Comparing Norwegians with Migrants

The Impact of Migration Factors on Utilisation of Health Services

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II

Foreword

The data applied in the analysis in this publication are based on "Level of Living – health, 2012 and 2015". The data are provided by Statistics Norway, and prepared and made available by NSD – Norwegian Centre for Research Data. Neither Statistics Norway nor NSD are responsible for the analysis/interpretation of the data presented here.

Abstract

BACKGROUND: One of the main goals of the Norwegian health care system is to achieve equal access based on need, but there are various factors that hinder this goal, such as the effect of being a migrant to Norway. It may be that migrants, especially those from lower income countries (LIC), access services less than the native population.

OBJECTIVES: To quantitatively analyse the effect of migrant background and related characteristics on utilisation of primary, specialist, mental, hospital, alternative and dental health care services in Norway, controlling for self-rated health, access to care and socio-economic factors. This includes analysis of contact with the services and additionally a more in-depth analysis of primary care services, focused on number of contacts. Results from 2012 and 2015 are compared to see if there are differences.

METHODS: Answers from the Level of Living questionnaires conducted in 2012 and 2015 were used. Step-wise binary multiple logistic regression models were built for each health care service with a binary dependent variable of contact/no contact. Each model had three steps: migrant variables, migrant plus control variables, and all influencing variables. Following this, two part models were used with number of contacts with primary care services as the dependent variable; one with log link and Poisson family, and one with log link and gamma family. Finally, a negative binomial model (NBM) was used on the same variables as the two part model. The groups compared were native Norwegians, LIC migrants, and higher income country (HIC) migrants.

RESULTS: LIC migrants had significantly lower odds of having had a contact with mental, alternative and dental health services compared to native Norwegians, though the significance for mental health services was only significant in 2015. Use of mental and specialist services was significantly more likely for those who had experienced discrimination. There were differences in results according to model used in terms of primary care contact; LIC migrants had significantly more contacts with a 2 part model (log link, Poisson family), whilst migrant group was not significant in the NBM model.

CONCLUSIONS: The picture of migrant contact with health services is complex and may be mediated by discrimination. Model choice is important when looking at health care data to ensure robust conclusions.

Sammendrag

BAKGRUNN: Et av de hovedmålene innen det norske helsevesenet er liktilgang og bruk av helsetjenester for samme behov. Det er mange faktorer som kan påvirke målet, blant annet det å være en innvandrer i Norge. Det kan hende at innvandrere, særlig de fra lavinntektsland (LIC), har mindre tilgang til helsetjenester enn nordmenn.

MÅL: Målet er å bruke kvantitativ metoder til å analysere effekten av innvandrerbakgrunn og andre kjennetegn på bruk av primærhelsetjenester, spesialisthelsetjenester inkludert sykehus, psykiske helsetjenester, alternative tjenester og tannlegetjenester i Norge. Andre faktorer, som for eksempel egenvurdert helse, indikatorer på tilgang til tjenester og sosioøkonomiske faktorer, vil bli kontrollert for. Analysene inkluderer kontakt med de forskjellige tjenestene i tillegg til en mer detaljert analyse av antall kontakter med primærhelsetjenesten. Resultatene fra 2012 og 2015 er sammenlignet.

METODER: Svarene fra Statistisk Sentralbyrås Levekårsundersøkelsene gjennomførte i 2012 og 2015 ble brukt. Trinnvis multippel logistisk regresjonsmodell ble bygd for hver tjeneste med en binær avhengig variabel som beskriver kontakt/ingen kontakt. Hver modell har tre trinn: innvandrer variabler, innvandrere pluss kontrollvariabler og alle influerende variabler. Antall kontakter med primærtjenester ble så analysert med todelte modeller; en med log linkfunksjon og Poisson fordeling og en med log linkfunksjon og gamma fordeling. En negativ binomialmodell (NBM) ble også brukt med bruk av de samme variablene som i de todelte modeller. Gruppene som ble sammenlignet var nordmenn, LIC innvandrere, og høyinntektsland (HIC) innvandrere.

RESULTATER: LIC innvandrere hadde betydelig mindre sannsynlighet for kontakt med psykiske tjenester, alternative tjenester og tannlegetjenester sammenlignet med nordmenn, men betydningen for psykiske tjenester var bare statistisk signifikant i 2015. Bruk av psykiske helsetjenester og spesialisthelsetjenester ble mer sannsynlig for respondentene som hadde opplevd diskriminering. Når det gjelder antall kontakter med primærhelsetjenesten, ble resultatene avhengig av modellen som var brukt. LIC innvandrere hadde betydelig flere kontakter med den todelte modellen som brukte log linkfunksjon og Poisson fordeling, mens innvandrergruppe hadde ingen betydning for antall kontakter i NBM modellen.

KONKLUSJON: Innvandreres kontakt med helsetjenesten er kompleks og kan være påvirket av opplevd diskriminering. Modellvalg er viktig for konklusjonene.

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Rachel Hasting

Oslo, May 2018

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Table of Contents

List of Tables

Abbreviations

AIC	Akaike Information Criterion
BIC	Bayesian Information Criterion
CAM	Complementary and Alternative Medicine
CMD	Common Mental Disorders
EU	European Union
EEA	European Economic Area
GLM	Generalised Linear Model
GP	General Practitioner
HIC	Higher Income Country (migrant)
IOM	International Organisation for Migration
LIC	Lower Income Country (migrant)
NBM	Negative Binomial Model
NSD	Norwegian Centre for Research Data
SES	Socio-economic Status
USA	United States of America

1   Introduction

The Norwegian health care system is a universal system based on the ideology of equality; that all requiring medical assistance will receive it regardless of social status or background. However, studies have shown that access in universal health care models is not equal amongst a country's population. There are various factors that may result in unequal health care access; one example is income, where those with higher incomes have faster and increased access to both primary and specialist care (Fosse, 2017). Another example is physician capacity, with those reporting a surplus of patients also having longer patient waiting times (Grytten & Sorensen, 2009). There appear to be gender differences too, with men tending to access health services less than women (Thompson et al., 2016). Finally, an emerging field of interest is the difference between health care access and usage between migrants and native populations in a country; research suggests that migrants have differential access to the native population with regards to usage of health care services. This is the case for several age groups including adolescents (e.g. Abebe, Lien, & Elstad, 2017) and older migrants (Lanari & Bussini, 2011). Furthermore, the country of origin also seems to be an important predictor of migrant usage of health services; migrants from more developed countries tend to use services similarly to native populations in Europe, whereas migrants outside of Europe seem to display more deviance in usage. This could be due to the fact that migrants within Europe and the other more developed countries (e.g. Australia) are primarily work migrants and may exhibit the "healthy migrant effect" (where selection of the strongest means those who migrate tend to be healthier), whereas migrants from outside of Europe are more likely to migrate due to crisis in their home country or may have poorer health standards (Elstad, 2016).

The aim of this study is to use the "Level of Living" questionnaires conducted nationally by Statistics Norway to quantitatively analyse the effect of migrant background and related characteristics on utilisation of different health care services in Norway, controlling for self-rated health, access to care and socio-economic factors. This includes analysis of contact with the services compared to no contact, and additionally a more in-depth analysis of the number of contacts to primary care services in the more recent questionnaire; this is because primary care has more questions related to respondent usage compared to other services.

The main research questions are as follows:

1.   Are there differences between the native Norwegian and migrant populations in terms of health services utilized in 2012 and in 2015, after controlling for socio-economic and health differences?

2.   Are there differences between the native Norwegian and migrant populations in terms of the number of contacts with primary care services in 2015, after controlling for socio-economic and health differences?

3.   Are there significant differences between 2012 and 2015 within the populations?

The third research question reflects the fact that the problems experienced by migrants in terms of accessing public services in general has become more and more publicised in the past few years, and it may be that this discussion has resulted in changes benefitting (or detrimental to) migrant populations.

1.1 Migration

A migrant can be defined as

> *"any person who is moving or has moved across an international border or within a State away from his/her habitual place of residence, regardless of (1) the person's legal status; (2) whether the movement is voluntary or involuntary; (3) what the causes for the movement are; or (4) what the length of the stay is."*
>
> *(International Organisation for Migration, 2018b)*

This study will focus on migration across international borders, namely into Norway; this is because although migration is, at present, most common within a country rather than between countries (e.g. due to crisis within the country, or due to lack of work in the home region; see Schenker, Castañeda, & Rodriguez-Lainz, 2014), in Norway, those who move within the country are still familiar with the language and culture associated with health services and thus will likely not experience the same barriers that international migrants might. Furthermore, the data used in this study does not contain information on internal migration; this makes it impossible to identify Norwegians who have moved to a different area of Norway.

Migration is not just the act of moving from one location to another; it is comprised of a series of events both before and after the actual physical movement (Bhugra & Becker, 2005). In the pre-migration phase, individuals begin to plan their move. The actual migration phase, or transit phase, involves the actual physical movement from one location to another. The post-migration phase can last many years, and is the process of adjusting to the culture and traditions of the new country (or region, though this readjustment is generally a smaller problem among those moving within a country). The migration phases may have varying lengths depending on the migrant e.g. those fleeing from crisis in their home country may have a pre-migration phase of hours or days, compared to economic migrants who have thoroughly planned their journey. It is also worth noting that the migrant may also choose to return to their country of origin if they have crossed an international border (thus creating a fourth, return phase; International Organisation for Migration, 2006). Each of these phases has different factors which can (positively or negatively) affect the health of the migrant at each point and further on in their lives, for example influencing the way the migrant relates to and integrates with the host country and its population (Bhugra & Becker, 2005). The International Organisation for Migration (IOM) has acknowledged migration as a social determinant of migrant health, illustrating its importance in the migrant health debate (International Organisation for Migration, 2018a). Some migrants may also migrate several times over the course of their lives, or may belong to different migration categories; their experiences will affect their health in a unique way (Schenker et al., 2014). Due to this distinctive influencing factor of migration on health, and the fact that the native population does not experience the effect of this process, it has been argued that migrants are a unique, separate population with differing needs and that policymakers should therefore acknowledge this when designing health policies for their population (Schenker et al., 2014).

There are 746,661 migrants residing in Norway as of January 2018, along with 169,964 second-generation migrants (those born in the country with migrant parents; Statistics Norway, 2018). Norway has a diverse population of migrants, with just under 54% of first-generation migrants from countries outside of the European Union/European Economic Area (EU/EEA), United States of America (USA), Canada, Australia and New Zealand. These migrants tend to come from lower income countries and mainly migrate to Norway as refugees or through family reunification (Elstad, 2016), compared to work migrants who tend to come to Norway through the free movement principle of the EU/EEA agreement, such as Polish migrants who comprise the largest migrant group in Norway (Statistics Norway,

2017a). In the past few years, Norway has seen an increase in the number of family reunifications, with this reason for migration becoming the most cited one in 2016. It has also historically seen great immigration due to refugees, namely through the wars in Bosnia-Herzegovina and Kosovo which led to great numbers of refugees entering the country in 1993 and 1999, and more recently the crisis in Syria (Statistics Norway, 2017a). The unemployment rate is much higher among migrants, over twice as high as in the general population, and migrants have a lower average wage than native Norwegians; however, this varies greatly with country of origin, with those from African countries on the lowest average wage and those from West Europe, North America and Oceania earning above the average wage for the general population (Statistics Norway, 2017b).

1.2 Migrants and the Norwegian Health Care System

The Norwegian health care system is founded mainly on equality of access; the services are financed publically, with patients contributing towards the costs of the services they use through co-payments. The co-payment amount varies depending on the health service accessed, any tests conducted, and, for primary care physicians, the time of day the appointment is scheduled. However, if a certain payment ceiling is reached, treatment for the rest of the year is free (Health Norway, 2017c). Children under 16 also receive most treatments for free. Emergency treatments are always free of charge, with the exception of emergency primary care services (e.g. out-of-hours doctors), which require a co-payment from adults. Adults must also pay the full cost of dental services, except in specific circumstances; children up to 18 years old receive free treatment with the exception of dental braces, and adolescents between 19-20 pay 25% of the full cost (Health Norway, 2016).

Residents are assigned to a general practitioner (GP), whom they can choose themselves, and they are free to change GP up to two times in one year (Health Norway, 2017a). GPs in the Norwegian health care system act as gatekeepers; patients must come to them first in order to receive medication or be referred to specialist services, planned hospital visits, or mental health services (Health Norway, 2015a). If the need for medical treatment arises outside normal working hours, patients can contact the walk-in centres and be seen by a GP there. Once the patient has obtained a referral from the GP, they can choose where they would like to receive treatment (Health Norway, 2017b). There are also private clinics that do not require referrals, but these are not as popular due to higher co-payments than in the public system

(Straiton & Myhre, 2017). When receiving elective specialist treatment, patients go through a prioritisation process and are given maximum waiting times based on disease/condition-specific guidelines for priority setting; if their wait exceeds the maximum waiting time allocated, patients are entitled to submit a complaint and receive treatment at a secondary hospital with the cost covered by the primary hospital (Johansson, Nygaard, Herlofsen, & Lindemark, 2017).

In Norway, those who have legal residence status are guaranteed access to the welfare state, including the health system. Those considered legal residents include citizens, individuals legally resident for at least 6 months, and registered asylum seekers. In terms of non-native residents, Norway does not distinguish between those who have come from another country in the EU as migrant workers and those who originate outside of the EU (Greve, 2016). Those who are in the country without legal status (i.e. undocumented migrants or rejected asylum seekers) are also able to access health care services (with the exception of preventive services), but they must pay the full costs of their care (Greve, 2016). Patients who are not fluent in Norwegian are entitled to professional interpretation at no cost to themselves (Health Norway, 2015b).

1.3 The Level of Living Questionnaire

The Level of Living questionnaire (*Levekårsundersøkelse* in Norwegian) is a telephone questionnaire undertaken every year across the EU (and also Norway). There are both general questionnaires and questionnaires focused on specific themes, and in 2012 and 2015 the focus was specifically on health. This version of the questionnaire has much more comprehensive questions related to usage of health services, assessment of the respondent's own health, factors that may influence health, and questions related to access of care and the respondent's reasoning for why they did not access health care when they needed it. The survey population includes native Norwegians, first-generation and second-generation migrants, and respondents are linked through their personal number to registry data for variables such as income and education level. The questionnaire is conducted both in Norwegian and English (Statistics Norway, 2014; Statistics Norway, 2017c).

As it is possible to stratify responses according to migrant land background (grouped into regions), the questionnaires provide a good source of data for analysis of health service use in

the native and migrant populations. As the focus on enabling equal access to health services for migrants has grown over the past few years, and the issue has become more prominent with factors such as the refugee crisis, it will be interesting to see how the responses to the two questionnaires focused specifically on health in 2012 and 2015 differ.

1.4 Thesis Structure

The introduction briefly outlines the situation of migrants in general concerning health, and focuses in specifically on migrants in Norway and the Norwegian health care system. It also gives a brief description of the questionnaires this analysis is based on. The next two chapters give a deeper insight into the existing research area. This includes differences between a native population and migrants in use of the different health services, and factors that may influence health service access, with a focus on factors that may influence migrants in a different way than natives. Finally, two popular theories in the migrant health debate are outlined; the "healthy migrant effect" and acculturation theory. Chapter Four describes the methods and models used in this study and analysis techniques, with Chapter Five containing the results of these analyses. Chapter Six sums up with a discussion of the results relative to current literature, and a conclusion.

2 Background

2.1 Migrant Use of Health Services

Being guaranteed equal access legally does not mean health services are actually accessed equally; research has shown that migrants differ in terms of their usage of health care services compared to native Norwegians. The following sections discuss access to services by native populations and migrant groups within primary care, specialist care, mental health services, hospital care, alternative care, and dental care.

2.1.1 Primary Care

Migrant utilisation of primary care services is one of the most covered areas of the literature, and studies suggest that migrants generally differ from natives in service use but vary in terms of whether usage is higher or lower (for an overview see Graetz, Rechel, Groot, Norredam, & Pavlova, 2017). Many studies suggest that migrants seem to utilise primary care services (i.e. have contact with the service) less, but that this varies depending on migrant country of origin and reason for migration (Diaz, Mbanya, Gele, & Kumar, 2017; Diaz, Gimeno-Feliu, Calderon-Larranaga, & Prados-Torres, 2014). Age and income also mediates contact with primary care services, though the direction is unclear with studies offering conflicting results (Diaz, Calderon-Larranaga, Prado-Torres, Poblador-Plou, & Gimeno-Feliu, 2015; Diaz et al., 2017). Aung, Rechel, and Odermatt (2010) found that Burmese migrants in London did not access primary care services as much as would be expected due to registration difficulties and also differential views on treatment; underuse of services compared to levels of diagnosis and estimates of illness is a common finding in primary care studies and may be due to unfamiliarity with the health care system or the choice of alternative, more traditional treatments (Aung et al., 2010; Diaz & Kumar, 2014; Diaz et al., 2017). In Norway, studies have found that migrants generally contact their general practitioner less than the native population (Diaz & Kumar, 2014; Diaz et al., 2015). In the study by Diaz and Kumar (2014), differences between migrants and native Norwegians were reduced once socioeconomic factors were included in the analysis; as the primary care system in Norway involves co-payments made by the patient, it could be that this is acting as a barrier to access.

Some studies suggest that the lower use of GP primary care services among migrants is due to the fact they use emergency primary care services more than predicted, thus substituting their use of GP services (Diaz et al., 2015; Ruud, Aga, Natvig, & Hjortdahl, 2015). As discussed above, those who are not registered as legally residing in Norway are only entitled to emergency health care, which includes emergency primary services, and this may be one of the reasons why there may be higher emergency primary health care among migrants (Ruud et al., 2015). Additionally, many migrants who are legal residents may not be registered to a regular GP (Ruud, Hjortdahl, & Natvig, 2017). However, Sandvik, Hunskaar, and Diaz (2012) found that overall, migrants accessed emergency primary care less than native Norwegians, and the study by Diaz et al. (2015) implied that the overall use of primary care services was still lower than that of native Norwegians even with emergency primary care included, suggesting there is still underuse of primary care services. Language may be a barrier to accessing primary care, with respondents in the study by Czapka and Sagbakken (2016) reporting that they stopped going to the doctor because it was easier to contact doctors in their native Poland.

Yet once migrants have taken contact with primary care services, it appears that they are more likely to have a higher number of consultations compared to Norwegians (Diaz et al., 2014; Diaz et al., 2015). When looking at migrant groups specifically, studies suggest that refugees use primary care services most out of the migrant groups, with work migrants showing much lower rates of use (Diaz & Kumar, 2014; Diaz et al., 2014). The higher number of consultations among migrants may also be related to the fact that those with chronic illnesses require a higher number of consultations, and that migrants may have a higher overall prevalence of chronic illness compared to native populations (Greve, 2016).

2.1.2 Specialist Services

Studies focusing mainly on specialist services are sparse, but those that compare migrants to native populations agree that migrants generally have a lower use of screening and outpatient specialist services (Graetz et al., 2017; Gimeno-Feliu et al., 2016). This may be related to the fact that a referral from the GP is needed to access specialist services in the public health system, which is not always something migrants are used to in their home countries.

2.1.3 **Mental Health Services**

Studies on migrant utilisation of mental health services are mixed. Mental health care utilisation is in part mediated by country of origin (Durbin, Moineddin, Lin, Steele, & Glazier, 2015); for example, in a study by Abebe et al. (2017), migrants from Iran and Iraq in particular had higher usage of specialist mental healthcare whereas the other migrant groups studied (e.g. Somalians) tended to have lower usage compared to native Norwegians. This finding may be related to reasons for migration; migrants who are refugees or are undergoing family reunification have more stressors and thus a higher risk of mental issues compared to work migrants, for example. Studies have shown that refugees access mental health services more than other groups of migrants (Abebe et al., 2017; Durbin et al., 2015). Usage of services may differ according to reason for migration; a study into migrants in Sweden by Klinthall (2008) suggests that migrants from countries with a high proportion of labour migrants tended to have a higher risk of psychiatric hospital admissions, while a similar study by Iversen and Morken (2003) suggested that asylum seekers had higher admission rates than other migrants and native Norwegians. Furthermore, Nielsen, Jensen, Kreiner, Norredam, and Krasnik (2015) found that this effect may be further mediated by gender; for example, refugees differed according to gender, with women more likely to use free psychiatrists and men more likely to use private psychologists that required part or full payment. A more general gender difference was also found in admissions to acute psychiatric care, with migrant women particularly underrepresented once prevalence and population characteristics were taken into account (Berg, 2009).

It has also been suggested that migrants do not have adequate access to mental health services, as they are predicted to have higher utilisation rates based on their likelihood of developing a mental illness, especially among groups such as refugees (Alemi, James, Cruz, Zepeda, & Racadio, 2014; Nielsen et al., 2015); thus they may not contact health services, preferring to deal with it alone or use informal networks due to lack of knowledge about the system or a lack of trust (Abebe et al., 2017; Czapka & Sagbakken, 2016). Others posit that the "healthy migrant effect" would mean that migrants actually do not need as much contact with mental health services and that this explains lower rates of utilisation, although in the Nordic countries the migrant population had a greater prevalence of mental health disorders compared to the native population (Greve, 2016).

2.1.4 **Hospital Care**

Utilisation of hospital services among migrants, defined here as having at least one overnight stay that is not connected to giving birth, has been shown to be generally lower than in the native population. This may be mediated by gender, socio-economic factors, reason for migration, and length of stay (Elstad, 2016; Albin, Hjelm, Ekberg, & Elmstahl, 2012; Klinthall, 2008), although there are other studies that suggest a higher usage (Graetz et al., 2017). In the study by Elstad (2016), recent migrants showed overall much lower rates of use than the native Norwegian population but this difference was reduced with an increasing length of stay in the host country. Refugees had around twice as high hospitalisation rates as work migrants, suggesting that they have poorer health. This also helps to explain the differing utilisation rates among migrants from different countries of origin, as migrants from regions of origin that were shown to have significantly higher rates of use were also regions with high levels of refugees and lower levels of work migrants. However, the socio-economic situation in migrants' country of origin seems not to be an mediating factor in access to hospital care, with the main socio-economic impact coming from the migrant's situation in the host country (Klinthall, 2008). Migrants also seem to have differing rates of utilisation for specific illnesses, for example hard-to-define illnesses may increase hospitalisation rates and length of hospital stay in migrants (Albin et al., 2012; Cacciani et al., 2006). Cacciani et al. (2006) also found that the rate of hospitalisation for injuries was higher for adult migrants; this may be due to their work environments and living conditions.

2.1.5 **Alternative Care**

The literature is fairly unclear regarding migrant differences in access to alternative care, defined in the Level of Living questionnaire as services such as homeopathy, acupuncture, reflexology, aromatherapy, massage therapy, osteopathy or natural healers (Statistics Norway, 2014; Statistics Norway, 2017c). Many studies into migrant usage of what is termed "complementary and alternative medicine (CAM)" do not directly compare usage with the native population (Lee, Goldstein, Brown, & Ballard-Barbash, 2010; Green, Bradby, Chan, & Lee, 2006). In studies that do compare different ethnic groups, migrants seem to use CAM services less than the native population, but that this is mediated by integration factors such as citizenship of the host country (Elewonibi & BeLue, 2016). This impact of integration was also found in a study by Lee et al. (2010), where the usage of CAM services by Mexican and

Asian migrants to the US was influenced by length of stay in the country but that this differed depending on type of service used and also between the migrant groups, and usage was also linked with proficiency in English (for Mexican Americans) and health status. They concluded that these migrants were more likely to use mainstream services such as chiropractor services alongside ethnic-specific providers (e.g. traditional Chinese medicine) as their length of stay increased.

Other studies have found evidence for medical pluralism; that migrants use both Western medicine and traditional medicine from their home culture, and that usage is tailored to the situation, with traditional medicinal services often contacted for minor illnesses and used if physicians do not offer treatments deemed culturally appropriate or sufficient (Sandberg et al., 2017). Age at migration may also be a relevant factor, as one study found that older immigrants from the former Soviet Union to the US use a variety of CAM treatments which they have "brought" with them; this may suggest that learned cultural behaviours impact use of alternative treatment in older migrants, along with other barriers to healthcare services common among migrants in general (Van Son & Stasyuk, 2014). Treatments can also be used from the home country, sent over by relatives, or migrants may travel back for treatment (Green et al., 2006; Van Son & Stasyuk, 2014), which would reduce the usage of alternative services in the host country (and other services, in the case of travelling back for treatment). However, the majority of these studies are from the US; this means that it is not certain if the same results apply to Norway and its different healthcare structure, namely that one can receive free treatment in Norway through a referral from the GP, whereas in the US all treatments must be paid for if an individual does not have insurance (Sandberg et al., 2017; Elewonibi & BeLue, 2016).

2.1.6 Dental Services

The topic of migrants and dental service utilisation does not have so much coverage in general, and dental care has not gained as much attention in Norway as other health care services. Norwegian-focused studies tend to concentrate mainly on children and adolescents; these studies tend to find that migrant children and adolescents have poorer dental health, especially those with non-Western parents (Wigen & Wang, 2010; Skeie, Riordan, Klock, & Espelid, 2006). Studies that have been done with adult populations suggest that migrants do not utilise dental services as often as the migrant population, even after socioeconomic and

sociodemographic factors had been included, although increases in income also increased the probability of utilising dental services (Erdsiek, Waury, & Brzoska, 2017). Migrants also seem to access dental services less than would be predicted based on their self-reported dental health (Hjern & Grindefjord, 2000). Some studies have found differing effects according to gender, with men having a higher access, but income and financial access is also named as one possible explanatory factor due to the higher likelihood of immigrant men holding better paid positions (Munoz-Pino, Vives-Cases, Agudelo-Suarez, & Ronda-Perez, 2017). Low income has an inhibiting effect on usage of dental services in general, likely due to the cost of dental care (Trohel, Bertaud-Gounot, Soler, Chauvin, & Grimaud, 2016).

3 Theory

3.1 Factors Affecting Health & Access to Health Services

This issue of unequal access for migrants compared to the native population is important as it suggests their usage is not correlated with their need; studies suggest migrants may have differing access for various reasons. There is an abundance of research into the various factors that affect health in general and access to services; the main factors of interest in this study are outlined below.

3.1.1 Self-rated Health

Self-rated health is the most common method used to assess migrant health relative to the health of the general population, and is a good measure of morbidity (Wiking, Johansson, & Sundquist, 2004; Chandola & Jenkinson, 2000). Studies conflict greatly in terms of whether migrants have better or poorer self-rated health compared to native populations in terms of physical illness, mental health illness, and overall self-rated health (Syed et al., 2006). Additionally, it is important to remember that self-rated health is different to objective evaluations of an individual's health; one's perception of their health will be influenced by other factors, such as their psychological mind-set, cultural factors and social environment (Syed et al., 2006; Neuman, 2014). A migrant's perception of what is "good" health may have changed, even if his/her objective health is the same, due to the average level of health in the host country. This could result in migrants rating their health differently in the host country compared to their home country, which suggests a possible over- or under-reporting of health conditions (Chiswick, Lee, & Miller, 2008; Neuman, 2014). Ljunge (2016) found that migrants from a country with high mean health assessments tended to have higher self-rated health in their host country than migrants to the same host country that originated from countries with lower mean health assessments. Self-rated health is one of the health-related variables used in this study in order to control for differences in health between the different groups.

3.1.2 **Age & Gender**

Health is affected by age, with a declining health status as age increases (Chiswick et al., 2008). Age also affects utilisation of mental health services, with younger migrants and native Norwegians alike showing the highest levels of utilisation in the study by Abebe et al. (2017).

Gender is also associated with health; women tend to report poorer health and have higher levels of morbidity than men, and additionally utilize health services more (Chiswick et al., 2008; Durbin et al., 2015). Women are also influenced differently than men when considering factors that affect health (Thapa & Hauff, 2005), and they have different health needs (e.g. reproductive health) compared to men. Therefore, women may experience problems with accessing these services due to not possessing the knowledge or language skills required to navigate the system, or they may face barriers to access, for example due to their legal status (Delara, 2016). In a review by Delara (2016) into determinants of mental health status among migrant women, it is suggested that gender is important as women can feel discriminated against relative to men, or that they may hold cultural attitudes of gender roles in a society, and that this has an impact on their mental health. Additionally, women may be more prone to mental ill health due to the demeaning nature and low status of their jobs. Over the past decade or so, the representation of women in the global migrant population has increased steeply, and women now account for around half of the total migrant population (Schenker et al., 2014), meaning that this gender difference is something that needs to be taken into account when evaluating the migrant population as a whole. In addition, one study suggested that being a migrant enhances this difference between genders, making this an even more relevant topic (Safipour, Higginbottom, Tessma, & Emami, 2012).

Age and gender are included in this study as control variables.

3.1.3 **Socio-Economic Factors**

Education

The positive correlation between education and self-rated health is established in the literature (Baker, Parker, Williams, Clark, & Nurss, 1997; Chiswick et al., 2008; La Parra-Casado, Stornes, & Solheim, 2017), but not many studies have focused on the link between education and use of health services. Evidence suggests that poor literacy is linked to higher hospitalisation and higher use of emergency walk-in services rather than use of the regular GP

(Baker et al., 1997; Ruud et al., 2017). A lack of general literacy skills can mean that migrants are not able to understand written information about their health; this may be a particular problem when it comes to understanding the layout of the host country's health system and the services available to them, as information on this is often given through written sources rather than orally even if it is in the native language of the migrant. It may also affect migrants' ability to take prescriptions in the proper way, as they may not understand the correct procedures due to being unable to read labels, and it may affect the completion of consent forms and ways of carrying out procedures in hospitals. Illiteracy could also affect the amount migrants utilise services, as they require more frequent contact with their physicians in order to understand their health conditions or treatment pathway. Bekker and Lhajoui (2004) report that literate migrants have an overall better view of their health condition compared to illiterate migrants in the Netherlands, when controlling for age, socio-economic status, education, and ability to speak the host country language, and that both first- and second-generation literate migrants had a similar level of self-assessed health. In this study, the reported education level will be used as a control variable.

Income

Socio-economic status (SES) affects the health of both natives and migrants; a lower SES is associated with poorer physical and mental health (Klinthall, 2008; Delara, 2016; Kim, Carrasco, Muntaner, McKenzie, & Noh, 2013), and unemployment has a negative impact on health (Syed et al., 2006). Those with a lower income are more likely to live in conditions that are adverse to health, and exhibit unhealthy behaviours, than those with a higher income (Delara, 2016; International Organisation for Migration, 2006). In Norway, the healthcare system has a co-payment element; that is, patients must pay towards the cost of their treatments or appointments (with the exception of non-elective hospital visits). Thus, it may be that those with a lower SES cannot afford these co-payments and thus this has an impact on their health, along with being a barrier to accessing services and the reason for lower utilization than they would otherwise have. Migrant groups tend to have lower mean income levels than native populations and thus may be more affected by income inequalities (Syed et al., 2006; International Organisation for Migration, 2006; Greve, 2010), and thus are more likely to have issues with co-payments and be deterred from seeking medical care. This tendency towards lower income may be influenced by the host country; those less welcoming in their policies towards migrant integration display a higher number of migrants living in

poor conditions and experiencing financial issues (Malmusi, 2015). However, Ljunge (2016) measured the socioeconomic gradient of health (how socioeconomic factors predict health) in 30 European countries and did not find a significant difference between natives and migrants; furthermore, it seems that some migrant populations actually have lower mortality rates than the native populations despite their lower socioeconomic status (Schenker et al., 2014). Here, income is used as a control variable.

3.1.4 Discrimination

Perceived discrimination is linked with poorer self-reported health in migrants (Borrell, Palencia, Bartoll, Ikram, & Malmusi, 2015; Delara, 2016; Kim et al., 2013). Perceived discrimination can stem from the social environment, cultural differences between the host country and country of origin, and also from the host country's immigration and integration policies (e.g. long-term residence policies, policies on family reunion). In the study by Borrell et al. (2015) on migrants from lower-income countries, this association was only significant amongst first-generation migrants, even though the level of perceived discrimination was not significantly different, and the relationship between discrimination and health outcomes was stronger for women than for men. This study, however, measured perceived group discrimination; it may be that individuals perceive that their immigrant group is discriminated against generally but that they do not feel discriminated against at an individual level; this could modify the effect the perceived discrimination has on their health outcomes. An example from this comes from Huijts and Kraaykamp (2012), who found that those reporting individual perceived discrimination had a 33.8% higher odds of reporting poor health. This effect is seen in both first- and second-generation immigrants, and seems to have a particularly harmful effect on second-generation immigrants. In a study by Viruell-Fuentes (2007), second-generation Mexican American women reported more experiences of "othering" in qualitative interviews compared to first-generation women. They also reported "othering" stories related to their parents, even though the first-generation women did not report as many stories; this indicates that second-generation migrants may be more aware of discrimination.

Actual discrimination may come in the form of employment conditions; migrant workers may be forced to work in sub-optimal conditions for lower wages than their native co-workers (International Organisation for Migration, 2006; Stipkova, 2016). Those working in poor

conditions have a higher risk of injury or illness. Additionally, those on low incomes or in jobs where they are paid by the hour may hesitate to contact health services during the day because they lose out on money (International Organisation for Migration, 2006); this problem is potentially amplified in Norway, as co-payments are higher when appointments are outside of working hours. Discrimination may also be in terms of accessing the labour market; for example, it may be that the self-reporting of high levels of discrimination is linked with problems accessing work e.g. due to poor knowledge of the native language or lower education levels (Wiking et al., 2004). Perceived discrimination is used as a variable of interest in this study.

3.1.5 **Migration Factors**

Cultural Differences

The effect of migration on health may also vary depending on the cultural values and norms of the country of origin (Detollenaere, Baert, & Willems, 2018; Kim et al., 2013; Lanari & Bussini, 2011). There may be differences in terms of health behaviours and things like diet, meaning that some migrant groups are healthier on average than others (Chiswick et al., 2008; Neuman, 2014), or migrants may perceive their health differently to native populations (Syed et al., 2006). Genetic factors can also be an influence, especially when comparing populations. Some populations will have increased risks of some chronic diseases, whilst other populations may have increased risks of other chronic diseases (Schenker et al., 2014).

In terms of health services, if these are not easily accessible in the country of origin it may be that migrants arrive in the host country with pre-existing conditions that are more advanced and thus harder to treat (International Organisation for Migration, 2006). Cultural beliefs and identities can also influence the way a migrant approaches and accesses the health services; they may see symptoms or health care options differently to, for example, the native population, and cultural norms and beliefs may prevent migrants from accessing certain services or make them more likely to access others (Klinthall, 2008; Delara, 2016; International Organisation for Migration, 2006; Durbin et al., 2015). Expectations also play a large role in accessing services; the health system design and norms of access/usage in the country of origin may be very different from that in the host country, meaning that migrants feel misunderstood when they explain their problems or feel that the service is ineffective

compared to that in their home country (Wiking, Saleh-Stattin, Johansson, & Sundquist, 2009). This may cause distrust of the medical system in the host country, with migrants preferring instead to consult professionals in their home country (Czapka & Sagbakken, 2016; Villa-Torres et al., 2017). In this study it is not possible to study cultural differences in detail; instead migrants are split into higher income country (HIC) and lower income country (LIC) groups; it is expected that LIC migrants will have bigger cultural differences to native Norwegians than HIC migrants.

The Migration Process

The migration process described in Section 1.1 can affect migrant health in a positive or negative way; it is generally understood that voluntary migrants are younger and have better health than their native population (Chiswick et al., 2008), but the process of migrating may involve overcoming many barriers and challenges, and the journeys of migrants from their home country to a host country can impact negatively on their health (Alemi et al., 2014; Stillman, McKenzie, & Gibson, 2009). The different stages of the migration process have different risks on health; for example, the pre-migration phase can expose migrants to health risks that will impact them further on in life, whereas the transition process includes stressors that can impact mental health (Klinthall, 2008; Schenker et al., 2014; Lanari & Bussini, 2011; Alemi et al., 2014). Post-migration stressors may include "culture shock", where the migrant experiences that their patterns of behaviour are not the norm in their host country (Alemi et al., 2014). Butler, Warfa, Khatib, and Bhui (2015) conducted a systematic review into the effect of the migration process on mental health in migrants, specifically the presence of common mental disorders (CMD), also known as psychological distress. They found that the literature was conflicting, with some reporting an increase in CMD over time and some reporting a decrease. CMD appeared to be associated with migrant personality (e.g. resilience) and employment status. The migration process can also have an impact on access to health care services in the host countries, for example for those who are not qualified to receive health services under that country's immigrant policies (Delara, 2016). As the questionnaires used in this study do not include any questions on migrants' situations before they arrived in Norway, it is not possible to study the impact of migration process on access to services.

The reason for migration may also affect self-reported health; many of the studies in the review by Butler et al. (2015) did not distinguish between migrant categories (e.g. economic

18

migrant versus refugee) and none investigated the impact of host country on CMD. Refugees tend to be in poorer health than economic immigrants, as their experiences negatively impact their health (Chiswick et al., 2008). The migrant category is related to the overall migration process; those arriving illegally, or fleeing from crisis situations, may have undergone difficult and dangerous journeys with sub-optimal travel conditions, and some may have attempted the journey several times (International Organisation for Migration, 2006). This means that the proportions of each migrant category could influence the bigger picture of migrant health within a country (La Parra-Casado et al., 2017), and thus have an impact on suggested policy. A large inhibiting factor in examining migrant category impacts on health is that the groups within countries tend to be small, and thus do not yield a sample size with adequate power (Butler et al., 2015). Migration process factor variables were unavailable for this study.

Immigration Policies

As mentioned above, immigration policies seem to be fairly important determinants of health; migrants residing in countries with more "exclusionist" policies that are not so friendly to them (e.g. that hinder family reunion or bar access to the labour market) tend to report poorer self-assessed health and more depressive symptoms than those in more inclusive countries (Borrell et al., 2015; Malmusi, 2015). Conversely, countries that encourage integration of migrants, such as Norway, tend to have migrants with better health, with differences tending to be related to migrants' socio-economic situation or reason for migration (Malmusi, 2015; Stipkova, 2016). Furthermore, policies regulating access to the health care system can result in barriers for migrants to obtain the services they need, which contributed to lower utilisation in Burmese migrants studied in London (Aung et al., 2010). The immigration process itself may also negatively affect health, as the questions and documents required can cause stress and anxiety among other things (Delara, 2016). Additionally, legal status is a large determinant of access to health, as many countries require migrants to prove they reside in the country legally in order for them to access non-emergency health services (International Organisation for Migration, 2006).

As many countries carry out health screening before migrants are allowed to enter (Chiswick et al., 2008; Delara, 2016) it is expected that migrants would be on average healthier than the population of the country they originate from (part of the "healthy migrant effect", see

Section 3.2). As there were no variables relating to Norway's migration policies in the questionnaires, and the migrants who took part had been granted legal residence, this was not included in the study.

3.1.6 Language Skills

Language skills are another large and obvious influencer of health and of utilisation of services. Migrants who do not have a good grasp of the native language in their host country are more likely to report poor self-assessed health, feelings of isolation, and difficulties entering the labour market (Chiswick et al., 2008; Kim et al., 2013); they may choose not to seek health services due to barriers in communication or a lack of understanding about their rights in their host country (Green et al., 2006; International Organisation for Migration, 2006) although as seen in Section 2.1, migrants access some services more than the native population. Migrants have reported communication issues with their general practitioners and emphasised the importance of professional interpreters (Wiking et al., 2009). A review by Alemi et al. (2014) indicated that improving English proficiency in English-speaking countries helped to reduce feelings of isolation in Afghan migrants whilst simultaneously improving access to mental health services, thus supporting the idea that language skills are beneficial for health. Some migrants may be worried that consulting mental health services could affect the status of their application for residency or citizenship (Delara, 2016). The questionnaire in this study was performed either in Norwegian and English; therefore, respondents required a basic understanding in one of these languages and differences in language comprehension could not be accounted for.

3.1.7 Other Factors

There are also other important factors that were not included in this study due to the structure of the dataset, but which are good to mention.

First- and second-generation migrants

First-generation migrants are those who undergo the migration process, whilst second-generation migrants are those who are the children of first-generation migrants (i.e. one or both parents migrated to the host country). It has been argued that first- and second-

generation migrants are affected differently in terms of health, though this may be mediated by gender, with men affected more than women (La Parra-Casado et al., 2017).

The health of second-generation migrants may be influenced by the cultural background of their parents; both in terms of genetic factors but also cultural norms and behaviours, though this may be mediated by acculturation (Schenker et al., 2014).

Length of Stay

Length of stay can impact health in connection with increasing familiarity to the host country's health system, and also the reduction of the healthy migrant effect discussed below (Elstad, 2016). Studies have found an increasing prevalence of disease and increased use of healthcare services with an increasing length of stay (Gimeno-Feliu et al., 2016; Gimeno-Feliu et al., 2015) and an increase also in poor reported health among adolescent migrants, argued to be "caught" between lack of acceptance in their host country and unfamiliarity with their home country (Lien, 2006).

Migrant Community in Host Country

The size of the migrant community from the country of origin (or in general) could also explain integration issues. In the study by Huijts and Kraaykamp (2012), there was a negative association between the size of migrant community and self-assessed health. This contradicts the idea that a large social network of individuals from one's native country in the host country is beneficial in terms of support and companionship (Delara, 2016), and suggests rather that it hinders integration and acculturation; this however may differ depending on whether mental or physical health is being studied. This in turn may hinder access to health care (Chiswick et al., 2008) as migrants do not get the information they need about health services available. The effect appears to get stronger over time (Chiswick et al., 2008). Additionally, family ties are a strong influencer of health; refugees who have lost or been separated from their family tend to have much poorer mental health (Alemi et al., 2014). Migrants keep in touch with their families in their home country, often calling them and sending financial support (Rodriguez-Lainz & Castañeda, in Schenker et al., 2014).

3.2 The "Healthy Migrant Effect"

The existence of a 'healthy migrant effect', whereby migrants enjoy better overall health compared to the native population, has been much discussed in the literature. Most studies agree that there is evidence that migrants are initially healthier than the native population, but that this disappears with an increasing length of stay (Kim et al., 2013; La Parra-Casado et al., 2017; Chiswick et al., 2008; Neuman, 2014). This effect has been found in several countries, among them Australia, North America, and Canada (Kim et al., 2013; Stillman et al., 2009; Durbin et al., 2015), but may be mediated by various factors, including country of origin, reason for migration, gender, education, and age (Kim et al., 2013; Detollenaere et al., 2018; Stipkova, 2016) and in some studies it was not found at all (Ljunge, 2016). Other studies found that migrants have poorer self-rated health compared to the native population (Wiking et al., 2004).

There are several explanations in the literature as to why this effect may occur. It could be related to selection; the idea that those who are healthier, more motivated and more able to secure work are more likely to migrate (La Parra-Casado et al., 2017; Neuman, 2014; Stipkova, 2016; Lanari & Bussini, 2011). Some countries have mandatory health screening for potential immigrants, which would again select those who are healthiest (Chiswick et al., 2008; Delara, 2016), although this only blocks a small number of migrants (Neuman, 2014). Spallek et al (in Schenker et al., 2014) suggest that the health risks from the country of origin decrease sharply i.e. poor drinking water, poor healthcare, and that the health risks associated with the host country (e.g. smoking, lack of exercise) begin to increase but are doing so at a much slower rate, resulting in migrants that are healthier than the native population. Finally, it may be that migrants have an expectation of a new and better life, where they find meaning and fulfilment, and that this has a positive effect on their health (Lofvander, Rosenblad, Wiklund, Bennstrom, & Leppert, 2014; Stillman et al., 2009).

The decline of the effect also has various posited explanations. Migrants may begin to adopt the behaviours of the native population in the host country and thus experience a deterioration in health ("negative acculturation", see also Section 3.2 below; Neuman, 2014). The process of adapting to the new host country may naturally impact the health of migrants, which is referred to as "regression to the mean" (Chiswick et al., 2008; Neuman, 2014), or alternately the host country's policies may hinder this integration into society, causing increased stress

and thus worse health (Malmusi, 2015; Czapka & Sagbakken, 2016). Another suggestion is that migrants' lack of knowledge and/or access to health services can affect their health (Chiswick et al., 2008); their health care usage and utilisation differs from natives, particularly in preventive care and screening services (Neuman, 2014). The above factors affecting migrant health (Section 1.4) may also provide some explanations as to why this healthy migrant effect disappears, for example through the stressors experienced through the migration process or the presence of discrimination.

The model has however been criticised for not accounting for the particular life stage a migrant may be in (e.g. childhood influences, accumulated risks over time); furthermore, a migrant who is deemed healthy in their country of origin may not necessarily be healthy compared to the average of the host country, contrary to the selection argument (Schenker et al., 2014). The variance found in studies with relation to the healthy migrant effect has led some to suggest that migrants may adapt at different rates; this may depend on their degree of integration into society. One line of thought is segmented assimilation theory, which suggests that different groups of migrants adapt to the host country at different rates (Schutt & Mejia, 2017); another is acculturation theory.

3.3 Acculturation Theory

Acculturation theory is one of the theories used to explain the disappearance of the healthy migrant effect; it suggests that over time, migrants become used to the norms and cultures in the host country and that they begin to adopt these behaviours and norms in their own lives, sometimes also relinquishing behaviours and norms from their home country (Lee et al., 2010). It is based on cultural and national identities and how migrants see themselves in relation to their culture in their home country, and the culture in their host country (Delara, 2016). This theory differs from assimilation theories in that migrants do not abandon all of their norms and values from their home country or mindlessly accept all the norms and values of their host country; they do not become the same as the native population, which means that they cannot be assumed to have the same health issues or access health services in the same way as the native population (Green et al., 2006). Acculturation can result in changing usage of health services over time among migrants, as their usage begins to mirror that of the native population; this has been demonstrated in migrant use of complementary and alternative medicine (CAM) in the US (Lee et al., 2010).

Acculturation can have positive or negative effects on migrant health, depending on the culture they come from and the culture in the host country (IOM, 2006; La Parra-Casado et al, 2017). It is often measured through length of stay or ability to speak and understand the language of the host country. There are differences in migrant responses depending on which measure is used; for example, acculturation measured through language ability is associated with better self-rated health (Wiking et al., 2004), but when measured using a measure of dietary adaptation, acculturation led to worse self-rated health (Okafor, Carter-Pokras, & Zhan, 2014). In addition, Lanari and Bussini (2011) found that the probability of reporting poor self-rated health increases with length of stay, although this effect was non-linear and heavily influenced by socio-economic factors for some groups of migrants. Length of stay has also been highlighted as a possible factor in worsening self-rated dental health among migrant children, with culture named as a large contributing factor (Skeie et al., 2006). However, language may be a better measure of acculturation than length of stay as it indicates integration into the host culture; it is possible to spend many years in a country without becoming integrated into it (Iversen, Ma, & Meyer, 2013). In addition, language skills can help break down some barriers to accessing health care i.e. by understanding information given in the host language (Detollenaere et al., 2018; Elstad, 2016; Alemi et al., 2014). Thus, adopting the behaviours of the native population can lead to poorer health in some migrants, but this is not necessarily connected to integration into the society; it depends on the measure used to measure acculturation. It is not clear whether the negative behaviours adopted outweigh the positive aspects of acculturation (e.g. integration meaning one can navigate the health system), but the documented disappearance of the healthy migrant effect (see above section) would suggest that this is the case.

The difference between the culture of a migrant's home country and that of their host country can also have an impact on health (Detollenaere et al., 2018); acculturation theory suggests this is because they have a greater discord to bridge. Chiswick et al (2008) demonstrate that the decline in health is greatest for those admitted to Australia under a Humanitarian visa, which is used for refugees and other vulnerable migrants; as these tend to come from cultures very different to the Australian culture, this would support acculturation theory's explanation. The study also found that some birthplace variables were significant, indicating a positive effect on health (e.g. English-speaking developed countries, Northern Europe, South-East Asia, North-East Asia) whilst others were not. This indicates that decline in self-reported health is not uniform across all migrant groups, and that the degree of acculturation required

is a factor in this. Additionally, age at migration seems to have a negative impact on self-assessed health (Chiswick et al., 2008); it may be that those who are older have a harder time becoming acculturated to the host country and this has effects on their health.

However, some have posited that the acculturation theory groups separate constructs together and does not adequately express the nuances present in the notion of "culture", especially the role of discrimination and structural racism (Viruell-Fuentes, 2007). Discrimination is related to acculturation in that it also has a negative effect on self-rated health (Wiking et al., 2004); in the study by Viruell-Fuentes (2007) it was second-generation migrants (thus those assumed to be most acculturated) that reported more stories of perceived discrimination. The complex interaction between the two factors has not been a focus of many studies and thus would benefit from further research. The process of acculturation may also result in conflicts between cultural identities and values within the individual, which can contribute to mental health issues and feelings of isolation (Safipour et al., 2012).

4 Methods

4.1 Data & Population

The Level of Living – health datasets from 2012 and 2015 were utilised in this study. The datasets come from an annual questionnaire carried out nationally by Statistics Norway, and the questionnaires with a specific focus on health are carried out every three years. More information can be found on the website of the Norwegian Centre for Research Data (NSD), who are responsible for making the data available.

The interview sample was selected using methods that ensured a representative sample from each county with regards to gender, age group and region, with a total chosen sample of 10,000 respondents in 2012 and 14,000 respondents in 2015. Members of the population were eligible for inclusion if they were 16 years or older and were in the Statistics Norway population register. The response rates for the questionnaires were 58% in 2012 (with 71% of these completing a self-report questionnaire afterwards) and 59% in 2015. Thus, in the data received from NSD, there were a total of 5,660 respondents in 2012 and 8,164 respondents in 2015.

Respondents were classified into native and migrant groups based on the classification followed in the 2015 Level of Living questionnaire (Statistics Norway, 2017c). The groups were as follows;

    1 – Norwegian

    2 - Migrants from the other Nordic countries

    3 - Migrants from other EU/EEA countries

    4 - Migrants from European countries not in the EU/EEA

    5 - Migrants from Asia, Africa, Latin America, Oceania (except Australia and New Zealand)

    6 - Migrants from the USA, Canada, Australia, and New Zealand.

Respondents who did not have a specified land background were excluded from analysis (2012: 22 observations).

From this, respondents were classified into three 'migrant' groups; native Norwegian (Group 1), Higher Income Country (HIC) migrant (Groups 2, 3 & 6), and Lower Income Country (LIC) migrant (Groups 4 & 5). This classification is not ideal, as it is impossible to separate countries within the groups that may (and do) have very different cultures and reasons for migration. However, it is a good approximation when compared to the classification of countries into income groups by the World Bank and it is the classification used by Statistics Norway (The World Bank Group, 2018; Statistics Norway, 2018).

4.2 Model Specification

The full list of variables used in the models can be found in Appendix 1. Participants missing any answers to the variables used in the last step of each health care model were removed from that model's analysis. Stata/S.E. version 15.1 for Windows was used in data analysis (StataCorp, 2017).

4.2.1 Logistic Regression Models

Six binary multiple logistic regression models were used in the first analysis; one for each type of health service utilised. Each regression model has three steps;

1. Dependent variable plus "migrant" group variable (denoted as x_{ji})

$$\text{logit}(\pi_i) = \log\left(\frac{\pi_i}{1 - \pi_i}\right) = \beta_0 + \beta_j x_{ji}$$

2. Dependent variable, "migrant" variable (x_{ji}) plus a vector of control variables (x_{ki})

$$\text{logit}(\pi_i) = \log\left(\frac{\pi_i}{1 - \pi_i}\right) = \beta_0 + \beta_j x_{ji} + \beta_k x_{ki}$$

3. Dependent variable, "migrant" variable (x_{ji}), a vector of control variables (x_{ki}), plus a vector of independent variables of interest (x_{li})

$$\text{logit}(\pi_i) = \log\left(\frac{\pi_i}{1 - \pi_i}\right) = \beta_0 + \beta_j x_{ji} + \beta_k x_{ki} + \beta_l x_{li}$$

where π_i is the probability of having at least one contact with the healthcare service, i=1,....n is the number of respondents, j=1,....,o is the number of migrant variables,

k=1,….,m is the number of control variables, and l=1,…,p is the number of independent variables of interest.

Estimates from these models are presented as odds ratios with 95% confidence intervals.

Dependent Variables

A binary dependent variable was created for each model, with 0 denoting no contact with the health service in question and 1 denoting at least one contact in the past 12 months. The health services are categorised as follows: primary care, specialist care, mental health services, hospital services (excluding hospital stays related to childbirth), alternative services, and dental care.

Control Variables

Socio-economic variables (i.e. age, sex, civil status, education level, income level) were included as categorical control variables in the second step of the model, along with a categorical variable to control for which region of Norway the respondent lived in. In the 2012 dataset, it was possible to calculate the number of free spaces on the patient list of a respondent's GP; this was included to control for variances in demand for health services.

The total number of people in the respondent's household was also included as a categorical variable, as the presence of others in the household can indicate good social networks and, in the case of spouses living together, may result in better health (Lanari & Bussini, 2011). Finally, overall life satisfaction was available and included in the 2015 models, as it could be that poor life satisfaction impacts on health though it is not specifically a health-related variable. This was categorised in the same manner as self-rated health (see below).

Variables of Interest

Variables of particular interest that are assumed to mediate the relationship between migration and health were included as a last step. Poor self-rated health and the presence of chronic illness negatively affects health in general and thus should increase contact with health services. Self-rated health was measured using one question on the questionnaire, asking respondents how they would rate their health in general (*"Hvordan vurderer du din egen helse sånn i alminnelighet?"*). Responses were collected on a 5-point Likert scale, with answers ranging from "very good" (coded as 1) to "very bad" (coded as 5). To include this in

28

regressions answers were grouped into 2 categories with a 'good' category (coded as 0) encompassing 'very good' and 'good' responses, and 'neither good nor bad', 'bad', and 'very bad' collapsed into a 'poor' category (coded as 1). This is common in studies using self-rated health (e.g. Huijts & Kraaykamp, 2012; Chiswick et al., 2008). Perceived discrimination was also included in both datasets as a measure of how much a migrant felt included in and integrated into Norwegian society.

Finally, there were some variables that were specific to some of the models:

Primary Care Model

In the 2012 questionnaire, respondents are asked where they chose to take contact with a doctor the last time they required help; this was included as a categorical measure of interest because it includes private and public doctors. In the 2015 dataset, a variable was included that asked respondents if they had required help from primary care services in the past 12 months but had not contacted the services. This was a binary yes/no variable.

Specialist Care Model

The categorical 2012 variable asking respondents where they chose to take contact with a doctor the last time they required help was included in the specialist care model.

Mental Health Care Model

The mental health care model also included a binary variable denoting whether or not a participant had required mental health services in the past month but had not contacted the service.

Alternative Care Model

The categorical variable on where respondents chose to contact a doctor last time they needed help (in the 2012 questionnaire) was included in the alternative care model, as it may be that alternative care is a replacement for primary care.

Dental Care Model

The dental care model included 2 additional variables; the first was a binary variable measuring self-rated dental health, categorised in the same way as self-rated health (see above). The second variable was also binary, and denoted whether or not a participant had required dental health services in the past month but had not contacted the service.

4.2.2 **Two Part Model**

Following the primary analyses, differences between migrant groups in terms of number of primary care contacts was investigated. The first analysis was through a two-part model, whereby a generalised linear model (GLM) with a dependent variable denoting the number of contacts with a primary care practitioner (either regular GP or another GP) was conducted dependent on a non-zero outcome in a previous logit regression with the same dependent variable. The variables that were in the Step 3 primary care model above were also used in this model. The Akaike information criterion (AIC) and Bayesian information criterion (BIC) were used to specify the link and family for the GLM (Deb, Norton, & Manning, 2017); this resulted in the choice of log link and Poisson family (see Appendix 4 for values). The model density function $g_i(y_i|x_i)$ is as follows:

$$g_i(y_i|x_i) = \begin{cases} \{1 + exp(x'_i\alpha^l)\}^{-1} & if \ y_i = 0 \\ \dfrac{1}{(1 + e^{-x'_i\alpha^l})} \times e^{x'_i\beta^{GLM}} & if \ y_i > 0 \end{cases}$$

where the top expression on the right hand side is the cumulative probability function of the logit regression (likelihood of having no contact), and the bottom expression is the likelihood of having more contacts once contact has been made, given the relationships between the explanatory and dependent variables.

A second two part model with a logit regression and GLM was also run; in this model, the GLM had a log link and gamma family. This was done because this specification is often used in health care data with a mass at zero (Deb et al., 2017), to see how the specification impacted the results compared to the first model. The specification for this model follows the same logic as above, and is defined as follows:

$$g_i(y_i|x_i) = \begin{cases} \{1 + exp(x'_i\alpha^l)\}^{-1} & if \ y_i = 0 \\ \dfrac{1}{(1 + e^{-x'_i\alpha^l})} \times e^{x'_i\beta^{GLM}} & if \ y_i > 0 \end{cases}$$

Marginal and incremental effects of the variables on number of primary care contacts were calculated.

4.2.3 **Negative Binomial Model**

The negative binomial model is favoured when overdispersion (the observation that variation within the data is higher than expected) is due to unobserved heterogeneity in the data; this is extremely common in health data due to the variation in health states and inability to capture all variation within the variables (Deb et al., 2017). With this data in particular, we can expect the migrants to vary substantially based on characteristics not included in the questionnaire, such as length of stay, country of origin, and migration experience. In addition, the variance for each migrant group with regards to number of contacts is larger than the mean for each group. This suggests that there is overdispersion and that the negative binomial model would be a good fit.

The model specification is as follows:

$$f(y_i; \mu, \alpha) = \frac{\Gamma(\alpha^{-1} + y_i)}{\Gamma(\alpha^{-1})\Gamma(y_i + 1)} \left(\frac{\alpha^{-1}}{\alpha^{-1} + \mu}\right)^{\alpha^{-1}} \left(\frac{\mu}{\alpha^{-1} + \mu}\right)^{y_i}, \qquad \alpha > 0$$

(from Deb et al., 2017, p.144)

where Γ denotes the gamma function, y is the count outcome for number of contacts with primary care services (0,1,2…y), α is an additional parameter, and μ is the intensity/rate parameter.

The negative binomial-2 (NB2) model was used; this model assumes that variance is a quadratic function of the mean and is used because a comparison of log likelihoods between it and the negative binomial-1 (NB1) model, which assumes dispersion is constant (linear), shows that the NB2 model is a better fit for this dataset. In addition, the NB2 model has lower AIC and BIC values (see Appendix 5). The conditional mean is specified as:

$$\mu_i = \exp(x'_i \beta)$$

The conditional variance is:

$$Var(y_i) = \mu_i + \alpha\mu_i^2$$

Average marginal and incremental effects were computed for the variables included in the model.

4.3 Statistical Analysis

The presence of significant differences between groups for categorical control variables were tested using chi-square tests; continuous variables were tested using one-way ANOVA. The stepwise logistic regression models described above were then run.

5 Results

5.1 2012 & 2015 Datasets

Table 1 shows the general characteristics for the migrant groups in the 2012 and 2015 datasets. As income was measured differently for the two datasets (yearly in 2012, and monthly in 2015), these are not included in this table; the full table for the two datasets is available in Appendix 2.

As can be seen from the table, the migrant groups differ on many of the baseline variables. Migrants tend to be younger than native Norwegians, particularly those from lower income countries, and migrants from higher income countries are more likely to have tertiary education. More native Norwegians were married, widowed or divorced compared to migrants. Oslo is the county with the most migrants, with over double the percentage of migrants compared to natives represented in the questionnaires. Migrants from lower income countries live in households that are 6 persons or larger more than natives or migrants from higher income countries. Migrants also tend to be on lower incomes more than natives, with migrants from lower income countries on lower incomes than migrants from higher income countries (see Appendix 2). More migrants expressed perceived discrimination compared to natives, and of these lower income migrants had higher reporting of discrimination related to skin colour and ethnicity in the 2012 dataset. There were no significant differences in self-rated health in the 2012 dataset, but in the 2015 dataset natives tended to report poor self-rated health more than migrants. Fewer migrants reported having at least one chronic disease.

Table 1. General Characteristics of Migrants in the 2012 and 2015 Datasets

Migrant Group	2012 Dataset			2015 Dataset		
	Native Norwegians (4,523)	HIC Migrants (510)	LIC Migrants (314)	Native Norwegians (6,451)	HIC Migrants (787)	LIC Migrants (509)
Female	2,299 (50.83%)	246 (48.24%)	153 (48.73%)	3,251* (50.40%)	369* (46.89%)	232* (45.58%)
Age Group*						
16-24	484 (10.70%)	92 (18.04%)	78 (24.84%)	765 (11.86%)	138 (17.53%)	130 (25.54%)
25-44	1,231 (27.22%)	219 (42.94%)	159 (50.64%)	1,732 (26.85%)	330 (41.93%)	255 (50.10%)
45-66	1,882 (41.61%)	158 (30.98%)	73 (23.25%)	2,600 (40.30%)	256 (32.53%)	115 (22.59%)
67-79	738 (16.32%)	34 (6.67%)	4 (1.27%)	1,026 (15.90%)	51 (6.48%)	9 (1.77%)
80+	188 (4.16%)	7 (1.37%)	0 (0%)	328 (5.08%)	12 (1.52%)	0 (0%)

Education Level***						
None/Primary	1,672 (36.97%)	133 (26.08%)	122 (38.85%)	2,355 (36.51%)	202 (25.67%)	197 (38.70%)
Secondary	1,305 (28.85%)	168 (32.94%)	79 (25.16%)	1,889 (29.28%)	229 (29.10%)	140 (27.50%)
Tertiary	1,546 (34.18%)	209 (40.98%)	113 (35.99%)	2,207 (34.21%)	356 (45.24%)	172 (33.79%)
Civil Status***						
Single	1,554 (34.36%)	253 (49.61%)	133 (42.36%)	2,379 (36.88%)	377 (47.90%)	239 (46.95%)
Married/ registered partner	2,367 (52.33%)	211 (41.37%)	152 (48.41%)	3,180 (49.29%)	335 (42.57%)	233 (45.78%)
Widowed	274 (6.06%)	12 (2.35%)	2 (0.64%)	367 (5.69%)	17 (2.16%)	3 (0.59%)
Separated	36 (0.80%)	7 (1.37%)	11 (3.50%)	55 (0.85%)	10 (1.27%)	9 (1.77%)
Divorced	292 (6.46%)	27 (5.29%)	16 (5.10%)	470 (7.29%)	48 (6.10%)	25 (4.91%)
County***						
1: Østfold	248 (5.48%)	35 (6.86%)	18 (5.73%)	297 (4.60%)	41 (5.21%)	27 (5.30%)
2: Akershus	499 (11.03%)	86 (16.86%)	39 (12.42%)	324 (5.02%)	52 (6.61%)	42 (8.25%)
3: Oslo	488 (10.79%)	112 (21.96%)	90 (28.66%)	564 (8.74%)	144 (18.30%)	135 (26.52%)
4: Hedmark	186 (4.11%)	19 (3.73%)	13 (4.14%)	349 (5.41%)	32 (4.07%)	11 (2.16%)
5: Oppland	185 (4.09%)	11 (2.16%)	5 (1.59%)	330 (5.12%)	32 (4.07%)	9 (1.77%)
6: Buskerud	224 (4.95%)	24 (4.71%)	22 (7.01%)	307 (4.76%)	44 (5.59%)	37 (7.27%)
7: Vestfold	219 (4.84%)	25 (4.90%)	11 (3.50%)	298 (4.62%)	49 (6.23%)	30 (5.89%)
8: Telemark	151 (3.34%)	14 (2.75%)	13 (4.14%)	310 (4.81%)	36 (4.57%)	21 (4.13%)
9: Aust-Agder	97 (2.14%)	14 (2.75%)	2 (0.64%)	310 (4.81%)	39 (4.96%)	15 (2.95%)
10: Vest-Agder	163 (3.60%)	15 (2.94%)	13 (4.14%)	289 (4.48%)	53 (6.73%)	29 (5.70%)
11: Rogaland	377 (8.34%)	33 (6.47%)	28 (8.92%)	325 (5.04%)	54 (6.86%)	27 (5.30%)
12: Hordaland	466 (10.30%)	53 (10.39%)	23 (7.32%)	340 (5.27%)	45 (5.72%)	33 (6.48%)
14: Sogn og Fjordane	95 (2.10%)	5 (0.98%)	3 (0.96%)	353 (5.47%)	18 (2.29%)	11 (2.16%)
15: Møre og Romsdal	245 (5.42%)	9 (1.76%)	5 (1.59%)	327 (5.07%)	22 (2.80%)	14 (2.75%)
16: Sør-Trøndelag	291 (6.43%)	25 (4.90%)	13 (4.14%)	358 (5.55%)	32 (4.07%)	22 (4.32%)
17: Nord-Trøndelag	139 (3.07%)	7 (1.37%)	3 (0.96%)	363 (5.63%)	23 (2.92%)	6 (1.18%)
18: Nordland	215 (4.75%)	12 (2.35%)	7 (2.23%)	364 (5.64%)	21 (2.67%)	13 (2.55%)
19: Troms	171 (3.78%)	8 (1.57%)	5 (1.59%)	354 (5.49%)	21 (2.67%)	11 (2.16%)
20: Finnmark	64 (1.41%)	3 (0.59%)	1 (0.32%)	289 (4.48%)	29 (3.68%)	16 (3.14%)
Number of people in household***						
1	987 (21.82%)	141 (27.65%)	66 (21.02%)	1,526 (23.66%)	192 (24.40%)	122 (23.97%)
2	1,790 (39.58%)	153 (30%)	67 (21.34%)	2,509 (38.89%)	243 (30.88%)	115 (22.59%)
3	636 (14.06%)	69 (13.53%)	56 (17.83%)	892 (13.83%)	131 (16.65%)	93 (18.27%)
4	710 (15.70%)	93 (18.24%)	78 (24.84%)	1,011 (15.67%)	145 (18.42%)	111 (21.81%)

5	325 (7.19%)	43 (8.43%)	27 (8.60%)	436 (6.76%)	64 (8.13%)	43 (8.45%)
6+	75 (1.66%)	11 (2.16%)	20 (6.37%)	77 (1.19%)	12 (1.52%)	25 (4.91%)
Experienced discrimination in the past 12 months*						
Yes (2015)				418 (6.48%)	82 (10.42%)	84 (16.50%)
Yes, related to ethnicity/skin colour (2012)	7 (0.15%)	10 (1.96%)	41 (13.06%)			
Yes, unrelated to ethnicity/skin colour (2012)	192 (4.24%)	33 (6.47%)	26 (8.28%)			
Not experienced	4,324 (95.60%)	467 (91.57%)	247 (78.66%)	6,033 (93.52%)	705 (89.58%)	425 (83.50%)
Poor self-rated health	1,039 (22.97%)	96 (18.82%)	68 (21.66%)	1,336* (20.71%)	138* (17.53%)	91* (17.88%)
Reported at least one chronic health condition	1,962* (43.38%)	198* (38.82%)	116* (36.94%)	2,319*** (35.95%)	232*** (29.48%)	131*** (25.74%)

*significant at the 0.05 level   **significant at the 0.01 level   ***significant at the 0.001 level

Contacts with Services

Migrants had significantly fewer contacts than natives in primary, specialist, hospital and dental care services. Migrants from HIC countries had more mental and alternative care contacts than those from LIC countries and native Norwegians (e.g. mental care contact in 2012: 6.9% (HIC), 5.3% (LIC), 3.75% (natives)); this was significant in the 2012 dataset for mental care, and in the 2015 dataset for alternative care (both p<0.01). Conversely, natives had more contact with the hospital care services, with LIC migrants having fewest contacts; this was significant in the 2015 data (p<0.01). Migrants were also significantly more likely to require an appointment with primary, mental or dental care services and not take contact; this was significant in the 2015 dataset for primary and mental care (primary: p<0.001, mental: p<0.01), and in both datasets for dental care (p<0.001). These percentages were higher in LIC migrants compared to HIC migrants (e.g. for dental care: 19.61% vs 10.81% (2012) and 10.5% vs 7.02% (2015)).

5.2 Logistic Regressions

In all the below logistic regressions, model 1 contains only migration variables; model 2 is adjusted for age, gender, education, civil status and income (plus overall life satisfaction in the 2015 dataset), and model 3 includes the variables of interest. The tables below include only odds ratios for the main variables of interest; for the full regression tables, please see Appendix 3.

Primary Care

Table 2. Step-wise logistic regression of migrant variables, control variables and variables of interest on having at least one contact with primary care services in the past 12 months (odds ratios)

USE OF PRIMARY CARE SERVICES	2012 Dataset			2015 Dataset		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
Migrant Category						
Norwegians (ref)	1	1	1	1	1	1
HIC migrants	0.823 [0.651,1.040]	0.923 [0.724,1.177]	0.959 [0.744,1.236]	0.839[*] [0.711,0.990]	0.980 [0.824,1.166]	0.994 [0.833,1.187]
LIC migrants	0.709[*] [0.535,0.939]	0.852 [0.633,1.149]	0.838 [0.606,1.160]	0.770[**] [0.632,0.939]	0.944 [0.762,1.168]	0.990 [0.795,1.232]
Free places on GP list (2012)		1.000 [0.999,1.000]	1.000 [0.999,1.001]		-	-
Poor self-rated overall life satisfaction (2015)					2.144[***] [1.749,2.628]	1.418[**] [1.142,1.760]
Poor self-rated health			2.246[***] [1.740,2.900]			1.525[***] [1.268,1.834]
Presence of at least one chronic health condition			2.299[***] [1.922,2.751]			2.587[***] [2.242,2.985]
Method of contact last time help was required (2012)						
Regular GP (ref)			1			-
Emergency/out of hours doctor			0.925 [0.735,1.164]			-
Private doctor's clinic			0.588[***] [0.445,0.778]			-
Another doctor			0.596[**] [0.430,0.826]			-
Have never required a doctor			0.0952[***] [0.0544,0.167]			-
Experienced discrimination in the past 12 months						
Yes, related to ethnicity/skin colour (2012)			1.323 [0.867,2.019]			
Yes, unrelated to ethnicity/skin colour (2012)			1.432 [0.645,3.182]			
Yes (2015)						1.240 [0.989,1.554]
Required a primary care appointment but did not book one (2015)						1.322[*] [1.057,1.653]
N	5305	5305	5305	7735	7735	7735

*significant at the 0.05 level   **significant at the 0.01 level   ***significant at the 0.001 level

In the step 1 regression for primary care, migrants from both HIC (in 2015) and LIC countries were less likely to have a contact with primary care compared to native Norwegians; however, this effect disappeared with the inclusion of control variables. Gender was significant at the 0.1% level in both Step 2 and Step 3, where variables of interest were included, with females more likely to have a primary contact compared to men. In the 2012 dataset, those with

36

secondary education were significantly more likely to have a contact in Step 2 (odds ratio 1.270, p<0.05), and this likelihood increased in significance in Step 3 (odds ratio 1.317, p<0.01). In the 2015 dataset, those with tertiary education were significantly less likely to have a contact in Step 2 (odds ratio 0.818, p<0.01), but this effect disappeared in Step 3. A monthly income between 40,000-59,999 NOK was also significantly associated with a higher risk of having a contact in Step 3 (odds ratio 1.383, p<0.01).

Reporting of poor self-rated health and the presence of at least one chronic disease both significantly increased the odds of having a contact; these groups were on average twice as likely to contact primary care services as those with good self-rated health and no disease. In addition, respondents in the 2012 dataset were significantly less likely to have a primary care contact if they contacted a private doctor or "another" doctor last time they required help, or had never required a doctor. Finally, in the 2015 dataset, respondents were slightly more likely to have a contact with a doctor if they had required an appointment during the past 12 months but had not contacted the service.

Specialist Care

Table 3. Step-wise logistic regression of migrant variables, control variables and variables of interest on having at least one contact with specialist care services in the past 12 months (odds ratios)

USE OF SPECIALIST CARE SERVICES	2012 Dataset			2015 Dataset		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Migrant Category						
Norwegians (ref)	1	1	1	1	1	1
HIC migrants	0.910 [0.756,1.096]	1.028 [0.847,1.247]	1.022 [0.837,1.249]	0.852[*] [0.729,0.996]	0.939 [0.799,1.104]	0.958 [0.811,1.132]
LIC migrants	0.734[*] [0.579,0.931]	0.915 [0.712,1.176]	0.845 [0.641,1.114]	0.716[***] [0.589,0.870]	0.825 [0.670,1.017]	0.870 [0.702,1.078]
Free places on GP list (2012)		1.000 [0.999,1.000]	1.000 [0.999,1.000]		-	-
Poor self-rated overall life satisfaction (2015)					1.760[***] [1.517,2.043]	1.166 [0.991,1.372]
Poor self-rated health			1.824[***] [1.575,2.112]			1.469[***] [1.283,1.682]
Presence of at least one chronic health condition			2.110[***] [1.869,2.382]			2.537[***] [2.273,2.832]
Method of contact last time help was required (2012)						
Regular GP			1			-
Emergency/out of hours doctor			1.083 [0.904,1.297]			-
Private doctor's clinic			1.206 [0.949,1.533]			-

Another doctor			1.243 [0.944,1.637]			-
Have never required a doctor			0.185*** [0.0785,0.434]			-
Experienced discrimination in the past 12 months						
Yes, related to ethnicity/skin colour (2012)			1.690*** [1.286,2.221]			
Yes, unrelated to ethnicity/skin colour (2012)			1.516 [0.856,2.686]			
Yes (2015)						0.815* [0.678,0.979]
N	5333	5333	5333	7743	7743	7743

*significant at the 0.05 level   **significant at the 0.01 level   ***significant at the 0.001 level

Migrants had significantly lower odds of having a contact with specialist care services compared to natives in the basic model in 2015 (HIC: p<0.05; LIC: p<0.001), but this significance disappeared in Step 2 when control variables were included. Females are more likely to have contact with specialist care services than men (p<0.001). Tertiary education was also associated with higher odds of a contact, and this effect remained even in Step 3 (2012: p<0.05; 2015: p<0.01). Older respondents were also significantly more likely to have a contact in Step 2, but in Step 3 this significance was found only in the age bracket 67-79 (2012: p<0.05; 2015: p<0.01). Income was a significant variable in the 2015 dataset, with those on higher monthly incomes also more likely to have a contact.

Poor self-rated life satisfaction was highly significant in Step 2 (p>0.001) in the 2015 data, but this significance disappeared in Step 3 when the interest variables were added. Poor self-rated health and presence of a chronic illness were significantly associated with a higher risk of having a contact (p<0.001), with the chance doubled in terms of chronic illness (e.g. 2015: odds ratio 2.537). In the 2012 dataset, never requiring a doctor in the past 12 months was associated with a significantly lower risk of contact (p<0.001), whilst perceiving discrimination related to ethnicity and skin colour was significantly associated with a higher risk of contact (p<0.001).

Mental Health Care

Table 4. Step-wise logistic regression of migrant variables, control variables and variables of interest on having at least one contact with mental care services in the past 12 months (odds ratios)

USE OF MENTAL CARE SERVICES	2012 Dataset			2015 Dataset		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Migrant Category						
Norwegians (ref)	1	1	1	1	1	1
HIC migrants	1.904** [1.277,2.838]	1.420 [0.939,2.148]	1.267 [0.813,1.975]	1.352* [1.006,1.815]	0.930 [0.674,1.282]	0.918 [0.660,1.277]
LIC migrants	1.437 [0.833,2.477]	1.007 [0.565,1.794]	0.862 [0.453,1.640]	1.044 [0.702,1.551]	0.483** [0.313,0.746]	0.503** [0.324,0.781]
Free places on GP list (2012)		1.000 [0.999,1.001]	1.000 [0.999,1.001]		-	-
Poor self-rated overall life satisfaction (2015)					6.726*** [5.349,8.457]	4.063*** [3.144,5.250]
Poor self-rated health			2.002*** [1.401,2.860]			1.825*** [1.394,2.389]
Presence of at least one chronic disease			1.431* [1.032,1.984]			1.699*** [1.328,2.173]
Experienced discrimination in the past 12 months						
Yes, related to ethnicity/skin colour (2012)			3.057*** [1.942,4.811]			
Yes, unrelated to ethnicity/skin colour (2012)			2.805* [1.040,7.571]			
Yes (2015)						0.603*** [0.449,0.811]
Required a mental health care appointment but did not book one			4.160*** [2.795,6.192]			2.276*** [1.530,3.384]
N	4786	4786	4786	7733	7733	7733

*significant at the 0.05 level   **significant at the 0.01 level   ***significant at the 0.001 level

The link between being a migrant and having at least one mental health contact is more complex than other services. In 2012, migrants had higher odds of having a contact with mental health services compared to natives; this was significant in the basic model for HIC migrants ($p<0.01$) but the significance disappeared after adding control variables. In the 2015 dataset, however, migrants have lower odds of contact with mental health services compared to natives once control variables have been included, and this is significant for LIC even after the variables of interest are included (odds ratio 0.503, $p<0.01$).

Gender is significant, with females having higher odds of contact compared to males. Age group is significant for ages over 44, especially in the 2015 dataset ($p<0.001$). In the 2012 dataset, married respondents have lower odds of having a contact ($p<0.01$), and in the 2015 dataset separated respondents have double the odds of having a contact compared to single

respondents (p<0.05). Poor self-rated overall life satisfaction and poor self-rated health were significantly associated with higher odds of a contact (p<0.001), with poor self-rated overall life satisfaction giving a 4 times higher risk of contact compared to good self-rated life satisfaction (odds ratio: 4.063 in 2015, Step 3). Perceiving discrimination was also significantly associated with a higher risk of contact, with this effect more significant for discrimination related to ethnicity/skin colour in the broken-down 2012 dataset (p<0.001 vs p<0.05). Requiring a mental health care appointment but not contacting the service was highly significant (p<0.001), with respondents answering yes to this question having a much higher risk of contact.

Hospital Care

Table 5. Step-wise logistic regression of migrant variables, control variables and variables of interest on having at least one contact with hospital care services in the past 12 months (odds ratios)

USE OF HOSPITAL CARE SERVICES	2012 Dataset			2015 Dataset		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Migrant Category						
Norwegians (ref)	1	1	1	1	1	1
HIC migrants	0.781 [0.550,1.107]	0.919 [0.640,1.318]	0.913 [0.632,1.318]	0.912 [0.705,1.179]	1.197 [0.914,1.566]	1.221 [0.929,1.605]
LIC migrants	0.679 [0.427,1.080]	0.849 [0.523,1.380]	0.834 [0.500,1.390]	0.554** [0.377,0.813]	0.777 [0.519,1.163]	0.810 [0.539,1.219]
Free places on GP list (2012)		1.000 [0.999,1.001]	1.000 [0.999,1.001]		-	-
Poor self-rated overall life satisfaction (2015)		-	-		2.188*** [1.779,2.690]	1.424** [1.139,1.782]
Poor self-rated health			2.217*** [1.782,2.758]			1.677*** [1.381,2.035]
Presence of at least one chronic health condition			1.893*** [1.525,2.351]			2.174*** [1.818,2.599]
Experienced discrimination in the past 12 months						
Yes, related to ethnicity/skin colour (2012)			1.431 [0.963,2.125]			
Yes, unrelated to ethnicity/skin colour (2012)			0.751 [0.218,2.585]			
Yes (2015)						0.821 [0.620,1.087]
N	5347	5347	5347	7741	7741	7741

*significant at the 0.05 level   **significant at the 0.01 level   ***significant at the 0.001 level

The odds of having a contact with hospital care services was significantly lower in the basic model for LIC migrants in the 2015 dataset (p<0.01), but this significance disappeared in the later steps. Gender was not significant in this instance, but in the 2015 dataset tertiary

education was significantly associated with a lower risk of contact (p<0.05). Age group was also significant for those 67 and above in the 2015 dataset (p<0.001) and those 80 and above in the 2012 dataset (p<0.01); these groups had a risk at least double compared to single respondents of having a contact. In the 2012 dataset, divorced respondents had a higher risk of a contact (p<0.01). In 2015, respondents from Finnmark county had odds almost 3 times higher than the reference group for having a hospital contact (p<0.001).

Poor life satisfaction (p<0.01), poor self-rated health (p<0.001) and the presence of at least one chronic condition (p<0.001) were significantly associated with a higher risk of contact.

Alternative Care

Table 6. Step-wise logistic regression of migrant variables, control variables and variables of interest on having at least one contact with alternative care services in the past 12 months (odds ratios)

USE OF ALTERNATIVE CARE SERVICES	2012 Dataset			2015 Dataset		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Migrant Category						
Norwegians (ref)	1	1	1	1	1	1
HIC migrants	1.058 [0.785,1.426]	0.941 [0.691,1.282]	0.944 [0.691,1.290]	1.162 [0.930,1.452]	1.055 [0.838,1.329]	1.069 [0.848,1.348]
LIC migrants	0.710 [0.459,1.097]	0.596* [0.378,0.940]	0.597* [0.370,0.963]	0.617** [0.438,0.870]	0.549** [0.384,0.785]	0.560** [0.391,0.802]
Free places on GP list		1.000 [0.999,1.000]	1.000 [0.999,1.001]			
Poor self-rated overall life satisfaction (2015)		-	-		1.225 [0.976,1.536]	1.084 [0.851,1.380]
Poor self-rated health			1.363** [1.087,1.709]			0.897 [0.729,1.105]
Presence of at least one chronic health condition			1.384** [1.135,1.689]			1.631*** [1.384,1.921]
Method of contact last time help was required (2012)						
Regular GP (ref)			1			-
Emergency/out of hours doctor			0.891 [0.655,1.213]			-
Private doctor's clinic			1.247 [0.866,1.797]			-
Another doctor			0.667 [0.399,1.116]			-
Have never required a doctor			0.189 [0.0260,1.378]			-
Experienced discrimination in the past 12 months						

	Model 1 (2012)	Model 2 (2012)	Model 3 (2012)	Model 1 (2015)	Model 2 (2015)	Model 3 (2015)
Yes, related to ethnicity/skin colour (2012)			1.379 [0.947,2.008]			
Yes, unrelated to ethnicity/skin colour (2012)			0.939 [0.349,2.530]			
Yes (2015)						0.788 [0.614,1.012]
N	5334	5334	5334	7739	7739	7739

*significant at the 0.05 level   **significant at the 0.01 level   ***significant at the 0.001 level

Migrants from LIC countries have lower odds of having a contact with alternative care services compared to natives and those from HIC countries even after control variables and variables of interest have been added (2012: $p<0.05$, 2015: $p<0.01$). HIC migrants have lower odds of using alternative services compared to natives in 2012, and higher odds in 2015, though neither of these are significant. Females have double the odds of having a contact compared to men ($p<0.001$). Those with secondary education in 2015 have higher odds of a contact ($p<0.01$), whilst those 80 and over have lower odds (2012: $p<0.05$, 2015: $p<0.01$). Being divorced is significantly associated with a higher risk of contact in 2012, and having a monthly income of above 60,000NOK is also associated with a higher risk in 2015 ($p<0.05$).

Poor self-rated health is significantly associated with a higher risk of contact in 2012 ($p<0.01$), but this effect is not present in 2015; conversely, the risk is lower (though this is not significant). The presence of at least one chronic health condition is associated with a higher risk of contact (2012: $p<0.01$, 2015: $p<0.001$).

Dental Care

Table 7. Step-wise logistic regression of migrant variables, control variables and variables of interest on having at least one contact with dental care services in the past 12 months (odds ratios)

USE OF DENTAL CARE SERVICES	2012 Dataset			2015 Dataset		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Migrant Category						
Norwegians (ref)	1	1	1	1	1	1
HIC migrants	0.838 [0.679,1.034]	1.042 [0.834,1.301]	1.042 [0.831,1.306]	0.782** [0.656,0.933]	0.882 [0.732,1.062]	0.867 [0.718,1.048]
LIC migrants	0.536*** [0.420,0.683]	0.690** [0.530,0.897]	0.741* [0.561,0.978]	0.389*** [0.322,0.470]	0.528*** [0.429,0.650]	0.514*** [0.415,0.636]
Free places on GP list (2012)		1.000 [0.999,1.000]	0.999* [0.999,1.000]		-	-
Poor self-rated overall life satisfaction (2015)		-	-		0.817* [0.688,0.972]	0.989 [0.817,1.196]
Poor self-rated health			1.036 [0.867,1.238]			0.880 [0.743,1.042]

Presence of at least one chronic health condition			1.111 [0.960,1.286]			1.163[*] [1.010,1.339]
Experienced discrimination in the past 12 months						
Yes, related to ethnicity/skin colour (2012)			0.800 [0.595,1.076]			
Yes, unrelated to ethnicity/skin colour (2012)			1.154 [0.618,2.155]			
Yes (2015)						0.980 [0.791,1.215]
Poor self-rated dental health			0.834[*] [0.711,0.978]			0.653[***] [0.570,0.749]
Required dental help but didn't book appointment			0.359[***] [0.291,0.443]			0.313[***] [0.256,0.383]
N	5322	5322	5322	7720	7720	7720

*significant at the 0.05 level   **significant at the 0.01 level   ***significant at the 0.001 level

Migrants have overall lower odds of having a contact with dental care services compared to natives. The difference in odds in LIC migrants is significant even with all other variables included (2012: p<0.05, 2015: p<0.001). Females have significantly higher odds of contact compared to males (p<0.001). The effect of age group is complex; those aged 45-79 have significantly higher odds of a contact, but this significance varies with year and age group. In the 2015 dataset, those aged 25-44 have lower odds of having a contact compared to those aged 16-24. Married respondents have higher odds of a contact compared to single respondents (2012: p<0.001, 2015: p<0.05), and in 2015 a higher number of people in the household (above 4) is associated with lower odds of contact compared to single households.

Income is highly significant in both 2012 and 2015, with almost all groups having higher odds of a contact compared to the reference group of those earning below 250,000NOK per year in 2012 or 20,000NOK per month in 2015 (p<0.001, excepting those earning between 500,000-1,000,000NOK per year in 2012). Some counties have significantly lower odds of a contact, especially Troms (2012: odds ratio 0.553, p<0.01; 2015: odds ratio 0.523, p<0.001). Presence of a chronic health condition was significantly associated with higher odds of a contact in 2015 (p<0.05).

Poor self-rated dental health was associated with lower odds of contact (2012: p<0.05, 2015: p<0.001), and those who required dental help but didn't contact the services also had lower odds of a contact (p<0.001).

5.3 Two Part Model

The results for the two different models (with differing GLM specifications) conducted on the 2015 dataset with regards to number of contacts with primary care services are shown below in Tables 8 and 9. Again, only the variables of interest are included; for the full tables, see Appendix 4.

Table 8. Two part model with migrant variables, control variables and variables of interest on number of contacts with primary care services in the past 12 months (GLM specification: log link, Poisson family)

	Part 1 – Logit Regression	Part 2 – Generalised Linear Model (Poisson family, log link)	Marginal & Incremental Effects of GLM Model
Migrant Category			
Norwegians (ref)	1	1	1
HIC migrants	0.980 [0.821,1.171]	0.945[*] [0.904,0.989]	-0.179[*] [-0.347,-0.012]
LIC migrants	1.009 [0.810,1.257]	1.083[**] [1.028,1.141]	0.262[*] [0.038,0.486]
Poor self-rated overall life satisfaction	1.408[**] [1.134,1.747]	1.263[***] [1.219,1.309]	1.012[***] [0.819,1.205]
Poor self-rated health	1.544[***] [1.283,1.858]	1.476[***] [1.429,1.524]	1.612[***] [1.434,1.790]
Presence of at least one chronic health condition	2.599[***] [2.253,2.998]	1.537[***] [1.492,1.583]	1.993[***] [1.859,2.126]
Experienced discrimination in the past 12 months	1.220 [0.974,1.528]	1.092[***] [1.047,1.140]	0.406[***] [0.207,0.605]
Required a primary care appointment but did not book one	1.273[*] [1.019,1.590]	1.057[*] [1.013,1.103]	0.320[***] [0.130,0.511]
N	7679	5702	5702

*significant at the 0.05 level   **significant at the 0.01 level   ***significant at the 0.001 level

With a GLM specification of log link and Poisson family, the effect of being a LIC migrant on having more contacts with the primary care services is significant at the 1% level and the effect of being a HIC migrant is significant at the 5% level. The other variables of interest are also highly significant ($p<0.001$). Table 8 also shows the marginal effect of each variable on number of primary health contacts. LIC migrants have around 0.26 more contacts compared to native Norwegians, while HIC migrants have 0.18 fewer contacts. Those reporting poor satisfaction with life, poor self-rated health or at least one chronic condition have at least 1 more contact than those who do not.

Below, Table 9 shows the two part model with a GLM specification of log link and Gamma family. In this model, the effect of being a migrant on number of contacts is not significant. The health variables are still significant, some at the 5% level and some at the 0.1% level.

44

Table 9. Two part model with migrant variables, control variables and variables of interest on number of contacts with primary care services in the past 12 months (GLM specification: log link, gamma family)

NUMBER OF CONTACTS WITH PRIMARY CARE SERVICES	Part 1: Logit regression	Part 2: Generalised Linear Model (log link, gamma family)	Marginal & Incremental Effects of GLM Model
Migrant Category			
Norwegians (ref)	1	1	1
HIC migrants	0.980 [0.821,1.171]	0.959 [0.879,1.046]	-0.138 [-0.414,0.138]
LIC migrants	1.009 [0.810,1.257]	1.080 [0.968,1.204]	0.252 [-0.135,0.639]
Poor self-rated overall life satisfaction	1.408** [1.134,1.747]	1.270*** [1.171,1.378]	1.030*** [0.691,1.370]
Poor self-rated health	1.544*** [1.283,1.858]	1.472*** [1.373,1.579]	1.601*** [1.302,1.900]
Presence of at least one chronic health condition	2.599*** [2.253,2.998]	1.528*** [1.443,1.618]	1.966*** [1.745,2.186]
Experienced discrimination in the past 12 months	1.220 [0.974,1.528]	1.130* [1.029,1.241]	0.524** [0.168,0.880]
Required a primary care appointment but did not book one	1.273* [1.019,1.590]	1.125* [1.027,1.233]	0.532** [0.184,0.880]
N	7679	5702	5702

*significant at the 0.05 level   **significant at the 0.01 level   ***significant at the 0.001 level

5.4 Negative Binomial Model

The variables of interest are shown in Table 10; the full table is available in Appendix 5.

Table 10. Negative binomial model with migrant variables, control variables and variables of interest on number of contacts with primary care services in the past 12 months

NUMBER OF CONTACTS WITH PRIMARY CARE SERVICES	Negative Binomial Model	Marginal/Incremental Effects
Migrant Category		
Norwegians (ref)	1	1
Western migrants	0.951 [0.865,1.046]	-0.151 [-0.432,0.130]
Non-Western migrants	1.076 [0.953,1.215]	0.237 [-0.168,0.641]
Poor self-rated overall life satisfaction	1.361*** [1.237,1.499]	1.060*** [0.693,1.426]
Poor self-rated health	1.568*** [1.454,1.690]	1.518*** [1.233,1.803]
Reported at least one chronic health condition	1.883*** [1.765,2.009]	2.012*** [1.781,2.243]
Experienced discrimination in the past 12 months	1.189** [1.062,1.331]	0.576** [0.171,0.980]
Required a primary care appointment but did not book one	1.182** [1.057,1.321]	0.555** [0.160,0.949]
N	7679	7679

*significant at the 0.05 level   **significant at the 0.01 level   ***significant at the 0.001 level

In this model, there was no significant effect of being a migrant on number of contacts with primary care services. The other health-related variables were significant; poor self-rated life satisfaction, poor self-rated health and presence of a chronic condition were associated with an increased number of contacts (p<0.001), with perceived discrimination and requiring an appointment with the service associated with less contacts (p<0.01).

6 Discussion

The research questions posed in this thesis were as follows:

1. Are there differences between the native Norwegian and migrant populations in terms of health services utilized in 2012 and in 2015, after controlling for socio-economic and health differences?

2. Are there differences between the native Norwegian and migrant populations in terms of the number of contacts with primary care services in 2015, after controlling for socio-economic and health differences?

3. Are there significant differences between 2012 and 2015 within the populations?

As the answers to these questions vary depending on the health service under consideration, the discussion section will be split according to service; a more general discussion will follow, along with some conclusions that can be drawn.

6.1 Primary Care

In the logistic regression models, the effect of being a migrant on having at least one contact with primary care services was not significant after other influencing variables had been included. This finding differs from other studies which suggest that migrants access services differently the native population (e.g. Graetz et al., 2017).

However, the two-part model with a log link and Poisson distribution suggests that migrants from LIC countries have significantly more contacts than native Norwegians once they have contacted primary care services in 2015, whilst HIC migrants had significantly less contacts. This is interesting given that LIC migrants do not seem to report poor self-rated health more often than native Norwegians, on the contrary having a lower overall percentage (21.66% vs 22.97% in 2012, and 17.88% vs 20.71% in 2015), but it is in line with previous studies (Diaz et al., 2015; Diaz et al., 2014). A two part model with log link and gamma family was also fitted, as this combination is common in healthcare studies (though mainly related to health expenditure; Deb et al., 2017), and this suggested that being a migrant had no significant effect on number of health contacts. Because of the overdispersion that may be present in the data, a negative binomial model was also fitted to the 2015 dataset. This too showed no

significant effect of migrant group on number of contacts with primary health care services, which differs from the findings of the two part model above. Model choice seems, therefore, to be important in this analysis; this is discussed further in the general discussion below.

Due to the structure of the questions in the questionnaire, it was not possible to separate regular GP contact from emergency primary care, so the differences in usage between these services could not be compared.

6.2 Specialist Services

The effect of being a migrant on having at least one specialist care contact (outpatient visits, day visits to the hospital) was not statistically significant once other variables had been included. Interestingly, in the 2012 dataset the effect of perceived discrimination related to ethnicity or skin colour was highly significant, with respondents reporting this over 50% more likely to have a contact with specialist care services. LIC migrants reported this type of discrimination significantly more than both native Norwegians and HIC migrants (13.06% vs 0.15% [natives] and 1.96% [HIC migrants]), but were also less likely to have a contact compared to native Norwegians (though this was not significant). Although it was not divided according to type of discrimination, reporting perceived discrimination was also significant in the 2015 regression, but this time related to a lower likelihood of contact; again, this level of reporting was higher among LIC migrants compared to HIC migrants and natives.

It may be that an interaction between migrant group and discrimination impacts respondents' ability or willingness to contact specialist services. This could be exacerbated by the fact that in Norway, access to specialist services is controlled by the GP, who acts as a gatekeeper. In a qualitative study on Polish migrants, Czapka and Sagbakken (2016) highlight the experiences of some participants who expressed that their GPs did not provide sufficient information on specialist health care; this may be due to attitudes towards migrants, or it may be due to unconscious assumptions made by the GP in that they assume the migrant is familiar with the health care system's organisation. Furthermore, many suggested that they were treated differently to Norwegians because they were migrants; this may be real or perceived discrimination, but it may still affect help-seeking behaviour. However, in this thesis perceived discrimination was associated with a higher likelihood of having at least one contact with specialist services. It may be that those who reported perceived discrimination

48

are also more accustomed to asserting their needs and opinions because of this perception and thus are more likely to request a referral than those who do not feel discriminated against and thus are more likely to accept what the GP recommends.

6.3 Mental Health Services

In 2012, migrants had higher overall odds of having contact with mental care services, but this was not significant once other variables had been included; in 2015, migrants had overall lower odds of having contact with mental health services and this was significant at the 1% level for LIC migrants, even after control variables and other variables of interest were included. This is in contrast to an earlier study conducted in the Tøyen area of Oslo by Ayazi and Bøgwald (2008), who found that "non-Western" migrants were overrepresented in usage of a psychiatric polyclinic when the percentage of this group residing in the catchment area was taken into account. This is an interesting finding, as some studies suggest that LIC migrants actually have a higher prevalence of mental health issues, with some suggesting the rate is twice as high (Baarnhielm, Javo, & Mosko, 2013). The study by Ayazi and Bøgwald (2008) also suggested that their "non-Western" migrants used services less than expected when they compared use to self-reported mental illness symptoms. This higher prevalence rate could be related to the fact that a large proportion of LIC migrants are refugees, and this migrant group tend to have higher rates of mental health issues due to their traumatic experiences and stressors related to migration (Jensen, Norredam, Priebe, & Krasnik, 2013). Furthermore, reporting discrimination was significantly associated with a contact, with discrimination related to ethnicity and skin colour highly significant in the 2012 dataset. The above mentioned fact that more migrants reported discrimination than Norwegians (particularly LIC migrants) also supports this idea that migrants should have a higher prevalence of mental health issues (and thus higher level of contact with services) compared to native Norwegians. Yet this does not correlate with the lower odds of contact found in the 2015 dataset, especially in LIC migrants, which suggests underutilisation. This underutilisation has also been found in other migrant studies in terms of a lower number of contacts, especially for LIC migrants (Nielsen et al., 2015; Berg, 2009); sample size restrictions meant that it was not possible to investigate number of mental health care contacts in this study.

There are several potential explanations for this underutilisation. It may be due to barriers experienced when accessing the service e.g. communication or lack of information (Baarnhielm et al., 2013). Mental health is a subject that has many cultural interpretations, and thus it may be that migrants have different expectations for treatment than the host country offers, and thus may refuse to continue (or begin) treatment because they do not believe it will help (Jensen et al., 2013). In addition, it is the GP who acts as gatekeeper for mental health services (unless it is an emergency or the patient contacts private services and covers the full cost); it may be that GPs struggle to provide similar access to mental health services due to communication issues and lack of options that suit the cultural background, as was the case in a Danish study conducted by Jensen et al. (2013) where GPs expressed the difficulties in finding a professional that speaks the same language, which is important in therapy sessions, for example. There may also be issues in identifying mental health conditions in migrants as they can present with more physical and somatic symptoms, leading to misdiagnosis (Jensen et al., 2013; Green et al., 2006). The migrants themselves may also not view their symptoms in the same way as those from the native population would, but instead see them as related to social issues, thus not prompting the seeking of mental health treatment (Green et al., 2006).

Those who reported requiring mental health care appointments yet not contacting the service in the past 12 months had significantly higher odds of having a contact; in 2012, these respondents were 4 times as likely to have a contact than those who had not required help without contacting the service. This may be due to the fact that respondents who answered yes to this question have more mental health problems, or they are more severe, than those who answered no. Unsurprisingly, poor self-rated life satisfaction was also highly correlated with contact; those who are dissatisfied with their life are more likely to have mental health issues.

6.4 Hospital Services

In this study, being a migrant had no significant effect on having a contact with hospital services (that required at least one overnight stay, and was not related to childbirth). This is in contrast to the generally lower usage found by other studies both in Norway and internationally (e.g. Gimeno-Feliu et al., 2016; Elstad, 2016). As the number of hospitalisations was low in the datasets (around 5-9% for the various migrant groups) it may be that the sample size of those who had a contact was insufficient for detecting differences

50

between migrant groups. The other variables of interest were also non-significant. As the variable in the questionnaire related to hospital admissions with at least one night spent in hospital, a possible explanation is that all those who required a hospital stay were taken into hospital and this rate did not differ between the three groups. As spending a night in the hospital usually denotes a serious health issue, it is thus unlikely that there would be underuse of this service. Equally, it is less likely for individuals to overuse hospital stays when they can use emergency walk-in care or their regular GP. The only potential difference may have been in planned hospital admissions (e.g. for planned operations); it could be that migrants do not use hospitals so often in this way, but as mentioned above, the low number of those reporting a hospital stay means that it is hard to investigate this.

6.5 Alternative Care Services

Migrants coming from LIC countries were significantly less likely to report having a contact with alternative services compared to native Norwegians both in 2012 and 2015, and this significant effect remained even after other variables were included. The alternative services included within this question are homeopathy, acupuncture, reflexology, aromatherapy, massage therapy, naprapathy, osteopathy and traditional healers. This is consistent with findings in studies from the US (Elewonibi & BeLue, 2016). One possible explanation is that instead of formally seeking alternative services in Norway, migrants may use informal networks or services in their country of origin (Czapka & Sagbakken, 2016; Villa-Torres et al., 2017). Additionally, it is hard to separate out the different services, and some of these require either a high copayment or a referral from the individual's GP (e.g. for chiropractor services) which could lead to migrants preferring not to access them.

Poor self-rated health was not significantly associated with contact with alternative services; this may be because many of the alternative services are more related to long-term muscle or skeletal issues rather than specific physical illnesses that can be treated using medicine, and migrants seek the help of physicians for the latter (Sandberg et al., 2017). The presence of chronic illness was significantly associated with contact; this could be because the chronic illnesses of respondents tend to be related to joint or musculoskeletal problems or that they choose to try/use alternative services when Western medicine does not help or they require further pain relief. Alternative services are growing in popularity among those with chronic conditions (Andreeva & Unger, 2014), so this is a plausible explanation.

It must be noted here that it was not possible in this analysis to separate the different services; this limits the interpretation of the results somewhat, as it may be that there is differing usage in some of the services included, related to knowledge of the treatments and ethnic-specific treatments commonly used in the migrant's home country (e.g. Lee et al., 2010). However, as the results line up with past research, we can assume they are fairly robust.

6.6 Dental Services

Contact with dental services was significantly less likely for LIC migrants than native Norwegians, and in 2015 this effect was very significant ($p<0.001$). Intriguingly, those who reported poor self-rated dental health were also significantly less likely to have a contact with dental services; this was found in migrant populations in other studies (Rota, Spanbauer, Szabo, & Okunseri, 2018; Hjern & Grindefjord, 2000). These findings may be because dental health is not considered as important as physical health, unless it has a significant impact on overall wellbeing. In addition income plays a role, with those on higher incomes significantly more likely to have a contact with dental health services. This finding was highly significant for all categories in 2015 compared to the reference category of 0-20,000NOK per month and also significant for most categories in the 2012 data compared to the reference of 0-250,000NOK per year. Income has shown to be an important predictor of self-reported dental health (Trohel et al., 2016), and thus it is possible that there is an interaction between these two variables related to the cost of care. As dental services are not covered by the government in Norway (with the exception of tooth decay) and individuals must pay the full cost themselves, they will be less likely to go if they are on a lower income due to prioritising other things and the lower willingness to pay for dental services due to its lower importance related to primary care. As LIC migrants are likely to be on lower salaries than HIC migrants and native Norwegians (Greve, 2016), it is thus likely that they will be less willing to pay for dental services.

6.7 General Discussion & Limitations

The results of this study suggest that migrants access services differently to native Norwegians, but that this difference is dependent on whether they come from higher income countries (HIC) or lower income countries (LIC). In this study the same effect is generally found in both the 2012 and 2015 datasets, though the level of statistical significance may

vary. LIC migrants are less likely to report having a contact with mental, alternative and dental health services compared with native Norwegians once other influencing variables had been controlled for, whilst there was no significant difference between HIC migrants and native Norwegians. The effect of being an LIC migrant on likelihood of having a contact with mental health services was only significant in 2015 (once all variables had been added). There was no significant difference between migrant groups and native Norwegians in the odds of having a contact with primary care or hospital services. This last finding could be due to the low rate of contact reported (between 5-9% for each group over the two years) and it is thus not possible to elaborate further.

As GPs are gatekeepers for many other services in Norway, the lower rate of first contact with these services may be linked to barriers experienced by migrants in terms of contacting their GP and also requesting further referral (Graetz et al., 2017). In terms of this study, GPs act as gatekeepers for all services excepting (unplanned) hospital visits and dental health care. The lower rate of contact with these services could be due to communication barriers, or due to cultural beliefs about appropriate treatments or illness origins; for example, in the study by Green et al. (2006), the Chinese women interviewed were very keen to avoid the suggestion that they had a mental illness due to stigma. Straiton, Reneflot, and Diaz (2014) found that migrants to Norway were less likely to use a GP for mental health problems, which would suggest that they are thus less likely to be referred on to specialist services. GPs may also be reluctant to refer patients to further treatment due to potential communication issues, particularly in the area of mental health (Jensen et al., 2013). The finding that being an LIC migrant had a significant effect on odds of having a contact with mental health services in 2015, but not in 2012, may be an indicator that barriers to access have increased, or migrants are choosing more often not to use mental health services. However, there is nothing to suggest why this may be the case. Targeting this migrant group with material related to common mental health issues and underlying causes, along with an explanation of how to seek help and why, may thus be a good pathway to reduce barriers related to stigma and confusion. In addition, information explaining the role of the GP as a gatekeeper and reiterating patient rights in terms of referrals more generally may be useful for those who do not have a similar system in their home country. Educating GPs in how to deal with patients from different cultures and how to spot symptoms that may differ from those of the native population is another possibility, along with providing more information on how those who

do not have Norwegian as their first language will be treated in the various services (particularly mental health services) in order to allay fears about communication.

The presence of perceived discrimination also appears to have an influence on contact with services; it is significantly associated with a higher likelihood of reporting contact with mental health services, and in 2012 this was specifically linked to discrimination related to ethnicity and skin colour, which was reported more among LIC migrants than the other groups (13.06%, compared to 0.15% [Norwegians] and 1.96% [HIC migrants]). The effect of being an LIC migrant was not statistically significant in 2012, but it may be the case that there is an interaction between discrimination and migrant group; namely that LIC migrants are more prone to perceiving discrimination and thus would be expected to have a higher utilisation of mental health services, yet their usage is not significantly different from that of native Norwegians who report a much lower rate of perceived discrimination. Thus, it may be that LIC migrants underutilise mental health services. However, this does not explain why both migrant group and perceived discrimination had a significant effect on having at least one contact with mental health services in 2015. Furthermore, discrimination related to ethnicity and skin colour was also associated with a higher usage of specialist services in 2012, while discrimination in 2015 was significantly linked with lower odds of having a contact. This indicates that the relationship may be more complex and beyond the analysis here.

The differences between migrant groups and native Norwegians regarding primary care was further investigated through analysis of the number of contacts made, and this result varied according to the chosen method of analysis. With a 2-part model, which takes as its premise that there is often two different decisions made (that of the patient to take contact, and that of the patient and GP together on what to do once the first contact has been made), LIC migrants had significantly more contacts compared to native Norwegians whilst HIC migrants had significantly less with one version, which had as its second part a log link and Poisson function, whilst there was no significant difference between the migrant groups in a different version, where the second part was a GLM with log link and Gamma family. The latter model did not fit the dataset as well as the other model given the AIC and BIC values, which would lead us to accept the former model's conclusions as more accurate. It is interesting to note that the various health measures maintained significance in both versions of the model; this suggests that while health effects are robust to model specification (i.e. self-rated health is

significant in both models), migrant-related variables may be sensitive to this. Conversely, when a negative binomial model is used, which accounts for the high proportion of zeros in a dataset and the overdispersion of data (high variance) but does not assume a difference between no contacts and at least one contact, there are no significant differences between the migrant groups. This highlights the importance of considering what data is being used and what model assumptions fit best; in the case of this study, it can be assumed that migrants in particular struggle to access services at first due to communication barriers and cultural differences but that those who do make contact have overcome these barriers; thus, the two part model is perhaps a better fit for this dataset. In addition, the AIC and BIC values are smaller for the two part model and the results from this model also fit with previous research, thus reinforcing this theory (Diaz et al., 2014; Diaz et al., 2015). The Poisson model has, furthermore, been used in other studies carrying out similar analyses (e.g. Saurina, Vall-Llosera, & Saez, 2012). However, other studies into utilisation have used different models, such as a negative binomial model in place of a GLM (Brown, Pagan, & Rodriguez-Oreggia, 2005; Villani & Mortensen, 2013). There are also other methods that could be used, such as the finite mixture model; this method accounts for heterogeneity that is unobserved, which also fits health service utilisation well (Deb et al., 2017). This difference in model choice among researchers indicates that there is no consensus on a "right" model to use for utilisation of health services; it may be the case that researchers simply need to reason their way to the one that is the best fit for their data.

Limitations

This study has analysed the effect of migration factors and other variables related to being a migrant on the likelihood of having at least one contact with a variety of healthcare services in Norway. The analysis of multiple services using the same dataset means that a picture of migrant use of the healthcare system overall and factors driving under- or overuse can be captured both in 2012 and 2015. It is also possible to highlight differences between the two years under study, and to make some recommendations as to what can be improved in order to ensure equal access to services between native Norwegians, migrants from higher income countries and migrants from lower income countries. The questionnaire is large and nationwide, and is also conducted in various other countries within the EU for the purposes of comparison. This means the results are likely to be robust and of high quality. As the

questionnaire has a national focus, the results are more generalizable towards the country as a whole and not just a particular area/city.

However, there are issues with the datasets used. Firstly, the data is cross-sectional; this means it is impossible to track a particular individual through the datasets due to confidentiality concerns (though this is possible with access to the full dataset). It is therefore not possible to study the health and health care utilisation of individuals over time and obtain a more detailed view of the complex problem of migration and health. The study has also lacked variables that would have been useful for a more in-depth analysis of migration factors, for example those related to the migration process. It may be that some migrants experienced more stress factors than others and thus have poorer self-assessed health for this reason. Migrants may also travel frequently between Norway and their country of origin e.g. to visit family and friends; as Norway does not keep a record of this, it is not possible to know whether these trips expose migrants to stressors or risks to health. There is also no information available on health pre-migration, which has been shown to be another important determinant of health (Schenker et al., 2014). When considering the impact of migration factors on health, it is useful to have data from the population in the country of origin as a comparison (Rodriguez-Lainz & Castañeda, in Schenker et al., 2014). The results would have been more robust had the same questionnaire been conducted in the countries of origin and the measure of self-rated health compared, as this is taken as a measure of general health in the population. Finally, as length of stay is also not available in the study, it has not been possible to further investigate the healthy migrant effect or control for it, and it may be that this has created some bias in the results. Related to the healthy migrant effect is the "salmon-bias effect", where migrants who become sick may return to their country of origin for help and are thus not represented in the analysis – this is an issue in many studies and can also be a factor in this one (Neuman, 2014; Sandvik et al., 2012). However, the rates of usage found in this study correlate with that of other studies, and the differences between the groups are not so large that there is reason to suspect this is a major problem.

More general limitations related to questionnaire-based studies into migrants and native populations in particular involve the groups under study. It can be difficult to collect information from the most vulnerable migrants, or those who are undocumented; they may be unwilling to participate due to fear of deportation, or they may simply be harder to contact (Schenker et al., 2014). This means they may be underrepresented in the data sample. Persons

56

residing illegally in Norway are also not included in official registries, one of which was used in the collection of data for the questionnaires in order to identify potential respondents (Statistics Norway, 2014; Statistics Norway, 2017c). It can also be hard to identify correct groupings for migrants; the wide diversity means that ideally they should be studied separately according to country of origin, as this may impact the effect of migration on health (Schenker et al., 2014; Lanari & Bussini, 2011); however, the small sample size in the datasets used and the grouping of migrants in the 2015 dataset into geographical areas, regardless of unique country situations, means it has not been possible to do that in this study. It was also not possible to separate migrants into groups related to reason for migration. This limits the applicability of the results, as the migrant groups may not be adequately represented and the groupings used may lead to 'ethnic lumping', which assumes that all countries in a particular area of the world have similar demographics and issues. Additionally, in these datasets the individual migrant populations representing countries of origin, and even those grouped into the separate geographical areas, were less than 10% of the total survey population. 10% has been suggested as a cut-off point for a "rare" population, and below this there is a great risk for larger sampling errors (Andresen et al, 2004; in Schenker et al., 2014). The sample size in this study was not sufficient to separate first- and second-generation migrants; it may be that there are differences between these groups that are not captured in this analysis, such as those related to perceived discrimination and its effects on health (Viruell-Fuentes, 2007).

Suggestions for Further Study

To deal with the small percentage of migrants in studies such as this and the lower response rate, thus improving the accessibility of the European Health Survey to those wishing to research migrants in connection with the themes of the questionnaires (e.g. health), it may be a good idea to consider oversampling migrant groups within the countries (Rodriguez-Lainz and Castañeda, in Schenker et al., 2014). This would allow a larger sample size and ensure the lower response rates among migrants do not affect the quality of the dataset. Another suggestion to build on the research done here would be to combine the quantitative nature of this study with more of a qualitative study (i.e. a mixed methods study) in order to understand further the impact of the migration process on self-assessed health. It may be that interview respondents shed some light on their understanding of how the migration process affects them; this could then be compared to the quantitative data and discrepancies can be

highlighted and explored further. This may be particularly useful when considering the psychological impact of the migration process (and individual factors) on self-assessed health. Additionally, as mentioned above, perceived discrimination appears to have a complex relationship with access to health services dependent on year; a more in-depth look into this variable could be useful in understanding its role in migration and health.

Conclusion

The aim of this study was to compare migrants to Norway with native Norwegians on their access to various health services, using contact as a measure and controlling for influencing variables related to health and personal characteristics. The main findings were that migrants from lower income countries (LIC) were statistically less likely to have reported a contact with mental, alternative or dental health services when compared with the native population. Migrants from higher income countries (HIC) did not differ from the native population. Furthermore, there was an effect of model choice when analysing differences with regards to number of contacts with primary health care services; LIC migrants had significantly more contacts and HIC migrants significantly less contacts compared to native Norwegians when a model taking into account the two parts of contacting a health service (i.e. first contact, and then follow-up contacts) was used, whereas there was no significance of migrant group on number of contacts when a model was used that takes into account overdispersion and a mass at zero, but does not differentiate between zero and one as more important than further contacts once contact has been established. This suggests that model choice is important when researching group differences in utilisation of health care services. The finding that LIC migrants access mental health services less than native Norwegians was significant only in 2015; this shows that there may have been a worsening of the situation since 2012, although this can also be due to an increase in refugee migrants over the past few years. The areas of alternative care and dental care (in adults) are under-researched, and further research could well focus on these areas. This is particularly important in dental care and oral health, which is undervalued in general but which can contribute to a greatly reduced quality of life.

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Appendices

Appendix 1: List of Variables

Migrant Group (Stata variable: "migrant", created from "landbak3gen1"

- Higher Income Country (HIC) migrants
- Lower Income Country (LIC) migrants

Gender (Stata variable: "Kjonn" in 2012 dataset, "IOs_Kjonn" in 2015 dataset

- Female
- Male

Age Group (Stata variable: "AldGrupp")

- 16-24
- 25-44
- 45-66
- 67-79
- 80+

Education Level (Stata variable: "education", created from "utdnivaa" in 2012 dataset and "utdnivaa1" in 2015 dataset)

- None/Primary (coded 0 and 1 in original variable)
- Secondary (coded 2-5 in original variable)
- Tertiary(coded 6-8 in original variable)

Total household income level (Stata variable: "inntekt", created from "aggf_08_su" in 2012 dataset [yearly] and "Net_month_sum_gruppert" in 2015 [monthly])

- 0 – 249,999 NOK (2012)
- 250,000 – 499,999 NOK (2012)
- 500,000 – 749,999 NOK (2012)
- 750,000 – 999,999 NOK (2012)
- 1,000,000+ NOK(2012)
- 0 – 19,999 NOK (2015)
- 20,000 – 39,999 NOK (2015)
- 40,000 – 59,999 NOK (2015)
- 60,000 – 79,999 NOK (2015)

66

- 80,000+ NOK (2015)

Civil Status (Stata variable: "SivStat")

- Single
- Married/ registered partner
- Widowed
- Separated
- Divorced

County (Stata variable: "fylke" in 2012 dataset, "Fylke" in 2015 dataset)

- 1: Østfold
- 2: Akershus
- 3: Oslo
- 4: Hedmark
- 5: Oppland
- 6: Buskerud
- 7: Vestfold
- 8: Telemark
- 9: Aust-Agder
- 10: Vest-Agder
- 11: Rogaland
- 12: Hordaland
- 14: Sogn og Fjordane
- 15: Møre og Romsdal
- 16: Sør-Trøndelag
- 17: Nord-Trøndelag
- 18: Nordland
- 19: Troms
- 20: Finnmark

Number of people in household (Stata variable: "antphush" in 2012 dataset, "antphush" created from "antpopptalt" in 2015 dataset)

- 1
- 2
- 3
- 4

- 5
- 6+

Experienced discrimination in the past 12 months (Stata variable: "disc", created from "Disk_" variables in 2012 and from "Disk" in 2015 dataset)

- Yes (2015,)
- Yes, related to ethnicity/skin colour (2012, positive response on "Disk_bak1" or "Disk_bak2")
- Yes, unrelated to ethnicity/skin colour (2012, positive response on: "Disk_Ikke", "Disk_Alder", "Disk_Kjonn", "Disk_Helse", "Disk_Funk", "Disk_Tro", "Disk_seks" or "Disk_Andre")
- Not experienced

Self-rated overall life satisfaction (2015, Stata variable: "lifesat", created from "Spm1")

- Good
- Poor

Self-rated health (Stata variable: "srh", created from "H1" in 2012 dataset and "HS1" in 2015 dataset)

- Good
- Poor

Reported at least one chronic health condition (Stata variable: "chrh", created from "H2a" in 2012 dataset and "HS2" in 2015 dataset)

- No
- At least one

Mean free places on GP list (2012, Stata variable: "gpledigp", created by "mp_ant_pas - ant_pas")

Method of contact last time help was required (2012, Stata variable: "Sp_Lghj")

- Regular GP
- Emergency/out of hours doctor
- Private doctor's clinic
- Another doctor
- Have never required a doctor

At least one primary care contact in last 12 months (Stata variable: "primcare", created from "H13a" in 2012 dataset and "AM2" in 2015 dataset)

- Yes

- No

Number of primary care contacts in last 12 months (2015, Stata variable: "H13a", count variable)

Required a primary care appointment in past 12 months without contacting services (2015, Stata variable: "primneed", created from "UNA")

- Yes
- No

At least one specialist care contact in last 12 months (Stata variable: "spescare", created from "H14" and "H16" in 2012 dataset and "AM4" and "HO3" in 2015 dataset)

- Yes
- No

At least one mental health care contact in last 12 months (Stata variable: "mentcare", created from "H15ps3", "H15ps" and "H17aPsyk" in 2012 dataset and "AM6B1", "AM6B2" and "H17aPsyk" in 2015 dataset)

- Yes
- No

Required a mental care appointment in the past 6 months without contacting services (Stata variable: "mentneed", created from "Hels5a_psyk" in 2012 dataset and "UND" in 2015 dataset)

- Yes
- No

At least one hospital care contact in last 12 months (not related to birth) (Stata variable: "hospcare", created from "H17a" and "H17a_f" in 2012 dataset and "HO1" and "H17a_f" in 2015 dataset)

- Yes
- No

At least one alternative care contact in last 12 months (Stata variable: "altcare", created from "Altern")

- Yes
- No

At least one dental service contact in last 12 months (Stata variable: "dentcare", created from "Tannleg4" in 2012 dataset and "AM1" in 2015 dataset)

- Yes

- No

Poor self-rated dental health (Stata variable: "srdenth", created from "Tannhel")

- Good

- Poor

Required dental help in past 12 months without contacting services (Stata variable: "dentneed", created from "Hels5a" in 2012 dataset and "UNB" in 2015 dataset)

- Yes

- No

Appendix 2: Full General Characteristics Table

Migrant Group	2012 Dataset			2015 Dataset		
	Native (4,523)	Western (510)	Non-Western (314)	Native (6,451)	Western (787)	Non-Western (509)
Female	2,299 (50.83%)	246 (48.24%)	153 (48.73%)	3,251* (50.40%)	369* (46.89%)	232* (45.58%)
Age Group*						
16-24	484 (10.70%)	92 (18.04%)	78 (24.84%)	765 (11.86%)	138 (17.53%)	130 (25.54%)
25-44	1,231 (27.22%)	219 (42.94%)	159 (50.64%)	1,732 (26.85%)	330 (41.93%)	255 (50.10%)
45-66	1,882 (41.61%)	158 (30.98%)	73 (23.25%)	2,600 (40.30%)	256 (32.53%)	115 (22.59%)
67-79	738 (16.32%)	34 (6.67%)	4 (1.27%)	1,026 (15.90%)	51 (6.48%)	9 (1.77%)
80+	188 (4.16%)	7 (1.37%)	0 (0%)	328 (5.08%)	12 (1.52%)	0 (0%)
Education Level*						
None/Primary	1,672 (36.97%)	133 (26.08%)	122 (38.85%)	2,355 (36.51%)	202 (25.67%)	197 (38.70%)
Secondary	1,305 (28.85%)	168 (32.94%)	79 (25.16%)	1,889 (29.28%)	229 (29.10%)	140 (27.50%)
Tertiary	1,546 (34.18%)	209 (40.98%)	113 (35.99%)	2,207 (34.21%)	356 (45.24%)	172 (33.79%)
Civil Status*						
Single	1,554 (34.36%)	253 (49.61%)	133 (42.36%)	2,379 (36.88%)	377 (47.90%)	239 (46.95%)
Married/ registered partner	2,367 (52.33%)	211 (41.37%)	152 (48.41%)	3,180 (49.29%)	335 (42.57%)	233 (45.78%)
Widowed	274 (6.06%)	12 (2.35)	2 (0.64%)	367 (5.69%)	17 (2.16%)	3 (0.59%)
Separated	36 (0.80%)	7 (1.37%)	11 (3.50%)	55 (0.85%)	10 (1.27%)	9 (1.77%)
Divorced	292 (6.46%)	27 (5.29%)	16 (5.10%)	470 (7.29%)	48 (6.10%)	25 (4.91%)
County*						
1: Østfold	248 (5.48%)	35 (6.86%)	18 (5.73%)	297 (4.60%)	41 (5.21%)	27 (5.30%)
2: Akershus	499 (11.03%)	86 (16.86%)	39 (12.42%)	324 (5.02%)	52 (6.61%)	42 (8.25%)
3: Oslo	488 (10.79%)	112 (21.96%)	90 (28.66%)	564 (8.74%)	144 (18.30%)	135 (26.52%)
4: Hedmark	186 (4.11%)	19 (3.73%)	13 (4.14%)	349 (5.41%)	32 (4.07%)	11 (2.16%)
5: Oppland	185 (4.09%)	11 (2.16%)	5 (1.59%)	330 (5.12%)	32 (4.07%)	9 (1.77%)
6: Buskerud	224 (4.95%)	24 (4.71%)	22 (7.01%)	307 (4.76%)	44 (5.59%)	37 (7.27%)
7: Vestfold	219 (4.84%)	25 (4.90%)	11 (3.50%)	298 (4.62%)	49 (6.23%)	30 (5.89%)
8: Telemark	151 (3.34%)	14 (2.75%)	13 (4.14%)	310 (4.81%)	36 (4.57%)	21 (4.13%)

9: Aust-Agder	97 (2.14%)	14 (2.75%)	2 (0.64%)	310 (4.81%)	39 (4.96%)	15 (2.95%)
10: Vest-Agder	163 (3.60%)	15 (2.94%)	13 (4.14%)	289 (4.48%)	53 (6.73%)	29 (5.70%)
11: Rogaland	377 (8.34%)	33 (6.47%)	28 (8.92%)	325 (5.04%)	54 (6.86%)	27 (5.30%)
12: Hordaland	466 (10.30%)	53 (10.39%)	23 (7.32%)	340 (5.27%)	45 (5.72%)	33 (6.48%)
14: Sogn og Fjordane	95 (2.10%)	5 (0.98%)	3 (0.96%)	353 (5.47%)	18 (2.29%)	11 (2.16%)
15: Møre og Romsdal	245 (5.42%)	9 (1.76%)	5 (1.59%)	327 (5.07%)	22 (2.80%)	14 (2.75%)
16: Sør-Trøndelag	291 (6.43%)	25 (4.90%)	13 (4.14%)	358 (5.55%)	32 (4.07%)	22 (4.32%)
17: Nord-Trøndelag	139 (3.07%)	7 (1.37%)	3 (0.96%)	363 (5.63%)	23 (2.92%)	6 (1.18%)
18: Nordland	215 (4.75%)	12 (2.35%)	7 (2.23%)	364 (5.64%)	21 (2.67%)	13 (2.55%)
19: Troms	171 (3.78%)	8 (1.57%)	5 (1.59%)	354 (5.49%)	21 (2.67%)	11 (2.16%)
20: Finnmark	64 (1.41%)	3 (0.59%)	1 (0.32%)	289 (4.48%)	29 (3.68%)	16 (3.14%)
Number of people in household*						
1	987 (21.82%)	141 (27.65%)	66 (21.02%)	1,526 (23.66%)	192 (24.40%)	122 (23.97%)
2	1,790 (39.58%)	153 (30%)	67 (21.34%)	2,509 (38.89%)	243 (30.88%)	115 (22.59%)
3	636 (14.06%)	69 (13.53%)	56 (17.83%)	892 (13.83%)	131 (16.65%)	93 (18.27%)
4	710 (15.70%)	93 (18.24%)	78 (24.84%)	1,011 (15.67%)	145 (18.42%)	111 (21.81%)
5	325 (7.19%)	43 (8.43%)	27 (8.60%)	436 (6.76%)	64 (8.13%)	43 (8.45%)
6+	75 (1.66%)	11 (2.16%)	20 (6.37%)	77 (1.19%)	12 (1.52%)	25 (4.91%)
Experienced discrimination in the past 12 months*						
Yes (2015)				418 (6.48%)	82 (10.42%)	84 (16.50%)
Yes, related to ethnicity/skin colour (2012)	7 (0.15%)	10 (1.96%)	41 (13.06%)			
Yes, unrelated to ethnicity/skin colour (2012)	192 (4.24%)	33 (6.47%)	26 (8.28%)			
Not experienced	4,324 (95.60%)	467 (91.57%)	247 (78.66%)	6,033 (93.52%)	705 (89.58%)	425 (83.50%)
Poor self-rated health	1,039 (22.97%)	96 (18.82%)	68 (21.66%)	1,336* (20.71%)	138* (17.53%)	91* (17.88%)
Reported at least one chronic health condition	1,962* (43.38%)	198* (38.82%)	116* (36.94%)	2,319*** (35.95%)	232*** (29.48%)	131*** (25.74%)
Total yearly income level (household)*						

2012 (yearly)						
0 – 249,999 NOK	1,919 (42.43%)	281 (55.10%)	207 (65.92%)			
250,000 – 499,999 NOK	863 (19.08%)	77 (15.10%)	47 (14.97%)			
500,000 – 749,999 NOK	498 (11.01%)	52 (10.20%)	20 (6.37%)			
750,000 – 999,999 NOK	287 (6.35%)	23 (4.51%)	10 (3.18%)			
1,000,000+ NOK	956 (21.14%)	77 (15.10%)	30 (9.55%)			
2015 (monthly)						
0 – 19,999 NOK				693 (10.74%)	87 (11.05%)	88 (17.29%)
20,000 – 39,999 NOK				1,782 (27.62%)	216 (27.45%)	158 (31.04%)
40,000 – 59,999 NOK				1,846 (28.62%)	235 (29.86%)	148 (29.08%)
60,000 – 79,999 NOK				1,386 (21.49%)	151 (19.19%)	83 (16.31%)
80,000+ NOK				744 (11.53%)	98 (12.45%)	32 (6.29%)
Mean free places on GP list (SD)	28.28 (129.91)	39.76 (133.54)	39.06 (122.02)	-	-	-
Method of contact last time help was required (2012 PRIMARY, SPECIALIST & ALTERNATIVE MODELS ONLY)***	**N = 4,513**	**N = 509**	**N = 312**			
Regular GP	3,450 (76.45%)	357 (70.14%)	237 (75.96%)			
Emergency/out of hours doctor	531 (11.77%)	80 (15.72%)	41 (13.14%)			
Private doctor's clinic	276 (6.12%)	38 (7.47%)	11 (3.53%)			
Another doctor	208 (4.61%)	24 (4.72%)	13 (4.17%)			
Have never required a doctor	48 (1.06%)	10 (1.96%)	10 (3.21%)			
PRIMARY CARE MODEL	**N = 4,487**	**N = 509**	**N = 309**	**N = 6,442**	**N = 785**	**N = 508**
At least one primary care contact in last 12 months	3,751* (83.60%)	411* (80.75%)	242* (78.32%)	4,848** (75.26%)	564** (71.85%)	356** (70.08%)
Required an appointment in past 12 months without contacting services				462*** (7.17%)	87*** (11.08%)	66*** (12.99%)
SPECIALIST CARE MODEL	**N = 4,512**	**N = 509**	**N = 312**	**N = 6,449**	**N = 785**	**N = 509**
At least one specialist care contact in last 12 months	1,983* (43.95%)	212* (41.65%)	114* (36.54%)	2,448*** (37.96%)	269*** (34.27%)	155*** (30.45%)
MENTAL HEALTH MODEL	**N = 4,054**	**N = 449**	**N = 283**	**N = 6,442**	**N = 783**	**N = 508**

At least one mental health care contact in last 12 months	152** (3.75%)	31** (6.90%)	15** (5.30%)	341 (5.29%)	55 (7.02%)	28 (5.51%)
Required an appointment in the past 6 months but didn't book one	183 (4.51%)	31 (6.90%)	17 (6.01%)	132** (2.05%)	28** (3.58%)	19** (3.74%)
HOSPITAL CARE MODEL	**N = 4,523**	**N = 510**	**N = 314**	**N = 6,447**	**N = 785**	**N = 509**
At least one hospital care contact in last 12 months (not related to birth)	412 (9.11%)	37 (7.25%)	20 (6.37%)	634** (9.83%)	71** (9.04%)	29** (5.70%)
ALTERNATIVE CARE MODEL	**N = 4,513**	**N = 509**	**N = 312**	**N = 6,447**	**N = 784**	**N = 508**
At least one alternative care contact in last 12 months	455 (10.08%)	54 (10.61%)	23 (7.37%)	728** (11.29%)	101** (12.88%)	37** (7.28%)
DENTAL CARE MODEL	**N = 4,502**	**N = 509**	**N = 311**	**N = 6,432**	**N = 783**	**N = 505**
At least one dental service contact in last 12 months	3,481*** (77.32%)	377*** (74.07%)	201*** (64.63%)	5,193*** (80.74%)	600*** (76.63%)	313*** (61.98%)
Poor self-rated dental health	1,146 (25.36%)	113 (22.20%)	92 (29.58%)	1,487 (23.12%)	177 (22.61%)	126 (24.95%)
Required dental help but didn't book appointment	372*** (8.26%)	55*** (10.81%)	61*** (19.61%)	408*** (6.34%)	55*** (7.02%)	53*** (10.50%)

Appendix 3: Full Logistic Regression Tables

Primary Care

USE OF PRIMARY CARE SERVICES	2012 Dataset			2015 Dataset		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Migrant Category						
Norwegians (ref)	1	1	1	1	1	1
HIC migrants	0.823 [0.651,1.040]	0.923 [0.724,1.177]	0.959 [0.744,1.236]	0.839* [0.711,0.990]	0.980 [0.824,1.166]	0.994 [0.833,1.187]
LIC migrants	0.709* [0.535,0.939]	0.852 [0.633,1.149]	0.838 [0.606,1.160]	0.770** [0.632,0.939]	0.944 [0.762,1.168]	0.990 [0.795,1.232]
Female gender		1.661*** [1.429,1.931]	1.589*** [1.358,1.858]		1.916*** [1.716,2.139]	1.847*** [1.651,2.066]
Education						
None/primary (ref)		1	1		1	1
Secondary		1.270* [1.044,1.544]	1.317** [1.074,1.615]		1.069 [0.929,1.230]	1.122 [0.973,1.295]
Tertiary		0.953 [0.786,1.156]	1.110 [0.908,1.358]		0.818** [0.709,0.943]	0.876 [0.757,1.015]
Age Group						
16-24 (ref)		1	1		1	1
25-44		1.005 [0.780,1.295]	0.869 [0.667,1.132]		1.177 [0.977,1.419]	1.096 [0.907,1.326]
45-66		1.318 [0.992,1.750]	1.055 [0.785,1.418]		1.360** [1.110,1.667]	1.157 [0.939,1.425]
67-79		2.150*** [1.459,3.167]	1.695* [1.131,2.540]		2.427*** [1.842,3.197]	2.090*** [1.577,2.769]
80+		2.787** [1.459,5.324]	1.830 [0.942,3.555]		3.381*** [2.195,5.208]	2.912*** [1.882,4.505]
Civil Status						
Single (ref)		1	1		1	1
Married/ registered partner		1.228 [0.999,1.509]	1.161 [0.939,1.436]		1.146 [0.983,1.336]	1.098 [0.939,1.284]
Widowed		1.417 [0.851,2.358]	1.390 [0.822,2.350]		1.111 [0.779,1.584]	1.080 [0.754,1.548]
Separated		2.344 [0.827,6.645]	2.261 [0.786,6.505]		1.490 [0.829,2.676]	1.667 [0.919,3.023]
Divorced		1.470* [1.011,2.138]	1.338 [0.909,1.969]		1.367* [1.064,1.757]	1.288 [0.996,1.664]
Number of people in household						

1 (ref)		1	1		1	1
2		1.053 [0.826,1.344]	1.109 [0.862,1.426]		1.303** [1.076,1.576]	1.288* [1.060,1.564]
3		0.930 [0.706,1.226]	0.999 [0.751,1.328]		1.134 [0.906,1.420]	1.118 [0.890,1.406]
4		0.910 [0.691,1.198]	1.033 [0.777,1.373]		0.928 [0.734,1.173]	0.940 [0.741,1.194]
5		0.761 [0.550,1.054]	0.906 [0.646,1.270]		0.899 [0.680,1.190]	0.911 [0.685,1.211]
6+		0.711 [0.433,1.168]	0.801 [0.480,1.335]		0.906 [0.575,1.429]	0.938 [0.591,1.489]
Total income level (household)						
2012 (yearly)						
0 – 249,999 NOK (ref)		1	1			
250,000 – 499,999 NOK		0.824 [0.673,1.009]	0.854 [0.693,1.052]			
500,000 – 749,999 NOK		1.000 [0.767,1.305]	1.033 [0.786,1.358]			
750,000 – 999,999 NOK		0.901 [0.647,1.255]	0.952 [0.677,1.340]			
1,000,000+ NOK		0.797* [0.645,0.986]	0.856 [0.687,1.066]			
2015 (monthly)						
0 – 19,999 NOK (ref)					1	1
20,000 – 39,999 NOK					1.062 [0.868,1.299]	1.143 [0.929,1.406]
40,000 – 59,999 NOK					1.260 [0.994,1.596]	1.383** [1.086,1.762]
60,000 – 79,999 NOK					1.127 [0.873,1.454]	1.294 [0.997,1.680]
80,000+ NOK					1.124 [0.849,1.486]	1.330 [0.998,1.771]
Free places on GP list (2012)		1.000 [0.999,1.000]	1.000 [0.999,1.001]		-	-
County						
1: Østfold (ref)		1	1		1	1
2: Akershus		1.194 [0.817,1.745]	1.195 [0.808,1.766]		0.764 [0.541,1.079]	0.760 [0.534,1.080]
3: Oslo		1.140 [0.783,1.659]	1.183 [0.803,1.743]		0.827 [0.608,1.124]	0.831 [0.608,1.138]
4: Hedmark		1.379 [0.834,2.281]	1.297 [0.773,2.177]		0.878 [0.614,1.253]	0.854 [0.594,1.229]
5: Oppland		1.076 [0.659,1.757]	1.078 [0.647,1.794]		0.779 [0.545,1.113]	0.771 [0.536,1.110]
6: Buskerud		1.094 [0.697,1.714]	1.103 [0.694,1.753]		0.798 [0.560,1.136]	0.800 [0.557,1.148]

7: Vestfold		0.909 [0.580,1.425]	1.013 [0.635,1.618]		0.989 [0.687,1.424]	0.992 [0.684,1.438]
8: Telemark		0.848 [0.519,1.386]	0.915 [0.549,1.525]		0.854 [0.596,1.225]	0.823 [0.569,1.188]
9: Aust-Agder		0.996 [0.552,1.795]	1.057 [0.576,1.942]		0.932 [0.648,1.339]	0.928 [0.641,1.342]
10: Vest-Agder		1.504 [0.888,2.550]	1.674 [0.968,2.893]		0.686* [0.483,0.975]	0.713 [0.498,1.021]
11: Rogaland		1.029 [0.690,1.532]	1.083 [0.718,1.634]		0.752 [0.533,1.063]	0.725 [0.510,1.032]
12: Hordaland		1.163 [0.788,1.715]	1.210 [0.809,1.810]		0.808 [0.572,1.140]	0.816 [0.574,1.160]
14: Sogn og Fjordane		0.836 [0.468,1.493]	0.991 [0.542,1.811]		0.539*** [0.383,0.758]	0.550*** [0.388,0.779]
15: Møre og Romsdal		0.933 [0.595,1.463]	0.955 [0.601,1.517]		0.904 [0.629,1.299]	0.895 [0.618,1.295]
16: Sør-Trøndelag		1.022 [0.669,1.559]	0.992 [0.641,1.535]		0.659* [0.469,0.925]	0.686* [0.485,0.970]
17: Nord-Trøndelag		0.915 [0.543,1.541]	0.933 [0.544,1.600]		0.746 [0.525,1.060]	0.759 [0.531,1.086]
18: Nordland		1.042 [0.650,1.669]	1.105 [0.677,1.804]		0.665* [0.471,0.939]	0.661* [0.465,0.940]
19: Troms		1.031 [0.625,1.701]	1.047 [0.623,1.761]		0.922 [0.645,1.318]	0.930 [0.646,1.339]
20: Finnmark		0.873 [0.438,1.738]	0.724 [0.357,1.470]		0.809 [0.562,1.165]	0.808 [0.557,1.172]
Self-rated overall life satisfaction (2015)						
Good (ref)		-	-		1	1
Poor		-	-		2.144*** [1.749,2.628]	1.418** [1.142,1.760]
Self-rated health						
Good (ref)			1			1
Poor			2.246*** [1.740,2.900]			1.525*** [1.268,1.834]
Presence of a chronic health condition						
None (ref)			1			1
At least one			2.299*** [1.922,2.751]			2.587*** [2.242,2.985]
Method of contact last time help was required (2012)						
Regular GP (ref)			1			-
Emergency/out of hours doctor			0.925 [0.735,1.164]			-
Private doctor's clinic			0.588*** [0.445,0.778]			-
Another doctor			0.596** [0.430,0.826]			-

			0.0952*** [0.0544,0.167]			-
Have never required a doctor			0.0952*** [0.0544,0.167]			-
Experienced discrimination in the past 12 months						
Not experienced (ref)			1			1
Yes, related to ethnicity/skin colour (2012)			1.323 [0.867,2.019]			
Yes, unrelated to ethnicity/skin colour (2012)			1.432 [0.645,3.182]			
Yes (2015)						1.240 [0.989,1.554]
Required a primary care appointment but did not book one (2015)						
No (ref)						1
Yes						1.322* [1.057,1.653]
N	5305	5305	5305	7735	7735	7735

*significant at the 0.05 level   **significant at the 0.01 level   ***significant at the 0.001 level

Specialist Care

USE OF SPECIALIST CARE SERVICES	2012 Dataset			2015 Dataset		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Migrant Category						
Norwegians (ref)	1	1	1	1	1	1
HIC migrants	0.910 [0.756,1.096]	1.028 [0.847,1.247]	1.022 [0.837,1.249]	0.852* [0.729,0.996]	0.939 [0.799,1.104]	0.958 [0.811,1.132]
LIC migrants	0.734* [0.579,0.931]	0.915 [0.712,1.176]	0.845 [0.641,1.114]	0.716*** [0.589,0.870]	0.825 [0.670,1.017]	0.870 [0.702,1.078]
Female gender		1.562*** [1.395,1.749]	1.556*** [1.383,1.750]		1.519*** [1.379,1.674]	1.458*** [1.319,1.611]
Education						
None/primary (ref)		1	1		1	1
Secondary		1.126 [0.972,1.303]	1.177* [1.011,1.370]		1.040 [0.918,1.177]	1.110 [0.976,1.262]
Tertiary		1.042 [0.902,1.204]	1.203* [1.034,1.400]		1.091 [0.963,1.236]	1.193** [1.048,1.359]

Age Group						
16-24 (ref)		1	1		1	1
25-44		1.158 [0.934,1.435]	1.061 [0.849,1.326]		1.074 [0.893,1.293]	0.981 [0.811,1.186]
45-66		1.451** [1.151,1.831]	1.233 [0.967,1.571]		1.240* [1.018,1.511]	1.005 [0.819,1.234]
67-79		1.665*** [1.253,2.212]	1.393* [1.035,1.875]		1.731*** [1.361,2.201]	1.441** [1.124,1.848]
80+		1.948*** [1.316,2.882]	1.438 [0.956,2.164]		1.578** [1.149,2.167]	1.291 [0.929,1.795]
Civil Status						
Single (ref)		1	1		1	1
Married/ registered partner		1.162 [0.985,1.370]	1.103 [0.930,1.309]		1.150 [0.998,1.324]	1.091 [0.943,1.261]
Widowed		1.001 [0.735,1.363]	0.960 [0.697,1.324]		1.048 [0.798,1.376]	1.004 [0.758,1.331]
Separated		0.928 [0.528,1.632]	0.894 [0.499,1.602]		1.031 [0.627,1.694]	1.156 [0.694,1.927]
Divorced		1.299* [1.006,1.678]	1.229 [0.941,1.604]		1.418*** [1.154,1.742]	1.322* [1.068,1.637]
Number of people in household						
1 (ref)		1	1		1	1
2		1.123 [0.933,1.351]	1.209 [0.998,1.465]		1.171 [0.986,1.391]	1.147 [0.960,1.371]
3		0.969 [0.780,1.203]	1.072 [0.856,1.343]		0.973 [0.791,1.197]	0.940 [0.759,1.164]
4		0.851 [0.681,1.062]	0.987 [0.783,1.243]		0.853 [0.684,1.064]	0.856 [0.681,1.074]
5		0.763 [0.579,1.005]	0.897 [0.673,1.194]		0.847 [0.647,1.107]	0.850 [0.644,1.120]
6+		0.736 [0.470,1.152]	0.852 [0.535,1.357]		1.090 [0.707,1.682]	1.146 [0.735,1.786]
Total income level (household)						
2012 (yearly)						
0 – 249,999 NOK (ref)		1	1			
250,000 – 499,999 NOK		0.982 [0.839,1.148]	1.036 [0.880,1.218]			
500,000 – 749,999 NOK		1.100 [0.907,1.334]	1.171 [0.959,1.431]			
750,000 – 999,999 NOK		1.133 [0.887,1.447]	1.256 [0.975,1.618]			
1,000,000+ NOK		0.967 [0.824,1.135]	1.043 [0.883,1.231]			

2015 (monthly)						
0 – 19,999 NOK (ref)					1	1
20,000 – 39,999 NOK					1.111 [0.923,1.336]	1.198 [0.990,1.451]
40,000 – 59,999 NOK					1.283[*] [1.035,1.590]	1.423[**] [1.139,1.778]
60,000 – 79,999 NOK					1.313[*] [1.039,1.660]	1.551[***] [1.217,1.978]
80,000+ NOK					1.174 [0.905,1.523]	1.437[**] [1.097,1.881]
Free places on GP list (2012)		1.000 [0.999,1.000]	1.000 [0.999,1.000]		-	-
County						
1: Østfold (ref)		1	1		1	1
2: Akershus		1.196 [0.901,1.589]	1.192 [0.889,1.598]		0.892 [0.666,1.196]	0.894 [0.661,1.210]
3: Oslo		1.065 [0.802,1.415]	1.049 [0.782,1.407]		0.915 [0.706,1.186]	0.922 [0.705,1.205]
4: Hedmark		0.916 [0.638,1.314]	0.822 [0.566,1.193]		0.823 [0.611,1.109]	0.803 [0.590,1.092]
5: Oppland		1.072 [0.742,1.549]	1.016 [0.694,1.489]		0.755 [0.557,1.023]	0.752 [0.549,1.029]
6: Buskerud		0.974 [0.693,1.368]	0.966 [0.680,1.372]		0.846 [0.628,1.141]	0.838 [0.615,1.141]
7: Vestfold		1.030 [0.730,1.452]	1.093 [0.765,1.561]		0.860 [0.637,1.160]	0.852 [0.626,1.162]
8: Telemark		0.943 [0.643,1.384]	0.941 [0.632,1.399]		0.969 [0.718,1.309]	0.934 [0.684,1.274]
9: Aust-Agder		1.180 [0.758,1.837]	1.210 [0.764,1.917]		0.842 [0.621,1.141]	0.833 [0.609,1.140]
10: Vest-Agder		1.257 [0.866,1.824]	1.295 [0.880,1.904]		0.765 [0.565,1.037]	0.788 [0.576,1.079]
11: Rogaland		0.977 [0.721,1.324]	1.006 [0.735,1.377]		0.702[*] [0.520,0.948]	0.671[*] [0.492,0.915]
12: Hordaland		1.148 [0.859,1.535]	1.127 [0.835,1.522]		0.789 [0.587,1.061]	0.792 [0.583,1.075]
14: Sogn og Fjordane		0.843 [0.528,1.347]	0.892 [0.549,1.449]		0.983 [0.729,1.325]	1.025 [0.753,1.395]
15: Møre og Romsdal		1.011 [0.717,1.427]	0.986 [0.690,1.408]		0.831 [0.612,1.127]	0.835 [0.610,1.144]
16: Sør-Trøndelag		1.032 [0.746,1.429]	0.992 [0.709,1.388]		0.780 [0.580,1.051]	0.801 [0.589,1.089]
17: Nord-Trøndelag		0.937 [0.623,1.408]	0.899 [0.589,1.371]		0.835 [0.620,1.125]	0.858 [0.631,1.166]
18: Nordland		1.260 [0.886,1.790]	1.268 [0.880,1.826]		0.806 [0.598,1.087]	0.800 [0.588,1.089]

80

19: Troms		1.201 [0.824,1.750]	1.155 [0.781,1.709]		0.756 [0.558,1.023]	0.756 [0.553,1.033]
20: Finnmark		1.342 [0.784,2.295]	1.143 [0.655,1.992]		0.743 [0.543,1.017]	0.731 [0.529,1.011]
Self-rated overall life satisfaction (2015)						
Good (ref)		-	-		1	1
Poor		-	-		1.760*** [1.517,2.043]	1.166 [0.991,1.372]
Self-rated health						
Good (ref)			1			1
Poor			1.824*** [1.575,2.112]			1.469*** [1.283,1.682]
Presence of a chronic health condition						
None (ref)			1			1
At least one			2.110*** [1.869,2.382]			2.537*** [2.273,2.832]
Method of contact last time help was required (2012)						
Regular GP			1			-
Emergency/out of hours doctor			1.083 [0.904,1.297]			-
Private doctor's clinic			1.206 [0.949,1.533]			-
Another doctor			1.243 [0.944,1.637]			-
Have never required a doctor			0.185*** [0.0785,0.434]			-
Experienced discrimination in the past 12 months						
Not experienced (ref)			1			1
Yes, related to ethnicity/skin colour (2012)			1.690*** [1.286,2.221]			
Yes, unrelated to ethnicity/skin colour (2012)			1.516 [0.856,2.686]			
Yes (2015)						0.815* [0.678,0.979]
N	5333	5333	5333	7743	7743	7743

*significant at the 0.05 level   **significant at the 0.01 level   ***significant at the 0.001 level

Mental Care

USE OF MENTAL CARE SERVICES	2012 Dataset			2015 Dataset		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Migrant Category						
Norwegians (ref)	1	1	1	1	1	1
HIC migrants	1.904** [1.277,2.838]	1.420 [0.939,2.148]	1.267 [0.813,1.975]	1.352* [1.006,1.815]	0.930 [0.674,1.282]	0.918 [0.660,1.277]
LIC migrants	1.437 [0.833,2.477]	1.007 [0.565,1.794]	0.862 [0.453,1.640]	1.044 [0.702,1.551]	0.483** [0.313,0.746]	0.503** [0.324,0.781]
Female gender		1.802*** [1.332,2.438]	1.537** [1.123,2.105]		2.033*** [1.629,2.538]	1.811*** [1.443,2.273]
Education						
None/primary (ref)		1	1		1	1
Secondary		0.818 [0.555,1.205]	0.826 [0.554,1.232]		0.951 [0.728,1.244]	1.031 [0.784,1.356]
Tertiary		1.047 [0.716,1.531]	1.286 [0.862,1.918]		0.853 [0.644,1.131]	1.005 [0.753,1.342]
Age Group						
16-24 (ref)		1	1		1	1
25-44		0.989 [0.635,1.540]	0.907 [0.572,1.440]		0.954 [0.688,1.322]	0.826 [0.591,1.154]
45-66		0.744 [0.446,1.243]	0.679 [0.395,1.167]		0.386*** [0.262,0.570]	0.306*** [0.205,0.458]
67-79		0.255** [0.105,0.620]	0.254** [0.101,0.636]		0.123*** [0.0633,0.238]	0.105*** [0.0535,0.205]
80+		0.135 [0.0166,1.099]	0.122 [0.0149,1.003]		0.0325*** [0.00725,0.146]	0.0270*** [0.00595,0.123]
Civil Status						
Single (ref)		1	1		1	1
Married/ registered partner		0.546** [0.361,0.827]	0.536** [0.350,0.823]		0.948 [0.701,1.282]	0.924 [0.680,1.255]
Widowed		0.364 [0.103,1.289]	0.330 [0.0903,1.205]		0.772 [0.337,1.766]	0.826 [0.357,1.908]
Separated		1.364 [0.460,4.044]	0.960 [0.299,3.083]		2.215* [1.055,4.650]	2.414* [1.137,5.128]
Divorced		1.039 [0.577,1.870]	0.954 [0.516,1.762]		1.445 [0.958,2.179]	1.340 [0.879,2.042]
Number of people in household						
1 (ref)		1	1		1	1

2		0.794 [0.527,1.195]	0.909 [0.593,1.394]		0.837 [0.599,1.171]	0.814 [0.578,1.147]
3		0.815 [0.503,1.319]	0.892 [0.538,1.478]		0.793 [0.526,1.195]	0.764 [0.502,1.163]
4		0.582[*] [0.345,0.981]	0.793 [0.459,1.370]		0.679 [0.433,1.063]	0.659 [0.417,1.042]
5		0.562 [0.282,1.119]	0.756 [0.373,1.531]		0.579 [0.324,1.034]	0.564 [0.312,1.021]
6+		0.326 [0.0758,1.403]	0.400 [0.0902,1.771]		0.999 [0.443,2.254]	0.956 [0.417,2.192]
Total income level (household)						
2012 (yearly)						
0 – 249,999 NOK (ref)		1	1			
250,000 – 499,999 NOK		1.048 [0.712,1.543]	1.188 [0.794,1.778]			
500,000 – 749,999 NOK		0.887 [0.476,1.655]	1.048 [0.551,1.993]			
750,000 – 999,999 NOK		0.985 [0.482,2.013]	1.118 [0.531,2.356]			
1,000,000+ NOK		0.419 [0.101,1.739]	0.431 [0.0945,1.965]			
2015 (monthly)						
0 – 19,999 NOK (ref)					1	1
20,000 – 39,999 NOK					0.815 [0.577,1.152]	0.923 [0.648,1.315]
40,000 – 59,999 NOK					0.832 [0.546,1.269]	0.962 [0.624,1.483]
60,000 – 79,999 NOK					0.784 [0.491,1.253]	0.964 [0.595,1.560]
80,000+ NOK					0.795 [0.464,1.364]	0.984 [0.565,1.711]
Free places on GP list (2012)		1.000 [0.999,1.001]	1.000 [0.999,1.001]		-	-
County						
1: Østfold (ref)		1	1		1	1
2: Akershus		1.196 [0.558,2.564]	1.110 [0.505,2.438]		1.176 [0.587,2.357]	1.278 [0.630,2.591]
3: Oslo		1.287 [0.620,2.672]	1.239 [0.585,2.627]		1.797 [0.998,3.236]	1.900[*] [1.043,3.463]
4: Hedmark		1.597 [0.657,3.884]	1.276 [0.507,3.210]		1.207 [0.588,2.477]	1.238 [0.594,2.580]

5: Oppland		0.886 [0.312,2.510]	0.788 [0.270,2.294]		0.914 [0.425,1.963]	0.982 [0.450,2.142]
6: Buskerud		1.254 [0.517,3.044]	1.145 [0.460,2.851]		1.434 [0.717,2.868]	1.470 [0.726,2.978]
7: Vestfold		1.462 [0.590,3.622]	1.471 [0.581,3.726]		2.054[*] [1.067,3.952]	2.079[*] [1.064,4.060]
8: Telemark		0.893 [0.296,2.690]	1.023 [0.334,3.133]		1.110 [0.537,2.294]	1.122 [0.536,2.349]
9: Aust-Agder		1.230 [0.371,4.083]	1.120 [0.327,3.838]		1.898 [0.961,3.748]	1.970 [0.987,3.932]
10: Vest-Agder		1.310 [0.482,3.560]	1.216 [0.433,3.414]		1.571 [0.803,3.074]	1.698 [0.853,3.383]
11: Rogaland		0.837 [0.353,1.987]	0.756 [0.311,1.837]		1.682 [0.868,3.260]	1.791 [0.914,3.511]
12: Hordaland		1.118 [0.512,2.438]	1.097 [0.492,2.442]		0.884 [0.428,1.827]	0.923 [0.441,1.929]
14: Sogn og Fjordane		0.291 [0.0364,2.326]	0.361 [0.0448,2.912]		0.626 [0.273,1.440]	0.687 [0.294,1.602]
15: Møre og Romsdal		0.584 [0.195,1.754]	0.575 [0.188,1.758]		1.330 [0.651,2.721]	1.455 [0.704,3.006]
16: Sør-Trøndelag		1.049 [0.439,2.506]	1.052 [0.430,2.578]		0.559 [0.253,1.232]	0.582 [0.260,1.306]
17: Nord-Trøndelag		0.862 [0.262,2.838]	0.722 [0.208,2.508]		0.781 [0.364,1.675]	0.786 [0.361,1.714]
18: Nordland		0.666 [0.222,2.000]	0.645 [0.211,1.976]		1.158 [0.572,2.346]	1.282 [0.625,2.628]
19: Troms		1.247 [0.476,3.270]	1.332 [0.499,3.552]		1.086 [0.532,2.216]	1.142 [0.551,2.367]
20: Finnmark		1.538 [0.402,5.889]	1.190 [0.304,4.663]		1.757 [0.888,3.474]	1.857 [0.926,3.726]
Self-rated overall life satisfaction (2015)						
Good (ref)		-	-		1	1
Poor		-	-		6.726[***] [5.349,8.457]	4.063[***] [3.144,5.250]
Self-rated health						
Good (ref)			1			1
Poor			2.002[***] [1.401,2.860]			1.825[***] [1.394,2.389]
Presence of a chronic disease						
None (ref)			1			1
At least one			1.431[*] [1.032,1.984]			1.699[***] [1.328,2.173]
Experienced discrimination in the past 12 months						

Not experienced (ref)			1			1
Yes, related to ethnicity/skin colour (2012)			3.057*** [1.942,4.811]			
Yes, unrelated to ethnicity/skin colour (2012)			2.805* [1.040,7.571]			
Yes (2015)						0.603*** [0.449,0.811]
Required a mental health care appointment but did not book one						
No (ref)			1			1
Yes			4.160*** [2.795,6.192]			2.276*** [1.530,3.384]
N	4786	4786	4786	7733	7733	7733

*significant at the 0.05 level   **significant at the 0.01 level   ***significant at the 0.001 level

Hospital Care

USE OF HOSPITAL CARE SERVICES	2012 Dataset			2015 Dataset		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
Migrant Category						
Norwegians (ref)	1	1	1	1	1	1
HIC migrants	0.781 [0.550,1.107]	0.919 [0.640,1.318]	0.913 [0.632,1.318]	0.912 [0.705,1.179]	1.197 [0.914,1.566]	1.221 [0.929,1.605]
LIC migrants	0.679 [0.427,1.080]	0.849 [0.523,1.380]	0.834 [0.500,1.390]	0.554** [0.377,0.813]	0.777 [0.519,1.163]	0.810 [0.539,1.219]
Female gender		0.958 [0.786,1.168]	0.924 [0.756,1.130]		1.132 [0.963,1.329]	1.071 [0.909,1.262]
Education						
None/primary (ref)		1	1		1	1
Secondary		1.008 [0.785,1.295]	1.078 [0.836,1.391]		1.043 [0.857,1.270]	1.127 [0.922,1.377]
Tertiary		0.841 [0.654,1.080]	1.024 [0.791,1.326]		0.720** [0.584,0.889]	0.778* [0.628,0.963]
Age Group						
16-24 (ref)		1	1		1	1
25-44		0.806 [0.534,1.216]	0.683 [0.450,1.038]		1.185 [0.842,1.668]	1.063 [0.753,1.502]
45-66		1.170 [0.760,1.800]	0.887 [0.571,1.380]		1.730** [1.216,2.462]	1.375 [0.961,1.969]

67-79		1.629 [0.990,2.679]	1.202 [0.722,2.001]		2.985*** [1.992,4.474]	2.446*** [1.620,3.693]
80+		3.424*** [1.902,6.164]	2.298** [1.256,4.205]		5.022*** [3.149,8.009]	4.221*** [2.620,6.801]
Civil Status						
Single (ref)		1	1		1	1
Married/ registered partner		1.254 [0.914,1.721]	1.216 [0.880,1.681]		0.970 [0.758,1.242]	0.918 [0.715,1.179]
Widowed		1.073 [0.660,1.746]	1.068 [0.652,1.749]		0.923 [0.627,1.357]	0.882 [0.595,1.309]
Separated		1.775 [0.766,4.114]	1.699 [0.717,4.028]		0.844 [0.357,1.993]	0.960 [0.403,2.287]
Divorced		1.861** [1.246,2.781]	1.745** [1.157,2.631]		1.292 [0.943,1.769]	1.189 [0.863,1.638]
Number of people in household						
1 (ref)		1	1		1	1
2		0.945 [0.687,1.301]	1.023 [0.739,1.418]		1.032 [0.780,1.365]	0.988 [0.743,1.314]
3		0.641* [0.424,0.971]	0.712 [0.467,1.086]		0.783 [0.544,1.127]	0.738 [0.510,1.069]
4		0.777 [0.515,1.172]	0.909 [0.598,1.383]		0.873 [0.594,1.282]	0.866 [0.585,1.280]
5		0.684 [0.401,1.167]	0.785 [0.456,1.352]		0.870 [0.536,1.413]	0.859 [0.526,1.404]
6+		0.853 [0.371,1.963]	1.015 [0.436,2.365]		1.151 [0.538,2.465]	1.196 [0.553,2.582]
Total income level (household)						
2012 (yearly)						
0 – 249,999 NOK		1	1			
250,000 – 499,999 NOK		0.939 [0.715,1.233]	0.988 [0.748,1.306]			
500,000 – 749,999 NOK		0.724 [0.509,1.030]	0.770 [0.538,1.103]			
750,000 – 999,999 NOK		0.789 [0.512,1.218]	0.866 [0.556,1.348]			
1,000,000+ NOK		0.843 [0.640,1.111]	0.915 [0.689,1.215]			
2015 (monthly)						
0 – 19,999 NOK (ref)					1	1
20,000 – 39,999 NOK					0.959 [0.723,1.272]	1.039 [0.779,1.386]

40,000 – 59,999 NOK				1.002 [0.712,1.410]	1.117 [0.788,1.583]
60,000 – 79,999 NOK				0.965 [0.655,1.420]	1.173 [0.790,1.741]
80,000+ NOK				0.898 [0.576,1.401]	1.129 [0.718,1.776]
Free places on GP list (2012)	1.000 [0.999,1.001]	1.000 [0.999,1.001]		-	-
County					
1: Østfold (ref)	1	1		1	1
2: Akershus	1.012 [0.602,1.702]	1.048 [0.620,1.772]		1.029 [0.593,1.785]	1.049 [0.601,1.831]
3: Oslo	1.307 [0.786,2.172]	1.269 [0.758,2.125]		1.266 [0.786,2.037]	1.308 [0.808,2.117]
4: Hedmark	1.105 [0.584,2.089]	1.031 [0.541,1.968]		1.326 [0.787,2.235]	1.345 [0.793,2.281]
5: Oppland	0.917 [0.465,1.810]	0.855 [0.429,1.703]		1.215 [0.712,2.073]	1.257 [0.732,2.158]
6: Buskerud	1.324 [0.742,2.365]	1.355 [0.752,2.441]		1.589 [0.953,2.649]	1.598 [0.952,2.684]
7: Vestfold	1.067 [0.579,1.966]	1.094 [0.589,2.034]		1.265 [0.742,2.157]	1.314 [0.766,2.254]
8: Telemark	0.848 [0.416,1.727]	0.869 [0.423,1.784]		1.724[*] [1.034,2.875]	1.715[*] [1.021,2.880]
9: Aust-Agder	1.052 [0.481,2.301]	1.021 [0.460,2.265]		1.441 [0.847,2.452]	1.415 [0.825,2.429]
10: Vest-Agder	1.553 [0.831,2.902]	1.567 [0.830,2.960]		1.253 [0.733,2.142]	1.323 [0.768,2.280]
11: Rogaland	1.299 [0.765,2.208]	1.353 [0.790,2.316]		1.493 [0.888,2.510]	1.487 [0.879,2.518]
12: Hordaland	1.284 [0.769,2.147]	1.244 [0.739,2.094]		1.491 [0.891,2.494]	1.553 [0.922,2.615]
14: Sogn og Fjordane	1.534 [0.728,3.232]	1.700 [0.797,3.624]		1.115 [0.644,1.930]	1.180 [0.677,2.056]
15: Møre og Romsdal	0.983 [0.532,1.815]	0.958 [0.514,1.786]		1.317 [0.771,2.250]	1.402 [0.816,2.409]
16: Sør-Trøndelag	1.036 [0.576,1.864]	1.000 [0.551,1.813]		1.173 [0.685,2.009]	1.230 [0.713,2.122]
17: Nord-Trøndelag	1.569 [0.814,3.022]	1.551 [0.794,3.029]		1.557 [0.936,2.590]	1.652 [0.987,2.767]
18: Nordland	0.864 [0.449,1.663]	0.827 [0.426,1.605]		1.323 [0.784,2.231]	1.330 [0.782,2.260]
19: Troms	1.043 [0.528,2.062]	0.968 [0.484,1.934]		1.439 [0.850,2.435]	1.482 [0.870,2.526]
20: Finnmark	1.084 [0.421,2.794]	0.899 [0.345,2.345]		2.744[***] [1.675,4.495]	2.865[***] [1.735,4.733]

Self-rated overall life satisfaction (2015)						
Good (ref)		-	-		1	1
Poor		-	-		2.188*** [1.779,2.690]	1.424** [1.139,1.782]
Self-rated health						
Good (ref)			1			1
Poor			2.217*** [1.782,2.758]			1.677*** [1.381,2.035]
Presence of a chronic health condition						
None (ref)			1			1
At least one			1.893*** [1.525,2.351]			2.174*** [1.818,2.599]
Experienced discrimination in the past 12 months						
Not experienced (ref)			1			1
Yes, related to ethnicity/skin colour (2012)			1.431 [0.963,2.125]			
Yes, unrelated to ethnicity/skin colour (2012)			0.751 [0.218,2.585]			
Yes (2015)						0.821 [0.620,1.087]
N	5347	5347	5347	7741	7741	7741

*significant at the 0.05 level   **significant at the 0.01 level   ***significant at the 0.001 level

Alternative Care

USE OF ALTERNATIVE CARE SERVICES	2012 Dataset			2015 Dataset		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Migrant Category						
Norwegians (ref)	1	1	1	1	1	1
HIC migrants	1.058 [0.785,1.426]	0.941 [0.691,1.282]	0.944 [0.691,1.290]	1.162 [0.930,1.452]	1.055 [0.838,1.329]	1.069 [0.848,1.348]
LIC migrants	0.710 [0.459,1.097]	0.596* [0.378,0.940]	0.597* [0.370,0.963]	0.617** [0.438,0.870]	0.549** [0.384,0.785]	0.560** [0.391,0.802]
Female gender		2.239*** [1.840,2.723]	2.194*** [1.801,2.674]		2.125*** [1.824,2.476]	2.052*** [1.760,2.393]
Education						
None/primary		1	1		1	1

(ref)						
Secondary		1.073 [0.835,1.379]	1.106 [0.859,1.423]		1.313** [1.084,1.592]	1.329** [1.095,1.613]
Tertiary		1.157 [0.909,1.472]	1.252 [0.979,1.601]		1.052 [0.863,1.281]	1.073 [0.880,1.309]
Age Group						
16-24 (ref)		1	1		1	1
25-44		2.038*** [1.380,3.008]	1.930** [1.304,2.856]		1.405* [1.063,1.857]	1.365* [1.032,1.806]
45-66		1.531* [1.005,2.333]	1.390 [0.908,2.128]		1.194 [0.884,1.612]	1.118 [0.826,1.515]
67-79		0.882 [0.522,1.490]	0.787 [0.463,1.337]		0.962 [0.654,1.416]	0.913 [0.618,1.347]
80+		0.425 [0.172,1.053]	0.360* [0.144,0.897]		0.386** [0.191,0.781]	0.369** [0.181,0.749]
Civil Status						
Single (ref)		1	1		1	1
Married/ registered partner		1.007 [0.775,1.308]	0.983 [0.754,1.280]		0.991 [0.807,1.218]	0.967 [0.787,1.189]
Widowed		1.338 [0.795,2.253]	1.343 [0.795,2.268]		0.726 [0.438,1.202]	0.715 [0.431,1.187]
Separated		1.549 [0.698,3.440]	1.487 [0.665,3.328]		1.069 [0.518,2.203]	1.074 [0.519,2.225]
Divorced		1.741** [1.201,2.525]	1.687** [1.161,2.453]		1.229 [0.911,1.659]	1.180 [0.873,1.596]
Number of people in household						
1 (ref)		1	1		1	1
2		1.056 [0.784,1.424]	1.089 [0.806,1.471]		0.839 [0.644,1.094]	0.836 [0.641,1.091]
3		1.030 [0.728,1.459]	1.078 [0.759,1.532]		1.084 [0.800,1.469]	1.083 [0.798,1.470]
4		1.073 [0.751,1.534]	1.164 [0.811,1.670]		1.084 [0.785,1.498]	1.109 [0.802,1.535]
5		0.995 [0.636,1.554]	1.077 [0.686,1.691]		1.014 [0.687,1.496]	1.041 [0.705,1.538]
6+		0.740 [0.334,1.639]	0.808 [0.362,1.799]		0.705 [0.343,1.446]	0.719 [0.350,1.477]
Total income level (household)						
2012 (yearly)						
0 – 249,999 NOK (ref)		1	1			
250,000 – 499,999 NOK		0.847 [0.648,1.108]	0.870 [0.664,1.139]			

500,000 – 749,999 NOK		1.256 [0.927,1.702]	1.297 [0.955,1.763]			
750,000 – 999,999 NOK		0.873 [0.565,1.349]	0.904 [0.583,1.401]			
1,000,000+ NOK		1.120 [0.863,1.452]	1.172 [0.901,1.525]			
2015 (monthly)						
0 – 19,999 NOK (ref)					1	1
20,000 – 39,999 NOK					1.250 [0.923,1.694]	1.275 [0.939,1.730]
40,000 – 59,999 NOK					1.353 [0.958,1.910]	1.377 [0.973,1.948]
60,000 – 79,999 NOK					1.427 [0.988,2.062]	1.467[*] [1.012,2.126]
80,000+ NOK					1.547[*] [1.038,2.305]	1.626[*] [1.088,2.429]
Free places on GP list		1.000 [0.999,1.000]	1.000 [0.999,1.001]			
County						
1: Østfold (ref)		1	1		1	1
2: Akershus		0.868 [0.563,1.340]	0.854 [0.552,1.321]		1.139 [0.733,1.771]	1.134 [0.728,1.767]
3: Oslo		0.836 [0.543,1.287]	0.819 [0.530,1.264]		1.086 [0.729,1.619]	1.080 [0.723,1.611]
4: Hedmark		0.664 [0.365,1.210]	0.623 [0.341,1.140]		1.037 [0.655,1.641]	1.032 [0.651,1.636]
5: Oppland		1.240 [0.729,2.112]	1.200 [0.702,2.051]		1.185 [0.752,1.868]	1.187 [0.752,1.874]
6: Buskerud		1.149 [0.697,1.895]	1.137 [0.688,1.880]		1.096 [0.695,1.727]	1.098 [0.695,1.733]
7: Vestfold		0.878 [0.515,1.498]	0.892 [0.522,1.525]		1.486 [0.962,2.296]	1.462 [0.945,2.264]
8: Telemark		0.947 [0.526,1.703]	0.978 [0.542,1.765]		1.453 [0.936,2.257]	1.422 [0.914,2.213]
9: Aust-Agder		0.679 [0.322,1.431]	0.679 [0.321,1.439]		0.795 [0.489,1.293]	0.795 [0.488,1.295]
10: Vest-Agder		0.777 [0.425,1.421]	0.766 [0.418,1.404]		0.695 [0.422,1.145]	0.701 [0.425,1.157]
11: Rogaland		0.909 [0.573,1.442]	0.912 [0.574,1.450]		1.037 [0.661,1.626]	1.016 [0.647,1.597]
12: Hordaland		0.687 [0.434,1.086]	0.678 [0.428,1.075]		0.872 [0.548,1.388]	0.869 [0.545,1.385]
14: Sogn og Fjordane		0.419 [0.170,1.038]	0.439 [0.176,1.092]		0.822 [0.508,1.332]	0.828 [0.510,1.343]

15: Møre og Romsdal		0.403[**] [0.208,0.782]	0.398[**] [0.205,0.773]		1.022 [0.639,1.634]	1.016 [0.634,1.627]
16: Sør-Trøndelag		0.692 [0.409,1.171]	0.672 [0.396,1.139]		0.763 [0.473,1.230]	0.766 [0.474,1.239]
17: Nord-Trøndelag		0.502 [0.240,1.050]	0.505 [0.241,1.059]		1.032 [0.654,1.630]	1.043 [0.659,1.650]
18: Nordland		0.614 [0.334,1.130]	0.614 [0.333,1.133]		0.786 [0.486,1.273]	0.793 [0.489,1.286]
19: Troms		0.602 [0.318,1.139]	0.600 [0.316,1.139]		0.614 [0.368,1.026]	0.616 [0.368,1.030]
20: Finnmark		0.591 [0.221,1.583]	0.546 [0.203,1.467]		0.711 [0.425,1.189]	0.703 [0.420,1.178]
Self-rated overall life satisfaction (2015)						
Good (ref)		-	-		1	1
Poor		-	-		1.225 [0.976,1.536]	1.084 [0.851,1.380]
Self-rated health						
Good (ref)		1			1	
Poor		1.363[**] [1.087,1.709]			0.897 [0.729,1.105]	
Presence of a chronic health condition						
None (ref)		1			1	
At least one		1.384[**] [1.135,1.689]			1.631[***] [1.384,1.921]	
Method of contact last time help was required (2012)						
Regular GP (ref)		1			-	
Emergency/out of hours doctor		0.891 [0.655,1.213]			-	
Private doctor's clinic		1.247 [0.866,1.797]			-	
Another doctor		0.667 [0.399,1.116]			-	
Have never required a doctor		0.189 [0.0260,1.378]			-	
Experienced discrimination in the past 12 months						
Not experienced (ref)		1			1	
Yes, related to ethnicity/skin		1.379 [0.947,2.008]				

colour (2012)						
Yes, unrelated to ethnicity/skin colour (2012)			0.939 [0.349,2.530]			
Yes (2015)						0.788 [0.614,1.012]
N	5334	5334	5334	7739	7739	7739

*significant at the 0.05 level   **significant at the 0.01 level   ***significant at the 0.001 level

Dental Care

USE OF DENTAL CARE SERVICES	2012 Dataset			2015 Dataset		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
Migrant Category						
Norwegians (ref)	1	1	1	1	1	1
HIC migrants	0.838 [0.679,1.034]	1.042 [0.834,1.301]	1.042 [0.831,1.306]	0.782** [0.656,0.933]	0.882 [0.732,1.062]	0.867 [0.718,1.048]
LIC migrants	0.536*** [0.420,0.683]	0.690** [0.530,0.897]	0.741* [0.561,0.978]	0.389*** [0.322,0.470]	0.528*** [0.429,0.650]	0.514*** [0.415,0.636]
Female gender		1.429*** [1.249,1.635]	1.439*** [1.255,1.651]		1.535*** [1.364,1.728]	1.498*** [1.327,1.692]
Education						
None/primary (ref)		1	1		1	1
Secondary		0.984 [0.829,1.168]	0.942 [0.791,1.122]		1.165* [1.004,1.352]	1.118 [0.961,1.302]
Tertiary		0.980 [0.823,1.168]	0.946 [0.790,1.133]		1.110 [0.951,1.295]	1.046 [0.893,1.225]
Age Group						
16-24 (ref)		1	1		1	1
25-44		1.049 [0.841,1.308]	1.077 [0.859,1.351]		0.671*** [0.552,0.816]	0.687*** [0.563,0.840]
45-66		2.028*** [1.575,2.611]	1.970*** [1.520,2.554]		1.338** [1.073,1.668]	1.304* [1.039,1.636]
67-79		1.755*** [1.263,2.439]	1.603* [1.145,2.244]		2.017*** [1.497,2.718]	1.868*** [1.377,2.534]
80+		1.067 [0.679,1.677]	0.987 [0.621,1.567]		0.935 [0.646,1.353]	0.840 [0.576,1.225]
Civil Status						
Single (ref)		1	1		1	1
Married/ registered partner		1.481*** [1.227,1.789]	1.425*** [1.176,1.727]		1.217* [1.033,1.434]	1.203* [1.017,1.422]

Widowed		1.162 [0.795,1.698]	1.100 [0.749,1.616]		1.073 [0.757,1.520]	1.039 [0.730,1.479]
Separated		0.701 [0.388,1.265]	0.682 [0.375,1.238]		1.325 [0.739,2.375]	1.224 [0.676,2.213]
Divorced		1.143 [0.839,1.557]	1.100 [0.804,1.505]		1.171 [0.900,1.523]	1.262 [0.964,1.653]
Number of people in household						
1 (ref)		1	1		1	1
2		1.062 [0.863,1.307]	1.051 [0.851,1.298]		0.866 [0.711,1.055]	0.896 [0.732,1.097]
3		0.937 [0.736,1.193]	0.939 [0.734,1.201]		0.762* [0.601,0.967]	0.791 [0.621,1.008]
4		1.059 [0.828,1.353]	1.019 [0.794,1.308]		0.731* [0.568,0.942]	0.763* [0.589,0.987]
5		1.187 [0.871,1.616]	1.172 [0.856,1.605]		0.631** [0.465,0.855]	0.664** [0.486,0.906]
6+		1.244 [0.762,2.031]	1.163 [0.707,1.912]		0.557* [0.346,0.895]	0.605* [0.372,0.984]
Total income level (household)						
2012 (yearly)						
0 – 249,999 NOK (ref)		1	1			
250,000 – 499,999 NOK		1.629*** [1.348,1.967]	1.541*** [1.272,1.867]			
500,000 – 749,999 NOK		1.546*** [1.216,1.966]	1.439** [1.128,1.835]			
750,000 – 999,999 NOK		1.267 [0.944,1.702]	1.175 [0.872,1.583]			
1,000,000+ NOK		1.770*** [1.443,2.171]	1.667*** [1.356,2.051]			
2015 (monthly)						
0 – 19,999 NOK (ref)					1	1
20,000 – 39,999 NOK					1.751*** [1.436,2.135]	1.605*** [1.310,1.967]
40,000 – 59,999 NOK					2.091*** [1.648,2.653]	1.892*** [1.482,2.416]
60,000 – 79,999 NOK					2.856*** [2.189,3.725]	2.485*** [1.891,3.265]
80,000+ NOK					3.389*** [2.496,4.604]	2.911*** [2.127,3.983]
Free places on GP list (2012)		1.000 [0.999,1.000]	0.999* [0.999,1.000]		-	-

County						
1: Østfold (ref)		1	1		1	1
2: Akershus		0.746 [0.526,1.059]	0.762 [0.534,1.088]		0.691[*] [0.480,0.995]	0.669[*] [0.461,0.972]
3: Oslo		0.930 [0.655,1.319]	0.957 [0.671,1.365]		0.839 [0.606,1.160]	0.821 [0.589,1.145]
4: Hedmark		1.199 [0.756,1.902]	1.199 [0.751,1.913]		0.963 [0.655,1.418]	0.893 [0.602,1.324]
5: Oppland		0.682 [0.439,1.060]	0.692 [0.443,1.083]		0.849 [0.578,1.247]	0.786 [0.531,1.164]
6: Buskerud		0.954 [0.626,1.454]	1.000 [0.652,1.534]		0.920 [0.628,1.347]	0.869 [0.589,1.282]
7: Vestfold		0.901 [0.587,1.385]	0.915 [0.592,1.414]		0.938 [0.638,1.378]	0.890 [0.600,1.319]
8: Telemark		0.717 [0.455,1.132]	0.770 [0.484,1.224]		1.097 [0.736,1.634]	1.045 [0.695,1.571]
9: Aust-Agder		0.668 [0.395,1.127]	0.668 [0.393,1.137]		0.924 [0.625,1.366]	0.862 [0.579,1.284]
10: Vest-Agder		1.109 [0.687,1.789]	1.167 [0.717,1.901]		1.227 [0.821,1.834]	1.245 [0.825,1.879]
11: Rogaland		1.026 [0.700,1.504]	1.029 [0.698,1.516]		1.078 [0.733,1.586]	1.036 [0.698,1.538]
12: Hordaland		1.017 [0.705,1.467]	1.020 [0.703,1.479]		0.714 [0.497,1.026]	0.693 [0.478,1.003]
14: Sogn og Fjordane		0.676 [0.392,1.168]	0.689 [0.397,1.197]		0.766 [0.527,1.115]	0.711 [0.485,1.041]
15: Møre og Romsdal		0.812 [0.534,1.235]	0.803 [0.525,1.228]		0.819 [0.558,1.202]	0.791 [0.534,1.172]
16: Sør-Trøndelag		0.629[*] [0.429,0.924]	0.635[*] [0.430,0.937]		0.799 [0.554,1.152]	0.762 [0.524,1.108]
17: Nord-Trøndelag		0.612[*] [0.381,0.984]	0.645 [0.397,1.045]		0.609[**] [0.422,0.878]	0.590[**] [0.406,0.859]
18: Nordland		0.690 [0.454,1.050]	0.724 [0.472,1.110]		0.600[**] [0.418,0.861]	0.593[**] [0.409,0.858]
19: Troms		0.541[**] [0.349,0.838]	0.553[**] [0.354,0.864]		0.512[***] [0.357,0.734]	0.523[***] [0.361,0.757]
20: Finnmark		0.675 [0.356,1.280]	0.792 [0.412,1.523]		0.552[**] [0.380,0.802]	0.550[**] [0.375,0.807]
Self-rated overall life satisfaction (2015)						
Good (ref)		-	-		1	1
Poor		-	-		0.817[*] [0.688,0.972]	0.989 [0.817,1.196]
Self-rated health						
Good (ref)			1			1
Poor			1.036 [0.867,1.238]			0.880 [0.743,1.042]

94

Presence of a chronic health condition						
None (ref)			1			1
At least one			1.111 [0.960,1.286]			1.163[*] [1.010,1.339]
Experienced discrimination in the past 12 months						
Not experienced (ref)			1			1
Yes, related to ethnicity/skin colour (2012)			0.800 [0.595,1.076]			
Yes, unrelated to ethnicity/skin colour (2012)			1.154 [0.618,2.155]			
Yes (2015)						0.980 [0.791,1.215]
Self-rated dental health						
Good (ref)			1			1
Poor			0.834[*] [0.711,0.978]			0.653[***] [0.570,0.749]
Required dental help but didn't book appointment						
No (ref)			1			1
Yes			0.359[***] [0.291,0.443]			0.313[***] [0.256,0.383]
N	5322	5322	5322	7720	7720	7720

*significant at the 0.05 level   **significant at the 0.01 level   ***significant at the 0.001 level

Appendix 4: Full Two Part Models

Specification of optimal link and family using Akaike information criterion (AIC) and Bayesian information criterion (BIC)

Link and family	Log likelihood	AIC	BIC
Log link, Gamma family	-18198.36	36488.71	36795.08
Square Root link, Gamma family	-18345.49	36782.97	37089.34
Identity link, Gamma family	-18557.53	37207.06	37513.42
Log link, Gaussian family	-33641.55	67371.1	67664.15
Square Root link, Gaussian family	-34058.12	68208.24	68514.6
Identity link, Gaussian family	-34071.38	68234.76	68541.13
Log link, Poisson family	-175076.7	350245.4	350551.7
Square Root link, Poisson family	-176945.6	353983.2	354289.6
Identity link, Poisson family	-183920	367928.1	368221.1

Logit regression followed by a GLM with log link and Poisson family

	Part 1 – Logit Regression	Part 2 – Generalised Linear Model (Poisson family, log link)	Marginal & Incremental Effects of GLM Model
Migrant Category			
Norwegians (ref)	1	1	1
HIC migrants	0.980 [0.821,1.171]	0.945[*] [0.904,0.989]	-0.179[*] [-0.347,-0.012]
LIC migrants	1.009 [0.810,1.257]	1.083[**] [1.028,1.141]	0.262[*] [0.038,0.486]
Female gender	1.852[***] [1.655,2.071]	1.142[***] [1.112,1.172]	0.784[***] [0.678,0.889]
Education			
None/primary (ref)	1	1	1

Secondary	1.118 [0.969,1.290]	0.950** [0.919,0.982]	-0.096 [-0.233,0.041]
Tertiary	0.896 [0.773,1.037]	0.883*** [0.854,0.914]	-0.443*** [-0.581,-0.306]
Age Group			
15-24 (ref)	1	1	1
25-44	1.088 [0.900,1.316]	1.052* [1.001,1.106]	0.240* [0.020,0.461]
45-66	1.131 [0.919,1.394]	0.825*** [0.782,0.872]	-0.512*** [-0.742,-0.283]
67-79	2.083*** [1.572,2.761]	0.740*** [0.692,0.791]	-0.534*** [-0.797,-0.272]
80+	2.736*** [1.773,4.220]	0.741*** [0.681,0.807]	-0.436** [-0.757,-0.115]
Civil Status			
Single (ref)	1	1	1
Married/registered partner	1.096 [0.938,1.282]	1.042* [1.002,1.083]	0.181* [0.030,0.332]
Widowed	1.121 [0.780,1.609]	0.997 [0.928,1.072]	0.059 [-0.243,0.360]
Separated	1.836 [0.996,3.382]	1.240*** [1.105,1.391]	1.105*** [0.532,1.677]
Divorced	1.279 [0.991,1.651]	1.100*** [1.044,1.159]	0.452*** [0.222,0.683]
Number of people in household			
1 (ref)	1	1	1
2	1.284* [1.057,1.559]	0.969 [0.926,1.014]	0.053 [-0.134,0.240]
3	1.108 [0.882,1.393]	1.030 [0.976,1.088]	0.162 [-0.067,0.391]
4	0.938 [0.739,1.191]	0.901*** [0.848,0.957]	-0.348** [-0.581,-0.116]
5	0.899 [0.676,1.196]	0.899** [0.834,0.968]	-0.380** [-0.658,-0.101]
6+	0.902 [0.570,1.429]	0.989 [0.875,1.120]	-0.100 [-0.585,0.384]
Total monthly income level (household)			
0 – 19,999 NOK (ref)	1	1	1
20,000 – 39,999 NOK	1.140 [0.926,1.403]	1.061* [1.011,1.113]	0.260** [0.068,0.452]
40,000 – 59,999 NOK	1.390** [1.090,1.771]	1.040 [0.982,1.100]	0.318*** [0.093,0.543]
60,000 – 79,999 NOK	1.303* [1.003,1.692]	1.029 [0.966,1.096]	0.247* [0.000,0.494]

80,000+ NOK	1.334[*] [1.001,1.777]	0.965 [0.898,1.037]	0.070 [-0.200,0.339]
County			
1: Østfold (ref)	1	1	1
2: Akershus	0.761 [0.536,1.081]	1.017 [0.940,1.100]	-.10783 [-0.428,0.212]
3: Oslo	0.832 [0.609,1.138]	1.008 [0.941,1.080]	-0.078 [-0.357,0.201]
4: Hedmark	0.862 [0.600,1.239]	1.009 [0.932,1.092]	-0.056 [-0.379,0.267]
5: Oppland	0.785 [0.546,1.130]	1.043 [0.963,1.130]	-0.007 [-0.340,0.326]
6: Buskerud	0.801 [0.559,1.149]	1.121[**] [1.038,1.211]	0.245 [-0.091,0.581]
7: Vestfold	0.996 [0.687,1.444]	0.912[*] [0.841,0.989]	-0.282 [-0.596,0.032]
8: Telemark	0.836 [0.579,1.207]	0.950 [0.876,1.030]	-0.256 [-0.577,0.065]
9: Aust-Agder	0.929 [0.643,1.343]	1.198[***] [1.109,1.294]	0.584[***] [0.233,0.934]
10: Vest-Agder	0.725 [0.507,1.038]	1.063 [0.981,1.152]	0.001 [-0.334,0.337]
11: Rogaland	0.745 [0.524,1.059]	1.048 [0.969,1.134]	-0.027 [-0.352,0.299]
12: Hordaland	0.842 [0.592,1.197]	0.972 [0.898,1.053]	-0.183 [-0.497,0.132]
14: Sogn og Fjordane	0.566[**] [0.399,0.803]	1.132[**] [1.044,1.227]	0.022 [-0.323,0.367]
15: Møre og Romsdal	0.926 [0.640,1.341]	0.971 [0.895,1.054]	-0.133 [-0.459,0.192]
16: Sør-Trøndelag	0.683[*] [0.483,0.965]	0.911[*] [0.839,0.989]	-0.492[**] [-0.801,-0.182]
17: Nord-Trøndelag	0.774 [0.541,1.106]	0.912[*] [0.840,0.990]	-0.416[**] [-0.730,-0.103]
18: Nordland	0.639[*] [0.450,0.907]	0.976 [0.900,1.058]	-0.342[*] [-0.662,-0.021]
19: Troms	0.929 [0.646,1.336]	0.909[*] [0.838,0.987]	-0.327[*] [-0.640,-0.014]
20: Finnmark	0.819 [0.564,1.188]	0.964 [0.886,1.049]	-0.224 [-0.556,0.107]
Self-rated overall life satisfaction			
Good (ref)	1	1	1
Poor	1.408[**] [1.134,1.747]	1.263[***] [1.219,1.309]	1.012[***] [0.819,1.205]
Self-rated health			
Good (ref)	1	1	1

Poor	1.544[***] [1.283,1.858]	1.476[***] [1.429,1.524]	1.612[***] [1.434,1.790]
Chronic health condition			
None (ref)	1	1	1
At least one	2.599[***] [2.253,2.998]	1.537[***] [1.492,1.583]	1.993[***] [1.859,2.126]
Experienced discrimination in the past 12 months			
No (ref)	1	1	1
Yes	1.220 [0.974,1.528]	1.092[***] [1.047,1.140]	0.406[***] [0.207,0.605]
Required a primary care appointment but did not book one			
No (ref)	1	1	
Yes	1.273[*] [1.019,1.590]	1.057[*] [1.013,1.103]	0.320[***] [0.130,0.511]
N	7679	5702	5702

*significant at the 0.05 level   **significant at the 0.01 level   ***significant at the 0.001 level

Logit regression followed by a GLM with log link and gamma family

	Part 1: Logit regression	Part 2: Generalised Linear Model (log link, gamma family)	Marginal & Incremental Effects of GLM Model
Migrant Category			
Norwegians (ref)	1	1	1
HIC migrants	0.980 [0.821,1.171]	0.959 [0.879,1.046]	-0.138 [-0.414,0.138]
LIC migrants	1.009 [0.810,1.257]	1.080 [0.968,1.204]	0.252 [-0.135,0.639]
Female gender	1.852[***] [1.655,2.071]	1.167[***] [1.108,1.229]	0.847[***] [0.674,1.020]
Education			
None/primary (ref)	1	1	1
Secondary	1.118 [0.969,1.290]	0.967 [0.906,1.032]	-0.041 [-0.266,0.183]
Tertiary	0.896 [0.773,1.037]	0.906[**] [0.847,0.968]	-0.367[***] [-0.588,-0.146]
Age Group			
15-24 (ref)	1	1	1

25-44	1.088 [0.900,1.316]	1.056 [0.958,1.164]	0.244 [-0.106,0.594]
45-66	1.131 [0.919,1.394]	0.852** [0.767,0.946]	-0.408* [-0.770,-0.046]
67-79	2.083*** [1.572,2.761]	0.807*** [0.711,0.916]	-0.271 [-0.699,0.156]
80+	2.736*** [1.773,4.220]	0.815* [0.692,0.959]	-0.144 [-0.693,0.405]
Civil Status			
Single (ref)	1	1	1
Married/registered partner	1.096 [0.938,1.282]	1.025 [0.952,1.104]	0.131 [-0.114,0.375]
Widowed	1.121 [0.780,1.609]	1.020 [0.886,1.173]	0.127 [-0.355,0.609]
Separated	1.836 [0.996,3.382]	1.243 [0.966,1.600]	1.120* [0.041,2.199]
Divorced	1.279 [0.991,1.651]	1.080 [0.968,1.205]	0.391* [0.001,0.781]
Number of people in household			
1 (ref)	1	1	1
2	1.284* [1.057,1.559]	1.015 [0.927,1.112]	0.193 [-0.107,0.494]
3	1.108 [0.882,1.393]	1.080 [0.967,1.205]	0.306 [-0.068,0.680]
4	0.938 [0.739,1.191]	0.965 [0.859,1.085]	-0.143 [-0.515,0.230]
5	0.899 [0.676,1.196]	0.998 [0.866,1.150]	-0.073 [-0.530,0.383]
6+	0.902 [0.570,1.429]	1.027 [0.809,1.303]	0.015 [-0.763,0.793]
Total monthly income level (household)			
0 – 19,999 NOK (ref)	1	1	1
20,000 – 39,999 NOK	1.140 [0.926,1.403]	1.094 [0.993,1.206]	0.354* [0.042,0.667]
40,000 – 59,999 NOK	1.390** [1.090,1.771]	1.038 [0.927,1.163]	0.311 [-0.051,0.673]
60,000 – 79,999 NOK	1.303* [1.003,1.692]	1.040 [0.918,1.177]	0.278 [-0.120,0.676]
80,000+ NOK	1.334* [1.001,1.777]	0.914 [0.797,1.048]	-0.086 [-0.502,0.330]

County			
1: Østfold (ref)	1	1	1
2: Akershus	0.761 [0.536,1.081]	1.014 [0.868,1.185]	-0.114 [-0.641,0.413]
3: Oslo	0.832 [0.609,1.138]	1.020 [0.890,1.170]	-0.040 [-0.508,0.428]
4: Hedmark	0.862 [0.600,1.239]	0.967 [0.827,1.130]	-0.186 [-0.707,0.335]
5: Oppland	0.785 [0.546,1.130]	1.084 [0.925,1.272]	0.120 [-0.441,0.681]
6: Buskerud	0.801 [0.559,1.149]	1.065 [0.911,1.247]	0.075 [-0.473,0.623]
7: Vestfold	0.996 [0.687,1.444]	0.950 [0.813,1.111]	-0.161 [-0.684,0.363]
8: Telemark	0.836 [0.579,1.207]	0.956 [0.816,1.120]	-0.236 [-0.762,0.291]
9: Aust-Agder	0.929 [0.643,1.343]	1.167 [0.995,1.368]	0.484 [-0.105,1.074]
10: Vest-Agder	0.725 [0.507,1.038]	1.054 [0.898,1.237]	-0.024 [-0.576,0.527]
11: Rogaland	0.745 [0.524,1.059]	1.038 [0.888,1.214]	-0.054 [-0.590,0.482]
12: Hordaland	0.842 [0.592,1.197]	1.002 [0.858,1.170]	-0.089 [-0.615,0.436]
14: Sogn og Fjordane	0.566[**] [0.399,0.803]	1.087 [0.924,1.280]	-0.100 [-0.657,0.457]
15: Møre og Romsdal	0.926 [0.640,1.341]	0.992 [0.846,1.163]	-0.067 [-0.607,0.473]
16: Sør-Trøndelag	0.683[*] [0.483,0.965]	0.906 [0.774,1.062]	-0.501 [-1.005,0.002]
17: Nord-Trøndelag	0.774 [0.541,1.106]	0.927 [0.792,1.085]	-0.368 [-0.881,0.145]
18: Nordland	0.639[*] [0.450,0.907]	0.981 [0.837,1.150]	-0.322 [-0.844,0.200]
19: Troms	0.929 [0.646,1.336]	0.933 [0.797,1.093]	-0.249 [-0.769,0.270]
20: Finnmark	0.819 [0.564,1.188]	0.995 [0.845,1.173]	-0.127 [-0.679,0.425]
Self-rated overall life satisfaction			
Good (ref)	1	1	1
Poor	1.408[**] [1.134,1.747]	1.270[***] [1.171,1.378]	1.030[***] [0.691,1.370]
Self-rated health			
Good (ref)	1	1	1

Poor	1.544*** [1.283,1.858]	1.472*** [1.373,1.579]	1.601*** [1.302,1.900]
Chronic health condition			
None (ref)	1	1	1
At least one	2.599*** [2.253,2.998]	1.528*** [1.443,1.618]	1.966*** [1.745,2.186]
Experienced discrimination in the past 12 months			
No (ref)	1	1	1
Yes	1.220 [0.974,1.528]	1.130* [1.029,1.241]	0.524** [0.168,0.880]
Required a primary care appointment but did not book one			
No (ref)	1	1	
Yes	1.273* [1.019,1.590]	1.125* [1.027,1.233]	0.532** [0.184,0.880]
N	7679	5702	5702

Appendix 5: Full Negative Binomial Model

Specification of model using Akaike information criterion (AIC) and Bayesian information criterion (BIC)

Model	Log Likelihood	AIC	BIC
Negative Binomial Model 1 (linear in mean)	-18823.48	37740.96	38053.99
Negative Binomial Model 2 (quadratic in mean)	-17955.86	36005.72	36318.75

Model results

NUMBER OF CONTACTS WITH PRIMARY CARE SERVICES	Negative Binomial Model	Marginal/Incremental Effects
Migrant Category		
Norwegians (ref)	1	1
Western migrants	0.951 [0.865,1.046]	-0.151 [-0.432,0.130]
Non-Western migrants	1.076 [0.953,1.215]	0.237 [-0.168,0.641]
Female gender	1.371*** [1.294,1.453]	0.967*** [0.791,1.144]
Education		
None/primary (ref)	1	1
Secondary	0.993 [0.920,1.072]	-0.023 [-0.270,0.223]
Tertiary	0.879*** [0.818,0.944]	-0.392*** [-0.612,-0.172]
Age Group		
15-24 (ref)	1	1
25-44	1.093 [0.974,1.226]	0.296 [-0.078,0.671]
45-66	0.897 [0.794,1.013]	-0.329 [-0.710,0.053]
67-79	0.951 [0.824,1.097]	-0.157 [-0.607,0.293]
80+	0.987 [0.827,1.178]	-0.042 [-0.603,0.519]
Civil Status		
Single (ref)	1	1

Married/registered partner	1.058 [0.973,1.151]	0.172 [-0.082,0.427]
Widowed	1.060 [0.908,1.238]	0.177 [-0.305,0.659]
Separated	1.447* [1.009,2.076]	1.324 [-0.212,2.860]
Divorced	1.161* [1.023,1.318]	0.476* [0.053,0.899]
Number of people in household		
1 (ref)	1	
2	1.080 [0.971,1.201]	0.240 [-0.084,0.565]
3	1.110 [0.973,1.266]	0.329 [-0.087,0.745]
4	0.952 [0.831,1.091]	-0.143 [-0.540,0.254]
5	0.969 [0.819,1.146]	-0.093 [-0.586,0.400]
6+	0.997 [0.755,1.316]	-0.010 [-0.839,0.820]
Total monthly income level (household)		
0 – 19,999 NOK (ref)	1	1
20,000 – 39,999 NOK	1.122* [1.002,1.257]	0.349* [0.017,0.682]
40,000 – 59,999 NOK	1.111 [0.973,1.268]	0.317 [-0.073,0.706]
60,000 – 79,999 NOK	1.098 [0.952,1.267]	0.281 [-0.143,0.704]
80,000+ NOK	0.976 [0.833,1.145]	-0.067 [-0.518,0.384]
County		
1: Østfold (ref)	1	1
2: Akershus	0.955 [0.809,1.128]	-0.144 [-0.665,0.377]
3: Oslo	0.980 [0.851,1.128]	-0.065 [-0.515,0.385]
4: Hedmark	0.950 [0.806,1.120]	-0.160 [-0.675,0.355]
5: Oppland	1.042 [0.874,1.242]	0.136 [-0.443,0.714]
6: Buskerud	1.027 [0.867,1.217]	0.087 [-0.466,0.640]
7: Vestfold	0.949 [0.809,1.115]	-0.162 [-0.664,0.340]
8: Telemark	0.928 [0.793,1.087]	-0.231 [-0.720,0.259]

9: Aust-Agder	1.166 [0.962,1.413]	0.533 [-0.155,1.221]
10: Vest-Agder	0.989 [0.836,1.170]	-0.034 [-0.571,0.502]
11: Rogaland	0.985 [0.835,1.162]	-0.048 [-0.574,0.478]
12: Hordaland	0.980 [0.826,1.163]	-0.064 [-0.606,0.479]
14: Sogn og Fjordane	0.955 [0.777,1.173]	-0.146 [-0.787,0.496]
15: Møre og Romsdal	0.994 [0.848,1.166]	-0.019 [-0.529,0.491]
16: Sør-Trøndelag	0.829[*] [0.702,0.979]	-0.549[*] [-1.035,-0.063]
17: Nord-Trøndelag	0.883 [0.754,1.033]	-0.377 [-0.853,0.100]
18: Nordland	0.891 [0.751,1.056]	-0.351 [-0.865,0.163]
19: Troms	0.929 [0.792,1.090]	-0.227 [-0.722,0.268]
20: Finnmark	0.949 [0.793,1.136]	-0.163 [-0.722,0.396]
Self-rated overall life satisfaction		
Good (ref)	1	1
Poor	1.361[***] [1.237,1.499]	1.060[***] [0.693,1.426]
Self-rated health		
Good (ref)	1	1
Poor	1.568[***] [1.454,1.690]	1.518[***] [1.233,1.803]
Chronic health condition		
None (ref)	1	1
At least one	1.883[***] [1.765,2.009]	2.012[***] [1.781,2.243]
Experienced discrimination in the past 12 months		
No (ref)	1	1
Yes	1.189[**] [1.062,1.331]	0.576[**] [0.171,0.980]
Required a primary care appointment but did not book one		
No (ref)	1	1
Yes	1.182[**] [1.057,1.321]	0.555[**] [0.160,0.949]
N	7679	7679