
Jesse KOKAUA,1 Seini JENSEN,2 Reremoana THEODORE,3 Nicholas BOWDEN,4 Russell BLAKELOCK,5 Debra SORENSEN,6 Wilmason JENSEN,7 Rosalina RICHARDS8

ABSTRACT:

Aim: The aims of this paper are to quantify the impact of parental education on the five-year incidence of mental health conditions (MHC) in Pacific young people and to investigate the influence of other factors.

Method: The analyses in this paper used data extracted from Aotearoa/New Zealand’s Integrated Data Infrastructure (IDI). Data relating to 383,595 young people (48,768 Pacific), identified in the 2013 Census, aged 12-24 years, and their parents’ were used. Logistic regression models were used to investigate the incidence of children with MHC from 2013-2018.

Results: Mental health conditions were identified in one of five Pacific young people. Irrespective of ethnicity, increased parental education was associated with decreased MHC. However, the association was only significant for those in specialist mental health care (OR=0.897, 95%CI:0.881-0.913) but not for those seen in other health settings (OR=0.989, 95%CI:0.974-1.004). The association, for specialist settings, was not mediated by the contribution of other factors (OR=0.941, 95%CI:0.926-0.958). However, increased parents education with the addition of social, cultural and economic advantages the number of Pacific children seen in the specialist mental health setting could be nearly halved.

Conclusion: The findings show that a parental educational advantage exists for children who access specialist mental health care. However, there are more complex but far greater opportunities for the health of Pacific families if a coordinated education, housing, employment and health solution were possible. The gains from a multi-disciplinary Pacific solution exist in terms of reduced severity for and level of care to Pacific children with MHC.

Key words: Ethnicity, Mental Health, Parental Education, Population data

BACKGROUND

New Zealand’s Pasifika Education Plan 2013-2017 characterises successful Pasifika learners as vibrant, dynamic, secure and confident in their identities, languages and cultures, across all curriculum areas.1 Such a vision of educational success implies that benefits of education extend beyond career aspirations to support better social or health outcomes for individuals and their families. The subsequent and current 10-year action plan2 for Pacific education aspires to respond to the needs and expectations of diverse communities or ethnic groups within Pasifika, guided by four key values: reciprocity; diversity; commitment; and collective action.

Corresponding author: Jesse Kokaua
jesse.kokaua@otago.ac.nz
1. Research Fellow, Centre for Pacific Health, Va’a O Tautai, Division of Health Sciences, University of Otago, Dunedin, New Zealand (NZ)
2. Director of Performance & Evaluation, Pasifika Futures Limited, Auckland, NZ
3. Co-Director, National Centre for Lifecourse Research, University of Otago, Dunedin, NZ
4. Big Data Theme, A Better Start National Science Challenge, Women and Children’s Health, Dunedin School of Medicine, University of Otago, PO Box 56, Dunedin, NZ
5. Specialist psychiatrist, Canterbury District Health Board, Christchurch, NZ
6. Chief Executive Officer, Pasifika Futures Limited, Auckland, NZ
7. Deputy Chief Executive, Pasifika Futures Limited, Auckland, NZ
8. Centre for Pacific Health, Va’a O Tautai, Division of Health Sciences, University of Otago, Dunedin, NZ
These values are reflected strongly in the priority areas, which address diversity, challenging racism and discrimination, and improving the established pedagogies to respond to the needs of Pacific children and young people.

The current Pacific Education Action Plan acknowledges its contribution to the nation’s strategy for the wellbeing of children and young people with particular focus on diverse Pacific communities.4 The plan has prioritised initiatives to mitigate the effects of poverty and socioeconomic hardship with a determined intent to address social inequalities and key determinants of health and wellbeing, including racism and discrimination. Other studies have documented Pacific peoples’ socio-economic status and related poorer health.4 None have sought to understand what factors contribute to improved Pacific health and socio-economic wellbeing nor how they interact. For education, this means exploring intergenerational associations with health among Pacific peoples and starting to unpack how this works and impacts. This includes considering the pathways that Pacific families have available to them to support health gains - how these might be maximised or whether there are alternative ways to access these benefits.

Given the literature that suggests achievement in higher education is related to better health,5 it is not surprising that Pacific children from families with educated parents may also display these patterns. Internationally, evidence suggests that children of parents with few qualifications are less likely to attain higher qualifications and also less likely to rate their health positively. International studies have presented strong evidence that parental education is protective for many health conditions.6,9,11-19 This is inclusive of mental health conditions, where there is an associations between parental education and their children’s mental health diagnoses and issues,8,9,20-22 as well as neurodevelopmental conditions like autism and Attention-deficit/hyperactivity disorder (ADHD).12 Conversely, a systematic review showed that less parental education had a stronger impact on their children's and adolescent's mental health than unemployment or occupation.21

A large study from the United States of parents of children under 18 years showed significant parental advantage for their child’s overall health but not for their socio-emotional domain, difficulty with emotions or getting along with others.23 Another study of DSM-IV disorders in children in the United States confirmed no association between parental education and any prevalence of disorder.24 However, they found that higher parental education was associated with reduced persistence and severity of disorder.

Studies have found that the association between parental educational status and improved physical and psychological wellbeing changed with the age of their children.25,26 Other studies have noted that parents’ education had a stronger influence than household income, and both were the strong contributors to their children’s mental health, compared to other factors like employment, sole parenting, or nationality. 27

To date there are few studies that have explored the value of education for Pacific parents to their child’s health or whether that value is consistent across different Pacific groups. One longitudinal study of Pacific children in Aotearoa found a strong association between parental education and childhood depression.8,9 While, a study linked parental and child administration data in Aotearoa showed potentially avoidable hospitalisations of Pacific children displayed a clear parental educational advantage.11

This paper is an output from Meitaki te Api'i: A study of the benefits of education to health outcomes for Pacific families in Aotearoa.28 Its focus is on mental health conditions (MHC) in Pacific young people using data from the Aotearoa integrated data infrastructure (IDI).29 The main aims for this paper are: (H1) to identify any parental education advantage to the five-year incidence of MHC in Pacific and other young people; (H2) to investigate if other factors mediate or moderate parental education advantage to their children’s MHC; (H3) to see how other factors influence MHC beyond parental education.

METHODS

Participants
This paper, part of the Meitaki te Api'i study of the influence of education on Pacific families, includes young people aged from 12 to 24 years in 2013, and their parents, restricted to those who filed a Census return. The data used are described in full in a publication of the study.
protocol for Meitaki te Api’i. This study uses data from linked datasets in the IDI for children who met the inclusion criteria, and their parents. These include ethnicity from personal details, the 2013 census, and relevant health datasets as indicated below.

The IDI reflects the whole population in Aotearoa. By focusing on the 2013 Census population, this study is using a snapshot of the total Aotearoa population at that point in time. Thus, establishing a baseline for parents education and other covariate characteristics and allows for a 5 year follow up period to observe mental health outcomes. In 2013, more than 1.2 million children and young people, under 25 years of age, were identified from the census of that year (Figure 1). From that group, 334,827 non Māori-non Pacific (NMNP) and 48,768 Pacific children between 12 and 24 years of age met the criteria for inclusion in this study. Of the latter, 12,375 Pacific children were identified with lower parental education, social, cultural and economic supports than other families in the study.

**Measures**

**Ethnicity:** Ethnicity for children in the study has been categorised in the personal details table of the IDI that includes an ID number, gender, birthdates and links to parents ID numbers. The personal details set also include six main ethnic groups, including Pacific or Pasifika, collated from multiple sources of data in the IDI. In this study we have used the terms Pacific and Pasifika interchangeably to refer to those descended from peoples indigenous to Pacific nations. Pacific children in the study represent a non-prioritised cohort of children who identified with any Pacific ethnicity, irrespective of any other group co-identified with. This approach will allow us to get a complete picture of Pacific children that will benefit other under-represented groups beyond those in this study. For comparison purposes, those who were neither Pacific nor Māori were assigned to a composite non Māori-non Pacific (NMNP) group.

We have excluded Māori except for those, included in the Pacific cohort, who are Pacific and Māori. As indigenous peoples, Māori command a unique position in Aotearoa and are deserving of independent research. However, their shared heritage with peoples from the Pacific, yet their very different colonisation experience in Aotearoa, means their presence in a comparison non-Pacific cohort would introduce systematic bias to many characteristics inherent in Pasifika.

**Mental health conditions (MHC):** Mental health cases were identified in the Meitaki O Te Api cohort using the method devised by E Tipu Rea: A Better Start National Science Challenge Big Data team. A mental health case identification method based on service use, designed to identify clinically meaningful cases of MHCs among children and young people minimising false positives. The method utilised available datasets that identified MHC such as psychotic, mood, anxiety, and substance use disorders. The specific datasets were Programme for integration of Mental Health Data (PRIMHD, specialty mental health services), national minimum dataset (NMDS, hospital admissions), pharmaceutical collection (PHARMS, medication dispensing) and national needs assessment and service coordination information (Socrates). In the present study, we have divided our analyses into three high level categories: any MHC, MHC identified via specialist mental health settings (PRIMHD only), MPH identified in other “community” settings (PHARMS, Socrates, NMDS).

**Years of parental education:** Parental education is represented by the highest maternal and paternal qualifications gained that were recorded in the 2013 Census. Aotearoa and international qualifications were acknowledged, however, international qualifications were translated to New Zealand equivalent qualifications. The years of each parent’s education were estimated by calculating the standard number of years’ study required to attain their highest educational qualification. The average parental years studied was obtained by dividing their combined years of education by number of parents for each child.

**Other covariate factors:** Other variables available in the IDI considered to influence a child’s health are parent’s birthplace/migration status, languages spoken in the home, parents smoking status, employment and home ownership. Factors associated with families included household income, church membership, numbers of adult and child household occupants and a measure of local area deprivation (NZDep2013). Household income was equivalised to reflect the total income for the household that a child lives in, adjusted to reflect the number of people living in their home. A separate study protocol for this study reports a breakdown of the study cohort by the variables used.
Statistical Models
This paper investigates the influence of education of parents upon the mental health outcomes for their children. The outcomes in this study are indicated with binary variables over a five-year period from 2013-2018. These were summarised by frequencies and crude rates with chi-squared tests for unadjusted ethnic differences. To investigate data over the five-year period starting from 2013, the year of the previous Census, logistic regression models were applied to each outcome. Thus, two models were used:

- a baseline model of parental education with age and sex of the child to establish a baseline association between parental education and mental health;
- Adjusted, other covariate variables were included to examine the influence of variables included in the previous section.

The adjusted model was used to predict marginal proportions of Pacific children with MHC for each year of parental education. Finally, the model was used to predict, in a cohort of children with few education, cultural, and socio-economic supports, how many children would be seen with MHC in two health settings.

All analyses were run in the IDI Datalab environment using SAS.

Ethical Approval
This study uses anonymised data in the IDI which fall outside the scope of the national Health and Disability Ethics committee (HDEC). Ethics approval for the study was obtained through the University of Otago ethics committee (HD18/042). In addition, a Tivaivai research framework, applied to Pacific health research using the IDI in Aotearoa. This framework has been developed to clearly link the study to Pacific research values.

RESULTS
Comparisons of 5-year cumulative incidence of MHC
In 2013, there were around 383,595 children and young people (48,768 (13%) Pacific), aged between 12 and 24 years of age, who met the criteria for inclusion in this study (Table 1). Small but significant ethnic differences were found in the incidence of overall MHC in Pacific and non-Maori, non-Pacific (NMNP) children in the five years following the 2013 census (p<0.0001), affecting around one in five Pacific and NMNP children. Nearly half of children's MHC were seen in a specialist mental health setting (10% of Pacific children, 9% of NMNP children).
Projected percentages of Pacific children with MHC shows slight ethnic differences in the gradients across years of parent’s educational qualification (Figure 2). The difference between children with MHC seen in a specialist mental health setting, at the two ends of the parental

Table 1: Five-year cumulative incidence of MHC by child’s ethnicity.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Pacific</th>
<th>NMNP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>N</td>
<td></td>
</tr>
<tr>
<td><strong>Any MH Problem</strong></td>
<td>n (%)</td>
<td></td>
</tr>
<tr>
<td><strong>Specialist MH Setting</strong></td>
<td>n (%)</td>
<td></td>
</tr>
<tr>
<td><strong>Other Health Setting</strong></td>
<td>n (%)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Pacific</th>
<th>NMNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>48,768</td>
<td>334,827</td>
</tr>
<tr>
<td>10,164 (20.8%)</td>
<td></td>
<td>65,880 (19.7%)</td>
</tr>
<tr>
<td>4,893 (10%)</td>
<td></td>
<td>28,605 (8.5%)</td>
</tr>
<tr>
<td>6,672 (13.7%)</td>
<td></td>
<td>46,524 (13.9%)</td>
</tr>
<tr>
<td>1.6 (0.2002)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Chi squared (χ²) tests and p-values for a difference between ethnic groups.*

education spectrum show a reduction in incidence of between 50% and 65% for NMNP and Pacific respectively. In contrast, there is little or no increase observed for MHC in other health settings. Peculiarly, for specialist mental health, if Pacific children shared the socio-demographic patterns of NMNP, their incidence increased. In contrast to their actual number shown in Table 1.

A single year of education for parents of Pacific and NMNP young people yields a 5% reduction in the odds of any MHC (Table 2). As shown in Figure 2, the gradients for specialist mental health settings were much steeper than other health settings, 13% and 10% reductions to Pacific and NMNP young people respectively. Other covariate factors, attributed for 43% and 72% of odds of any advantage from parents education to MHC in specialist settings for Pacific and NMNP young people, respectively. After adjusting for all covariates, Pacific young people reported a 6% and NMNP a 3% reduction in odds of specialist MHC for every additional year of their parent’s education.

No significant associations were found between education for parents of Pacific young people and their unadjusted odds of MHC in other health settings. NMNP alone had a significant unadjusted gradient, other factors attributed fully for parental education advantage (PEA) in other settings.

Overall, in five years from 2013, 10,164 Pacific children were identified with at least one MHC, 4,893, in specialist settings and 6,672 in other settings. Of those, 1,683 and 1,716, respectively, were from 12,375 Pacific families living in areas of high socio-economic deprivation and with at least one parent without a qualification higher than school. Adjusted regression model results predicted the numbers of children from those families if different combinations contributing risk factors were no longer an issue.

Figure 3 summarises the hypothetical numbers of Pacific children who, if nothing else changed for those children, increasing their parents education, to both parents with at least a school qualification, would prevent 357 (21%) children seen in specialist and 84 (5%) in other settings. For mental health specialist services, addressing social and cultural barriers as well as education would reduce by half the MHC for children in families with few advantages.

Social and cultural factors outweigh economic barriers, the latter preventing as much as a further 237 (14%) of Pacific young people seen in mental health specialist services. Education and, social and cultural factors, by comparison, reduce 225 (13%) of community MHC, from other health settings. Improved economic status increased Pacific child’s use of community MHC in families with low economic advantages and little influence on their incidence of specialist care. If all factors were addressed for Pacific children from families with least means and support, as much as half of MHC in specialist services could be avoided with a minimal decrease and possibly an overall increase in community MHC.

**DISCUSSION**

Given the need to find holistic approaches to support wellbeing among Pacific families, this study offers a unique opportunity to explore the potential positive impact of parental education on a number of child health outcomes, while taking into account a range of contributing other family, social and economic factors. Measuring health outcomes for children is difficult even without considering the complexities of Pacific concepts of health, which incorporate multiple domains. This paper investigated the influence of parental education to their children’s outcomes of *Tu manako* (mental wellbeing) and (family or parents) and *Aorangi* (household and geographic socio-economic status).
It is important to note that MHC are not a definitive indicator of mental ill health in Pacific children as these conditions have been identified by interactions through government funded health related interventions. Two contexts of mental health care have been investigated in this paper, children identified in specialist mental health settings and those identified in other community settings. The former is more likely to represent more severe diagnosed mental illness in recent treatment in mental health services.

**Figure 2**: Five-year incidence of MHC by years of parental education by ethnicity of child.

![Graph showing incidence of MHC by years of parental education by ethnicity of child.]

**Table 2**: Odds ratios for Parental educational influence on children's MHC by child's ethnicity.

<table>
<thead>
<tr>
<th></th>
<th>Pacific</th>
<th>NMNP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>48768</td>
<td>334827</td>
</tr>
<tr>
<td><strong>Any MH Problem</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline OR (CIW)</td>
<td>0.948(0.013)***</td>
<td>0.948(0.004)***</td>
</tr>
<tr>
<td>Adjusted OR (CIW)</td>
<td>0.966(0.013)***</td>
<td>0.985(0.005)***</td>
</tr>
<tr>
<td>%attr</td>
<td>35.6%</td>
<td>70.8%</td>
</tr>
<tr>
<td><strong>Specialist MH Setting</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline OR (CIW)</td>
<td>0.897(0.016)***</td>
<td>0.901(0.006)***</td>
</tr>
<tr>
<td>Adjusted OR (CIW)</td>
<td>0.941(0.017)***</td>
<td>0.972(0.007)***</td>
</tr>
<tr>
<td>%attr</td>
<td>42.8%</td>
<td>71.7%</td>
</tr>
<tr>
<td><strong>Other Health Setting</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline OR (CIW)</td>
<td>0.989(0.015)ns</td>
<td>0.977(0.005)***</td>
</tr>
<tr>
<td>Adjusted OR (CIW)</td>
<td>0.987(0.016)ns</td>
<td>0.995(0.006)ns</td>
</tr>
<tr>
<td>%attr</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*CIW* reports the width of one side of the 95% confidence interval for the odds ratio. %attr is the proportional reduction in baseline odds ratio by introducing other covariates to the regression models. ***An odds ratio is significantly different from parity with a p-val<0.001, "ns" is not significant.*
Figure 3: Predicted numbers of children from families with little socio-economic support and at least one MHC with different cultural, social and economic scenarios.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Baseline: Estimated number of young people from families without any of the support below</th>
<th>1683 in MH specialist settings</th>
<th>1716 in other health settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>If differences in parents education were removed</td>
<td></td>
<td>1326 (21%)</td>
<td>1632 (5%)</td>
</tr>
<tr>
<td>If barriers for older and/or single parents were removed and household smoking eliminated</td>
<td></td>
<td>1020 (39%)</td>
<td>1569 (9%)</td>
</tr>
<tr>
<td>If barriers for parents from other countries or different language abilities were removed</td>
<td></td>
<td>1104 (34%)</td>
<td>1551 (10%)</td>
</tr>
<tr>
<td>If social and cultural barriers were removed</td>
<td></td>
<td>843 (50%)</td>
<td>1491 (13%)</td>
</tr>
<tr>
<td>If parents owned their homes, were employed with increased wages and deprivation inequalities were removed</td>
<td></td>
<td>924 (45%)</td>
<td>1656 (3%)</td>
</tr>
</tbody>
</table>

**Parental education and MHC in Pacific young people**

The first part of the overall aims of this paper was to quantify the impact of parental education on the five-year incidence of MHC. The findings show that parental education advantage exists for the incidence of overall MHC in young Pacific people (H1), but that advantage extended only to specialist identified MHC and not to those identified in other community settings. A key finding from this study is a modest reduction in MHC incidence in specialist settings (i.e. more severe cases), for each additional year of parent's education. These findings are somewhat supported by previous research evidence that also suggest that parent's education was protective of their children's diagnosed mental illness. They also are reflective of another study's findings that parental education was not associated with overall prevalence of mental disorders but with severity.

**Influence of other factors on MHC in Pacific children**

Overall, there is a clear advantage to the mental health of Pacific young people from their parents’ education. However, that advantage is perhaps less about the avoiding the condition, but more about influencing the severity of their condition and the setting at which a young person with a mental health problem is cared for. Studies have shown that children of better-educated mothers are more likely to receive medical or dental care than other children, regardless of the family’s income. Whether by increased health literacy or other means, the influence of parental education would appear to extend beyond improved economic position or other factors. Pacific peoples in Aotearoa are currently over-represented in many poorer outcomes related to socio-economic, health and educational status.

In the past decade there has been a growing recognition, within the education sector, that current programmes may not meet the needs of Pacific learners and new and innovative approaches are being developed to support Pacific learners in primary, secondary and tertiary education.
influence of parental education particularly for specialist MHC. However, for specialist MHC, parental education remained significantly advantageous.

Our findings support the approach taken by the Child and Youth Wellbeing Strategy in that they suggest multi-sectoral approaches that, if addressed, will optimise the influence of increased parental education advantage. If nothing else changed for those Pacific children in families with the greatest need, increasing their parents’ education would result in 28% of children being seen in settings other than in specialist mental health care. While some care must be taken with interpreting the findings, however, there appear to be opportunities to prevent many Pacific young people, with serious mental disorders, from requiring specialist mental health treatment, if inter-sectoral approaches could address cultural and social barriers. Such as, successfully engaging parents who have difficulties communicating in English as well as Pacific families with single parents, older Pacific parents, or parents not born in Aotearoa.

These findings have many implications for promoting education as an investment to family health irrespective of ethnicity. Nevertheless, in spite of education sector initiatives, challenges still exist for Pacific young people to engage with learning institutions with implications for education institutions to engage with continuing education for young parents who may have disconnected from an education pathway. In addition, a more complex but far greater opportunity to the health of Pacific families is available. While we have to be careful about advocating for one setting over another for the care of MHC, our findings suggest that, potentially, as many as four out of five MHC in specialist mental health settings could be prevented if education, social, cultural and economic support could be addressed. This finding highlights the importance of such service configurations as those promoted by the Whanau Ora Pasifika programmes that seek to address Pacific family wellbeing across multiple domains. The gains from a multi-disciplinary Pacific solutions exist in terms of reduced severity for and level of care to Pacific children with MHC.

Strengths and weaknesses of the study
The findings of this paper are part of a wider study of the benefits of education to health outcomes for Pacific families in Aotearoa. Its findings are hoped to inform Pasifika communities in terms of health and education with the intent to produce better outcomes for Pasifika families.21 Models of Pacific health emphasise the need for inclusive views of life, success and wellbeing. This study has adopted a Tivaivai research framework and applied it to quantitative methodologies to incorporate Pacific values and community practices in the analyses and presentation of its results. To that end, this paper is a product of a study design with Pacific communities at its core, upholds Pacific leadership, respect of cultural values, researcher development and is part of a wider process of reciprocity and seeking Pacific led solutions.

For this study, strengths of using the IDI include: it uses population data providing increased statistic power; it has more consistent ethnicity data from multiple sources, which is an improvement over using ethnicity captured in any single data collections; it enables researchers to look at Pacific sub-ethnic groups; it uses a method of identifying the MHC outcomes captured across a range of service areas. However, the mental health case identification method is yet to be fully validated and is based on service utilisation. Therefore, it is likely to identify more severe MHC and therefore undercount the true community prevalence of MHC. This study is a reflection of patterns of MHC in Pacific children prior to 2019. The 2020 COVID-19 pandemic will influence the collections of data as well as mental illness in Aotearoa.

Two factors, not included in this study, that have been suggested reduce the influence of parental education were parental morbidity and children’s own education.18 Additionally, in contrast to one study that suggested better-educated parents with better access to healthcare in studies using administrative health data may inflate education and income advantage on health conditions.4 In this study, the omission of privately funded hospitalisations is more likely to potentially lead to an under-estimation of the impact of people with high socio-economic status. Affluent parts of the population, with private insurance, may have greater access to private hospital services.

The statistical models displayed modest performance. The models Hosmer-Lemshov statistic was below the threshold of what is considered having acceptable predictive strength but their patterns still hold valid ability to draw some important conclusions.

CONCLUSION
The findings above show that, in spite of some ethnic differences, a parental educational advantage, in terms of a reduction in severe MHC, exists for Pacific children who access specialist
mental health care. That remained significant even taking into account the contribution by other factors. There are many implications for promoting education as an investment to family health irrespective of ethnicity. However, a more complex but far greater opportunity to the health of Pacific families is available if a coordinated education, housing, employment and health, solution were possible. The gains from a multi-disciplinary Pacific solution exist in terms of reduced severity for and level of care to Pacific children with MHC.

Statistics New Zealand Disclaimer
These results are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI) which is carefully managed by Stats NZ. For more information about the IDI please visit https://www.stats.govt.nz/integrated-data/.

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Competing interests:
There were no potential conflicts of interest known to exist for any of us. Neither PMA nor any funding agency had any role in the design of the study, analyses, interpretation of the results or in the preparation, review or approval of the manuscript.

Author contributions:
All authors have contributed to the idea, and discussion. JK and NB contributed to the methodological sections relating to the IDI. All authors contributed to the drafting of the article and reviewing significant content and all have approved the final version to be published.

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