BMJ Open

Primary healthcare usage and morbidity among immigrant children compared with non-immigrant children: a population-based study in Norway

Lars T Fadnes,[1,2] Kathy Ainul Møen,[1] Esperanza Diaz[1,3]

CrossMark

[1]Department of Global Public Health and Primary Care, University of Bergen, Bergen, Norway
[2]Department of Clinical Dentistry, University of Bergen, Bergen, Norway
[3]Norwegian Centre for Minority Health Research, Norway

Correspondence to
Dr Lars T Fadnes;
lars.fadnes@uib.no

ABSTRACT

Objectives: Health status, disease spectrum and use of healthcare have been reported to vary across groups of migrants and according to the different phases of migration. However, most studies are conducted among adults. This study assesses usage of primary healthcare (PHC) by children with immigrant background compared with non-immigrant children in Norway and describes their relative morbidity burden.

Design: Population-based retrospective cohort study.

Setting: This study used 3 linked population-based registers in Norway for children under 18 years of age in 2008.

Main exposure and outcome measures: Immigrants were defined as children with both parents born abroad, and further classified into first and second generation, and according to the World Bank income categories of their parents' country of origin. Usage and morbidity were assessed with negative binomial regression and logistic regression analyses, respectively. Further, population-attributable fraction analyses on PHC visits were conducted to estimate the impact on the primary health system.

Participants: 1 168 365 children including 119 251 with immigrant background.

Results: The mean number of visits to PHC for non-immigrant children was 1.40 compared with 1.19 for immigrants from high-income countries (HIC) and 1.76 for immigrants from low-income countries (LIC). Compared with non-immigrants, first generation immigrants used PHC significantly less after adjusting for age and sex (incidence risk ratio (IRR) 0.70 (HIC) to 0.93 (LIC)) while second generation immigrant children generally used PHC more (IRR 1.03 (HIC) to 1.43 (LIC)); however, the median number of visits were similar between all groups. The morbidity spectrum also varied between the groups.

Conclusions: Compared with non-immigrants, the excess number of consultations attributable to immigrant groups corresponds to around 1.3% of PHC visits among children.

Strengths and limitations of this study

- The study had a national coverage which avoids selection biases, and gives numbers that allow us to classify immigrants in more homogeneous groups.
- Healthcare data were collected with several quality control measures in a setting with confidentiality also minimises recall biases, social desirability and contributes to good data quality.
- Data on unregistered immigrants were not available in this study.
- The study does not include privately provided healthcare, but this type of care is used to limited degree in Norway.
- It was difficult to assess to which degree the health needs of immigrants were met.

INTRODUCTION

In 2014, nearly 60 million individuals were forcibly displaced due to conflict, violence, persecution or human right violation.[1] Even if two-thirds of these were internally displaced, a large proportion was forced to leave their country. In addition, many people move between borders for other reasons. In 2014, there were estimated to be 33.5 million migrants born outside the European Union member states living within these countries, while there were 698 546 immigrants in Norway in 2016 which is equivalent of ~13% of the Norwegian population.[2]

Health status, disease spectrum and use of prescribed medication have been reported to vary among different groups of migrants and according to different phases of migration.[3–5] Also, differences in these indicators between first and second generation immigrant children have been suggested.[6] Migration is an independent determinant of health, but it also interacts with other socioeconomic factors.[3] Nevertheless, immigrants

are usually reported as healthier than their peers, which is known as the healthy immigrant effect.[7 8]

Earlier studies have assessed how different groups of immigrants use primary health services,[9] but fewer have reported on this for children.[10] There seems to be a knowledge gap on how immigrant children from nationally representative samples use primary healthcare (PHC), differences in PHC use between first and second generation immigrant children, and morbidity spectrum among these groups. This nationwide, population-based study assesses the usage of PHC services, which in Norway includes care delivered by general practitioners (GPs) and emergency room (ER), by children with immigrant background compared with non-immigrant populations in Norway in 2008. Further, we compared morbidity spectrum between these groups.

METHODS

This study used register data from the National Population Register (NPR) in Norway, the Norwegian Health Economics Administration Database (HELFO) and Anatomical Therapeutic Chemical (ATC) codes from the Norwegian Prescription Database (NorPD) for the year 2008.[11 12] These registers were linked using personal identification numbers assigned to all non-immigrants and registered immigrants staying in Norway for at least 6 months. At the time of the study, Norway had a registered population of 4 737 200 of which 1 168 000 were children under the age of 18 years.[13] Immigrants were defined as children with both parents born abroad, and were further classified into first (born abroad) and second generation (who were born in Norway, but both parents being immigrants) and according to the World Bank income categories of their parents' country of origin into low-income countries (LIC), middle-income countries (MIC) and high-income countries (HIC).[14] Information regarding sex, age, country of origin for child and parents, and age at arrival in Norway was obtained from NPR.

HELFO contains administrative claims for PHC for all patient contacts based on diagnoses coded using the International Classification of Primary Care (ICPC-2) and includes both contacts with GPs and ER. Morbidity was organised through Major Expanded Diagnosis Clusters (MEDCs) using the Johns Hopkins University Adjusted Clinical Groups case-mix system (ACG System) based on diagnoses (ICPC-2) and prescription information (NorPD).[15] The MEDCs group diseases in 27 broad categories (such as cardiovascular, musculoskeletal and psychosocial conditions) based on clinical, diagnostic and therapeutic similarities of the diseases and help remove differences in coding behaviour between practitioners. For each MEDC, a dichotomised variable was created indicating the presence or absence of a given MEDC for a child in 2008.

In Norway, the health system is structured around GPs providing PHC for a defined group of patients during standard working time. The GPs also provide ER health services for an extended area out-of-hours and are responsible for initial assessments of most types of diseases and injuries including investigation and treatment of patients of all ages and various degree of severity, and refer to secondary care when needed. Children in Norway under the age of 16 years are provided with free healthcare, while those above 16 years of age cover some limited costs.

ANALYSIS

Descriptive statistics including percentages and means are presented. Relative use of different types of PHC services as count variables was analysed with negative binomial regression including unadjusted models and models adjusted by age and sex. In addition, online supplementary tables also include models adjusting for morbidity as expressed by the number of chronic conditions classified with ACG. Relative risks were calculated with 95% CIs. For morbidity assessments, logistic regression models adjusted by age and sex were used to calculate ORs with CI for the presence or absence of diagnosed clusters (MEDCs) among first and second generation immigrants compared with non-immigrants. These data are presented in forest plots. The estimation of the population-attributable fraction of PHC visits if they had corresponding healthcare-seeking behaviour as non-immigrants, were based on a calculation of the difference between the actual number of PHC visits in each population group and the expected numbers of visits in each group as a product of the number of people in each group and the corresponding frequency of visits among the non-immigrants. Stata SE V.11 and SPSS V.20.0 were used for statistical analysis.

The Norwegian Social Science Data Service prepared the final pseudoanonymised data file.

RESULTS

Our data comprised 926 044 children born in Norway of Norwegian parents and 119 251 immigrant children, of which 49 014 were first generation and 70 237 were second generation immigrants (see table 1 and online supplementary file). Among the immigrants, 22 234 originated from LIC, 69 333 from MIC and 27 684 from HIC. In addition, 123 070 children had a mixed background (eg, children with at least one Norwegian parent), and are not presented in the analyses below. The sex distribution was similar for immigrants and non-immigrants. The mean age of immigrant children, particularly those from LIC (8.2), was slightly lower than that of non-immigrants (9.3).

The mean number of visits to PHC services including GPs, and ER services ranged from 1.19 for HIC children to 1.76 for immigrants from LIC (table 2); however, the median number of visits to PHC were similar between all the groups with differences seen in the 75th and 90th centiles (see online supplementary file). Some of

Table 1 Background characteristics of the population included

	Non-immigrants		HIC		MIC		LIC		Total	
	n	Per cent	n	Per cent	n	Per cent	n	Per cent	n	Per cent
Sex of child										
Boy	475 250	51	14 120	51	35 414	51	11 471	52	536 255	51
Girl	450 794	49	13 564	49	33 919	49	10 763	48	509 040	49
Age of child (years)										
0–2	91 127	10	3726	13	7134	10	2980	13	104 967	10
2–5	135 071	15	5109	18	11 096	16	4079	18	155 355	15
5–10	233 934	25	7148	26	18 449	27	5663	25	265 194	25
10–18	465 912	50	11 701	42	32 654	47	9512	43	519 779	50
Immigrant category										
Non-immigrant	926 044	100								
First generation			17 879	65	19 958	29	11 177	50	49 014	41
Second generation			9805	35	49 375	71	11 057	50	70 237	59
Area of origin										
Asia, Africa and Latin America			2049	7	57 637	83	22 234	100	81 920	8
North America and Oceania			822	3	3	0			825	0
Nordic countries			4885	18					4885	0
Norway	926 044	100							926 044	89
Western Europe			7012	25					7012	1
Eastern Europe			12 916	47	11 693	17			24 609	2

Categories of immigration is grouped according to country of origin of children and parents in line with the World Bank income categories into LIC, MIC and HIC.
HIC, high-income countries; LIC, low-income countries; MIC, middle-income countries.

Table 2 Mean number of visits to GP, ER healthcare and combined primary healthcare (GP and ER) among children in Norway in 2008

	Use of GP	Use of ER	Primary care use
Non-immigrants	1.23	0.18	1.40
First and second generations combined			
HIC	1.05	0.14	1.19
MIC	1.41	0.25	1.66
LIC	1.53	0.23	1.76
First generation			
HIC	0.86	0.11	0.96
MIC	0.99	0.13	1.12
LIC	1.12	0.11	1.24
Second generation			
HIC	1.39	0.21	1.60
MIC	1.59	0.29	1.88
LIC	1.95	0.34	2.29

Immigrants grouped according to country of origin of children and parents in line with the World Bank income categories into LIC, MIC and HIC and by first and second generations (combined and separately).
ER, emergency room; GP, general practitioner; HIC, high-income countries; LIC, low-income countries; MIC, middle-income countries.

the differences were attributed to differences in age (table 3). First generation immigrants used PHC less compared with non-immigrants when adjusting for age and sex, while second generation immigrants generally used PHC more. There were no differences in the number of PHC visits among immigrant girls and boys. The results were similar when restricting the analyses to children <10 years of age (see online supplementary file).

Regarding morbidity spectrum, diseases and symptoms related to respiratory tract infections, renal, oral and gastrointestinal conditions, eczema, fever and nausea were more frequently presented among second generation immigrants compared with non-immigrants, while only nausea and gastrointestinal conditions were presented more frequently presented among first generation immigrants compared with non-immigrants (see figures 1 and 2 and online supplementary file). Among non-immigrants, attention-deficit disorder and anxiety, allergy and asthma, neurological, musculoskeletal and rheumatic conditions were more frequently presented compared with among immigrants.

The total number of PHC visits for children in Norway with immigrant and non-immigrant background during 2008 was 1 486 907 (table 4). Compared with non-immigrants, the excess number of consultations attributable to all immigrant groups combined was 19 967. This corresponds to 1.3% of the combined PHC consultations among children (1.2% of GP visits and 2.6% of ER visits).

DISCUSSION

This study showed significant differences in PHC usage among non-immigrants and the different groups of

Table 3 Relative use of GP's healthcare, ER healthcare and combined PHC including GP and ER reported as IRRs with 95% CIs assessed with negative binomial regression models unadjusted and also adjusting for age and sex

	Use of GP IRR (CI)	Use of ER IRR (CI)	Use of PHC IRR (CI)
Model 1: unadjusted results, first generation only			
Non-immigrants (reference)	1	1	1
HIC	0.70 (0.68 to 0.72)	0.60 (0.57 to 0.63)	0.69 (0.67 to 0.70)
MIC	0.81 (0.79 to 0.82)	0.75 (0.72 to 0.79)	0.80 (0.78 to 0.82)
LIC	0.91 (0.89 to 0.94)	0.65 (0.61 to 0.69)	0.88 (0.86 to 0.90)
Model 2: unadjusted results, second generation only			
Non-immigrants (reference)	1	1	1
HIC	1.13 (1.10 to 1.16)	1.20 (1.13 to 1.27)	1.14 (1.11 to 1.17)
MIC	1.29 (1.28 to 1.31)	1.65 (1.61 to 1.69)	1.34 (1.32 to 1.36)
LIC	1.59 (1.56 to 1.63)	1.92 (1.83 to 2.01)	1.63 (1.60 to 1.67)
Model 3: adjusted by age and sex, first generation only			
Non-immigrants (reference)	1	1	1
HIC	0.71 (0.69 to 0.72)	0.61 (0.58 to 0.64)	0.70 (0.68 to 0.71)
MIC	0.87 (0.85 to 0.89)	0.87 (0.83 to 0.91)	0.87 (0.85 to 0.89)
LIC	0.96 (0.93 to 0.98)	0.72 (0.67 to 0.77)	0.93 (0.90 to 0.95)
Model 4: adjusted by age and sex, second generation only			
Non-immigrants (reference)	1	1	1
HIC	1.03 (1.00 to 1.06)	1.00 (0.94 to 1.06)	1.03 (1.00 to 1.06)
MIC	1.23 (1.21 to 1.24)	1.47 (1.44 to 1.51)	1.26 (1.25 to 1.27)
LIC	1.41 (1.38 to 1.45)	1.53 (1.46 to 1.60)	1.43 (1.40 to 1.46)

Categories of immigration is grouped according to country of origin of children and parents in line with the World Bank income categories into LIC, MIC and HIC for first and second generations separately.
ER, emergency room; GP, general practitioner; HIC, high-income countries; IRR, incidence risk ratio; LIC, low-income countries; MIC, middle-income countries; PHC, primary healthcare.

registered immigrant children living in Norway, but the differences were almost balanced out between different immigrant groups on the system level. First generation immigrant children used PHC services significantly less than non-immigrants, while PHC use was significantly higher among second generation immigrant children. The difference was mainly driven by a minority among second generation immigrant children. The total differences in use of PHC services among immigrants contribute to 1.3% of the PHC consultations, proportionally more for ER than GP services. The distribution of symptoms and health problems differed between first and second generation immigrants and non-immigrants.

The observed differences in healthcare use might be related to several factors. First, the language and cultural barriers between migrants and GPs could translate into a need for several consultations required to provide similar healthcare services, independent on whether a translator is used.[16] There are also indications that healthcare providers to limited degree are trained to meet the more complex needs of refugees,[17] and thus immigrants may to a larger degree need to consult physicians several times for the same health problem if initially unsolved. In addition, to limit spread of communicable diseases, new migrants undergo routine screening of some infectious diseases which might contribute to a proportion of the consultations, although much of this happens outside standard PHC.[18] A recent assessment in hospitals and secondary healthcare in Norway

shows relatively similar patterns with only minor differences in healthcare use among children.[19] It could be assumed that some few families migrate to seek improved medical care for severely sick children. However, in accordance to previous studies, our data indicate that if this is the case, it does not contribute to a large burden for the health system. 'The healthy immigrant effect' reported mostly among adults[7 8] is probably more relevant for first generation immigrant children than for second generation immigrant children who are not born in their parents' country of origin. Similar patterns of PHC usage for children and adults is not surprising as parents often have a strong degree of influence on when their children should seek healthcare.[20] Increasing length of stay is also likely that to be linked with increasing adoption of culture and behavioural patterns from the new country of residence.

Immigrants' health can be influenced by emotional stress related to challenges at the individual, familial and societal levels.[7 21] This includes fear of deportation, discrimination, linguistic and cultural difficulties, family, relatives and friends living in uncertainty, changing between different educational systems, obstacles in accessing healthcare and the right to work. The influence of these factors on heath seems to be particularly relevant for refugees who have experienced torture and other potentially traumatic events who are at increased risk of post-traumatic stress disorder and depression.[22] A systematic review of serious mental health disorders in refugees

Morbidity		Odds Ratio (95% CI)
01. Respiratory conditions		0.81 (0.76, 0.87)
02. – Acute lower resp. tract infection		0.79 (0.67, 0.92)
03. Allergy		0.46 (0.41, 0.52)
04. Asthma		0.38 (0.32, 0.44)
05. Psychological conditions		0.64 (0.58, 0.71)
06. – Attention deficit disorder		0.10 (0.06, 0.16)
07. – Anxiety, neuroses		0.71 (0.53, 0.94)
08. Neurological conditions		0.79 (0.72, 0.87)
09. – Migraine or other headaches		0.86 (0.75, 0.99)
10. – Head injury		0.68 (0.53, 0.87)
11. – Sleep problems		0.68 (0.50, 0.93)
12. – Seizure disorder		0.96 (0.69, 1.32)
13. – Developmental disorder		0.76 (0.54, 1.07)
14. Muskelo–skeletal conditions		0.63 (0.60, 0.68)
15. – Musculo–skeletal symptoms		0.70 (0.65, 0.76)
16. – Fractures (excluding digits		0.51 (0.41, 0.64)
17. Eye signs and symptoms		0.77 (0.71, 0.84)
18. – Conjunctivitis		0.51 (0.45, 0.58)
19. Ear nose throat and upper airways		0.87 (0.83, 0.92)
20. – Acute upper resp. tract infection		0.91 (0.86, 0.97)
21. – Otitis media		0.68 (0.60, 0.77)
22. – Fever		1.02 (0.94, 1.10)
23. – Nausea		2.00 (1.73, 2.32)
24. – Fatigue		0.46 (0.38, 0.55)
25. – Contraception		0.15 (0.11, 0.21)
26. Skin conditions		0.82 (0.78, 0.87)
27. – Viral warts and molluscs		0.56 (0.48, 0.66)
28. – Dermatitis and eczema		1.13 (1.01, 1.26)
29. – Acne		0.82 (0.67, 1.02)
30. Renal conditions		1.14 (0.59, 2.20)
31. Gastrointestinal conditions		1.61 (1.48, 1.75)
32. Cardiovascular		0.83 (0.63, 1.11)
34. Urinary tract infections		0.50 (0.42, 0.60)
35. Incontinence		1.30 (1.04, 1.63)
36. Oral conditions		1.20 (0.99, 1.46)
37. Rheumatic conditions		0.10 (0.01, 0.75)

.25   1   4

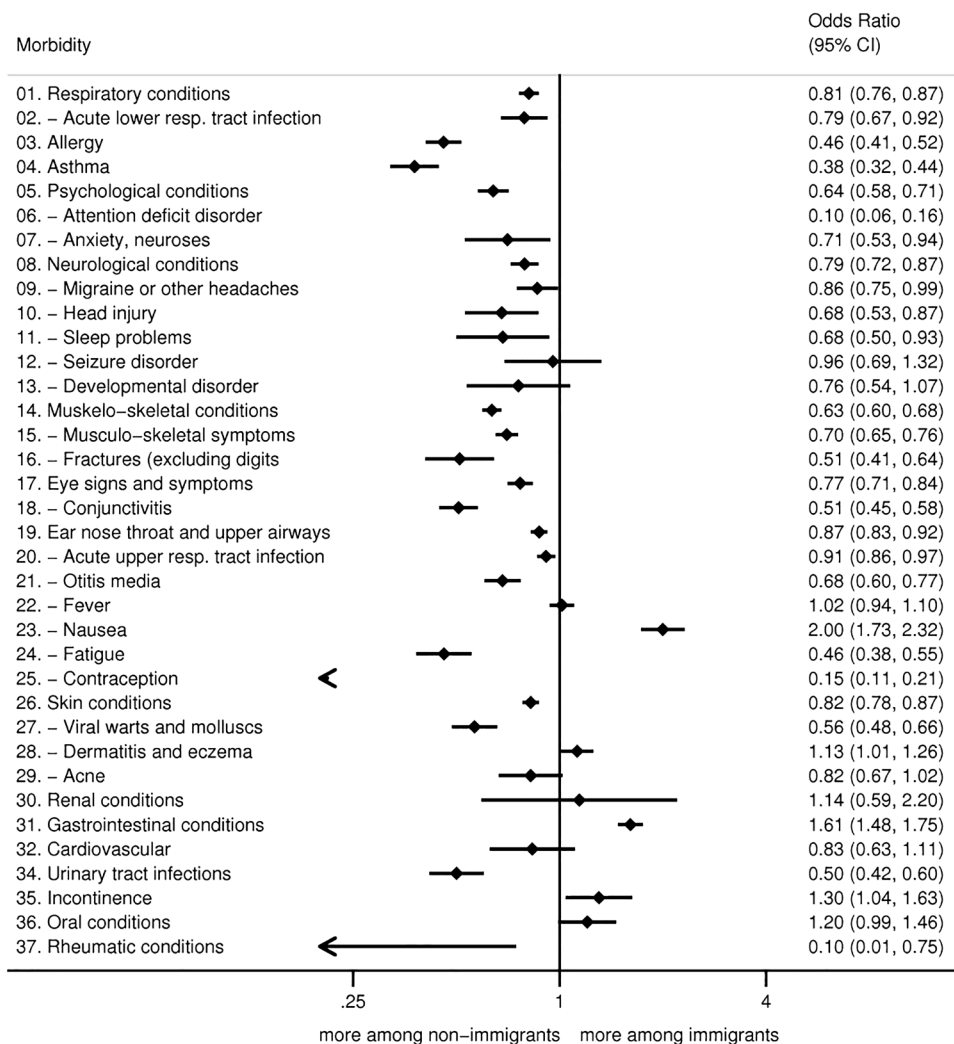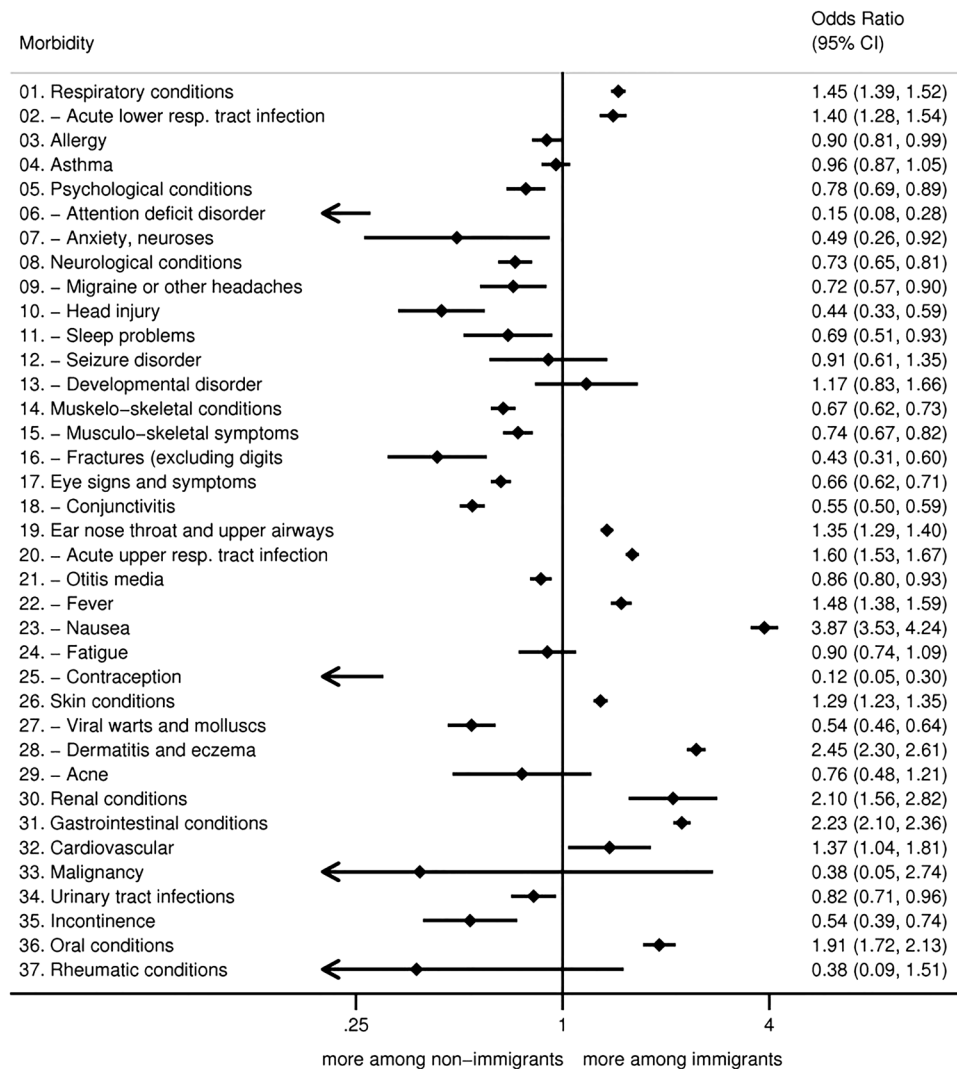more among non–immigrants   more among immigrants

Figure 1 Forest plot presenting differences in diagnosed morbidity adjusted for age and sex reported as ORs with 95% CIs assessed with logistic regression models. Comparison between non-immigrants (reference) and immigrants from low-income countries including first generation only.

in Western countries indicated a substantially increased burden, with around 11% of the children suffering from post-traumatic stress disorder.[23] We did not find any increase but rather substantially lower rates of mental health disorders diagnosed among immigrants. This corresponds well to a study among adult immigrants in Norway as well as findings from Spain.[24] [25] There could be several explanations for this. On the one side, cultural differences including differences in family structure could make immigrants less vulnerable for severe mental health suffering, mental health conditions among children could be less acknowledged in immigrants or the mental health suffering might be reported in a way which is less often recognised among physicians in Norway.[21] [26] On the other side, mental suffering can be presented through symptoms such as nausea or gastrointestinal symptoms, often referred to as somatisation, which can again have varying forms in different ethnic groups.[27] Accordingly, Kirmayer[26] has argued that mental suffering has various presentations in different

cultures, and that variances in somatisation could be due to misclassification and insufficient cultural understanding of how mental health suffering is presented. These mechanisms could also explain the higher relative frequency of non-specific and gastrointestinal symptoms and conditions among immigrant children from LIC. Finally, it is also possible that healthcare in Norway is more focused and trained to identify some health conditions, for example, attention-deficit disorders and to a lesser degree recognise suffering from post-traumatic stress disorder among children, with the latter probably being more common among refugees.[22]

Respiratory tract infections were also more commonly presented among immigrants. This could be explained by immigrant children often having more siblings and living in smaller housing compared with non-immigrants, as crowding could increase the risk of, for example, respiratory tract infections,[28] but could also be linked with differences in health seeking behaviour. This study also showed substantial differences in use of

Figure 2 Forest plot presenting differences in diagnosed morbidity adjusted for age and sex reported as ORs with 95% CIs assessed with logistic regression models. Comparison between non-immigrants (reference) and immigrants from low-income countries including second generation only.

Table 4 Total number of primary healthcare visits among children in Norway including use of GP's healthcare, ER healthcare and total combined primary healthcare including GP and ER and differences (Δ) in healthcare use compared with non-immigrants

	Population	GP visits	ER visits	Total visits	ΔGP visits	ΔER visits	ΔTotal visits
Non-immigrants	926 044	1 135 251	164 335	1 299 586	0	0	0
Immigrated (parents and child born abroad, first generation)							
HIC	17 879	15 342	1893	17 235	−6576	−1280	−7856
MIC	19 958	19 750	2656	22 406	−4717	−886	−5603
LIC	11 177	12 519	1285	13 804	−1183	−698	−1882
Parents immigrated, child born in Norway (second generation)							
HIC	9805	13 606	2090	15 696	1586	350	1936
MIC	49 375	78 355	14 470	92 825	17 825	5708	23 533
LIC	11 057	21 590	3765	25 355	8035	1803	9838
Total	1 045 295	1 296 413	190 494	1 486 907	14 970	4997	19 967
Δ in per cent compared with non-immigrants					1%	3%	1%

Categories of immigration is grouped according to country of origin of children and parents in line with the World Bank income categories into LIC, MIC and HIC. This table has included figures for first and second generation immigrants.
Δ Difference in healthcare use compared with non-immigrant use.
ER, emergency room; GP, general practitioner; HIC, high-income countries; LIC, low-income countries; MIC, middle-income countries.

contraceptives among immigrants under age of 18 years compared with non-immigrants. Similar findings have also been reported among adults.[29] There could be different reasons for this including differences in age of sexual debut, differences in use of barrier contraception including condoms, differences in use of natural preventive strategies such as 'safe periods', different cultural views on contraceptives and different views in importance of family planning.

Other studies have suggested that difficulties in accessing standard PHC services could lead to increased use of ER healthcare.[10 30] Our results showed that first generation immigrants used ER healthcare less often than non-immigrants, while second generation immigrants generally used both types of PHC services more often than non-immigrants, with greater differences for use of ER healthcare for second generation immigrant children from LIC. To the best of our knowledge, there are no other studies comparing PHC services among first and second generation immigrant children, and it could be useful for future studies to investigate whether the same patterns are seen in other countries.

Our study has several strengths including its national coverage, which avoids selection biases, and gives numbers that allow us to classify immigrants in more homogeneous groups, although heterogeneity inside groups still exists. The use of healthcare registered data collected with several quality control measures in a setting with confidentiality also minimises recall biases, social desirability and contributes to good data quality for many of the included variables. However, our study also has some limitations. As it is based on national registers, unregistered immigrants, whose healthcare access is likely to be lower,[31] are not included. It is also difficult to assess to which degree the health needs of immigrants are met. Even though we have several hypotheses on the reasons for the observed differences in PHC usage, we cannot verify to which degree the various causes contribute. Some variables that could have been useful, such as sociodemographic variables of the family and length of stay of parents, were not possible to link to the children included. Data on these among adults in Norway show that immigrants particularly from LIC more often had a lower income and education than non-immigrants.[32] We would expect the same to be true for the parents of the included children, partly explaining their higher use of PHC. The morbidity estimates are based on ICPC-2 diagnosis codes reported for administrative claims, in which often only one diagnosis is reported per visit even in the presence of more than one disease. However, ICPC-2 codes have been widely used and validated for comparison of populations,[33] and as we do not use them to calculate prevalence of diseases, this is unlikely to cause substantial biases in the presented data. Our study does not include privately provided healthcare, but this type of care is used to limited degree in Norway where public health insurance covers 85% of health spending.[34] Still, it is possible that there is an opposite pattern in private healthcare use balancing out the small differences in PHC usage between immigrants and non-immigrants.

In conclusion, first generation immigrant children in Norway use PHC services less than non-immigrants when taking slight differences in age distribution into account. Second generation immigrants generally have somewhat higher use of PHC services, mainly driven by a minority within the group. The difference in PHC usage among children with immigrant background contributes to only 1.3% of the PHC visits among children compared with the non-immigrant population in Norway. There were some differences in conditions they sought healthcare for.

REFERENCES

1. United Nations High Commissioner for Refugees (UNHCR). *Forced displacement in 2014*. UNHCR Global Trends, 2015.
2. Statistics Norway (Statistisk sentralbyrå). Immigrants and Norwegian-born to immigrant parents. http://www.ssb.no/en/befolkning/statistikker/innvbef
3. Rechel B, Mladovsky P, Ingleby D, *et al*. Migration and health in an increasingly diverse Europe. *Lancet* 2013;381:1235–45.
4. Wolfe I, Thompson M, Gill P, *et al*. Health services for children in Western Europe. *Lancet* 2013;381:1224–34.
5. Gimeno-Feliu LA, Armesto-Gómez J, Macipe-Costa R, *et al*. Comparative study of paediatric prescription drug utilization between the Spanish and immigrant population. *BMC Health Serv Res* 2009;9:225.
6. Balcazar AJ, Grineski SE, Collins TW. The Hispanic health paradox across generations: the relationship of child generational status and citizenship with health outcomes. *Public Health* 2015;129:691–7.
7. Linton JM, Choi R, Mendoza F. Caring for children in immigrant families: vulnerabilities, resilience, and opportunities. *Pediatr Clin North Am* 2016;63:115–30.
8. Gimeno-Feliu LA, Calderón-Larranaga A, Diaz E, *et al*. The healthy migrant effect in primary care. *Gac Sanit* 2015;29:15–20.
9. Uiters E, Devillé W, Foets M, *et al*. Differences between immigrant and non-immigrant groups in the use of primary medical care; a systematic review. *BMC Health Serv Res* 2009;9:76.
10. Ballotari P, D'Angelo S, Bonvicini L, *et al*. Effects of immigrant status on emergency room (ER) utilisation by children under age one: a population-based study in the province of Reggio Emilia (Italy). *BMC Health Serv Res* 2013;13:458.
11. Statistics Norway (Statistisk sentralbyrå). Classification of centrality, 2013. http://www.ssb.no/metadata/conceptvariable/vardok/927/en

12. Furu K. Establishment of the nationwide Norwegian Prescription Database (NorPD)—new opportunities for research in pharmacoepidemiology in Norway. *Norw J Epidemiol* 2008;18:129–36.
13. Statistics Norway (Statistisk sentralbyrå). Population, 2008. http://ssb.no/en/befolkning/statistikker/folkemengde/aar/2008-03-13
14. World Bank. New country classifications 2013, 2013. http://data.worldbank.org/news/new-country-classifications
15. Health Services Research & Development Center. The Johns Hopkins ACG System. Technical Reference Guide Version 10.0. In: Weiner JP, Abrams C, eds. The Johns Hopkins ACG System. Technical Reference Guide Version 10.0. Baltimore, MD: Johns Hopkins Bloomberg School of Public Health, 2011. https://www.healthpartners.com/ucm/groups/public/@hp/@public/documents/documents/cntrb_035024.pdf
16. Karliner LS, Jacobs EA, Chen AH, *et al*. Do professional interpreters improve clinical care for patients with limited English proficiency? A systematic review of the literature. *Health Serv Res* 2007;42:727–54.
17. Adams KM, Gardiner LD, Assefi N. Healthcare challenges from the developing world: post-immigration refugee medicine. *BMJ* 2004;328:1548–52.
18. Norwegian Directorate of Health (Helsedirektoratet). Asylsøkere, flyktninger og familiegjenforente. Veileder for helsetjenestetilbudet til asylsøkere, flyktninger og familiegjenforente (Guidelines for the health care services for asylum seekers, refugees and family reunification). 2015. https://helsedirektoratet.no/retningslinjer/asylsokere-flyktninger-og-familiegjenforente
19. Elstad JI, Finnvold JE, Texmon I. *Bruk av sykehus og spesialisthelsetjenester blant innbyggere med norsk og utenlandsk bakgrunn*. NOVA Rapport 10/2015: Norsk institutt for forskning om oppvekst, velferd og aldring, 2015:155.
20. Coyne I. Children's participation in consultations and decision-making at health service level: a review of the literature. *Int J Nurs Stud* 2008;45:1682–9.
21. American Psychological Association (APA) Presidential Task Force on Immigration. Crossroads: The psychology of immigration in the new century. 2012. http://www.apa.org/topics/immigration/report.aspx
22. Steel Z, Chey T, Silove D, *et al*. Association of torture and other potentially traumatic events with mental health outcomes among populations exposed to mass conflict and displacement: a systematic review and meta-analysis. *JAMA* 2009;302:537–49.
23. Fazel M, Wheeler J, Danesh J. Prevalence of serious mental disorder in 7000 refugees resettled in western countries: a systematic review. *Lancet* 2005;365:1309–14.
24. Straiton M, Reneflot A, Diaz E. Immigrants' use of primary health care services for mental health problems. *BMC Health Serv Res* 2014;14:341.
25. Macipe-Costa RM, García-Campayo J, Gimeno-Feliu LA, *et al*. Differences in methylphenidate use between immigrants and Spaniards in the child population of Aragon, Spain: a retrospective study. *J Child Neurol* 2011;26:1265–70.
26. Kirmayer LJ. Cultural variations in the clinical presentation of depression and anxiety: implications for diagnosis and treatment. *J Clin Psychiatry* 2001;62(Suppl 13):22–8; discussion 29–30.
27. Aragona M, Rovetta E, Pucci D, *et al*. Somatization in a primary care service for immigrants. *Ethn Health* 2012;17:477–91.
28. Colosia AD, Masaquel A, Hall CB, *et al*. Residential crowding and severe respiratory syncytial virus disease among infants and young children: a systematic literature review. *BMC Infect Dis* 2012;12:95.
29. Omland G, Ruths S, Diaz E. Use of hormonal contraceptives among immigrant and native women in Norway: data from the Norwegian Prescription Database. *BJOG* 2014;121:1221–8.
30. Sandvik H, Hunskaar S, Diaz E. Immigrants' use of emergency primary health care in Norway: a registry-based observational study. *BMC Health Serv Res* 2012;12:308.
31. Karlsen MA. *Precarious inclusion. Irregular migration, practices of care, and state bordering in Norway*. University of Bergen, 2015.
32. Diaz E, Gimeno-Feliu LA, Calderón-Larrañaga A, *et al*. Frequent attenders in general practice and immigrant status in Norway: a nationwide cross-sectional study. *Scand J Prim Health Care* 2014;32:232–40.
33. Frese T, Herrmann K, Bungert-Kahl P, *et al*. Inter-rater reliability of the ICPC-2 in a German general practice setting. *Swiss Med Wkly* 2012;142:w13621.
34. Statistics Norway (Statistisk sentralbyrå). Health accounts, 2015. https://www.ssb.no/en/nasjonalregnskap-og-konjunkturer/statistikker/helsesat/aar/2016-03-14