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**Public Health Challenges
of Immigrants in Norway:
A Research Review**

NAKMI report 2/2010

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NAKMI report (NAKMIs skriftserie for minoriteter og helse)
Redaktør: Karin Harsløf Hjelde
ISSN: 1503-1659
ISSB: 978-82-92564-09-7
Design and print: 07 Gruppen AS, 2010

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Foreword

NAKMI is proud to present this first systematic research review of immigrant health studies in Norway. The report *Public Health Challenges of Immigrants in Norway: A Research Review* gives an overview of migration and health research from the last two decades in a Norwegian context. We are presented with the main findings of a total of 224 immigrant health studies focusing on five large health issues; lifestyles- and diet-related disorders, mental health problems, infectious diseases, access to and use of health services, and reproductive health. The report also discusses central methodological challenges of immigrant health research.

There are obvious and compelling reasons for learning more about the health situation among migrants both at the level of society and at the individual level. In order to reach the different migrant populations with adjusted medical prevention and treatment we need the best available knowledge and documentation.

However, it is important not to forget that focusing explicitly on migration and health may contribute to migrants' vulnerable position. With such focus, minorities may stand out as anomalies in a society that is otherwise perceived as holistic and stabile. Migrants may stand out as peoples that belong in – or connect to – another place, their homelands. Thus, migrant-minority studies include dimensions of sensitivity, in addition to the more obvious socio-cultural, language and power dimensions. In the present context, the dimension of sensitivity in itself is multi-dimensional with both political, socio-cultural and health dimensions. Studies focusing on migrants, including minority health studies, may unintendedly negatively revive political issues and thus contribute to differentiating and ranking migrants. In addition, they may bring to the fore a different relationship to the nation state and to citizenship, possibly even evoking an impression of illegality, criminality and suspicion. Also certain socio-cultural dimensions concerning the relationship between majority and minority may, unintendedly, be emphasised. These are dimensions that most migrants tend to keep silent about: experiences of humiliating fall in social status, of social isolation, of racism and discrimination, of defeat in work or school, and of new gender and conflicting generation roles. In migrant health studies, sensitive issues which are normally kept silent, such as experiences of war, violence (sexualised), persecution and torture as well as traditional taboo themes as mental disorders, may be focused. Many studies also focus on homeland traditions as female genital mutilation, forced marriages, violence and honour killings. These are complex and sensitive issues which have to be dealt without running the risk of a further pathologisation, medicalisation and clientification of migrant populations.

These concerns pose serious ethic dilemmas on researchers. When the relationship between migration and health is studied, research may contribute to a general categorisation of migrants as *a* category and thus to the social isolation and stigmatisation of migrants. The present report on immigrant health studies in its discussions show us how vital it is that migrant populations are studied in their full heterogeneity and complexity. For this purpose, it emphasises the importance of choice of research strategy and methodology for the

assessment of the respective health status and healthcare needs and for measuring ethnic inequality in health. A good basis has thus been laid for integrating these methodological and ethic issues in future immigrant health studies. My wish for this report is that it will serve as a source of inspiration and contribute to the further deepening of our understanding of immigrant health.

NAKMI, June 2010
Karin Harsløf Hjelde
Acting Director

Acknowledgments

I would like to thank the Norwegian Center for Minority Health Research (NAKMI) for funding to write this research review report. I express my heartfelt gratitude to Karin Harsløf Hjelde and Arild Aambø for providing me with the opportunity to work at NAKMI, enriching discussions, editing the report and for all the support along the way. It has been a privilege and pleasure to work with them.

I am also grateful to all my colleagues at NAKMI: Claire Mock Muñoz de Luna, Emine Kale, Jennifer Gerwing, Ragnhild Spilker, Thor Indseth, Torunn Arntsen Sajjad, Sara Kahasy, Ursula-Georgine Småland Goth and Vera Minja, for being very supportive and for all the encouragement. I would like to thank Lars Lien and Kristin Holvik for providing me with constructive comments and sharing their publications.

Thanks to all researchers and scholars who contributed their experiences and knowledge about immigrant health in Norway.

NAKMI, June 2010
Dawit Shawel Abebe
Author

Executive Summary

Background:

Migration is considered to be a complex and dynamic process that can impact the health of migrants, both positively and negatively depending on a number of conditions associated with individual, social, environmental and health related factors. Immigrant health has therefore been regarded as a public health challenge in several countries. Today's immigrant population in Norway constitutes 10.6 % of the general population. Understanding and generating research-based knowledge on immigrant health problems and healthcare needs is highly relevant for planning preventive interventions, as well as guiding social and policy actions. However, research in this field has been confronted by a number of gaps and ambiguities.

Aim:

To map the available knowledge on primary public health problems, identify knowledge gaps and discuss methodological issues related to immigrants' health in Norway.

Methodology:

We searched relevant publications through the core databases, such as PUBMED, EMBASE, PsychINFO and MEDLINE. The search was based on: [Norway] AND [immigrant OR immigration OR ethnicity OR ethnic minority OR migrant OR migration] AND/OR [health]. We mainly included published peer-reviewed research articles and some research reports, with most of articles having been published since the 1990s. The studies were organized accordingly: 32 studies on lifestyle- and diet-related disorders, 41 on mental health problems, 54 on infectious diseases, 21 on reproductive health and related problems and 74 on various public health problems.

Results:

In the majority of the studies, the immigrant populations were presented with poor health conditions and multiple risk factors related to pre- and post-migration experiences, socio-economic conditions and individual backgrounds such as:

Lifestyle- and diet-related disorders:

- Higher prevalence rates of obesity and overweight that significantly varied across ethnic and gender groups were specifically reported among Turkish and Pakistani adult immigrants, boys with Western and Middle East/North African backgrounds and girls from Eastern Europe.
- In studies particularly focusing among South Asian adult immigrants, the prevalence of diabetes and gestational diabetes was significantly higher than in individuals with Western backgrounds.

- Unhealthy dietary intake and behaviors, and less physical activity were found to be the main risk factors.
- Cardiovascular risk factors have been found with a greater ethnic variation.
- A high prevalence of Vitamin D deficiency was found among both adults and children with immigrant backgrounds, which was significantly associated with a lower daily intake of Vitamin D and a migration to a northern latitude, while the use of fatty fish and cod liver oil has a positive impact.
- Community-based and culturally adapted lifestyle interventions showed a significant increase in physical activity and desired changes towards a healthy dietary intake and behavior.
- There is a paucity of data to explain ethnic, gender and age differences, in addition to the prevalence and risk factors of lifestyle- and diet-related disorders in other ethnic and age groups of immigrants, i.e. those from Africa, and children and adolescent immigrants.

Mental health problems:

- It is uncertain whether adolescent immigrants necessarily have a greater burden of mental health problems than their Norwegian peers. However, their increased risk for mental illness is linked to a higher risk for acculturative stress, high levels of perceived discrimination and identity crisis, and parental war experience.
- Prevalence rates have been consistently higher among adult immigrants, specifically among women and those from low and middle income countries compared to Norwegians and the general population. Identified risk factors include poor social support, deprived socioeconomic conditions, multiple negative life events, experiences of discrimination and traumatic pre-migration experiences.
- Further studies need to explore the role and effect of gender in social integration processes and their effect on mental health, the association between mental health problems and somatic illness, mental health and ethnicity, and developing culturally sensitive and validated instruments.

Infectious Diseases:

- Tuberculosis (TB) and HIV/AIDS are commonly reported, particularly among immigrants from Africa, but there is a limited amount of knowledge about other sexually transmitted infections among immigrants in general.
- Delay in diagnosis and early start of treatment for TB, inadequate follow-up system, and an inefficient health information system were found to be challenges for TB control among immigrants.
- A high rate of TB among immigrants is not a threat to the general population, as adequate control strategies are in place.

Reproductive Health and Related Problems:

- Immigrant women from Asian and African countries were found to experience a higher risk of obstetric-related complications, perinatal mortality and high rates for the termination of pregnancies in comparison to Norwegians and Western immigrants. The risk factors were female genital mutilation, consanguineous marriage, low or inconsistent use of contraception, low education and poor socioeconomic status.
- In addition, a lack of experience and knowledge among health workers and communication problems between healthcare providers and immigrant patients were mentioned as possible challenges.

Methodological Challenges:

- Most studies are presented with numerous methodological and conceptual challenges such as diverse immigrant populations portrayed as a homogenous group and inadequate control of pre- and post-migration variables.
- Studies have been challenged with a low response rate, small sample size, questionnaires that have not been validated for cross-cultural use and information bias as a result of different conceptions of health, attitudes, language problems and misclassification. Furthermore, very few studies have adopted a prospective, longitudinal design and comparison to non-immigrant native populations.

Other Public Health Problems:

- Despite frequent visits to general practitioners, immigrant patients were reported to have less satisfaction with the provision of health services. The reasons suggested included poor mutual communication, ethnic and cultural differences, expectations and a lack of experience.
- Only a few studies investigated situations related to the use of and access to healthcare.
- Musculoskeletal disorders, sickness absences, disability pensions and dental health problems are reported as major public health challenges among immigrant populations, although the use of drugs and substance is lower among immigrants compared to Norwegians.
- Despite the fact that cancer has been regarded as a major public health problem in the general population, there is no published information on this disease among immigrants.

Conclusion:

Most reviewed studies revealed a higher burden of important public health problems among the immigrant population and their descendents compared to Norwegians and the general population. The available knowledge certainly indicates an urgent need for community-based and culturally adapted health promotion programs and preventive interventions. Correspondingly, research in this field has a number of unanswered questions, ambiguities and challenges that strongly demand a nationally comprehensive research program.

Definition of terms¹

Immigrants are defined as being born abroad by two foreign-born parents, and registered as residents in Norway (“first-generation immigrants” or “migrants”)

Norwegian-born to immigrant parents is defined as those born in Norway with two immigrant parents (before 2000, they were called “second-generation immigrants”).

Refugees are defined as persons who have refugee status and have been granted a residence permit in Norway according to the Norwegian Directorate of Immigration’s register of refugees.

Asylum seeker – person who on his or her own initiative, and without prior notification, asks the authorities for protection and recognition as a refugee. The person is called an asylum seeker until a decision has been made on the application.

Ethnic Minority is a term used to refer to both immigrant populations and their descendants.

Norwegian-born is defined as being born in Norway and having two Norwegian-born parents (sometimes defined as *Ethnic Norwegians* or just *Norwegians*).

1 Source: Statistics Norway(http://www.ssb.no/innvandring_en/) and Norwegian Directorate of Immigration (<http://www.udi.no/Norwegian-Directorate-of-Immigration/About-UDI/Definitions-of-terms/>)

Abbreviations

AIDS:	Acquired Immuno Deficiency Syndrome
ANOVA:	Analysis of variance
BMI:	Body Mass Index
CVDs:	Cardiovascular diseases
FGM:	Female Genital Mutilation
HIV:	Human Immunodeficiency Virus
HSCL:	Hopkins Symptom Check List
HUBRO:	<i>Helseundersøkelsen i Oslo</i> (The Oslo Health Study)
MANOVA:	Multivariate analysis of variance
M.tb:	Mycobacterium Tuberculosis
SDQ:	Strengths and Difficulties Questionnaire
SSB:	<i>Statistisk sentralbyrås</i> (Statistics Norway)
TB:	Tuberculosis
T2D:	Type 2 Diabetes
US:	United States of America
UK:	United Kingdom
WHO:	World Health Organization
WHR:	Waist hip ratio
VDD:	Vitamin D Deficiency

1. Background

Basic Facts about Immigrants in Norway

The immigrant population of Norway has been rapidly increasing since the end of the 1960's. Today, immigrants and those born in Norway to immigrant parents constitute approximately 508,000 persons or 10.6 % of the total population: 423,000 immigrants and 86,000 Norwegian-born persons with immigrant parents. This percentage consists of people from 214 different countries and independent regions. In total, 203,000 have a European background, of which 60,500 have a background outside the EU/EEA. A total of 186,000 persons have a background from Asia, 61,000 from Africa, 17,000 from Latin America and 16,500 from North America and Oceania. The largest immigrants groups from the highest on down are from Poland, Pakistan, Sweden, Iraq and Somalia (1).

The immigrant population is comprised of a relatively high number of young adults as compared with the entire population. In 2008, almost half of all immigrants and those Norwegian-born to immigrant parents were aged 20–44 years. There are almost as many women as men among immigrants and Norwegian-born to immigrant parents in total. However, in the largest immigrant groups, men from countries with many labor migrants (68 % from Poland and 61 % from Great Britain) and newly arrived refugees (58 % from both Iraq and Afghanistan) were in the majority. As for the duration of residence, about 40 % have lived in Norway less than 5 years, 28 % between 5–14 years and 30 % for at least 15 years. In 2008, more than half of all immigrants and Norwegian-born to immigrant parents live in three cities: 30 % in Oslo, 17 % in Bergen and 12 % in Stavanger (1).

In 2007, 9 out of 10 of all 16–18-year-olds in Norway attended upper secondary school. This proportion was 68 % among immigrants, while 89 % among immigrants and Norwegian-born to immigrant parents. Among those who continued to tertiary education in the same year, the proportion for immigrants was 27 % and 46 % for immigrants and Norwegian-born to immigrant parents, respectively. In general, the level of employment is increasing among immigrants compared to the total population: from 57 % in the fourth quarter of 2005 to 63.3 % in the same quarter of 2007. In 2007, African immigrants had the lowest level of employment with 49 %, followed by Asian immigrants with 56.3 %. Additionally, employment rates for women in a number of immigrant groups outside of Europe were extremely low. Income inequality is greater among immigrants: immigrants from the Nordic and other Western European countries, North America and Oceania have a median income at the same level as the general population, while immigrants and Norwegian-born to immigrant parents from Eastern Europe, Asia, Africa and Latin America generally have a much lower median income (1).

Migration and Health

Migration is a process of social change during which an individual moves from one social and cultural setting to another for the purpose of setting down permanently or for an extended period (2). The reasons for migration are usually for economic, political or educational betterment. Such a change can influence a person's health in positive and negative ways depending on the nature of the migration, places of origin and destination as well as an individual's physical and mental condition (3–5).

Like all people, immigrants have their own ethnic, family and social values, disease susceptibility, experiences in accessing healthcare and beliefs in coping with life, illness and death. These imprints can continue to determine health and health behavior during both pre- and post-migration periods (3;4;6–8). In addition, inequalities in health and socioeconomic status can further impact on their health status and access to healthcare (9). Their mental health status is also influenced by a mix of “cultural shock”, language difficulty, homesickness, job insecurity, powerlessness and the constant fear of deportation in case of asylum seekers (3;4;10). Due to a number of psychosocially-, lifestyle- and biologically-related factors, immigrant populations generally experience a greater burden of morbidity (2;3;11–13).

On the other hand, the process of immigration may yield positive health effects termed as “healthy migrant hypothesis” or “epidemiological paradox”, which explains the relatively low level of mortality and good health among Mexican Americans in the US (14). This hypothesis suggests that immigrants with a lower socioeconomic status can share the same pattern of mortality and health conditions as those of the most advantaged, host population (14). However, this has drawn much controversy and criticism from studies that affirmed weak support for the healthy migrant hypothesis (15–17). One of the main reasons mentioned by these studies is the self-selection of migrants: healthy, young people are more prone to immigrate than less healthy and older people, particularly in cases of labor migrants who require a relatively good level of health as well as those who may have a positive outlook on their lives and future (4;16;17). Moreover, it is also possibly caused by diverse uncontrolled, confounding factors and reporting errors (16).

Research initiatives on migrant health have been in progress since the late 20th century (4). Previously, there has been little effort in investigating how migration impacts migrants' health, except in the area of mental and psychological well-being, although today there has been a growing interest in acquiring a better understanding of the health status and healthcare needs of rising numbers of migrants (4). Still, knowledge about the health status of migrants is often limited or immigrants are either excluded or too few in nationally representative studies and clinical trials (4;18–20).

Research on migrants' health in Norway has a fairly recent history, being started in the mid-1990s. In 2000–2002, the first comprehensive population-based health surveys were performed: the Oslo Health Study (HUBRO) conducted in 2000–2001 and the Oslo Immigrant Health Study (Invandrer-HUBRO) conducted in 2002. These studies provided

information about health status based on self-reported, physical and clinical examinations, with more detailed information about the health surveys being available on the Norwegian Institute of Public Health's website.² In addition, Statistics Norway (SSB) has been conducting periodic surveys (in 1998 and 2005) among immigrants and Norwegian-born from two immigrant parents aged 16–70 years from 10 countries: Bosnia-Herzegovina, Serbia and Montenegro, Turkey, Iraq, Iran, Pakistan, Vietnam, Sri Lanka, Somalia and Chile. The surveys mainly focus on living conditions and self-reported morbidity (21). From these studies, including individual works (doctoral and master theses), we have today a number of scientific publications and reports that provide a better understanding about immigrant health. However, there are still a number of unanswered issues and gaps in this field of study.

Aims

The aims of this research review are to map the available knowledge on immigrants' health status, to identify lessons from and knowledge gaps in research on immigrant health, and to indicate and discuss methodological challenges of immigrant health studies.

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2. Methodology

For the purpose of this research review, we mainly included published peer-reviewed research articles based on studies performed in Norway. Using non-specific keywords, we searched for published articles from core databases such as PUBMED, PsychINFO, EMBASE and MEDLINE. About 512 references were downloaded, which include original articles, short communications and editorial letters. All this literature was organized using Reference Manager V.12 software (see Table 1).

Table 1 – Literature search strategy and result, October 30, 2009

Keywords	Database	Number of hits
Immigr* and health and Norway	– MetaSearch from core databases	172
Immig* and Norway	– PubMed	310
Immig* and ethnic* and Norway	– MetaSearch from core databases	50

*Immigrant, immigration, ethnicity or ethnic minority

We performed a preliminary cleaning of the list of references by checking duplicate articles from different databases and then selecting literature by reading abstracts. Because of using different databases and searching through non-specific keywords, 288 articles were removed due to both duplication and low relevance to the field of migrant health. Then, 224 references were grouped into five main categories: 32 on lifestyle- and diet-related disorders, 41 on mental health problems, 54 infectious diseases, 21 on reproductive health and related problems and 74 on other public health problems.

In addition, the database has been updated continuously by cross-checking cited references and using an automatic alert system on a PubMed database: published articles with keywords of immig*, ethnic*, and health, were retrieved weekly. The full texts of most articles were accessed using online sources and the library at the University of Oslo.

The review primarily includes research articles from population- and registry-based studies, predictive / risk factors identified from studies employing multivariable analysis, and all qualitative studies. The studies were published both in English and Norwegian, and most of them were published after the 1990s. Data/information extraction and synthesis from the literature was often done using a form that consists of authors, title, year of publication, main outcome of study, study and participant characteristics, main findings, conclusions, recommendations and study limitations (see Appendix 1).

This review report presents the material as follows: lifestyle- and diet-related disorders, mental health problems, infectious diseases, reproductive health and related problems,

methodological challenges, and finally conclusions and implications. In addition, other health problems are summarized separately. In each chapter, a list of references which also comprises further reading and additional references is included. The summary of the main studies is presented in Tables 2–5.

Table 2 – Lifestyle- and diet-related disorders

Author (s)	Sample and outcome measure	Design and analysis	Objective
Glenday, K. et al., 2006	2,988 adult immigrants from Pakistan, Turkey, Sri Lanka, Iran and Vietnam. CVDs risk factors	Population-based, cross-sectional. Linear regression and Framingham risk score	To investigate ethnic differences in cardiovascular risk factors
Hjellset, V.T. et al., 2009 (<i>InnvaDiab-DEPLAN study</i>)	198 female Pakistani immigrants. Risks for type 2 diabetes	Population-based, cross-sectional. t-test and ANOVA	To provide an update of the risk of T2D and metabolic syndrome (MetS)
Holvik, K. et al., 2005	1,000 adult immigrants from Pakistan, Turkey, Sri Lanka, Iran and Vietnam. s-25(OH)D	Population-based, cross-sectional. Logistic regression	To study prevalence and possible predictors of Vitamin D deficiency in ethnic groups
Holvik, K. et al., 2007	161 adult Pakistani immigrants and 413 Norwegians. s-25(OH)D and s-Ca ²⁺	Population-based, cross-sectional. ANOVA and linear regression	To investigate whether Pakistani immigrants have an altered Vitamin D metabolism compared with ethnic Norwegians
Jenum, A.K. et al., 2005	2,513 adults from Western countries and South Asia. Diabetes	Population-based, cross-sectional. Age-standardized prevalence and logistic regression	To investigate the prevalence of diabetes and its association with ethnicity and sex
Jenum, A.K. et al., 2006 (<i>Romsas in Motion study*</i>)	2,950 adults from Western (78 %) and Non-Western countries (22 %). Physical activity and its effect on risks for T2D and CVDs	A 3-year cohort, community-based intervention. ANOVA, MANOVA, linear and logistic regression	To assess the effects of physical activity on risk factors for T2D and CVDs
Johansen, K.S. et al., 2009 (<i>InnvaDiab-DEPLAN study</i>)	198 female Pakistani immigrants. Dietary behavior and intake	A 7-month intervention trial. Descriptive and treatment-received analyses	To present the effect of a culturally adapted lifestyle intervention on changes in dietary behavior and intake

Table 2 continued

Author (s)	Sample and outcome measure	Design and analysis	Objective
Kolsgaard, M.L.P. et al., 2008(<i>Oslo Adiposity Intervention study</i>)	203 overweight and obese Norwegian, Pakistani, Tamil and Turkish patients aged 6–17 years. MetS	Hospital-based cross-sectional study. Multiple linear regression	Are there differences in the prevalence of MetS between obese and overweight Norwegian and immigrant children and adolescents?
Kumare, B.N. et al., 2006	3,019 adult immigrants from Pakistan, Turkey, Sri Lanka, Iran and Vietnam. BMI and WHR	Population-based, cross-sectional. ANOVA and linear regression	To compare ethnic and gender differences in the prevalence of obesity
Kumar, B.N. et al., 2004	1,659 adolescent, 2 nd generation immigrants from Western and Eastern Europe, North Africa and the Middle East, Sub-Saharan Africa, Indian subcontinent, East Asia/Pacific. BMI	School-based, cross-sectional. Ordinal logistic regression	To examine ethnic differences in BMI, food habits and physical activity and to identify associated factors
Kumar, B.N. et al., 2009	14,856 adult individuals born in Norway, Turkey, Iran, Pakistan, Sri Lanka and Vietnam. CVDs risk factors	Population-based, cross-sectional. European SCORE high-risk models (CVDs)	To compare the estimated 10-year risk of CV death between ethnic Norwegians and five immigrant groups
Madar, A.A. et al., 2009	86 immigrant mothers with their infants; 45 Pakistani, 25 Turkish, and 10 Somali. Serum s-25(OH)D	Clinic-based, cross sectional. Simple and multiple linear regression	To describe the Vitamin D status and correlated factors among infants aged 6 weeks and their mothers
Madar, A.A. et al., 2009	51 infants born in Norway from Pakistani, Turkish and Somali mothers. Serum s-25(OH)D	Randomized control trial. Conventional ANCOVA	To study whether a free supply of Vitamin D drops to 6-week-old infants, together with tailor-made information handouts, improves their Vitamin D status
Mellin-Olsen, T. and Wandel, M., 2005	25 female Pakistani immigrants. Dietary habits	Qualitative study (focus group discussion). Analyzed by a model developed by Kocturk and PRECEDE	To provide information to better understand how various factors influence dietary habits after migration

Table 2 continued

Author (s)	Sample and outcome measure	Design and analysis	Objective
Meyer, H.E. et al., 2008	196 adults in Sri Lanka and 242 Sri Lankan immigrants in Oslo. Serum s-25(OH)D	Comparative population-based, cross-sectional. ANOVA	To compare Vitamin D status
Raberg, M. et al., 2009	629 adult Pakistani and Sri Lankan immigrants. BMI, WHR, weight dissatisfaction and slimming	Population-based, cross-sectional. Multiple linear regression	To investigate how socioeconomic position, demographic factors, degree of integration and dietary indicators are related. BMI/WHR and weight dissatisfaction
Sagatun, A. et al., 2008	2,489 adolescents; 20 % ethnic minority backgrounds. Physical activity	3-year longitudinal, baseline and follow-up. ANOVA and linear regression	To investigate levels, change and stability of physical activity during late teens among ethnic Norwegians and minorities.
Vangen, S. et al., 2003	All births from 1988 to 1998 from 11,268 mothers born in South Asia and North Africa and 601,785 in Norway. Pregnancy outcomes and diabetes	Registry-based longitudinal study. Logistic regression	To study outcome of pregnancy among immigrant women with diabetes
Wandel, M. et al., 2008	629 adult immigrants from Pakistan and Sri Lanka. Food consumption habits and practice	Population-based, cross-sectional. Logistic regression	To explore changes in food habits after migration and influencing factors

*multiple articles were published from this study

Table 3 – Mental health problems

Author (s)	Sample and outcome measure	Design and analysis	Objective
Dalgard, O.S. et al., 2006	15,723 adults living in Oslo. Psychological distress	Population-based, cross-sectional. ANOVA and multiple linear regression	To compare the level of psychological distress between Norwegian born and immigrants, and to investigate the explanatory factors
Dalgard, O.S. et al., 2007	15,899 adults living in Oslo: 1,448 immigrants from Non-Western and 1,059 immigrants from Western countries. Psychological distress	Population-based, cross-sectional. General linear model and multiple linear regression	To investigate the relationship between social integration and psychological distress
Fandrem, H. et al., 2009	3,431 native Norwegian and immigrant adolescents aged 13–15 years. Depressive symptoms	School-based, cross-sectional. MCA and ANOVA	To examine the role of socio-demographic factors on depressive symptoms
Hauff, E. and Vaglum, P., 1993, 1994, 1995, 1997	145 adult Vietnamese refugees. Mental disorders, and post-traumatic stress syndrome	A 3-year, prospective, community cohort. Multiple linear and logistic regression	To study mental health status both during and after settlement
Iversen, V.C. and Morken, G., 2003	94 immigrants, 39 asylum seekers and a control group of 133 Norwegians. Admission rate	Hospital admission registry. Descriptive statistics	To compare admission rates in a psychiatric hospital
Lie, B. et al., 2004	21 Bosnian refugees returning to Bosnia and 175 refugees remaining in exile in Norway. Psychological and somatic symptoms	Longitudinal, comparative cohort. Chi-square and point-bi-serial correlation	To explore possible differences in the longitudinal course of psychological and somatic symptoms
Lien, L. et al., 2008	7,345 adolescents aged 15–16 years, 24 % have immigrant backgrounds. Mental health problems and inflammatory conditions	School-based, cross-sectional. Logistic regression	To describe the prevalence and investigate the association between mental health problems and Inflammatory conditions
Lien, L. et al., 2007	7,343 adolescents aged 15–16 years, 24 % have immigrant backgrounds. Mental health problems and acute infections	School-based, cross-sectional. Logistic regression	To study the association between mental health problems, negative life events, perceived pressure at school and the frequency of acute infectious illnesses

Table 3 continued

Author (s)	Sample and outcome measure	Design and analysis	Objective
Lien, L, et al., 2006	7,343 adolescents aged 15–16 years, 24 % have immigrant backgrounds. Mental health problems	School-based, cross-sectional. One-way ANOVA	To investigate differences in internalizing and externalizing mental health problems between adolescents exposed and not exposed to their own and parental war experience
Oppedal, B. et al., 2005	1,295 adolescents (10 th grade) with 11 ethnic origins. Psychiatric problems	School-based, cross-sectional. ANOVA	To investigate the effects of ethnic origin and acculturation factors on psychiatric problems
Oppedal, B. et al., 2004	633 adolescents (8 th grade) with different ethnic origins. Psychological distress	School-based, cross-sectional. ANOVA	To investigate differences in the level of mental health, life stress and social support among adolescents with immigrant and domestic backgrounds
Sagatun, A. et al., 2008	2,489 adolescents aged 15–18 years; 54 % from ethnic minorities. Mental health problems	Longitudinal, one baseline and one follow up. MANOVA	To compare changes in self-reported mental health between adolescents with ethnic Norwegian and ethnic minority
Sam, D.L. et al., 1994, 1997	568 immigrant children aged 10–17 years. Psychological adjustment and acculturative stress	Population-based, cross-sectional. Descriptive and ANOVA	To examine the adjustment of young immigrants to their new cultural environment and the incidence of emotional disorders
Sam, D.L. et al., 1994	506 adolescents with Vietnamese, Pakistani, Turkish and Chilean backgrounds	Population-based, cross-sectional. Descriptive and linear regression	To examine predictors of the psychological well-being of adolescents
Syed, H.R. et al., 2006	13,581 Norwegian-born 339 ethnic Pakistanis (adults). Mental distress	Population-based, cross-sectional. Logistic regression	To investigate the association between psychological distress and psychosocial factors among Pakistani immigrants and ethnic Norwegians

Table 3 continued

Author (s)	Sample and outcome measure	Design and analysis	Objective
Thapa, S.B. et al., 2007	2,246 adult immigrants from high- and low-income countries. Psychological distress	Population-based, cross-sectional. Logistic regression	To compare and explain psychological distress between immigrants from low- and high-income countries
Thapa, S.B. et al., 2005	1,536 adult immigrants from middle- and low-income countries. Psychological distress	Population-based, cross-sectional. Logistic regression	To compare and explain gender differences of psychological distress among immigrants from low- and middle-income countries
Vaage, A.B. et al., 2009	94 Norwegian-born children from Vietnamese refugees, aged 4–18 years. Mental health difficulties (SDQ)	Cross-sectional from a longitudinal community cohort. Chi-square and t-test	To compare the mental health of Norwegian born children from Vietnamese refugees with that of Norwegians
Virta, E. et al., 2004	840 adolescents with Turkish, Swedish and Norwegian backgrounds. Psychological adaptation	Comparative school-based, cross-sectional. ANOVA	To assess the psychological adaptation of adolescents with a Turkish background in Norway and Sweden

Table 4 – Reproductive health and related problems

Author (s)	Sample and outcome measure	Design and analysis	Objective
Eskild, A. et al., 2000	All women 16–50 years of age, living in Oslo in 1999. Induced abortion	Registry-based, cross-sectional. Descriptive	To investigate whether Non-Western immigrant women are overrepresented among women requesting induced abortions
Small, R. et al., 2008	10,431 Somali-born women and 2, 168,891 receiving country-born women in six countries. Pregnancy outcomes	Meta analysis	To investigate pregnancy outcomes in Somali-born women compared with women born in each of the six receiving countries
Stoltenberg, C. et al., 1995	All births in Oslo between 1968 and 1991 (n = 146,133). Low birth weight and gestational age	Registry-based, cross-sectional. Descriptive	To determine the influence of children born to immigrant mothers on the total proportions of low birth weight and preterm deliveries

Table 4 continued

Author (s)	Sample and outcome measure	Design and analysis	Objective
Stoltenberg, C. et.al., 1997	All 1.56 million births in Norway from 1967 to 1993. Birth defects	Registry-based, cross-sectional. Descriptive	To compare and explain frequencies of birth defects between immigrants and Norwegians
Vangen, S. et.al., 1999	66 ethnic Pakistani and 71 ethnic Norwegian women (obstetrical patients). Pregnancy complications	Hospital-based, cross-sectional. Logistic regression	To describe the pattern of complaints and complications in pregnancy among ethnic Norwegian and ethnic Pakistani women
Vangen, S. et.al., 2000	553,491 live births during the period 1986–1995. Cesarean section	Registry-based, cross-sectional. Descriptive	To study prevalence of cesarean section among different groups of immigrants compared to Norwegians
Vangen, S. et.al., 2002	All births to mothers born in Norway (808,658), Pakistan (6,854), Vietnam (3,283) and North Africa (1,461) from 1980 to 1995. Birth weight and perinatal mortality	Registry-based, cross-sectional. Descriptive	To explore whether ethnic differences in birth weight explain ethnic differences in perinatal mortality
Vangen, S. et.al., 2002	All births to women born in Somalia (1,733) and Norway (702,192) from 1986 to 1998. Perinatal complications	Registry-based, cross-sectional. Descriptive	To examine the risk of perinatal complications among ethnic Somalis
Vangen, S. et.al., 2003	All births from mothers born in South Asia and North Africa (11,268) and Norway (601,785) from 1988 to 1998. Pregnancy outcomes and gestational diabetes	Registry-based, cross-sectional. Descriptive	To study outcome of pregnancy among immigrant women with diabetes
Vangen, S. et.al., 2004	23 Somali immigrant women and 36 Norwegian health care professionals. Experience of obstetric care	Qualitative in-depth interview.	To explore how perinatal care practice may influence labor outcomes among circumcized women

Table 4 continued

Author (s)	Sample and outcome measure	Design and analysis	Objective
Vangen, S. et al., 2008	All women 15–49 years undergoing termination of pregnancy (TOP) and living in Oslo from 2000 to July 2003. TOP	Registry-based, cross-sectional. logistic regression	To estimate frequency of termination of pregnancy (TOP) and associated risk factors according to immigration status
Vikanes, A. et al., 2008	All primiparous women in Norway from 1967 – 2005 (N=900,074). Hyperemesis gravidarum	Registry-based, cross-sectional. Descriptive	To estimate the prevalence of hyperemesis gravidarum in women living in Norway

Table 5 – Infectious diseases

Author (s)	Sample and outcome measure	Design and analysis	Objective
Farah, M.G. et al., 2003	A total of 3,530 notified TB cases , of which 1,402 were foreign-born residents.	Registry data from 1986–1999. Standard Incidence rate and population attributable risk	To estimate the standardized incidence ratio of TB among the foreign-born
Farah, M.G. et al., 2005	1,514 TB cases with immigrant background	Registry data from 1986–2002. Cox regression model	To examine the long-term risk of TB among immigrants
Farah, M.G. et al., 2006	83 notified TB cases; 71 of them born abroad	Registry data from 2003–2004. Multiple linear regression	To assess the delays in the start of treatment for TB patients in Oslo/Akershus and to analyze risk factors for the delays
Harstad, I. et al., 2009	5,112 asylum seekers ≥ 18 years who arrived at the National Reception Centre. TB	Registry data from 2005 to 2006. Descriptive	To assess to what extent the national recommendations for screening, treatment and follow-up of tuberculosis disease and infection among asylum seekers
Sagbakken, M. et al., 2010	22 participants diagnosed with TB who originated from Somalia or Ethiopia.	Qualitative study.	To explore experiences of being diagnosed with TB among immigrants
Dahle, U.R. et al., 2003	Isolates from 818 patients diagnosed with TB. Genetic diversity of M.tb	Registry data from 1994 to 2001. Descriptive	To determine the genetic diversity of M.tb

Table 5 continued

Author (s)	Sample and outcome measure	Design and analysis	Objective
Dahle, U.R. et al., 2007	3,131 patients were notified with TB. Genetic diversity of M.tb	Registry data from 1994 to 2005. Descriptive	To determine the effect of immigration on the genetic diversity of M. tb
Heldal, E. et al., 2003	861 culture-positive TB cases. Risk factors for TB	Registry data from 1994–1999. Multivariate logistic regression	To identify risk factors for developing TB following recent infection
Aavitsland, P. and Nilsen, O., 2001	2,016 cases of HIV infection in Norway. Incidence of HIV infection	Registry data 1983 to 1999. Descriptive	To assess the connections between the Norwegian and African HIV epidemic
Aavitsland, P. et al., 1996	1,537 individuals with HIV infection in Norway	Registry data up to 1996. Descriptive	To describe the epidemiology of HIV infection
Aavitsland, P. and Nilsen, O., 2006	3,263 individuals with HIV infection in Norway	Registry data from 1996 to 2005. Descriptive	To describe the epidemiology of HIV infection
Jensenius, M. et al., 1999	222 cases of falciparum malaria diagnosed in Oslo and Akershus	Registry data from 1988 to 1997. Descriptive	To describe epidemiology of malaria
Blystad, H., 2000	744 imported malaria cases	Registry data from 1989 to 1998. Descriptive	To describe epidemiology of malaria

3. Lifestyle- and Diet-Related Disorders

Introduction

The burden of chronic diet- and lifestyle-related diseases is rapidly increasing worldwide. The World Health Organization (WHO) estimated that in 2001 chronic diseases contributed to approximately 60 % of the 56.5 million total reported deaths in the world and approximately 46 % of the global burden of disease. Almost half of the total chronic disease deaths are attributable to cardiovascular diseases (CVDs), which kill more people annually than any other disease. In 2004, an estimated 17.1 million people died from CVDs, representing 29 % of all global deaths. CVDs will also remain as the single leading cause of deaths over the next decades (1;2).

Obesity and diabetes are also showing worrying trends, not only because they already affect a large proportion of the population, but because they have also started to appear earlier in life (2). According to figures for 2005, 23.2 % of the world's adult population was overweight (24 % of men vs. 22.4 % of women) and 9.8 % of the world's adult population was obese (7.7 % of men and 11.9 % of women). The projected trends in absolute burden and prevalence indicate that the number of overweight and obese individuals will increase by 44 and 45 %, respectively, from 2005 estimates, reaching a total of 1.35 billion overweight and 573 million obese individuals in 2030 (3). Likewise, the burden of diabetes is increasing in the world; the prevalence for all age groups was estimated at 2.8 % in 2000 and will be 4.4 % in 2030. The total number of persons with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030 (4).

Migration is often associated with major changes in environment and behavior, most notably changes in dietary habits, nutrient intake and physical activity influenced by a process of urbanization or westernization. This has subsequently led to an increased risk of chronic diet- and lifestyle-related diseases in ethnic minority groups (5;6). Several studies over the past four decades have also indicated an increased risk of obesity, diabetes, CVDs and Vitamin D deficiency (VDD) in immigrant communities as compared to their country of origin and the mainstream population. A major factor responsible for many of the aforementioned disorders is the nutritional transition, including a diet high in calories, saturated fat, simple sugars and a low intake of dietary fibers, fruits and vegetables factors (5–7). Other determining factors are physical inactivity, interaction between genetic susceptibility and environmental factors (i.e. diet, smoking and exercise), psychological stress, immune-inflammatory changes, inequalities in access to and lower quality of health care, inappropriate management and the under detection of morbidities (5–7). Furthermore, an excess nutrient supply in those with “early-life adverse events” such as a low birth weight and fetal growth retardation have often been cited as a factor responsible for increased rates of obesity, hypertension and type-2 diabetes (T2D) in immigrants from developing countries, especially in the face of improvements in their standard of living. The poor health outcomes in ethnic

minority groups could also create a cycle of disadvantage that will be transferred to the next generation (Barker's theory) (8).

Obesity

In Norway, there has been an increasing trend in the number of those who are overweight and obese in relation to the global pattern. According to 2000–2003 county studies, over half of adults were obese or overweight, except for 30-year-old women where the proportion is somewhat lower. The proportion with obesity rose from 9–10 % in 1985 to 13–22 % around 2000. Similarly, about 15–20 % of children (8–12 years old) and 8–14 % of adolescents (15–16 years old) are overweight or obese, although there is a limited amount of information to suggest a trend over time (9).

In general, adult immigrant populations have a higher prevalence of obesity that differs markedly among ethnic groups and gender. The Oslo Immigrant Health Studies conducted among adult immigrant groups (Pakistan, Turkey, Iran, Sri Lanka and Vietnam), report the proportion of the age-adjusted, generalized obesity range to be from 48 % in Turkish women to 3 % in Vietnamese men (i.e. measured by BMI ≥ 30 kg/m²). The proportion among Vietnamese men and women was even lower than Norwegians. Generalized obesity was higher among women than men in all the immigrant groups, as well as among Turkish and Pakistani immigrants [See Figure 1] (10;11). Similarly, this pattern of prevalence has been reported in the 10 immigrant groups in the SSB 2005/06 survey; one out of ten immigrants, or 11 % were found to be obese compared to 8 % in the general population, i.e. measured by self-reported BMI ≥ 30 kg/m² (12) .

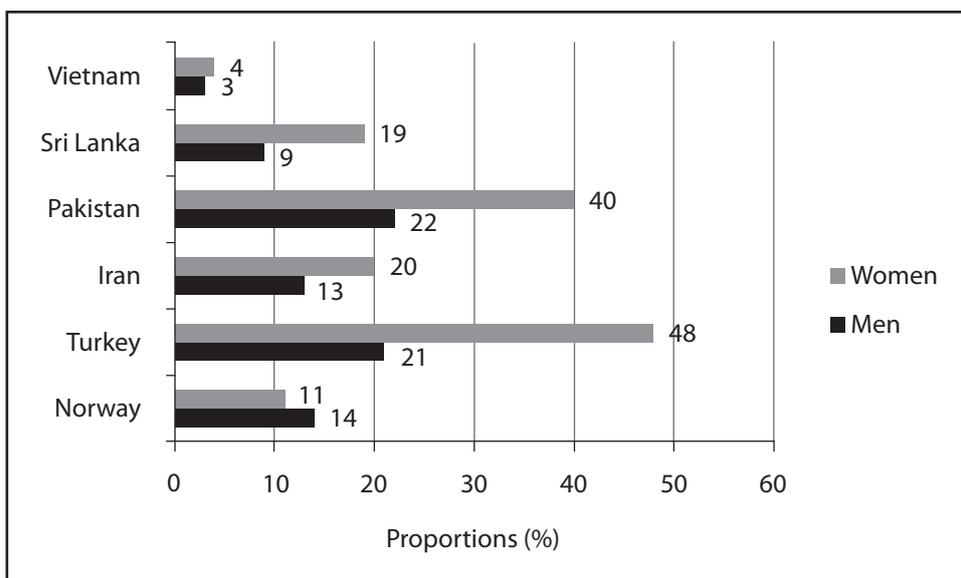


Figure 1 – Age-adjusted proportions (%) of general obesity among the HUBRO studies population (10)

In adolescent immigrants, a study conducted among 10th graders (15–16 years-old) in Oslo reported obesity based on geographical regions as a marker for ethnicity (13). The prevalence rates were significantly different among regions as well as between boys and girls. Boys from Western countries and the Middle East/North Africa, and girls from Eastern Europe had higher proportions of overweight (85th BMI percentile) (13). Moreover, a hospital-based study reported a higher prevalence of metabolic syndrome (MetS) among overweight and obese children with Middle Eastern and South Asian backgrounds (30.6 %) as compared to Norwegian children (20.8 %) (14).

At present, studies have a limited amount of information to explain the reasons for the greater burden of obesity and its risk factors in addition to the differences between ethnic groups and gender. However, suggested risk factors for obesity and overweight are expected to be related to gender, ethnicity and dietary habits (13;15). The higher risk of obesity among women is associated with their greater level of bodily dissatisfaction, as they are more prone to unhealthy eating habits (15). In addition, they may have an increased sensitivity to adiposity, particularly for those with Middle Eastern and South Asian backgrounds (14).

Overall, the high prevalence of obesity within immigrant communities identifies an obvious need for a long-term strategy for early prevention. These ethnic differences could be a reflection of their socioeconomic status and degree of change in lifestyles, most notably in relation to a sedentary lifestyle, unhealthy dietary intake and behavior. Due to a significant difference in obesity findings between ethnic groups and gender, future studies should consider such factors when investigating obesity and its risk factors, and also target other ethnic and age groups. Specifically, exploring the process of a change in lifestyle and attributing factors will yield a better understanding. Additionally, follow-up studies need to be performed so as to better identify risk factors and explore pathways between socioeconomic and lifestyle- and diet-related factors associated with obesity, particularly the directional effects of these relationships. A qualitative study is also required to provide an in-depth understanding in terms of the mechanism of associations between risk factors, and to explain gender and ethnic differences and possible measures for prevention. The results of such investigations will provide knowledge which can be used for planning preventive interventions.

Diabetes

According to a registry for diabetic medicine users, over 130,000 people are expected to have diabetes in Norway (9). However, it is likely that the actual figure may be higher. Many cases, including those who handle the condition with exercise and diet, may go undiagnosed.

Furthermore, data used for published reports in Norway are not from a representative population-based study (9). According to the International Diabetes Federation (IDF), the estimated prevalence in Norway was 4.7 % in 2007 and is projected to rise to 5.4 % in 2025 (16). A study conducted in two multi-ethnic districts in Oslo reported that the total prevalence of diabetes was 9 % for men and 5.1 % for women (17). In this study, there were a large number of cases (39 %) which had previously gone undiagnosed (17). As a trend over time, studies performed in Nord-Trøndelag (HUNT) indicated a moderate increase in T2D, though the

actual figures are uncertain (9;18). This increase is linked to the rising prevalence of obesity as well as the increased risk of diabetes that both come with an aging population (9;18).

In all published reports (19–23), diabetes is more widespread among immigrants in Norway than among Norwegians. In addition, immigrants have more risk factors for diabetes compared to Norwegians. For example, a population-based survey performed in two districts with a low socioeconomic status in eastern Oslo reported a higher prevalence and risk of diabetes among South Asian immigrants, specifically among women: the rates were 27.5 % for South Asian women and 2.9 % for Western women, and 14.3 % for South Asian men and 5.9 % for Western men (20). In this study, Westerners comprise individuals from Western Europe, North America, Australia and New Zealand, while South Asians include those from Pakistan, India and Sri Lanka (20). Likewise, a review of a 10-year (1988–1998) Medical Birth Registry revealed a high prevalence of gestational diabetes among first generation immigrant women from the Indian subcontinent and North Africa (8.9/1000 births), with rates greater than twice those found among Norwegians (3.6/1000 births) (23). Maternal diabetes affects more than the mother, as it was associated with a significantly increased risk of complications during pregnancy such as low birth weight, macrosomia, preterm birth, preeclampsia and cesarean sections in both immigrants and Norwegians (23).

The main risk factors for the higher occurrence of T2D in South Asian immigrants are a high prevalence obesity accompanied with changes in diet and decreased physical activity (11;15;19;20). It is clear that women are at increased risk for diabetes since women seem to be more at risk for obesity. A recently published study of female Pakistani immigrants also indicated a high risk of T2D: approximately 90 % of study participants were at risk for T2D, 41 % had the full MetS and 12 % T2D (19). The risk scores evaluated with variables such as age, BMI, waist circumference, physical activity, diet history (how often do you eat vegetables, fruits and berries?), use of blood pressure medication, blood sugar measurement (have you ever been diagnosed with high blood sugar?), and family history of diabetes. However, there is a paucity of data to describe the burden among other ethnic groups and to explain ethnic and gender differences, including associated risk factors.

In general, the studies showed an alarmingly higher prevalence of diabetes among immigrants, particularly in South Asian women compared to Norwegians and immigrants from other Western countries. This situation brings considerable challenges to health services and has implications for public health. Community-based lifestyle modifications, supplemented with an early diagnosis of diabetes and adequate metabolic controls, need to be intensified. The various impacts of diabetes across ethnic groups and gender give a strong indication of the importance of social, cultural and environmental influences. Ethnic differences in gender roles, job participation, as well as societal norms about obesity and physical fitness need further investigation to explain the differences in the risk of diabetes. This should be investigated by both follow-up and qualitative studies, and target underrepresented immigrants and age groups, i.e. African immigrants and children/adolescents.

Cardiovascular Diseases

In Norway, there has been a downward trend in CVDs mortality rates since 1970. According to a study in 25 districts of Oslo, mortality rates and risk factors for CVDs could vary with regard to socioeconomic differences; higher mortality and a range of CVDs risk factors such as daily smoking, sedentary lifestyle and increased BMI were found more in eastern than western Oslo (24). Despite the presence of a higher proportion of immigrants in eastern than western Oslo, this did not explain the difference in the mortality and risk factors because the immigrant population is much younger than Norwegians, so the number of deaths among immigrants were expected to be small (24;25).

There are few studies that examine CVDs among immigrant populations. The Oslo Immigrant Health Studies documented ethnic variation in CVDs risk factors, particularly in HDL-cholesterol, triglycerides and smoking in the five immigrants groups (Pakistan, Turkey, Iran, Sri Lanka and Vietnam) (26). Men from Turkey and Pakistan presented a greater risk for CVDs, reflecting the high prevalence of smoking, low HDL-cholesterol, high triglycerides and blood pressure in these two groups (26). Likewise, ethnic variation in the distribution of CVDs risk factors has been reported, in which the immigrant populations had lower levels of total cholesterol and blood pressure, and higher level of triglycerides compared to Norwegians. In contrast, Norwegians had higher levels of total cholesterol and blood pressure, but lower mean levels of triglycerides and higher HDL in comparison to the immigrant groups (10;26;27).

While CVDs are expected to be common among immigrant populations due to a higher prevalence of obesity, diabetes, physical inactivity and unhealthy dietary habits, it is unclear whether the disease is becoming common over time, including its prevalence and risk factors. The ethnic distinction in the distribution of risk factors for CVDs shows the need for implementing culturally-oriented preventive interventions in addition to performing ethnicity-based studies.

Physical Activity and Diet

Physical activity, diet and nutrition are the most common specific and mutually interacting behaviors that influence the risk and pathogenesis of several chronic diseases (2). The process of urbanization or westernization associated with migration influences the change in dietary habits to calorie-dense/low fiber foods and the adoption of a sedentary lifestyle (i.e. less physical activity). These changes play a key role as the risk factors for lifestyle- and diet-related morbidities such as obesity, T2D and CVDs (2;5).

Physical Activity

A higher proportion of immigrant populations were found to have less physical activity level as compared to both Norwegians and the general population: among the study participants in the Oslo immigrant studies, one in two immigrants reported that they were inactive, while only one in five Norwegians reported the same (9). Immigrant men tended to be less

sedentary than women, but less educated men from Turkey, Pakistan and Vietnam reported a greater proportion of inactivity (10). Similarly, according to an SSB 2005 survey, the proportion of physical inactivity was higher among immigrant women: 37 % for women and 29 % for men (12).

The gender and ethnic differences are also documented among adolescents. A school-based, follow-up study in Oslo reported that adolescent ethnic minority girls were found to be less physically active than Norwegian girls (28). Interestingly, the study indicated no disparity between the levels of activity of ethnic minority and Norwegian boys. However, both boys and girls, regardless of ethnicity, showed a decline in physical activity over the three-year period of the study. In particular, physical activity declined more in girls with mothers who had a compulsory education than with tertiary education; it also declined more in boys with fathers who had a low rather than high income (28). Unlike the adult study, this study used the term ethnicity to refer to adolescents with different ethnic backgrounds, such as those who have both parents from the Indian subcontinent, the Middle East and Eastern Europe. In addition, both adolescents born in and outside of Norway were grouped together.

Intervention can make a positive difference in the burden of chronic disease among immigrant groups. “Romsås in Motion” was a community-based, non-randomized intervention trial conducted in the multicultural districts of Oslo. It consisted of the application of a three-year, low-cost multilevel intervention that promoted physical activity. Immigrant participants who received the intervention were significantly more likely to increase their level of physical activity, resulting in positive health effects on risk factors for T2D and CVDs as compared to those in the control districts (17;29;30).

In general, most studies demonstrated that an unacceptably higher proportion of the immigrant population is physically inactive, which may contribute to the disproportionately high likelihood of chronic diseases such as obesity, T2D and CVDs. Fortunately, the implementation of community-based interventions can increase the practice of physical activity and reduce risk factors for T2D and CVDs. There is a limited amount of knowledge to explain the gender and ethnic difference, although this difference may be attributed to religious, cultural, social and environmentally related factors. Promoting physical activity requires a society-wide approach that focuses on families and local societies, and should consider the special needs of boys and girls. This was already well-articulated for the adult population in the “Romsås in Motion” intervention trial (17;29;30). In the long run, the impact of the interventions should be assessed in terms of how well they reduce the incidence of obesity, T2D and their complications. Future studies should also benefit from pursuing a community-based intervention design that also target children, adolescents/youths and other ethnic groups of immigrants.

Dietary Habits and Nutrient Intake

Studies revealed substantial changes in dietary habits and nutrition intake after migration (10;31;32). Specifically, the studies performed among Pakistani and Sri Lankan adult immigrants (31) and Pakistani women (32) documented considerable changes in meal patterns, meal consumption and intake of different foods after immigration. These include: (a) mixed/

bi-cultural eating patterns, (b) a reduction in the number of hot meals, (c) an increased intake of fat-rich foods (oil, meat and milk), and (d) less consumption of legumes and vegetables (31;32).

In addition, the Oslo Immigrant Health Studies found both desirable and unhealthy dietary habits that differed across ethnic groups and gender: the highest consumption of fruit and vegetables was discovered among Turkish women and the least among men from Vietnam; men consumed more cola/soft drinks and full-fat milk than women in immigrant groups; women consumed alcohol less often than men, while immigrants reported a lower alcohol consumption compared to Norwegians (10).

Pakistani and Sri Lankan adult immigrants who are better educated, older and have a good command of the Norwegian language were found more likely to reduce their consumption of high fat and high sugar foods (31). On the other hand, those with low incomes who were well integrated (as defined by a high score on the integration index: knowledge of Norwegian language, reading Norwegian newspaper, visit by Norwegian and receiving help from Norwegian) were more likely to increase their consumption of fat and sugar-rich foods (31). In addition, a qualitative study performed among Pakistani women reported a number of factors which influence dietary changes such as beliefs and attitudes towards health, children's preferences, work schedules, social relations, stress, traditional beliefs, climate, season and access to certain foods (32).

Such changes in dietary habits and nutritional intake, supplemented with reduced physical activity have significant nutritional and health implications. Sociocultural and economic factors plus aspects of social integration have a considerable effect on these changes after migration. This indicates that strategies for interventions should not only include dietary advice, but a focus on the multitude of factors causing dietary changes as well. Such changes can also be achieved through implementing culturally adapted lifestyle education, including diet and physical activity. This has been already reported in an intervention study conducted among Pakistani women (InnvaDiab-DEPLAN study) in which women in the intervention group significantly altered their intentions to make their diet healthier in comparison to those in the control group (33). The study has examined this change through a reduced intake of sugar-rich foods, changes regarding the purchase and use of oil, an increase in the total intake of vegetables, fruits and fruits juice as well as a better motivation to change an unhealthy diet (33). These preventive interventions should be promoted on a large-scale level within the community. In addition, more research is required to understand how changes occur and how various factors influence dietary habits and the impact on processes of change in food habits with regard to the process of social integration. This knowledge can be utilized to develop effective interventions and strategies that combat chronic diseases within migrant populations.

Vitamin D Deficiency

Since the 1980's in Norway, VDD, including nutritional rickets has been regarded as one of the major public health problems in migrant communities (34–39). Several studies have

found a very high prevalence of VDD in immigrant populations, specifically among those from low and middle income countries: pregnant and delivering Pakistani women (38;40;41), children with an immigrant background (37;39), and adult men and women born in Pakistan, Sri Lanka, Turkey, Iran and Vietnam (40;42;43). Among the participants in the Oslo Immigrant Health Study born in these five countries, 37 % had VDD and 90 % had Vitamin D insufficiency. The lowest Vitamin D status is observed in women with a Pakistani background, who typically have mean levels of 20–25 nmol/l (42). A comparative study performed in Kandy (Sri Lanka) and Oslo showed that Tamil Sri Lankans who had immigrated to Oslo had a nine times higher prevalence of VDD than those living in their country of origin (44). Another study among six-week-old infants and their mothers with Pakistani, Turkish and Somali backgrounds who attended child health clinics in Oslo found a high prevalence of VDD, but there was no significant ethnic variation in infant and maternal levels of Vitamin D (45).

The known risk factors for VDD include spending more time indoors (46), clothing/veiling (covering of skin) (47), a diet poor in Vitamin D content (42;48) and migration to northern latitudes where there is limited exposure to sunlight (44). In Norway, very little research has been done regarding the social and cultural risk factors in immigrant populations. The main risk factors identified in studies are less educated mothers who did not use daily supplements of Vitamin D (45), exclusively breast-fed infants with no supplements of Vitamin D (45) and migration to a northern latitude (44). As to the food sources, the reported use of fatty fish and cod liver oil supplements showed a strong positive association with Vitamin D status (42). Furthermore, an experimental study demonstrated that daily supplementation with Vitamin D through a fish oil capsule or multi-vitamin tablet efficiently increased the status of Vitamin D to adequate levels among Tamil Sri Lankans during four weeks in late winter (49). In a randomized trial, the daily supplementation of Vitamin D drops to six-week-old infants with tailored information brochures to mothers with Pakistani, Turkish and Somali backgrounds showed a significant improvement in Vitamin D status compared to those receiving usual care (50).

VDD is a widespread public health problem among immigrant groups in Norway, where the prevalence is higher among women than men. On the basis of these studies, an increased intake of fatty fish or fish supplements and the provision of free Vitamin D supplements appear to be effective and feasible measures for combating VDD among adults and infants with an immigrant background. The use of multilingual translated brochures about the prevention of rickets and VDD is also recommended as part of this intervention, which should be available at all health facilities along with free Vitamin D drops. Future studies need to explore social and cultural risk factors, and target adolescents and other ethnic groups.

Conclusion

Most of the reviewed studies conclude that the immigrant populations have a higher burden and are at greater risk for lifestyle- and diet-related disorders compared to Norwegians and

the general population, but with significant variance across ethnic and gender groups. Identified risk factors mainly include unhealthy dietary intake and behaviors, inadequate dietary intake/supplements and a sedentary lifestyle. There is a paucity of data to explain ethnic and gender differences, attributing factors for changing lifestyles and dietary habits and a very limited amount of research among immigrants from Africa, adolescent and children immigrants, i.e. more research in this field is an urgent need. Despite the knowledge gaps and methodological challenges of studies, a review of studies reveals the need for implementing integrated and comprehensive health promotion program, with a particular focus on community-based, preventive interventions oriented to addressing ethnic and gender differences.

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4. Mental Health Problems

Introduction

“Mental health is defined as a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community”. This definition is the central component of the WHO’s definition of health: “A state of complete physical, mental and social well-being, and not merely the absence of disease” (1).

Mental health disorders make a substantially independent contribution to the burden of diseases worldwide, and are an important cause of long-term disability and dependency. Mental disorders are also linked to the development of a number of communicable and non-communicable diseases and contribute to both accidental and non-accidental injuries (2). By contrast, certain health conditions increase the risk for mental disorders or lengthen episodes of mental illness. Such dynamic interaction between mental health disorders and other health problems affects help-seeking behavior and practice, diagnosis, the quality of care provided plus treatment outcome and adherence (2).

The relationship between migration and mental health has been the subject of studies for several decades and is considered a public health challenge in several countries. Research on the field of migration and mental health has been difficult and contradictory findings are abundant (3–5). The process of migration, which can be said to consist of three stages: pre-migration, migration and post-migration, has been strongly associated with a higher risk for mental health problems in immigrant communities. The stages of migration each encompass a number of complex and interactive factors that can influence the mental health status of immigrants and vice versa (3;4).

In most cases, immigrants and their descendents have been found to be at greater risk for developing mental illness than mainstream populations (3;4). Nevertheless, the prevalence of mental disorders has not consistently been found to be elevated among immigrants in general. There are also studies reporting lower levels of mental health problems among immigrants than among host populations; for example, studies on immigrants of Hispanic ethnic origin in the US (6) and South Asians in the UK (7) reported lower rates of psychological distress compared to the mainstream population. Mental health outcomes associated with migration may therefore vary depending on factors such as sociocultural and economic contexts, gender, generation, acculturation or social integration, and the conditions and reasons under which migration takes place.

Before describing study findings about mental health problems in immigrant populations in Norway, it is useful to briefly consider the difficulties of accurately measuring mental health problems and comparing different results. Some of the challenges are studies which use different instruments for assessing mental health status that are often not cross-culturally validated, and ethnic groups are usually lumped together with an inadequate control of

confounding (details are discussed in the methodological challenges chapter). With this in mind, study findings are discussed and compared accordingly.

Mental Health of Adolescent Immigrants in Norway

Immigrants vs. Norwegians

In adolescent studies, it is unclear whether adolescent immigrants have greater mental health problems compared to adolescent Norwegians, but most studies reported higher levels of mental health problems among adolescent immigrants, particularly among girls, than among adolescent Norwegians (8–17). For example, a nationwide, school-based study demonstrated that adolescents (13–15 years) from both high and low income countries reported significantly more depressive symptoms (mean score=0.78) than their Norwegian peers (mean score=0.61) (8). In a longitudinal study performed in Oslo, both boys and girls from ethnic minorities reported more emotional symptoms/mental distress, conduct problems and peer problems than their Norwegian counterparts, both at baseline and follow-up periods (1999–2000 and 2004) (10). In addition to ethnic lumping, these studies combined both first- and second-generation adolescents.

Factors linked to these increased levels of mental health problems most notably included a higher risk for acculturative stress, high levels of perceived discrimination and identity crisis, parental war experience and the occurrence of several acute infections (8;10–14) (see Table 6).

On the other hand, some studies reported a small difference or even better mental health status in adolescent immigrants as compared to their Norwegian compatriots (9;18;19). A cross-sectional study in Oslo discovered that there was a small difference in the level of internalized mental health problems between Norwegian and immigrant adolescents, although not for externalized mental health problems (9). A study conducted among three adolescent immigrant groups (Pakistanis, Vietnamese and Turkish) in Norway and Sweden reported that immigrant adolescents on the whole neither differed from their host peers with respect to psychological adaptation nor on value discrepancies (18). In line with these findings, another study among second-generation Vietnamese children (4–18 years-old) surprisingly demonstrated a better mental health status of Vietnamese children as compared to their Norwegian peers (19). Possible protective factors for Vietnamese children are a strong family structure that is conscious of a tradition and value system, and the parent's influence regarding adolescent socialization and externalizing behavior (19).

Such conflicting findings were also reported in a review of mental health studies conducted among migrant youth in other Western countries, as these studies did not show that migrant youths are necessarily at a higher risk of developing mental health problems (20).

Even so, adolescent immigrants are generally expected to have a greater risk for developing psychiatric disorders, most notably because of the stress related to the immigration process, a minority position in the host country and their multi-cultural background, all of which may contribute to the development of mental health problems. Depending on a number of factors, migrant youth may also experience a lower risk of mental health problems, known as the “healthy migrant effect”. In this phenomenon, a selection of the fittest people

and a coherent and supportive family culture could protect them against the development of mental health problems. At this stage, drawing any conclusions is unsatisfactory, thus it is important to conduct follow-up studies.

Factors Associated with Adolescent Mental Health Problems

Gender represents a significant factor in the variation and level of mental health problems among adolescents. One study reported that adolescent girls (mean score=0.79) had substantially more depressive symptoms than boys (mean score=0.44) in general, in which immigrant girls reported the most and Norwegian boys reported the fewest (8). A study in Oslo indicated that girls reported more internalized mental health problems than boys, and statistically significant, more immigrant boys than Norwegians reported internalized mental health problems (9). A poorer psychological adaptation for girls was also reported in a study conducted in Norway and Sweden (18). The psychological adaptation in this study was measured using a 5-item life satisfaction scale, a 10-item self-esteem inventory and 15 questions measuring depression, anxiety and psychosomatic symptoms. In contrast, another study found no gender differences in the level of psychological distress (measured by HSCL-25) among immigrants as well as a statistical indifference between immigrant girls and ethnic Norwegian girls (21).

Possible suggestions for the gender difference include a traditional gender role within the family and society, family relationship and support, ethnic and host culture competences and the extent to which mental health problems were reported, in which girls tend to internalize their psychological distress, while boys externalize theirs (8;18;21). In supporting this evidence, a study conducted in Oslo found immigrant boys reported an increased conduct problem, while girls reported hyperactivity associated with an increased length of stay (22). This could be due to integration into the host culture being stressful or the result of sample selection and the instruments used (23).

The specific generation or whether adolescents are first- or second-generation immigrants has been mentioned as one of the moderators of mental health status, which reflects the stages of immigration and adaptation, and the exposure towards social and environmental conditions in the host country. Since 2000, SSB has recommended use of the term “Norwegian-born to immigrant parents” instead of second-generation immigrants. As for the association between generations and mental health status, there is conflicting evidence. For example, a nationwide, school-based study found that first- versus second-generation immigrants, and immigrants versus refugees, did not differ significantly in their scores of depressive symptoms (8). Another study performed in Oslo found no significant difference in the HSCL-25 score between first- and second-generation 8th grade students (21). Nevertheless, a study conducted in five European countries reported that second-generation immigrant youth in Norway (13–18 years of old) had better psychological adaptation than first-generation immigrant youth, with the same level of adaptation compared to their Norwegian peers (24). Similarly, second-generation immigrant youth in Oslo reported significantly fewer emotional and peer problems than first generation (14). However, when the effect of gender was taken into account in the later study, first-generation girls and second-generation boys appeared to be more vulnerable to mental illness (14).

Despite such contradictory findings among the studies, first-generation adolescents seem to be more likely to be at higher risk of mental health problems. This is probably due to stress related to the process of immigration, both pre- and post-migration experiences and socio-cultural adaptation.

A difference in mental health status has also been observed according to which countries immigrants have settled in. A comparative study conducted among adolescents with a Turkish background in Sweden and Norway reported that Turkish adolescents in Norway had significantly lower self-esteem and more mental health problems than those in Sweden, independent of parental socioeconomic status and country of birth (13). The reasons cited for why adolescents in Norway have a poorer psychological adaptation and cultural integration were that they experienced less Turkish identity, while perceiving discrimination and marginalization (13). Still, there is a shortage of data to explain whether this acculturation or social integration process could be regarded as being protective or a risk factor for mental health problems [see Table 6 for a summary of the above mentioned risk factors].

Mental Health of Adult Immigrants in Norway

Immigrants vs. Norwegians

Unlike the studies conducted among adolescent immigrants' mental health, the prevalence of mental health disorders is consistently reported to be higher among adult immigrants (30–76 years of age) compared to adult Norwegians and the general population (25–31). For instance, studies performed among immigrants in Oslo found that individuals from low-income countries (Non-Western immigrants) had a significantly higher burden of psychological distress, measured by HSCL-10, as compared to Western immigrants and Norwegians (25;26;28–30). In one study, the prevalence rates of psychological distress range from 24.3 % among immigrants from low-income countries to 10.3 % among those from high-income countries (30). Likewise, the 2005 SSB survey found that the prevalence of mental health problems (measured by HSCL-5) was threefold higher in the immigrant compared to the general population: 9 % vs. 27 % (31). Still, there was no significant difference between immigrants from high-income countries and Norwegians (25).

The highest levels of psychological distress were found among immigrants from the Middle East (39 %) and the lowest among South Asian immigrants (18.9 %) (29). Specifically, immigrants from Iran (42 %), Iraq (39 %) and Turkey (more than 40 %) had the highest prevalence, while the lowest levels were found among Sri Lankans (16 %) and Somalis (16 %) (27;31). While mental health problems are common in immigrant populations, it is unclear whether these problems are becoming more common over time because of a lack of longitudinal research and also whether they have a higher or lower risk compared to native populations in their countries of origin.

In Norway, the mental health status of refugees, specifically Vietnamese and Bosnian refugees, has been highly investigated from a longitudinal perspective (32–36). In general, refugees may be expected to have experienced more negative life events and extreme traumatic stress such as war, violence and torture, thereby increasing their vulnerability to mental

health problems. In line with later suggestions, several studies reported that psychological disorders were prevalent in refugees and asylum seekers (34;35;37–39). In addition, the effect of traumatic experiences for refugees was found to be long lasting (35).

Gender

Taken as a whole, the prevalence of mental health problems among immigrants was higher in women than men (27;31) [see Figure 2]. However, we observed that this difference varied according to the groups being compared and the geographic representation of immigrants. For example, a comparison of psychological distress between Western and Non-Western immigrants showed that the level of psychological distress was highest among men who had arrived to Norway most recently from Non-Western countries (26). Surprisingly, another study utilizing similar data found no significant difference in terms of psychological distress between immigrants from low- and middle-income countries, but when specific geographical regions of origin were compared, women from Eastern Europe and the Middle East experienced significantly higher levels of distress than men from the same regions (29). These findings may exemplify how the use of different gross categories (ethnic lumping) creates misunderstandings towards the study findings in general.

Pre-migration experiences of war or conflict, and a shift in the status and roles of men and women in the corresponding society, may explain the differences between men and women in terms of levels of distress (29). Furthermore, differences in the experience of social integration have been used as possible explanations for the gender differences in levels of distress. In men, a good social integration experience could create the opportunity for paid employment and better income, with the subsequent positive effects on health. On the other hand, social integration in immigrant women was found to increase psychological stress because the traditional role of women within their family can be challenged by cultural values that differ from their own. Also, women's efforts to integrate into the Norwegian community could provoke negative reactions from men of their own ethnic groups, potentially leading to conflicts about socially acceptable norms, threats to self and/or loss of identity (26).

Age

According to the 2005 SSB survey, the prevalence of mental health problems among immigrants appeared to have an increasing pattern across age groups in both sexes, while a consistent pattern was found among the general population [see Figure 2 below] (31). Likewise, another study reported that women within higher age groups (59/60 years old) scored significantly higher for psychological distress (29). The age of immigrants is one of the important demographic variables that influence the efficiency and competence to learn and use a new language, to interact and socialize with a society and to cope with healthy or stressful environments. Most importantly, the age at which immigration takes place is a significant moderator in the relationship between social status and mental health: a study conducted among Asians in the US showed that those who arrived before the age of 25 years had an inferior mental health status despite greater educational gains and income (40). In Norway, there is a

lack of data that could explain the association of mental health status in relation to current age and age at migration, including the relationship with social development and integration.

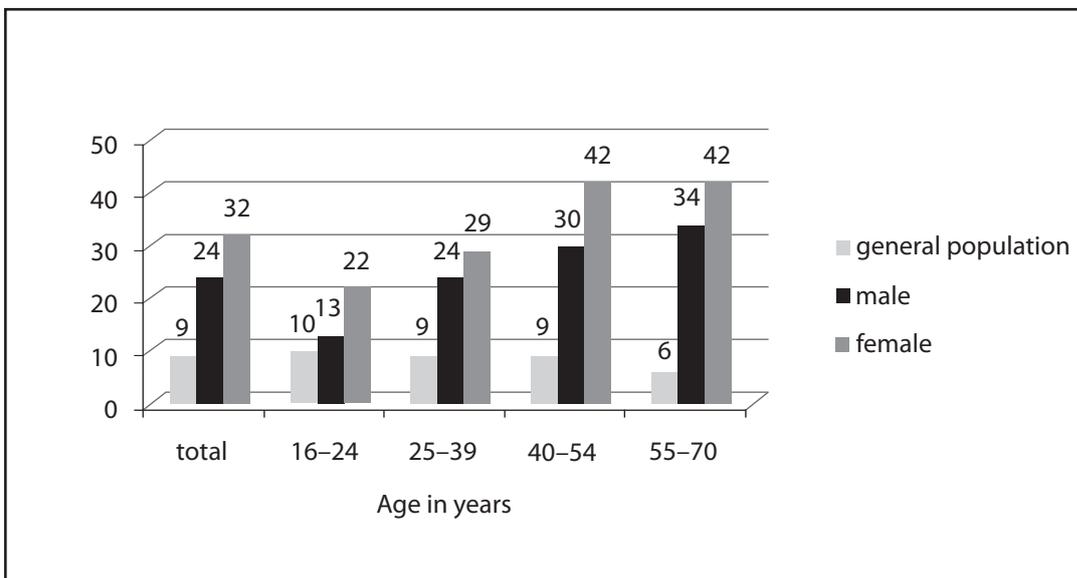


Figure 2 – Prevalence of mental health problems among immigrants and general population in the 2005/06 SSB survey (31)

Other Factors Associated with Adult Mental Health Problems

Studies have reported several risk factors contributing to a higher burden of mental health problems among adult as well as adolescent immigrants [see Table 6]. More specifically, reasons cited for why those from low- and middle-income countries had a higher risk of mental health problems included poor social support, deprived economic conditions, multiple negative life events and experiences of discrimination (11;13;14;25;26;28–30). Moreover, the pressure to adopt Norwegian language and customs was likely to create stress and subsequent mental health problems, while also potentially providing positive effects in the long run. Other potential risk factors included originating from countries with higher rates of mental disorders and traumatic pre-migration experiences (26;35).

In general, lengths of stay, reason for migration, socioeconomic condition and access to a social support system in the host country are some of the factors considered as determinants in research on the mental health of immigrants. In regard to these factors, however, there is a limited amount of information to explain and compare mental health problems among immigrants in Norway.

Table 6 – Risk factors for mental health problems among immigrants in Norway

Risk factors	Ref. No.	Positive association with risk	Negative association with risk
Female gender* and **	(35)	x	
Older age**	(29)	x	
Middle East background**	(29)	x	
Immigrants from low-income countries**	(25)	X	
Urbanization*	(8)	x	
Less annual family income(<200,000NOK)**	(25;30)	x	
Lacking a paid job or unemployment**	(25;26;28–30)	x	
Lack of a close confident* and **	(35)	x	
Chronic family separation * and **	(35)		
Experience of denial of housing**	(29)	x	
Experience of denial of job**	(29)	x	
Living without a partner**	(29)	x	
Parental war experience*	(12)	x	
High level of family values*	(14)		x
High level of host and ethnic cultural competence*	(14)		x
Conflict in intimate relationship**	(26)	x	
Negative life events** and *	(11;25;29;30;35)	x	
Experience of powerless**	(25;28)	x	
More marginalization*	(13)	x	
More perceived discrimination*	(13;14)	x	
Identity crisis*	(13;14)	x	
Lack of/poor social support**	(25;26;28)	x	
Visits made by Norwegians**	(29)		x
Having two or more acute infections*	(11)	x	
Past traumatic experience**	(29;35)	x	

adolescent*, Adult**

Conclusion

Our review of studies on the mental health of immigrants can partially conclude that immigrants in Norway have a higher burden and greater risk for mental health problems than Norwegians and the general population. This higher risk, mainly among adult immigrants, is primarily associated with social and economic deprivation as well as poor social support systems within immigrant communities. Therefore, mental health promotion should be aimed towards immigrant populations, especially those from low-income countries. Preventive programs should be implemented with a comprehensive integration policy that focuses on social support systems and economic conditions.

Furthermore, studies present numerous methodological challenges and limitations. In the majority of studies, immigrant populations were portrayed as a homogenous population, data collection instruments were not cross-culturally validated, allowing for the possibility of information bias and inadequate control for possible confounding variables. Moreover, very few studies adopted a prospective, longitudinal design or attempted a comparison with native populations in the host country, and none did so with original populations.

Hence, conducting further studies into the mental health of immigrant populations is an urgent need and should meet the aforementioned methodological challenges and limitations. It is important to adopt a prospective and longitudinal design and to conduct a comparison with both the Norwegian and original population. Qualitative studies should also be conducted in order to explore the effects of migration-related factors and to develop culturally validated instruments. Additionally, such studies should address the role and effect of gender and generation in social integration processes and their effect on mental health, explore the association between mental health problems and somatic illness, mental health and ethnicity, and develop culturally sensitive and validated instruments.

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5. Infectious Diseases

Migration is one of the main causes for intercontinental movements that create opportunity for the spread and establishment of common infectious diseases (1). According to a US Intelligence Council study, about 2 million people travel each day across borders, including one million per week between developing and developed countries with a great influence in the spread of globally infectious diseases (2). Among infectious diseases, tuberculosis (TB) and HIV/AIDS are the common diseases which have been extensively investigated and attracted the attention of policy makers and scholars. The prevalence of these diseases in Western countries has started to rise since the 1980s despite a significant improvement of socioeconomic conditions and better access to health care (3). In spite of the fact that most immigrants are healthy young adults, they have a higher burden of undiagnosed infectious diseases. For instance, approximately 70 % of newly diagnosed cases for TB, HIV and malaria were in patients born outside the UK (2). In 2005, approximately one-fourth of those diagnosed with HIV in Europe were Non-European citizens, mostly from Sub-Saharan Africa, who were primarily infected in their country of origin (2). Most Western countries have established various strategies and protocol for the screening of infectious diseases among newly arrived individuals, mainly for asylum seekers and refugees.

Tuberculosis

The epidemiology of TB in Norway was stabilized about three decades ago (4). Socioeconomic improvement and a well-maintained control program reduced the morbidity and mortality due to TB. However, the effect of migration has changed the TB epidemiology since the 1980s. TB has started to rise again and is more likely to occur among immigrants from high TB burden countries, particularly from Africa (5–9). The proportion of TB patients among immigrants has increased from 5 % in the 1970s to roughly 80 % in 2007 (10).

The incidence ratio of TB has significantly varied among age groups and different countries of origin. The incidence was highest for the age group between 15–39 years and lowest for those aged 65 years and over. The highest incidence was found among Africans, specifically among Somali immigrants, i.e. the standard incidence ratio of TB was 883 (95 % CI 775–991) in 1986–1999, while the lowest was for those from the US and Canada at 0.4 (95 % CI 0.1–1) (6). This higher magnitude of TB among Africans is a reflection of the TB prevalence in their country of origin, and most of them may have been infected prior to arrival. The risk of developing the disease still exists many years after resettlement, which is estimated at about 7 to 90 times higher than the crude incidence of TB in Norway (9). Among immigrant groups, asylum seekers and refugees have higher risk for TB. Studies among Kosovo refugees (11) and asylum seekers (12) found a higher prevalence of active TB, both on arrival and a few years after arrival.

Despite the fact that the country has successfully implemented TB control programs, delays in diagnosis and the start of TB treatment are still reported as one of the main challenges for the program. Such delays are associated with a failure of health care providers to initiate an accurate early diagnosis and patients' perception and knowledge about the disease (13;14). Furthermore, the TB program has been confronted with an inadequate follow-up system and an inefficient health information system, specifically between administrative levels, as well as between asylum-seeker centers and primary or specialist health services (12). These challenges have been linked to a complexity in the organizational structure, insufficient handling procedures and awareness and an inadequate adherence to guidelines (12).

The high incidence of TB among immigrants is not a threat to the general population as long as there are adequate TB control strategies (15–17). Studies have demonstrated that the majority of foreign-born TB patients were infected before arrival and that there has been a low degree of transmission between immigrants and the native population. Thus, in order to control the epidemic, effective control and prevention strategies should be strengthened. These strategies include an active screening of all newly arrived individuals, a follow-up of high risk groups, the use of preventive therapy and improved access to health services for the foreign-born population. Additionally, the public awareness about transmission, manifestations and the natural history of TB should be intensified, and such an awareness strategy should also target health professionals. Improving awareness at both the patient and health professional level will thereby reduce the delay in diagnosis as well as the initiation of early treatment.

HIV/AIDS

Since the 1980s, over 3,000 HIV infected individuals have been diagnosed in Norway. Over this period, the HIV epidemic has shown a steady rise in the number of diagnosed individuals. Out of the total number of diagnosed persons, about 68 % of them are males from the 28–41 age group (18–20). Among the reported HIV cases with a known route of transmission, approximately 32 % have been due to men having sex with men, 50 % due to heterosexual contact and 15 % among injecting drug users (21). There has been a continually high rate of infection among homosexual men and immigrants from countries with generalized HIV epidemics (20). Over the last 10 years, about half of HIV diagnosed persons were asylum seekers and family reunion immigrants. Most of these individuals came from Africa, mainly from Ethiopia, Somalia, though there were also some from Thailand. Regardless of where they came from, most were infected before their arrival to Norway (19;20), which is a reflection of the increased prevalence of HIV in their countries of origin. In general, the low rate of transmission and sexual behavior of Norwegians, in combination with preventive efforts, have contributed much to combating the epidemic of HIV in this country. These preventive efforts should continue with disseminating health information, improving access to HIV prevention, counseling and testing, and treatment and support services. There is a dearth of data about other sexually transmitted diseases among immigrants.

Others

Malaria is also one of the imported tropical infectious diseases related to immigration. Since the 1980s, the increase of malaria cases in Norway has been linked to immigrants from endemic countries (22–24). For instance, a nine-year (1988 to 1997) review of 222 malaria cases diagnosed in Oslo and Akershus revealed that 34.7 % of them were immigrants residing in Norway who had visited their country of origin, and 23 % of them were visitors or refugees who arrived to Norway from endemic countries. Most of these individuals (95.4 %) had contracted malaria in Sub-Saharan Africa (24). This study also reported that a prolonged delay in a doctor's diagnosis was significantly associated with complications from the disease. Thus, a high index of suspicion among health professionals examining immigrants and returning travelers, the use of anti-malarial chemoprophylaxis and providing advice on preventive measures for travelers to endemic areas are highly recommended.

Other communicable diseases such as campylobacter enteritis (25), typhoid and paratyphoid fever (26–28), hepatitis A (27;29) and B (30), chagas' diseases (31), brucellosis (32) and fascioliasis (33) have been diagnosed and reported as imported diseases, specifically among immigrant children and adults.

Conclusion

According to the studies, the overall situation with regard to infectious diseases has been well controlled and improved in Norway. Its progress has been monitored through the national surveillance system for communicable diseases (MSIS), which registers over 50 infectious diseases. Prevention and control interventions, in addition to access to health care, need to be maximized, particularly for newly arriving immigrants, travelers to and from endemic areas and undocumented immigrants. Future research should also investigate other sexually transmitted diseases, factors that limit access to and the utilization of health services as well as forwarding possible strategies to increase the coverage and uptake of health information and services among immigrant populations, including undocumented immigrants.

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6. Reproductive Health and Related Problems

Reproductive health is defined as a state of complete physical, mental and social well-being, not merely the absence of reproductive disease or infirmity (1). Reproductive health deals with the reproductive processes, functions and system at all stages of life in order to have a responsible, satisfying and safe sex life, as well as the capability to reproduce and the freedom to decide if, when and how often to do so. This implies “the right of men and women to be informed of and to have access to safe, effective, affordable and acceptable methods of fertility regulation of their choice, and the right of access to appropriate health care services that will enable women to go safely through pregnancy and childbirth and provide couples with the best chance of having a healthy infant” (1).

For the past 40 years, women have been migrating at a similar rate to men. It is estimated that women comprised 50 % of immigrants in 2005 (2). Immigrant women may face complex health problems associated with immigration, especially refugee women who may have experienced rape/sexual abuse and violence which put them at a greater risk for HIV, sexually transmitted diseases and a range of post-traumatic stress disorders (3). Immigration can change traditional female roles and status in the family and society that can be a source of more stress for women than for men. In addition, their social integration may be equally limited due to their initial lack of education and occupational experience. The reproductive health needs of immigrant women are often overlooked and unnoticed, even during the post-migration period (2;3). This situation may result from a lack of awareness about available services, linguistic barriers, the failure to make health issues a priority and the inferior social status of women. Moreover, the traditional or cultural beliefs and practices of women could present many problems and challenges to health personnel (4).

On the other hand, immigration may also provide an opportunity to improve women's health, most notably for those who migrate from low-income countries which have a high burden of diseases and limited access to health services. As mentioned earlier, the effect of migration on health is determined by conditions under which the migration occurred, the extent of integration into the host society, the social status of women in the host country and the health conditions in the host and original countries (2;3).

Several studies in Norway reported that immigrant women have a higher risk for reproductive health problems, including unmet health care needs compared to Norwegian women (5–20). Among reproductive health problems since the 1990s, female genital mutilation (FGM) has received the most attention from scholars and policymakers. The arrival of African immigrants, mainly Somalis, has made FGM an issue for health and social services (21). Women with FGM generally have a higher risk of certain obstetric complications in comparison to women without FGM, including caesarean sections, postpartum hemorrhage, extended maternal hospital stays, infant resuscitation, stillbirths or early neonatal death, and a low birth weight (22). A meta-analysis of six countries (Australia, Belgium, Canada, Finland, Norway and Sweden) found that Somali-born women had an excess of caesarean sections

and stillbirths (8). Similarly, a population-based registry study reported that women of Somali origin have more frequent perinatal complications than Norwegians (13), including induction of labor, fetal distress, secondary arrest, prolonged second stage of labor, operative delivery and perinatal death (13).

In addition to FGM, studies indicated that a lack of experience and knowledge among health care providers, different concepts of health and diseases, exposure to different standards of perinatal care, and language and communication problems may play a role in the high risk of obstetric and related complications among immigrant women with FGM (5;8;13;23;24).

Immigrant women are also experiencing a higher rate of perinatal mortality (5;14). A study performed among twin pregnancies in Oslo and Akershus reported an increased risk of stillbirth among women of Non-Western origin (7). Another earlier study also reported a higher frequency of birth defects among immigrants, mainly among Pakistanis (10). Such risks may reflect the higher frequency of consanguineous marriage as well as the mere socio-economic effects of being an immigrant.

A population-based registry study conducted among all women 15–49 years of age who were undergoing termination of pregnancy (TOP) and residents in Oslo documented that refugees (30.2 %) and labor migrants (19.9 %) had significantly higher TOP rates than non-migrants (16.7 %) (17). Such high TOP rates, specifically among refugees, may be the effect of fertility transition influencing fertility rate, non-use or inconsistent contraceptive use, low education and poor social status (17). Likewise, another earlier study reported a higher proportion of induced abortion among Non-Western immigrant women (6). A high prevalence in the use of cesarean section was also reported among immigrant groups: the prevalence varies considerably among groups, 10.1 % among women from Vietnam to 28.8 % in the group from the Philippines (12). This high prevalence was associated with an increased frequency of fetopelvic disproportion, fetal distress and prolonged labor (12).

Pregnancy-related complications such as gestational diabetes, intrauterine growth retardation, hyperemesis gravidarum and anemia were commonly diagnosed among women from Africa and Asia (11;15;18–20). For instance, longitudinal registry-based studies found that women, specifically those from Africa (except for Northern Africa), Pakistan, India or Sri Lanka, had a higher prevalence of hyperemesis gravidarum (18–20). The reasons could be due to a pre-migration exposure to malnutrition and infections, consanguineous marriage and multiple gestations. However, these studies did not verify the risk factors associated with these pregnancy-related complications.

Conclusion

In general, studies showed that immigrant women have a greater risk for reproductive health problems and complications that pose serious challenges to health services, with these problems also pointing to the need for special attention and care for immigrant women. The preventive and curative health services should address the difficulty related to language, communication and cultural differences. Health information should be delivered to newly

arrived immigrants, including universal sex education in schools. Furthermore, health care workers need to be empowered in order to be culturally sensitive and non-judgmental during the handling and implementing of preventive interventions. Further research is required to explain the observed differences of reproductive health and related problems. Studies should also explore best practices that need to be used to improve the access and use of health services by immigrant women.

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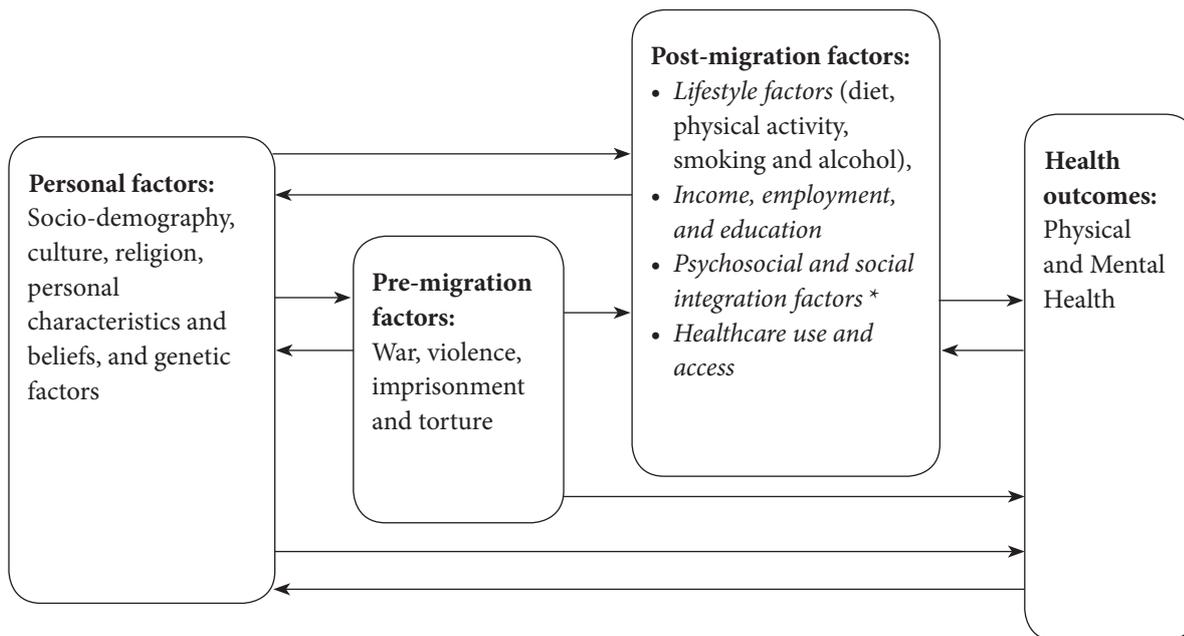
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7. Methodological Challenges of Migrant Health Studies

The migrant health studies in this review report have equally provided an in-depth knowledge about the health status of immigrants in Norway and an indication of the challenges of research in this field of study. One of the main challenges is that many studies have portrayed immigrant populations as a homogenous group despite differences in ethnicity, culture and traditions, socioeconomic status, religious background, origin and reason for migration, generation and length of stay. These factors, including factors related to pre-migration, migration and post-migration periods have not been adequately addressed, and health outcomes were not well-adjusted to these factors. Studies have been challenged with a low response rate and small sample size, and questionnaires have not been validated for cross-cultural use. Information bias was also commonly found as a result of differing conceptions of health, attitudes, language problems and misclassifications of ethnic groups. Furthermore, very few studies adopted a prospective, longitudinal design that compares non-immigrant native populations and the Norwegian population, as well as the use of mixed methods (quantitative and qualitative design). These methodological and conceptual challenges may lead to mistaken conclusions that diminish the validity of the study findings. These challenges have been repeatedly reported and remained contested in the debate about several immigrant health studies in other Western countries (1–5). In this chapter, we therefore discuss these methodological challenges and possible approaches to dealing with them.

Migration is a complex process that embeds a number of dynamic and interactive factors. Capturing and conceptualizing such myriad factors, as well as understanding their effects on the health of immigrants and vice versa, are important. This can be done by developing a theoretical model which provides a better insight into immigrant health research and its methodology. In the literature, models such as “stress model,” “acculturation model” and “healthy migrant effect” have been mentioned to justify the effects of migration on health and vice versa (4;6;7).

Using the aforementioned models as a reference, we developed a dynamic model that includes common variables related to personal characteristics of migrant, pre- and post-migration experience that may be associated with the health status of immigrants. These include factors related to socio-demography and -economy, culture, psychological/behavioral characteristics, lifestyles, environment and biology (see Figure 4). In addition, these explanatory variables, together with a social integration process and healthcare access and use, are seen to influence the physical and mental health status of immigrants and vice versa. This type of model can be used as a conceptual framework for immigrant health research.



*social support, social network, social norms and values, negative life events, discrimination, powerlessness, inclusion factors/ policy and social integration factors such as employment, education, language ability, income, etc.

Figure 4 – A modified conceptual model for migration and health research

The concept of ethnicity has been one of the most hotly debated issues in the research field of migrants' health. Ethnicity refers to the sharing of a common culture and religion, including shared origin, language, lifestyle, environmental and biological factors, as well as a sometime similar history of migration (2;8;9). From studies in Norway and other Western countries, we have often observed a large variation in health status (morbidity and risk factors) between and even within ethnic groups. Simultaneously, a strong association between ethnicity and health outcomes was found (10–17). For example, the Oslo Immigrant Health Studies found ethnic differences in the age-adjusted proportions of obesity, with high proportions among those from Pakistan and Turkey but a low proportion among those from Vietnam, even in comparison to those born in Norway (see Figure 2) (14). Similarly, the same studies reported marked ethnic differences for CVDs risk factors (12;15). Migration may also alter or exaggerate such inequalities in health status to a certain extent. This evidence strongly indicates the rationale for generating knowledge based on ethnicity as well as the need for ethnicity-based research programs.

In contrast, studies in Western countries rarely recognize such heterogeneity in immigrant populations or ethnic variations in health status and health care access and use (2;9). In Norway, we often observed studies that categorize ethnic minority/immigrant populations based on geographical/economical regions such as South Asia, Eastern Europe, Sub-Saharan Africa, or Western versus Non-Western or immigrants from high- versus low-income countries (11;13;18–29). Even though socioeconomic position makes a key contribution to health

inequality, its role in fully explaining ethnic inequalities in health remains a topic of considerable debate (30).

The main reason given for ethnic lumping is small sample populations for each ethnic group. However, this type of classification may be inadequate for providing evidence about the health status and health care needs of diverse ethnic groups. It may also mask the ethnic differences or the concept of ethnicity that have multidimensional scope, ranging from genetic to social factors (2). This consequence has been termed as “black box epidemiology,” in which “the casual mechanisms behind an association remain unknown and hidden (black), but the inference is that the casual mechanism is within the association (box)” (31).

Despite the difficulty and complexity of understanding ethnicity, assessing the health status and health care needs based on ethnicity or measuring ethnic inequality in health is a powerful tool for both epidemiological studies and the planning of preventive and social actions (2;9;16). This can preferably be done by defining ethnicity based on country of birth. This ethnicity-based information can be used to monitor the progress and quality of social services and public health measures for the entire population (9;16;32). Therefore, future studies should be designed to embrace the concept of ethnicity and explain how they are using the concepts of ethnicity in the classification and inclusion of study populations.

In general, selecting an appropriate study design is one of the vital tasks in research methodology. Specifically, using a study design that can address the myriad factors related to migration and health has a significant contribution in reducing methodological challenges and biases. As a result, we summarize the following characteristics of migration and health study design (“ideal study”) mentioned in the literature (4;7) :

- Having three comparison cohorts: migrants-to-be or migrants, non-migrants in the host country and native residents in original country.
- Health outcomes and related factors should preferably be measured from a prospective viewpoint.
- The three cohorts should be monitored and compared in terms of health status, psychosocial and environmental dimensions, including their mechanisms of change and effects, both initially and at follow-ups.
- Designs of studies should have adequate control and conceptualization of the myriad social and environmental variables.
- Utilizing a large sample size and appropriate data analysis tools that are able to control confounders and adjust the health effects.

In addition, a comparison between ethnic groups or migrants versus non-migrants is often performed in migrants’ health research. Nonetheless, we have observed that such comparability lacks adequate control of confounding variables and is incomplete in terms of explaining the actual difference between the comparison groups. In order to reduce such types of bias, the following characteristics should be reflected and discussed in the comparative study (7;9;33) :

- The characteristics of the host country such as whether it is a multicultural or homogenous society, the pressure toward assimilation (integration policy), cultural background, the public attitude towards immigrants and barriers to entry into various social networks.

In addition, social mechanisms of racism, prejudice, discrimination of oppression and the extent to which these mechanisms may explain differences between immigrants and the host population. This can also yield insight into the size of the ethnic minority effect.

- The characteristics of immigrants related to social environment such as the availability of an ethnic network, cultural compatibility, family status and functioning, relationship with native community, skills in language, education and specific training, resources to coping and family. Furthermore, stages of generation, length of stay and reasons for migration should be considered since they reflect the various stages of migration and adaptation and the exposure towards the social and environmental conditions in the host country.
- Comparison of the native population in the host/original country and migrant population should take into account the different effects of physical and other measurements in different ethnic groups. The cut-off points to define abnormality require an adjustment of methods and normal values because its effect may not be the same in one ethnic group as in another.
- The distance between the native and host country should be clarified in terms of social norms, values, attitudes, socioeconomic differences, educational levels, etc.
- The selection process and its effect on migrant groups and their exposure should be considered.
- Differences in health seeking behavior and practice between migrant and native populations, including the type and level of health care, need to be clarified.

Research participation of migrants in Western countries has been usually regarded as a major challenge: a low participation rate and low sample size have commonly been mentioned as reasons for the lumping of diverse ethnic minority groups (34–37). This approach is expected to bring biases related to information, selection and categorization as well as limit the generalizability of research findings. The evidence found in US studies indicating that ethnic minorities are willing to participate in health research disproves the widely believed argument that ethnic minorities are less willing to participate in health research. This has rather been the responsibility of research communities: funders, ethics committees and researchers (35;37). As a result, the effort should focus on ensuring equal access to health research for all groups. This can be achieved through involving researchers with an ethnic minority background and community-based organizations, allowing sufficient resources, developing culturally sensitive research methods and materials, inviting immigrant groups to participate using sites accessible to them, and addressing factors that may undermine the participation of individuals, e.g. language barriers, the need for child care or the reimbursement of travel expenses (34–37).

Furthermore, the mandatory inclusion of ethnic minority subjects in any research program should be embraced in the national research strategy, as their exclusion is not legally, ethically or scientifically acceptable. This has been well-implemented in the US: an act spurred investigators to include ethnic minority populations and women unless there are scientific reasons not to do so (38). This guarantees to avoid the exclusion of ethnic minorities from research (specifically in clinical trials), increases the participation of ethnic minorities, eventually

reduces health disparities and promotes health for all. This act has been strongly recommended to be considered in Europe as well (32).

Conclusion

In general, most of the reviewed studies have been presented with a number of methodological and conceptual challenges and limitations that could undermine the validity and reliability of research results, as well as limiting our understanding about the health status and mechanisms that protect or risk the health of migrants. Future studies should therefore do more: 1) to standardize methodology, 2) to control and conceptualize complex variables and their interactions and processes related to migration and health, 3) to utilize comprehensive strategies to ensure the participation of immigrant populations in research, 4) to adopt the application of combined quantitative and qualitative designs, and 5) to generate ethnicity-based knowledge. Making use of these strategies in immigrant health research can enable the provision of comprehensive knowledge about vulnerable/high risk groups and the risk and protective factors of the health problems. This knowledge can also be used to improve health status and reduce inequalities in addition to guiding policy and practical actions in the long run.

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8. Other Public Health Problems

Use of and Access to Health Service

The growing number of immigrants in Norway has been regarded as a challenge to the health care system. The reasons given are that immigrants have different health problems and needs compared to Norwegians, which can also be associated with their culture, beliefs, expectations and unfamiliarity with the health care system compared to that in their country of origin (1).

Since 2001, the Norwegian health service has primarily been performed through a Regular General Practitioners (RGPs) scheme (*fastlegeordning*) in which every individual who is a legal resident has the right to have their own doctor. Despite this fact, immigrants (particularly those who have newly arrived) often use emergency clinics for low urgency inquiries (2). The Oslo Immigrant Studies found that immigrants made two to three times the number of visits to GPs and specialists than Norwegians. Specifically, women and immigrants with less than 10 years of education have made frequent visits, at least 4 times over the past 12 months. Turkish and Iranians visited a psychiatrist/psychologist most frequently compared to others immigrant groups. As previously mentioned, these groups have reported a higher burden of mental illness than other immigrants or Norwegians (3).

In spite of the fact that immigrants made frequent visits to health institutions, they reported less satisfaction with the provision of health services (4). The reasons given were possibly due to poor communication between the health workers and the immigrant patients (5;6), which could be associated with differences in language, culture and conflicting conceptions of the doctor's role (5;7;8). In addition, health workers competence as well as immigrants' experiences and expectations towards health services may affect the level of the patients' overall satisfaction in addition to how they feel about using these services later (4;9).

Surprisingly, there are only a few studies which have investigated immigrants' experience and challenges towards the use and access to health services. These studies recommended that the health care system should be adaptive to the needs and health problems of immigrants. Access to comprehensive health service should be considered for asylum seekers and undocumented migrants, as these groups mainly present various infectious and psychosomatic health problems. Future research should focus on identifying the special needs and barriers for immigrant patients that can ultimately improve their use and access to health services.

Musculoskeletal Disorders

Musculoskeletal disorders represent a major determining factor in terms of people's health functioning and are one of the most common causes for seeking medical care and sickness absence in Norway (10–12). This carries considerable economic consequences for the country as well as the quality of life of individuals and their families. The report from the Oslo

Immigrant Health Study documented that a prevalence of self-reported musculoskeletal disorders among immigrant groups was approximately three to eightfold higher than Norwegians, with a greater proportion among immigrant women (3). In addition, Brekke and Hjortdahl indicated that having a background from a low- and middle-income country leads to a strong independent correlation with severe musculoskeletal pain (13). In this study, the higher risk for immigrants in Oslo is linked to a low level in both physical and mental health, and a less healthy lifestyle (13). However, the precise nature of the relationship trends over time and the mechanisms of the association between musculoskeletal disorders, psychosomatic disorders and risk factors are unanswered questions in the literature.

Sickness Absence and Disability Pension

Today, sickness absence and disability pensions are major public health and socioeconomic challenges that have been attracting increasing attention in many welfare states (14–16). In the third quarter of 2009, the rate of sickness absence in Norway rose to 7.7 % of the total working age population, a growth of 11 % (12). Studies report that the risk of being on sick leave and a disability pension increases significantly in persons aged 55–64, being mostly women with an immigrant/foreign-born background (14;17). A study in Oslo found that among immigrants from developing countries and Eastern Europe, the risk of receiving a disability pension is twice as high as it is for Norwegians (18). An earlier study in Oslo reported that the highest rates of disability pension use could be found among immigrants from Pakistan, Turkey and Morocco (19). Clausen et al. indicated that such a high rate of disability pension use among immigrants from developing countries is largely linked to work-related factors: manual/unskilled work characterized by physical hardship, long working hours and low wages (18). In addition, the poorer health conditions experienced by these workers are also expected to have a strong effect on long-term sick leave and disability pension use (18–20). Neither of these studies explains gender and ethnic differences in connection with long-term sick leave and disability pension use, nor do they address mechanisms and trends over time of both medical and non-medical risk factors among immigrant populations.

Others

- Drug and substance abuse/addiction is also one of the main public health problems among the general population in Norway: about 8,000–15,000 drug users and about 5 % of the total populations are alcoholics (21). However, the extent of this problem is lower among immigrants, especially those from Asia and Africa, compared to Norwegians. For example, both immigrant men and women who participated in the HUBRO studies reported a lower consumption of alcohol when compared to Norwegian men and women (3). In contrast, the use of *khat*, especially among Somali immigrants and drug use among adolescent immigrants have revealed an increasing trend that should be addressed in research and preventive interventions (1).

- Despite positive progress in reducing dental health problems (dental caries and periodontal illness) among the general population, studies determined that children and Non-Western adult immigrants have a higher percentage of dental health problems in comparison to Norwegians and the general population (22;23).
- Cancer has been regarded as one of the main public health challenges in Norway, but there is no published research information about this deadly disease among immigrants. This should be given a priority in both cancer registration and cancer research programs.

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9. Conclusions and Implications

The review of most studies demonstrated that immigrant populations have poorer health conditions and a lower socioeconomic status, particularly those from low- and middle-income countries as compared to those from Western countries and Norwegians. This report clearly indicates ethnic inequalities in health and to some extent inequalities in socioeconomic status. Immigrants are experiencing a higher burden and risk of lifestyle- and diet-related disorders, mental health problems, infectious diseases, reproductive health and related problems in addition to a limited access to health care as compared to Norwegians and the general population. The extent of these problems significantly varies across gender, ethnic and age groups, and among immigrant groups as immigrants from Western countries have a relatively similar health status compared to Norwegians. The available knowledge emphasizes the need for implementing preventive interventions through adopting community-based and culturally-oriented strategies.

Correspondingly, research practices in immigrant health need to be lifted to a standard which can address these public health challenges. Our review report, while valuable in mapping the available knowledge on immigrant health, has left a number of unanswered questions. This indeed limits our understanding of immigrants' health status and needs. The methodological challenges could also affect the validity and reliability of the findings. As a result, future studies should use the findings in this report as a platform for further research that addresses the gaps and methodological challenges. Additionally, immigrants need to be a part of follow-up/cohort studies in order to explain ethnic and gender inequalities in their health outcomes, including risk factors and their mechanisms and trends over time. This also necessitates a qualitative investigation that provides an in-depth understanding about the nature and mechanism of association between health outcomes and risk factors. Based on this, we recommend a comprehensive research program that focuses on the health status and healthcare needs of immigrant populations. A national research strategy needs to be formulated to ensure equal participation and to avoid the exclusion of immigrant populations. A research initiative on immigrant health should be given a priority in terms of resources/fund allocation.

Appendix

Appendix 1 – Data/study findings extraction form

Author	
Title	
Ref. ID and Reference	
Health outcomes	
Study period	
Study characteristics: <ul style="list-style-type: none">• Aim/objective of study• Study design• Sample population and size• Data analysis methods	
Participant characteristics : <ul style="list-style-type: none">• Age• Gender• Ethnicity• Migration category	
Main findings: With regard to age, gender, ethnicity, migration category, etc.	
Conclusion and recommendation	
Limitations	

