

# LEARNING FROM PARENTS

A report on feedback from 1145 parents whose babies used a Pēpi-Pod sleep space in the five years before July 2017.

Prepared by Stephanie Cowan  
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*About using  
Pēpi-Pod sleep  
spaces with more  
vulnerable infants*



**Learning from parents** about using Pēpi-Pod® sleep spaces with more vulnerable infants

A report on feedback from 1145 parents, whose babies used a Pēpi-Pod® sleep space in the five years before July 2017.

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We dedicate this report to those parents who give feedback on their experiences using Pēpi-Pod® sleep spaces with their infants, and enable the learning that results.

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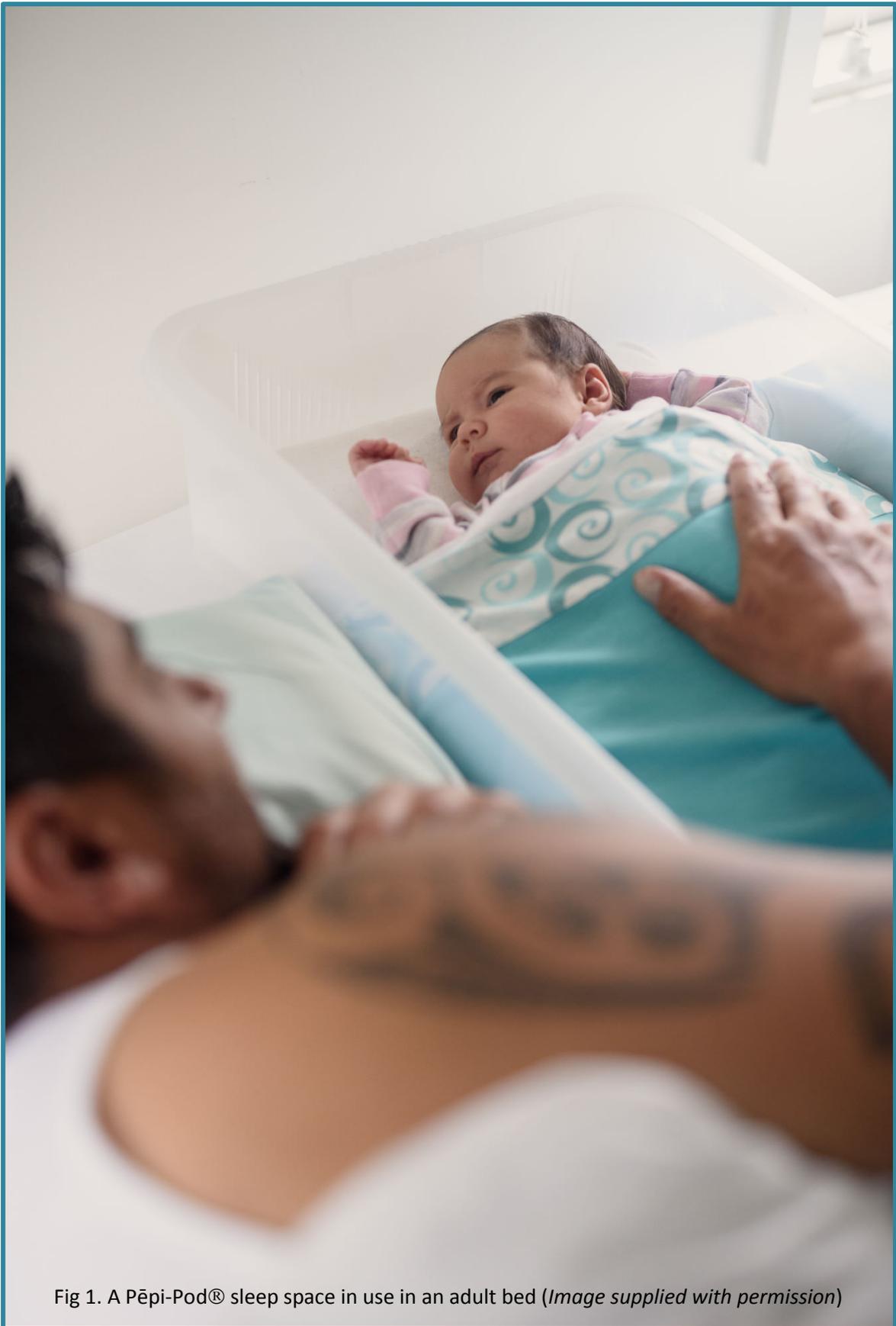


Fig 1. A Pēpi-Pod® sleep space in use in an adult bed (*Image supplied with permission*)

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## Executive summary

The Pēpi-Pod Programme is embedded in diffusion of innovations theory<sup>11</sup> where **changing opportunities**, and not people, is the goal. This report describes what 1145 families mostly of Māori and Pacific infants (81%), did with the opportunity to use a Pēpi-Pod sleep space to help protect their more vulnerable infants from sudden infant death when sleeping.

Pēpi-Pod sleep spaces were **acceptable** to Māori and Pacific families and rated highly (7-9/9) for support with safety, convenience and settling their babies for sleep (91%, 89% and 73% for Māori, and 89%, 83% and 73% for Pacific, respectively).

Adult-infant bed sharing since getting a Pēpi-Pod was common (75%). Seventy-eight percent of bed sharing infants were 'always or usually' also in a Pēpi-Pod. Use when bed sharing was dependent on an infant's degree of exposure to risk. Infants were significantly more likely to be using a Pēpi-Pod when bed sharing 'last night', if also exposed to smoking in pregnancy, prematurity, low birthweight or being aged less than 17 weeks, compared to term, smokefree and older infants.

Usage reduced over time, in relation to infant age, from 94% still using at 4 weeks, 77% at 8 weeks, 53% at 12 weeks, 26% at 16 weeks, to 18% still using beyond 16 weeks of age.

Next-bed arrangements were a 'cot or other baby bed' for 90% of infants. Compared to smokefree infants, those exposed to smoking in pregnancy were significantly more likely to transfer to a cot or other baby bed when they stopped using the pod, than bed share with an adult. Next-bed arrangements were not related to infant age, ethnicity, birthweight or prematurity status.

Comments from parents revealed personal ways in which the programme had empowered them:

- improved knowledge (*"The pēpi-pod was more than a baby bed for us; we learnt so much about how to protect our baby from SUDI."*)
- peer-to-peer conversations (*"I had slept with my other babies in our bed when they were little, but now that I know the risk I have told all my friends and family not to sleep with their babies if they smoke."*)
- importance of portability (*"We take it everywhere - when visiting family, to the beach and to the marae."*)

In summary, Pēpi-Pod sleep spaces were acceptable to and used appropriately by recipient families, and safety advice was reflected in snap shots of infant care. 'High awareness of risk' and 'having a Pēpi-Pod' enhanced protection opportunities for sleeping infants in a range of situations, and reduced opportunities for extreme hazard from the joint action of 'smoking in pregnancy' and 'bed sharing'. Post-perinatal mortality (PPM) rates (deaths of infants aged 7 days to 1 year, all causes) fell during the survey period by 33% for Māori infants (from 4.3 to 2.9/1000 live births) and 29% for non-Māori (from 1.7 to 1.2/1000 live births).

Lessons learned from parents about their experiences using Pēpi-Pods has created opportunities for improved understanding and more precision when implementing sleep space programmes for preventing sudden infant deaths.

## Recommendations

When it comes to translating scientific evidence into effective interventions for preventing sudden infant death, learning from parents is *as* important as learning from science. The recommendations below are a guide to more precision in implementing sleep space programmes.

It is recommended that:

- 1) sleep spaces be distributed in late pregnancy or before an infant is 2 weeks old to **minimise exposure to SUDI risk** for babies awaiting a sleep space.
- 2) a strong emphasis be placed on promoting the **extreme hazard** for today's infants of the **joint action** of 'smoking in pregnancy' and 'bed sharing with infants'.
- 3) 'joint action' thinking is applied to enhancing protection in all situations where there is a **confluence of risks** acting on an infant.
- 4) **neutral language** is used to describe sleep spaces, where there are multiple risks acting on an infant, so as to avoid fostering a misguided sense of security in parents from promoting sleep spaces as *safe* sleep spaces.
- 5) the critical importance of a **standard safety briefing**, mediated by using a picture card to guide discussion, be upheld as a key fidelity indicator (KFI) of the Pēpi-Pod Programme.
- 6) the critical importance of promoting **peer to peer discussions** for the sharing of knowledge and devices be upheld as a key fidelity indicator (KFI) of the Pēpi-Pod Programme.
- 7) the critical importance of **collecting programme data** as a quality process be upheld as a key fidelity indicator (KFI) of the Pēpi-Pod Programme.
- 8) consideration of '**next bed**' arrangements for babies for when they stop using sleep spaces be an essential component of the initial safety briefing with parents.
- 9) future studies **define bed sharing** as
  - i) direct (infant not in any type of infant sleeping device when sharing the bed), or
  - ii) indirect (infant also in some type of infant sleeping device when sharing the bed)to reflect the differences in risk and protection inherent in these two forms of the practice.

## Introduction

Intervention programmes that are informed by **current** and **strong** scientific evidence have the best opportunity for relevance, focus and impact. Thankfully, we now have the New Zealand sudden unexpected death in infancy (SUDI) case control study, published in 2017, as an evidence basis for informing **current approaches** to reducing sudden infant deaths.<sup>2</sup>

This more recent study confirms findings from the 1991 New Zealand Cot Death Study (NZCDS) that still need addressing today, specifically smoking in pregnancy, bed sharing, non-supine sleeping positions and sleeping in rooms different from sleeping parents.<sup>3</sup> Comparing 137 cases and 258 controls in the 2017 study, the prevalence of the above risks, in both groups, was 74% vs 35%, 57% vs 18%, 30% vs 17%, 46% vs 31%, respectively.

The **standout finding** in the 2017 study was that the **joint action** of ‘smoking in pregnancy’ and ‘bed sharing’ led to a **32-fold increase** in SUDI risk for babies exposed to both factors (48% cases vs 6% controls) compared to babies exposed to neither (17% cases vs 53% controls). While it has been known for more than 25 years that this combination is concerning (a 5-fold increase in risk was found in the NZCDS<sup>3</sup>), the recent study describes **extreme hazard** for present-day babies from this interaction.

There were 35% fewer deaths than expected in the three year study period of 2012-2014, during which time PPM rates fell by 29% in New Zealand.<sup>4</sup> This has been attributed to the Safe Sleep programme which included the introduction in 2012 of the scaled use of portable sleeping devices for infants. These devices can be brought into the adult bed and can be used in situations where babies do not sleep in traditional baby beds (bassinets and cots) e.g. when sleeping in, or on, adult beds, mattresses, couches, chairs and floors, or they can be used as make shift beds when away from home. These are all environments of increased SUDI risk.

The Pēpi-Pod Programme<sup>5</sup> developed to support the pioneering work of wahakura. Both devices were a deliberate attempt to **de-couple** the joint action of ‘smoking in pregnancy’ and ‘bed sharing’ to promote ‘safer’ bed sharing. There is clear evidence from the 2017 SUDI case control study that removal of one or other factor should **prevent all deaths** from their joint action.

The fall in **total infant mortality** rates that we are currently seeing in New Zealand suggests early success from this decoupling effort. In the six years since 2011, total infant mortality (infants 0 to 52 weeks, all causes) rates have decreased by 25% (from 5.09 to 3.82 per 1000 live births)<sup>6</sup>. That there has been no reported change to smoking in pregnancy rates in this period, it is more likely that removing the ‘bed sharing’ risk by supplying sleep spaces, over removing the ‘smoking in pregnancy’ risk, explains, at least in part, the reducing mortality.

We have learned about **SUDI risk** from the parents who have participated in scientific studies, and for some of those parents, also from their tragic infant losses. In this report we learn about **SUDI prevention** from parents who completed a survey about their experiences using Pēpi-Pod sleep spaces with their infants. From this we hope that families and health services can intervene with more precision to protect infants from preventable sudden infant death.

## Methods

The methods of the Pēpi-Pod Programme have been described in full in the programme report 'Their first 500 sleeps'<sup>4</sup> and will not be repeated here.

In summary, the intention was that Pēpi-Pod sleep spaces (to be referred to as 'pods' hereon in, for reading ease) were offered to families of new-born infants (unborn or less than 2 weeks old) who were identified by health and community workers as more vulnerable to sudden infant death, using evidence-based criteria for eligibility, with follow-up contact 2-4 weeks later, and a one in ten sample of users surveyed when their babies were 8-10 weeks old. Data were entered into the on-line programme database mostly by health or whānau professionals and in some cases by parents themselves.

Quantitative data were analysed by frequency distributions and percentages were of the total respondents with available data in each question. The Chi Squared test of independence was used to determine if there was a significant relationship between variables and the significance level was set as  $p < 0.01$ . Thematic analysis was used for qualitative data.

This report describes feedback from parents who completed the survey.

## Results

There were 10,075 records for distribution and follow-up of the Pēpi-Pod Programme that were entered on the programme database in the five years prior to July 2017. Feedback was received from the families of 1145 infants issued a pod, giving an 11% sample. Results are summarised below and presented on Table 1 (for participants) and Table 2 (for user experience).

### Participants

**Region:** More than a quarter (28%) of respondents lived in the Waikato and 64% in the total Midland region. Participation in the survey by other regions was: Northern 16%, Central 11% and Southern 9%.

**Ethnicity:** The survey was completed by family members of infants of mainly Māori and/or Pacific ethnicity (81%). Infant ethnicity was reported as '*includes Māori*' for 78%, '*includes Pacific*' for 26% and does not include Māori or Pacific for 18%.

**Infant age:** Most (85%) infants were less than four weeks when they received a pod and 52% were unborn or less than one week old. At the time of the survey, 63% of infants were aged sixteen weeks or less and 50% of infants were still using their pods.

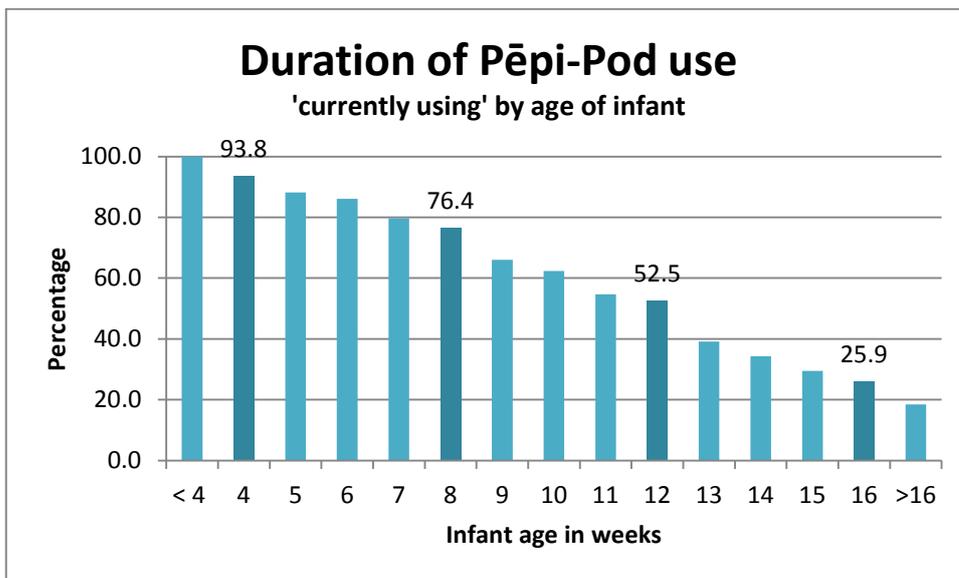
**Exposure to SUDI risk:** The majority (94%) of infants were exposed to SUDI risks. Sixty percent were exposed to some smoking. More than half had mothers who smoked; 58% of mothers reported smoking before pregnancy, 51% during and a third of infants lived in households where two or more people smoked.

A quarter of pod users were infants born before 37 weeks gestation or born weighing less than 2500g.

## Experience

**Distribution:** Questions were asked to assess adherence to core elements for the delivery of the Pēpi-Pod programme. Most (97%) families reported receiving their pods from a health or whānau worker, were shown how to make up their pods (98%) and underwent safety briefings where the 'rules of protection' were explained (98%). Most (95%) also reported being asked to help spread to others what they had learned about protecting babies.

**Duration of Use:** Half (50%) of surveyed infants had stopped using their pods at the time of the survey. As expected, duration of use by these infants was inversely proportional to their increasing age with 94% still using at 4 weeks, 77% at 8 weeks, 53% at 12 weeks and 26% at 16 weeks. Eighteen percent used their pods beyond the age of 16 weeks. (See Fig.2)

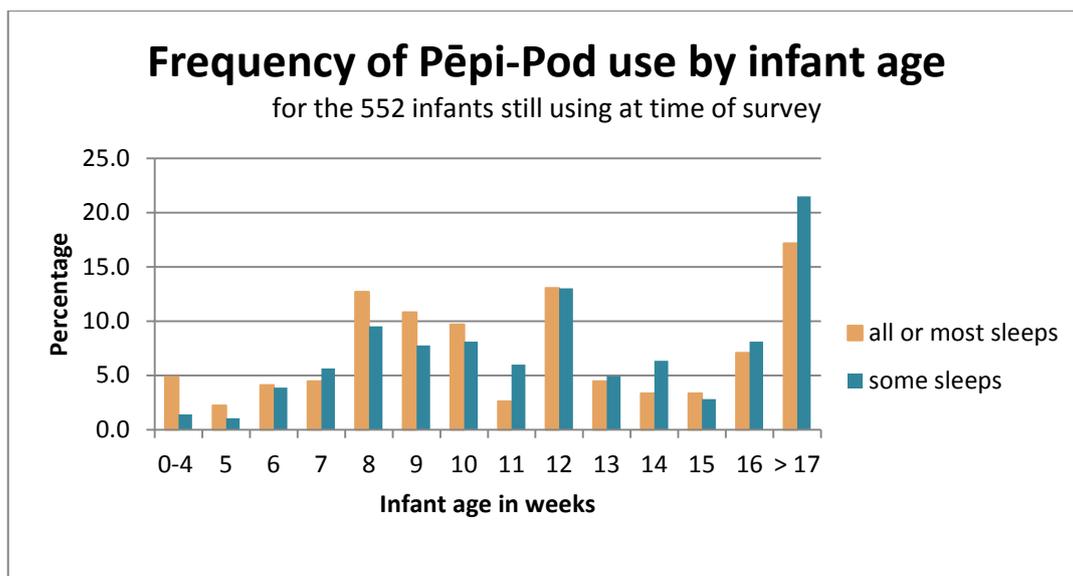


**Fig 2.** Duration of Pēpi-Pod use in weeks

Reasons given for stopping use related mostly to infants out-growing the pod or beginning to roll (80%). Some parents moved their infants to a bassinet or cot, where they had one and as their infants became settled sleeping there (10%). A small (7%) group of families had negative reasons to stop using the pod that included 'didn't like it' (10), 'baby was unsettled in it' (10), 'baby's arms hitting the sides' (4) and 'breakage' (2).

Of those infants still using the pod at the time of the survey, the age distribution for use was similar to those infants no longer using their pods, with 19% still using when aged more than 16 weeks.

**Frequency of use:** How frequently pods were used was related to infant age. They were used more often for '*all or most sleeps*' until infants were 13 weeks old (60%), and more often for '*some sleeps*' from 13 weeks (40%) (See Fig.3).



**Use when bed sharing:** Sharing their beds with infants was common for respondents. In answer to the question “*Since getting your Pēpi-Pod, has baby ever slept in bed WITH you when you were ALSO asleep?*” 75% said ‘yes’, with 78% of these infants ‘always’ or ‘usually’ also in a pod (defined as **indirect** bed sharing), and 22% ‘sometimes’ (141) or ‘never’ (40) (defined as **direct** bed sharing).

Of the 181 infants directly bed sharing on at least some occasions, 70 were exposed to maternal smoking in pregnancy, showing that at least 6% of the 1145 infants in the survey were, at some times, exposed to the joint action of ‘*smoking in pregnancy*’ and ‘*direct bed sharing*’.

‘*Any bed sharing*’ was significantly more common for Pacific than other infants ( $\text{Chi}^2 = 9.968$ ,  $\text{df}=1$ ,  $p < 0.01$ ). Indirect bed sharing, where infants were ‘always’ or ‘usually’ in pods when bed sharing, was significantly more likely for infants exposed to smoking in pregnancy ( $\text{Chi}^2 = 10.726$ ,  $\text{df}=1$ ,  $p < 0.01$ ) than for smokefree infants. There was no significant relationship between indirect bed sharing and an infant being Māori or non-Māori, younger or older than 16 weeks, premature or of low birth weight, or not.

Infant care questions about what happened ‘*last night*’ showed that, for the 552 infants who had not yet finished with their pods, more than a half (55%) slept in pods ‘*last night*’, 41% in some other baby bed, and 4% were not in any type of baby bed ‘*last night*’. Of those infants in pods ‘*last night*’, 85% were also in their parents’ beds.

‘*Last night*’ a total 19% of surveyed infants were bed sharing; 125 indirectly (i.e. also in a pod) and 84 directly. Indirect bed sharing ‘*last night*’ was significantly more likely for premature (<37 weeks gestation) or low birth weight (>2500gms) infants ( $\text{Chi}^2 = 8.324$ ,  $\text{df}=1$ ,  $p < 0.01$ ), infants exposed to smoking in pregnancy ( $\text{Chi}^2 = 7.519$ ,  $\text{df}=1$ ,  $p < 0.01$ ) and infants younger than 17 weeks ( $\text{Chi}^2 = 9.795$ ,  $\text{df}=1$ ,  $p < 0.01$ ), compared to term, smokefree and older infants, but was not related to ethnicity.

Of the 84 infants directly bed sharing 'last night', 25 were also exposed to smoking in pregnancy this being 2% of all surveyed infants known to be exposed to the joint action of 'smoking in pregnancy' and 'direct bed sharing' 'last night'.

**Room Sharing:** It was common (89%) for surveyed infants to sleep in the same room as a sleeping parent 'last night' and this practice was significantly more likely for infants younger than 16 weeks than for older infants ( $\text{Chi}^2=25.785$ ,  $\text{df}=1$ ,  $p<0.01$ ). Most (90%) 'room-sharing' infants were also sleeping in some kind of infant bed 'last night'.

**Use of bedding:** The majority of respondents said that they used the sheet sets (93%) and merino blanket (94%) that came with the pod.

**'Next bed' plans:** When asked "When you stop (or stopped) using the Pēpi-Pod, WHERE will (or does) baby sleep?" responses were: 'in cot or other baby bed' for 90%, 'in adult bed with adult' for 9% and in some other place for the remaining 26 infants. These 'other' places included a mix of baby bed and adult bed (13), arrangements that considered infant safety (9) and potentially dangerous scenarios for 4 infants. In summary, 10% of the total pod-using group of infants were to move into sleeping situations not recommended as safe for them.

Women who smoked in pregnancy were significantly more likely to plan to, or actually, transfer their baby to a cot or other baby bed when they stopped using the pod, rather than bed share, than were smokefree women ( $\text{Chi}^2=11.453$ ,  $\text{df}=1$ ,  $p<0.01$ ). 'Next bed' arrangements were not related to infant age, ethnicity, birthweight or prematurity status.

**Sleep position:** When asked "Yesterday, in what POSITION did you put your baby down for sleep?" most (88%) said 'on the back'. Of the 141 infants either placed on their sides (80), fronts (28) or in no usual position (33), 80 were younger infants ( $\leq 16$  weeks) and 78 were exposed to smoking in pregnancy, both factors that increase the risk from non-supine sleeping positions. Seven per cent of all surveyed infants were at heightened risk from the joint action of 'smoking in pregnancy' and 'non-supine sleeping', or, 'young infant age' and 'non-supine sleeping'.

**Breastfeeding:** Most (73%) surveyed infants were breastfed 'yesterday' with 44% fully breastfed (fed only breastmilk), 29% some breastmilk and 27% not breastfed at all 'yesterday'. For babies 16 weeks or younger at the time of the survey, 77% were breastfed 'yesterday' and half of these 'fully'. Being breastfed 'yesterday' was related to smoking in pregnancy and significantly less likely for smoke-exposed compared to smokefree infants ( $\text{Chi}^2 39.927$ ,  $\text{df}= 2$ ,  $p<0.01$ ).

**Accidents, incidents or concerns.** No accidents were reported, but 17 people identified a concern or incident due to pods tipping slightly if placed on a soft or uneven surface (4) or from the actions of siblings (4) or the baby themselves (1), or due to babies getting themselves up against the top, or sides, of the pod (4). One pod broke when a father stepped on it. The baby was not in it at the time, but the family resumed bed sharing until their pod was replaced.

**Perceptions of support:** Respondents were asked to rate how well the pod had supported them on three variables, using a rating scale of 1 (low) to 9 (high). Responses indicated high support (7-9/9) for safety (90%), convenience (88%) and settling baby for sleep (71%).

When invited to comment on other ways the pod might have supported them, 50% of respondents gave personalised comments. Most comments (62%) related to 'portability', both within the house and when away from home, and the convenience, proximity and reassurance that portability enabled. Some comments specifically identified enabling 'peace of mind', 'better sleep' and 'closeness' as ways that the pod had also supported them. The main themes, with a selection of examples, are listed below.

**Portability (n=359)**

*It is portable and can be taken where ever we go.*

*It was great for travelling and also great for moving between rooms; lounge in the daytime and bedroom at night time.*

*Baby was able to go with his Dad to his Dad's place and sleep safely.*

*It has been great when staying on the marae and at marae functions. Many others have been able to see it through using it on the marae.*

*I was able to have him in it on the lawn when I was hanging out washing.*

*It makes life easy for me to carry baby around the house during the day without disturbing her from her sleep.*

*The Pēpi-Pod is so easy to take with me, it just goes in the car, I don't have to collapse it and when baby gets out of the car, he's usually asleep and goes straight back into the Pēpi-Pod.*

**Peace of mind (n=32)**

*It supported my sanity. If I needed to check on him, I would just open my eyes and lift my head and there he would be.*

*Felt less stressed and worried, knowing he was safe.*

*Peace of mind knowing that he was still sleeping with me, but had his own space.*

*I know that my baby is safe and that is a good feeling.*

*It gave me peace of mind with him having better and safer sleeps.*

*Knowing my baby is safe in bed with me, means I sleep easier.*

*I found it comforting to know that he was fine all night, as I was able to check him without getting out of bed. I always knew he was warm and feeds were so easy as I also didn't have to get out of bed to get him.*

**Better sleep (n=21)**

*It allowed baby to sleep right next to me, but safely. Both baby and I had better sleeps because of it.*

*Baby sleeps in the pod very well and for much longer.*

*My two elder tamariki didn't sleep through the night until they were around 1 year old. My third pēpi, using the Pēpi-Pod, slept through the night basically from 1 month.*

*It helped me to get a better sleep.*

*It helped my baby develop good sleeping patterns and also helped me have good moe (sleep).*

*My baby was hard to settle and now she is amazingly easy to settle thanks to the Pēpi-Pod. Mummy and Daddy got a better sleep.*

*Since I started using the Pēpi-Pod my baby's daytime nap has improved a lot.*

#### **Closeness (n=16)**

*Pēpi-Pod was good to have close by so I could touch him.*

*Clear sides so I could always see baby.*

*Good to have baby so close to mum - it is a comfort to both mum and baby.*

*Having baby sleep between both parents gives equality to mum and dad.*

*It was good to keep the twins close to me without having to have them sleeping in the bedroom during the day.*

*Means we can interact with baby and she can see us as we go about household duties.*

*I like to have him sleeping close by me.*

**Rating overall for the Pēpi-Pod idea:** Respondents were invited to rate the Pēpi-Pod idea over all using the same rating scale of 1 (low) to 9 (high). In answer to the question 'Overall, do you think Pēpi-Pods are a good idea?' 94% rated the idea highly (7-9/9) and 78% rated it 9/9.

**General comment:** Respondents were given an opportunity to make further comment about their experience using Pēpi-Pod sleep spaces and 66% did so. Most (96%) comments were positive and expressed what has already been reported in terms of appreciation for enabling safety, convenience, portability, peace of mind, infant-parent closeness and safer bed sharing. Or they were generally appreciative using words such as: 'love it' (82), 'awesome' (44), 'fantastic' (23), 'very good' (17), 'excellent' (14), 'amazing' (11), 'brilliant' (8).

Forty-one comments were feedback on ways to improve the pod including suggestions to make it: smaller so as to take up less space, bigger so as to last longer, with a drop-down side so babies can breastfeed while in the pod, of harakeke and not plastic, come with more bedding, have handles on four sides, have more colour choices, in two sizes, have softer edges for when babies' arms hit the sides.

**Contexts of use:** Some respondents commented in some detail, telling a story about their experience that gave context on their use of pods. A selection of these 'stories' are presented below with a summary statement of the learning inherent in the 'story'.

#### **Example of empowering recipients to share their pods and knowledge with others**

*I'm glad I was approached and given the option of having a pēpi-pod; it's a really good idea. I've given it away now to someone who's having her baby in a couple of months and told her all about it, she was a bit hesitant at first, but I told her 'trust me, you will want this; it's helped*

*me and I know it will help you, too.' I kept the merino blanket, but told her to use a woollen blanket. I've spoken to lots of young mothers and they love the pēpi-pod too, you get a good night's sleep having baby sleep close to you. I want a healthy lifestyle, I stopped smoking during pregnancy and I still don't smoke. I read up about what smoking does to the baby, I don't want my baby having ear infections and it costing money to go to the doctor.*

**Example of 'word of mouth' promotion of safe sleep options within social networks,**

*It's fantastic, especially for Māori who like to have our babies in bed with us. It's also good to be able to have her close to us day and night instead of having to drag around her bassinet or have her on the floor all the time. My cousin is due to have a baby in June so she will get my pēpi-pod plus I have told lots of my other friends who are pregnant to see if they can get a pēpi-pod when they have their babies.*

**Example of needing to include more than first-time parents in safe sleep support**

*Easy to move pēpi-pod from place to place. We placed pēpi-pod in cot beside our bed initially and then moved baby and the pod into our bed when he woke for his first night feed, and kept him close to us. The messages that we were given when we got the pēpi-pod were a great reminder for safe sleeping, being our 4th baby we sort of forgot about safety when baby sleeps, sometimes we have a 'she'll be right' attitude when it comes to sleeping. We will pass the pēpi-pod on to my cousin who is due to have a baby on April and will most definitely pass on the key messages to her also. It is her third baby.*

**Example of the pod as a tool for educating whole families about infant protection**

*All my family knew how to look after our baby when she was sleeping in her pēpi-pod. They knew not to smoke in the house or the car, and they knew they had to wash before touching her if they had just had a smoke. The pēpi-pod was more than a baby bed for us; we learnt so much about how to protect our baby from SUDI.*

**Example of the impact of knowledge plus an enabler in changing bed sharing practice**

*My 2 sisters had pēpi-pods for their babies so I knew about them a while ago, so when I had my baby I was excited to have a pēpi-pod for my own baby. I was worried about having baby in bed with me after the midwife talked to me about smoking, I had slept with my other babies in our bed when they were little, but now that I know the risk I have told all my friends and family not to sleep with their babies if they smoke.*

**Example of the importance of whānau in improving access to safe sleep support**

*I have moved from Kawerau to Picton. I passed the pēpi-pod onto my cousin who had no bed for her baby. They didn't have much money to buy a baby bed and they didn't know how to get a pēpi-pod here. I told her all the safety information. She said she is using it for her baby. I really liked the pēpi-pod. It was safe for baby and easy to carry around. I wouldn't have given it up if my cousin didn't need it.*

**Example of how the pod supports the everyday realities of family life with babies.**

*I am a bit paranoid about co-sleeping and with my previous babies often used to fall asleep while feeding them in bed. With my third baby, I woke one night to find him with his face in my armpit as he had rolled. It totally freaked me out. Having the pēpi-pod this time means that I could feed and when we were both sleepy, just put her across into her pod and pat her off to sleep and there was no chance of me or her siblings rolling on her or putting the blankets over her head. I found it really useful to take with me when I was visiting people or watching my other daughter at gymnastics and I could just put her to sleep in the pēpi-pod while we were there. It was also fantastic in the early days for putting her to sleep in when she was out in the lounge so that the kids didn't accidentally jump on her.*

**Example of the how pods supported a whole family with the demands of new-born twins.**

*When my twins were born we were offered the pēpi-pods at hospital for them. I was so excited as I thought the babies were too small to put in a cot. These pods have been amazing!! We stayed at my parents' house for 3 weeks so that my mum and dad were able to help us with the boys and also with our 20 month old little girl. Having these pods meant we could travel anywhere with the twins and still have a safe sleeping space for them. Only very occasionally did we ever have the boys in bed with us when we were unable to settle them as they suffer from colic and reflux. Also having the pods meant we could move them from room to room so that my husband and I could sleep and my mum or someone else could take care of the boys. I was expressing and bottle feeding the boys from 8 days old as they are both tongue tied and gave me badly cracked nipples. They are now fully formula fed as I dried up. But I am so grateful for these pēpi-pods. They have made having twins that little bit easier.*

**Example that portability and transparency are valued features of the pod.**

*I enjoyed the convenience of the pēpi-pod, it was light and portable and easy to take with us when we were travelling. A friend gave me a bassinet to use but I never used it because I found when I was in bed I had to sit up to look over the side to see my baby. With the pēpi-pod, baby was quite visible and that was a comfort for me looking over from my bed. My cousin is pregnant so I'm going to give her my pēpi-pod and pass on the safe sleeping messages.*

**Example of 'seeing is believing' and the impact of safe sleep role modelling using pods**

*I found the pēpi-pod very convenient. I loved how it made possible the fact that baby could sleep in my bed, but had his own space so he was always close. The merino blanket that came with it is a bonus and I love it. Baby is 11 months now and we still use the blanket, its great in both warm and cooler months. Other family members had mixed feelings about the pēpi-pod when I first used it, but after they saw the convenience and safer sleeps bubs was having it soon changed their minds. I have now passed on the pēpi-pod to a family member who was pregnant during the time I used it. I have kept the blanket though.*

**Example of the value of involving fathers and whanau in education about using pods**

*The pēpi-pod was really convenient, several family members also had Pepi-Pods and when we were all together, the babies were all in their pēpi-pods. We take it everywhere, when visiting family, to the beach and to the marae. People are really interested in it, including the nannies at the marae, and we tell them all about it and they think it's a good idea. My husband is a*

tour guide at the marae and sometimes he took baby along with the pēpi-pod and showed people. He was there when we were told about it at the beginning so he knew all about it.

### Example of night-time realities that can lead to risk-taking and how risks were avoided

The pēpi-pods were good for our twins. They were born five weeks early so were quite small when we got to take them home. We only had a big cot that the SCBU staff said may not be a good idea to sleep them both in because they were so small. So I was given two pēpi-pods to use. We used one in the cot beside our bed and the other was in our bed and the grumpiest twin each night ended up in the pēpi-pod in our bed next to us at night so that I could feed him without having to get in and out of bed, especially as I had had a caesarean with them. I am so grateful to have had the pēpi-pods. Thank you.

### Changes to infant mortality

Post-perinatal mortality (PPM) describes infant deaths from all causes for infants aged between one week and one year. Because sudden infant deaths require a review process before they can be classified by cause, it takes two or more years for SUDI rates to become available. On the other hand, PPM rates are available from Statistics New Zealand every quarter. This makes PPM rates a more responsive measure for monitoring the impact of the sleep space programme. Even though PPM includes all causes of death, preventable and non-preventable, where there are changes to preventable deaths these will become evident.

Total PPM rates fell by 29% during the survey period, from 2.4 to 1.7/1000 live births. Rates fell by 33% for Māori (from 4.3 to 2.9/1000 live births), and by 29% for non-Māori (from 1.7 to 1.2/1000 live births). (See Fig. 3 below)

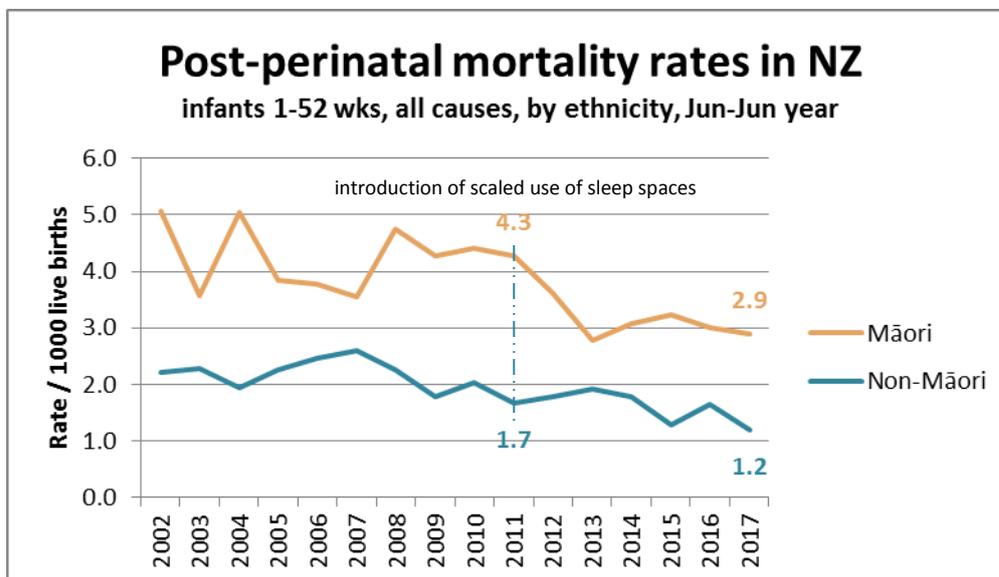


Fig. 3. Post-perinatal mortality rates in New Zealand

## Discussion

Learning from parents requires that we listen with care to what has been shared here; listen to

what lies beyond the words and numbers in order to make a meaningful translation of parents' experiences.

This is the only report of its kind. The health-funded and scaled supply of portable sleeping devices for more vulnerable infants is only happening in New Zealand, although there is growing activity in parts of Australia. While it is likely that the surveyed families were selected on the basis of whom could be contacted, rather than randomised to a 1 in 10 sample as intended, they make up a large group whose infants were mainly Māori or Pacific (82%) and exposed to key SUDI risks (94%). We must learn what we can from these parents.

### **Lesson 1: Pēpi-Pod sleep spaces were acceptable to and highly valued by Māori and Pacific families.**

The families of infants with ethnicity 'includes Māori' (n=776) and 'includes Pacific' (n=275) rated highly (7-9/9) their experience using pods, in terms of how pods supported them with safety, convenience and settling babies for sleep (91%, 89% and 73% for Māori, and 89%, 83% and 73% for Pacific, respectively). High ratings for the idea itself rose to 95% for Māori and 94% for Pacific. So, what might this mean?

When personalised comments are also considered, a picture emerges of high value for: having babies close by wherever parents are themselves, bed sharing with babies, frequent visiting with family and friends, frequent checking in on babies, marae and church based events. The high value rating for the pod is likely to reflect its compatibility with these existing values and practices. This alignment translated into feelings of control, reassurance, life made easier and success as parents in addressing safety, that were reflected in parents' comments. The intervention fitted well with their lived realities.

Surveyed parents were all Pēpi-Pod users as this was the only sleep space option offered to most of them in that period. Increasingly, wahakura sleep spaces are being offered as a health-funded option, too. Being hand-woven from harakeke (a flax-like plant), wahakura have obvious cultural appeal, especially to Māori, but not only to Māori. A commercial model for the supply of wahakura has been developed in some regions of New Zealand, but not all, and wahakura weaving wānanga (workshops) where parents are taught to weave a wahakura for their own babies, is a community-based supply option being supported by some district health boards.

The Pēpi-Pod programme developed in 2010 to support wahakura and reach more babies, but not to compete with wahakura; instead to act as its 'little sister' in the words of Dr David Tipene-Leach, who led the introduction of wahakura in 2006. This is still the intended relationship today – a complementary one.

While it would be interesting to have similar information about wahakura use as we report here for Pēpi-Pods, it would be unwise to pitch one device against the other. The dynamics of supply and demand is likely to be the arbiter for now. Where a choice of device is available, parents themselves will know which option they perceive best meets their needs, circumstances and values.

Given the strong acceptability of Pēpi-Pods by Māori and Pacific parents in this survey, and the reducing post-perinatal mortality rates that occurred during the survey period (a period when 90% of sleep spaces distributed were pods), it makes sense to continue the complementary roles of both devices for now, all the while supporting an increased supply of wahakura.

### **Lesson 2: Most parents understood the extreme hazard to babies from the joint action of 'smoking in pregnancy' and 'bed sharing with infants'.**

Smoking status influenced pod use. Compared to smokefree infants, those exposed to smoking in pregnancy were statistically significantly more likely also to be in a pod when bed sharing. This was the case for 'any bed sharing since getting pods' and for bed sharing 'last night'. Also, they were statistically significantly more likely to have a 'next bed' plan that included a cot and excluded bed sharing, thus extending the protection beyond the pod-using period.

This lesson suggests that several things had happened.

- Families had been well briefed about the purpose of the sleep space programme by the person distributing it, and families' distribution experiences supported this.
- Parents knew the degree of vulnerability for their infants, with younger (<17 weeks), premature (<37 weeks) and low birth weight (<2500 grams) infants also statistically significantly more likely to be in pods when bed sharing 'last night'.
- Parents were empowered by the knowledge, and enabled by the pod to take protective action.
- Parents were able to make an appropriate assessment of infant risk in deciding
  - when, where and for how long to use their pods
  - 'next-bed' arrangements for when their babies outgrew their pods.

Despite the strong and positive lesson above, 2% of infants were exposed to extreme hazard from the joint action of '*smoking in pregnancy*' and '*bed sharing last night*' despite having the means to prevent this. Also, 10% of infants were transitioning to 'next bed' arrangements that are not recommended as safe. Competing needs or knowledge gaps that may lead to risk-taking, must first be understood, and working with families to manage these is an essential aspect of any safe sleep intervention.

### **Lesson 3: Perceptions of infant risk, not ethnicity, drive the safe sleep responses of parents.**

The findings discussed above, where infant risk and not ethnicity, was related to safe sleep action by parents, is consistent with the finding from a recently published paper<sup>7</sup> that the association between SUDI risk and bed-sharing and/or smoking in pregnancy, is the same regardless of ethnicity. It is because Māori infants are exposed more frequently to both behaviours due to higher Māori smoking rates, rather than anything inherent in being Māori.

Implications for Safe Sleep education are positive and obvious; a shift is needed away from simplistic lists of single factor risks, and towards fostering understanding of how factors can combine to escalate, or reduce, risk. Smoking in pregnancy increases SUDI risk further when acting jointly with younger infant age, prematurity, low birthweight and/or impairment of bed

sharing adults from recent use of alcohol or drugs. Similarly, non-supine sleeping positions escalate risk for the small number of infants now exposed, when acting jointly with younger infant, being winter, and/or smoking in pregnancy. Soft items and loose bedding in the sleeping environment escalate risk for older babies who by their own actions may get into situations they then cannot get out of.

Parents in this survey have shown that they are empowered by 'joint action' thinking, that they can work with complex prevention messages when these are carefully explained and come with enabling tools, and that they have a strong drive to protect their infants when thus enabled. It is imperative, now, that safe sleep education is embedded in Triple Risk<sup>9</sup>/Triple Protection thinking for vulnerable age, vulnerable baby and vulnerable environment, to protect against the joint action of multiple risks that overwhelms most SUDI victims in current times.

#### **Lesson 4: Safe sleep knowledge and action within groups traditionally deemed 'high risk' or 'hard to reach' by health teams, were strengthened by pod-using parents.**

First and foremost, in using pods for their own infants, parents were visible role models of safe infant sleep within their networks, building a new normal where it is needed most. Then, scattered through the qualitative data were comments that parents passed their pods to cousins, sisters or friends along with the safe sleep messages. Embracing this communication role is a core component of the Pēpi-Pod Programme and is the mechanism by which the relationship between parents and the health service becomes a partnership. There is dignity in reciprocity, meaning in participation and shared responsibility in partnership. The Pēpi-Pod Programme was designed for these less visible impacts, too.

Parents may receive their pods for free, in an economic sense, yet pay for them many times over from simply using, talking about, and sharing their pods and knowledge, with others. Recipient parents became 'persons of influence' within their networks in ways that health professionals could never be. The 'hard to reach' by health teams were 'easy to reach' by families who, through their participation, have extended access to safe sleep knowledge and devices, helped normalise the use of pods, and contributed to reducing infant mortality rates in our country – and all within priority groups. This is an effective reorientation of the health service, as are wahakura weaving wānanga/workshops<sup>10</sup>, and their associated opportunities for safe sleep education, that are growing in Māori communities.

#### **Lesson 5: Parents of infants with multiple risks may have a misguided sense of safety from using Pēpi-Pod sleep spaces.**

A Pēpi-Pod is a sleep space not a *safe* sleep space. Any type of sleep space that can be brought into an adult bed can only be a partial solution to protecting infants from SUDI. Safety depends on when, where and how pods are used and the vulnerability of the infants placed in them. This is why a standard safety briefing at distribution is an essential part of the Pēpi-Pod Programme. Promoting *safe* sleep spaces is misleading. It may undermine education efforts to strengthen 'joint action' thinking where a confluence of risks is acting on infants.

Where there was smoking in pregnancy, 91% of parents rated pods highly for support with safety. Their infants were certainly *safer* in a pod, than not, when bed sharing, on a couch or

away from home, but they were still exposed to the effects of smoking in pregnancy, which, on its own carries a 6-fold increase in SUDI risk<sup>1</sup>. Equally, 85% of the 77 smokefree parents who were directly bed sharing 'last night' with their younger infants (<17 weeks) rated the pod highly for support with safety, yet direct bed sharing on its own carries a 5-fold increase in SUDI risk<sup>1</sup>. And 90% of the parents of the 78 younger (<17 weeks) infants placed in non-supine positions 'yesterday' rated the pod highly for safety, but non-supine positions for young babies remain risky practices<sup>1</sup>.

When briefing families on the use of sleep spaces, care is needed when discussing infant vulnerability and the part a sleep space can play in overall protection. Factors such as smoking in pregnancy, preterm birth and low birthweight cannot be modified once a baby is born, making it even more necessary to protect all infants exposed in these ways from any and all non-supine sleeping, any and all direct bed sharing, and any and all sleeps in rooms distant from parents.

The Pēpi-Pod Programme is embedded in diffusion of innovations theory<sup>8</sup> where **changing opportunities**, and not people, is the goal. Findings from this survey confirm that parents have taken up the opportunity for protection that the pod offers their infants, while continuing to live their lives and care for their babies in ways that are familiar, relevant and important to them.

Diffusion theory also explains that as a new idea or practice spreads and becomes more main stream, face to face communication becomes more important than campaigns<sup>8</sup> for influencing uptake. Before adopting a new idea or practice themselves, people look to trusted others for credible reassurance that it will be worthwhile. Pod-using parents embraced the opportunity to participate as protection advocates, and share their pods and knowledge through peer to peer conversations. In so doing, they strengthened influence for change within priority networks where there are more infants vulnerable to SUDI.

Survey findings, translated as lessons from parents, are consistent with the essential components of the Pēpi-Pod sleep space programme: distribute early to infants exposed to SUDI risks, provide a standard safety briefing to ensure understanding of infant vulnerability, explain the safety features of the pod and its recommended use, invite families to share their safe sleep knowledge and pods with others they know, collect programme data so that the voices of parents can be heard. The safety briefing **informs**, the device **enables**, the role to share **empowers**, and data **account** for the experiences of families.

## Conclusion

This report describes much more than the appropriate use of Pēpi-Pods in families with infants more vulnerable to SUDI. It also describes infant-care decision-making processes that were based on assessments of risk, and the capacity of families to respond to complex information in regard to the joint-action impact from exposure to multiple risks.

Overall, Pēpi-Pod sleep spaces were highly valued, appropriately used, and care decisions in families were driven by parents' assessments of their infants' risks. Having a pod enhanced protection opportunities for sleeping infants in a range of situations and reduced opportunities for extreme hazard from the joint action of 'smoking in pregnancy' and 'bed sharing'.

'Joint action' thinking for explaining infant vulnerability and ways to build protection where risks cluster in an infant, is recommended as a fresh and more precise focus for education about safer infant sleep.

## Tables

Table 1. Characteristics of participating infants

	Smoking in pregnancy			%
	Yes	No	Total	
<b>Participants</b>				
<b>Region (N=1110)</b>				
Northland	93	84	177	15.9%
Midland	336	376	712	64.1%
Central	62	55	117	10.5%
Southern	60	44	104	9.4%
<b>Ethnicity (n=1059)</b>				
Includes Maori	483	339	822	77.6%
Includes Pacific	125	147	272	25.7%
Maori or Pacific	530	322	852	80.5%
Other	51	144	195	18.4%
<b>Infant age when pod received (n=1121)</b>				
unborn or <1wk	318	261	579	51.7%
1-4 wks	173	201	374	33.4%
5 or more wks	72	96	168	15.0%
<b>Infant age at time of survey (n=1100)</b>				
≤ 16wks	<b>362</b>	<b>328</b>	<b>690</b>	<b>62.7%</b>
>16wks	<b>189</b>	<b>221</b>	<b>410</b>	<b>37.3%</b>
<b>Exposure to smoking</b>				
Before pregnancy	531	103	634	57.6%
During pregnancy	566	0	566	51.2%
In household	488	224	712	64.4%
<b>Prematurity / low birthweight (n=1114)</b>				
<37 wks or 2500g	150	138	288	25.9%

Table 2. Experiences of those using Pēpi-Pod sleep spaces

	Smoking in pregnancy			%	p value
	Yes	No	Total		
Duration of use (still using by infant age) (n=562)					
4 wks	238	282	520	93.9%	
8 wks	190	233	423	76.4%	
12 wks	128	165	293	52.9%	
16 wks	59	85	144	26.0%	
>16 wks	45	57	102	18.4%	
Frequency of use by 'currently using' infants (n=551)					
All or most sleeps	155	115	270	49.0%	
Some sleeps	145	136	281	51.0%	
Any bed sharing since getting pod (n=825)					
yes	415	410	825	74.5%	
Type of bed sharing (n=818)					
direct (no pod)	70	106	176	21.5%	p=0.001
indirect (with pod)	340	302	642	78.5%	
Bed sharing 'last night' (n= 209)					
direct (no pod)	61	64	125	59.8%	p=0.006
indirect (with pod)	25	59	84	40.2%	
Room sharing 'last night' (n=1119)					
Yes, in baby bed	429	361	790	70.6%	p=0.005
Yes, in adult bed	86	123	209	18.7%	
No	49	71	120	10.7%	
Next bed plans (n=1083)					
Unsafe options	41	69	110	10.2%	p=0.0007
Cot or bassinet	500	473	973	89.8%	
Breastfeeding 'yesterday' (n=1124)					
Only breastmilk	204	295	499	44.4%	p=0.00001
Some breast milk	168	152	320	28.5%	
No breastmilk	194	111	305	27.1%	
Sleep position 'yesterday' (n=1124)					
Back	488	498	986	87.7%	
Side	50	30	80	7.1%	
Front	9	17	26	2.3%	
No usual	19	13	32	2.8%	
Perception of support from using pods – rating 7-9/9					
safety	505	495	1000	90.2%	
convenience	494	478	972	87.6%	
settling for sleep	402	381	783	71.2%	
Overall idea	528	525	1053	93.5%	

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