

COHORT PROFILE

Cohort Profile: The Pacific Islands Families (PIF) Study

Janis Paterson,^{1*} Teuila Percival,² Philip Schluter,^{1,3} Gerhard Sundborn,¹ Max Abbott,¹ Sarnia Carter,¹ Esther Cowley-Malcolm,¹ Jim Borrows,¹ Wanzhen Gao¹ and the PIF Study Group[†]

Accepted 31 July 2007

How did the study come about?

In New Zealand, the Pacific population (those resident with a Pacific Islands heritage) is one of the fastest growing population subgroups and on census night, 7 March 2006, numbered 265 974 usual residents or 6.6% of the total population.¹ Auckland is the preferred region of domicile.² Samoans constitute the largest group (50%), followed by Cook Island Maori (23%), Tongan (18%), Niuean (9%), Fijian (3%), Tokelauan (3%) and Tuvalu Islanders (1%).² This ethnic diversity is manifest in differing cultures, languages, and differential access to and utilization of education, health and social services. Pacific people are over-represented in many adverse health and social statistics^{2–4} leading to higher rates of communicable and non-communicable disease,^{2,4,5} hospitalization^{3,4,6} and death.² Yet, prior to this study, there was relatively little culturally specific information on which to base efficacious coordinated public health interventions for this ethnic group.⁷

The Pacific Islands Families (PIF) Study, a birth cohort study, was developed through a process of collaboration with Pacific communities, researchers, and relevant health and social agencies to provide this much needed information. At inception, the PIF study

had two directors, Dr Janis Paterson and Dr Colin Tukuitonga, a number of Pacific and non-Pacific investigators, and a team of Pacific field staff. An independent Pacific People's Advisory Board, composed of community representatives, was established to guide the directors and the management team in the scientific and cultural directions of the research. The Plunket Society (a not-for-profit society with clinical staff and volunteer network, and the largest provider of services to support the health and development of children under five⁸) also worked closely with the PIF research team.

Grants were awarded from the Foundation for Research, Science and Technology (FRST) in 1998 and the Health Research Council (HRC) in 1999 to undertake a pilot study that enabled instruments, recruitment and interview procedures to be tested and refined. The main study commenced in 2000 and has been principally funded from FRST, with supplementary studies funded by multiple national and regional agencies. To date, the study has received approximately NZD\$4.42 million in funding.

What does it cover?

The PIF study design is multi-disciplined, broad-based and inclusive—capturing information from mothers, fathers and children. General aims of the PIF study are to: (i) identify and characterize those individuals and families experiencing both positive and negative health outcomes; (ii) understand the mechanisms and processes shaping the pathways to those outcomes and (iii) make empirically based strategic and tactical recommendations to improve the wellbeing of Pacific children and families and thereby benefit New Zealand society as a whole. Specific aims of the PIF Study have been previously described in detail within a cost-free electronically available design and methodology paper (see: <http://www.nzma.org.nz/journal/119-1228/1814/content.pdf>).⁹

¹ Faculty of Health and Environmental Sciences, AUT University, Auckland, New Zealand.

² Kidz First Children's Hospital and Community Service, Auckland, New Zealand.

³ School of Nursing, University of Queensland, Brisbane, Australia.

* Corresponding author. Faculty of Health & Environmental Sciences, AUT University, Private Bag 92006, Auckland 1142, New Zealand. E-mail: janis.paterson@aut.ac.nz

[†] The PIF study group includes past members, Phil Silva, Colin Tukuitonga, Michael Feehan, Maynard Williams, Lynne Giles and present members, Junior Tutagalevao, Leon Iuistini, Jeremy Williams and Elaine Rush.

Who is in the sample?

The target index population was eligible Pacific Island infants delivered at Middlemore Hospital (a large tertiary hospital), South Auckland, between March 15 and December 17, 2000 and who were alive at the 6-week postpartum interview. An infant was defined to be of Pacific Islands ethnicity if at least one parent identified themselves as being of that ethnicity, and eligible if at least one parent was a permanent resident of New Zealand. The cohort was recruited from Middlemore Hospital because its maternity division has the largest number of Pacific births in New Zealand (Figure 1).

In instances where children were adopted, fostered or were primarily cared for by persons other than one or both biological parents (such as grandparents, aunts or new partners) then these adults were recruited into the study rather than the absent biological parent(s). However, instances where a child lives with a mother who has a new partner but the biological father has regular ongoing contact with the child (such as alternate week or weekend care), then the biological father was included in the study rather than the new partner—and vice versa for children living with their fathers. For ease of exposition, all adult females shall be labelled 'mothers' and all adult males labelled 'fathers' hereafter.

Presentation of study information to mothers and an assessment of potential eligibility were undertaken

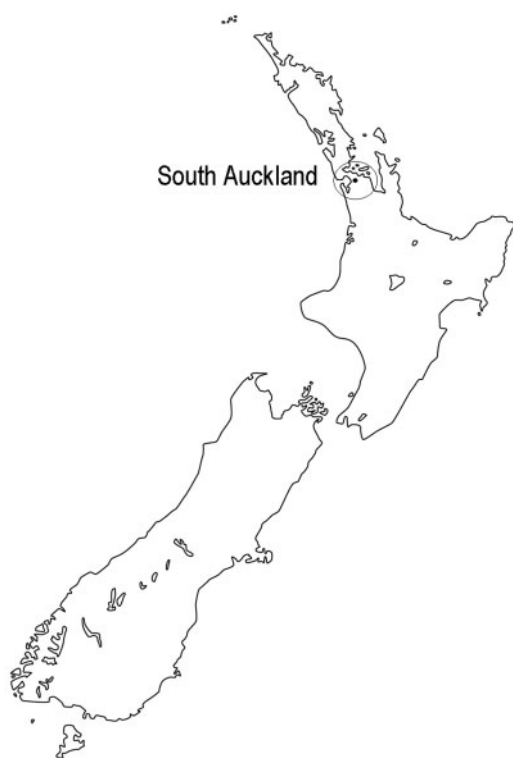


Figure 1 Map of New Zealand showing the location of the PIF study

within the hospital setting. During this recruitment period, 1708 mothers were identified, 1657 were assessed to be potentially eligible, and of those 1590 mothers consented to a home visit for the 6-week postpartum interview. At the scheduled home visits, 10 mothers were found to be ineligible (non-New Zealand permanent residents, 7; baby died, 3) and 103 had indeterminate eligibility (untraceable, 36; left Auckland, 26; other 41) leaving 1477 eligible mothers. Of these, 1376 (93%) consented and completed the 6-week interview (comprising 1368 biological mothers, 1 foster mother, 6 adoptive mothers and 1 grandmother). Within this cohort, 23 mothers gave birth to twins. However, one twin member was stillborn and so the study included 1398 children. Table 1 includes the distribution of maternal and paternal sociodemographic and obstetric details of the PIF cohort. Only minor differences in the baseline distributions over time can be seen in Table 1.

At the 12-month interview, 999 mothers had partners who were able to act as collateral respondents, of whom 825 (83%) consented and completed the interview (comprising 822 biological fathers, 1 foster father and 4 adoptive fathers). Both maternal and paternal reports of child functioning, as well as reports of their own and their partner's wellbeing and behaviours provides valuable insight into parents perception of the family, as well as matched concordance and discordance information largely absent from many other studies.

How often have they been followed up?

Maternal interviews were carried out at approximately 6 weeks postpartum by trained Pacific female bilingual interviewers who were, where possible, ethnically matched to the potential participants. Once eligibility was established and informed consent obtained, mothers participated in one-hour interviews concerning the health and development of the child and family functioning. This interview was conducted at the participant's home and in the preferred language of the mother. The survey instruments were made available in English, Samoan, Tongan and Cook Island Maori. At the 6-week interview, 93% of mothers declared being of Pacific Islands ethnicity yet, of these, only 14% elected to use a Pacific language survey, and so all subsequent survey instruments were made available in English only.

With consent, home visits were repeated at approximately 12 months, 2 years, 4 years and 6 years postpartum. At the 12-month, 2-year and 6-year interviews, mothers were asked to give permission for an interviewer to contact and interview the father. If permission and paternal contact details were obtained then a Pacific male interviewer contacted the father to discuss participation in the study. Once informed consent was obtained from the father, the

Table 1 Percentage of maternal and infant baseline characteristics at the 6 weeks, 12 months, 2 years and 4 years measurement waves and paternal baseline characteristics at the 12 months and 2 years measurement waves

	PIF sample			
	6 weeks (n = 1376)	12 months (n = 1224)	2 years (n = 1144)	4 years (n = 1048)
Maternal characteristics				
<i>Maternal age (years)</i>				
<20	8.1	7.4	7.4	7.6
20–24	25.8	25.7	24.7	24.0
25–29	26.6	26.6	26.8	27.2
30–34	23.6	23.8	24.1	24.2
≥35	16.0	16.5	17.1	17.1
<i>Ethnicity of mother^a</i>				
Samoa	50.9	51.7	51.3	48.9
Tongan	22.6	21.3	22.8	23.1
Cook Island Maori	18.2	18.8	17.9	19.1
Other Pacific	8.3	8.3	8.0	8.9
<i>Highest educational qualification</i>				
No formal qualification	38.9	38.2	37.5	36.0
Secondary	33.7	33.9	34.2	35.2
Post-secondary	27.4	27.9	28.3	28.8
<i>Marital status</i>				
Married/ <i>de facto</i>	80.5	81.0	81.0	80.9
Single	19.5	19.0	19.0	19.1
<i>Current smoking status</i>				
Non-smoker	75.0	75.5	76.1	76.2
Smoker	25.0	24.5	23.9	23.8
Child characteristics				
<i>Female</i>				
Female	48.5	48.0	48.2	48.8
<i>Preterm birth (<37 weeks gestation)</i>				
Preterm birth (<37 weeks gestation)	7.8	7.9	7.8	8.2
<i>Low birth weight (<2500 g)</i>				
Low birth weight (<2500 g)	4.4	4.4	4.4	4.4
Paternal characteristics				
<i>Paternal age (years)</i>				
<20		0.9	0.7	
20–24		11.9	11.4	
25–29		26.3	24.6	
30–34		28.9	28.4	
≥35		32.1	34.9	

Ethnicity of father^a

Samoa	57.4	62.5
Tongan	26.0	21.6
Cook Island Maori	9.5	8.9
Other Pacific	7.1	7.0

Highest educational qualification

No formal qualification	58.4	57.7
Secondary	26.7	27.3
Post-secondary	14.8	15.1

Current smoking status

Non-smoker	59.2	58.9
Smoker	40.8	41.1

^a99 mothers and 59 fathers were non-Pacific but eligible in the study through the Pacific ethnicity of their partner.

interview was carried out in the father's preferred language.

Additionally, at 2 years, 4 years and 6 years, mothers were asked to give permission for female Pacific interviewers to conduct child assessments and at 6 years permission was sought to contact the child's teacher for their assessment of the child's scholastic and social attributes. Figure 2 presents a schematic of the timing and components of the measurement waves, and the next two proposed future measurement wave timing and measurement components.

What has been measured?

A battery of questions and standardized instruments have been employed for each measurement wave for mothers, fathers and children (a comprehensive list appears elsewhere⁹). Pacific researchers have considerable input into the general measurement framework and specific measures employed to ensure their content acceptability and validity. Some measures underwent focus group examination to check wording of items and testing procedures. The psychometric properties of most standardized measures used in the pilot were acceptable and few modifications were required.

Different additional data has also been collected at various times, including obstetric and perinatal information obtained from hospital records and postnatal information from Plunket, which included their comprehensive physical assessment undertaken at 6 weeks and 6 months postpartum. Following the 4-year maternal interview, a child assessment was conducted at the PIF Study Clinic and measured size (height, weight and waist circumference), fitness (bioimpedance analysis), hearing, and assessed

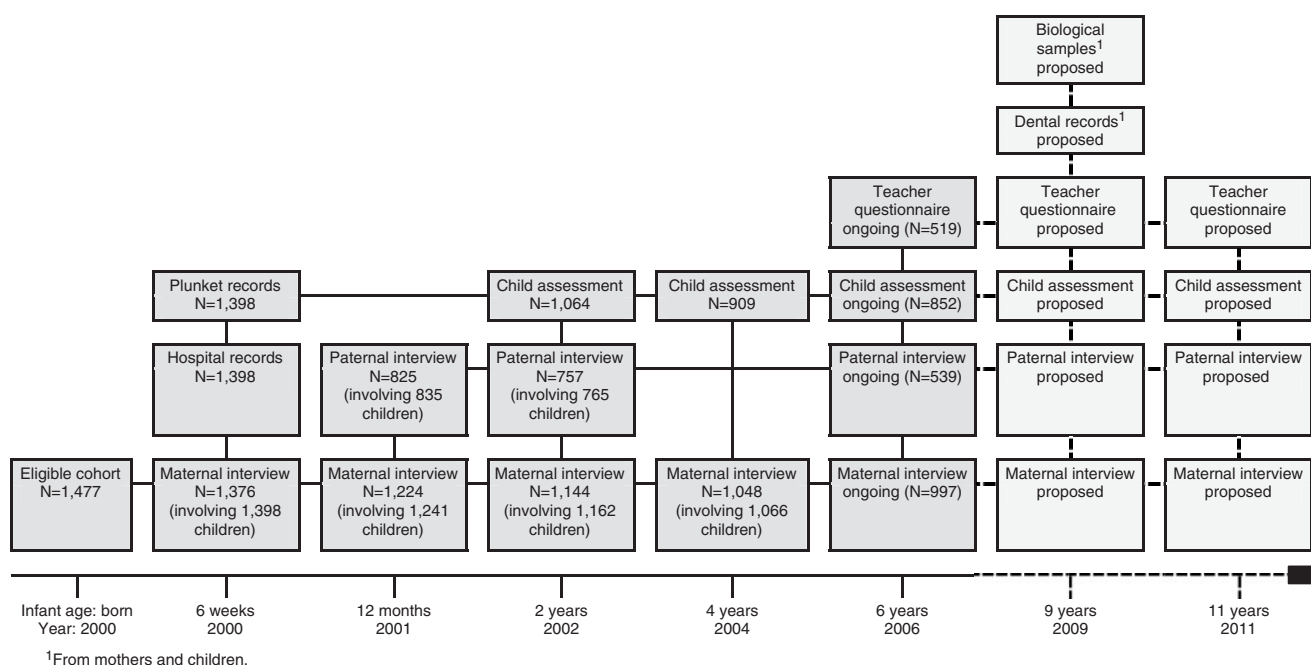


Figure 2 Participant groups and numbers over time covering the information of 1398 children in the cohort

physical, social, cognitive and language development. At this time, a caregiver completed a questionnaire about the child's nutrition, physical activity and leisure time. After the 6-year maternal and paternal interviews, another child assessment was undertaken within the school setting and included physical body measurements, body fitness, blood pressure and lung function tests, and a short child interview that focused on self esteem, friendships, vocabulary and cultural orientation.

Various supplementary studies have also been undertaken including self-reported and objective measures (accelerometers) of physical activity in mothers and children at the 6-year measurement wave, geographic information system (GIS) mapping of households relating ambient pollutants to health conditions such as respiratory problems, and nested case-control study relating neurotoxins (in particular mercury) to behaviour problems in children. Furthermore, biological samples and dental records are proposed to be measured in the next measurement wave.

What is attrition like?

As eligibility and formal recruitment was confirmed at 6 weeks this is taken as the baseline point for recruitment and retention measurement. Of the 1376 mothers who participated at the 6 weeks post-partum time point, 1224 (89%) were re-interviewed at 12 months, 1144 (83%) at 2 years, 1048 (76%) at 4 years, and while ongoing, 997 (72%) mothers have

completed the 6-year interview (Figure 2). As information about each child was asked separately (i.e. including each child in a multiple birth), these maternal interviews provided information for 1398 children at the 6-week interview, 1241 children at 12 months, 1162 children at 2 years, 1066 children at 4 years and 1015 children at 6 years to date. Additionally, for children, hospital and Plunket information was available for all 1398 infants (44 were live twins) at the 6-week measurement wave. Child assessment was completed for 1064 children (32 twins) at 2 years, 909 (28 twins) at 4 years, and while ongoing, 852 (15 twins) have completed the 6-year component. With respect to fathers, at the 12-month interview, 999 mothers consented to the child's biological father or her partner to act as a collateral respondent, of whom 825 (83%) consented and completed the interview. A father was deemed ineligible for interview if they had no contact with the child or the mother requested that the father not be interviewed. At the 2-year interview, 938 mothers consented to the child's biological father or her partner to act as a collateral respondent of whom 757 (81%) consented and completed the interview. For the 6-year interview, which remains ongoing, 844 mothers have consented to the child's biological father or her partner to act as a collateral respondent, of whom 539 (64%) fathers have consented and completed interview at this time. As with mothers, fathers provided information about each child separately and included 835 children at 12 months, 765 children at 2 years and 548 children at 6 years interviews to date.

No important differential attrition has been observed for mothers, children or fathers within the cohort for any of the considered sociodemographic variables (Table 1).⁹

What has it found? Key findings and publications

Currently, 33 peer-reviewed papers, 1 book chapter and 2 major technical reports have been published from the PIF Study. Key findings include improved immunization uptake for Pacific children in New Zealand compared with historically low rates,¹⁰ and reasons for continued non-immunization.¹¹ Otitis media with effusion is problematic for Pacific children, especially for those attending day care centres.¹² Many mothers and their Pacific children have poor basic oral hygiene and dietary practices that substantially increase the oral health risk in these children.¹³ Traditional gift giving among Pacific families resident in New Zealand is an important issue. Although generally socially and economically disadvantaged, the majority of Pacific families made traditional gift commitments to family (often resident in the Pacific Islands) and the church. These commitments frequently made household financial situations even more difficult.¹⁴ Intimate partner violence is common for many Pacific couples but consistent with that reported in other New Zealand groups, and that mothers are as likely as fathers to perpetrate and be victims of this violence.¹⁵ The experience of social inequality and acculturation are associated with intimate partner violence, albeit differentially across the experience of victimization and perpetration.¹⁶

Other publications report on experiences and risk factors in the antenatal period (including: pregnancy planning,¹⁷ antenatal care^{18,19}); infant care practices (including SIDS,^{20–22} feeding^{23–25}); infant health problems (including: injury,²⁶ behaviour,²⁷ general health issues²⁸); postnatal depression in new mothers,²⁹ housing issues (including: crowding,³⁰ ownership,³¹ poor quality³²); smoking,^{33–35} gambling;^{36,37} and cultural experiences.^{38,39} A current complete list of publications appears on the study's website at: http://www.aut.ac.nz/about/faculties/health_and_environmental_sciences/research_centres_and_institutes/pacific_islands_families/about_us.htm.

What are the main strengths and weakness?

A primary strength of this study has been the recruitment and retention success in what was previously considered a 'hard-to-reach' population. Both recruitment and retention success is fundamental and vital to the success of most robust longitudinal population studies. The integral involvement

with Pacific people in the consultation, design, development of the interview protocols and instruments, recruitment, elicitation and interpretation of information and governance of the study was critical and a major reason for this success. Such input gives credibility, cultural appropriateness and Pacific community involvement and ownership of the study. These features coupled with the perceived importance and relevance of the PIF study by the participants themselves should ensure that response rates remain respectable. Also the establishment and guidance afforded by the Pacific Peoples' Advisory Board who monitored the general direction of the study was vital.

Also instrumental in the PIF study's recruitment and retention success are the research base for fieldwork staff and the home visits by gender and generally ethnic matched bilingual Pacific interviewers. The research base was a readily identifiable 'home' for the field workers—where they engaged, learnt, and developed with fellow colleagues and the study investigators. Home visitations were convenient and comfortable for participants, particularly for those without private transportation. Moreover, they were less disruptive for the family especially if they have other children who need attention. The ethnic and gender-matched bilingual Pacific interviewers facilitates the development of rapport between themselves and the participants, and language barriers or difficulties are circumvented. The availability of survey instruments in English, Samoan, Tongan and Cook Island Maori, in the first instance, probably contributed to the strong participant response.

Recruitment was also likely optimized using design efficiencies. A single hospital-based recruitment catchment enabled the target population to be easily identified and accessed. This enhances the cost-effectiveness of recruitment and data collection, and increases the 'health' credibility of the study for the participants. Also, this institutional sampling frame lends itself to a 'study champion'; a person or persons with considerable passion and vigour, who understand/s the local system and ensures smooth running of study. Other design efficiencies included the utilization of data from alternative available sources, such as Middlemore Hospital Discharge Summary records and Plunket's records. The capture and use of these data decreases participant burden and thereby is likely to increase participation rates. Additionally, use of the data 'value-add' to the records collected by each of these organizations themselves.

While the PIF study uses a battery of commonly employed standardized instruments facilitating comparisons with other studies worldwide, the main weakness is the reliance on self-report for most measurement domains. Ideally, information pertaining to social, medical or dental health that utilized appropriate records rather than recall would provide more robust findings. Moreover, no biological samples have been taken from the cohort to this time,

preventing any genetic or biomarker investigations. However, venepuncture and consent to examine dental records is proposed for mothers and children at the next measurement wave (in 2009 when children are 9 years of age), which will go some way to addressing this deficiency.

Another weakness is the geographically focused recruitment strategy. Health, dynamics and family function of Pacific individuals and families in rural settings, minor towns or in other (particularly South Island) cities are likely to be different to the participants in the PIF Study, hence the generalizability of the Study's findings to these populations less tenable. However, as 98% of the Pacific population is urbanized in New Zealand, and 66% live in the Auckland urban area, the efficiencies of this geographical focus outweighed this disadvantage.²

Can I get hold of the data?

Where can I find out more?

A set of Webzine (an electronic publishing point for the PIF newsletters), publications and contact details can be found on the study's website at: http://www.aut.ac.nz/about/faculties/health_and_environmental_sciences/research_centres_and_institutes/pacific_islands_families/about_us.htm.

The PIF study team engages in collaborative research, and welcomes future collaborative opportunities. Access to the data is subject to study protocols and enquires should be made to the study's director or lead researchers with contact details listed on the study website.

Acknowledgements

The authors gratefully acknowledge the families who participated in the study, the Pacific Peoples Advisory Board and the other members of the PIF research team.

References

- 1 Statistics New Zealand. *QuickStats about New Zealand's Population and Dwellings: Revised 18 May 2007*. Wellington: Statistics New Zealand; 2007.
- 2 Statistics New Zealand. *Pacific Progress: A report on the economic status of Pacific peoples in New Zealand*. Wellington: Statistics New Zealand, 2002.
- 3 Bathgate M, Donnell A, Mitikulena A. *The Health of Pacific Islands People in New Zealand. Analysis and Monitoring Report 2*. Wellington: Public Health Commission, 1994.
- 4 Ministry of Health. *The Health of Pacific Peoples*. Wellington: Ministry of Health, 2005.
- 5 Ministry of Health. *Te Orau Ora: Pacific Mental Health Profile*. Wellington: Ministry of Health, 2005.
- 6 Tukuitonga CR, Bell S, Robinson E. Hospital admission among Pacific children Auckland 1992–97. *NZ Med J* 2000;**113**:358–61.
- 7 Mitaera J. Pacific Children's Issues in the Next Five Years: Commentary to the Seminar on Children's Policy. Paper presented at: Seminar on Children's Policy Agenda for Children; 19–20 July, 2000; Wellington.
- 8 Royal New Zealand Plunket Society. Plunket on-line. <http://www.plunket.org.nz>. (Accessed April 29, 2005).
- 9 Paterson J, Tukuitonga CR, Abbott M *et al*. Pacific Islands Families First Two Years of Life study: design and methodology. *NZ Med J* 2006;**119**:U1814.
- 10 Paterson J, Schluter P, Percival T, Carter S. Immunisation of a cohort Pacific children living in New Zealand over the first 2 years of life. *Vaccine* 2006;**24**:4883–89.
- 11 Paterson J, Percival T, Butler S, Williams M. Maternal and demographic factors associated with non-immunisation of Pacific infants living in New Zealand. *NZ Med J* 2004;**117**:U994.
- 12 Paterson J, Carter S, Wallace J, Ahmad Z, Garrett N, Silva P. Pacific Islands Families Study: risk factors associated with otitis media with effusion among Pacific 2-year-old children. *Int J Pediatr Otorhinolaryngol* 2007;**71**:1047–54.
- 13 Schluter P, Durward C, Cartwright S, Paterson J. Maternal self-report of oral health in 4-year-old Pacific children from South Auckland, New Zealand: findings from the Pacific Islands Families Study. *J Public Health Dent* 2007;**67**:69–77.
- 14 Cowley E, Paterson J, Williams M. Traditional gift giving among Pacific families in New Zealand. *J Fam Econ Issues* 2004;**25**:431–44.
- 15 Schluter PJ, Paterson J, Feehan M. Prevalence and concordance of interpersonal violence reports from intimate partners: findings from the Pacific Islands Families Study. *J Epidemiol Community Health* 2007;**61**:624–30.
- 16 Paterson J, Feehan M, Butler S, Williams M, Cowley-Malcolm E. Intimate partner violence within a cohort of Pacific mothers living in New Zealand. *J Interpers Violence* 2007;**22**:698–721.
- 17 Paterson J, Cowley E, Percival T, Williams M. Pregnancy planning by mothers of Pacific infants recently delivered at Middlemore Hospital. *NZ Med J* 2004;**117**:U744.
- 18 Low P, Paterson J, Wouldes T, Carter S, Williams M, Percival T. Factors affecting antenatal care attendance by mothers of Pacific infants living in New Zealand. *NZ Med J* 2005;**118**:U1489.
- 19 Gao W, Paterson J, Carter S, Percival T. Risk factors for preterm and small-for-gestational-age babies: a cohort from the Pacific Islands Families Study. *J Paediatr Child Health* 2006;**42**:785–92.
- 20 Paterson J, Tukuitonga C, Butler S, Williams M. Awareness of Sudden Infant Death risk factors among mothers of Pacific infants in New Zealand. *NZ Med J* 2002;**115**:33–35.
- 21 Paterson J, Tukuitonga C, Butler S, Williams M. Infant bed-sharing among Pacific families in New Zealand. *NZ Med J* 2002;**115**:241–43.
- 22 Schluter P, Paterson J, Percival T. Infant care practices associated with sudden infant death syndrome: findings from the Pacific Islands Families study. *J Paediatr Child Health* 2007;**43**:388–93.

- ²³ Butler S, Tukuitonga C, Paterson J, Williams M. Infant feeding and feeding problems experienced by mothers of a birth cohort of Pacific infants in New Zealand. *Pac Health Dialog* 2002;**9**:34–39.
- ²⁴ Butler S, Williams M, Tukuitonga C, Paterson J. Factors associated with not breastfeeding exclusively among mothers of a cohort of Pacific infants in New Zealand. *NZ Med J* 2004;**117**:U908.
- ²⁵ Schluter P, Carter S, Percival T. Exclusive and any breastfeeding rates of Pacific infants in Auckland: data from the Pacific Islands Families First Two-Years of Life study. *Public Health Nutr* 2006;**9**:692–99.
- ²⁶ Schluter P, Paterson J, Percival T. Non-fatal injuries among Pacific infants in Auckland: data from the Pacific Islands families first two years of life study. *J Paediatr Child Health* 2006;**42**:123–28.
- ²⁷ Paterson J, Carter S, Gao W, Perese L. Pacific Islands Families Study: behavioral problems among two-year-old Pacific children living in New Zealand. *J Child Psychol Psychiatry* 2007;**48**:514–22.
- ²⁸ Paterson J, Carter S, Williams M, Tukuitonga C. Health problems among six-week old Pacific infants living in New Zealand. *Med Sci Monit* 2006;**12**:CR51–54.
- ²⁹ Abbott M, Williams M. Postnatal depressive symptoms among Pacific mothers in Auckland: prevalence and risk factors. *Aust NZ J Psychiatry* 2006;**40**:230–38.
- ³⁰ Schluter P, Carter S, Kokaua J. Indices and perception of crowding in Pacific households domicile within Auckland, New Zealand: findings from the Pacific Islands Families Study. *NZ Med J* 2007;**120**:U2393.
- ³¹ Carter S, Paterson J, Williams M. Housing tenure: Pacific families in New Zealand. *Urban Policy Res* 2005;**23**:411–26.
- ³² Butler S, Williams M, Tukuitonga C, Paterson J. Problems with damp and cold housing among Pacific families in New Zealand. *NZ Med J* 2003;**116**:U494.
- ³³ Butler S, Williams M, Paterson J, Tukuitonga C. Smoking among mothers of a Pacific Island birth cohort in New Zealand: associated factors. *NZ Med J* 2004;**117**:U1171.
- ³⁴ Carter S, Percival T, Paterson J, Williams M. Maternal smoking: risks related to maternal asthma and reduced birth weight in a Pacific Island birth cohort in New Zealand. *NZ Med J* 2006;**119**:U2081.
- ³⁵ Carter S, Paterson J, Gao W, Iusitini L. Maternal smoking during pregnancy and behaviour problems in a birth cohort of 2-year-old Pacific children in New Zealand. *Early Hum Dev* 2007; doi:10.1016/j.earlhumdev.2007.03.009.
- ³⁶ Bellringer M, Perese L, Abbott M, Williams M. Gambling amongst Pacific mothers living in New Zealand. *Int Gambling Stud* 2006;**6**:217–35.
- ³⁷ Schluter P, Bellringer M, Abbott M. Maternal gambling associated with families' food, shelter and safety needs: findings from the Pacific Islands Families Study. *J Gambling Issues* 2007;**19**:87–90.
- ³⁸ Fairbairn-Dunlop P, Paterson J, Cowley E. Maternal experiences of childhood: Pacific mothers in New Zealand. *Pac Stud* 2005;**28**:291–309.
- ³⁹ Poland M, Paterson J, Carter S, Gao W, Perese L, Stillman S. Pacific Islands Family Study: factors associated with living in extended families one year on from the birth of a child. *Kotuitui* 2007;**2**:17–28.