ONE SIZE DOES NOT FIT ALL!

Barriers and drivers influencing people's behaviour towards COVID-19 public health and social measures in the Netherlands

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PDPC

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Authors: Drs. Valérie Eijrond (PDPC), Drs. Nora Bünemann (EUR), Drs. Nicky Renna (PDPC), Dr. Anja Schreijer (PDPC).

Review group: Drs. Brett Craig (WHO/Europe), Prof.dr. Pearl Dykstra (EUR), Dr. Katrine Bach Habersaat (WHO/Europe), Dr. Fraukje Mevissen (GGD Rotterdam-Rijnmond) & Dr. Hélène Voeten (GGD Rotterdam-Rijnmond).

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Summary

Introduction: The disease burden of COVID-19 infection, morbidity, and mortality is unevenly distributed across different population subgroups. A one-size-fits-all approach may not reach all groups. Identifying barriers and drivers that influence people's behaviour towards COVID-19 public health and social measures (PHSM) (i.e. vaccination, testing and other measures) is an important step when designing tailored interventions. The World Health Organization (WHO) has developed the Tailoring Health Programmes (THP) approach to assist countries in diagnosing barriers and drivers to health protective behaviours. We present the findings of the situation analysis, phase 1 of the THP approach. The aim was threefold: 1) to identify the population subgroups with a lower uptake and adherence to COVID-19 PHSM, 2) gain an overview the previously identified barriers and drivers of the general population and population subgroups, and 3) to obtain an overview of interventions and research initiated by various stakeholders in the Netherlands.

Methods: We conducted a literature scan, semi-structured interviews with 23 national experts and held an expert meeting. The results were categorised according to the capability, opportunity and motivation (COM-B) framework to understand behaviour towards COVID-19 PHSM.

Results: The situation analysis revealed that different population subgroups have been studied regarding their barriers and drivers for uptake and adherence to COVID-19 PHSM, such as (older) migrant communities and youth/young adults. Identified barriers across groups with regards to the uptake and adherence to COVID-19 PHSM included lack of trust in the government, issues related to information and low perceived risk and severity of the disease. Identified drivers across groups included self-protection and the moral duty to protect others and reopening of society. However, capability barriers were mostly present among subgroups, such as lack of or problems with Dutch language skills. Lastly, network ties play a role, such as social influence, behaviour and norms of family and friends. Both act as a barrier and driver. Most of the research is quantitative and predominantly focused on understanding (vaccination) behaviour among the general population rather than in subgroups. Furthermore, drivers were identified to a much lesser extent than barriers. Over 45 interventions and research projects related to COVID-19 PHSM were identified. The three highlighted interventions (tailored vaccination and education, risk-oriented large-scale testing, and the vaccination doubt line) addressed some capability, physical, social and motivational barriers. Several interventions revealed the importance of including key figures, to successfully identify subgroups and in the design and implementation of interventions. A lack of monitoring and evaluation of interventions during the pandemic was acknowledged by experts.

Conclusion: The situation analysis reveals that knowledge of the most prevalent barriers and drivers between different underserved groups in the Netherlands and how to address them with targeted (cost) effective interventions is lacking. While the highlighted interventions offer promising instances of applying behavioural insights to tackle health disparities, there was insufficient monitoring and evaluation of these interventions to ascertain their (cost) effectiveness. Another topic requiring further investigation is the role of network ties including family members, caregivers, key figures e.g., health professionals and community leaders as sources of information and as shapers of vaccination/testing behaviour. How to tackle the barriers disinformation and lack of trust towards the government,

institutions, and vaccines demand attention. With this THP project the aim is to develop new or improve existing interventions addressing behaviours towards public health and social measures among a prioritised population group informed by evidence-based behavioural insights.

Samenvatting

Introductie: De ziektelast van COVID-19-infectie, morbiditeit en mortaliteit is ongelijk verdeeld over verschillende bevolkingssubgroepen. Een one-size-fits-all benadering bereikt mogelijk niet alle groepen. Het identificeren van barrières en drijfveren die het gedrag van mensen ten aanzien van COVID-19 volksgezondheid en sociale maatregelen beïnvloeden, is een belangrijke stap bij het ontwerpen van interventies op maat. De Wereldgezondheidsorganisatie (WHO) heeft de 'Tailoring Health Programs' (THP)-benadering ontwikkeld om landen te helpen bij het identificeren van barrières en drijfveren voor gezondheidsbeschermend gedrag. We presenteren de bevindingen van de situatieanalyse, fase 1 van de THP-aanpak. Het doel was drieledig: 1) om subgroepen van de bevolking te identificeren een lagere acceptatie en naleving van COVID-19 PHSM, 2) een overzicht te verkrijgen van de eerder geïdentificeerde barrières en drijfveren voor COVID-19 PHSM en 3) om een overzicht te verkrijgen van de interventies en onderzoeken geïnitieerd door verschillende belanghebbenden in Nederland.

Methode: We hebben een literatuurstudie uitgevoerd, semigestructureerde interviews gehouden met 23 nationale experts, en een expertmeeting gehouden. De uitkomsten zijn gecategoriseerd volgens het 'COM-B' (capability, opportunity and motivation ofwel bekwaamheid, kansen en motivatie) raamwerk toegepast om gedrag ten opzichte van COVID-19 volksgezondheid en sociale maatregelen te begrijpen.

Resultaten: Uit de situatieanalyse bleek dat bij tal van subgroepen van de bevolking onderzoek is gedaan naar hun barrières en drijfveren voor het opname en naleving van COVID-19 volksgezondheid en sociale maatregelen, zoals (oudere) migrantengemeenschappen, jongeren/jongvolwassenen. Geïdentificeerde barrières tussen groepen met betrekking tot de opname en naleving van COVID-19 volksgezondheid en sociale maatregelen zijn onder meer een gebrek aan vertrouwen in de overheid, kwesties met betrekking tot informatie en een laag waargenomen risico en ernst van de ziekte. Geïdentificeerde drijfveren tussen groepen zijn onder meer zelfbescherming en de morele plicht om anderen te beschermen en de samenleving weer open te stellen. Capaciteitsbarrières waren vooral aanwezig bij specifieke groepen, bijvoorbeeld de Nederlandse taalbarrière. Tot slot speelt het sociale netwerk een rol, zoals sociale invloed; gedrag en normen van familie en vrienden. Ze fungeren zowel als barrière als drijfveer. Andere bevindingen waren dat er vooral kwantitatief onderzoek is gedaan naar het gedrag van mensen ten opzichte van COVID-19 volksgezondheid en sociale maatregelen. Onderzoek heeft zich vooral gericht op het begrijpen van (vaccinatie)gedrag onder de algemene bevolking in plaats van in subgroepen. Er werden vooral barrières en in veel mindere mate drijfveren geïdentificeerd. Er werden meer dan 45 interventies en onderzoeksprojecten met betrekking tot COVID-19 volksgezondheid en sociale maatregelen geïdentificeerd. De drie uitgelichte interventies

(fijnmazig vaccineren, risicogericht grootschalig testen en de twijfel telefoon) pakten een aantal capaciteits-, fysieke, sociale en motivatiebarrières aan. Uit verschillende interventies bleek het belang van het betrekken van sleutelfiguren voor het identificeren van subgroepen en in het ontwerp- en implementeren van interventies. Een gebrek aan monitoring en evaluatie van interventies tijdens de pandemie werd erkend door experts.

Conclusie: Uit de situatieanalyse blijkt dat kennis ontbreekt van de meest voorkomende barrières en drijfveren tussen verschillende underserved groepen in Nederland en hoe deze kunnen worden aangepakt met gerichte (kosten)effectieve interventies. Hoewel de uitgelichte interventies veelbelovende voorbeelden bieden van het gebruik van gedragsinzichten om gezondheidsverschillen aan te pakken, was er onvoldoende monitoring en evaluatie van deze interventies om hun (kosten)effectiviteit vast te stellen. Een ander onderwerp dat nader onderzoek behoeft, is de rol van sociale netwerken bijvoorbeeld familieleden, zorgverleners, sleutelfiguren zoals gezondheidswerkers en gemeenschapsleiders als informatiebronnen en vormgevers van vaccinatiegedrag/testen. Hoe om te gaan met de barrières desinformatie en gebrek aan vertrouwen richting de overheid, instellingen en vaccins vragen aandacht. Ons doel met dit THP-project in Nederland is om nieuwe interventies te ontwikkelen of bestaande interventies te verbeteren die gericht zijn op gedrag ten opzichte van volksgezondheid en sociale maatregelen onder een geprioriteerde bevolkingsgroep op basis van evidence-based gedragsinzichten.

Trefwoorden: Tailoring Health Programmess; underserved groups; COVID-19; gedragswetenschappen; volksgezondheid en sociale maatregelen.

Contents

Abbreviations

BSN	Social Security Number
CBS	Statistics Netherlands
COM-B model	Capability, Opportunity, Motivation, Behaviour Model
GGD	Municipal Health Services
GP	General Practitioner
PDPC	Pandemic and Disaster Preparedness Center
PHSM	Public health and Social Measures
RIVM	National Institute for Public Health and the Environment
SES	Socioeconomic Status
THP	Tailoring Health Programmes
WHO	World Health Organization

1. Introduction

The COVID-19 pandemic has infected more than 8.7 million people in the Netherlands and caused more than 23 thousand deaths as of May 11, 2023 (John Hopkins, 2023). Certain population subgroups are at greater risk of SARS-CoV-2 infection and subsequent COVID-19 related morbidity and mortality. People older than 70 years and adults older than 18 years with underlying health conditions (e.g., obesity and diabetes) have an increased risk of a serious course of COVID-19 (RIVM, 2022h; Pouw et al., 2021). Also, unvaccinated people have a greater risk of getting admitted to the Intensive Care Unit due to COVID-19 compared to a vaccinated person (RIVM, 2021h). Furthermore, people with a low socioeconomic status (SES) or a migration background run a greater risk of being infected with the COVID-19 virus (Pharos, 2022). 20% of people with the lowest income had a 2.5 times higher risk of dying from COVID-19 in the first year (2020) than people from the highest income group (CBS 2022b). The risk of dying from the COVID-19 virus is 1.6 – 1.8 times greater for people with a Moroccan, Turkish and Surinamese migration background living in the Netherlands than for people without a migration background (CBS 2022b). During the second wave, COVID-19 deaths were more common in the major cities, which more often tend to be home to people with a migrant background (CBS, 2022b; Chilunga et al., 2022). Furthermore, a recent study found that Surinamese, Moroccan and Turkish background have a higher long COVID risk than Dutch background (Chilunga et al., 2023).

The disease burden of COVID-19 infection, morbidity, and mortality is unevenly distributed across different subgroups of the population in the Netherlands. This phenomenon is not new, as historically, pandemics have been experienced unequally with higher infection and mortality rates among the most deprived communities (Bambra et al., 2020). Furthermore, the COVID-19 vaccination acceptance, defined as the degree to which individuals accept, question or refuse vaccination (Thomson et al., 2016) and uptake, defined as the use of a vaccine in an immunisation program (Thomson et al., 2016), is not evenly distributed among groups (Merkelbach et l., 2022; RIVM, 2023). During the different vaccination campaigns vaccination acceptance was lower among young adults, people with a migrant background and people with a lower education level (RIVM, 2023). A possible explanation is that public health and social measures (PHSM[1]), including vaccination, testing and other measures (e.g., home isolation, mask-wearing, social distancing and keeping physical distance), were not aligned with the needs and circumstances of people and communities (WHO, 2023). A one-size-fits-all policy and practice approach risks excluding population subgroups, suggesting there is a need for targeted public health interventions that reflects the beliefs and needs of these groups (Habersaat et al., 2020; RIVM, 2023).

There are a variety of factors that influence individuals to partake in health protective behaviours. Therefore, identifying barriers and drivers for specific groups towards COVID-19 PHSM is an important step in designing tailored interventions. According to a multinational Delphi study on the COVID-19 pandemic, the perceptions and expertise of communities and vulnerable groups were often not considered and should be engaged to inform pandemic response priorities (Lazarus et al., 2022). The World Health Organization (WHO) Tailoring Health Programmes (THP) approach serves as a

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[1] Definition: 'Public health and social measures (PHSM): Actions or measures taken by individuals, institutions, communities, local and national governments to reduce the spread of COVID-19. PHSM include non-pharmaceutical interventions, physical distancing measures, pre- and post-exposure prophylaxis and vaccines.' (WHO, 2020)

diagnostic guide, aimed at identifying population subgroups with a suboptimal uptake of a health behaviour, in this case COVID-19 PHSM, as well as capturing the related barriers and drivers. These behavioural and cultural insights are used to develop tailored interventions, contributing to improved health outcomes and address health inequities (WHO, 2023). The THP approach can assist health care professionals, public health authorities and decision-makers to support the application of behavioural insights for health. The theoretical underpinning of the THP approach is the capability-opportunity-motivation-behaviour (COM-B) model (WHO, 2023). The model identifies three inter-linked factors, capability, opportunity and motivation (COM) that need to be present for any health behaviour (B) to take place (see Figure 1).

As described by Michie et al., 2011, capability is the individual's psychological and physical capacity to engage in a specific health behaviour. Opportunity pertains to factors outside an individual, consisting of their physical (e.g. legislative framework) and sociocultural (e.g. cultural traditions) surroundings. Lastly, motivation is a broad category that includes the brain processes that influence behaviour, including unconscious (e.g., emotions and trust) and conscious (e.g., beliefs and attitudes) processes. This broad theoretical model warrants that both individual and contextual barriers and drivers are explored (Habersaat & Jackson, 2020; WHO, 2023).
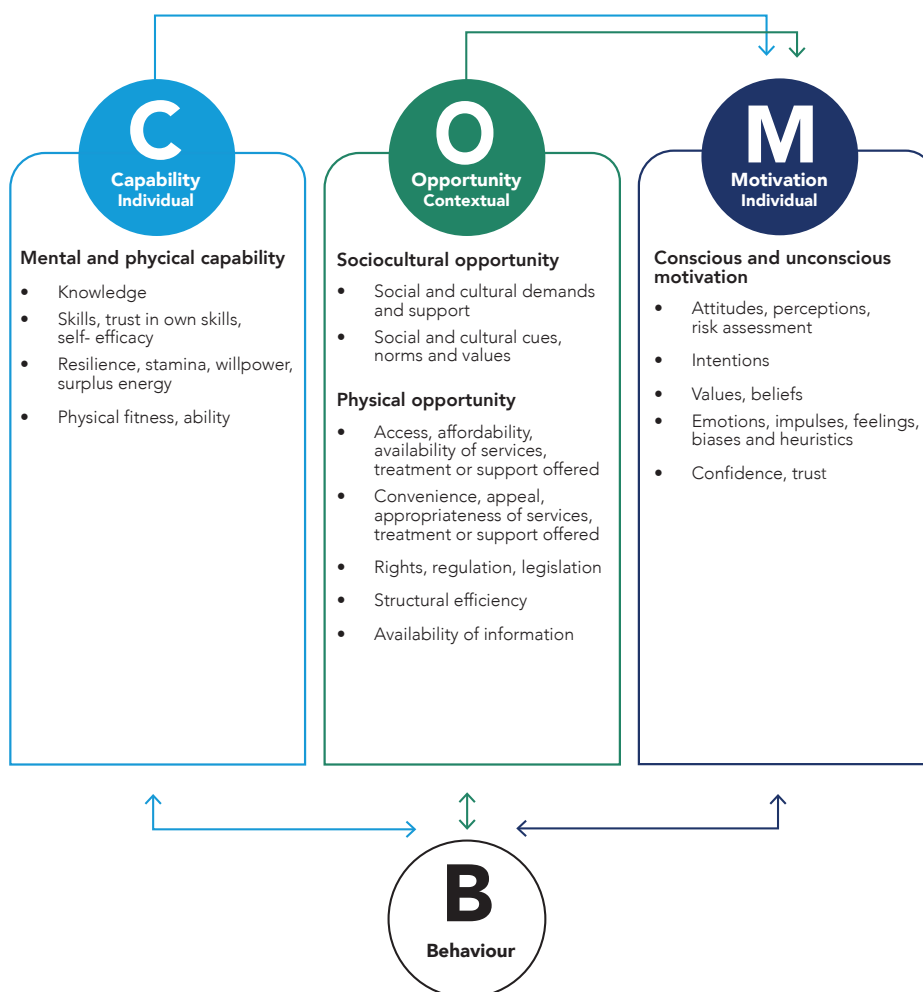
Figure 1: Modified COM-B system – a framework for understanding health behaviour (WHO, 2023)

The aim of this report is to share the findings of the first phase of the WHO THP approach: the situation analysis. This phase entails analysing and synthesising available data and knowledge regarding affected population subgroups, the possible barriers and drivers and interventions that have been implemented (see Figure 2). The situation analysis is based on a literature scan, interviews with experts to gather insights into their experiences during the pandemic and an expert meeting.

The objective is threefold:

1) to identify the population subgroups with a lower uptake and adherence to COVID-19 PHSM;
2) gain an overview of the previously identified barriers and drivers of the general population and population subgroups to COVID-19 PHSM; and
3) to obtain an overview of interventions and research initiated by various stakeholders in the Netherlands.
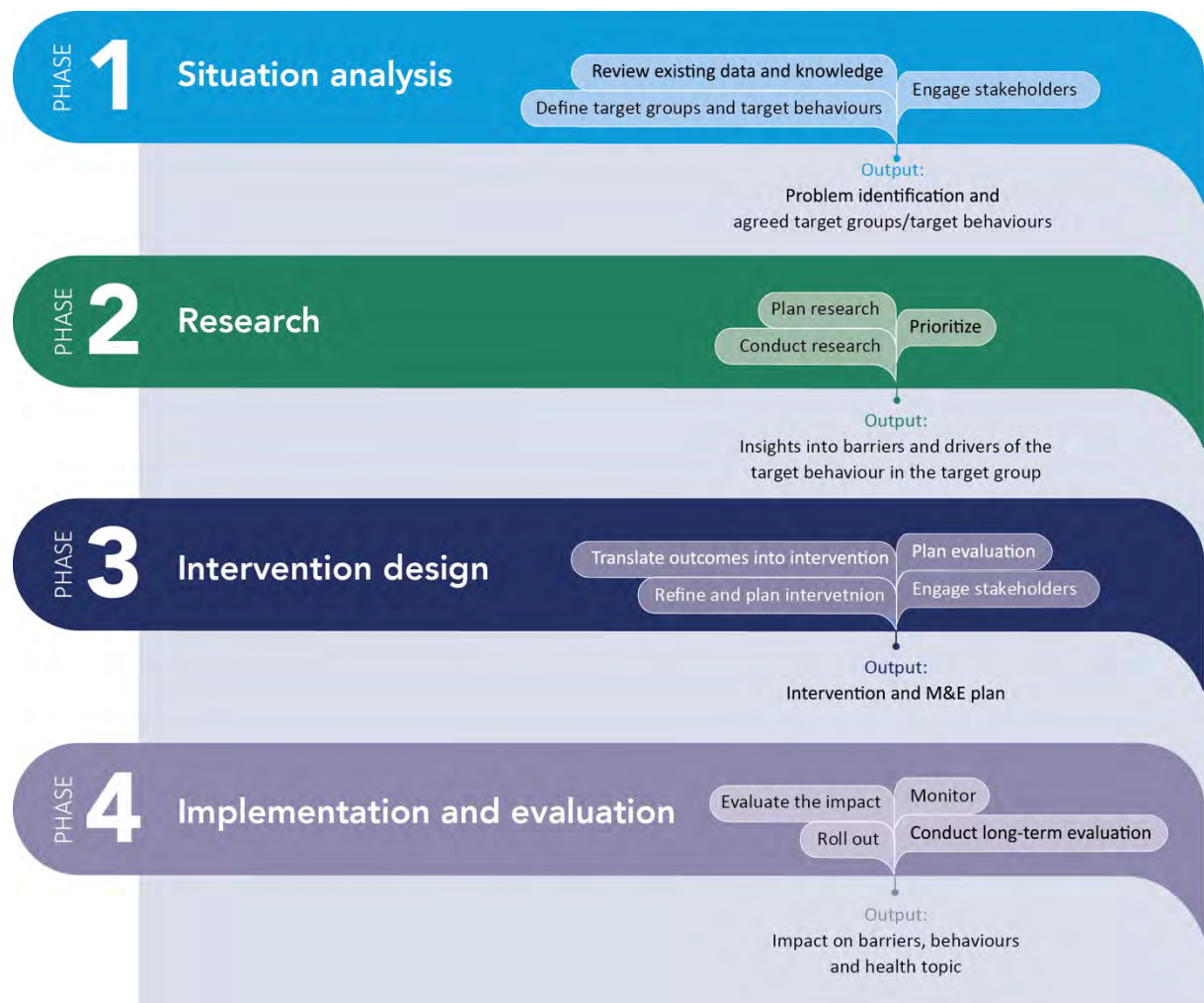
Figure 2: Phases of the THP process (WHO, 2023)

2. Methodology

2.1 Desktop research

We conducted a literature scan of peer-reviewed and grey literature. To be as inclusive as possible, the search was performed using a systematic review method: a search across multiple databases using a detailed search strategy with keywords and MeSH terms (see Appendix 1). The search was performed in Embase, Medline and Web of Science on the 13th of July 2022. Articles were included if they were published between 2019 and 2022 using data gathered in the Netherlands, and if they focused on COVID-19 and vaccine acceptance, testing, compliance to non-pharmaceutical measures, beliefs, trust, attitudes, concerns, perceptions, barriers and drivers. The literature was supplemented according to the snowball method: reference lists of included articles were checked to retrieve additional relevant articles. A search of the peer-reviewed literature produced 156 potential articles; after removal of duplicate papers, 90 records were screened. Following the review of the titles and abstracts, 19 peer-reviewed articles were included (Figure 3). Other websites were searched for additional relevant documents in English as well as in Dutch. These included grey literature, pre-prints, working papers, memos and projects from international organisations such as the European Centre for Disease Control (ECDC) and the WHO as well as national organisations such as the funder of health research and innovation in care (ZonMw), Municipal Health Services (GGD), and the National Institute for Public Health and Environment (RIVM). The literature was also supplemented with (unpublished) articles, presentations and reports received by the interviewed experts. In total, including the grey literature and additional articles, 58 articles were included in this report (19 peer-reviewed and 39 grey literature and additional articles). As shown in Figure 4, most articles and reports were published in 2021 and were quantitative research papers. Others included literature reviews, reports, or presentations that were found via e.g., the RIVM, WHO or ECDC website or shared via the interviewed experts.
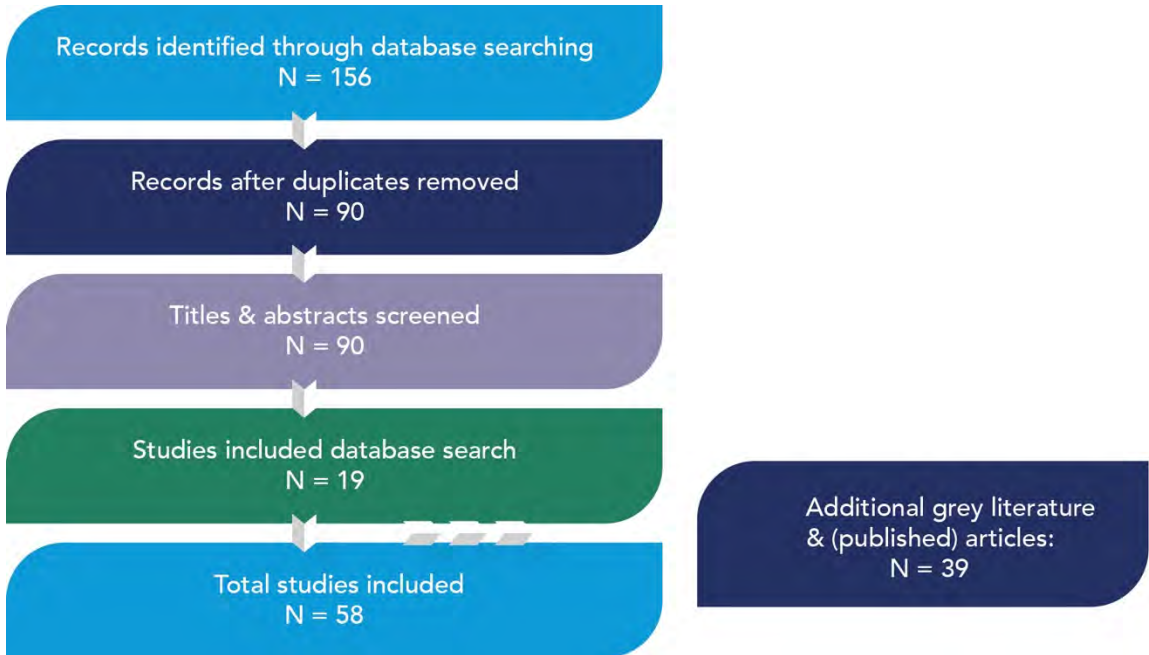
Figure 3: Flow diagram literature search 13 July 2022
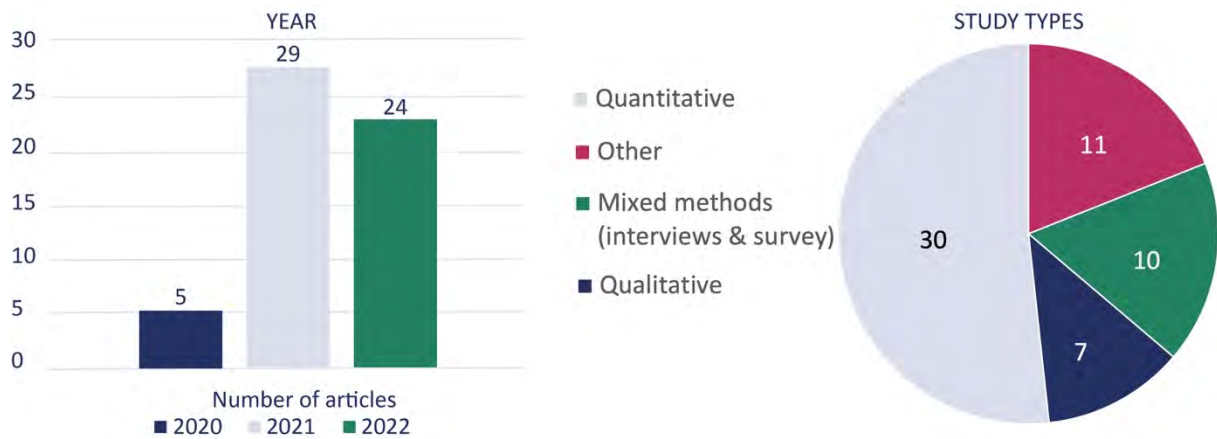
Figure 4: Outcomes desktop search (database and grey literature search) 13 July 2022

2.2 Interviews

To complement the literature review, online semi-structured interviews were held with 23 experts with various backgrounds ranging from policy makers (n = 5) and social and behavioural sciences researchers (n = 12) to (bio)medical specialists (n = 6) between August and September 2022. The interviewees were selected through our network in the field of infectious diseases, public health and behavioural and social sciences in the Netherlands. The selected experts were invited by email to participate. All interviews were conducted in Dutch by two researchers and audio recorded. Informed consent was obtained, prior to the interviews, including requesting permission to audio record the interviews. To elicit the experts' perspectives, the interviews commenced with a question about their area of expertise and their work in relation to COVID-19. Subsequently, interviewees were asked to share their views on the population groups which have a low vaccination uptake and or lower adherence towards testing and other measures by the possible barriers and drivers. Next, the interviewees were asked to share research projects and interventions that have been done or are ongoing, as not all projects and interventions have been published, hence not captured in the literature review. Towards the end of the interview, the experts were asked about possible remaining knowledge gaps and the lessons learned from COVID-19. Lastly, experts were asked to suggest potential additional experts to interview. See Appendix 2 for the full interview protocol. The interviews were transcribed and analysed according to the rapid assessment procedure (RAP) sheets (WHO, 2022). The COM-B model provided the theoretical framework for categorising the barriers and drivers.

2.3 Expert meeting

Following the interviews, an expert meeting was held on the 11th of October 2022 in Utrecht, the Netherlands, facilitated by the Pandemic and Disaster Preparedness Center (PDPC) and the WHO/Europe, to which the interviewees and other experts were invited. The meeting was attended by 16 experts including two students, from for example: the National Institute for Public Health and the Environment (RIVM), Municipal Health Services (GGD), Erasmus University Rotterdam (EUR), Erasmus MC, Utrecht University (UU) and the Ministry of Health, Welfare and Sport (VWS). The objectives of the

workshop were to 1) create a common understanding of the steps in the THP approach; 2) share results from the literature scan and interviews; 3) discuss and reflect on the situation analysis ("the past") and 4) discuss what is needed to develop, test and evaluate informed tailored interventions for population subgroups with a lower uptake and adherence to vaccination, testing and other measures ("the future").

3. Results

The results are presented in three sections: 1) the results of the literature scan, followed by 2) the findings of the interviews and lastly, 3) the outcomes of the expert meeting will be elucidated.

3.1. Desktop research

The literature scan involved identifying coverage data and the sociodemographic characteristics of individuals that have low vaccination and testing acceptance, uptake and adherence to other measures. Thereafter, the barriers and drivers for COVID-19 PHSM of the general population followed by population subgroups are given (see Figure 5). Following the THP approach, the identified barriers and drivers, were categorised according to the capability, opportunity and motivation (COM-B) framework for three different behaviours: vaccination, testing and other measures.
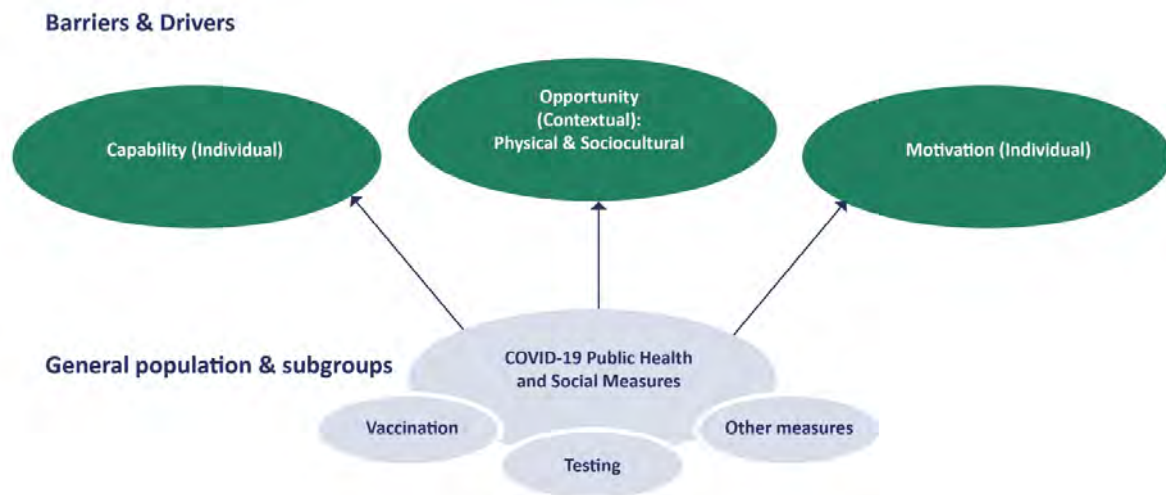
Figure 5: A schematic overview of the literature analysis using the COM-B framework

3.1.1. Vaccination: figures of the general population and subgroups

The latest RIVM data (11 May 2023) showed that 82.2% of the Dutch population above 18 years had the full basic vaccination series[2], with a total number of 4.213.463 registered vaccinations in the Netherlands (Rijksoverheid, 2023b). Acceptance to vaccinate was found to be higher than the actual vaccination uptake, based on research done between 2020 and 2022 by the RIVM Corona Behavioural Unit (RIVM, 2023). For the basic vaccination series, average acceptance was 92%, whereas the vaccination uptake was 83%. For the booster vaccination, average acceptance was 85%, while the vaccination uptake is approximately 64% (RIVM, 2023).[3] Several factors have been identified that may

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[2] Completion of 1 dose of the Janssen-vaccine, 2 doses of BioNTech/Pfizer, Moderna, AstraZeneca or Novavax vaccines, 2 doses of different vaccines, or after a corona infection and 1 dose (other than the Janssen vaccine).

[3] Selection bias is a possible explanation for this discrepancy. Certain groups known to have low uptake levels, such as people with low levels of literacy or do not have a good command of the Dutch language, are hardly represented in the research on willingness. Another reason is that people might have reported they are willing to get vaccinated, but ultimately face obstacles to get vaccinated (RIVM, 2023).

influence the acceptance to vaccinate. Surveys with respondents from the Dutch population showed that the acceptance to vaccinate was higher among older than among younger participants (CBS, 2022a; Snel et al., 2021) and lower among the low and intermediate educated (Vader et al., 2022; CBS, 2022c). After accounting for differences in age and educational attainment, acceptance to vaccinate was lower among people with a non-Western migration background compared to people with a Western migration or Dutch background (CBS, 2022c; Snel et al., 2021). Research among participants of a study on migrant groups in Amsterdam showed that acceptance to be vaccinated against COVID-19 was lower among people with a migration background (Ghanaian, South-Asian Surinamese, Turkish, African Surinamese and Moroccan) compared to individuals of Dutch origin (Campman et al., 2023; Stronks et al., 2021). In addition to age, education level and migration background, vaccination acceptance may change over time, due to shifting beliefs. Whereby people with a stronger vaccination acceptance were mostly driven by protecting others. Whereas people who were less willing, were most concerned about side effects (Sanders et al., 2021). Neighbourhood-level data showed lower COVID-19 vaccine uptake among people aged 50+, people with a non-Western migration background and greater voting rates for right-wing Christian and conservative political parties. Higher vaccination uptake was associated with higher socioeconomic status and greater voting rates for right-wing liberal, progressive liberal and Christian middle political parties (Labuschagne et al., 2023).

3.1.2. Barriers and drivers among the general population

Most studies in our literature review on the barriers and drivers were carried out among the general population (Bochove et al., 2021, de Vries et al., 2022a; de Vries et al., 2022b; Engbersen et al., 2021; Gebrekrstos, 2022; I&O Research, 2022; IPSOS, 2021; Mouter et al., 2020; Mouter et al., 2022; Sanders et al., 2021; Vader et al., 2022; Yousuf et al., 2021; RIVM, 2022f; RIVM, 2021h; RIVM, 2022e; RIVM, 2021c; RIVM, 2021d; RIVM, 2022d; RIVM, 2021f). The majority were survey studies which found various factors associated with vaccination acceptance. As Table 1 shows, the barriers are mostly related to the individuals' motivation, for instance the short and long-term effects of the vaccine and governmental distrust. Multiple drivers (Table 2) were also identified relating to motivation, e.g., protecting one's own health, and opportunity (social) e.g., protecting others and believing it is the way out of the crisis.

3.1.3. Barriers and drivers of subgroups

We now report on studies focusing on the barriers and drivers of subgroups, as shown in Tables 1 & 2. The barriers and drivers of the following groups were studied youth/ young adults (Stichting Alexander, 2021, te Brinke, van der Cruijsen et al., 2021; Vollmann & Salewski, 2021; Euser et al., 2022; RIVM, 2021e; Hilverda & Vollmann, 2021; Wismans et al., 2021), people with a migration background, (Antwi-Berko et al., 2022; Stronks et al., 2021; RIVM, 2021g), people living in a low SES neighbourhood (Merkelbach et al., 2021), older migrants (el Fakiri et al., 2022; GGD Amsterdam, 2021), homeless people (van Loenen & van den Muijsenbergh, 2022) and people with low health skills (Knottnerus et al., 2021). For instance, in survey studies among **youth/ young adults** (12-18-year-olds), vaccination acceptance was higher among older youth and those with a higher education level. The reasons for vaccination were protecting own health, protecting others and getting rid of restrictive policies. Also acceptance among youth was associated with vaccination acceptance from peers and parents.

Negative associations with vaccination acceptance were perceived side-effects, potential unknown long-term effects and lack of information about vaccines (Euser et al., 2021; RIVM, 2021e).

Among **people with a migration background** that were studied (Turkish, Ghanaian, Surinamese, Moroccan, Antillean), barriers included the safety of the vaccine, perceived risk and severity of the disease, general distrust of the government and language barriers. The influence of the social environment may act as a barrier and driver. Specific drivers included travel requirements for vaccination and the accessibility of vaccination locations (e.g. without appointment and proximity). Studies carried out among **older migrants** showed that barriers also include fear of the side effects, as well as lack of trust in the vaccine, religious reasons, in which getting sick is predestined (lies in God's hands) or believing that vaccination does not provide benefits. Drivers to vaccination include protecting one's health, belonging to a risk group for COVID-19 and protecting the health of family members (el Fakiri et al., 2022, GGD Amsterdam, 2021). In the view of the medical professionals who were interviewed about barriers for people living in a **low SES** neighbourhood, capability barriers such as difficulties to make an (online) vaccination appointment, language barriers and having no transport to a vaccination location as well as information issues were mentioned (Merkelbach et al., 2022)

Table 1: Barriers towards COVID-19 vaccination across different population subgroups

Behaviour: VACCINATION		Population subgroups						
		General Population[4]	Youth/ Young Adults[5]	People with a migration background[6]	Low SES[7]	Older Migrants[8]	Homeless People[9]	Low Health Skills[10]
COM-B	Barriers							
Capability (individual)								
	Language barriers			X	X			
	Difficulty making an (online) appointment (digital skills)				X			
	No transport to inaccessible vaccination location				X			
Opportunity (contextual)								
Societal	Lack of obligations: No pressure and obligation from the government	X						
	Famous Dutch people who do not vaccinate		X					
	Religious beliefs		X				X	
	Influence of religious and political leaders			X				
	Strong influence of the social environment			X				
	Social pressure			X				
	Social norms, following trusted friends or leaders in a community				X			
	Many rumours from various sources about adverse effects					X		
	If I get sick, this is predestined (lies in God's hands)					X		
	Misinformation	X		X				
Physical (information)	Information needed about side effects among people with the same characteristics (age) or comorbidities as themselves	X						
	Contradictory information		X					
	Insufficient information about vaccines		X		X		X	

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[4] Bochove et al., 2021, de Vries et al., 2022a, de Vries et al., 2022b, Engbersen et al., 2021, Gebrekrstos., 2022, I&O Research, 2022, IPSOS, 2021, Mouter et al., 2020, Mouter et al., 2022, Sanders et al., 2021, Vader et al., 2022, Yousuf et al., 2021, RIVM, 2022f; RIVM, 2021h, RIVM, 2022e; RIVM, 2021c, RIVM, 2021d; RIVM, 2022d, RIVM, 2021f

[5] Stichting Alexander, 2021, te Brinke et al., 2021, Vollmann & Salewski, 2021, Euser et al., 2022; RIVM, 2021e, Hilverda & Vollmann 2021, Wismans et al. 2021, 2022

[6] Antwi-Berko et al., 2022, Stronks et al., 2021, RIVM, 2021g

[7] Merkelbach et al. 2022

[8] el Fakiri et al., 2022, GGD Amsterdam, 2021

[9] van Loenen & van den Muijsenbergh, 2022

[10] Knottnerus et al., 2021

		General Population	Youth/ Young Adults	People with a migration background	Low SES	Older Migrants	Homeless People	Low Health Skills
	(Fear & uncertainty) from unreliable information		X		X			
	Opposing messages because information from the own community or home country does not correspond with information from the Dutch government			X				
	Unilateral reporting by government and media		X					
Motivation (individual)								
Attitudes, perception, risk assessment	Low sense of urgency	X						
Attitudes, perception, risk assessment	Low perceived risk and severity of disease		X				X	
	I don't need it, I'm healthy enough	X						
	I do not believe that COVID-19 poses a serious threat (to me and public health)	X						
	I have already had COVID-19	X						
	Sufficient protection from the other vaccinations	X						
	Not a risk group yourself / Believe in your own immune system		X					
	COVID-19 is not a serious disease		X					
	Have been infected before, don't expect to get infected again						X	
	Expectation that herd immunity will take place		X					
	Sceptical attitude versus vaccines		X					
Trust (in vaccines)	Concerns about short-term and long-term side effects / that vaccines are harmful **or** have side effects	X				X	X	
Trust (in vaccines)	Side effects of previous injection(s)	X						
	Doubts about the effectiveness of the vaccine	X						
	Doubts/concerns about vaccine safety	X		X		X		
	Concerns about the side effects of the vaccine in relation to their specific medical condition	X						
	Distrust mRNA new vaccines							
	Doubt about certain types of vaccines		X					
	Consider vaccines unnecessary	X						

		General Population	Youth/ Young Adults	People with a migration background	Low SES	Older Migrants	Homeless People	Low Health Skills
	It is better to become immune to COVID-19 through infection than through a vaccine	■						
	I do not want to take a vaccine if there is a chance that you will still be infected with COVID-19	■						
	Two vaccinations are more than enough	■						
	Waiting because quality of the vaccine will improve over time	■						
	Too early to see the negative effects			■				
	Do not know what is in the vaccine			■				
	Lead to other complications (e.g., heart attack, death)							
	Concerns about (in)fertility	■	■	■				
	Concerns vaccine discovered too quickly	■		■				
	Fear of the unknown		■				■	
	No trust in the vaccine					■		
	High speed development of vaccines						■	
	Vaccine is still in a testing phase						■	
	Generalised lack of governmental trust	■	■					
	Distrust in the pharma industry	■	■					
Trust (in institutions)	Experiencing pressure/pressure from the government to vaccinate	■					■	
Trust (in institutions) Other	Lack of trust in the media	■						
	GGD is unreliable		■					
	Inserting a chip		■				■	
	Resistance: protecting the integrity of one's own body in response to restrictions of freedom/coercion/ 'being pressured'	■						
	Increasing/high vaccination rate works as a barrier (free-riding). If already high, 'I no longer need to do it'	■						
	Wait-and-see attitude 1: more knowledge (regarding long-term consequences and effectiveness) could give them greater confidence in the vaccine and could increase acceptance to be vaccinated	■						

		General Population	Youth/ Young Adults	People with a migration background	Low SES	Older Migrants	Homeless People	Low Health Skills
Other	Wait-and-see attitude 2: want to make their own assessment, with the reason that they expect that the usefulness of vaccination in the autumn will be greater than vaccination now; and that if they vaccinate now, the vaccines will no longer work sufficiently in the autumn	■						
	Fear for needles		■					
	Doubt from believing in conspiracy theories		■					
	Negative experiences with the flu shot							■
	Not thinking about/being involved with (the importance of) vaccination because there are more urgent problems in daily life (such as poverty)				■			
	Vaccinating is of no benefit to me					■		
	Production of antibodies after infection						■	
	The assumption that vaccination is only useful in case of complaints							■
	Resistance to injecting something in the body							■

Table 2: Drivers towards COVID-19 vaccination across different population subgroups

Behaviour: VACCINATION		Population subgroups				
		General Population[11]	Youth/ Young Adults[12]	People with a migration background [13]	Older Migrants[14]	Homeless People[15]
COM-B	**Drivers**					
Capability (individual)						
	No values	No values	No values	No values	No values	No values
Opportunity (contextual)						
Physical	Cue to action: invitation letter or through trusted messages	■				
	Vaccinate on location					■
	Vaccine passports made mandatory by the government			■		
	Trusted locations			■		
	Vaccination location nearby			■		
	Vaccination without appointment			■		
	Travel options		■	■		■
	The use of role models					■
	A personal approach by trusted care providers					■
Social	An increasing/high vaccination rate works as a driver (greater confidence in safety/effectiveness)	■				
	Social influence: behaviour and norms of family and friends. People around me do it / think it's important. Social norms (e.g., health care providers, people in their surroundings, public figures or important leaders)	■	■	■		
	Vaccination is key to reopening society: "COVID-19 crisis will only end if many people get vaccinated"	■	■	■		

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[11] Bochove et al., 2021, de Vries et al., 2022a, de Vries et al., 2022b, Engbersen et al., 2021, Gebrekrstos, 2022, I&O Research, 2022, IPSOS, 2021, Mouter et al., 2020, Mouter et al., 2022, Sanders et al., 2021, Vader et al., 2022, Yousuf et al., 2021 , RIVM, 2022f; RIVM, 2021h, RIVM, 2022e; RIVM, 2021c, RIVM, 2021d; RIVM, 2022d, RIVM, 2021f

[12] Stichting Alexander, 2021, te Brinke et al., 2021, Vollmann & Salewski, 2021, Euser et al., 2022; RIVM, 2021e, Hilverda & Vollmann 2021, Wismans et al. 2021, 2022

[13] Antwi-Berko et al., 2022' Stronks et al., 2021, RIVM, 2021g

[14] el Fakiri et al., 2022, GGD Amsterdam, 2021

[15] van Loenen & van den Muijsenbergh, 2022

		General Population	Youth/ Young Adults	People with a migration background	Older Migrants	Homeless People
	Engage in more social contacts and hug people, or take part in more activities again in free time	X				
	If freedoms for unvaccinated people are further restricted	X				
	Fighting the pandemic	X				
	Pressure from family	X				
	Peers' acceptance to vaccinate		X			
	Parents' expectations		X			
	Importance for the economy and society		X			
	Community involved			X		
	Collaboration with local care organisations				X	
Motivation (individual)						
Trust	Trust in the government	X	X			
	Trust in science	X	X			
	Follow advice of their physicians	X	X			
	Rely on the safety of the vaccine		X			
Attitudes, perceptions, risk assessment	Protect oneself	X	X	X	X	
	Sense of urgency: increasing hospital or intensive care (ICU) admissions	X				
	Perceived severity of the disease: as people would get more serious to get sick themselves or infect others, they are more willing to be vaccinated	X	X			
	(Changes in) personal health condition (i.e. age, risk group)	X			X	
	Belief that COVID-19 infection can be prevented through vaccination		X			
	Concerns about COVID-19		X			
	Due to the restrictions in their social life (e.g., QR codes)			X		
	Instead of getting a PCR test all the time			X		
	Moral duty: sense of responsibility towards society	X	X	X		
	Heightened protection of family and friends	X			X	

3.2.1. Testing: figures of the general population and subgroups

Between August 1, 2020 and mid-April 2021, the GGDs conducted 11.3 million COVID-19 tests among 6.7 million people, which means that 38% of the Dutch population had themselves tested at least once at a GGD location during this period (CBS, 2021b). Young people and young adults were tested the most, older people (65+) the least. The percentage of testing was highest among people who work in education. Employed people were tested more often than people on social aid benefits or on a pension scheme (CBS, 2021b). Generally men, older people (65+) and low educated people had a lower test propensity (RIVM, 2022a; RIVM, 2021a; CBS, 2021b; McDonald et al., 2021; Mevissen et al., 2022). Moreover, data showed that the population groups with low testing propensity but high COVID-19 positivity were: older people (>65 years), people receiving pension benefits, people with a low income and people working in the transport and trade sector (de Jonge & van Deursen, 2021).

3.2.2. Barriers and drivers of the general population

Tables 3 & 4 show the barriers and drivers to test for COVID-19 that have been identified in studies carried out within the general population (RIVM, 2022a; RIVM, 2022b; RIVM, 2021b; RIVM, 2021a; CBS, 2021a; RIVM, 2022d). The first set is related to opportunity: practical barriers such as access and affordability of self-tests and test locations. For instance, as the distance to the test location increases, the percentage of testing decreases more for people from households without a motor vehicle than for people from households with a motor vehicle (CBS, 2021a). Another survey study found that participants who find self-tests expensive, take a self-test less often when they have complaints (RIVM, 2022b). Factors related to individual motivation were low trust in the government and low risk perception. Note, there may be differences in barriers and drivers for testing between people who have been vaccinated and who have not been vaccinated. For example, vaccinated individuals may not get tested because they were vaccinated against COVID-19. Individuals who were not vaccinated mainly tested to gain access to events and or locations, which was hardly reported as a driver among vaccinated individuals (see RIVM, 2021a and RIVM, 2022a).

3.2.3 Barriers and drivers of subgroups

Some barriers and drivers to test for COVID-19 have been studied within the following population groups (see Tables 3 & 4): undocumented migrant (workers) (Torensma et al., 2021; van den Muijsenbergh et al., 2022; de Ruiter et al., 2022), people with a migration background (Surinamese, Moroccan, Ghanaian and Turkish) (Stronks et al., 2021), older migrants (GGD Amsterdam, 2021; el Fakiri et al., 2021) and, people with low health skills (Knottnerus et al., 2022) and people living in a low SES neighbourhood (Mevissen et al., 2022). **Undocumented migrant (workers)** experienced difficulties in complying with the measure to test for COVID-19, due to language barriers, lack of knowledge of where and how to access tests and test locations, and the fear of identifying themselves (Torensma, 2021). However, their precarious position affected their perceived vulnerability, which motivated them to test (van den Muijsenbergh et al., 2022). Studies among **older migrants** indicated that testing does not yield them anything (doesn't make them better), they did not know where the test locations are, did not have transport to the test locations or experienced the test as (very) unpleasant (GGD Amsterdam, 2021, el Fakiri et al., 2022). However, the proportion of over-65s with a migration

background who have had themselves tested for COVID-19 is higher than among the over-65s of Dutch origin (GGD Amsterdam, 2021). Note that the vast majority (87%) of the over-65s indicate that they do not experience any obstacles to getting tested. This is lowest among Turkish older adults, namely 76% (GGD Amsterdam, 2021). Among **migrants**, having an infection can be a taboo and there is a fear of stigmatisation of people with a COVID-19 infection, which may act as a barrier to testing (Stronks et al., 2021).

A study by Mevissen et al., (2022, *unpublished manuscript)* conducted in a **low SES** neighbourhood in Rotterdam, found that testers estimate the chance of having COVID-19 at the time of the study to be higher than non-testers. The severity of COVID-19 was also higher by testers than by non-testers. The testers were also more positive about the COVID-19 test and having themselves tested again than the non-testers. People who had never been tested before were a little more concerned about being stigmatised by their environment in the event of a positive test result. The testers consider themselves more capable of getting tested and carrying out the quarantine measures in the event of a positive result than the non-testers. For non-testers, the opinion of family and friends is more important than for testers. In a study people with **limited health literacy**, defined as people who have difficulty with the Dutch language and/or with finding, understanding and/or applying health information, were interviewed to identify barriers they faced. Reported barriers included waiting time and the expected travel time to test locations, doubting the reliability of the test result and the usefulness of testing, because the test result was only one snapshot, it would add little for them personally (Knottnerus et al., 2021).

Table 3: Barriers towards COVID-19 testing across different population subgroups

BEHAVIOUR: TESTING		Population subgroups						
		General Population[16]	People with a migration background [17]	Low Health Literacy[18]	Undocumented Migrants and Status Holders[19]	Undocumented Migrant Workers[20]	Older Migrants[21]	Low SES[22]
COM-B	Barriers							
Capability (individual)								
	Finding reliable information							
	Language barrier							
	No transportation							
	Applying for a COVID-19 test difficult							

[16] RIVM, 2022a; RIVM, 2022b; RIVM, 2021a; RIVM, 2021b; CBS, 2021a; RIVM, 2020b
[17] Stronks et al., 2021
[18] Knottnerus et al., 2022
[19] de Ruiter et al, 2022
[20] Torensma et al., 2021, van den Muijsenbergh et al., 2022
[21] GGD Amsterdam, 2021, El Fakiri et al., 2021
[22] Mevissen et al., (2022, unpublished manuscript)

		General Population	People with a migration background	Low Health Literacy	Undocumented Migrants and Status Holders	Undocumented Migrant Workers	Older Migrants	Low SES
Opportunity (contextual)								
	Lack of information on test locations					X	X	
	High costs of a self-test	X						
	Large distance to test locations	X		X				
	Long time to get a test (result)	X		X				
	Limited available times for setting an appointment	X						
	Inaccessibility of test streets	X						
	No BSN	X			X	X		
Social	Taboo & stigmatization		X					X
Motivation (individual)								
	Low trust in government (affiliated agencies)	X			X			
	Untrustworthiness test	X						
	Low risk perception	X						X
	Belief that COVID-19 is not a serious disease	X						
	Mild complaints (e.g. runny nose) or have during the winter season	X						
	Complaints attributed to underlying conditions (e.g. asthma, hay fever)	X		X				
	Testing is unpleasant	X						
	Vaccinated against COVID-19	X						
	Been infected before, so testing is pointless	X						

		General Population	People with a migration background	Low Health Literacy	Undocumented Migrants and Status Holders	Undocumented Migrant Workers	Older Migrants	Low SES
	Belief testing will yield nothing (it doesn't make me better)							
	Fear request BSN, fear of being evicted							

Table 4: Drivers towards COVID-19 testing across different population subgroups

BEHAVIOUR: TESTING		Population subgroups		
		General Population[23]	Undocumented Migrant Workers[24]	Low SES[25]
COM-B	Drivers			
Capability (individual)				
	No values	No values	No values	No values
Opportunity (contextual)				
Physical	Test location nearby	X		
	Testing without appointment	X		
	Low-threshold test methods	X		
	Free self-tests	X		
Motivation (individual)				
	Severe COVID-19-related complaints (e.g. fever, severe coughing)	X		
	Reassurance no COVID-19	X		
	To be able to go (back) to work	X		
	Negative test certificate to gain access to cultural, social activities/ events or to go abroad	X		
	Not infecting others/ protect others	X		
	Response efficacy: See the added value of testing for themselves, others & the pandemic	X		
	Self-efficacy: Easy advice & implementable	X		X
	Precarious position affecting their perceived vulnerability		X	X

3.3.1. Other measures: figures of the general population and subgroups

Other measures entail adherence to various types of behaviours such as home isolation, mask-wearing, social distancing (avoiding crowds and social gatherings) and keeping physical distance. Young people encountered greater challenges to follow contact-limiting measures, such as keeping a distance of 1.5 metres or receiving a maximum number of visitors, compared to older age groups (RIVM, 2022g). Insofar studies have been carried out they show no indications that knowledge about measures in migrant groups is much lower. However, there appears to be a lack of understanding about the rationale and effect of the measures, which can, in turn, make it difficult to comply with the measures (Stronks et al., 2021). In a study conducted in Amsterdam among multiple older people with a migration background, Turkish elderly more often indicated that they have difficulty with the measures and less often comply compared to older migrants with Surinamese, Antillean, Moroccan and Dutch origin (GGD Amsterdam, 2021). In addition, Knotternerus et al., (2021) found that people with limited health skills have more difficulty complying with the COVID-19 measures. In a large-scale panel survey (N=22,696), Snel et al., (2022) found that SES has both a direct and indirect effect on the level of institutional trust. People with higher SES experience less economic insecurity, have less dissatisfaction with the COVID-19 policies and, partly as a result of this, stronger institutional trust. It is also true that economic insecurity increases dissatisfaction with the COVID-19vpolicies and, partly as a result of this, weakens the level of trust.

3.2.3. Barriers and drivers of the general population

Self-reports via questionnaires, literature and observational studies have been conducted regarding adherence to other measures within the general population (Verberk et al., 2021; RIVM, 2020a; RIVM, 2020b; RIVM, 2020c; RIVM, 2022d; Liebst et al., 2022; Hoeben et al., 2021). For instance, a study found no observational evidence of an association between mask-wearing and social distancing but found a positive link between crowding and social distancing violations (Liebst et al., 2022). Hoeben et al (2021) found that compliance with 1.5 metre distance measure is short-lived and coincides with the number of people on the street and with compliance to stay-at-home measures. As Table 5 shows, multiple barriers were identified related to capability e.g. working from home is not possible, opportunity (physical) e.g., impracticality/ discomfort of for instance wearing face masks, opportunity (social) e.g., worries about not being able to participate to social (organised) activities such as festivals and holidays and *motivation* e.g. people did not find their complaints serious, complaints do not feel any different than usual ('I often have a runny nose'). Some drivers were identified (Table 5), such as with more serious complaints (fever, shortness of breath) people were more likely to stay at home and get tested more often. People who saw the added value of staying at home and testing (for themselves and for others), follow these advices more often. Solidarity considerations, such as concern about infecting others, also played a role.

3.3.3. Barriers and drivers of subgroups

Barriers and drivers were studied in multiple population subgroups: people with a migration background, such as in Ghanaian-Dutch, Afro, Eritrean, Hindustani Surinamese-Dutch communities (Bakuri et al., 2022; Stronks et al., 2021; Torensma et al., 2021), older migrants (GGD Amsterdam,

2022; El Fakiri et al., 2021), youth/ young adults (Kollman et al., 2022; Koning et al., 2022), people with a low SES (Van Loenen et al., 2020), low health skills (Knottnerus et al., 2021), and undocumented migrant workers (van den Muijsenbergh et al., 2022). Multiple barriers and to a much lesser extent drivers have been identified among the different groups, as shown in Tables 5 & 6. Among **young adults (university students)** due to their high (impersonal) risk perception and high affective response (i.e. worry about COVID-19), they adhered to most preventive behaviours. However, at times they did not comply to social distancing due to the mental health effects and the uncertainty of the duration of the situation (Kollmann et al., 2022). Young adults (16 and 24 years) with fewer depressive symptoms adhered better to social distancing measures. Young adults who were less suspicious of others, more resilient, and those with a coping strategy or help from someone from their social network (e.g. nonparent relative, neighbour, teacher, friend) more often adhered to COVID -19 measures (Koning et al., 2022). Among **people with a migration background** (Moroccan, Turkish, Surinamese, Ghanaian, Eritrean), barriers included limited Dutch proficiency, unclear and inconsistent information and interference of misinformation. Other barriers are a strong social norm to keep with cultural and religious practices or providing help for people in need, and limited opportunities for preventive behaviours in work, where working from home and keeping 1.5 metres distance were not (always) possible (Bakuri et al., 2022; Stronks et al., 2021; Torensma et al., 2021).

Table 3: Barriers towards other measures across different population subgroups

Behaviour: OTHER MEASURES		Population subgroups						
		General Population[26]	People with a migration background[27]	Young Adults[28]	Low SES[29]	Undocumented Migrant Workers[30]	Older Migrants[31]	Low Health Literacy[32]
COM-B	Barriers							
Capability (individual)								
	Occupations not possible to keep distance or work from home	X	X					
	Living situation: many people in small houses		X			X		
	Language: Limited/ no Dutch proficiency		X		X	X	X	
	Difficulty to translate measures to individual situations	X	X					
	Effects on mental health		X	X	X			X
	Forgetfulness		X					X
Opportunity (contextual)								
Physical	Crowded places	X						
	Lack of understanding why the government imposed measures (too complicated)	X	X		X		X	X
	Conflicting/ inconsistent information		X					X

[26] Verberk et al, 2021; Liebst et al., 2020; RIVM, 2020c; RIVM, 2020d, RIVM, 2020b, Hoeben et al.,2021; RIVM, 2020a
[27] Bakuri et al., 2022; Stronks et al., 2021; Torensma et al., 2021
[28] Kollmann et al., 2022, Koning et al., 2022
[29] van Loenen et al., 2020
[30] van den Muijsenbergh et al., 2022
[31] GGD Amsterdam, 2021, El Fakiri et al., 2021
[32] Knottnerus et al., 2021

		General Population	People with a migration background	Young Adults	Low SES	Undocumented Migrant Workers	Older Migrants	Low Health Literacy
	Misinformation		X					
	Impracticality/ discomfort (e.g. face masks)	X	X					
	Limited social interaction	X	X					
Social	Family obligations/ helping in need (e.g. children)	X	X		X			
	Stigmatisation & segregation	X	X					
	Specific situations e.g. holidays	X						
	Concerns about economy	X						
	Strong social norm to keep to cultural and religious practices	X	X					
	Information from own country of origin		X		X			
Motivation (individual)								
	Low risk perception of infection & severity of illness	X	X					
	Ineffectiveness of measures	X						
	Boredom	X						
	Mild complaints not associated with COVID	X	X					
	Uncertainty/ long duration			X				
	Trust in the government			X	X			X
	Concerns about privacy and security							X
	Vaccination						X	
	Concerns about personal financial situation	X						

Table 4: Drivers towards other measures across different population subgroups

Behaviour: OTHER MEASURES		Population subgroups				
		General Population[33]	Young Adults[34]	Low SES/ Deprived Areas[35]	Undocumented Migrant Workers[36]	Older Migrants[37]
COM-B	Drivers					
Capability (individual)						
	More knowledge	▪				
	Practical feasibility: advice easy and implementable	▪	▪			
	Following news or looking up information	▪				
Opportunity (contextual)						
Physical	Clear communication & information about measures	▪				
Social	Measures compulsory	▪				
	Penalties for non-compliance	▪				
	Social influences and norms	▪				
	High social participation			▪		
Motivation (individual)						
	Self-health protection	▪		▪		
	High risk perception				▪	
	Effectiveness of measures (see the added value for themselves and others)	▪				
	Anxiety about COVID-19	▪		▪		▪
	Trust in government	▪				
	Perceived susceptibility for COVID-19	▪				
	Precarious position in society				▪	
	Experiencing serious complaints	▪				
	High impersonal risk perception	▪				
	Protect others/ solidarity	▪		▪		
	High affective response (e.g. worry)	▪	▪			

[33] Verberk et al, 2021; Liebst et al., 2020; RIVM, 2020c; RIVM, 2020d, RIVM, 2020b, Hoeben et al.,2021; RIVM, 2021a

[34] Kollmann et al., 2022, Koning et al., 2022

[35] van Loenen et al., 2020

[36] van den Muijsenbergh et al., 2022

[37] GGD Amsterdam, 2021, El Fakiri et al., 2021

Check-in 1|2

Toiletten
Toilets

Abflug alle Gates
Departure all gates

Bus|Coaches
Tram|Tramway

SWISS

3.2. Interviews

A total of 23 experts were interviewed, with the aim of retrospectively capturing their experiences and observations during the COVID-19 pandemic (see Appendix 2 for the interview questions). The main results of the interviews are presented in the following subsections: 1) population subgroups, 2) barriers and drivers, 3) interventions and research, 4) lessons learned and 5) knowledge gaps.

3.2.1. Population subgroups and their characteristics

Figure 6: Population subgroups

The experts were asked which population groups they currently believe have a low acceptance of COVID-19 PHSM and based on their observations, what features characterise these groups. As shown in Figure 6, the population subgroups mentioned by the experts were people with a low socioeconomic status, migrants, asylum seekers and refugees, youth, older people, homeless people, people prone to conspiracy theories, undocumented people, religious groups, sex workers and people with disabilities. In responds to the question, no distinction was made between the various COVID-19 PHSM. The characteristics for the population groups that were described were: low socioeconomic status, living under complex social circumstances, lack of trust in the government and institutions, lack of or poor Dutch language skills, lower (health) literacy, lower level of education and poor digital skills.

3.2.2. Barriers and drivers

Figures 7 and 8 provide an overview of the barriers and drivers that influence uptake and adherence to COVID-19 PHSM as mentioned by the interviewed experts. The barriers and drivers have been quantified to obtain a general picture of which barriers and drivers were mentioned by most experts. Table 8 and 9 in the Appendix lists all barriers and drivers. The barriers and drivers were categorised according to the COM-B framework. This categorisation was not done to any particular population group or prevention measure, as the experts were asked a general question and were not promoted to enumerate barriers and drivers for specific population groups or COVID-19 measures.
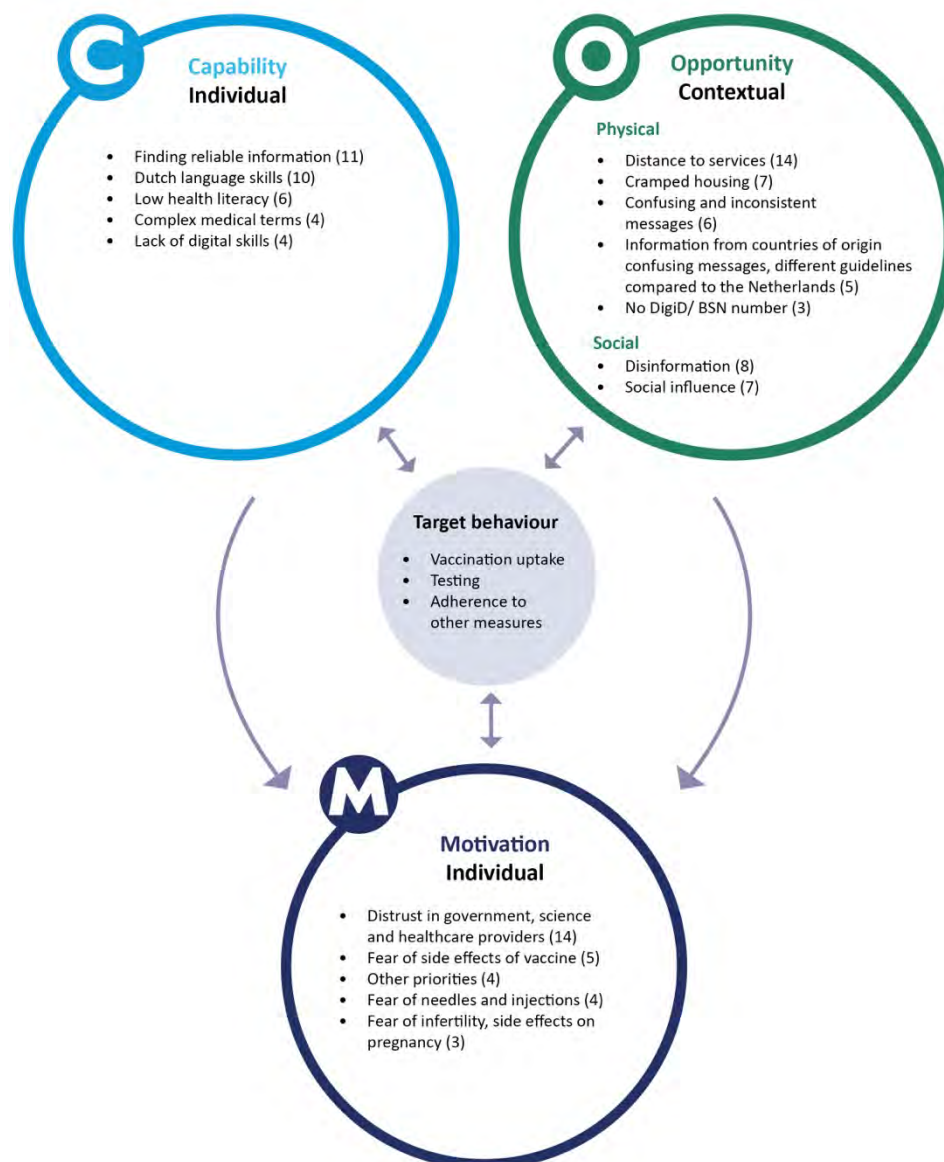

Figure 7: Overview of the barriers influencing adherence to COVID-19 public health and social measures most often mentioned by interviewed experts (n = 23)
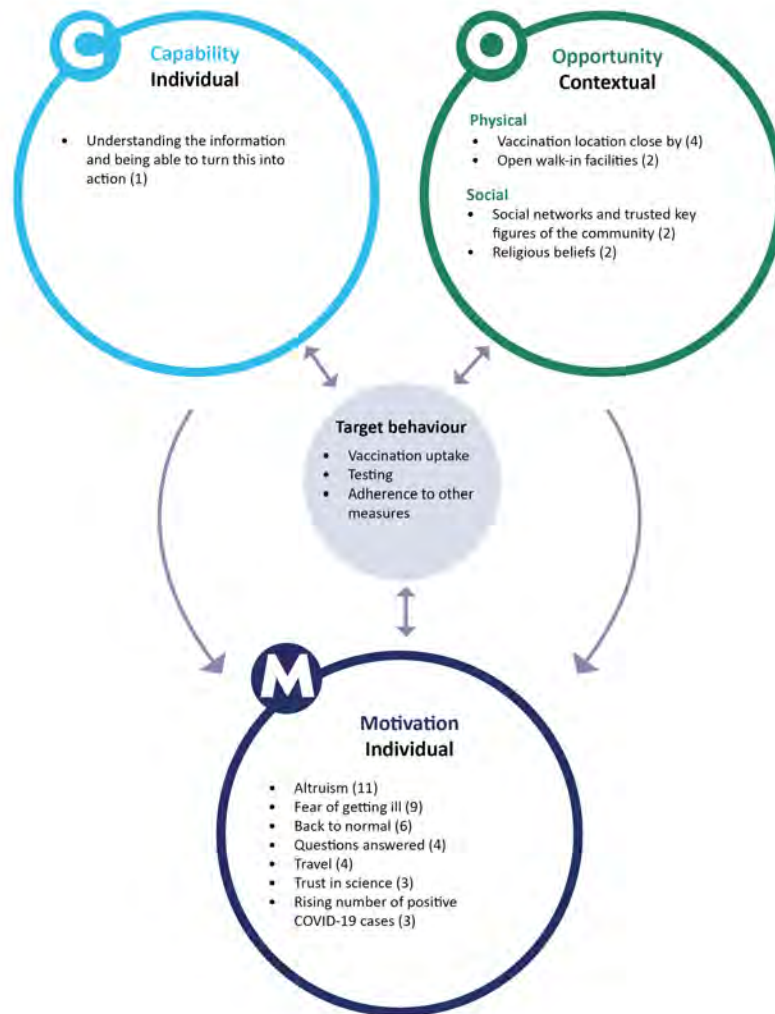
Figure 8: Overview of the drivers influencing adherence to COVID-19 public health and social measures most often mentioned by interviewed experts (n = 23)

The most frequently mentioned **capability** barriers were linked to knowledge and skills such as: finding reliable information (11), Dutch language skills (10) low health literacy (6) and poor or lack of digital skills (4). The most frequently stated **physical contextual (opportunity)** barriers were: distance to services (14), cramped housing (7), confusing and inconsistent messages, constant changes in guidelines and measures from the government (6), retrieving information from countries of origin which included different guidelines and measures compared to the Netherlands leading to confusion (5). Rights, regulations and legislation barriers were identified as well as not having an ID and/or BSN number (3). The most cited **opportunity (social)** barriers were: disinformation via social media (8) and influence of community, friends, family, taboo and stigmatisation (7). Religious population groups in the Bible belt region of the Netherlands were named as a population subgroup and their religious beliefs were given as a barrier for their low vaccine uptake and adherence to measures. Common

motivation barriers were: lack of trust in the government, science and healthcare providers (14), fear of side effects of the vaccine (5), other priorities and/or no sense of urgency (4) and fear of needles and injections (4). Fewer drivers than barriers were mentioned by the interviewed experts. The most frequently mentioned **opportunity (physical)** drivers were*:* walk-in (without appointment) testing and vaccination facilities, nearby vaccination and testing locations (4) and **opportunity (social)***:* information shared by social networks and trusted key figures within the community (2). The most prevalent **motivations** were altruism/ protecting others (11), fear of getting sick (9) and getting back to normal (6).

3.2.3. Interventions and projects

A total of around 45 interventions and research projects in the Netherlands were mentioned by the interviewed experts. The interventions were implemented on a local, regional and national level. Many experts noted that key figures, defined as "persons who form the link between the authorities and local residents in organisations and communities" (Kolner et al., 2023, p.5), such as GPs, trusted religious leaders, played an important role in identifying groups with a lower acceptance or uptake and the design and implementation of interventions. The map below provides examples of national, regional and local interventions mentioned by the interviewed experts, aimed at enhancing vaccine uptake, testing and other measures designed to mitigate the spread of the virus is shown below (Figure 9). The following three interventions are examples of targeted interventions 1) Tailored vaccination and education (fijnmazig vaccineren), 2) Risk-oriented large-scale testing ("risicogericht grootschalig testen) and 3) the Vaccination doubt line (twijfel telefoon).

Tailored vaccination and education, is an intervention that was implemented by various GGDs across the Netherlands, specifically targeting citizens in neighbourhoods with a low vaccination uptake, and where mainly older people lived, under the assumption that older people are more prone to encountering physical barriers, such as challenges in accessing vaccination locations. Through temporary pop-ups and mobile vaccination units (buses) the access to healthcare facilities and information was increased. Information about the mobile vaccination units was provided by local GP's, medical students and other healthcare professionals at markets, community centres, churches and mosques. The GGD Rotterdam - Rijnmond evaluation (2023, unpublished) of the tailored vaccination and education campaign in Rotterdam and surroundings showed that the mix of interventions; distribution of information via markets, community centres and walk-in facilities led to increased vaccination uptake. An RIVM study (2022) found that on a day when a vaccination bus was present, an average of 26% more people were vaccinated, compared to days and districts without a vaccination bus. Merkelbach et. al (2022) evaluated the market vaccinations in Rotterdam, an initiative of GPs in Rotterdam. According to interviewed medical professionals, the success of the intervention was attributed by addressing needs, barriers and circumstances of people of the deprived neighbourhoods. Barriers, needs and circumstances of people with a migrant background, facing Dutch language problems, having limited access to public transport, poor health literacy and those who have doubts about the vaccination due to lack of access to reliable information were addressed by the intervention. Volunteers who were interviewed felt that both the provision of information by medical professionals from the district and communication in the language of migrants were deemed crucial (Merkelbach et. al, 2022).

Risk-oriented large-scale testing provided free and accessible testing for people without COVID-19 symptoms. Various test locations were set up in different municipalities and districts across the Netherlands, for example in Rotterdam, Lansingerland, Bunschoten and Dronten. Results from the pilot study in low-income neighbourhoods in Rotterdam showed that test uptake increased among residents of the pilot neighbourhoods, especially in the older age groups, compared to people living in comparable neighbourhoods without community-based testing facilities (Vink et al., 2022; Sanders et al., 2022; GGD Rotterdam-Rijnmond, 2021; Rijksoverheid, 2021). In a similar study where community-based testing was offered in three low-income neighbourhoods in Rotterdam, results showed socio-demographic differences between visitors at exclusively walk-in locations from those at by-appointment locations. Visitors of by-appointment locations were more often higher educated and had a Dutch background (Vink et al., 2022).

The **Vaccination doubt line** is a helpline set up by doctors and staff at the Erasmus Medical Center, in Rotterdam, the Netherlands (van der Kleij et al., 2023). The vaccination doubt line, which was mainly operated by medical students, provided people the opportunity to obtain more information about COVID-19 vaccination and seek answers to specific questions pertaining to their health or chronic condition. The popularity of the doubt line was attributable to the low threshold, the doubt line was easily accessible, making it more socially acceptable for individuals to ask questions, to be hesitant or voice concerns. Within the first months more than 26,000 people called to ask their medical questions or to discuss their concerns (https://twijfeltelefoon.nl/). Medical students, supported by medical specialists, provided independent medical advice on vaccinations, if possible tailored to the individual medical situation of the caller. Turkish-speaking students were available on Wednesdays, Arabic-speaking students on Fridays. The intervention was targeted at the general population to address barriers such as fear of side effects due to personal health conditions or lack of trust in science.

The experts also mentioned several research projects, in collaboration with organisations, that are still ongoing or being finalised. Figure 10 illustrates some of the research projects, many focusing on population subgroups.

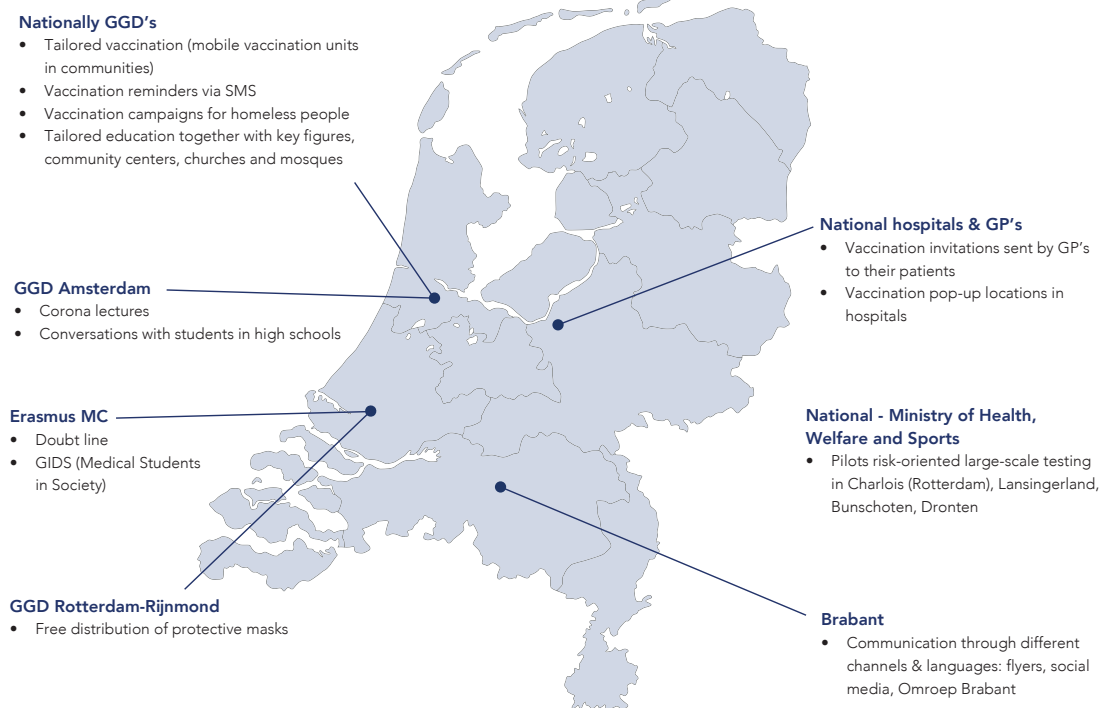## Examples of COVID-19 <u>interventions</u> in the Netherlands

Nationally GGD's
- Tailored vaccination (mobile vaccination units in communities)
- Vaccination reminders via SMS
- Vaccination campaigns for homeless people
- Tailored education together with key figures, community centers, churches and mosques

GGD Amsterdam
- Corona lectures
- Conversations with students in high schools

Erasmus MC
- Doubt line
- GIDS (Medical Students in Society)

GGD Rotterdam-Rijnmond
- Free distribution of protective masks

National hospitals & GP's
- Vaccination invitations sent by GP's to their patients
- Vaccination pop-up locations in hospitals

National - Ministry of Health, Welfare and Sports
- Pilots risk-oriented large-scale testing in Charlois (Rotterdam), Lansingerland, Bunschoten, Dronten

Brabant
- Communication through different channels & languages: flyers, social media, Omroep Brabant

Figure 9: Map of COVID-19 interventions in the Netherlands as mentioned by the experts

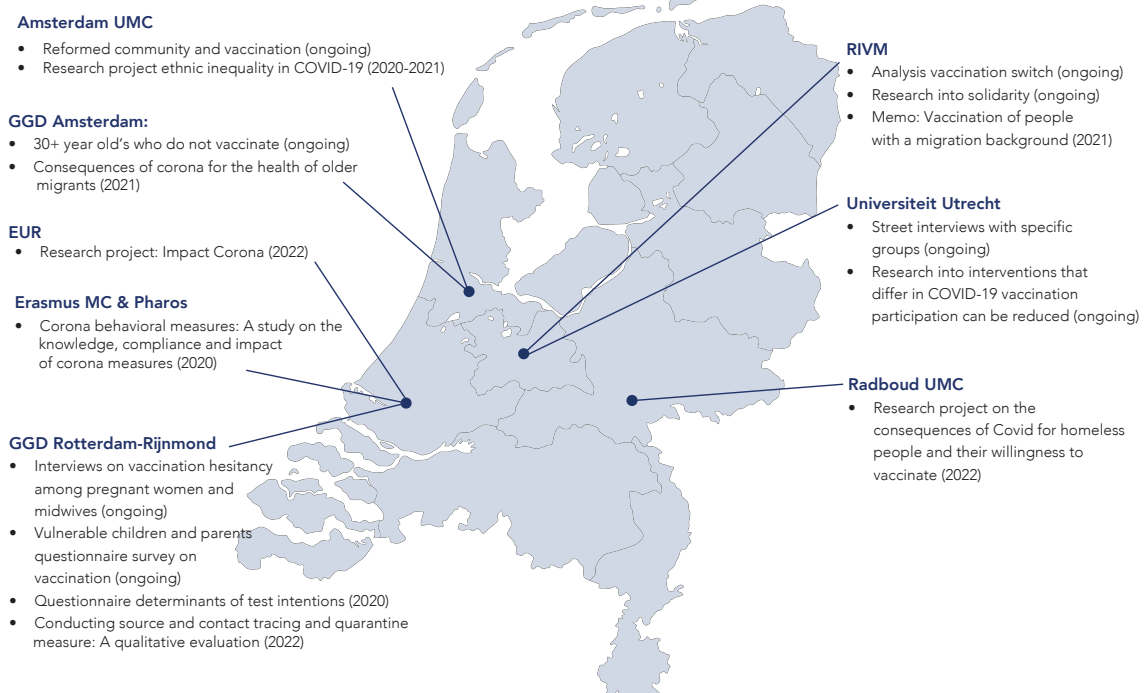## Examples of COVID-19 <u>research projects</u> in the Netherlands

Amsterdam UMC
- Reformed community and vaccination (ongoing)
- Research project ethnic inequality in COVID-19 (2020-2021)

GGD Amsterdam:
- 30+ year old's who do not vaccinate (ongoing)
- Consequences of corona for the health of older migrants (2021)

EUR
- Research project: Impact Corona (2022)

Erasmus MC & Pharos
- Corona behavioral measures: A study on the knowledge, compliance and impact of corona measures (2020)

GGD Rotterdam-Rijnmond
- Interviews on vaccination hesitancy among pregnant women and midwives (ongoing)
- Vulnerable children and parents questionnaire survey on vaccination (ongoing)
- Questionnaire determinants of test intentions (2020)
- Conducting source and contact tracing and quarantine measure: A qualitative evaluation (2022)

RIVM
- Analysis vaccination switch (ongoing)
- Research into solidarity (ongoing)
- Memo: Vaccination of people with a migration background (2021)

Universiteit Utrecht
- Street interviews with specific groups (ongoing)
- Research into interventions that differ in COVID-19 vaccination participation can be reduced (ongoing)

Radboud UMC
- Research project on the consequences of Covid for homeless people and their willingness to vaccinate (2022)

Figure 10: Map of COVID-19 research projects in the Netherlands as mentioned by the experts

3.2.4. Lessons learned

The experts were asked "What lessons can we learn from the COVID-19 pandemic?" One of the lessons is that it is crucial to identify the different barriers and drivers of different population subgroups, tailor interventions to subgroups from the beginning, and design interventions informed by theory and evidence. Different population subgroups use different communication channels as sources of information e.g., social media, videos or peer communication, besides mainstream communication channels like television, radio, websites and newspapers. Next to identifying which communication channels are used by different subgroups, how and when the information is communicated also plays a role in reaching diverse groups. In addition, experts highlighted the importance of identifying what information people require and desire about COVID-19, vaccines, testing and other non-pharmaceutical measures. This information is vital for designing tailored communication campaigns. The use of key figures: working together with GPs, primary healthcare providers, community leaders and community organisations has, according to the interviewees, proven to be successful for the identification of underserved groups and design of vaccination and information campaigns.

According to experts, another key lesson is the necessity of an interdisciplinary and systematic approach for the successful development of interventions. As some experts pointed out, the behaviour of people and adherence to measures were key to controlling the spread of the virus. However, responses were overly focused on clinical and virological aspects and less on behavioural aspects. There was a lack of collaboration between medical, public health, behavioural and communication specialists. Social and behavioural researchers, communication specialists, data specialists and civil society should be involved from the beginning, working together on the design of interventions to address different behaviours, barriers of population subgroups. In addition, sharing (preliminary) results of interventions and research between experts is of utmost importance, which was limited during the pandemic, due to time constraints. Sharing results is vital because it provides the opportunity to learn and adapt interventions if required, based on the results of collected data. While the urgency to respond and devise interventions took precedence, the sharing of data and research findings related to barriers and motivators was restricted. The design of most interventions was based on signals, such as low vaccination and testing rates in specific regions and neighbourhoods that required immediate action. Lastly, experts suggested that when designing interventions, lessons learned from previous pandemics e.g., the Mexican flu could provide valuable insights. During the Mexican flu, barriers to vaccination hesitancy were identified, including conspiracy theories and concerns about infertility, similar to challenges observed during the COVID-19 pandemic.

3.2.5. Knowledge gaps

Table 7 provides an overview of the knowledge gaps that were identified by the experts, requiring further understanding to address barriers towards vaccination acceptance and uptake and adherence to measures. The listed knowledge gaps stems from the experiences and observations of the experts during the two-year COVID-19 pandemic in the Netherlands. The COVID-19 pandemic underscored the significance of behavioural insights. However, the translation and implementation of behavioural insights into action still needs to be improved.

Trust	• How to tackle lack of trust towards the government, health authorities and science?
Communication	• How to reach different subgroups? • What are effective means of communication for subgroups? • What type of communication and information works for which group? • Where do people acquire their knowledge? • What type of communication channels do people use?
Disinformation	• How does disinformation influence health behaviour? • How to combat disinformation?
Social network	• What is the value of using key figures?
Vaccination	• Why are people sceptical and hesitant towards vaccines? • 20 years ago, the vaccination uptake was higher under migrants: what happened? • What are the unintended consequences of the COVID-19 vaccine policy?
Perceptions	• What do underserved groups want and need? • What motivates them to adhere to COVID-19 PHSM? • What knowledge and attitude towards health, wellbeing and sickness do different groups have? • Migrants are a heterogeneous group – what are the differences in barriers and drivers towards public health and social measures (i.e. vaccination, testing and other measures)?

Table 5: Knowledge gaps according to the interviewed experts

3.3. Expert meeting

On 11th October 2022 an expert meeting took place, with the purpose to present the preliminary results of the situation analysis, and in two interactive workshop rounds discuss and reflect on the situation analysis and on what is needed to develop, test and evaluate informed tailored interventions for population subgroups in the Netherlands. In the workshops, the experts' experiences with different population subgroups, barriers, drivers and interventions were also discussed. Experts were asked how they had identified population subgroups who were not vaccinated and/or had a low adherence to COVID-19 PHSM. Population **subgroups** were identified in several ways: through infection rates based on wastewater data measured in neighbourhoods, qualitative data (e.g. from interviews) of testing and vaccination, quantitative data of testing and vaccination (including geographical data); e.g., corona dashboard, RIVM vaccination databases, vaccination coverage rates at neighbourhood-level and age-groups, 3- and 6 weekly surveys (self-reported). Additionally, other sources included the Helius cohort

study data (an ongoing health survey among migrant groups in Amsterdam), source and contact tracing (in Dutch: bron- en contact onderzoek) and cluster analysis. Pro-active signals from community (health care) workers; e.g., conversations with key figures based on the existing network of the GGDs or GPs also provided insights. Population subgroups were also identified through the local COVID-19 prevention teams of the GGD's. The experts identified **barriers** and **drivers** through surveys, literature, focus group sessions, in-depth interviews, expert meetings, health promotion meetings, community-based interventions, use of their own network and social media analysis.

Interventions were designed and implemented based on past experience, in collaboration and co-creation with key figures. Other procedures involved "trial and error", using social marketing i.e. customer journey thinking, using available information about specific groups from other European countries and looking at the drivers within specific groups. The participants of the expert meeting listed the following interventions as successful (based on number of people it reached): the doubt line, local test buses, local services for vaccination and conversations with key figures like general practitioners.

The following **knowledge gaps** were identified in the workshops:
- A better understanding of which interventions worked well and which did not in reaching subgroups;
- How to translate knowledge (in behaviour) into action (interventions);
- Insights into community needs and resources. A bottom-up approach should be included in the preparedness plan;
- How to evaluate interventions; how to measure effectiveness and when is an intervention considered successful? When should one end an intervention? How to prioritise between interventions?
- A better understanding of when and how connections/social capital have an influence on the decision-making process of the target subgroup of the population.

To **develop interventions**, the participants stressed the need for financial capacity for developing, monitoring and evaluating interventions. Moreover, interdisciplinary collaboration, such as between social, biomedical and technical sciences. A multisectoral approach among various stakeholder groups, such as policymakers, researchers and civil society is desired. Key areas of expertise that are needed for understanding barriers and drivers as well as developing interventions include: behavioural scientists, intervention development specialists, evaluation and implementation experts, key figures such as healthcare workers (e.g., GPs) and social workers. In addition, a knowledge hub that facilitates the exchange of information across disciplines and stakeholders should be established. More human capacity is vital, as personal interventions are labour intensive. Various tools were recommended to gather insights such as behavioural change models (e.g., the health belief model) and intervention mapping, which help translate insights into action, as well as triangulation, ethnography, observation research and an information hub for sharing knowledge between different disciplines, sectors and stakeholders. The experts argued that those who have a higher risk of COVID-19 infection, hospitalisation and death, are less willing to get vaccinated or tested for COVID-19, and have been mostly affected by the control measures. To better serve these groups, they need to be prioritised for developing targeted interventions. These groups include older migrants and their social network, undocumented people, migrant communities such as the Turkish and Moroccan, people with a low

socioeconomic status and (mentally) disabled people. Factors that should be considered when deciding which population groups have the highest priority for targeted interventions are:

- Vulnerable groups (people with the highest risk for COVID-19 severity and mortality) such as older people and medically frail groups;
- Largest population groups in specific regions, such as the Moroccan community in Rotterdam;
- The groups with the biggest impact on reducing the spread of COVID-19.

4. Discussion

This situation analysis is the first phase of the THP approach, which identified population subgroups with a lower uptake and adherence to COVID-19 public health and social measures, provided a comprehensive overview of current evidence regarding the barriers and drivers towards COVID-19 PHSM. It also provides an overview of interventions and research projects that were implemented among various population subgroups in the Netherlands during the pandemic.

Identified population subgroups

The literature scan revealed that multiple population subgroups have been studied regarding their barriers and drivers for uptake and adherence to COVID-19 PHSM. These include (older) migrant communities (specifically Moroccan, Turkish, Ghanaian, Surinamese, Antillean, and Eritrean), undocumented migrant (workers), homeless people, youth/ young adults (between 12-30 years old), people with a low SES or living in neighbourhoods with a low SES and people with low health literacy. In addition to the above-mentioned groups, experts in the interviews and expert meeting also mentioned the following groups: sex workers, people prone to conspiracy theories, asylum seekers, status holders (recognised asylum seekers who have a residence permit and are allowed to study/work in the Netherlands), and people with disabilities.

Identified barriers and drivers to COVID-19 PHSM

Multifactorial barriers and drivers were identified, with similarities and differences between the general population and population subgroups. Identified barriers across groups with regards to uptake and adherence to COVID-19 PHSM included lack of trust in the government, issues related to information (i.e. insufficient, complex, contradictory, misinformation) and low perceived risk and severity of the disease. Specifically for vaccination acceptance, vaccine safety and the short and long-term side effects were reported as barriers. Identified drivers across groups included self-protection, the moral duty to protect others, and the reopening of society. During the interviews, experts mentioned some barriers that were more frequently found among some subgroups of the population. Among migrants and refugees where capability barriers were present, mainly lack of or problems with Dutch language skills. The literature scan and interviews revealed that distance to vaccination and test locations is a physical barrier present among older people, people with a migrant background and people with a low SES. For the adherence to other measures, not being able to work from home due to the type of occupation or cramped housing, were identified as barriers. Lastly, it was brought to our attention that various network ties may act both as a driver and barrier for vaccination and adherence to measures. Wanting to protect family and friends from infection and severe illness, can be a driver to vaccinate. However, fear of stigmatisation by family and friends can act as a barrier.

Most of the available research is quantitative and has predominantly focused on understanding (vaccination) behaviour among the general population, rather than in subgroups. Furthermore, drivers were identified to a much lesser extent than barriers, most likely because these were not studied rather than not present among the subgroups. This is supported by the results of the interviews, where experts cited more barriers than drivers.

Interventions and research projects

We identified approximately 45 interventions and research projects based on the interviews and literature. The three highlighted interventions (tailored vaccination and education, risk-oriented large-scale testing and the vaccination doubt line) addressed some capability, physical, social and motivational barriers. For instance, older people who were less mobile and had difficulty travelling to vaccine or testing sites (physical barrier) and people whose personal queries were not addressed through the general mass media campaigns (opportunity and motivational barrier), had the opportunity to ask questions at the market stalls or via the doubt line. The evaluation of the pop-up vaccination locations in GGD-Rotterdam/Rijnmond area revealed that the multilevel approach (pop up locations, door to door flyers, information campaigns on the market) focusing on physical, social and motivational barriers led to an increase in vaccination uptake. Based on the interviews and expert meeting, working together with key figures in identifying underserved groups and developing and implementing targeted interventions was named as one of the key lessons learned during the COVID-19 pandemic. This is supported by findings in the literature, which emphasise that early engagement and collaboration with the community are cornerstones of efforts to improve public health and its core value of social justice (Michener et al., 2020). Throughout the interviews and expert meeting, the experts concluded that there was a lack of monitoring and evaluation of interventions during the pandemic, due to continuous changes, time constraints and lack of resources. Knowledge gaps remain regarding the (cost) effectiveness of interventions, what type of interventions were successful for different subgroups and what information is still missing to address certain barriers and drivers of population subgroups. The question remains; when is it crucial to target subgroups and when can generic measures suffice?

Based on the literature scan, interviews and expert meeting, our results identified the subgroups of the population that are so-called underserved (Habersaat & Jackson, 2020) for example migrant communities, older people and people with a low SES. They have a lower uptake or acceptance to get vaccinated, tested or adhere to other measures. They may also have different barriers and drivers compared to the general population, face barriers associated with accessing healthcare services and were possibly not reached through national, general information campaigns, testing and vaccination strategies.

Future research and actions

More behavioural insights are needed to understand the barriers and drivers of different underserved groups and how to address them. To the best of our knowledge, there is a lack of research (based on existing Dutch literature) among disabled people, refugees (e.g., Syrians) and migrant communities (e.g., Indonesians) about their barriers and drivers towards COVID-19 PHSM. More specifically, research into the multifaceted (individual and contextual) barriers and *especially* drivers of different underserved groups (e.g., different migrant communities) is missing. Another topic requiring further investigation is the role of family members, caregivers and key figures e.g., health professionals and community leaders as sources of information and as shapers of vaccination/ testing behaviour. Multi-method research is necessary to acquire a rich understanding of a target group's perspective and to be able to determine the most important determinants of a behaviour across a larger representative sample. For the development of cost-effective interventions, it would be of value to make a distinction between the most frequent and important barriers and drivers of different underserved groups, as some may be

more prevalent in certain groups than others. Moreover, keeping in mind that a multitude of barriers may influence people's decision to vaccinate. For instance, even if vaccination is made more accessible, people might still not choose to get vaccinated, due to persisting concerns about vaccine safety or trust issues with the government. This highlights the need for, a multi-level approach targeting multiple barriers within an intervention. Moreover, a more refined distinction between the barriers that can "easily" be changed with interventions (e.g., distance to services) and those that require more "complex" actions (e.g., distrust towards the government and mis- and dis-information) is needed. The results of the situation analysis suggest that the barriers disinformation and lack of trust towards the government, institutions and vaccines demand attention on how to tackle them.

For healthcare professionals, researchers and policy makers the importance of the use of behavioural insights became evident during the COVID-19 pandemic (De Bruin et al., 2022; van Bavel et al., 2020; Habersaat et al., 2020). Challenges persist in the integration and utilization of behavioural insights and in the translation of these insights into practical actions. These need to be addressed on a multi – and interdisciplinary level. The RIVM Corona Behavioural Unit has highlighted the need for more insight into specific groups of people (e.g., migrants) and to focus on differences between groups of people, as interventions do not have the same effect on every group and within every group. They call for a solid knowledge base and cooperation with organisations with expertise in specific population groups (RIVM, 2022c).

Strengths and Limitations

A key strength of this study is the use of three complementary research methods which enhanced the situation analysis by pooling knowledge from multiple sources: experts' knowledge and experience, unpublished research, peer-reviewed and grey literature. The interviews brought interventions to the attention which have not (yet) been documented. An added value of the interviews and expert meeting was the wide range of perspectives offered by experts from various disciplines as well as sectors such as academia, the government and municipalities. Nevertheless, it is important to reflect on the limitations of this study. Despite the diverse sample of experts, due to time constraints, not all researchers who worked on relevant topics participated in the making of this report. Also, it should be noted that population subgroups, community organisations or leaders and general practitioners were not included in the first phase of the project, the situation analysis. The barriers and drivers may differ, or additional factors may exist that have not been identified in the literature or mentioned by experts. We also acknowledge that we did not include a quality appraisal of the included studies. The COVID-19 literature base is evolving rapidly, and it is likely that a number of relevant (unpublished) reports and peer-reviewed articles have been overlooked. Similarly, regarding the identified interventions, we did not conduct a search for interventions and research projects that targeted specific population groups or barriers. Ideally, this literature review could be updated on an ongoing basis to incorporate newer evidence as it becomes available. Every specific measure may need its own model (e.g. face masks, etc.). Moreover, the time aspect of the pandemic has not been included. It is possible that barriers and drivers of people towards vaccination possibly changed over the course of the pandemic. Take in mind that the list of barriers and drivers is not exhaustive. Certain barriers and drivers that were identified in some population subgroups may also be present in other groups but were not mentioned in the included literature or interviews. Lastly, the identified barriers and drivers should be interpreted with caution when applied to other geographical and cultural contexts. It would be interesting to expand

this study by looking into the research conducted and interventions designed for underserved groups during COVID-19 in other European nations.

5. Conclusion

The pandemic shined a spotlight on the existing disparities in health and the unmet needs of underserved groups. This calls for the use of behavioural insights to tailor health policies, services, communications, and interventions according to the needs and circumstances of underserved groups. This situation analysis reveals that knowledge of the most prevalent barriers and drivers between different underserved groups in the Netherlands and how to address them is still lacking. While the highlighted interventions offer promising instances of employing behavioural insights to tackle health disparities, there was insufficient monitoring and evaluation of these interventions to ascertain their (cost) effectiveness. This report can inform scoping and problem formulation for the next step of the THP approach: to conduct primary research into the barriers and drivers towards public health and social measures among a prioritised population group.

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Appendix 1: Database search

Search terms:

Database searched	Platform	Years of coverage	Records	Records after duplicates removed
Embase	Embase.com	1971 - Present	74	71
Medline ALL	Ovid	1946 - Present	46	14
Web of Science Core Collection*	Web of Knowledge	1975 - Present	36	5
Total			156	90

*Science Citation Index Expanded (1975-present); Social Sciences Citation Index (1975-present); Arts & Humanities Citation Index (1975-present); Conference Proceedings Citation Index- Science (1990-present); Conference Proceedings Citation Index- Social Science & Humanities (1990-present); Emerging Sources Citation Index (2005-present)

Netherlands
embase.com 74
('SARS-CoV-2 vaccine'/exp OR 'COVID-19 testing'/exp OR (('coronavirus disease 2019'/de OR pandemic/de) AND ('social distancing'/de OR 'face mask'/de)) OR (((SARS-CoV-2 OR SARSCoV2 OR covid* OR corona* OR pandemic*) NEAR/3 (vaccin*))):ab,ti OR (((SARS-CoV-2 OR SARSCoV2 OR covid* OR corona*) AND (vaccin* OR booster* OR test*))):ti) AND (motivation/exp OR willingness/de OR anxiety/exp OR attitude/exp OR fear/de OR 'refusal to participate'/de OR 'public opinion'/de OR 'treatment refusal'/de OR prejudice/de OR (motivat* OR willing* OR anxiety OR attitude* OR belief* OR fear* OR distrust* OR mistrust* OR refus* OR reject* OR public-opinion* OR ((vaccin* OR booster* OR test* OR social-distanc* OR social-isolat* OR physical-distanc* OR face-mask* OR facemask* OR government-measures* OR prevent*-measures* OR protect*-measures* OR restrict*-measures* OR lockdown* OR lock-down* OR government*-health-measures* OR containment-measures*) NEAR/3 (awareness OR behavior OR behaviour OR hesitanc* OR trust OR criticis* OR doubt* OR dropout* OR exemption* OR perception OR rumor* OR rumour* OR intent* OR controvers* OR misconception* OR misinformation OR opposition OR delay OR dilemma* OR objector* OR resist* OR sceptic OR uptake OR barrier* OR choice* OR concern* OR accepta* OR complian* OR adher* OR noncomplian* OR nonadher*)) OR anti-vaccin* or antivaccin* OR under-vaccin* or undervaccin*):Ab,ti OR (determin* OR correlate* OR demograph* OR sociodemograph* OR heterogen* OR disparit* OR inequit* OR driver*):ti) AND (Netherlands/exp OR Benelux/de OR (Netherlands OR dutch OR Benelux):ab,ti)

Medline ALL Ovid 46
(exp COVID-19 Vaccines / OR exp COVID-19 Testing / OR ((COVID-19/ OR Pandemics/) AND (Physical Distancing/)) OR (((SARS-CoV-2 OR SARSCoV2 OR covid* OR corona* OR pandemic*) ADJ3 (vaccin*)).ab,ti. OR (((SARS-CoV-2 OR SARSCoV2 OR covid* OR corona*) AND (vaccin* OR booster* OR test*))).ti.) AND (Motivation / OR exp Anxiety / OR exp Attitude / OR exp Fear / OR exp Refusal to

Participate / OR Public Opinion / OR exp Treatment Refusal / OR Prejudice / OR (motivat* OR willing* OR anxiety OR attitude* OR belief* OR fear* OR distrust* OR mistrust* OR refus* OR reject* OR public-opinion* OR ((vaccin* OR booster* OR test* OR social-distanc* OR social-isolat* OR physical-distanc* OR face-mask* OR facemask* OR government-measures* OR prevent*-measures* OR protect*-measures* OR restrict*-measures* OR lockdown* OR lock-down* OR government*-health-measures* OR containment-measures*) ADJ3 (awareness OR behavior OR behaviour OR hesitanc* OR trust OR criticis* OR doubt* OR dropout* OR exemption* OR perception OR rumor* OR rumour* OR intent* OR controvers* OR misconception* OR misinformation OR opposition OR delay OR dilemma* OR objector* OR resist* OR sceptic OR uptake OR barrier* OR choice* OR concern* OR accepta* OR complian* OR adher* OR noncomplian* OR nonadher*)) OR anti-vaccin* or antivaccin* OR under-vaccin* or undervaccin*).ab,ti. OR (determin* OR correlate* OR demograph* OR sociodemograph* OR heterogen* OR disparit* OR inequit* OR driver*).ti.) AND (Netherlands / OR (Netherlands OR dutch OR Benelux).ab,ti.)

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(TS=(((SARS-CoV-2 OR SARSCoV2 OR covid* OR corona* OR pandemic*) NEAR/2 (vaccin*))) OR TI=(((SARS-CoV-2 OR SARSCoV2 OR covid* OR corona*) AND (vaccin* OR booster* OR test*)))) AND (TS=(motivat* OR willing* OR anxiety OR attitude* OR belief* OR fear* OR distrust* OR mistrust* OR refus* OR reject* OR public-opinion* OR ((vaccin* OR booster* OR test* OR social-distanc* OR social-isolat* OR physical-distanc* OR face-mask* OR facemask* OR government-measures* OR prevent*-measures* OR protect*-measures* OR restrict*-measures* OR lockdown* OR lock-down* OR government*-health-measures* OR containment-measures*) NEAR/2 (awareness OR behavior OR behaviour OR hesitanc* OR trust OR criticis* OR doubt* OR dropout* OR exemption* OR perception OR rumor* OR rumour* OR intent* OR controvers* OR misconception* OR misinformation OR opposition OR delay OR dilemma* OR objector* OR resist* OR sceptic OR uptake OR barrier* OR choice* OR concern* OR accepta* OR complian* OR adher* OR noncomplian* OR nonadher*)) OR anti-vaccin* or antivaccin* OR under-vaccin* or undervaccin*) OR TI=(determin* OR correlate* OR demograph* OR sociodemograph* OR heterogen* OR disparit* OR inequit* OR driver*)) AND TS=((Netherlands OR dutch OR Benelux))

Appendix 2: Interview questions

<u>Introduction</u>
1. Could you tell us briefly about your expertise and what your role is/was during COVID-19?

<u>Population groups</u>
2. Which population groups currently have low acceptance of COVID-19 measures?
   a. Are the challenges related to vaccination, testing, measures, etc.?
   b. What characterises these groups?

Follow up questions:
- Socioeconomic factors (social group, income, education, work, family size)?
- Geography (district, district size, rural/urban, population density, climate)?
- Community-cultural factors (culture, religion, politics, community, lifestyle)?
- Vaccination position (acceptable, hesitant, refusal; intention/willingness)?
- Other, namely….

<u>Barriers and Drivers</u>
3. What do you think are the possible barriers of COVID-19 measures (based on answer 2a, i.e. low vaccination coverage) for that specific group (based on answer 2)?

4. What do you think are the possible drivers/motives of COVID-19 measures?

<u>Research (gaps)/Projects</u>
5. What qualitative and quantitative research has been done?

6. What do you think are the best practices (interventions/projects that have been done or are currently ongoing with positive experiences)?

7. What are the knowledge gaps?

<u>Concluding questions</u>
8. Do you know possible key figures?

9. What are the lessons learned from COVID-19?

10. Which other experts do you recommend interviewing?

<u>Closing</u>
11. Are there any additional matters that have not been discussed in this interview but are important for this research?

12. Do you have any questions or comments regarding the research and/or the interview?

Appendix 3. Overview of all barriers and drivers influencing adherence to COVID-19 public health and social measures as identified by the experts

Table 6: Prevalence of all barriers influencing adherence to COVID-19 public health and social measures as identified by the experts.

BEHAVIOUR: Vaccination, testing and other measures		Prevalence according to experts (n= 23)
COM-B	Barriers	
Capability (individual)	Finding reliable information	11
	Dutch language skills	10
	Low health literacy	6
	Complex medical terms	4
	Lack of digital skills, access to internet or difficult to make appointments	4
	Difficulties reading and writing	1
Opportunity (contextual)		
Physical	Distance to services (travel costs)	14
	Cramped housing	7
	Confusing and inconsistent messages, constant change in guidelines and measurements from the government	6
	information from countries of origin which included different guidelines and measures compared to the Netherlands leading to confusion	5
	No BSN/DigID	3
	Occupation	2
	Disinformation via social media (youth)	8
	Social influence, taboo & stigmatization	7
	Conspiracy theories	1
	Religious beliefs	1
Motivation (individual)	Distrust in government (affiliated agencies), science and healthcare providers	14
	Fear of side effects of the vaccine	5
	Other priorities, no sense of urgency, what is the added benefit for me	4
	Fear of needles and injections	4
	Fear of infertility, side effects pregnancy	3
	Low risk perception	3
	Lots of unanswered questions	2

Table 7: Prevalence of all drivers influencing adherence to COVID-19 public health and social measures as identified by the experts.

Behaviour: Vaccination, testing and other measures		Prevalence according to experts (n=23)
COM-B	**Drivers**	
Capability (individual)	Understanding the information and being capable to turn this into action	1
Opportunity (contextual)		
Physical	Vaccination locations close by	4
	Open walk in facilities	2
Social	Social networks and trusted key figures of the community	2
	Religious beliefs	2
Motivation	Altruism (protecting others)	11
	Fear of getting ill	9
	Back to normal	6
	Questions answered	4
	Travel	3
	Trust in science/vaccines	3
	Rising number of positive COVID cases	2
	Fear of lockdown	2
	Experience severe illness	2

Colophon

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www.pdpc.nl
E-mail: pdpc@erasmusmc.nl