population and the desires and need of the target population. Both can be seen as repositioning of the current basic healthcare package which can help raise its effectiveness and efficiency. Finally, the outcomes may aid policymakers and maybe other health stakeholders with possible follow-up steps towards the ambitions for 2040 regarding the National Prevention Agreement when planning for further implementation of lifestyle-related health interventions (prevention) into the basic healthcare package. Nevertheless, in line with the findings of Luyten et al. (2015) this study shows that DCEs in healthcare should be complemented by ethical considerations. Thus, instead of being right useful to policymakers' decisions, this study supports the need for a broader and more extensive public debate about the appropriate role of lifestyle-related health interventions (prevention) in healthcare rationing (Luyten et al. 2015).

# References


Abiiro, G. A., Leppert, G., Mbera, G. B., Robyn, P. J., & De Allegri, M. (2014). Developing attributes and attribute-levels for a discrete choice experiment on micro health insurance in rural Malawi. *BMC Health Services Research*, *14*(1), 235. https://doi.org/10.1186/1472-6963-14-235

Ammi, M., & Peyron, C. (2016). Heterogeneity in general practitioners' preferences for quality improvement programs: a choice experiment and policy simulation in France. *Health Economics Review*, *6*(1), 1–11. https://doi.org/10.1186/s13561-016-0121-7

Berendsen, B., Pj Kremers, S., Savelberg, H. H., Schaper, N. C., & Hendriks, M. R. (2015). *The implementation and sustainability of a combined lifestyle intervention in primary care: mixed method process evaluation*. https://doi.org/10.1186/s12875-015-0254-5

Bijlmakers, L., Jansen, M., Boer, B., Van Dijk, W., Groenewoud, S., Zwaap, J., Helderman, J. K., Van Exel, J., & Baltussen, R. (2020). Increasing the Legitimacy of Tough Choices in Healthcare Reimbursement: Approach and Results of a Citizen Forum in The Netherlands. *Value in Health*, *23*(1), 32–38. https://doi.org/10.1016/j.jval.2019.07.015

Boot, J. M. (2013). *De Nederlandse gezondheidszorg : Bevolking en gezondheid Voorzieningen Beleid*. https://web-b-ebscohost-com.eur.idm.oclc.org/ehost/ebookviewer/ebook/bmxlYmtfXzE0ODU4NTlfX0FO0?sid=1750219a-c699-432b-952e-0daee2f82836@sessionmgr103&vid=0&format=EB&rid=1

Bosworth, R., Cameron, T., & Deshazo, J. (2010). *Is an ounce of prevention worth a pound of cure? Comparing demand for public prevention and treatment policies*. https://doi.org/10.1177/0272989X10371681

Campbell, D., & Erdem, S. (2019). *Including Opt-Out Options in Discrete Choice Experiments: Issues to Consider*. *12*, 1–14. https://doi.org/10.1007/s40271-018-0324-6

CBS. (2020). *StatLine - Bevolking; kerncijfers*. https://opendata.cbs.nl/statline/#/CBS/nl/dataset/37296NED/table?fromstatweb

CBS. (2021). *Gezondheid en zorggebruik; persoonskenmerken*. https://www.cbs.nl/nl-nl/cijfers/detail/83005ned

CDC. (n.d.). *Prevention*. Retrieved July 27, 2021, from https://www.cdc.gov/pictureofamerica/pdfs/picture_of_america_prevention.pdf

Charlier, P., Coppens, Y., Malaurie, J., Brun, L., Kepanga, M., Hoang-Opermann, V., Correa Calfin, J., Nuku, G., Ushiga, M., Schor, X., Deo, S., Hassin, J., & Hervé, C. (2017). A new definition of health? An open letter of autochthonous peoples and medical anthropologists to the WHO. *European Journal of Internal Medicine*, *37*, 33–37. https://doi.org/10.1016/j.ejim.2016.06.027

Cornelissen, D., Boonen, A., Bours, S., Evers, S., Dirksen, C., & Hiligsmann, M. (2020). Understanding patients' preferences for osteoporosis treatment: the impact of patients' characteristics on subgroups and latent classes. *Osteoporosis International*, *31*(1), 85–96. https://doi.org/10.1007/s00198-019-05154-9

Craven, M., Sabow, A., Van der Veken, L., & Wilson, M. (2020). *Not the last pandemic: Investing now to reimagine public-health systems*. https://www.mckinsey.com/~/media/McKinsey/Industries/Public and Social Sector/Our Insights/Not the last pandemic Investing now to reimagine public health systems/Not-the-last-pandemic-Investing-now-to-reimagine-public-health-systems-F.pdf

Czeresnia, D. (1999). *The concept of health and the difference between prevention and promotion. 15*(4), 701–709. https://doi.org/10.1590/S0102-311X1999000400004

Dahlberg, M., & Eklof, M. (2003). *Relaxing the IIA assumption in locational choice models: a comparison between conditional logit, mixed logit, and multinomial probit models*. https://www.researchgate.net/publication/5098296_Relaxing_the_IIA_Assumption_in_Locational_Choice_Models_A_Comparison_Between_Conditional_Logit_Mixed_Logit_and_Multinomial_Probit_Models

De Bekker-Grob, E. W., Essink-Bot, M. L., Meerding, W. J., Pols, H. A. P., Koes, B. W., & Steyerberg, E. W. (2008). Patients' preferences for osteoporosis drug treatment: A discrete choice experiment. *Osteoporosis International*, *19*(7), 1029–1037. https://doi.org/10.1007/s00198-007-0535-5

De Bekker-Grob, E. W., Swait, J. D., Kassahun, H. T., Bliemer, M. C. J., Jonker, M. F., Veldwijk, J., Cong, K., Rose, J. M., & Donkers, B. (2019). Are healthcare choices Predictable? The impact of discrete choice experiment designs and models. *Value in Health*, *22*(9), 1050–1062. https://doi.org/10.1016/j.jval.2019.04.1924

De Jong, J., Van Esch, T., & Brabers, A. (2017). *De zorgverzekeringsmarkt: gedrag, kennis en solidariteit Een verdiepend onderzoek naar verschillen tussen groepen verzekerden*. https://www.nivel.nl/sites/default/files/bestanden/Kennissynthese_De_zorgverzekeringsmarkt_gedrag_kennis_solidariteit.pdf

Dima-Cozma, C., Gavriluta, C., Mitrea, G., & Cojocaru, D.-C. (2014). The importance of healthy lifestyle in modern society: a medical, social and spiritual perspective. *European Journal of Science and Technology*. https://www.researchgate.net/publication/281293844

Egger, G., Binns, A., & Rossner, S. (2009). The emergence of "'lifestyle medicine'" as a structured approach for management of chronic disease. *The Medical Journal of Australia*. https://onlinelibrary-wiley-com.eur.idm.oclc.org/doi/pdfdirect/10.5694/j.1326-5377.2009.tb02317.x

Epstein, R. M., & Peters, E. (2009). Beyond information: Exploring patients' preferences. In *JAMA - Journal of the American Medical Association* (Vol. 302, Issue 2, pp. 195–197).

American Medical Association. https://doi.org/10.1001/jama.2009.984

Goryakin, Y., Vuik, S., & Cecchini, M. (2019). Chapter 5. Promoting healthier diets and active lifestyles: Policies and best practices. In *The heavy burden of obesity: the economics of prevention* (pp. 124–168). https://doi.org/10.1787/2f7cd1bf-en

Green, C., & Gerard, K. (2009). Exploring the social value of health-care interventions: a stated preference discrete choice experiment. *Wiley InterScience*, *18*, 951–976. https://doi.org/10.1002/hec.1414

Hauber, A., Marcos González, J., Groothuis-Oudshoorn, C., Prior, T., Marshall, D., Cunningham, C., IJzerman, M., & Bridges, J. (2016). *Statistical methods for the analysis of discrete choice experiments: a report of the ISPOR conjoint analysis good research practices task force*. https://doi.org/10.1016/j.jval.2016.04.004

Heiestad, H., Gjestvang, C., & Haakstad, A. (2020). Investigating self-perceived health and quality of life: a longitudinal prospective study among beginner recreational exercisers in a fitness club setting. *British Medical Journal*. https://doi.org/10.1136/bmjopen-2019-036250

Himmler, S., Soekhai, V., Van Exel, J., & Brouwer, W. (2021). What works better for preference elicitation among older people? Cognitive burden of discrete choice experiment and case 2 best-worst scaling in an online setting. *Journal of Choice Modelling*, *38*, 100265. https://doi.org/10.1016/j.jocm.2020.100265

Horstman, K., & Houtepen, R. (2005). *Worstelen met gezond leven. Ethiek in de preventie van hart- en vaatziekten*. https://books.google.nl/books?hl=nl&lr=&id=fw4PD-dpbAAC&oi=fnd&pg=PP11&dq=basisverzekering+en+autonomie+in+gezonde+keuzes&ots=BtHMGTe3XH&sig=YMtzymdFQBayummSHOnGDXmdTUk#v=onepage&q&f=false

Hunston, S., & Oakey, D. (2020). Designing a questionnaire. In *Introducing Applied Linguistics* (Vol. 1, Issue 1, pp. 163–170). Routledge. https://doi.org/10.4324/9780203875728-26

Jiang, M. Z., Fu, Q., Xiong, J. Y., Li, X. L., Jia, E. P., Peng, Y. Y., & Shen, X. (2020). Preferences heterogeneity of health care utilization of community residents in China: A stated preference discrete choice experiment. *BMC Health Services Research*, *20*(1), 1–11. https://doi.org/10.1186/s12913-020-05134-4

Johnson, F., Lancsar, E., Marshall, D., Kilambi, V., Muhlbacher, A., Regier, D., Bresnahan, B., Kanninen, B., & Bridges, J. (2013). *Constructing experimental designs for discrete-choice experiments: report of the ISPOR conjoint analysis experimental design good research practices task force*. https://reader.elsevier.com/reader/sd/pii/S1098301512041629?token=B35FBFC6586EAD63BF9332DCB9DDBF5AD22067FF299A85B05731E0ED790C2847260003775E083D28A659276082923E59&originRegion=eu-west-1&originCreation=20210721133002

Jonker, M. F., Donkers, B., De Bekker-Grob, E., & Stolk, E. A. (2019). Attribute level overlap (and color coding) can reduce task complexity, improve choice consistency, and decrease the dropout rate in discrete choice experiments. *Health Economics*, *28*(3), 350–363. https://doi.org/10.1002/hec.3846

Kjaer, T. (2005). *A review of the discrete choice experiment-with emphasis on its application in health care*. https://www.sdu.dk/~/media/52E4A6B76FF340C3900EB41CAB67D9EA.ashx

Kriston, P., Pikó, B., & Kovács, E. (2012). Self-perceived health, as an indicator of psychological well-being: behavioural epidemiological analysis among the adolescent population. *Orvosi Hetilap*, *153*(47), 1875–1882. https://doi.org/10.1556/OH.2012.29491

Livingstone, K., Lamb, K., Abbott, G., Worsley, T., & Mcnaughton, S. (2020). *Ranking of meal preferences and interactions with demographic characteristics: a discrete choice experiment in young adults*. https://doi.org/10.1186/s12966-020-01059-7

López Barreda, R., Robertson-Preidler, J., & Bedregal García, P. (2019). Health assessment and the capability approach. *Global Bioethics*, *30*(1), 19–27. https://doi.org/10.1080/11287462.2019.1673028

Louviere, J., Hensher, D., Dan Swait, J., & Adamowicz, W. (2000). *Stated choice methods: analysis and applications*.

Luyten, J., Kessels, R., Goos, P., & Beutels, P. (2015). *Public Preferences for prioritizing preventive and curative health care interventions: a discrete choice experiment*. https://reader.elsevier.com/reader/sd/pii/S1098301514047937?token=4B88D2B7CB6ABDEEEDEE38C077F484C87A310B79652AFB4498E0A2528472817C274BB3019B909C0D919009A10F13683D&originRegion=eu-west-1&originCreation=20210727113345

Molema, C., Veldwijk, J., Wendel-Vos, W., de Wit, A., Van de Goor, I., & Schuit, J. (2019). *Chronically ill patients' preferences for a financial incentive in a lifestyle intervention. Results of a discrete choice experiment*. https://doi.org/10.1371/journal.pone.0219112

Mortimer, D., & Segal, L. (2008). Is the value of a life or life-year saved context specific? Further evidence from a discrete choice experiment. *Cost Effectiveness and Resource Allocation*, *6*(1), 1–15. https://doi.org/10.1186/1478-7547-6-8

Netemeyer, R., Bearden, W., & Sharma, S. (2012). Scaling Procedures. In *Scaling Procedures*. SAGE Publications, Inc. https://doi.org/10.4135/9781412985772

Nielsen-Bohlman, L., Panzer, A. M., & Kindig, D. A. (2004). *Health Literacy: a prescription to end confusion*. https://doi.org/10.17226/10883

Nivel. (n.d.). *Effecten coronavirus op korte en langere termijn | Nivel*. Retrieved June 13, 2021, from https://www.nivel.nl/nl/effectencovid-19

O'brien, R. M. (2007). *A caution regarding rules of thumb for variance inflation factors*.

https://doi.org/10.1007/s11135-006-9018-6

Obadha, M., Barasa, E., Kazungu, J., Abiiro, G. A., & Chuma, J. (2019). Attribute development and level selection for a discrete choice experiment to elicit the preferences of health care providers for capitation payment mechanism in Kenya. *Health Economics Review*, *9*(1), 30. https://doi.org/10.1186/s13561-019-0247-5

OCW. (2019). *Opleidingsniveau van de bevolking | Kengetallen | Onderwijs in cijfers*. https://www.onderwijsincijfers.nl/kengetallen/internationaal/opleidingsniveau-bevolking

OECD. (2019). *The heavy burden of obesity : The economics of prevention. OECD Health policy studies.* 124–168. https://www.oecd-ilibrary.org/docserver/67450d67-en.pdf?expires=1627392301&id=id&accname=guest&checksum=F74AD36A92013E5343D26395083F9CDC

Palinkas, L., Horwitz, S., Green, C., Wisdom, J., Duan, N., & Hoagwood, K. (2013). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research*. https://doi.org/10.1007/s10488-013-0528-y

Piepoli, M., & Villani, G. (2017). Lifestyle modification in secondary prevention. *European Journal of Preventive Cardiology*, *24*(3), 101–107. https://doi.org/10.1177/2047487317703828

Psaltopoulou, T., Ilias, I., & Alevizaki, M. (2010). The role of diet and lifestyle in primary, secondary and tertiary diabetes prevention: A review of meta-analyses. *Review of Diabetic Studies*, *7*(1), 26–35. https://doi.org/10.1900/RDS.2010.7.26

Rajesh, T., Gandhi, M. ., John, B., Lynch, M. D., & del Rio, C. (2020). Mild or moderate COVID-19. *The New England Journal of Medicine*. https://www.nejm.org/doi/pdf/10.1056/NEJMcp2009249

Rappange, D., & Brouwer, W. (2012). The evaluation of lifestyle interventions in the Netherlands. *Health Economics, Policy and Law*, *7*, 243–261. https://doi.org/10.1017/S1744133112000023

Rappange, D., Brouwer, W., Rutten, F., & Van Baal, P. (2009). Lifestyle intervention: from cost savings to value for money. *Journal of Public Health*. https://doi.org/10.1093/pubmed/fdp079

Rawlins, M. (2005). *Pharmacopolitics and deliberative democracy*. https://www-ncbi-nlm-nih-gov.eur.idm.oclc.org/pmc/articles/PMC4954175/pdf/471.pdf

Reckers-Droog, V., Van Exel, J., & Brouwer, W. (2018). Who should receive treatment? An empirical enquiry into the relationship between societal views and preferences concerning healthcare priority setting. *PLoS ONE*, *13*(6). https://doi.org/10.1371/journal.pone.0198761

Rijksoverheid. (2018). *Nationaal Preventieakkoord | naar een gezonder Nederland*.

https://www.rijksoverheid.nl/documenten/convenanten/2018/11/23/nationaal-preventieakkoord

RIVM. (2018). *Quickscan mogelijke impact nationaal preventieakkoord*. https://www.rivm.nl/documenten/quickscan-mogelijke-impact-nationaal-preventieakkoord

Roscam Abbing, H. D. . (1991). *Kiezen en delen; rapport van de commissie Keuzen in de zorg (Commissie-Dunning) | Nederlands Tijdschrift voor Geneeskunde*. https://www.ntvg.nl/artikelen/kiezen-en-delen-rapport-van-de-commissie-keuzen-de-zorg-commissie-dunning/volledig

Ryan, M., Gerard, K., & Amaya, M. (2008). *Using discrete choice experiments to value health and healthcare*. (Vol. 11). Springer Netherlands. https://link-springer-com.eur.idm.oclc.org/content/pdf/10.1007%2F978-1-4020-5753-3.pdf

Ryan, M., Scott, D. A., Reeves, C., Bate, A., Van Teijlingen, E. R., Russell, E. M., Napper, M., & Robb, C. M. (2001). Eliciting public preferences for healthcare: A systematic review of techniques. *Health Technology Assessment*, *5*(5). https://doi.org/10.3310/hta5050

Soeters, M., & Veroeks, G. (2015). *Financiering van preventie*. https://www.trimbos.nl/docs/bf92622f-b31d-4412-b33b-c21ffb496717.pdf

Stern, J., Hirsch, J., Blair, S., Foreyt, J., Frank, A., Kumanyika, S., Madans, J., Marlatt, G., St Jeor, S., & Stunkard, A. (1995). *Weighing the options: criteria for evaluating weight-management programs. The Committee to Develop Criteria for Evaluating the Outcomes of Approaches to Prevent and Treat Obesity*. https://www.ncbi.nlm.nih.gov/books/NBK236738/

Timmermans, D. (2013). *De keuze is aan ons! Of toch niet?* https://www.researchgate.net/publication/306263374

Van den Berg, B., Van Dommelen, P., Stam, P., Laske-Aldershof, T., Buchmueller, T., & Schut, F. T. (2008). Preferences and choices for care and health insurance. *Social Science and Medicine*, *66*(12), 2448–2459. https://doi.org/10.1016/j.socscimed.2008.02.021

Van der Horst, A., & De Jong, J. (2013). *Gezondheid loont; tussen keuze en solidariteit*. https://www.cpb.nl/sites/default/files/CPB-Boek-7-Toekomst-voor-de-zorg-Hoofdstuk8-leefstijl-en-preventie.pdf

Van der Vliet, N., Suijkerbuijk, A., de Blaeij, A., Ardine de Wit, G., Van Gils, P., Staatsen, B., Maas, R., & Polder, J. (2020). Ranking preventive interventions from different policy domains: What are the most cost-effective ways to improve public health? *International Journal of Environmental Research and Public Health*, *17*(6). https://doi.org/10.3390/ijerph17062160

Van der Wulp, I., Van den Hout, W., de Vries, M., Stiggelbout, A., & Van den Akker-van Marle, E. (2012). Societal preferences for standard health insurance coverage in the Netherlands: a cross-sectional study. *BMJ Open*, *2*(2), e001021. https://doi.org/10.1136/bmjopen-2012-001021

Van Exel, J., Baker, R., Mason, H., Donaldson, C., & Brouwer, W. (2015). Public views on principles for health care priority setting: Findings of a European cross-country study using Q methodology. *Social Science and Medicine*, *126*, 128–137. https://doi.org/10.1016/j.socscimed.2014.12.023

Van Ommen, B., Pijl, H., Wopereis, S., Kiefte-de Jong, J., Chavannes, N., Kremer, B., Van Bilsen, J., & Winkelhof, M. (2020). *Wetenschappelijke notitie over de relaties tussen COVID-19, metabole ontregeling, weerstand en leefstijlinterventies*. https://www.tno.nl/nl/over-tno/nieuws/2020/5/covid-19-maakt-duidelijk-leefstijl-en-leefstijlgeneeskunde/

Van Rinsum, C., Gerards, S., Rutten, G., Van De Goor, I., & Kremers, S. (2018). The coaching on lifestyle (CooL) intervention for obesity, a study protocol for an action-oriented mixed-methods study. *BMC Public Health*, *18*(1), 1–12. https://doi.org/10.1186/s12889-017-5010-4

Van Someren, M., Barnard, Y., & Sandberg, J. (1994). *The think aloud method: a practical guide to modelling cognitive processes*. https://www.researchgate.net/publication/215439100_The_Think_Aloud_Method_-_A_Practical_Guide_to_Modelling_CognitiveProcesses/link/00463517ae0d3c12c0000000/download

Vass, C. (2015). *Using discrete choice experiments to value benefits and risks in primary care*. https://www.research.manchester.ac.uk/portal/files/54579019/FULL_TEXT.PDF

Vingard, E., Alexanderson, K., & Norlund, A. (2004). Chapter 9. Consequences of being on sick leave. In *Personal Injury Prevention*.

WHO. (2021a). *Coronavirus*. https://www.who.int/health-topics/coronavirus#tab=tab_1

WHO. (2021b). *Weekly epidemiological update - 9 February 2021*. https://www.who.int/publications/m/item/weekly-epidemiological-update---9-february-2021

World health organization. (2021). *How to conduct a discrete choice experiment for health workforce recruitment and retention in remote and rural areas: A user guide with case studies*. https://www.who.int/hrh/resources/DCE_UserGuide_WEB.pdf?ua=1

World Medical Association. (2018). *WMA Declaration of Helsinki – Ethical Principles for Medical Research Involving Human Subjects*. https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/

Zorginstituut Nederland. (n.d.). *Basispakket Zvw | Verzekerde zorg | Zorginstituut Nederland*. Retrieved June 20, 2021, from https://www.zorginstituutnederland.nl/Verzekerde+zorg/b/basispakket-zorgverzekeringswet-zvw

Zorginstituut Nederland. (2017). *Pakketadvies in de praktijk: wikken en wegen voor een rechtvaardig pakket | Rapport | Zorginstituut Nederland*. https://www.zorginstituutnederland.nl/publicaties/rapport/2017/09/06/rapport-pakketadvies-in-de-praktijk-wikken-en-wegen-voor-een-rechtvaardig-pakket

Zorginstituut Nederland. (2020). *Landelijk beeld | Zorgcijfersdatabank.nl*. https://www.zorgcijfersdatabank.nl/databank?infotype=zvw&label=00-totaal&geg_wlz=j2020NEW&geg_zvw=j2015NEW&meta_tabel=kosten&tabel=B_kost&item=

Zorginstituut Nederland. (2021). *Landelijk beeld | Zorgcijfersdatabank.nl*. https://www.zorgcijfersdatabank.nl/databank?infotype=zvw&label=00-totaal&geg_wlz=jjaarNEW&geg_zvw=j2020NEW&meta_tabel=kosten&tabel=B_kost&item

# Appendices

# Appendix 1: Ethical approval form

MEC-U
MEDICAL RESEARCH ETHICS COMMITTEES UNITED

Medical research Ethics Committees United

Postbus Postbus 2500
3430 EM Nieuwegein

Bezoekadres Koekoeksloan 1 te Nieuwegein
088 320 8784

E-mail info@mec-u.nl

Website www.mec-u.nl

Maasstad Ziekenhuis

T.a.v. mevrouw M. van Haaften
Postbus 9100
3007 AC ROTTERDAM

Betreft: WMO-plichtigheid onderzoek W21.100 Datum: 22-4-2021

Geachte mevrouw Van Haaften,

MEC-U heeft de door u ingediende studie met titel: "*Basispakket en maatschappelijke voorkeuren in de zorg*", waaraan het registratienummer **W21.100** is toegekend, in goede orde ontvangen.

U heeft de commissie verzocht om te beoordelen of uw studie al dan niet onder de reikwijdte van de Wet medisch-wetenschappelijk onderzoek met mensen (WMO) valt.

De volgende documenten zijn daarbij betrokken:

| Sectie | Onderwerp | Versie |
|---|---|---|
| A1 | aanbiedingsbrief | d.d. 07-04-2021 |
| C1 | onderzoeksprotocol | (Engelstalig) d.d. 21-02-2021 |
| C1 | onderzoeksprotocol | zonder datum |
| E1-2 | proefpersoneninformatie incl. toestemmingsformulier | versie 1 d.d. 06-04-2021 |
| F1 | vragenlijst | Thesis vragenlijst d.d. (datum ontbreekt) |
| K6 | vragenlijst niet-WMO | d.d. 06-04-2021 |

Onderzoek valt onder de reikwijdte van de WMO als voldaan is aan de twee volgende voorwaarden:
1. het is medisch-wetenschappelijk onderzoek en
2. de proefpersonen worden onderworpen aan handelingen en/of krijgen een gedragswijze opgelegd, zoals bedoeld in de definitie van medisch-wetenschappelijk onderzoek in artikel 1 lid 1 sub b van de WMO.

Ad 1. Medisch wetenschappelijk onderzoek is onderzoek dat als doel heeft het beantwoorden van een vraag op het gebied van ziekte en gezondheid (etiologie, pathogenese, verschijnselen/symptomen, diagnose, preventie, uitkomst of behandeling van ziekte), door het op systematische wijze vergaren en bestuderen van gegevens. Het onderzoek beoogt bij te dragen aan medische kennis die ook geldend is voor populaties buiten de directe onderzoekspopulatie.

Uw studie heeft als doel meer inzicht te krijgen in de voorkeur van Nederlanders voor verzekerde zorg via het basispakket. Er worden 150 deelnemers geïncludeerd in de studie. De groep bestaat uit mensen die niet zijn besmet met COVID-19, mensen die lichte klachten hebben gehad als gevolg van het COVID-19 virus en mensen die ernstige klachten hebben gehad als gevolg van het COVID-19 virus. Uw studie voldoet niet aan de eerste voorwaarde.

Ad 2. Er is sprake van een gedragswijze of een handeling, indien de handeling inbreuk maakt op de lichamelijke of psychische integriteit van de proefpersoon.

Het dagelijks bestuur is van mening dat er geen sprake is van inbreuk op de lichamelijke of psychische integriteit van de proefpersoon. Het invullen van de vragenlijsten neemt niet veel tijd in beslag en de vragen zijn niet ingrijpend. Hierbij voldoet uw onderzoek niet aan de tweede voorwaarde.

De commissie is van oordeel dat deze studie **niet** onder de werking van de WMO valt.

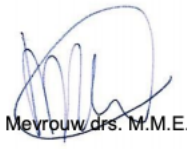
De commissie geeft u ten aanzien van het onderzoek nog de volgende overweging mee:
Het niveau van de vragenlijst is naar het oordeel van de commissie te hoog voor een aantal doelgroepen die worden gedefinieerd in de lijst. Zij geeft de overweging mee de vragenlijst aan te passen naar vmbo-niveau.

Als u de opzet van het nu beoordeelde onderzoek gaat wijzigen dient u het amendement, hoe beperkt van aard ook, opnieuw aan de commissie voor een nadere beoordeling voor te leggen.

De commissie verzoekt u deze studie in te dienen bij de lokale commissie van uw centrum ter verkrijging van een verklaring van geen bezwaar voor uitvoering van de studie in uw ziekenhuis.

Ik verwacht u hiermee voldoende te hebben geïnformeerd.

Met vriendelijke groet,
namens dr. B. van Ramshorst (voorzitter MEC-U)



Mevrouw drs. M.M.E. van Dijk-Baak, ambtelijk secretaris

To whom it may concern,

Referring to your study (reference number **W21.100**) it is hereby confirmed that the Medical Research Involving Human Subjects Act (WMO) does not apply to the above mentioned study and that therefore an official approval of this study by the MEC-U is not required under the WMO.

# Appendix 2: Content basic health package

Below the overview of the contents of the basic package according to the National Health Care Institute (Zorginstituut Nederland, n.d.):

- Pharmaceutical care
- Medicines
- Dietary preparations
- Mental healthcare
- Geriatric rehabilitation care
- General practitioner care
- Nursing articles
- Respiratory aids
- Alarm devices (personal alarm)
- Contraceptive devices
- Movement aids
- Diabetes aids
- Elastic stockings
- Electrostimulations for chronic pain
- Devices to help people with disorders of consciousness
- Devices to aid speech impairment
- Devices for mobility
- Devices for the blind and partially sighted
- Devices for hemodialysis at home
- Devices for information provision
- Devices for incontinence and ostomy
- Aids for hearing-impaired and deaf people (auditory aid)
- Devices for care and nursing in bed
- Infusion pumps for the administration of medicines
- Injection syringes or pens
- Prostheses
- Wigs
- Shoe fittings
- Bandaging material
- Dietary aids
- Self-measuring devices for blood clotting times
- Chain care
- Childcare (0-18 years)
- Maternity care
- Medical-specialist care
- Oral care and dentist
- Paramedic care
- Physiotherapy and remedial therapy
- Speech therapy
- Occupational therapy
- Dietetics
- Stay
- Obstetric care
- Transport
- District nursing
- Care for the sensory handicapped
- Care and foreign countries

# Appendix 3: Updated Ngene design (post-pilot)

```
design
;alts=altA,altB,altC
;eff=(mnl,d,mean)
;bdraws=halton(1000)
;rows=36
;block=3
;alg=mfederov
;reject:
altA.MSZ=25 and altA.FZ=10 and altA.GGZ=10 and altA.HZ=10 and altA.PZ=5,
altB.MSZ=25 and altB.FZ=10 and altB.GGZ=10 and altB.HZ=10 and altB.PZ=5,
altA.MSZ=20 and altA.FZ=5 and altA.GGZ=5 and altA.HZ=5 and altA.PZ=0,
altB.MSZ=20 and altB.FZ=5 and altB.GGZ=5 and altB.HZ=5 and altB.PZ=0
;model:
U(altA)= b1.dummy[(n,-0.55,0.28)| (u,0.05,0.15)]          *MSZ [20,30,25]
+ b2.dummy[(n,-0.42,0.21)|(u,0.05,0.15)]                  *FZ [5,15,10]
+ b3.dummy[(n,-0.51,0.26)|(u,0.05,0.15)]                  *GGZ [5,15,10]
+b4.dummy[(n,-0.83,0.43)|(n,0.07,0.51)]                   *HZ [5,15,10]
+b5.dummy[(n,-0.83,0.42)|(n,0.29,0.15)]                   *PZ [0,10,5]
+b6.dummy[(u,0.05,0.15)|(n,-0.43,0.22)]                   *P [-5, 5, 0]
/
U(altB)= b1.dummy*MSZ
+ b2.dummy*FZ
+ b3.dummy*GGZ
+ b4.dummy*HZ
+ b5.dummy*PZ
+ b6.dummy*P
/
U(altC)= 0
$
```

# Appendix 4: Questionnaire

Start of the research

Dear participant,

First of all, we would like to thank you for your participation in this study. The aim of this study is to gain insight into the preferences of Dutch citizens for insured healthcare. It will take approximately 15 minutes of your time. Your data will be treated confidentially and the results will be processed completely anonymously.

If you have any questions, please send an email to 586115fb@eur.nl.

Please confirm that you understand and agree with each of the points below:

- [ ] I understand that my participation is voluntary.
- [ ] I understand that the purpose of this questionnaire is to gain more insight into my preferences for the composition of the basic benefit package.
- [ ] I understand that the questionnaire is anonymous and that my answers will be used for scientific purposes.

First, we would like to ask you some questions about yourself.

What is your age? [ ]

What is your gender?

- ○ Male
- ○ Female
- ○ Undefined

What is your highest level of completed education?

- ◯ Primary education
- ◯ Pre-vocational Secondary Education (VMBO-g, VMBO-k or VMBO-b)
- ◯ Secondary Education (VMBO-t/HAVO/VWO, etc.)
- ◯ Secondary Vocational Education (MBO level 1)
- ◯ Secondary Vocational Education (MBO level 2/3/4)
- ◯ Higher Professional Education (HBO)
- ◯ University Education (BSc)
- ◯ University Education (MSc)
- ◯ PhD
- ◯ No education

What decribes your daily occupation best?

- ◯ Working, fixed contract
- ◯ Working, no fixed contract
- ◯ Self-employed without staff / Self-employed with staff
- ◯ Student and working
- ◯ Student and not working
- ◯ Unemployed, looking for a job
- ◯ Unemployed, not looking for a job
- ◯ Housekeeping/care
- ◯ Retired

What does your household look like?

- ◯ I live alone
- ◯ I live alone with a child/children
- ◯ I live with my partner
- ◯ I live with my partner and child/children
- ◯ I live with one or more roommates
- ◯ I live with my parents
- ◯ Other

What is your net income per month?

- ◯ Up to 999 euros
- ◯ 1000 - 1499 euros
- ◯ 1500 - 1999 euros
- ◯ 2000 - 2499 euros
- ◯ 2500 - 2999 euros
- ◯ 3000 - 3499 euros
- ◯ 3500 - 3999 euros
- ◯ 4000 - 4499 euros
- ◯ 4500 - 4999 euros
- ◯ 5000 euros or more
- ◯ I would rather not say

Every adult Dutch person (18+) is obliged to purchase health insurance in the form of the basic healthcare package, for which a monthly premium is paid. The basic benefit package covers the costs for various types of care, such as a doctor's visit or medication.

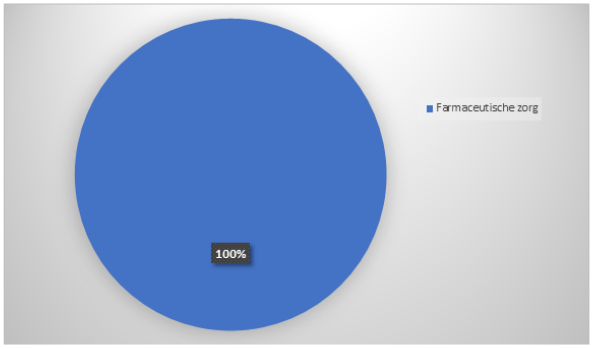
For this study, we are interested in your preference for the composition of the basic healthcare package. You will be presented with three alternative basic healthcare packages each time. One of the options approximately represents the composition of the current basic package, the other options are variations on this. We will ask you which is your preferred option, viewed from your own perspective.

Now the five types of care are explained in three steps.

1) **Specialist medical care**: medical care for which you need a referral. This includes, for example, a visit to a medical specialist, such as an oral surgeon, internist or allergist, in the hospital.

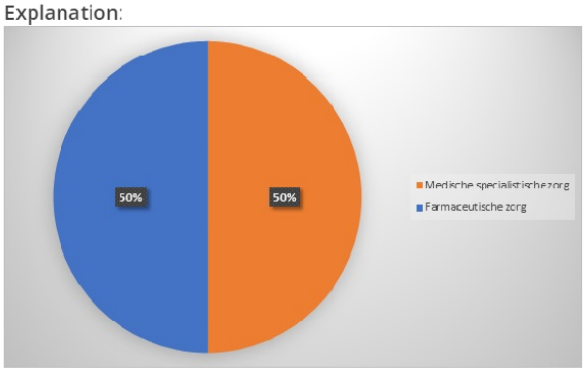
2) **Pharmaceutical care**: care that contributes to a patient using his/her medicines as correctly, efficiently and safely as possible. This includes all registered medicines that are available at the pharmacy on prescription from a doctor.

In this study we use percentages that show how much of the total basic healthcare package is spent on the type of care in question. Here are a few examples:

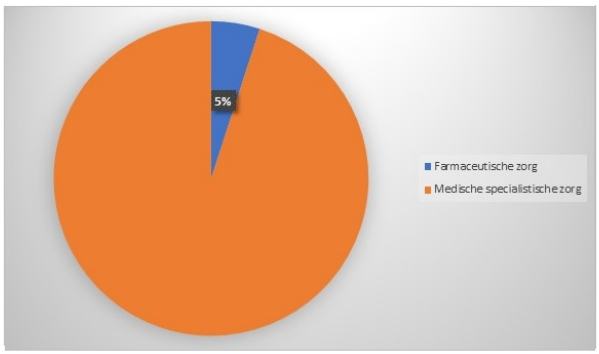



Explanation:
In the figure above you can see that the entire circle is colored blue. This means that 100% of the basic healthcare package consists of pharmaceutical care. In this example, medical specialist care would not be covered from the basic benefit package. For example, you would have to pay this yourself.

Explanation:




In the figure above, you can see that half of the circle is colored blue and the other half orange. This means that 50% of the basic healthcare package consists of pharmaceutical care and the other 50% consists of medical specialist care. In this example, general practitioner care would not be covered from the basic package. For example, you would have to pay this yourself.




In this second example, 5% of the basic benefit package consists of pharmaceutical care and the remaining 95% consists of medical specialist care. In this example, general practitioner care would not be covered from the basic package. For example, you would have to pay this yourself.

To indicate how the percentages change compared to the current situation, the following signs and colors are used in the choice tasks:

↑ means that the percentage (%) (so the part of the basic healthcare package that includes that specific type of care) increases compared to the current situation. This is displayed in light purple.

↓ means that the percentage (%) (so the part of the basic healthcare package that includes that specific type of care) decreases compared to the current situation. This is displayed in dark purple.

= means that the percentage (%) (so the part of the basic healthcare package that includes that specific type of care) remains the same compared to the current situation. This is displayed in purpe.

Now step 2 of the explanation follows.

3) **Mental healthcare**: care that is aimed at preventing, treating and curing mental illnesses. This includes for example: basic mental health care (mild to moderate mental illnesses), specialist mental health care (severe, complicated mental illnesses) and the first three year of residence in a mental healthcare facility.

4) **General practitioner healthcare**: care that the general practitioner prescribes (e.g. medication), the diagnostics that the general practitioner orders outside his or her practice, a visit to the general practitioner and the health care that he or she refers to (e.g. physical therapist or medical specialist).

In addition to the two compositions of the basic healthcare package, a third option will be present in the choice tasks. This third option approximates the current basic package, it does not completely correspond, but for this research, you can assume that it depicts the current situation. Choose which option you think is the best for yourself.

On the next page a practice question follows to become acquainted with the choice tasks and previously explained concepts.

In the Netherlands, the content of the basic package is determined by the government. Imagine that you had a choice yourself, which basic package then has your preference?

| | Basic package 1 | Basic package 2 | Current basic package |
|---|---|---|---|
| General practitioner care | 10% (=) | 10% (=) | 10% |
| Mental healthcare | 5% (↓) | 15% (↑) | 10% |
| | Select | Select | Select |

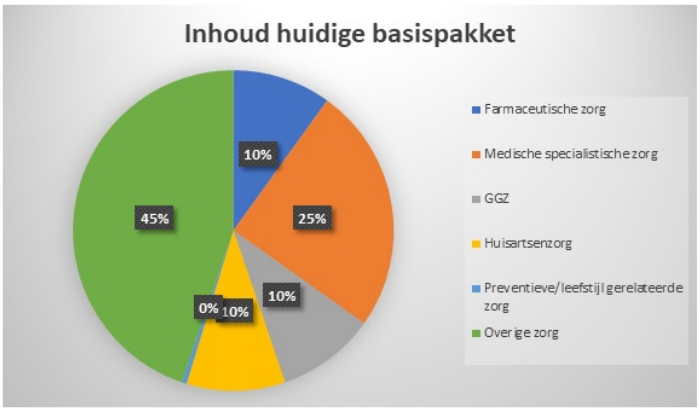
**Explanation**:
The percentage indicates how much of the total basic healthcare package consists of that type of care.
This is not a comprehensive description of the basic healthcare package. There is still a lot of care that falls within the basic package that is not directly included in this survey. The remaining % therefore always concerns other care and can vary between 15% and 65% depending on the composition you choose.

Now the third and final step of the explanation follows:

5) **Prevention/lifestyle-related care**: care that is aimed at improving health, early detection of diseases and prevention of health problems or negative consequences of already present diseases. This entails for example prevention programmes like education and physical exercise programs.

6) **Premium change (monthly)**: in the Netherlands everybody pays a monthly premium for health care within the basic package. This is a fixed amount of 125 monthly. In this research, this amount will stay equal, or change with +€5 or -€5.

The different types of care relevant to this questionnaire are all introduced now. In the pie chart beneath they are all displayed. In this figure, the current basic healthcare package is shown.




The different compositions of the basic healthcare package that are represented to you are not complete. There is still a lot of health care that falls within the basic package but is not directly represented in this research. The remaining percentage concerns 'other care' and can vary between 15% and 65%, depending on the composition chosen. In the pie chart, 'other care' is depicted in green.

In the Netherlands, the content of the basic healthcare package is determined by the government. Imagine that you had a choice yourself, which basic healthcare package then has your preference?

(1 of 1)

| | Basispakket 1 | Basispakket 2 | Huidige basispakket |
|---|---|---|---|
| Medical specialist care | 30% (↑) | 20% (↓) | 25% |
| Pharmaceutical care | 15% (↑) | 10% (=) | 10% |
| Mental healthcare | 15% (↑) | 5% (↓) | 10% |
| General practitioner care | 15% (↑) | 10% (=) | 10% |
| Prevention/lifestyle-related care | 10% (↑) | 5% (=) | 5% |
| Premium change (monthly) | €5 euro minder (↓) | €5 euro meer (↑) | €0 |
| | Kies | Kies | Kies |

**Explanation**:
Explanation: The percentage indicates how much of the total basic package consists of that type of care.
This is not a comprehensive description of the basic package. There is still a lot of care that falls within the basic package that is not directly included in this survey. The remaining % therefore always concerns other care and can vary between 15% and 65% depending on the composition you choose.

You have completed the introduction and the example questions to get familiar with the choice tasks.

On a scale of 1 (strongly disagree) to 5 (strongly agree), to which extent do you agree with the following statement?

| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
|---|---|---|---|---|---|
| The introduction was clear. | ○ | ○ | ○ | ○ | ○ |

You have completed the introduction and the example questions to get familiar with the choice tasks.

On a scale of 1 (strongly disagree) to 5 (strongly agree), to which extent do you agree with the following statement?

| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
|---|---|---|---|---|---|
| The introduction was clear. | ○ | ○ | ○ | ○ | ○ |

You have completed the tutorial. The first 6 (of the total 12) choice tasks will now follow.

Which basic healthcare package would you prefer if you could choose for yourself?

(1 of 12)

| | Basic package 1 | Basic package 2 | Current basic package |
|---|---|---|---|
| Specialist medical care | 30% (↑) | 25% (=) | 25% |
| Pharmaceutical care | 15% (↑) | 15% (↑) | 10% |
| Mental healthcare | 15% (↑) | 10% (=) | 10% |
| General practitioner care | 5% (↓) | 5% (↓) | 10% |
| Prevention/lifestyle related care | 10% (↑) | 0% (↓) | 5% |
| Premium change (per month) | €5 euro less (↓) | €5 euro less (↓) | €0 |
| | Select | Select | Select |

**Explanation**:
The percentage indicates how much of the total basic healthcare package consists of that type of care.
This is not a comprehensive description of the basic healthcare package. There is still a lot of care that falls within the basic package that is not directly included in this survey. The remaining % therefore always concerns other care and can vary between 15% and 65% depending on the composition you choose.

Thank you for repeatedly answering the same kind of questions.
This is important for us to know your preferences regarding the basic healthcare package.

You have answered 6 of the 12 choice tasks. One evaluation question follows now.

On a scale from 1 (strongly disagree) to 5 (strongly agree), to what extent do you agree with the following statement?

| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
|---|---|---|---|---|---|
| I understand the questions so far. | ◯ | ◯ | ◯ | ◯ | ◯ |

You have completed the 12 choice tasks! In the next part of the questionnaire, we would like to ask you a few more in-depth questions.

Do you work in the healthcare sector?

- ◯ Yes
- ◯ No

In which of the following sectors are you employed?

- ◯ Specialist medical care
- ◯ Pharmaceutical care
- ◯ Mental healthcare
- ◯ General practitioner care
- ◯ Prevention/lifestyle related care
- ◯ As a policy officer/advisor in health care
- ◯ Others

Some questions related to the basic healthcare package follow below:

Suppose you could put together the basic healthcare package of your choice, but you would have to pay an extra premium every month. How much extra would you be willing to pay per month for this? The monthly health care premium is currently about €125 per month.

- ◯ €5 extra (so €130 per month)
- ◯ €10 extra (so €135 per month)
- ◯ €15 extra (so €140 per month)
- ◯ More than €15 extra (so more than €140 per month)
- ◯ I don't want to change anything, so €0 extra (so €125 per month)

How would you rate your own knowledge of the basic healthcare package and health insurance in the Netherlands?

| Very little knowledge | Little knowledge | Neutral | Good knowledge | Very good knowledge |
|---|---|---|---|---|
| ◯ | ◯ | ◯ | ◯ | ◯ |

How satisfied are you with the composition of the current basic health package?

| Very unsatisfied | Unsatisfied | Neutral | Satisfied | Very satisfied |
|---|---|---|---|---|
| ◯ | ◯ | ◯ | ◯ | ◯ |

We will now ask you some questions related to your health and the coronavirus:

Do you have one or more long-term or chronic diseases? (e.g. diabetes, high blood pressure, rheumatism, lung disease, cancer)?

- ◯ I have no long-term or chronic diseases
- ◯ I have one long-term or chronic diseases
- ◯ I have several long-term or chronic diseases

In general, how do you rate your health?
(from 0 to 10 where 0 is very bad and 10 is very good)

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ | ◯ |

Have you tested positive and been contaminated with covid-19 in the past?

- ◯ No, I have not been contaminated
- ◯ Yes, I have been contaminated and had a mild course of disease
- ◯ Yes, I have been contaminated and had a severe course of disease

How long have you been unable to carry out your daily activities due to (persistent) health problems caused by the coronavirus?

- ◯ I have had no health problems
- ◯ < 1 week
- ◯ 1 to 3 weeks
- ◯ 3 to 6 weeks
- ◯ > 6 weeks

Now some questions related to your lifestyle will follow:

What is your height in cm? ☐

What is your weight in kg? ☐

If you prefer not to answer this question, you can leave the answer field empty.

Do you smoke, and if so how much?

- ◯ No
- ◯ Incidental
- ◯ 0-10 times a day
- ◯ 10-20 times a day
- ◯ > 20 times a day
- ◯ Ex-smoker, stopped < 5 years ago
- ◯ Ex-smoker, stopped > 5 years ago

What is your (average) alcohol consumption?

- ◯ Never
- ◯ Incidental
- ◯ 1-7 glasses per week
- ◯ 7-14 glasses per week
- ◯ 14-21 glasses per week
- ◯ > 21 glasses per week

Which description of physical activity fits you best?

- ◯ **Less than 2.5 hours a week** of moderate intensity exercise (e.g. walking or cycling) & **less than twice a week** of muscle and bone strengthening activity (e.g. weight training)
- ◯ **2.5 hours per week** moderate-intensity exercise (e.g. walking or cycling) & **twice per week** muscle and bone strengthening activities (e.g. weight training)
- ◯ **More than 2.5 hours per week** of moderately intense exercise (e.g. walking or cycling) & **more than twice a week** of muscular and bone-strengthening activity (e.g. weight training)

Finally, we would like to ask you some prevention-related questions.

On a scale from 1 (strongly disagree) to 5 (strongly agree), to what extent do you agree with the following statements?

| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
|---|---|---|---|---|---|
| If a treatment ensures that complaints can be prevented later in life, that is a reason to reimburse the treatment. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Measures that contribute to people's awareness of their lifestyle should be eligible for reimbursement within the basic health insurance package. | ◯ | ◯ | ◯ | ◯ | ◯ |
| If lifestyle has played a role in the occurrence or continuation of a disorder, this may be a reason not to reimburse the treatment. | ◯ | ◯ | ◯ | ◯ | ◯ |
| More money should be made available for preventing diseases instead of curing them. | ◯ | ◯ | ◯ | ◯ | ◯ |

How important do you think the following types of prevention are? Drag the types of prevention from left to right in order of preference.

Types of prevention to rank

- Interventions aimed at nutrition and the prevention of overweight
- Interventions aimed at physical activity
- Interventions aimed at mental health
- Interventions aimed at addiction

Most wanted

Less wanted

Do you have any feedback?

**This is the end of the survey. We would like to thank you very much for your participation! Please click on the arrow to hand in your answers.**

# Appendix 5: Latent class model results

The results for the selection of the appropriate number of classes are presented in figure 9. The CAIC show that the best fit is obtained with four latent classes. As an extra validation, the probability of the class membership was estimated at 93.1% which can be considered high. However, no clear and not much statistically significant patterns arose with the four-class model, whereas the three latent class model gave more information. Thus, the three latent class model was chosen.

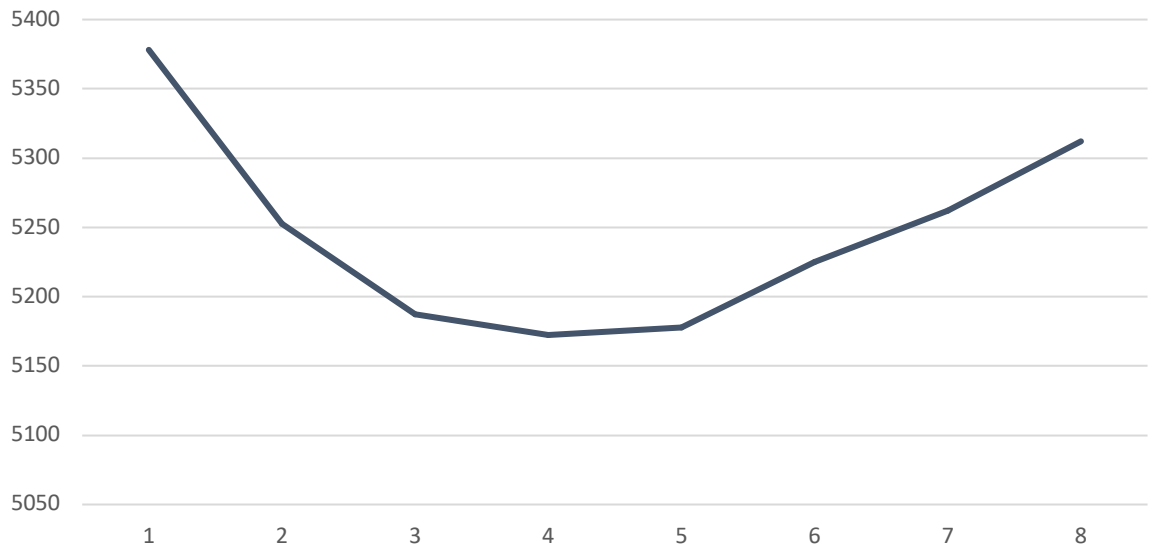



Figure 9: CAIC value

About 35% of respondents were allocated in class 1, 29% in class 2 and 36% in latent class 3. The latent class model estimates are presented in table 6. For the first class, all levels with lower percentages compared to the current situation were significant and had a negative effect on utility. In the second class, the significance of the attributes is slightly different, but signs are similar. They dislike fewer general practitioners care, but they are indifferent to more prevention. In class 3 distinct behaviour is observed. Respondents in the third class highly value 10% prevention while those in the second class do not. Nevertheless, the LCM was not appropriate in this case. It was unable to identify distinct groups in the sample, with widely different preference about different type of care to be covered by the basic healthcare package, especially when looking at prevention.

Table 6: Estimation of the latent class logit model – 3 classes

| Attributes | Level | Class 1 | Class 2 | Class 3 |
|---|---|---|---|---|
| Specialist medical care | 20% | -1.443*** | -1.068*** | -0.198 |
| | 25% | -- | | |
| | 25% | 0.371* | 0.242 | -0.314* |

| | | | | |
|---|---|---|---|---|
| Pharmaceutical care | 5% | -1.149*** | -0.758*** | -0.106 |
| | 10% | -- | | |
| | 15% | 0.092 | 0.428*** | 0.101 |
| General practitioners care | 5% | -2.284*** | -1.524*** | -0.802*** |
| | 10% | -- | | |
| | 15% | -0.070 | -0.200 | 0.353** |
| Mental healthcare | 5% | -0.435* | -0.733*** | -0.671*** |
| | 10% | -- | | |
| | 15% | 0.289 | 0.389** | 0.117 |
| Prevention/lifestyle related care | 0% | -1.919*** | -0.138 | -2.102*** |
| | 5% | -- | | |
| | 10% | 0.692*** | -0.438 | 1.283*** |
| Premium change (monthly) | -5€ | 0.012 | 0.438** | -0.069 |
| | 0€ | -- | | |
| | +5€ | -1.011*** | -0.697*** | -0.314* |
| Opt-out | | 0.348 | -0.833*** | -0.556** |
| Class size | | 0.349 | 0.292 | 0.359 |

-- Ref. category, *P<0.05, **P<0.01, ***P<0.001

As the latent class analysis aimed to recover hidden groups from the observed data. The profile of classes probabilities is shown in table 7. For example, people contaminated with covid-19 were more likely to be in class 3.

Table 7: Classification probabilities

| **Indicators** | **Class 1** | **Class 2** | **Class 3** |
|---|---|---|---|
| Contaminated with covid-19 | 0.349 | 0.283 | 0.373 |
| Not contaminated with covid-19 | 0.650 | 0.716 | 0.627 |

However, as shown in table C, covid-19 is negatively associated with class 1 and 3 memberships, but it is not statistically significant at the 5% critical value. It can be concluded that covid-19 is not a good predictor of class membership. At this point it was worth comparing the results of the MXL and LCM and the MXL was retained for the analyses.

Table 8: covid-19 probabilities

| | **Coef.** | **SE** | **P** | **95% conf. interval** |
|---|---|---|---|---|
| Share1 | | | | |
| Covid | -0.132 | 0.344 | 0.700 | -0.807, 0.542 |
| _cons | 0.214 | 0.228 | 0.925 | -0.426, 0.469 |
| Share2 | | | | |
| Covid | -0.496 | 0.384 | 0.197 | -1.250, -0.498 |
| _cons | -0.042 | 0.232 | 0.855 | -0.498, 0.413 |

# Appendix 6: Covid-19 demographics

**1) Age distribution by covid-19 contamination**

Table 9: age distribution

| Age group | Not contaminated, n (%) | Contaminated and recovered without supportive care, n (%) | Contaminated and recovered with supportive care, n (%) |
|---|---|---|---|
| **18-25** | 76 (49%) | 34 (50%) | 3 (25%) |
| **26-35** | 21 (13%) | 16 (24%) | 3 (25%) |
| **36-55** | 26 (17%) | 11 (16%) | 4 (33%) |
| **56 and older** | 33 (21%) | 7 (10%) | 2 (17%) |

Overall, the distribution of the sample across age was equal, except for the group respondents contaminated and recovered with supportive care.

**2) Gender distribution by covid-19 contamination**

Table 10: gender distribution

| Gender | Not contaminated, n (%) | Contaminated and recovered without supportive care, n (%) | Contaminated and recovered with supportive care, n (%) |
|---|---|---|---|
| **Male** | 56 (36%) | 16 (24%) | 7 (58%) |
| **Female** | 100 (64%) | 52 (76%) | 5 (42%) |

Approximately a quarter of respondents contaminated with covid and recovered without supportive care were men and more than half of respondents contaminated with covid and recovered with supportive care were men.

**3) Inability to perform daily activities due to covid-19**

A chi-square test of independence was perfomed to examine the relation between the inability to perform daily activities due to covid-19 and whether respondents recovered with supportive care. The relation between these variables was significant, $X^2$ (4, N= 80) = 640.9214, p = 0.000. The inability to perform daily activities mean duration was lower for respondents recovered without supportive care (2.5 ± 0.02) than for respondents recovered with supportive care (4 ± 0.03).

# Appendix 7: Results MXL with interactions

Table 11: Results of the mixed logit model with interactions

| **Attributes** | **Level** | **Mean (SD)** | **SE (SE)** | **P (P)** | **95% conf. interval (95% conf. interval)** |
|---|---|---|---|---|---|
| Specialist medical care | 20% | -1.547 | 0.183 | 0.000*** | -1.905, -1.188 |
| | | (1.740) | (0.210) | (0.000)*** | (1.327, 2.153) |
| | 30% | 0.107 | 0.124 | 0.388 | -0.136, 0.350 |
| | | (0.877) | (0.154) | (0.000)*** | (0.574, 1.180) |
| | 25% ref. category | | | | |
| Pharmaceutical care | 5% | -1.197 | 0.172 | 0.000*** | -1.535, -0.860 |
| | | (1.529) | (0.185) | (0.000)*** | (1.166, 1.893) |
| | 15% | 0.366 | 0.120 | 0.002** | 0.130, 0.602 |
| | | (0.639) | (0.255) | (0.012)* | (0.138, 1.139) |
| | 10% | | | | |
| General practitioners care | 5% | -2.437 | 0.193 | 0.000*** | -2.816, -2.059 |
| | | (1.383) | (0.212) | (0.000)*** | (0.967, 1.799) |
| | 15% | 0.288 | 0.119 | 0.016* | 0.053, 0.522 |
| | | (-0.824) | (0.184) | (0.000)*** | (-1.186, -0.463) |
| | 10% ref category | | | | |
| Mental healthcare | 5% | -1.350 | 0.192 | 0.000*** | -1.727, -0.972 |
| | | (2.027) | (0.208) | (0.000)*** | (1.619, 2.435) |
| | 15% | 0.339 | 0.129 | 0.009** | 0.085, 0.593 |
| | | (1.250) | (0.154) | (0.000)*** | (0.947, 1.553) |
| | 10% ref category | | | | |
| Prevention/lifestyle related care | 0% | -1.457 | 0.613 | 0.018* | -2.659, -0.254 |
| | | (2.672) | (0.261) | (0.000)*** | (2.160, 3.183) |
| | 10% | 0.756 | 0.341 | 0.027* | 0.086, 1.426 |
| | | (1.404) | (0.152) | (0.000)*** | (1.104, 1.704) |
| | 5% ref category | | | | |
| Premium change (monthly) | -5€ | 0.218 | 0.127 | 0.087* | -0.031, 0.468 |
| | | (1.045) | (0.1440) | (0.000)*** | (0.763, 1.328) |
| | +5€ | -1.046 | 0.155 | 0.000*** | -1.351, -0.740 |
| | | (1.207) | (0.216) | (0.000)*** | (0.783, 1.632) |
| | 0€ ref category | | | | |
| Opt-out | | -0.374 | 0.182 | 0.041* | -0.731, -0.016 |
| | | (1.641) | (0.181) | (0.000)*** | (1.285, 1.996) |
| Interactions | Covid-prevention0% | -0.926 | 0.467 | 0.047* | -1.843, -0.010 |
| | | (-0.423) | (0.282) | (0.134) | (-0.977, 0.129) |
| | Covid-prevention10% | 0.320 | 0.232 | 0.168 | -0.134, 0.775 |
| | | (-0.428) | (0.160) | (0.008)** | (-0.743, -0.114) |

# Appendix 8: Direct ranking and weighted average scores

Table 12: Direct ranking percentages and weighted average scores – general population

| Type of care<br>Ranking | Nutrition and overweight | Physical exercise and activity | Mental health | Addiction and alcohol abuse |
|---|---|---|---|---|
| #1 | 33.05% | 27.97% | 31.36% | 7,63% |
| #2 | 26.69% | 34.75% | 27.17% | 11.44% |
| #3 | 25.85% | 20.76% | 30.08% | 23.31% |
| #4 | 14.41% | 16.53% | 11.44% | 57.63% |
| Weighted average score | 0.22 | 0.23 | 0.22 | 0.33 |

Table 13: Direct ranking and weighted average scores –covid-19

| Type of care<br>Ranking | Nutrition and overweight | Physical exercise and activity | Mental health | Addiction and alcohol abuse |
|---|---|---|---|---|
| #1 | 23.75% | 35.00% | 35.00% | 6.25% |
| #2 | 30.00% | 33.75% | 22.50% | 13.75% |
| #3 | 27.50% | 15.00% | 32.50% | 25.00% |
| #4 | 18.75% | 16.25% | 10.00% | 55.00% |
| Weighted average score | 0.24 | 0.21 | 0.22 | 0.33 |

# Appendix 9: chi-square of covid-19 contamination and prevention statements

Table 14: Chi-square results

| **Covid-19 contamination** | **If a treatment ensure that complaints can be prevented later in life, that is a reason to reimburse the treatment** | | | | | **$X^2$** | **d.f.** |
|---|---|---|---|---|---|---|---|
| | **Strongly disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly agree** | | |
| No | 1 | 2 | 9 | 98 | 46 | 46.19*** | 4 |
| Yes | 1 | 0 | 5 | 50 | 24 | | |
| **Covid-19 contamination** | **Measures that contribute to peoples' awareness of their lifestyle should be eligible for reimbursement within the basic healthcare package** | | | | | **$X^2$** | **d.f.** |
| | **Strongly disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly agree** | | |
| No | 2 | 21 | 30 | 74 | 29 | 107.48*** | 4 |
| Yes | 36 | 5 | 18 | 39 | 17 | | |
| **Covid-19 contamination** | **If lifestyle has played a role in the occurrence or continuation of a disorder, this may be a reason to reimburse the treatment** | | | | | **$X^2$** | **d.f.** |
| | **Strongly disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly agree** | | |
| No | 24 | 57 | 36 | 31 | 8 | 146.72*** | 4 |
| Yes | 6 | 27 | 24 | 19 | 4 | | |

| **Covid-19 contamination** | **More money should be made available for preventing diseases instead of curing them** | | | | | **$X^2$** | **d.f.** |
|---|---|---|---|---|---|---|---|
| | **Strongly disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly agree** | | |
| No | 0 | 5 | 16 | 82 | 53 | 49.45*** | 3 |
| Yes | 0 | 1 | 10 | 39 | 30 | | |