How do Pacific island households and communities cope with seasonally absent members?

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Households and communities in the Pacific islands are increasingly likely to have some of their most productive members regularly absent due to growing opportunities for seasonal work abroad. If these absences are costly for the family left behind, the net development benefits of seasonal migration will be less than what they appear from remittances and repatriated foreign earnings, and there might be a role for government policies in host and source countries to mitigate some of the effects of absence. This article provides the first evidence of how Pacific island households and communities are affected by and cope with seasonal absences. We find that Tongan households have succeeded in mitigating many of the potential adverse effects associated with seasonal separation of members, whereas households from Vanuatu with members participating in the RSE appear to have suffered some short-term costs in terms of diet and health.

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Households and communities in the Pacific islands are increasingly likely to have some of their most productive members regularly absent due to growing opportunities for seasonal and other temporary work overseas. These opportunities include the 5,000 visas a year that are available for Pacific island workers under New Zealand's new Recognised Seasonal Employer (RSE) Program and the 2,500 visas that will be available over three years under the Pacific Seasonal Worker Pilot Scheme in Australia. Some long-standing temporary migration opportunities, such as for seafarers from

Kiribati and peacekeepers from Fiji, also entail considerable periods of separation for families and communities.

If these absences impose either monetary or non-monetary costs on the family and community members left behind, the net development benefits of seasonal migration will be less than what they appear to be from remittances and repatriated foreign earnings.[1] Various types of costs might be imposed on the family left behind, including disruption to human capital formation if children are withdrawn from school or learn more slowly because of an absent parent, reduced food production, possible nutritional stress and negative health shocks if there is inadequate labour to replace the home production inputs previously made by the migrant worker, and even dissolution of the household if the worker does not return to his or her family. At the community level, there might be a reduction in labour available for the production and maintenance of local public goods, reduced local surpluses could raise food prices and reduced inputs into village or customary events could weaken social capital.

The literature from other regions of the world does not provide clear guidance on either the relevance or the strength of these possible costs that absent migrants might impose on families and communities left behind. This lack of evidence is not due to a rarity of temporary migration; indeed, a 2003 International Labour Organisation (ILO) survey finds more than 500 bilateral labour agreements (UN 2006:82) and many developing countries appear to be suppliers of seasonal migrants. Instead, there has been a lack of comprehensive study of this issue. Most studies of seasonal migration (for example, Basok 2003) do not have baseline information on households from before the workers migrated and also lack control groups to see what might have happened to left-behind members in these households if the seasonal worker had not migrated.

In this article, we report more methodologically sound estimates of how households and communities are affected by and cope with seasonally absent members. We study short-term impacts from New Zealand's RSE program on diet, food production, health, human capital formation, household composition and community activity in Tonga and Vanuatu. The RSE allows migrants to work in horticulture and viticulture in New Zealand for up to seven months a year and has been in operation since 2007 (Ramasamy, Krishnan, Bedford and Bedford 2008). In the first year of the RSE program, most of the recruited workers were male,[2] and the majority were recruited for less than the full seven-month period.

While the RSE is open to all Pacific island countries, the New Zealand government has put in place facilitative measures with five Pacific island countries to help them increase their supply of migrant labour. The focus of this analysis is on two of these countries: Tonga and Vanuatu. They have been the largest suppliers of RSE workers. These two countries also provide contrasts since Tongan households and communities have had a long history of (settlement) emigration to New Zealand while the RSE is one of the first migration channels to open up for ni-Vanuatu.

Our estimates are based on two waves of a panel survey that we designed specifically for evaluating the RSE. The first wave provided baseline data on households just before workers left for their first season in New Zealand and was fielded from October 2007 to March 2008. The samples included, in addition to households with RSE workers, households with individuals who applied to participate in the RSE but were not recruited (henceforth 'RSE applicants') and households where no individuals applied to the RSE (henceforth 'non-applicants'). These two control groups provide counterfactuals of what might have happened to RSE house-

holds if the workers had not been absent. If there is non-random selection of households purposively choosing to have members apply for the RSE, stronger inferences are likely from using just the RSE applicants as the counterfactual group.

The second wave of our survey was fielded from April 2008 to July 2008, when most of the workers were still in New Zealand. This was expected to be the period of most costly adjustment for the left-behind families, when they would be suffering the absence of a child, spouse or parent and also facing possible financial stress. Such stress could occur at this stage because it is costly to send money from New Zealand to the Pacific, with transaction costs of at least 15 per cent (Gibson, McKenzie and Rohorua 2006). Consequently, many RSE workers repatriate most of their earnings home in person, rather than remitting them while they are in New Zealand.[3] At the time of the second wave of our survey therefore the left-behind family might not yet have benefited from the workers' earnings in New Zealand.

Literature on the effects of seasonal migration on left-behind families

Previous literature does not provide clear evidence of the effects that seasonal or temporary migration can have on the family members left behind. In part, this reflects weaknesses in the evidence base, since many household surveys in migrant-source countries do not distinguish between permanent, temporary and seasonal migration. Further, surveys of seasonal migrants often lack information on the family left behind because they are fielded only in the host country (for example, Basok 2000) and so cannot observe family members left in the source country. Even in studies of seasonal migrants where the fieldwork spans the source and the host country, it is typically only the households that participate in seasonal migration that are surveyed, and usually only after the fact (for example, Basok 2003). There are therefore no control groups to see what might have happened if the seasonal worker had not migrated and no baseline information to control for pre-existing differences with the control groups.

Even among the more methodologically sound studies there is no broad agreement in findings, perhaps because this literature is so limited that there is yet to be replicated study in the same settings. The most commonly studied impacts have been on children's human capital formation, where it is possible to find claims of both positive and negative effects. A recent study by Macours and Vakis (forthcoming) tested the cognitive development of 1,800 pre-schoolers (aged 3–7 years) in rural Nicaragua, where approximately one-half had an adult household member (most typically a father) seasonally migrate in the previous 12 months—either to other areas of Nicaragua or to other Central American countries. Their instrumental variable results (using shocks as the instrument) suggest that the migration of mothers has a positive effect on the cognitive development of these preschool children while there is no effect from the seasonal migration of fathers or other household members. These authors infer that the income benefits from mothers' migration outweigh any negative effects of separation on children's cognitive development.

In a contrasting finding, however, primary-school-aged (9–15 years) Filipino children with either parent working overseas had lower school grades and ranked lower in class than did children for whom neither parent was overseas (Battistella and Conaco 1998). The lower performance in school was especially marked for the children whose

mother was absent and these children were also more likely to report difficulty with homework and problems with teachers and classmates than were children whose father only was absent. Even though the migrant parents of these children were working on temporary work permits overseas, these were of long duration, with the average time abroad more than four years. It is possible that this longer separation, compared with the average separation of only three months in Nicaragua, accounts for the contrasting negative effects.

Among other forms of human capital formation, changes in diet for the family left behind are also possible, especially when there are strong gender roles in food production. For example, in Borovnik's (2007) interviews with the families of seafarers from Kiribati, some wives in South Tarawa reported a switch away from meals with fish and coconut toddy, since there was no adult male left in their household to go fishing or climb coconut trees. While these foods might be available for sale in local markets, the prices often appear prohibitive to consumers who are accustomed to obtaining them from family labour, especially if the family is not in receipt of regular remittances.

The gender roles in food production are an important feature of debate in the literature about the extent to which seasonal migration of men shifts agricultural workloads towards women. Evidence from rural Bolivia suggests that when men seasonally migrate to urban areas, including to neighbouring countries, women bear the burden of an increased agricultural workload (Gisbert, Painter and Quiton 1994). In rural areas of the Sahel in Burkina Faso, however, the *exode* (temporary migration of men for a few months to urban areas—mainly Abidjan) is carefully managed so as to not rob a household of all its adult men (Hampshire 2006). In fact, the gender roles are so strongly set in this area that even in the rare cases when a household's men are all on *exode*, the women do not take on any male production tasks and instead either 'import' male labour from extra-household networks or the left-behind group joins another household in order to have access to male labour.

Despite this example, there is little evidence of how widespread is the reformation of households in response to seasonal absences of (typically) adult males. In part, this reflects the difficulty of obtaining evidence from household surveys when the nature of the household changes so fundamentally that it affects the feasibility of surveys.[4] Qualitative data, however, suggest that such reformations can be an important cost imposed on the left-behind family. According to Borovnik's (2007) interviews with the families of seafarers from the outer islands of Kiribati, sometimes when the husband returns from voyaging he stays in the urban area of Tarawa rather than going home to his wife, and occasionally even takes a second wife in Tarawa, effectively abandoning the family in the outer islands.

Data

The data used in this paper are from a survey designed especially for evaluating the RSE. Information is used on 442 households from Tonga and 386 households from Vanuatu, with about 40 per cent of these households supplying RSE workers. A full description of the survey methodology, with detailed statistics on the baseline characteristics, is available from Gibson, McKenzie and Rohorua (2008) for Tonga and McKenzie, Garcia Martinez and Winters (2008) for Vanuatu. These two papers also discuss the differing processes used in each country for potential workers to apply to the RSE scheme and for the selection of workers.

The 442 households in the second wave of the survey in Tonga comprise 99 per cent of the households from the baseline survey, so there are no concerns with sample attrition. In Vanuatu, however, the 386 households interviewed in the second wave are only 83 per cent of the baseline sample, raising concerns about possible attrition bias.

To help explore the sample attrition, and also to illustrate the importance of controlling for baseline differences, summary information on baseline characteristics for five samples in each country is presented (Tables 1a and 1b). The first two sets of averages, in Columns (a) and (b), are for the full sample in Wave 1 and the sub-sample of panel households who were also interviewed in Wave 2. The statistical significance of any differences between the panel households and those in (a) who are not in (b) is also presented. The last three columns in Tables 1a and 1b present the means for three sub-samples of the panel households: those that sent RSE workers (Column c), the applicants (Column d) and the non-applicants (Column e). The

Table 1a **Baseline characteristics of households in Tonga with RSE workers, applicants and non-applicants**

	All (a)	In Wave 2 (b)	RSE (c)	Applicants (d)	Non-applicants (e)
Household size	5.20	5.21	5.76	4.97[a]	4.74[a]
Adult (>14 years) share of household	0.67	0.67	0.63	0.72[a]	0.68[c]
Male share of adults	0.53	0.53	0.55	0.51[b]	0.52[b]
Share of adults literate in English	0.93	0.93	0.94	0.90	0.96
Share of adults with schooling beyond grade 10	0.46	0.46[c]	0.43	0.49[c]	0.47
Share of adults who previously visited New Zealand	0.26	0.26[c]	0.37	0.19[a]	0.17[a]
Average days of hard physical labour/person/week	4.23	4.23	4.39	4.11	4.12
Number of pigs owned	5.53	5.53	5.69	5.46	5.39
Number of chickens owned	5.12	5.16	5.17	4.91	5.35
Number of cattle owned	0.46	0.45	0.47	0.47	0.42
Number of vehicles owned	0.63	0.63	0.60	0.62	0.68
Per capita total household income (pa'anga)[d]	1,030	1,035	829	1,093[a]	1,247[a]
Per capita total household consumption (pa'anga)[d]	1,028	1,026	832	993[b]	1,294[a]
Sample size	448	442	181	116	145

[a] significant at 0.01, [b] significant at 0.05, [c] significant at 0.1, [d] income and consumption estimates are semi-annual
Source: Authors'calculations

statistical significance of mean differences between the RSE households and the applicants, and between the RSE households and the non-applicants, is also reported.

The attrition in Wave 2 of the survey in Vanuatu appears to be related to some observable characteristics (Table 1b). The households that were not re-interviewed were smaller, had higher English literacy rates, did fewer days of hard physical labour and had higher per capita incomes and consumption in the baseline survey than the panel households that appeared in both waves of the survey. Some caution should therefore be exercised in drawing inferences from the results for the Vanuatu sample. In contrast, the only characteristics that show weakly statistically significant differences between the panel households and those not interviewed in Wave 2 in Tonga are the share of the adults with more than grade 10 schooling and the share that had previously been to New Zealand.

The other key feature from Tables 1a and 1b is the evidence of pre-existing differences between households that supplied

Table 1b **Baseline characteristics of households in Vanuatu with RSE workers, applicants and non-applicants**

	All (a)	In Wave 2 (b)	RSE (c)	Applicants (d)	Non-applicants (e)
Household size	4.75	4.82[c]	4.73	4.88	4.83
Adult (>14 years) share of household	0.69	0.68[c]	0.68	0.67	0.68
Male share of adults	0.53	0.53	0.52	0.53	0.53
Share of adults literate in English	0.77	0.75[a]	0.83	0.75[c]	0.69[a]
Share of adults with schooling beyond grade 10	0.06	0.05	0.07	0.04	0.05
Share of adults who previously visited New Zealand	0.03	0.03	0.10	0.01[a]	0.01[a]
Average days of hard physical labour/person/week	3.33	3.47[a]	3.14	3.35	3.76[a]
Number of pigs owned	3.51	3.65	3.86	3.87	3.38
Number of chickens owned	11.62	12.50[a]	9.42	14.30[b]	13.21[c]
Number of cattle owned	1.59	1.70	0.92	2.35[b]	1.75[c]
Number of vehicles owned	0.18	0.17	0.24	0.19	0.11
Per capita total household income (vatu)[d]	77,050	71,251[a]	88,768	68,343	62,258[b]
Per capita total household consumption (vatu)[d]	63,371	56,354[a]	63,474	64,509	46,420[b]
Sample size	466	386	105	113	168

[a] significant at 0.01, [b] significant at 0.05, [c] significant at 0.1, [d] income and consumption estimates are semi-annual
Source: Authors'calculations

RSE workers and either the applicant or non-applicant households. In Tonga, the RSE households were larger and had lower per capita income or consumption but also greater previous experience in New Zealand than either of the two comparison groups. In Vanuatu, the baseline differences go in the opposite direction, with the panel households that supplied RSE workers having higher per capita income, higher levels of education and lower exposure to agriculture (as seen from the fewer livestock owned and fewer days of hard physical labour). These baseline differences could interfere with inferences about the impact of the RSE if only a single comparison is made between RSE households, applicants and non-applicants. In fact, from the two waves of the survey, we are able to estimate *differences in differences*, which take account of pre-existing differences at the baseline and any changes affecting RSE households that might have occurred anyway.

Results for household diet indicators

A comparison of dietary indicators between RSE and non-RSE households, their change over time between waves of the survey and the difference in these differences across the sample groups are reported for Tonga (Table 2a) and Vanuatu (Table 2b). The first indicator was dietary diversity, which was simply a count of how many separate food types (from a list of 30) any member of the household had eaten on the day before the survey. The next seven indicators are counts of the number of meals eaten the previous day that contain a member of the following overlapping food groups: cereals (bread and rice); roots (taro, Chinese taro, kumara, taamu, yams, cassava and potato); fruits and non-root vegetables (green vegetables, fresh and dry coconut, banana, mango, pawpaw and other fruits); fish (fresh and tinned); fats (corned beef, mutton and coconut); meats (corned beef, mutton, fresh beef, chicken, pork and other meat); and milk. The final indicator is the equivalent market value of own-produced or own-captured food consumed by the household in the week before the survey.

On average, the sample in Tonga had eaten 7.5 different foods on the day before the survey, with no significant variation between RSE households and the other groups (Table 2a). Significant differences do show up in the number of meals with fruits and vegetables and with meats, with RSE households having fewer fruits and vegetables than either non-applicants or the overall non-RSE group (made up of applicants and non-applicants). On the other hand, the RSE households consumed more meals of meat in the second wave of the survey than either the applicants or non-applicants. For RSE households in Vanuatu, the number of foods eaten (6.9) is significantly lower than for applicant households, but not compared with non-applicants; and the number of meals of milk is significantly higher than for the applicants. It should be noted, however, that these differences in average diets are not robust estimates of the dietary impact of having a member go to New Zealand under the RSE, since they do not take account of any baseline differences in diets between the groups of households.

Similarly, the *change* in each dietary indicator relative to the baseline level, which is reported in Columns e–h of Tables 2a and 2b, does not give the full story of impacts due to RSE absences. These changes showed that for the Tongan sample there were increases in dietary diversity and in the number of meals from most food groups (except meats and milk), and in the value of consumption from own production. In contrast, for the sample from Vanuatu, there were reductions in dietary diversity, in the value of

Table 2a **Dietary indicators, changes from baseline and difference in differences for RSE, applicant and non-applicant households in Tonga**

	Dietary indicators (in Round 2)				Changes in diet components (from baseline)				Difference in differences (versus control groups)		
	RSE (a)	Applicants (b)	Non-applicants (c)	Non-RSE (d)	RSE (e)	Applicants (f)	Non-applicants (g)	Non-RSE (h)	Applicants (e–f)	Non-applicants (e–g)	Non-RSE (e–h)
Dietary diversity	7.49	7.52	7.71	7.62	1.73	1.85	1.75	1.80	–0.12	–0.02	–0.07
Number of meals of:											
Cereals	0.91	0.83	0.85	0.84	–0.05	0.15	–0.06	0.03	–0.20[b]	0.01	–0.08
Roots	1.65	1.63	1.68	1.66	0.24	0.18	0.26	0.23	0.06	–0.02	0.02
Fruit and vegetables	2.11	2.22	2.38[a]	2.31[b]	0.65	0.73	0.93	0.84	–0.09	–0.28[c]	–0.20
Fish	0.63	0.59	0.64	0.62	0.03	–0.02	0.03	0.01	0.05	0.01	0.03
Fats	1.04	1.11	1.13	1.12	0.33	0.44	0.50	0.47	–0.11	–0.17[c]	–0.15
Meats	0.92	0.79[c]	0.80[c]	0.80[b]	–0.02	–0.07	–0.20	–0.14	0.05	0.18[b]	0.12
Milk	0.34	0.28	0.34	0.31	–0.10	–0.23	–0.19	–0.21	0.13[c]	0.09	0.11[c]
Food production (pa'anga)	161	143	144	143	82	68	65	66	14	18	16
Sample size	181	116	145	261	181	116	145	261	297	326	442

[a] significant at 0.01, [b] significant at 0.05, [c] significant at 0.1

Notes: The RSE households included those where the worker was still in New Zealand and those where the worker had just returned home. The non-RSE group is the sum of applicants and non-applicants. In Columns b–d, significance is for comparison with Column a. In the difference-in-differences columns, the significance is for comparison with zero.

Source: Authors'calculations

Table 2b **Dietary indicators, changes from baseline and difference in differences for RSE, applicant and non-applicant households in Vanuatu**

	Dietary indicators (in Round 2)				Changes in diet components (from baseline)				Difference in differences (versus control groups)		
	RSE (a)	Applicants (b)	Non-applicants (c)	Non-RSE (d)	RSE (e)	Applicants (f)	Non-applicants (g)	Non-RSE (h)	Applicants (e–f)	Non-applicants (e–g)	Non-RSE (e–h)
Dietary diversity	6.87	7.55[c]	7.09	7.27	–2.73	–0.57	–0.54	–0.55	–2.17[a]	–2.19[a]	–2.18[a]
Number of meals of:											
Cereals	1.55	1.42	1.45	1.44	–0.55	–0.09	0.00	–0.04	–0.46[c]	–0.55[a]	–0.52[a]
Roots	1.95	2.18	2.07	2.11	–0.29	–0.32	0.14	–0.04	0.03	–0.43	–0.24
Fruit and vegetables	3.34	3.75	3.48	3.59	–2.11	–1.74	–0.58	–1.05	–0.37	–1.53[a]	–1.06[b]
Fish	0.65	0.77	0.55	0.64	–0.12	0.05	–0.08	–0.03	–0.18	–0.04	–0.10
Fats	1.06	1.16	1.06	1.10	–0.37	–0.43	–0.06	–0.21	0.06	–0.31	–0.16
Meats	0.64	0.54	0.63	0.59	–0.44	–0.12	–0.01	–0.06	–0.31	–0.43[b]	–0.38[b]
Milk	0.18	0.05[b]	0.11	0.09[b]	0.03	0.04	0.05	0.05	–0.01	–0.03	–0.02
Food production (vatu)	2,945	3,470	2,386	2,824	–1,556	–1,990	–1,530	–1,716	435	–26	160
Sample size	105	113	168	281	105	113	168	273	218	273	386

[a] significant at 0.01, [b] significant at 0.05, [c] significant at 0.1

Notes: The RSE households included those where the worker was still in New Zealand and those where the worker had just returned home. The non-RSE group is the sum of applicants and non-applicants. In Columns b–d, significance is for comparison with Column a. In the difference-in-differences columns, the significance is for comparison with zero.

Source: Authors'calculations

food consumed from own production and in the number of meals for most of the food groups except milk. These changes relative to the baseline presumably reflect seasonal or other temporal influences and highlight the difficulty of drawing inferences about the impact of the RSE if there is just a before-and-after series of questions directed at households supplying RSE workers, with no comparison with the changes also occurring in the control groups.

Instead, the *difference in differences* take account of pre-existing dietary differences between the groups of households and the changes in diets that might have occurred anyway. These showed that for RSE households in Tonga there was a reduction in the number of meals of cereals relative to the applicants and a reduction in the number of meals of both fruit and vegetables and fats relative to the non-applicants. This reduction in fats is due entirely to fewer meals with coconuts, which are also counted in the fruits and vegetables group. On the other hand, households with RSE workers recorded an increase in the number of meals with either milk or meat, relative to the applicants and non-applicants, respectively. Neither dietary diversity nor the value of own-produced food consumed show any difference in average changes for the RSE households compared with the other groups.

For RSE households in Vanuatu there appears to have been a significant reduction in dietary diversity. On average, the number of different foods eaten the day before the survey falls by two (compared with a mean of seven foods across all of the sample groups in Wave 2) for RSE households between Waves 1 and 2 of the survey, relative to changes in any of the control groups. There is also a reduction—by approximately 0.5—in the number of meals from the cereals group when compared with any of the control groups. No other significant difference in differences shows up with respect to the applicant group; there is, however, a reduction of 1.5 meals from the fruits and vegetables group and 0.4 meals from the meats group in comparison with the change that occurs in the non-applicant group.

One concern with drawing inferences from the results in Tables 2a and 2b is that some of the RSE workers (especially in Tonga) had already returned to their households by the time of the second wave of survey interviews. Hence the results for the RSE group, whether in levels or differences, will be an average across those households where the worker is still absent and those with a just-returned worker. To see if this averaging affects inferences, the following regression was estimated for the k^{th} indicator of diet (the subscript i for each individual household is suppressed) (Equation 1).

$$\Delta diet_k = \alpha + \beta_1 RSE + \beta_2 Returned + \varepsilon \quad (1)$$

The β_1 coefficient is the estimate of the impact on the households where the RSE worker is still absent while the sum of the β_1 and β_2 coefficients is the impact on households where the worker has returned.[5] Only two of the diet indicators—dietary diversity and the number of meals of milk—showed significant differences within the RSE group between the households with a returned worker and those where the worker was still away. Moreover, of these two indicators only dietary diversity showed a significant difference between the change for RSE households with the worker still away and the change for non-RSE households (a coefficient of –0.59). The pooling of the two types of RSE households is therefore likely to have only a slight effect in attenuating differences with respect to the non-RSE households in Tonga. This differentiation within the RSE group makes even less difference in Vanuatu, where only for the

number of meals of milk is there a weakly significant ($p = 0.06$) difference between the households with a just-returned worker and those with the worker still away.

Another concern with drawing inferences from Tables 2a and 2b is that household size might have changed between the waves of the survey—most obviously for households with an absent RSE worker. There are, however, also other movements into and out of households. The number of foods and meals eaten can decline simply because the household is smaller. When we control for this feature of the data, however, with the following regression (Equation 2) there appears to be an even more negative effect on the diets of RSE households in Vanuatu, with the coefficient on dietary diversity declining from –2.18 to –2.36.

$$\Delta diet_k = \lambda + \gamma_1 RSE + \gamma_2(\Delta Hhold\ size) + \varepsilon \quad (2)$$

Moreover, the decline (relative to applicants) in the number of meals of fish and meats also becomes weakly significant, whereas it was statistically insignificant in Table 2b. When the same regression is applied to the data from Tonga, the magnitude of the statistically significant coefficients from Table 2a is increased, with no changes in sign, and the increase in the number of meals of meat relative to non-RSE households becomes statistically significant ($p = 0.02$). It does not appear therefore that inferences drawn from Tables 2a and 2b about the impact of the RSE on household diets is distorted by failure to allow for changes in household size.

Results for individual human capital and health indicators

The estimation of the impacts on the human capital and health of individual household members of having an RSE worker go to New Zealand proceeds in a similar way as for the dietary impacts examined above. Since the data on human capital and health are captured at an individual level, however, the relevant sample varies for each indicator examined—in contrast with the household-level indicators examined above.[6] There are four human capital indicators used: school enrolment for those individuals aged 5–20 years; current grade for those in high school; high school grade adjusted for age (values less than 1 indicate slower progression than would be expected given age and an assumed primary school starting age of 5 years); and the number of days absent from school in the previous month. The five health indicators used include: whether the individual is reported as being in 'very good health' (the top level on a five-point scale); whether the individual's health is reported as being 'much better now' compared with one year ago; how many days in the past week the individual has done hard physical labour for four or more hours a day; whether the individual currently smokes; and whether the individual has consumed an alcoholic drink in the past month. The last two indicators are restricted to individuals who are at least 15 years old.

The absence of adults due to RSE work appears to have no significant negative impacts on human capital formation in Tonga. The results reported (Table 3a) show school enrolment rates for 5–20-year-old individuals in RSE households in Tonga of 0.90, significantly higher than the 0.83 rate in applicant households and insignificantly different from the 0.93 rate in non-applicant households (Table 3a). The number of days

absent from school in the previous month is also lower—at 2.06 versus 2.24—for children in RSE households compared with those in applicant households. Once pre-existing differences are taken into account, there are, however, no significant changes in any of the human capital indicators between individuals in RSE households and those in any of the control groups.

In Vanuatu, children in RSE households had significantly fewer days absent from school at the time of Wave 2 of the survey than did children in non-applicant households (Table 3b). This pattern, however, appears to reflect just baseline differences since there are no significant differences in differences between RSE and other households for school absences or any of the schooling variables (middle columns of Table 3b). One interesting pattern that does emerge when the RSE households are split into those where the worker has just returned and those where the worker is still in New Zealand is that enrolment rates are considerably higher—by 19 percentage points ($p = 0.03$)—when the worker is back in the household.

The health indicators do show some significant changes for RSE households in Tonga, but they are in the direction that would normally be considered improvements. Individuals in RSE households do fewer days of hard physical work than individuals in either applicant or non-applicant households and are less likely to drink alcohol than applicants (Table 3a). On the other hand, individuals in RSE households are less likely to report that their health is much better now than a year ago than are non-applicants. Once the change from baseline values is considered, only two health indicators show significant differences in differences—individuals in RSE households appear to have reduced hard physical labour by almost one-half day a week and the smoking rate among adults is 4 percentage points lower.

In contrast, the health changes in Vanuatu are more mixed, with at least some in the direction of negative impacts. Individuals in RSE households in Vanuatu have a significant reduction in the likelihood that they report as being in very good health and a significant increase in the risk of having their daily activities disrupted by a health complaint.[7] Relative to applicants, individuals in RSE households report a significant decrease in the number of days of hard physical labour, while relative to non-applicants there is a significant increase. There are also significant decreases in the likelihood of either smoking or drinking, relative to both control groups. None of these health indicators varies within the RSE group between individuals in households where the worker has just returned and those where the worker is still absent.

The health indicators available from the survey data are all self-reported, so it is not possible to detect whether they reflect just physical changes or whether they also include some psychological changes. It is known that anthropometric changes can occur quite quickly for children when a household is split by migration (Gibson, McKenzie and Stillman 2009), but it is less likely that changes would occur so rapidly for adults. If the households with absent RSE workers have temporarily lower cash incomes—perhaps because remittances have yet to be received from the worker—then illnesses might go untreated, which could account for the increased disruption from bad health as well as the decreased proportion of respondents reporting themselves in very good health. These effects could, however, also reflect psychological changes if the left-behind family members are anxious about either their absent worker or their own situation, and sad because they miss their family member.

Table 3a **Human capital and health indicators and difference in differences for individuals in RSE, applicant and non-applicant households in Tonga**

	Human capital and health indicators (in Round 2)				Difference in differences (versus control groups)			Sample sizes			
	RSE (a)	Applicants (b)	Non-applicants (c)	Non-RSE (d)	Applicants (a–b)	Non-applicants (a–c)	Non-RSE (a–d)	RSE	Applicants	Non-applicants	Non-RSE
Enrolment rate (5–20 years)	0.90	0.83[b]	0.93	0.88	0.04	0.00	0.02	337	191	215	406
Grade level (high school)	9.38	9.70	9.47	9.58	–0.08	0.03	–0.02	101	53	58	111
Grade for age	0.98	0.96	0.95	0.96	–0.01	0.00	0.00	101	53	58	111
Days absent from school	2.06	2.24[c]	2.19	2.21[c]	–0.17	–0.06	–0.11	279	144	186	330
Very good health	0.25	0.23	0.24	0.24	–0.05	–0.01	–0.03	874	502	583	1,085
Much better health	0.26	0.29	0.32[a]	0.31[a]	–0.03	–0.04	–0.04	874	502	583	1,085
Days of hard physical labour	2.83	3.31[a]	3.08[b]	3.18[a]	–0.46	–0.41[a]	–0.43[a]	625	376	462	838
Currently smoke?	0.28	0.32	0.29	0.31	–0.04	–0.04[c]	–0.04[b]	579	378	404	782
Drink alcohol in past month?	0.20	0.25[c]	0.24	0.25[b]	–0.02	–0.02	–0.02	579	378	404	782

[a] significant at 0.01, [b] significant at 0.05, [c] significant at 0.1

Notes: The RSE households included those where the worker was still in New Zealand and those where the worker had just returned home. The non-RSE group is the sum of applicants and non-applicants. In Columns b–d, significance is for comparison with Zero. In the difference-in-differences columns, the significance is for comparison with zero.

Source: Authors'calculations

Table 3b **Human capital and health indicators and difference in differences for individuals in RSE, applicant and non-applicant households in Vanuatu**

	Human capital and health indicators (in Round 2)				Difference in differences (versus control groups)			Sample sizes			
	RSE (a)	Applicants (b)	Non-applicants (c)	Non-RSE (d)	Applicants (a–b)	Non-applicants (a–c)	Non-RSE (a–d)	RSE	Applicants	Non-applicants	Non-RSE
Enrolment rate (5–20 years)	0.76	0.71	0.69	0.69	–0.03	–0.01	–0.02	172	188	280	468
Grade level (high school)	8.60	8.33	8.51	8.45	–0.06	0.45	0.27	13	11	20	31
Grade for age	1.10	0.93	0.97	0.96	0.00	0.06	0.04	13	11	20	31
Days absent from school	0.99	1.15	1.59[b]	1.41[c]	0.11	0.18	0.15	115	117	172	289
Very good health	0.71	0.74	0.73	0.73	–0.15[a]	–0.13[a]	–0.14[a]	292	379	538	917
Much better health	0.12	0.11	0.17[b]	0.15	–0.05	0.02	–0.01	292	379	538	917
Disruption from bad health	0.09	0.11	0.10	0.10	0.07[b]	0.07[b]	0.07[a]	292	379	538	917
Days of hard physical labour	1.86	2.32[a]	1.90	2.07[c]	–0.43	0.60[a]	0.18	232	317	457	774
Currently smoke?	0.10	0.25[a]	0.23[a]	0.24[a]	–0.16[a]	–0.09[a]	–0.12[a]	257	325	477	802
Drink alcohol in past month?	0.15	0.28[a]	0.28[a]	0.28[a]	–0.16[a]	–0.08[a]	–0.11[a]	257	325	477	802

[a] significant at 0.01, [b] significant at 0.05, [c] significant at 0.1

Notes: The RSE households included those where the worker was still in New Zealand and those where the worker had just returned home. The non-RSE group is the sum of applicants and non-applicants. In Columns b–d, significance is for comparison with Column a. In the difference-in-differences columns, the significance is for comparison with zero.

Source: Authors'calculations

Changes in household composition and other coping mechanisms

The difference-in-differences results suggest that the impact of an absent worker on the left-behind members of RSE households is largely neutral in Tonga but might be slightly negative in Vanuatu. There are at least two reasons why households can perhaps accommodate the temporary loss of a productive member: first, technology might allow the absent member to be somewhat present in the life of the household; and second, the remaining members might have access to various coping strategies. Moreover, depending on the previous contribution that the absent member was making before he or she left, there could be a relatively low opportunity cost to their absence.

There are likely to be substantial differences between Tonga and Vanuatu in all three of these factors and these differences could account for the more negative impacts apparent in Vanuatu. First, better access to communications and money transfer technologies makes it likely that absent Tongans are somewhat less removed from their family's life than are absent ni-Vanuatu workers. Second, coping strategies are likely to differ, especially because Tongan villages have been coping with out-migration and static or declining populations for many years, while villages in Vanuatu have a much more youthful population and fewer international migration opportunities. Finally, one key difference in the selection of RSE workers was that in Tonga the process targeted those from larger, poorer, rural households and those who were not in formal employment (Gibson, McKenzie and Rohorua 2008). In contrast, the selection of workers from Vanuatu was related less to observable characteristics that could correlate with a low economic opportunity cost of temporarily removing the worker from the household.

This cross-country difference in the opportunity costs of having an RSE worker absent emerges clearly from questions the survey asked of the person who headed the household while the worker was in New Zealand. According to the data provided by these respondents, in only 7.7 per cent of the RSE households in Tonga had the worker been in wage employment during the six months before he or she went to New Zealand. In contrast, 41 per cent of the surveyed RSE households in Vanuatu reported that the worker had been employed before going to New Zealand (Table 4). Similarly, monetary contributions to the household in terms of the unconditional average earnings in Vanuatu of the RSE worker before leaving for New Zealand were US$29 a week, versus only US$6.50 a week in Tonga. There is therefore likely to be a higher opportunity cost of an absent worker—in terms of forgone cash incomes—for RSE households in Vanuatu than for those in Tonga. On the other hand, the RSE workers in Tonga had been providing an average of 38 hours a week of household production (mainly gardening, child care and looking after domestic animals) while in Vanuatu they had been providing only 25 hours a week.

The cross-country differences in the accessibility of technology that can help an absent worker maintain a virtual presence at home also emerge clearly from the survey results. Specifically, just less than three-quarters (72.7 per cent) of the RSE households in Tonga used money that the RSE worker had sent from New Zealand to help replace the contribution the worker had previously made to the household. In Vanuatu, however, this proportion was significantly lower ($p < 0.001$), at just 39.1 per cent (Table 4). This difference most likely reflects the lower transaction costs

Table 4 **Previous contributions by RSE workers and the use of coping strategies and technologies to maintain a presence in their household: comparison of Tonga with Vanuatu**

	Mean		p-value for significant difference in means
	Tonga	Vanuatu	
Previous contribution of RSE worker[a]			
Proportion in wage employment	0.077	0.406	0.000
Average earnings per week (US$)	6.512	29.008	0.000
Hours spent on household production	37.596	24.661	0.000
Continued presence in life of the family			
Used remittances sent by RSE worker in New Zealand	0.723	0.391	0.000
Communicate with RSE worker at least weekly	0.724	0.257	0.000
Coping strategies			
Extra work by existing household members	0.905	0.523	0.000
Help from friends or neighbours	0.390	0.640	0.001
Help from the community	0.504	0.500	0.952
Ceased some activities	0.177	0.168	0.858
Changed household composition[b]	0.138	0.218	0.086
Had people join the household	0.079	0.115	0.334
Had people leave the household	0.101	0.138	0.368

[a] in the six months before the RSE worker went to New Zealand
[b] not including the RSE worker
Notes: The responses were from those households where the RSE worker was still in New Zealand and those where the worker had just returned home and in each case the person who was the head of the household while the worker was away answered the questions. Depending on the question, there were up to 181 respondents from Tonga and 101 from Vanuatu.
Source: Author's calculations

of sending money to Tonga and, especially, the much poorer geographic accessibility of banks, ATMs and money transfer operators in Vanuatu. It is also apparent that the RSE workers from Tonga were able to keep in much more frequent contact with their family—72.4 per cent of the RSE households in Tonga communicated at least weekly with their absent worker versus only 25.7 per cent of the RSE households in Vanuatu.

The coping mechanisms also differ between the two countries. The most common response of the Tongan households (used by 90.5 per cent) to replace the contribution of the absent RSE worker was for other members of the household to take on additional tasks (especially feeding animals).[8] In contrast, only one-half of the RSE households in Vanuatu relied on this strategy, with the additional work including market production such as copra sales. Instead, the most common coping mechanism, used by two-thirds of RSE households in Vanuatu, was to seek help from neighbours or friends. Most probably, these differences reflect the relatively larger size of RSE households in

Tonga and the greater labour surplus in villages in Vanuatu.

Another type of coping mechanism, used with equal frequency in Tonga and Vanuatu, was to stop doing some activities. Among the most common uses of time that were stopped in Tonga were church activities, especially singing, followed by weaving and tapa-cloth making, and then reduced involvement in community meetings. In Vanuatu, the most common activity that was reduced by RSE households was gardening, followed by reduced time looking after children and studying.

The final set of coping mechanisms considered by the survey was changes in household composition. These were somewhat more common in Vanuatu, with 21.8 per cent of RSE households either gaining or losing members (not counting the worker moving to New Zealand). In Tonga, only 13.8 per cent of RSE households changed composition as a coping mechanism and this proportion was weakly significantly different ($p < 0.09$) compared with Vanuatu (Table 4). In both countries, there was almost equal likelihood of either gaining or shedding household members while the RSE worker was absent. In fact, when the change in household size for RSE households is compared with the change in size for non-RSE households there are no significant differences in differences for either country.[9]

Community-level impacts

In addition to impacts on the left-behind members of households, the absence of RSE workers, their remittances and their subsequent return and repatriation of earnings are likely to have broader community-level impacts. To obtain some evidence of these impacts, the survey teams interviewed community leaders such as town officers, village chiefs, clergy and others who had been involved in the initial screening of RSE applicants. All of the 58 leaders interviewed in Tonga were from villages that had supplied RSE workers, while 55 of the 74 leaders interviewed in Vanuatu were from RSE-sending villages, with the others from villages that had RSE applicants.

Another difference between Tonga and Vanuatu is in terms of the spatial distribution of villages from which RSE workers have been recruited, and this could affect the reported community-level impacts. In Tonga, there was a conscious attempt by the government to include all regions and villages in the scheme. Consequently, all island groups participated reasonably equally, with the ratio of RSE workers to resident population varying in only a narrow range—from 0.4 to 1.4 per cent (Gibson, McKenzie and Rohorua 2008). In contrast, the recruitment of workers in Vanuatu concentrated on fewer islands (the reason that our survey also concentrated on only three islands: Ambrym, Tanna and Efate) and many villages within islands had no RSE workers.

In Tonga, 97 per cent of the interviewed leaders considered that participation in RSE by members of their community had been positive for the community (either 'very positive' or 'somewhat positive' on a five-point Likert scale). In fact, 74 per cent rated it 'very positive'. The most frequently listed benefits were income for families and income for the community and church, but changes in skills and work attitudes were also frequently noted. The separation of families was the main disadvantage of the RSE that was mentioned. A majority of the surveyed communities in Tonga had received monetary contributions from the returned RSE workers, averaging 700 pa'anga for each community. In 82 per cent of the communities this contribution was used for water-supply projects, with roads,

scholarship funds, streetlights, improvements to the village hall and a community lawn mower also mentioned.

In Vanuatu, the responses were more mixed, partly because not all of the leaders came from communities that had supplied workers and also because fewer of the workers had returned by the time the leaders were surveyed.[10] Just one-third of the interviewed leaders considered that their community life had been affected positively (community life was either 'much better' or 'better' on a five-point Likert scale) by the RSE scheme. Among this group, when they were asked about specific types of benefits, 70 per cent said that opportunities for children's schooling had increased, 50 per cent thought there were more job opportunities available and 44 per cent thought that more money was given to the community.

These types of benefits suggest that a more general equilibrium analysis, which takes account of changes in community-wide human capital, infrastructure, labour market conditions and prices, will eventually be needed to judge the full impacts of the RSE.

Conclusions

The new seasonal worker programs in the Pacific have the potential to improve significantly the wellbeing of participating workers, their families and their communities. The overall development impact will, however, depend on how successfully families and communities are able to cope with the absence of their workers. This article provides a first look at how households in Tonga and Vanuatu have adjusted to workers participating in the first year of New Zealand's RSE scheme. Since the pre-migration characteristics of RSE households differ from those of applicant and non-applicant households that did not send RSE workers, simply comparing households with an absent RSE migrant with those without one will likely yield biased results. We therefore employed a difference-in-differences estimation to control for pre-existing differences and continuing trends.

The results show that households in Tonga have been able to adjust rather smoothly to the absence of their RSE member. There were, at most, small changes in diet, no changes in child schooling or adult health and less hard physical labour by household members. The majority received remittances from their absent members and were able to communicate with this member regularly. In contrast, the results suggest that the adjustment process might not have been as smooth for households in Vanuatu. They appear to have been eating less variety of foods while members are away and are suffering more health complaints. On the positive side, there was no change in child schooling. The greater remoteness and poorer infrastructure of islands in Vanuatu meant that less than 40 per cent of the surveyed ni-Vanuatu households were able to rely on remittances from the migrant as a means of coping with their absence and only one-quarter of the households were able to communicate regularly with their household member. Households received far more in money when their family member returned than was sent back while the family member was absent. This highlights the need for further improvements in the banking and remittance infrastructure in Vanuatu to reach remote island communities.

The changes reported here are those in the first year of the RSE program. It is thus the first time that most of the families and communities have had to learn how to cope with the absence of a seasonal migrant—and the first time the migrant has had to learn how to best serve his or her family while

overseas. It is thus possible that the costs of separation will fall in subsequent years as households and communities learn ways of adjusting, and if current repatriated savings can be used to sustain households during the next migration episode. It is also possible, however, that the costs to families of having members absent for up to half the year might accumulate with multiple episodes of separation, in which case the medium and longer-term adjustment costs might exceed those measured here in the short term. Our research will continue to follow these households into at least their second season of migration to investigate these issues.

Notes

1 There are also possible spill-over benefits to the community of having some members participate in seasonal migration, such as the possibility that unemployed non-migrants are able to work in jobs previously undertaken by migrants and that the remittances sent back can stimulate the local economy. We are not able to observe these changes occurring in the short period involved, but will monitor them in the longer term.

2 Official data as of May 2008 showed that 91 (78) per cent of RSE workers from Tonga (Vanuatu) were male. Only 28 per cent were recruited for the full seven-month period while 43 per cent were recruited for periods of less than five months.

3 On average, the ratio of repatriated earnings to remitted earnings was 5:1 for the RSE workers who had returned home to Vanuatu in our sample, although it was lower for those from Tonga.

4 Most longitudinal surveys used by economists are panels of *dwellings* rather than of people, so if the left-behind members move in with another household they are likely to disappear from the samples.

5 The weighted average of β_1 and the sum of β_1 and β_2 correspond to the values in Columns e–h of Tables 2a and 2b.

6 To allow space for reporting the sample sizes, the set-up of Tables 3a and 3b differs from Tables 2a and 2b in suppressing the columns that report the changes from the baseline. These estimated changes are available from the authors.

7 The 'disruption from bad health' indicator is not reported for Tonga because in most of the sub-samples there were zero respondents who reported such disruption.

8 Since Table 3a indicated that individuals in RSE households did fewer days of hard physical labour than non-RSE households, some of the extra tasks taken on in Tonga might not have been physically demanding. Moreover, there might also have been a seasonal rise in gardening labour demand experienced by all Tongan households, as seen from the increased value of food production in Table 2a. So, extra tasks might also have been taken on by the members of non-RSE households. We cannot confirm this since there was no similar section of the questionnaire for them.

9 The estimates are not in Table 4, which is restricted to the households that reported on their coping activities rather than the full sample including non-RSE households. The coefficients (*p*-values) from the difference-in-differences estimation for household size change, net of the RSE worker, are: Tonga = 0.068 (0.20); Vanuatu = 0.012 (0.92).

10 The community leader surveys in Tonga took place approximately five months after those in Vanuatu (starting in October 2008, compared with May 2008).

References

Basok, T., 2000. 'Migration of Mexican seasonal farm workers to Canada and development: obstacles to productive investment', *International Migration Review*, 34(1):79–97.

——, 2003. 'Mexican seasonal migration to Canada and development: a community-based comparison', *International Migration*, 41(2):3–25.

Battistella, G. and Conaco, C., 1998. 'The impact of labour migration on the children left behind: a study of elementary school children in the Philippines', *SOJOURN: Journal of Social Issues in Southeast Asia*, 13(2):220–41.

Borovnik, M., 2007. 'Labour circulation and changes among seafarers' families and communities in Kiribati', *Asian and Pacific Migration Journal*, 16(2):225–49.

Gibson, J., McKenzie, D. and Rohorua, H., 2006. 'How cost elastic are remittances? Evidence from Tongan migrants in New Zealand', *Pacific Economic Bulletin*, 21(1):112–28.

——, 2008. 'How pro-poor is the selection of seasonal migrant workers from Tonga under New Zealand's Recognised Seasonal Employer (RSE) program?', *Pacific Economic Bulletin*, 23(3):187–204.

Gibson, J., McKenzie, D. and Stillman, S., 2009. What happens to diet and child health when migration splits households? Evidence from a migration lottery program, Mimeo., The World Bank, Washington, DC.

Gisbert, M., Painter, M. and Quiton, M., 1994. 'Gender issues associated with labor migration and dependence on off-farm income in rural Bolivia', *Human Organization*, 53(2):110–22.

Hampshire, K., 2006. 'Flexibility in domestic organization and seasonal migration among the Fulani of northern Burkina Faso', *Africa*, 76(3):402–26.

Macours, K. and Vakis, R., forthcoming. 'Seasonal migration and early childhood development', *World Development*.

McKenzie, D., Garcia Martinez, P. and Winters, L.A., 2008. 'Who is coming from Vanuatu to New Zealand under the new Recognised Seasonal Employer (RSE) program?', *Pacific Economic Bulletin*, 23(3):205–28.

Ramasamy, S., Krishnan, V., Bedford, R. and Bedford, C., 2008. 'The Recognised Seasonal Employer policy: seeking the elusive triple wins for development through international migration', *Pacific Economic Bulletin*, 23(3):171–86.

United Nations (UN), 2006. *International Migration and Development Report*, 16 May 2006, UN Secretary-General, United Nations, New York and Geneva.

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