Author/s:
Guo, S;Liu, M;Chong, SY;Zendarski, N;Molloy, C;Quach, J;Perlen, S;Nguyen, MT;O'Connor, E;Riggs, E;O'Connor, M

Title:
Health service utilisation and unmet healthcare needs of Australian children from immigrant families: A population-based cohort study

Date:
2020-11-01

Citation:
Guo, S., Liu, M., Chong, S. Y., Zendarski, N., Molloy, C., Quach, J., Perlen, S., Nguyen, M. T., O'Connor, E., Riggs, E. & O'Connor, M. (2020). Health service utilisation and unmet healthcare needs of Australian children from immigrant families: A population-based cohort study. Health and Social Care in the Community, 28 (6), pp.2331-2342. https://doi.org/10.1111/hsc.13054.

Persistent Link:
https://hdl.handle.net/11343/275939

**Title:** Health service utilization and unmet healthcare needs of Australian children from immigrant families: A population-based cohort study

**Authors:** Shuaijun Guo,[1,2] Mengjiao Liu,[1,2] Shiauyun Chong,[1] Nardia Zendarski,[1] Carly Molloy,[1] Jon Quach,[1,3] Susan Perlen,[1] Minh Thien Nguyen,[1,2] Elodie O'Connor,[1] Elisha Riggs,[4] Meredith O'Connor[1,2,5]

**Author affiliations:**

[1]Centre for Community Child Health, Murdoch Children's Research Institute, Royal Children's Hospital, Melbourne, Australia

[2]Department of Pediatrics, The University of Melbourne, Melbourne, Australia

[3]Melbourne Graduate School of Education, The University of Melbourne, Melbourne, Australia

[4]Intergenerational Health Group, Murdoch Children's Research Institute, Royal Children's Hospital, Melbourne, Australia

[5]College of Arts and Social Sciences, Australian National University, Canberra, Australia

**Corresponding authors:** Dr Shuaijun Guo, Centre for Community Child Health, Royal Children's Hospital, 2 East Clinical Offices, 50 Flemington Road, Parkville, 3052, Victoria, Australia. Email: jun.guo@mcri.edu.au. Phone: +61 452 110 331. Fax: +61 3 9345 5900.



This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1111/HSC.13054

## ACKOWLEDGEMENTS

The authors thank Professor Sharon Goldfeld for feedback on this manuscript. The research is supported by the Victorian Government's Operational Infrastructure Support Program. This study uses unit record data from Growing Up in Australia, the Longitudinal Study of Australian Children (LSAC). The LSAC is linked to the National Assessment Program - Literacy and Numeracy (NAPLAN) and is conducted in partnership between the Australian Government Department of Social Services, the Australian Institute of Family Studies and the Australian Bureau of Statistics, with advice provided by a consortium of leading researchers from research institutions and universities throughout Australia. The authors would like to acknowledge and thank the children, families and teachers who generously give their time to participate in the LSAC. LSAC was approved by the Australian Institute of Family Studies Human Research Ethics Review Board (AIFS 13-04).

## CONFLICT OF INTEREST

None.

## CONTRIBUTORS

SG and MO contributed to and oversaw the planning and reporting of the work described in this article. SG, ML, NZ, and MO wrote the first draft of the manuscript. SG conducted the data analysis. SG, ML, SC, NZ, CM, JN, EO, SP, JQ, ER, and MO contributed to the planning, conduct, and reporting of the work described in this article.

DR. SHUAIJUN GUO (Orcid ID : 0000-0001-5737-4765)



Article type : Original Article

## TITLE

Health service utilization and unmet healthcare needs of Australian children from immigrant families: A population-based cohort study

## ABSTRACT

Compared with most other Organization for Economic Co-operation and Development (OECD) countries, information about the patterns of health service use for children from immigrant families in Australia is currently limited, and internationally, data on unmet healthcare needs are scarce. This study aims to examine the distribution of health service utilization and unmet healthcare needs for immigrant children aged 10-11 years in Australia. We drew on data from the Longitudinal Study of Australian Children Birth (B; n=5107) and Kindergarten (K; n=4983) cohorts. The exposure was family immigration background collected at 0-1 (B-cohort) and 4-5 (K-cohort) years. Outcomes were parent-reported child health service use and unmet healthcare needs (defined as the difference between services needed and services received) at 10-11 years. Logistic regression analyses were used to examine associations between family immigration background and health service use / unmet healthcare needs, adjusting for potential confounders. Results showed that one-third of Australian children (B-cohort: 29.0%; K-cohort: 33.4%) came from immigrant families. There were similar patterns of health service use and unmet healthcare needs between children from English-speaking immigrant and Australian-born families. However, children from non-English-speaking immigrant families used fewer health services, including pediatric, dental, mental health, and emergency ward services. There was a disparity between the services used when considering children's health needs, particularly for pediatric

specialist services (B-cohort: OR=2.43, 95% CI 1.11-5.31; K-cohort: OR=2.72, 95% CI 1.32-5.58). Findings indicate that Australian children from non-English-speaking immigrant families experience more unmet healthcare needs and face more barriers in accessing health services. Further effort is needed to ensure that the healthcare system meets the needs of all families.

**Keywords:** Health services, unmet needs, healthcare disparity, children, longitudinal studies, immigrants, Australia

## WHAT IS KNOWN ABOUT THIS TOPIC

- Children from immigrant backgrounds are at higher risk of experiencing poor health outcomes than native-born peers.
- International research shows that patterns of child health service use differ by family immigration history, but data on unmet healthcare needs are scarce.

## WHAT THIS PAPER ADDS

- We found similar patterns of health service use and unmet healthcare needs for children from Australian-born and English-speaking immigrant families.
- Children from non-English-speaking immigrant families used fewer health services than their Australian-born and English-speaking immigrant peers, including pediatric, dental, mental health, and emergency ward services.
- Consistent with the lower use of health services, children from non-English-speaking immigrant families had higher levels of unmet healthcare needs.

## INTRODUCTION

The number of immigrants globally has grown rapidly from 173 million in 2000 to 258 million in 2017, representing 3.4% of the worlds' population (United Nations, 2017). In addition, global forced migration is at its highest ever with over 70 million people forcibly displaced from their homes in 2018 (UNHCR, 2019). Around two-thirds of immigrants live in high-income countries, with one in eight being children under 18 years old (Unicef, 2016; United Nations, 2017). Migration and child health are closely linked (Fellmeth et al., 2018). Mounting evidence suggests that children from immigrant backgrounds are at higher risk of experiencing poor health outcomes (Curtis, Thompson, & Fairbrother, 2018; Jaeger, Hossain, Kiss, & Zimmerman, 2012). For example, a systematic review showed that immigrant children in Switzerland had a 40% higher risk of hospitalization due to neonatal illness than their native-born peers, despite universal health coverage (Jaeger et al., 2012). These differential health outcomes are unjust, economically wasteful, and preventable (Diaz et al., 2017). The 2030 Agenda for Sustainable Development recognizes that coherent and comprehensive responses from all governments are necessary to reduce health inequities, including those experienced by immigrant families (Nations, 2015).

One of the likely contributors to health inequities arising for immigrant children is differential access to health services (Renton, Hamblin, & Clements, 2016). All children have the right to access health services that enable them to lead a healthy and fulfilling life (Buchner-Eveleigh, 2016). However, national and international research suggests different patterns of health service utilization between immigrant and native-born families (Curtis et al., 2018; Jaeger et al., 2012; Markkula et al., 2018; Ou, Chen, & Hillman, 2010; Warren, 2017). A recent systematic review of 107 studies – mostly from North America and Europe – found that patterns of child health service use differed by family immigration history, with immigrant children accessing less primary healthcare (e.g., general access to care/having a usual source of care, oral health) than non-migrant children, but more tertiary healthcare (e.g., emergency ward use, hospitalization) (Markkula et al., 2018).

These differences likely reflect unmet needs for primary healthcare, which represents the difference between health services needed and health services actually received (Carr & Wolfe, 1976). While some small Australian studies are suggestive of higher unmet healthcare needs for people from migrant and refugee backgrounds (Paxton, Smith, Win, Mulholland, &

Hood, 2011), little is known about unmet healthcare needs for children. Comprehensive data on children's unmet healthcare needs are also lacking internationally. Most available evidence is drawn from the US, which has fundamental differences to the Australian healthcare system and that of other developed countries such as the UK (Mossialos, Djordjevic, Osborn, & Sarnak, 2017). In addition, existing studies typically use cross-sectional data, which capture just one point in time, and only focus on unmet needs for primary healthcare (Kan, Choi, & Davis, 2016; Kuo et al., 2014; Miller, Nugent, Gaboda, & Russell, 2013; Toppelberg, Hollinshead, Collins, & Nieto-Castañon, 2013).

Compared with native-born families, immigrant families generally face greater barriers to health service utilization in both high-income and low-and-middle-income countries (Mossialos et al., 2017). The health literacy environment, defined as 'the infrastructure, policies, processes, materials, people, and relationships that make up the health system', is a major contributor to the uptake and use of health service for all families, particularly immigrant families (Australian Commission on Safety and Quality in Health Care, 2014; Riggs, Yelland, Duell-Piening, & Brown, 2016). There are both general and immigrant-specific factors that have direct and indirect effects on health service utilization for immigrant families (Yang & Hwang, 2016). For instance, medical institutions are not immune to stereotypes or prejudices prevalent in the general community and direct and indirect forms of discrimination in healthcare have been well documented (World Health Organization, 2017a). Health providers with limited experience and training in trauma-informed care are less likely to provide effective and high-quality care for immigrant and refugee families who have stressful and complex trauma experiences, which in turn can lead to the underutilization of health services (Wylie et al., 2018). Other contributing factors outside of the direct health service experience include differential access to stable housing, employment, and educational opportunities, all of which can impact on individuals' engagement with the healthcare system (Markkula et al., 2018).

The degree to which differential health service use and unmet healthcare needs arise for immigrant children may vary across countries and jurisdictions with different immigration policies and healthcare system structures (Curtis et al., 2018; Markkula et al., 2018). Australia has historically had a high level of immigration, and immigrant children constitute almost a third of all children aged 0-17 years (Katz & Redmond, 2010). According to the 2016 Australian Census (Australian Institute of Health and Welfare, 2018), almost half of all

Australians (45%) were either born overseas or have at least one parent who was born overseas, and one in five Australians speaks a language other than English at home. The focus of Australia's immigration policies has changed over time, with a current policy prioritizing new migrants with high employability in the labour market. Australia has two formal programs in place to facilitate the arrival of permanent migrants - the Migration Program (offers 190,000 places per year) for skilled and family entrants and the Humanitarian Program (offers 18,750 places per year; around 6.9% of all immigrants) for refugees and those in refugee-like situations (Productivity Commission, 2016). All migrants who have applied or been accepted for permanent residency have the right to access the Australian universal healthcare system funding medical, pharmaceutical, and healthcare for all residents (i.e., Medicare) (Australian Institute of Health and Welfare, 2018).

While the number of immigrant families in Australia is high and growing, information about patterns of health service use for children from Australian immigrant families is currently limited, compared with most other Organization for Economic Co-operation and Development (OECD) countries (Curtis et al., 2018; Jaeger et al., 2012; Kuo et al., 2014). Available data suggest that Australian children from immigrant families appear to have a better health status than those in other high-income countries (e.g., UK and USA) (Washbrook, Waldfogel, Bradbury, Corak, & Ghanghro, 2012). However, this overall picture could mask underlying variation. Families with fewer socioeconomic resources and/or who face more marginalization and discrimination in society are more likely to experience obstacles to accessing needed health services (Newacheck, Hughes, Hung, Wong, & Stoddard, 2000; World Health Organization, 2017a). Even within a universal healthcare system, Australian data show that children from lower socioeconomic status families receive less government Medicare spending (Dalziel, Huang, Hiscock, & Clarke, 2018). In contrast, others may have fewer healthcare needs or access barriers because they come from other English-speaking countries, have more available socioeconomic resources, and/or all family members are in good enough health to relocate (i.e., 'healthy migrant effect', which refers to the sometimes better health of the migrant population than native-born people in a new country of settlement (Jatrana, Richardson, & Pasupuleti, 2018)). In addition, the extent to which differences in health service use reflect unmet needs for these services has also yet to be quantified.

Despite the Australian population becoming increasingly diverse (Productivity Commission, 2016), the extent to which the current healthcare system meets the needs of children from immigrant families is poorly understood. The present study aims to fill this gap and describe patterns of health service utilization and unmet healthcare needs for immigrant children in Australia, and how this varies according to the primary language spoken, taken as a proxy for the likelihood of experiencing discrimination and related barriers to healthcare access (Zanchetta & Poureslami, 2006). We draw on data from the Longitudinal Study of Australian Children (LSAC) (Soloff, Lawrence, & Johnstone, 2005), a nationally representative sample that includes data on family immigration background, children's health needs, and a wide spectrum of health service use.

# METHODS

## Data source

The LSAC commenced in 2004 and recruited 5107 infants (B-cohort) and 4983 four-year-olds (K-cohort). The detailed design and sampling methodology of LSAC have been documented elsewhere (Soloff et al., 2005). In summary, a two-stage clustered design was used to select the sample, first selecting 311 postcodes across Australia and then selecting proportional numbers of children within each postcode by state of residence and urban versus rural status.

The current study draws on data from both the B-cohort (51.2% male) and the K-cohort (50.1% male), focusing on parent-reported family characteristics collected at baseline and health service use and health problems reported when children were 10-11 years. At 10-11 years, we expected to capture persistent differences in service use and unmet healthcare needs, rather than those arising in the immediate aftermath of the transition to a new country. In addition, this age was when adolescents became more independent healthcare consumers (Ghaddar, Valerio, Garcia, & Hansen, 2012). Attrition over waves has been gradual; by 10-11 years, the retained B-cohort sample (N=3764) and retained K-cohort (N=4169) represented 73.7% and 83.7% of the original cohorts respectively.

## Measures

Measures were the same in the B- and K-cohort of LSAC, except where specified. Responses were gained from the child's primary caregiver; in most cases (99.7%), this was the child's

biological mother. Interviews were conducted with interpreters when respondents spoke a language other than English.

**Family immigration background**

Family immigration history was determined at the baseline wave (B-cohort: 0-1 years, K-cohort: 4-5 years) by the mother's and father's country of birth (native-born/foreign-born). In the K-cohort, an additional indicator of the child's country of birth was used. Families were categorized as 'immigrant families' if at least one parent and/or child were born outside of Australia. The term 'immigrant families' used herein refers to families where either parent immigrated, but not necessarily the children themselves. All other families were categorized as 'Australian-born families'.

To explore variation in health service use patterns within immigrant families, we further categorized families according to the primary language spoken, presumed to correlate with the likelihood of experiencing barriers to healthcare (Zanchetta & Poureslami, 2006). Immigrant families where either parent and/or child mainly spoke a language other than English at home were categorized as 'non-English-speaking immigrant families', while all others were categorized as 'English-speaking immigrant families'.

**Child health service use**

Parents reported whether their child used nine types of health services (general practitioner (GP), pediatrician, dental service, guidance counsellor, mental health service, speech therapy, emergency ward, hospital outpatient, and hospitalization) in the last 12 months, with a binary response option (yes/no) for each service. An overall indicator of health service use (yes/no) was also derived to represent the use of any of these services.

**Unmet healthcare needs**

Indicators of unmet healthcare needs were generated as the difference need for health services (i.e., whether the child had any health problems) and whether each type of health service (and any health service overall) was received. Children were first coded as having health problems if their parents reported that the child had any of the following: chronic health condition/s (yes/no), special healthcare need/s (yes/no), and/or borderline or abnormal mental health symptoms on the Strengths and Difficulties Questionnaire at age 10-11 (concurrent to service use) (Coombs, 2005). For those with any health problems, children

were coded as having "unmet healthcare needs" if they did not access health services. Unmet healthcare needs (yes/no) were derived in reference to each specific service (e.g., GP) and any health service overall.

**Sociodemographic characteristics**

Sociodemographic data at baseline included child's sex (female/male), maternal age at birth (years), parents' English proficiency (very good/not very good), year of arrival in Australia for parents (≤10 years/>10 years), family living in the home (two parents/lone parent), geographic region of residence (urban/regional/remote) and family socioeconomic position (SEP), which was measured as a composite of each parent's annual income, highest education, and occupation level (Blakemore, Strazdins, & Gibbings, 2009), and dichotomized as the bottom 25% (low SEP) versus the top 75% (high SEP).

## Analytic approach

All analyses were conducted using Stata V.15.1 (StataCorp, 2017). Sociodemographic characteristics of the sample were described using descriptive analyses, both overall and according to family immigration background (i.e., three groups of families: Australian-born families, English-speaking immigrant families, and non-English-speaking immigrant families).

The prevalence of health service use was first examined according to family immigration background. Multivariable logistic regression models were then run to calculate odds ratios with 95% confidence intervals for each type of health service use and overall. Two sets of models were performed to estimate: 1) the unadjusted association between family immigration background and the use of each service type, and 2) this association adjusted for child's sex, maternal age at birth, family living in the home, family SEP and geographic region of residence.

Similarly, the prevalence of unmet healthcare needs was examined and multivariable logistic regression models were conducted to investigate the association between family immigration background and unmet healthcare needs, both unadjusted and adjusted for child's sex, maternal age at birth, family living in the home, family SEP and geographic region of residence.

The analyzed sample herein consisted of all children who had data on family immigration background and health service use: N=3373 for the B-cohort and N=3567 for K-cohort. Within the analysis sample, missing data on all other study variables ranged from 0 to 3.1% (Appendix Table 1). Given low percentages of missing values, results from complete data are reported, taking into account survey weights and clustering by postcodes to adjust for non-response and sample attrition (Norton & Monahan, 2015).

# RESULTS

## Socio-demographic characteristics of immigrant families

Approximately one-third of Australian children (B-cohort 29.0%; K-cohort 33.4%) came from immigrant families (Table 1). The main countries of birth for parents born overseas were New Zealand and the UK. In the K-cohort, a small number of children (n=94; 2.7%) were born overseas, again mainly in the UK and New Zealand. Almost three quarters (B-cohort 70.9%; K-cohort 77.2%) of immigrant parents had lived in Australia for over 10 years.

For immigrant families, around one third (B-cohort 31.8%; K-cohort 34.7%) spoke a language other than English at home. The main languages spoken in immigrant families included Arabic (13.1%-17.3%), Vietnamese (9.8-11.7%), Italian (5.5-7.7%), Cantonese (4.9-5.7%), and Greek (4.4-5.5%). Of those immigrant families who spoke a language other than English at home, a quarter (B-cohort 25.1%; K-cohort 26.2%) had lower levels of English proficiency.

Overall, immigrant families had similar levels of socioeconomic disadvantage to Australian-born families. However, this differed by the primary language spoken: around one in five children from English-speaking immigrant families had low SEP (B-cohort 18.9%; K-cohort 18.7%), whereas nearly one in three of those from non-English-speaking immigrant families had low SEP (B-cohort 31.2%; K-cohort 32.3%).

## Health service use according to family immigration background

Most Australian children (B-cohort 89.9%; K-cohort 87.8%) had used at least one type of health service in the past 12 months. Generally, a lower proportion of children from non-

English-speaking immigrant families had accessed a health service, as compared to children from either English-speaking immigrant or Australian-born families (Table 2).

There was little difference in health service utilization between children from Australian-born families and those from immigrant families overall (Appendix Table 2). However, when differentiating immigrant families according to the primary language spoken, clear patterns emerged. Compared to those from Australian-born and English-speaking immigrant families, children from non-English-speaking immigrant families had lower odds of using health services in both the B-cohort and K-cohort (Figure 1): approximately 50% lower for services from pediatricians, 30% lower for dental services, 55% lower for mental health services, and 40% lower for emergency wards. In the K-cohort only, associations were also observed with higher use of hospital outpatient services (OR 1.69, 95% CI 1.20-2.39), and lower use of guidance counsellors (OR 0.33, 95% CI 0.16-0.66).

## Unmet healthcare needs among those with health problems

Overall, a small proportion of Australian children with health problems (B-cohort 3.9%; K-cohort 8.3%) had unmet healthcare needs (Table 3). Similarly, a higher proportion of unmet healthcare needs was observed for children from non-English-speaking immigrant families. For example, the proportion of unmet healthcare needs from a pediatrician in the B-cohort was 88.9% for non-English-speaking immigrant families, but 75.6% for Australian-born families and 75.9% for English-speaking immigrant families.

Compared to those from Australian-born and English-speaking immigrant families, children from non-English-speaking immigrant families had higher odds of unmet healthcare needs (Figure 2): around 2.5 times for pediatricians in both the B- and K-cohort; 2.8 times for emergency wards in the B-cohort; 3.8 times for overall health service use in the B-cohort; and five times for guidance counsellors in the K-cohort (Appendix Table 3).

# DISCUSSION

This study provides nationally representative Australian data on the patterning of child health service utilization and unmet healthcare needs by family immigration background. We found similar patterns of health service use and unmet healthcare needs for children from Australian-born and English-speaking immigrant families. However, children from non-

English-speaking immigrant families used fewer health services than their Australian-born and English-speaking immigrant peers, including pediatric, dental, mental health, and emergency ward services. Consistent with this, children from non-English-speaking immigrant families appeared to have higher levels of unmet healthcare needs.

The similar patterns of health service use and unmet healthcare needs between Australian-born and English-speaking immigrant families align with previous data (Washbrook et al., 2012), showing that Australian children from English-speaking immigrant families had similar health status and needs with their native-born peers. One possible explanation for our findings is that a large proportion of Australian immigrants come from European countries where healthcare systems are similar to Australia's (e.g., public insurance for basic coverage, GPs as gatekeepers for secondary care) (Australian Institute of Health and Welfare, 2018; Mossialos et al., 2017). In addition, these families have fewer requirements from the healthcare system or face fewer structural barriers to access health services than non-English-speaking families. For instance, whether professional medical interpreters are available or not will not affect their access to healthcare (Karliner, Jacobs, Chen, & Mutha, 2007).

While similar service use was observed between Australian-born and English-speaking immigrant families, we found that children from non-English-speaking immigrant families had lower health service use compared to those from Australian-born and English-speaking immigrant families, especially in secondary and tertiary services. These findings are consistent with national and international research in countries like the USA, where children in non-English-speaking families were less likely to have doctor contact and other outpatient healthcare utilization (Markkula et al., 2018; Warren, 2018; Yu, Huang, Schwalberg, & Nyman, 2006). Child health services from pediatricians, dentists, and mental health providers mainly belong to secondary healthcare in Australia and are often referred by a GP (Mossialos et al., 2017). This means that gaining access to these services requires families to navigate across different types of health professionals, which may be particularly demanding for immigrant families if, for example, adequate language and interpretation services are not provided (Australian Commission on Safety and Quality in Health Care, 2014). We also observed lower use of emergency wards, which differs from previous international research showing greater use of emergency wards for children from immigrant families in countries such as Germany, Norway, and the USA (Markkula et al., 2018). One possible reason is the different health systems and healthcare funding programs across countries (Ou et al., 2010).

Another reason could be the high proportion of immigrant families having dissatisfaction with emergency department service in Australia, as previous research suggested non-English-speaking families were less satisfied with emergency department service and likely to leave emergency departments before medical assessment (Fry, Thompson, & Chan, 2004; Mahmoud, Hou, Chu, Clark, & Eley, 2014). Overall the differences in health service utilization we found here were more pervasive across service types than those observed in the international context.

Our findings further suggest that children from non-English-speaking immigrant families have higher unmet healthcare needs. This aligns with the US data from the 2011 National Survey of Children's Health (Kan et al., 2016), showing that migrant children (foreign-born versus native-born) were more likely to experience unmet needs for primary health services. On the other hand, another US study using the 2005-06 and 2009-10 National Survey of Children with Special Healthcare Needs found that the primary language spoken at home (English versus other) was not associated with unmet healthcare needs (Kuo et al., 2014). Part of the reasons for this inconsistency in previous findings may be the different indicators used to capture family immigration background. Previous studies did not take into account both family immigration history and language backgrounds as exposure (Kan et al., 2016; Kuo et al., 2014), which may underestimate the effect of immigration on health needs. Our study extends on this existing evidence by considering both main language spoken at home and family immigration background for unmet healthcare needs of Australian children, suggesting that the potential for unmet healthcare needs across the intersections of these groups should be further explored.

While we cannot know the causes and processes behind these differential patterns of health service use and unmet healthcare needs, previous research suggests a range of barriers may occur during the healthcare engagement process that could potentially contribute to the patterns of results observed here and may reflect opportunities for system improvement (Ahmed et al., 2016). For instance, healthcare professionals' attitudes and behaviours (e.g., implicit biases, communication barriers, and cultural misunderstandings) can exacerbate disparities regarding access to healthcare for immigrant families (Drewniak, Krones, & Wild, 2017). When there are no professional interpreters available, immigrant families are less likely to utilize clinical services like hospital admissions, diagnostic tests, and emergency

department visits (Karliner et al., 2007). Despite the universal health coverage in Australia, private health insurance remains a crucial determinant that affects families' access to secondary or tertiary healthcare (Ou et al., 2010; Warren, 2018). Research also suggests that healthcare disparities between Australian-born and immigrant families could be substantially reduced when cultural competence is embedded as a core value in healthcare settings (Fong, 2004; Taylor & Lurie, 2004).

## Strengths and limitations

This study used nationally representative Australian data from nearly 10,000 children recruited at birth (B cohort) and at 4-5 years (K cohort) when the children were aged 10-11 years old. The large sample size allows for stratification by primary language spoken and increases the generalizability of our findings. However, there are also limitations to consider in the interpretation of these findings. First, we classified all Australian families into three subgroups, based on the available data. We were not able to further differentiate groups of families with specific immigration experiences such as skilled migrants versus those with refugee backgrounds, 1st or 2nd generation immigrants, or families who have immigrated from specific countries (e.g., UK, USA, China). It should, therefore, be acknowledged that these groups are heterogeneous and we are unable to specifically comment on the role of these additional factors from the current data, highlighting an important area for future research. Large sample sizes will be required to undertake such work, allowing sufficient cell sizes to also disaggregate the data by these and other factors, like immigration history of each specific family member, that could impact health service access and use (Kan et al., 2016; Yu, Huang, & Kogan, 2008). Second, our samples are representative of 0-1 year-olds and 4-5 year-olds in Australia in 2004, which may not reflect the full diversity of immigration experiences in all Australian 10-11-year-olds in 2010 (K-cohort) or 2014 (B-cohort), and so findings from this study may not generalize to the experiences of current waves of recent immigrant families and emerging communities arriving in Australia. Third, health service use was reported by parents which could be influenced by memory and recall bias (Althubaiti, 2016). Similarly, children's unmet healthcare needs were derived from indicators of any health conditions/needs against each type of health service use, and parent-report children's health conditions can be influenced by factors such as social stigma (e.g., for mental illness, which can be more common in migrant families from specific regions like South-East Asia (Minas et al., 2013)). Also, due to the lack of specific data in LSAC, it was not possible to

align specific health conditions with the required service type. We therefore examined how children with any health conditions used each type of service. More granular data would be valuable in investigating specific unmet healthcare needs associated with specific conditions in future research. Finally, further investigation is warranted to integrate indicators of quality and satisfaction of health service use for immigrant families to support an effective, coordinated, and culturally appropriate healthcare system.

## Implications

Even within Australia's universal healthcare system (Australian Institute of Health and Welfare, 2018), we found variation in health service use and unmet needs particularly for secondary (e.g., pediatrician, mental health service, guidance counsellor) and tertiary care (e.g., emergency ward), though not for primary care (i.e., GPs). This is concerning because a failure to meet healthcare needs could result in more short-and-longer term health problems for children from immigrant and in particular non-English speaking immigrant families, thus contributing to inequities in distal health outcomes (e.g., morbidity, mortality, and quality of life) (Mendoza, 2009). Those health service inequities arising in childhood need political attention and should be considered from a social determinants perspective that recognizes the social structural determinants of health that are embedded in the cultural knowledge, values, and attitudes of specific cultural groups (Commission on Social Determinants of Health, 2008; Zanchetta & Poureslami, 2006). Immigrant ethnic culture shapes the experience and expression of health problems, coping strategies, pathways to care and the effectiveness of treatment and prevention (Yang & Hwang, 2016). Within a social determinants framework, there are opportunities that could help move towards a further understanding of these experiences by immigrant families and enable services and policies to respond adequately. Furthermore, there is also a need for community involvement (e.g., community awareness of migrant health needs) as well as joint actions and coherent public policy responses by multisector collaborations between the health sector and other sectors such as social, educational, and welfare systems to address these inequities in health service use (World Health Organization, 2017b, 2018).

Australia's population has become more culturally and linguistically diverse over time (Australian Institute of Health and Welfare, 2018), and the healthcare system, therefore, needs to reorient to effectively respond to the needs of all children including those with

different cultural and immigration backgrounds (Australian Commission on Safety and Quality in Health Care, 2014). Of note, those from migrant and refugee backgrounds are likely to be included in the group of families from non-English-speaking immigrant backgrounds, and previous research suggests that families with refugee backgrounds experienced poorer general health and poorer mental health than Australian-born families (Giallo et al., 2017). Given little evidence is available on their health service use and unmet healthcare needs, there is a need for future research to fill this gap and support the needs of this specific group. Further research is also needed to explore possible structural barriers and enablers to accessing secondary or tertiary care so that we can understand opportunities for the healthcare system to promote optimal outcomes for immigrant families. The concept of health literacy may provide a useful framework for considering these opportunities, as recommended by the Australian Commission on Safety and Quality in Health Care (Australian Commission on Safety and Quality in Health Care, 2014). For example, the organizational health literacy responsiveness framework can be used as a toolkit to identify strengths and limitations of a health organization in response to health service barriers for those from different social and cultural backgrounds (Trezona, Dodson, & Osborne, 2017). This framework has seven domains (access to services, community engagement, communication practices, workforce, leadership and culture, external policy and funding environment, systems and policies) describing how healthcare systems can make health information and support available and accessible to people from all backgrounds, including immigrant families. Factors outside of the immediate healthcare environment also need to be considered, such as legal and regulatory frameworks that limit immigrants' right to healthcare (Suphanchaimat, Kantamaturapoj, Putthasri, & Prakongsai, 2015; Volandes & Paasche-Orlow, 2007). Further research may also consider using statistical techniques such as causal mediation analysis to examine factors (e.g., individual health literacy, social connections, and resilient health systems) that mediate the relationship between immigration and health service use, in order to identify possible policy levers for future early intervention programs.

## CONCLUSION

We found evidence of differential health service use and unmet healthcare needs between children from immigrant and Australian-born families. The associations between immigration and child health service use and unmet healthcare needs differ by the specific type of child health service. Results suggest that children from non-English-speaking immigrant families

face more barriers when using health services. This is concerning because it is likely to perpetuate health inequities for these children into the future. Further effort is needed to ensure that the healthcare system meets the needs of all children and their families, including those from diverse cultural and language backgrounds.

## REFERENCES


Ahmed, S., Shommu, N. S., Rumana, N., Barron, G. R., Wicklum, S., & Turin, T. C. (2016). Barriers to access of primary healthcare by immigrant populations in Canada: a literature review. Journal of immigrant and minority health, 18(6), 1522-1540. https://doi.org/10.1007/s10903-015-0276-z

Althubaiti, A. (2016). Information bias in health research: definition, pitfalls, and adjustment methods. Journal of multidisciplinary healthcare, 9, 211-217. doi:10.2147/JMDH.S104807

Australian Commission on Safety and Quality in Health Care. (2014). Health Literacy National Statement. Sydney: Australian Commission on Safety and Quality in Health Care.

Australian Institute of Health and Welfare. (2018). Australia's health 2018. Australia's health series no. 16. AUS 221. (AUS 221). Canberra: AIHW.

Blakemore, T., Strazdins, L., & Gibbings, J. (2009). Measuring family socioeconomic position. Australian Social Policy, 8, 121-168.

Buchner-Eveleigh, M. (2016). Children's rights of access to health care services and to basic health care services: a critical analysis of case law, legislation and policy. De Jure, 49(2), 307-325. http://dx.doi.org/10.17159/2225-7160/2016/v49n2a6

Carr, W., & Wolfe, S. (1976). Unmet needs as sociomedical indicators. International Journal of Health Services, 6(3), 417-430. https://doi.org/10.2190/MCG0-UH8D-0AG8-VFNU

Commission on Social Determinants of Health. (2008). Closing the gap in a generation: Health equity through action on the social determinants of health. Final Report of the Commission on Social Determinants of Health. Geneva: WHO.

Coombs, T. (2005). Australian Mental Health Outcomes and Classification Network: Strengths and Difficulties Questionnaire: Training Manual. Parramatta, NSW, Australia: NSW Institute of Psychiatry and Australian Mental Health Outcomes and Classification Network.

Curtis, P., Thompson, J., & Fairbrother, H. (2018). Migrant children within Europe: a systematic review of children's perspectives on their health experiences. Public health. https://doi.org/10.1016/j.puhe.2018.01.038

Dalziel, K. M., Huang, L., Hiscock, H., & Clarke, P. M. (2018). Born equal? The distribution of government Medicare spending for children. Social science & medicine, 208, 50-54. https://doi.org/10.1016/j.socscimed.2018.04.037

Diaz, E., Ortiz-Barreda, G., Ben-Shlomo, Y., Holdsworth, M., Salami, B., Rammohan, A., . . . Krafft, T. (2017). Interventions to improve immigrant health. A scoping review. Eur J Public Health, 27(3), 433-439. https://doi.org/10.1093/eurpub/ckx001

Drewniak, D., Krones, T., & Wild, V. (2017). Do attitudes and behavior of health care professionals exacerbate health care disparities among immigrant and ethnic minority groups? An integrative literature review. International Journal of Nursing Studies, 70, 89-98. https://doi.org/10.1016/j.ijnurstu.2017.02.015

Fellmeth, G., Rose-Clarke, K., Zhao, C., Busert, L. K., Zheng, Y., Massazza, A., . . . Lertgrai, W. (2018). Health impacts of parental migration on left-behind children and adolescents: a systematic review and meta-analysis. The Lancet, 392(10164), 2567-2582. https://doi.org/10.1016/S0140-6736(18)32558-3

Fong, R. (2004). Culturally competent practice with immigrant and refugee children and families: Guilford Press.

Fry, M., Thompson, J., & Chan, A. (2004). Patients regularly leave emergency departments before medical assessment: a study of did not wait patients, medical profile and outcome characteristics. Australian Emergency Nursing Journal, 6(2), 21-26. https://doi.org/10.1016/S1328-2743(04)80111-1

Ghaddar, S. F., Valerio, M. A., Garcia, C. M., & Hansen, L. (2012). Adolescent health literacy: the importance of credible sources for online health information. Journal of School Health, 82(1), 28-36. https://doi.org/10.1111/j.1746-1561.2011.00664.x

Giallo, R., Riggs, E., Lynch, C., Vanpraag, D., Yelland, J., Szwarc, J., . . . Brown, S. J. J. B. o. (2017). The physical and mental health problems of refugee and migrant fathers: findings from an Australian population-based study of children and their families. BMJ open, 7(11), 1-12. http://dx.doi.org/10.1136/bmjopen-2016-015603

Jaeger, F. N., Hossain, M., Kiss, L., & Zimmerman, C. (2012). The health of migrant children in Switzerland. International journal of public health, 57(4), 659-671. https://doi.org/10.1007/s00038-012-0375-8

Jatrana, S., Richardson, K., & Pasupuleti, S. S. R. (2018). Investigating the dynamics of migration and health in Australia: a longitudinal study. European Journal of Population, 34(4), 519-565. https://doi.org/10.1007/s10680-017-9439-z

Kan, K., Choi, H., & Davis, M. (2016). Immigrant families, children with special health care needs, and the medical home. Pediatrics, 137(1), e20153221. https://doi.org/10.1542/peds.2015-3221

Karliner, L. S., Jacobs, E. A., Chen, A. H., & Mutha, S. (2007). Do professional interpreters improve clinical care for patients with limited English proficiency? A systematic review of the literature. Health services research, 42(2), 727-754. https://doi.org/10.1111/j.1475-6773.2006.00629.x

Katz, I., & Redmond, G. (2010). Review of the circumstances among children in immigrant families in Australia. Child Indicators Research, 3(4), 439-458. https://doi.org/10.1007/s12187-010-9069-z

Kuo, D. Z., Goudie, A., Cohen, E., Houtrow, A., Agrawal, R., Carle, A. C., & Wells, N. (2014). Inequities in health care needs for children with medical complexity. Health affairs, 33(12), 2190-2198. https://doi.org/10.1377/hlthaff.2014.0273

Mahmoud, I., Hou, X. Y., Chu, K., Clark, M., & Eley, R. (2014). Satisfaction with emergency department service among non-English-speaking background patients. Emergency Medicine Australasia, 26(3), 256-261. https://doi.org/10.1111/1742-6723.12214

Markkula, N., Cabieses, B., Lehti, V., Uphoff, E., Astorga, S., & Stutzin, F. (2018). Use of health services among international migrant children - a systematic review. Global Health, 14(1), 52. https://doi.org/10.1186/s12992-018-0370-9

Mendoza, F. S. (2009). Health disparities and children in immigrant families: a research agenda. Pediatrics, 124(Supplement 3), S187-S195. https://doi.org/10.1542/peds.2009-1100F

Miller, J. E., Nugent, C. N., Gaboda, D., & Russell, L. B. (2013). Reasons for unmet need for child and family health services among children with special health care needs with and without medical homes. PLoS One, 8(12), e82570. doi: 10.1371/journal.pone.0082570

Minas, H., Kakuma, R., Too, L. S., Vayani, H., Orapeleng, S., Prasad-Ildes, R., . . . Oehm, D. (2013). Mental health research and evaluation in multicultural Australia: developing a culture of inclusion. International journal of mental health systems, 7(1), 23-23. doi:10.1186/1752-4458-7-23

Mossialos, E., Djordjevic, A., Osborn, R., & Sarnak, D. (2017). International profiles of health care systems 2017: Australia, Canada, China, Denmark, England, France,

Germany, India, Israel, Italy, Japan, the Netherlands, New Zealand, Norway, Singapore, Sweden, Switzerland, Taiwan, and the United States.

Newacheck, P. W., Hughes, D. C., Hung, Y.-Y., Wong, S., & Stoddard, J. J. (2000). The unmet health needs of America's children. Pediatrics, 105(Supplement 3), 989-997.

Norton, A., & Monahan, K. (2015). LSAC Technical paper No. 15. Wave 6 Weighting and Non-Response. Melbourne, Australia: Australian Bureau of Statistics.

Ou, L., Chen, J., & Hillman, K. (2010). Health services utilisation disparities between English speaking and non-English speaking background Australian infants. BMC public health, 10(1), 182. https://doi.org/10.1186/1471-2458-10-182

Paxton, G., Smith, N., Win, A., Mulholland, N., & Hood, S. (2011). Refugee status report: A report on how refugee children and young people in Victoria are faring. Department of Education and Early Childhood Development: Victorian Government, 135.

Productivity Commission. (2016). Migrant Intake into Australia. Inquiry Report No. 77. Canberra, Australia: Productivity Commission.

Renton, Z., Hamblin, E., & Clements, K. (2016). Delivering the Healthy Child Programme for young refugee and migrant children. *National Children's Bureau*.

Riggs, E., Yelland, J., Duell-Piening, P., & Brown, S. J. (2016). Improving health literacy in refugee populations. Med J Aust, 204(1), 9-10. https://doi.org/10.5694/mja15.01112

Soloff, C., Lawrence, D., & Johnstone, R. (2005). LSAC Technical paper No. 1. Sample design. Melbourne, Australia: Australian Institute of Family Studies.

StataCorp. (2017). Stata Statistical Software: Release 15. College Station, TX: StataCorp LLC.

Suphanchaimat, R., Kantamaturapoj, K., Putthasri, W., & Prakongsai, P. (2015). Challenges in the provision of healthcare services for migrants: a systematic review through providers' lens. BMC health services research, 15(1), 390. https://doi.org/10.1186/s12913-015-1065-z

Taylor, S. L., & Lurie, N. (2004). The role of culturally competent communication in reducing ethnic and racial healthcare disparities. The American journal of managed care, 10, SP1-4. https://doi.org/10.13016/jysr-kkt7

Toppelberg, C. O., Hollinshead, M. O., Collins, B. A., & Nieto-Castañon, A. J. S. m. h. (2013). Cross-sectional study of unmet mental health need in 5-to 7-year old Latino children in the United States: do teachers and parents make a difference in service utilization? School mental health, 5(2), 59-69. https://doi.org/10.1007/s12310-012-9089-6

Trezona, A., Dodson, S., & Osborne, R. H. (2017). Development of the organisational health literacy responsiveness (Org-HLR) framework in collaboration with health and social services professionals. BMC health services research, 17(1), 513. https://doi.org/10.1186/s12913-017-2465-z

UNHCR. (2019). Global Trends in Forced Displacement in 2018. Geneva, Switzerland: UNHCR.

Unicef. (2016). Uprooted: The growing crisis for refugee and migrant children. UN.

United Nations. (2017). International Migration Report 2017: Highlights. New York: United Nations.

United Nations General Assembly (2015). Transforming our world: The 2030 agenda for sustainable development. Resolution adopted by the General Assembly.

Volandes, A. E., & Paasche-Orlow, M. K. (2007). Health literacy, health inequality and a just healthcare system. The American Journal of Bioethics, 7(11), 5-10. https://doi.org/10.1080/15265160701638520

Warren, D. (2017). *Children's use of health* care services. Melbourne, Australia: Australian Institute of Families Studies.

Warren, D. (2018). LSAC Annual Statistical Report 2017. Chapter 12. Children's use of health care services. Melbourne, Australia: Australian Institute of Families Studies.

Washbrook, E., Waldfogel, J., Bradbury, B., Corak, M., & Ghanghro, A. A. (2012). The development of young children of immigrants in Australia, Canada, the United Kingdom, and the United States. Child development, 83(5), 1591-1607. https://doi.org/10.1111/j.1467-8624.2012.01796.x

World Health Organization. (2017a). Joint United Nations statement on ending discrimination in health care settings. Geneva, Switzerland: WHO.

World Health Organization. (2017b). Promoting the health of refugees and migrants. Framework of priorities and guiding principles to promote the health of refugees and migrants. Geneva, Switzerland: WHO.

World Health Organization. (2018). Health of refugees and migrants. Practices in addressing the health needs of refugees and migrants. New Delhi, India: WHO.

Wylie, L., Van Meyel, R., Harder, H., Sukhera, J., Luc, C., Ganjavi, H., . . . Wardrop, N. (2018). Assessing trauma in a transcultural context: challenges in mental health care with immigrants and refugees. Public Health Reviews, 39, 22. https://doi.org/10.1186/s40985-018-0102-y

Yang, P. Q., & Hwang, S. H. (2016). Explaining immigrant health service utilization: a theoretical framework. Sage Open. https://doi.org/10.1177/2158244016648137

Yu, S. M., Huang, Z. J., & Kogan, M. D. J. A. J. o. P. H. (2008). State-level health care access and use among children in US immigrant families. American Journal of Public Health, 98(11), 1996-2003. https://doi.org/10.2105/AJPH.2007.117911

Yu, S. M., Huang, Z. J., Schwalberg, R. H., & Nyman, R. M. (2006). Parental English proficiency and children's health services access. American Journal of Public Health, 96(8), 1449-1455. https://doi.org/10.2105/AJPH.2005.069500

Zanchetta, M. S., & Poureslami, I. M. (2006). Health literacy within the reality of immigrants' culture and language. Canadian Journal of Public Health/Revue Canadienne de Sante'e Publique, S26-S30.

# TABELS

**Table 1.** Participants' characteristics by family immigration background.

| | Australian-born families, n (%) | | Immigrant families, n (%) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | English-speaking | | Non-English-speaking | | Overall | |
| | B-cohort | K-cohort | B-cohort | K-cohort | B-cohort | K-cohort | B-cohort | K-cohort |
| **Full sample** | 2394 (71.0) | 2375 (66.6) | 668 (19.8) | 779 (21.8) | 311 (9.2) | 413 (11.6) | 979 (29.0) | 1192 (33.4) |
| **Child's sex** | | | | | | | | |
| Female | 1168 (48.8) | 1146 (48.3) | 325 (48.7) | 403 (51.7) | 152 (48.9) | 196 (47.5) | 477 (48.7) | 599 (50.3) |
| Male | 1226 (51.2) | 1229 (51.8) | 343 (51.4) | 376 (48.3) | 159 (51.1) | 217 (52.5) | 502 (51.3) | 593 (49.8) |
| **Maternal age at birth** (Mean ±SD) | 31.4±4.9 | 30.7±4.9 | 33.3±4.6 | 32.5±4.9 | 32.3±5.2 | 31.9±5.6 | 32.9±4.8 | 32.3±5.1 |
| **Parents' English proficiency** | | | | | | | | |
| Very good | 2393 (99.96) | 2373 (99.96) | 668 (100.0) | 777 (99.7) | 230 (74.9) | 302 (73.8) | 898 (92.1) | 1079 (90.8) |
| Not very good | 1 (0.04) | 1 (0.04) | 0 | 2 (0.3) | 77 (25.1) | 107 (26.2) | 77 (7.9) | 109 (9.2) |
| **Parents' year of arrival in Australia** | | | | | | | | |
| >10 years | - | - | 479 (74.6) | 610 (81.7) | 194 (63.2) | 283 (69.0) | 673 (70.9) | 893 (77.2) |
| ≤10 years | - | - | 163 (25.4) | 137 (18.3) | 113 (36.8) | 127 (31.0) | 276 (29.1) | 264 (22.8) |
| **Family living in the home** | | | | | | | | |
| Two parents | 2393 (100.0) | 2375 (100.0) | 668 (100.0) | 776 (99.6) | 298 (95.8) | 394 (95.4) | 966 (98.7) | 1170 (98.2) |
| One parent | 1 (0.01) | 0 | 0 | 3 (0.4) | 13 (4.2) | 19 (4.6) | 13 (1.3) | 22 (1.9) |
| **Family socioeconomic position** | | | | | | | | |
| Top 75% | 1770 (74.1) | 1761 (74.2) | 542 (81.1) | 633 (81.3) | 212 (68.8) | 279 (67.7) | 754 (77.3) | 912 (76.6) |
| Bottom 25% | 620 (25.9) | 612 (25.8) | 126 (18.9) | 146 (18.7) | 96 (31.2) | 133 (32.3) | 222 (22.8) | 279 (23.4) |
| **Geographic region of residence** | | | | | | | | |
| Urban | 1395 (58.5) | 1339 (56.5) | 517 (77.4) | 598 (76.8) | 282 (90.7) | 369 (89.6) | 799 (81.6) | 967 (81.2) |
| Regional | 594 (24.9) | 572 (24.1) | 91 (13.6) | 109 (14.0) | 16 (5.1) | 18 (4.4) | 107 (10.9) | 127 (10.7) |
| Remote | 397 (16.6) | 459 (19.4) | 60 (9.0) | 72 (9.2) | 13 (4.2) | 25 (6.1) | 73 (7.5) | 97 (8.2) |
| **Child with medical conditions** | | | | | | | | |
| No | 1728 (72.6) | 1661 (70.4) | 503 (75.6) | 577 (74.5) | 215 (72.6) | 292 (72.6) | 718 (74.7) | 869 (73.8) |
| Yes | 651 (27.4) | 697 (29.6) | 162 (24.4) | 198 (25.6) | 81 (27.4) | 110 (27.4) | 243 (25.3) | 308 (26.2) |

SD: standard deviation.

**Table 2.** Proportion of children using health services at 10-11 years by family immigration background.

| Health service use | Full sample, n (%) | Australian-born families, n (%) | Immigrant families, n (%) | | |
|---|---|---|---|---|---|
| | | | Overall | English-speaking | Non-English-speaking |
| **B-cohort** | | | | | |
| General practitioner | 2222 (65.9) | 1581 (66.0) | 641 (65.5) | 439 (65.7) | 202 (65.0) |
| Pediatrician | 268 (8.0) | 204 (8.5) | 64 (6.5) | 51 (7.6) | 13 (4.2) |
| Dental service | 2279 (67.6) | 1623 (67.8) | 656 (67.0) | 466 (69.8) | 190 (61.1) |
| Guidance counselor | 171 (5.1) | 133 (5.6) | 38 (3.9) | 29 (4.3) | 9 (2.9) |
| Mental health service | 222 (6.6) | 172 (7.2) | 50 (5.1) | 40 (6.0) | 10 (3.2) |
| Speech therapy | 119 (3.5) | 93 (3.9) | 26 (2.7) | 17 (2.5) | 9 (2.9) |
| Emergency ward | 544 (16.1) | 403 (16.8) | 141 (14.4) | 104 (15.6) | 37 (11.9) |
| Hospital outpatient | 209 (6.2) | 151 (6.3) | 58 (5.9) | 42 (6.3) | 16 (5.1) |
| Hospitalization | 151 (4.5) | 107 (4.5) | 44 (4.5) | 28 (4.2) | 16 (5.1) |
| Any of the above | 3031 (89.9) | 2163 (90.4) | 868 (88.7) | 597 (89.4) | 271 (87.1) |
| **K-cohort** | | | | | |
| General practitioner | 2201 (61.7) | 1470 (61.9) | 731 (61.3) | 472 (60.6) | 259 (62.7) |
| Pediatrician | 221 (6.2) | 163 (6.9) | 58 (4.9) | 41 (5.3) | 17 (4.1) |
| Dental service | 2364 (66.3) | 1583 (66.7) | 781 (65.5) | 539 (69.2) | 242 (58.6) |
| Guidance counselor | 168 (4.7) | 118 (5.0) | 50 (4.2) | 39 (5.0) | 11 (2.7) |
| Mental health service | 158 (4.4) | 117 (4.9) | 41 (3.4) | 31 (4.0) | 10 (2.4) |
| Speech therapy | 99 (2.8) | 65 (2.7) | 34 (2.9) | 21 (2.7) | 13 (3.2) |
| Emergency ward | 495 (13.9) | 339 (14.3) | 156 (13.1) | 119 (15.3) | 37 (9.0) |
| Hospital outpatient | 193 (5.4) | 117 (4.9) | 76 (6.4) | 58 (7.5) | 18 (4.4) |
| Hospitalization | 148 (4.2) | 99 (4.2) | 49 (4.1) | 33 (4.2) | 16 (3.9) |
| Any of the above | 3132 (87.8) | 2091 (88.0) | 1041 (87.3) | 688 (88.3) | 353 (85.5) |

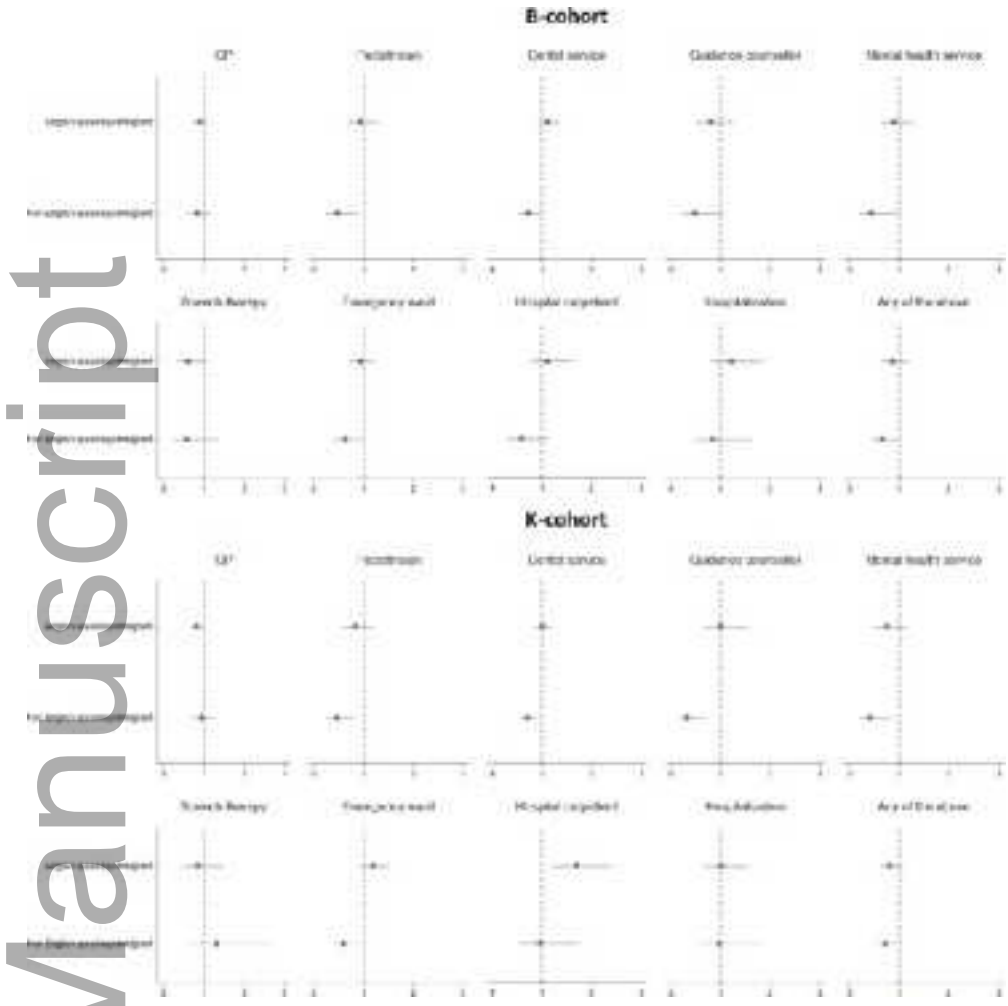
**Table 3.** Proportion of children with unmet healthcare needs at 10-11 years by family immigration background.

| Unmet healthcare needs | Full sample, n (%) | Australian-born families, n (%) | Immigrant families, n (%) | | |
|---|---|---|---|---|---|
| | | | Overall | English-speaking | Non-English-speaking |
| **B-cohort** | | | | | |
| General practitioner | 180 (20.1) | 130 (20.0) | 50 (20.6) | 28 (17.3) | 22 (27.2) |
| Pediatrician | 687 (76.9) | 492 (75.6) | 195 (80.3) | 123 (75.9) | 72 (88.9) |
| Dental service | 304 (34.0) | 221 (34.0) | 83 (34.2) | 48 (29.6) | 35 (43.2) |
| Guidance counselor | 802 (89.7) | 573 (88.0) | 229 (94.2) | 153 (94.4) | 76 (93.8) |
| Mental health service | 738 (82.6) | 530 (81.4) | 208 (85.6) | 136 (84.0) | 72 (88.9) |
| Speech therapy | 808 (90.4) | 585 (89.9) | 223 (91.8) | 148 (91.4) | 75 (92.6) |
| Emergency ward | 710 (79.4) | 507 (77.9) | 203 (83.5) | 131 (80.9) | 72 (88.9) |
| Hospital outpatient | 790 (88.4) | 579 (88.9) | 211 (86.8) | 137 (84.6) | 74 (91.4) |
| Hospitalization | 825 (92.3) | 604 (92.8) | 221 (91.0) | 148 (91.4) | 73 (90.1) |
| Any of the above | 35 (3.9) | 20 (3.1) | 15 (6.2) | 6 (3.7) | 9 (11.1) |
| **K-cohort** | | | | | |
| General practitioner | 290 (28.9) | 206 (29.6) | 84 (27.3) | 60 (30.3) | 24 (21.8) |
| Pediatrician | 837 (83.3) | 571 (81.9) | 266 (86.4) | 168 (84.9) | 98 (89.1) |
| Dental service | 363 (36.1) | 250 (35.9) | 113 (36.7) | 68 (34.3) | 45 (40.9) |
| Guidance counselor | 916 (91.1) | 630 (90.4) | 286 (92.9) | 181 (91.4) | 105 (95.5) |
| Mental health service | 897 (89.3) | 616 (88.4) | 281 (91.2) | 176 (88.9) | 105 (95.5) |
| Speech therapy | 949 (94.4) | 663 (95.1) | 286 (92.9) | 183 (92.4) | 103 (93.6) |
| Emergency ward | 833 (82.9) | 581 (83.4) | 252 (81.8) | 156 (78.8) | 96 (87.3) |
| Hospital outpatient | 902 (89.8) | 630 (90.4) | 272 (88.3) | 171 (86.4) | 101 (91.8) |
| Hospitalization | 933 (92.8) | 646 (92.7) | 287 (93.2) | 183 (92.4) | 104 (94.6) |
| Any of the above | 83 (8.3) | 59 (8.5) | 24 (7.8) | 15 (7.6) | 9 (8.2) |

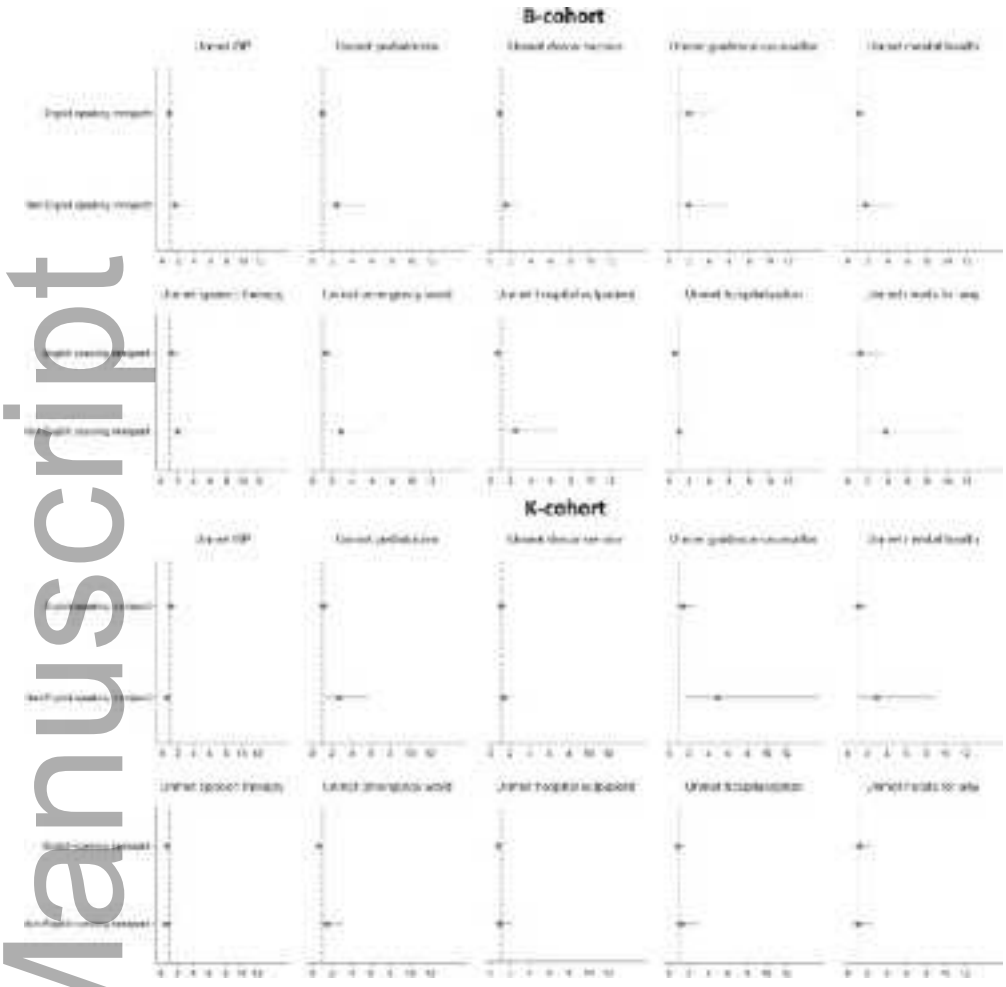
## FIGURES

**Figure 1.** Odds of using health services at 10-11 years according to family immigration background. Estimates are odds ratios with 95% confidence intervals, adjusted for child's sex, maternal age at birth, family living in the home, family socioeconomic position and geographic region of residence. Children from Australian-born families are the reference group to which others are compared; dotted line represents reference category (1).

**Figure 2.** Odds of having unmet healthcare needs at 10-11 years according to family immigration background. Estimates show odds ratios with 95% confidence intervals, adjusted for child's sex, maternal age at birth, family living in the home, family socioeconomic position and geographic region of residence. Children from Australian-born families are the reference group to which others are compared; dotted line represents reference category (1).




hsc_13054_f1.png




hsc_13054_f2.png