Can a Multipronged Strategy of “Soft” Interventions Surmount Structural Barriers for Financial Inclusion? Evidence From the Unbanked in Papua New Guinea

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ABSTRACT We study the impacts of a comprehensive financial inclusion program in a particularly remote, insecure and low-trust setting, lacking bridging institutions to facilitate sustained interventions. We evaluate this program in Wewak district in northwest Papua New Guinea, by randomly assigning treatment to 41 of 79 villages. The program involves a 2-day financial literacy training workshop, timely offers of no-fee bank accounts with reduced administrative hurdles, and savings ‘nudges’. We use both survey and bank account administrative data to measure its impact on financial literacy, budgeting and savings behavior, as well as on the ownership and use of bank accounts. Although 25 per cent of adults in treatment villages attended the training and 70 per cent of participants opened a bank account, we do not detect any significant downstream effects. Our results draw into question the benefit of initiatives aiming to ‘bank the unbanked’ in remote areas, revealing challenges in promoting financial inclusion among the next frontier of underserved and hard-to-reach populations.

KEYWORDS: Field experiment; financial education; saving; banking; Papua New Guinea; reminders

1. Introduction

Policymakers seek to increase financial inclusion for the poor in developing countries to enhance resilience, mitigate inequality, and deepen financial markets. Financial inclusion enjoys a prominent position as part of the 2030 Sustainable Development Goals (SDGs). Being part of the financial system can allow people to better manage risk, start or invest in a business, and fund large expenditures such as education or home improvements (Ashraf, Karlan, & Yin, 2010; Bruhn, Lara Ibarra, & McKenzie, 2014; Burgess, Wong, & Pande, 2005; Dupas & Robinson, 2013). However, despite progress in recent years in enhancing access to formal financial services, a number of open questions remain about enhancing financial inclusion, particularly in rural and remote areas lacking market access and in areas facing low trust and insecurity, and for households that are not easily reached through bridging institutions such as microfinance institutions, agricultural cooperatives, schools, or private companies.
Attempts to date at enhancing financial inclusion have largely focused on three key barriers: lack of financial literacy, the administrative, procedural and cost barriers to the take-up of formal financial services, and social and behavioural interventions that can stimulate and reinforce good financial health. However, insights from prior studies, which generally focus on tackling one barrier at a time in more densely populated areas through leveraging bridging institutions (such as existing community organisations), may be less relevant for more isolated, remote, and insecure populations. For example, while there is broad evidence that intensive financial education is more impactful (Kaiser & Menkhoff, 2017), intensive and prolonged interventions may be infeasible in hard-to-reach locations. Meanwhile, simply providing bank accounts, even after removing some fees and administrative barriers, may not be impactful in the absence of additional support stimulating account utilisation (Dupas, Karlan, Robinson, & Ubfal, 2018).

According to policymakers, only 37 per cent of adults in Papua New Guinea (PNG) have access to a bank account, which is one of the highest rates of exclusion in the world (Pacific Financial Inclusion Programme (PFIP), 2017). In the rural and remote areas covering most of the country, most people lack basic financial knowledge about savings and budgeting. A comprehensive survey by the World Bank in two largely rural provinces in PNG (Madang and Morobe) showed that most households do not budget and over two-thirds of households stated that they would not be able to cover a major unexpected expense tomorrow without borrowing (Sibley, Kauzi, Barker, Zhang, & Gibson, 2015). The only nationwide survey on financial literacy in PNG showed that just 25 per cent of respondents understood how to calculate compound interest and a little over half of respondents understood percentages (Anglo Pacific Research, 2013). As PNG is not part of the Global Financial Inclusion Index, it is difficult to directly compare these measures of financial literacy and behaviour to other countries, but they are likely to be among the lowest in the world (World Bank, 2021).

To address these challenges, the Asian Development Bank (ADB) and Australian Government have supported the Bank of PNG to implement a highly scalable financial inclusion programme over the past 8 years that has reached more than 250,000 adults across all provinces of PNG (Asian Development Bank, 2016). This programme was the main way the PNG Government planned to meet its commitment to ensure at least one million new bank accounts were opened within a 2-year period, which was part of a global initiative, called the Maya Declaration, to ‘bank the unbanked’ (Bank of Papua New Guinea, 2013; The Alliance For Financial Inclusion, 2021). The programme included a 2-day training workshop on financial literacy, focusing on saving and budgeting. The features of the workshop match a number of best practices for financial training that have found support in recent literature, including being ‘simple and actionable, personalised for individuals’ needs and situations ... convenient to access and entertaining to participate in’ (Wagh, 2017). In particular, the workshops were simple and relevant to the local context, and personalised through individual budgeting exercises and role-playing. Bank agents then visited the same communities at the end of the training to offer bank accounts with limited to no fees. This careful timing allowed participants to make an immediate, convenient decision about accessing a bank account.

For the purposes of this study, we augmented the nationwide programme with two additional intervention elements. First, reducing the burden of bank account sign-up, by allowing participants in the training to register for a bank account simply with the combination of their training certificate (verified by the training team), and physical identification by the head of their ward. Bank agents often augmented this by taking a photo of participants. Second, participants who had a mobile phone received six SMS reminders to save every two weeks following the training.

To identify the impact of the programme, we conducted a cross-sectional randomised control trial in 2017–2018 across 79 wards in Wewak district in East Sepik province in northwest PNG, a remote part of the country with high levels of violence and theft, and hence low trust (Lakhani & Willman, 2014). The region had not previously been exposed to the training...
programme. According to the 2011 PNG Census, there are over 87,000 people spread across Wewak district. The Wewak economy largely depends on cash crops and is isolated in terms of land transport from the broader PNG economy. Wewak town is the only urban centre in Wewak district. There are three main banks operating in the district and all have branches in Wewak town. All three banks offer mobile money services, most commonly through feature phones. However, most of the study wards were in rural areas outside Wewak town, where households are typically engaged in small-scale agriculture, such as cocoa. In the entire province, there were around 30,000 active bank accounts for over half a million people.

In August 2017, prior to treatment assignment, we conducted a baseline survey with an adult in each of a representative sample of 3123 households, in the 78 candidate wards. Results of the baseline survey confirm low ex ante access to savings options outside the household. After treatment assignment, the training workshops were launched in September 2017. The training was socialised through ward leaders, and anyone in the community was free to join. By the end of 2017, 80 per cent of participants had completed the programme, with the remaining 20 per cent completing the programme in January and February 2018. We conducted a follow-up survey and based our cross-sectional randomised control trial on this data in August 2018, which is on average 9 months after the median participant completed the programme.

On average, 25 per cent of the entire adult population in the treatment wards attended the training. This is notable, as previous studies have found that demand for financial education can be very low, even in the presence of incentives (e.g. Bruhn et al., 2014). Hence, it is striking that a broadly targeted programme with no financial incentives managed to reach around a quarter of the population. Furthermore, administrative data illustrates that bank agents were present at the end of the training in every treatment ward, and bank account take-up was around 70 per cent among the trainees. Overall, this suggests a relatively strong ‘first stage’ to the experiment, sufficient to make the detection of economically meaningful impacts on downstream outcomes feasible.

Despite the popularity of the programme, we did not detect significant downstream effects in any of the major outcomes in our follow-up survey, except for savings behaviour. Administrative data from the commercial banks in Wewak district corroborates the findings from primary surveys, as over 80 per cent of the bank accounts that were opened as part of the programme were not used. Per our pre-analysis plan, we study heterogeneity in the treatment effects from the programme in terms of distance to Wewak town, frequency of attendance to Wewak town (where the banks are based) and ownership of a mobile phone (as savings SMS reminders were only sent to participants with a phone). We find some evidence that the programme had a positive effect on the savings behaviour of respondents who rarely visit Wewak town, and on those located in more remote wards. This higher level of savings did not lead to greater use of bank accounts, potentially because these participants face higher transaction costs from visiting the bank in person, which is how almost 90 per cent of transactions are made. Collectively, our results draw into question the benefit of initiatives aiming to ‘bank the unbanked’ in remote areas, revealing challenges in promoting financial inclusion among the next frontier of underserved and hard-to-reach populations.

This study provides a number of contributions to the literature on the impacts of financial education, and more broadly to the literature on financial inclusion, in developing countries. First, while prior literature has shown limited impacts from more narrowly focused financial inclusion programmes, this is one of the first randomised evaluations to consider an intervention that addresses multiple constraints. Prior studies have often shown relatively limited benefits from programmes that only focus on one component of financial inclusion, such as low-fee bank accounts, particularly when focusing on usage (Dupas et al., 2018; Knowles, 2018), or financial education training on its own (Bruhn et al., 2014; Carpena, Cole, Shapiro, & Zia, 2019; Fernandes, Lynch, & Netemeyer, 2014; Kaiser & Menkhoff, 2017; Miller, Reichelstein, Salas, & Zia, 2015). Among the few studies combining financial education and bank account
offers, Jamison, Karlan, and Zinman (2014) showed that a combined intervention increased the level of savings of households through youth clubs in Uganda. However, the bank accounts were group-based. In a broadly similar vein, Calderone, Sadhu, Fiala, Sarr, and Mulaj (2018) added a financial education programme to the rollout of a branchless banking programme, showing that this led to an increase in savings. However, this relied on an intensive financial access programme. Finally, there is evidence that SMS reminders can be an effective nudge to increase the use of savings accounts (Karlan, McConnell, Mullainathan, & Zinman, 2016), although there are relatively few studies that consider the impacts of follow-up account offers or training with regular reminders to save. We study one of the most comprehensive financial inclusion programmes to be evaluated, as it aims to increase knowledge, accessibility to banks (through bringing in bank agents to do local sign-ups in a timely way, reducing or eliminating fees, and simplifying documentation requirements), and nudge people to use their bank accounts.

Second, with respect to the literature on financial education, we provide evidence on a programme that integrates a number of ‘best practice’ characteristics highlighted in recent literature. There is promising evidence that financial education programmes with features such as being simple and actionable (e.g. Drexler, Fischer, & Schoar, 2014), targeted and personalised (e.g. Carpena et al., 2019), and convenient and entertaining (Berg & Zia, 2017), can have significant benefit (Wagh, 2017). Meta-analyses of the literature on financial education interventions have also previously emphasised the importance of timeliness (Fernandes et al., 2014; Kaiser & Menkhoff, 2017). While by nature the intervention we consider is not timed to coincide with specific financial decisions of participants, the bank account offers and savings reminders are designed to build on and reinforce the education component in a timely way.

Third, we provide evidence on a scalable financial inclusion programme in a relatively unique setting. Prior evaluations of financial inclusion programmes, whether through bank accounts with reduced access constraints or other mechanisms to increase savings, have tended to be conducted in urban or peri-urban locations (e.g. Prina, 2015), and/or have leveraged bridging institutions to build and sustain connections to beneficiaries, such as formal and informal financial institutions, agricultural cooperatives and clubs, schools, and private companies (e.g. Ashraf, Karlan, & Yin, 2006; Brune, Giné, Goldberg, & Yang, 2016; Dupas & Robinson, 2013). Programmes on financial education have also tended to be conducted in urban areas (e.g. Bruhn et al., 2014; Carpena et al., 2019; Doi, McKenzie, & Zia, 2014), and also to leverage bridging institutions (e.g. Bruhn, de Souza Leão, Legovini, Marchetti, & Zia, 2016). Lessons in successful financial education programmes tend to be more intensive (Kaiser & Menkhoff, 2017) and may not be scalable in rural and remote contexts, particularly when bridging institutions are lacking, so this is an important question as various stakeholders look to increase financial inclusion among the next frontier of underserved and hard-to-reach populations. We provide evidence from a particularly remote setting in Papua New Guinea with relatively high risk of theft, insecurity, and lack of trust. Prior studies of financial inclusion interventions among populations facing insecurity or conflict are also relatively scarce (e.g. Blumenstock, Callen, & Koepke, 2015; Hetling, Postmus, & Kaltz, 2016).

Finally, we contribute what is to our knowledge the first large-scale randomised control trial of a primarily economic intervention in the country of Papua New Guinea, and one of the first in the Pacific Islands. A small set of prior studies in other Pacific Islands have included leveraging randomisation to look at the impacts of community-driven development (Beath, BenYishay, D’Adda, Grosjean, & Weber, 2018) and migration through a public lottery (Gibson & McKenzie, 2014). Our study contributes to evidence-based policymaking in this part of the world, by providing evidence on a highly policy-relevant issue for the region, from a preregistered study design.
2. Background

2.1 Setting of the study

Papua New Guinea is a lower-middle-income country, with one of the highest rates of extreme poverty in Asia, and ranks in the bottom 20 per cent of countries globally in terms of the United Nations Human Development Index (United Nations Development Programme, 2019; World Bank, 2019). PNG also has a relatively low rate of bank account ownership, with only 37 per cent of the adult population owning an account (PFIP, 2017), compared to 63 per cent across low- and middle-income countries globally and over 70 per cent in developing East Asia and the Pacific (World Bank, 2021). As of 2017, there were three main retail banks in PNG (Bank South Pacific, People’s Micro Bank and MiBank), 227 branches, 464 ATMs, and 460 agents servicing a population of almost eight million people (PFIP, 2017).

The impact evaluation took place in the northwest of PNG in Wewak district in East Sepik province (see also the map of the parts of Wewak district included in Supplementary Materials S1). At the time of the 2011 PNG Census, there were 87,761 people in 16,278 households spread across Wewak district. Many of these wards are located on remote islands or in mountainous terrain, which makes them logistically very challenging to reach. Subsistence farming is the main activity and this occurs all year around. The only major source of economic activity that generates cash flow in the district is cocoa and copra farming. These crops are harvested all year round.

Access to bank accounts is slightly higher in Wewak district compared to the rest of the country, according to administrative data provided by the three main banks that have retail operations there. This is largely driven by residents of Wewak town, where the only physical bank infrastructure in the district is located. Nevertheless, there is only limited use of mobile cash agents by banks. The majority of wards in the district are located within 2 h by public motor vehicle ride on sealed roads from Wewak town. As such, access to banks to actually deposit or withdraw money is possible but time-consuming and relatively costly.

2.2 Intervention

The financial inclusion programme we are evaluating is a key activity facilitated by the Centre for Excellence in Financial Inclusion at the Central Bank of PNG (BPNG). In total, US$25 million of financing, primarily by the ADB, was spent on this programme from 2011 to 2019. Over 250,000 people, half of whom are women, participated in the training across all provinces in PNG, and around 100,000 bank accounts have been opened by participants in conjunction with the programme.

The financial inclusion programme that we evaluate in Wewak district in East Sepik province took place primarily from September 2017 to February 2018. The programme was open to all adults in the treatment wards and they were invited to preregister one to two weeks in advance at ward meetings. Anecdotal evidence suggests that around half of households in a ward send a representative to attend the weekly meetings. It was during these meetings that ward members were informed and reminded about registering for the financial education training.

There were three main components to the programme: (1) financial education training about the benefits of saving and budgeting; (2) access to fee-free bank accounts that could be opened away from bank branches with reduced administrative requirements; and (3) savings reminders sent via SMS to the owners of the bank accounts. The aims of the programme, based on the hypotheses described further in Supplementary Materials S2, are to increase financial literacy, budgeting, and savings behaviour as well as to integrate people into the formal financial system through the ownership of bank accounts. The programme is clearly designed in a way that implies that a lack of knowledge about financial literacy and a lack of access to formal financial
products are binding constraints to improved budgeting and savings behaviour. We look at each component of the programme in greater detail below.

2.2.1. Component 1: two-day financial education training. The training course consisted of 2 (consecutive) days focusing on the topics of savings and budgeting (a brief summary of topics can be found in the Supplementary Materials S3). The content of the course was developed by the US-based organisations Microfinance Opportunities and Freedom from Hunger through funding by the Citigroup Foundation, and we then tailored it to the local context. The savings module (a total of 11 h) focused on encouraging participants to set savings goals, increase their level of savings, and prepare for emergencies by setting aside money in an ‘emergency fund’. The budgeting module (7 h) taught participants how to budget and keep records of their income and expenses as well as set short-term and long-term financial goals. All participants were required to develop their own personalised savings and budgeting plan and were encouraged to share their plans with the group. In addition, there were opportunities for participants to be involved in role-play and ask questions throughout the course.

A widely respected local non-government organisation won the competitive tender process to conduct the training. The training took place at the ward level, but there was a maximum of 30 participants per instructor. On average, three separate sessions were held simultaneously in each ward (i.e. 60–90 people were trained). All highly qualified and certified instructors received a 5-day training course by BPNG staff. The training was primarily conducted in the local dialect, Tok Pisin.

2.2.2. Component 2: bank account offers. All participants in the programme were immediately offered no-fee bank accounts from the commercial banks that operate in Wewak district at the end of the training. The banks agreed to send agents to the 41 treatment wards on the second day of the financial education training to sign people up to get bank accounts. In addition, they removed the onerous identification requirements that often inhibit people from accessing bank accounts, instead accepting customers on the basis of a training completion certificate and verification of their identity by the head of the ward. In practice, only one of the three banks, MiBank, regularly attended the training sessions (visiting all wards where the training was conducted); however, participants in all treatment wards had access to an agent from at least one bank. Only training programme participants were eligible for the fee-free accounts (details in the Supplementary Materials S4), and the banks did not offer the accounts to other people in the treatment wards who did not attend the training, or anyone else from the control wards or elsewhere. This was verified using programme data and random auditing by BPNG staff.

2.2.3. Component 3: savings reminders. All participants in the training that signed up for a no-fee bank account and had a mobile phone received six SMS reminders every two weeks following the training, to encourage them to use their bank accounts. These messages referred to some of the themes discussed as part of the financial education training (see Supplementary Materials S5). Most of the participants elected to open mobile money accounts, which meant it was possible for them to transfer funds into their accounts upon receiving an SMS without needing to contact an agent or visit a branch. The messages were sent in both English and the local dialect, Tok Pisin.

3. Methodology

3.1 Data collection

The main sources of data for this study are a representative baseline survey with 3123 households in 78 wards and follow-up survey of 3071 households across 79 wards. The data collected
in the follow-up survey was used for the cross-sectional randomised control trial. The questions included in the questionnaire in both the baseline and follow-up surveys cover background characteristics of households, budgeting activities, ownership and use of financial products, financial literacy, financial awareness, and decision-making within households (see variable definitions in the Supplementary Materials S6). The main source of questions was from a 2014 survey conducted by the World Bank in neighbouring provinces, which used a standardised questionnaire about financial capability that had been rolled out in 14 low- and middle-income countries in Latin America, Africa, the Middle East, East Asia, and the Pacific (Sibley et al., 2015). Additional questions were sourced from a 2013 survey on financial literacy in PNG conducted by the market research firm Anglo Pacific and funded by the ADB (Anglo Pacific Research, 2013).

The fieldwork for the baseline and follow-up surveys was conducted by Tebbutt Research, which is a leading survey firm in the Pacific region. Households included in the survey were selected using a ‘random walk’ approach to approximate a representative sample of the ward. Enumerators were instructed to approach the household and first seek to interview the household head. If the household head was not available, then they were instructed to seek to interview the household head’s spouse. If the spouse was not available, then they were instructed to interview an adult member of the household who was well informed about the household’s financial behaviour.

Both the baseline and follow-up surveys took around four weeks in the field. The baseline survey was conducted in August 2017 and the follow-up survey took place in August 2018. Data quality was ensured at multiple steps throughout the collection process. We complement this primary survey data with administrative data from the three main commercial banks in Wewak district and with programme reporting data from the implementing partner that was independently verified by BPNG.

3.2. Experimental design and analysis

3.2.1. Randomisation and statistical balance. To identify the impact of the programme, we randomised the treatment at the ward level, with a single treatment arm (41 wards) compared to a single control arm (38 wards). Many of the wards in Wewak district are located on remote islands or in mountainous terrain, which makes them very challenging to reach. Due to logistical constraints, only 79 of the more accessible wards in Wewak district were included in this study. We stratified the randomisation of wards by sub-district to ensure the treatment and control wards were equally allocated within each of the five sub-districts in Wewak district.

The random selection of which wards participated in the financial inclusion programme resulted in statistical balance on observables between treatment and control wards across the key background characteristics in both the baseline and follow-up surveys (see Table B1 and Table B2 in Supplementary Appendix). To be clear, the data collected in the baseline and follow-up survey rounds are each meant to obtain a representative sample within each ward. However, due to attrition (primarily at the individual level) respondents in both rounds are not necessarily the same. This is because there were instances where we could not contact the individuals or households from the baseline round. More information about survey and experimental design related to attrition, reducing contamination and minimising spillovers are in Supplementary Appendix A.

3.2.2. Sample size and statistical power. We conducted statistical power calculations based on our main outcome of interest, bank account ownership, to determine the minimum sample size needed across these 79 wards to detect an increase of 10 percentage points at the level of the population in a single cross-sectional follow-up survey round. As per preregistration, we made the set of assumptions shown in Table B4 in Supplementary Appendix based on existing BPNG
programme data and the experience of the programme managers in other parts of PNG. Based on these assumptions, a sample size of at least 3,000 households in 79 wards was determined to be appropriate.

Our experiment is adequately powered to be able to detect an effect on a range of outcomes of interest beyond a 10-percentage-point increase in bank account ownership from a single post-treatment survey round. We will be able to detect an effect on behaviours that are plausibly directly impacted by the training programme (e.g. savings and budgeting behaviour) at a similar order of magnitude to that of bank account ownership. Prior studies have found effects of a size that we would be powered to detect for such outcomes, such as a 10 percentage point increase in financial knowledge (Carpena et al., 2019).

3.2.3. Statistical model. We perform two types of empirical analysis using the follow-up survey data. The first and most straightforward type of analysis we conduct is comparing the effect of the programme on the outcomes discussed above using an Ordinary Least Squares (OLS) regression in the form of a linear probability model.9 We use this model to examine the intent-to-treat estimate of the programme. This involved creating a dummy variable, \( T_i \), which takes on the value one if the respondent belongs to the treatment group and the value zero if the respondent belongs to the control group. In addition, we create a dummy variable for each of the outcomes of interest discussed above (\( Y_{ij} \)):

\[
Y_{ij} = \beta_0 + \beta_1 T_i + \gamma X_i + \theta_j + \epsilon_{ij}
\]

where \( i \) denotes households, \( j \) denotes sub-districts, \( \beta_1 \) captures the average difference between respondents in the treatment group and the control group in regards to the outcome of interest (\( Y_{ij} \)), \( \epsilon_{ij} \) is the error term and cluster robust standard errors will be estimated at the ward level, \( \beta_0 \) is the intercept, \( X_i \) is the set of background characteristics, and \( \theta_j \) is sub-district fixed effects.

We also explore heterogeneous effects of the treatment between different groups of respondents. We preregistered our intention to explore heterogeneity in terms of respondents’ distance from Wewak town, frequency of attendance to Wewak town, and ownership of a mobile phone.

3.2.4. Multiple outcome and multiple hypothesis testing. Since our surveys contain a number of questions related to financial knowledge, behaviours, and outcomes, we follow Kling, Liebman, and Katz (2007) in creating aggregate indicators for different families of outcomes. These indexes are created by determining the average z-score of outcomes within a given family, such as financial literacy (obtained by subtracting the mean of each variable and dividing it by its standard deviation). The three families of outcomes relate to financial literacy/knowledge, budgeting, and savings. In the main results section we present the impact on each of the individual questions that make up these aggregates along with the overall impact of the indexes. For the sake of brevity in the heterogeneous treatment effects section, we only present the effects on the aggregate measures. As the questions regarding bank account ownership/use are quite distinct,10 we chose not to create an index for these outcomes.

4. Data

4.1. Descriptive data from household survey

4.1.1. Background characteristics of respondents. As discussed in Section 2.1, this study took place in the district surrounding a small, coastal urban area in a remote part of PNG. Just over half the respondents to our survey (51.4 per cent) lived either in Wewak town or within 30 min travel to the main marketplace in the town. On average, respondents reported a monthly household income of K220 (approximately US$65) shared between six people. This means that the
fees associated with owning a bank account (see Supplementary materials S4) would constitute up to 5 per cent of the average household income over a 3 months period. Respondents who lived in Wewak town reported a household income around twice as large as those that lived in the other four rural sub-districts and 70 per cent reported they earned an income through labour. As is the case in most subsistence settings, households in rural areas of Wewak district largely relied on food crops as their main source of income and around half earned an income from the main cash crop, cocoa. Levels of education were also substantially higher in urban areas, with around 57 per cent of respondents within Wewak town having attended secondary school, compared to an average of 34 per cent in the other four rural sub-districts.

4.1.2. Levels of financial inclusion. At first glance, survey respondents would appear to have had a moderate level of financial inclusion without the programme; however, this is largely on the extensive margin as opposed to the intensive margin. While half of respondents claimed they set a target of how much to spend each week or month, only 22 per cent reported sticking to their targets. Similarly, around 42 per cent of respondents claimed they saved weekly, but only half of them reported saving each time they were paid. Surprisingly, around half of survey respondents reported owning a bank account prior to the start of the programme. However, as is the case with budgeting and savings, this aggregate figure masks lower levels of financial inclusion. Only 16 per cent of respondents reported actually depositing money in their bank accounts at least once a month. As such, two-thirds of people that owned a bank account rarely or never used their bank account.

One of the main reasons respondents stated for not owning a bank account was lack of access to banks and their agents. This can be seen by the fact that about 90 per cent of respondents in Wewak town, Wewak rural and Dagua sub-districts (70 per cent in Turubu and the islands sub-districts) had not encountered or heard of a bank agent visiting their ward in the 6 months prior to the survey. In addition, less than 10 per cent of respondents in the baseline survey stated they had access to informal savings outside the household. As such, prior to the programme, most participants did not have access to savings options (either formal or informal) outside of their household.

4.2. Programme attendance and bank account take-up data

This subsection provides an overview of the implementation of the programme by drawing on data about programme participants and bank account take-up.

4.2.1. Programme attendance data. On average, around 25 per cent of the adult population attended the training in the 41 wards where the programme took place. Figure 1 shows the variation in training between wards. The training was much more popular in wards in the three sub-districts further away from Wewak town, with over 25–30 per cent of the adult population being trained. In the wards just outside Wewak town around 20 per cent of the adult population were trained and in wards in Wewak town less than 15 per cent attended.

As part of the registration for the programme, we collected background characteristics about the gender of participants and their existing ownership of bank accounts. On average, 53.6 per cent of participants were female and within each training session the share of females varied from 13 per cent to 95 per cent. Among people who attended the training, the ownership of existing bank accounts was only 34 per cent, which is considerably lower than the rate of ownership reported in the population-representative survey data.

4.2.2. Bank account take-up. Around 70 per cent of participants opened an account as part of the programme (in total, 2158 accounts were opened). This meant that the account ownership rate among participants more than doubled as at the start of the programme only 34 per cent
of participants owned a bank account. Almost 75 per cent of accounts were opened with MiBank, which was probably driven by the fact that MiBank was the only bank whose agents visited all wards where the programme took place. When participants could pick from multiple banks at their training location, no single bank was substantially more popular than others.

5. Results

In this section, we first present administrative data about bank account use that shows even though there was high take-up of accounts, the vast majority were deactivated due to lack of use. We then draw on the follow-up survey data that was collected 6–12 months after the programme to illustrate the impact of the programme. Specifically, we present the results of the randomised control trial on financial literacy and knowledge, including financial behaviours like budgeting, which are the expected first-order impacts of the programme, and then on downstream economic behaviours such as savings and ownership of active bank accounts. Finally, we present heterogeneous effects from the treatment.

5.1. Bank account use

This subsection presents analysis of bank account use by drawing on administrative data provided by the bank that opened 75 per cent of the accounts as part of the programme (MiBank).12 These findings are purely descriptive and provide insights into what programme participants did with their account after they opened it. Strikingly, over 80 per cent of bank accounts were not used over a 9-months period after being opened as part of the programme (Figure 2).13 Importantly, banks deactivate accounts that have not been used over a 3-months period. This means that even though 2158 accounts were opened as part of the programme (see Section 4.2.2), only around 200 accounts remained active by the time of the follow-up survey.

Over the same 9-months period, only 25 per cent of pre-existing accounts in Wewak district were not used. Conditional on being used, accounts opened during the programme and those
that were pre-existing had similar sized deposits (the median deposit size was K30 for both groups, and the mean was K361 for pre-existing accounts and K407 for those opened during the programme).

Overwhelmingly, the main channel through which bank account holders make transactions is in person at the bank (see Figure 3). This is the case for accounts opened as part of the programme (86 per cent of transactions) and pre-existing accounts (80 per cent). Interestingly, programme participants were more than six times more likely to use an agent than existing account holders. However, despite recently receiving training on mobile phone banking, programme
participants were almost three times less likely to make a transaction via the phone compared to existing account holders.

We also consider the timing of when deposits are made as we would expect this to potentially increase immediately following the SMS saving reminders being sent. We do not observe a clear trend in the data to suggest that this is the case. The exception is in terms of the first SMS message being sent, whereby there was a noticeable increase in deposits. However, this was only after less than 20 per cent of participants had been trained and the increase in deposits was only in the order of three times higher than the previous peak. As such, we conclude this is weak evidence to suggest these nudges had an impact, especially in light of the fact that there was no further evidence to suggest that the SMS messages had an effect.

5.2. Main findings from survey data

In this subsection, we show that the programme failed to have a statistically significant average treatment effect on any of the financial literacy and knowledge outcomes, but we find positive effects on downstream savings behaviour. In line with administrative data about the bank account use discussed in Section 5.1, we fail to detect an effect on ownership of active bank accounts 6 to 12 months after the programme.

Table 1 shows the programme did not improve participants’ financial literacy and knowledge. In the treatment and control groups, more than 80 per cent of respondents answered a question on basic division correctly and had heard of budgeting (columns (1) and (4) respectively), while two-thirds of respondents answered a question about percentages correctly (column (2)), which is in line with previous surveys in PNG on this topic (Sibley et al., 2015). In both groups only a third of respondents answered a question about compound interest correctly (column (3)) and given there were only three options, this means on average they failed to outperform a simple guess. The upper bound of the 95 per cent confidence interval for the literacy index (column (5)) shows we can rule out even a small effect size (above 0.063 standard deviations).

Table 2 shows the programme had no effect on budgeting behaviour. In general, 41.6 per cent of respondents state they regularly spend money on drugs and alcohol, when they have money left over after paying for essentials (column (6)). While the majority of respondents (65.5 per cent) set targets of how much to spend each week or month, only 35.0 per cent reported sticking to this and only 17.6 per cent write this down (columns (3) to (5)). The upper bound of the 95 per cent confidence interval for the budget index (column (7)) shows we can rule out even a small effect size (above 0.028 standard deviations).

Table 3 shows the programme had a positive effect on self-reported savings behaviour. Respondents in the treatment group were more likely to report they could pay an unexpected expense tomorrow (between 2.5 and 3.8 percentage points; columns (1) and (2)), and the
Table 2. Impact on participants’ financial planning behavior

|       | (1)   | (2)   | (3)   | (4)   | (5)   | (6)   | Budget index |
|-------|-------|-------|-------|-------|-------|-------|--------------|
|       | B1    | B2    | B3    | B4    | B5    | B6    |              |
| Treatment | 0.036* | -0.012 | -0.007 | 0.003 | 0.011 | -0.011 | -0.012 |
| p-value | 0.079 | 0.326 | 0.711 | 0.822 | 0.548 | 0.625 | 0.556 |
| 95% CI | (-0.077, 0.004) | (-0.037, 0.012) | (-0.047, 0.032) | (-0.025, 0.031) | (-0.026, 0.049) | (-0.054, 0.033) | (-0.051, 0.028) |
| Control variables | Y | Y | Y | Y | Y | Y | Y |
| Control group mean | 0.638 | 0.860 | 0.655 | 0.176 | 0.350 | 0.416 | 0.006 |
| N     | 3071  | 3071  | 3071  | 3071  | 3071  | 3071  | 3071         |

Notes. Standard errors are clustered at the ward level. ***, **, and * indicate significance at 1, 5, and 10 per cent critical level. All estimates control for sub-district fixed effects, dummies of respondents’ gender, relations to households, education, phone ownership, traveling time and cost to visit Wewak town.
estimate for column 2 is statistically significant at the 10 per cent level. They were also more likely to have money left over after paying for their weekly expenses (2.5 percentage points; column (3)), however this estimate is not statistically significant. In addition, they were 4.8 percentage points more likely to keep money for the future (column (4)), and 0.07 points higher on an index of savings (column (5)), with the latter estimate significant at the 5 per cent level.

Table 4 shows the programme did not have a positive treatment effect on the ownership and use of bank accounts. On average, more than half of respondents reported having an active bank account (columns (1) and (2)) and just over a quarter of them used their accounts (column (3)). The upper bound of the 95 per cent confidence interval for each of the outcomes is quite small, ranging from 2.9 to 4.1 percentage points.

5.3. Heterogeneous effects analysis, based on survey data

In this subsection we present the heterogeneous effects of the treatment in terms of respondents’ location, frequency of attendance to Wewak town and access to a mobile phone. We preregistered our intent to examine heterogeneity along these dimensions.

Collectively, this analysis provides evidence suggesting that the programme increased informal (non-bank) savings behaviour among people with less access to information and less exposure to the financial system, whether due to living in a more remote ward, visiting Wewak town less frequently, or not owning a mobile phone.

5.3.1. Location of respondents. We consider how the effect of the treatment varied by location. As discussed above, respondents that live within 30 min travel from the centre of Wewak town

| Table 3. Impact on savings behavior and resilience of households |
|-----------------------------------------------|
| (1)  | (2)  | (3)  | (4)  | (5)  |
| S1   | S2   | S3   | S4   | Save index |
| Treatment | 0.025 | 0.038* | 0.025 | 0.048* | 0.073** |
| p-Value | (0.021) | (0.020) | (0.022) | (0.024) | (0.032) |
| 95% CI | (−0.016, 0.067) | (−0.002, 0.077) | (−0.018, 0.069) | (−0.000, 0.097) | (0.010, 0.135) |
| Control variables | Y | Y | Y | Y |
| Control group mean | 0.144 | 0.232 | 0.560 | 0.591 | −0.036 |
| N   | 3071 | 3071 | 3071 | 3071 |

Notes. Standard errors are clustered at the ward level. *** *, and * indicate significance at 1, 5, and 10 per cent critical level. All estimates control for sub-district fixed effects, dummies of respondents’ gender, relations to households, education, phone ownership, traveling time and cost to visit Wewak town.

| Table 4. Impact on ownership and use of bank accounts |
|-----------------------------------------------|
| (1)  | (2)  | (3)  |
| Own account | Number of accounts | Use account |
| Treatment | −0.012 | −0.009 | −0.009 |
| p-Value | (0.025) | (0.025) | (0.019) |
| 95% CI | (−0.062, 0.038) | (−0.060, 0.041) | (−0.046, 0.029) |
| Control variables | Y | Y | Y |
| Control group mean | 0.518 | 0.514 | 0.269 |
| N   | 3071 | 3071 |

Notes. Standard errors are clustered at the ward level. *** *, and * indicate significance at 1, 5, and 10 percent critical level. All estimates control for sub-district fixed effects, dummies of respondents’ gender, relations to households, education, phone ownership, traveling time and cost to visit Wewak town.
Table 5. Heterogeneous treatment effects

| Variables                          | (1) Literacy index | (2) Budget index | (3) Save index | (4) Own account |
|-----------------------------------|--------------------|------------------|----------------|-----------------|
| Treatment                         | 0.026              | 0.007            | 0.076*         | −0.061*         |
|                                  | (0.034)            | (0.021)          | (0.044)        | (0.034)         |
| Time to Wewak                     | 0.073              | 0.021            | −0.039         | −0.053          |
|                                  | (0.059)            | (0.053)          | (0.058)        | (0.049)         |
| Treatment × Time to Wewak         | −0.039             | −0.041           | −0.006         | 0.104**         |
|                                  | (0.051)            | (0.045)          | (0.064)        | (0.047)         |
| Panel A – Heterogeneous treatment effects by location |
| Treatment                         | −0.026             | −0.027           | 0.127***       | 0.028           |
|                                  | (0.034)            | (0.028)          | (0.043)        | (0.028)         |
| Frequency to Wewak                | −0.034             | 0.006            | 0.163***       | 0.091**         |
|                                  | (0.040)            | (0.023)          | (0.040)        | (0.039)         |
| Treatment × Frequency to Wewak    | 0.075              | 0.036            | −0.118**       | −0.088*         |
|                                  | (0.046)            | (0.040)          | (0.057)        | (0.046)         |
| Panel B – Heterogeneous treatment effects by frequency of visits to Wewak town |
| Treatment                         | −0.012             | −0.023           | 0.071*         | −0.009          |
|                                  | (0.041)            | (0.026)          | (0.043)        | (0.037)         |
| Own phone                         | 0.089***           | 0.041            | 0.132***       | 0.227***        |
|                                  | (0.031)            | (0.028)          | (0.034)        | (0.027)         |
| Treatment × Own phone             | 0.036              | 0.022            | 0.003          | −0.006          |
|                                  | (0.041)            | (0.035)          | (0.051)        | (0.035)         |
| Control variables                 | Y                  | Y                | Y              | Y               |
| N                                 | 3071               | 3071             | 3071           | 3071            |

Notes. Standard errors are clustered at the ward level. ***, **, and * indicate significance at 1, 5, and 10 percent critical level. All estimates control for sub-district fixed effects, dummies of respondents’ gender, relations to households, education, phone ownership, traveling time and cost to visit Wewak town. Time to Wewak is a dummy variable, coded as 1 if it would take less than 30 min to visit Wewak town and 0 otherwise. Frequency to Wewak is a dummy variable, coded as 1 if the respondents visited Wewak town at least twice over the last four-week period and 0 otherwise. Own phone is a dummy variable, coded as 1 if the respondents owned or had regular access to a mobile phone and 0 otherwise.
have substantially higher levels of financial literacy, budgeting, saving, and use of bank accounts than those that live further away, suggesting less opportunities for the programme to achieve impacts. Furthermore, Section 4.2.1 further documents that rates of training participation increase in distance from Wewak town, and take-up rates of training tend to be higher among the unbanked, which might provide more leverage to improve outcomes in rural areas. On the other hand, those living closer to Wewak town have lower physical barriers to access banking services. Hence effects could go either way, or these forces could cancel each other out.

Table 5 shows that the treatment effect on savings behaviour was statistically significant at the 10 per cent level for respondents who lived more than 30 min away from the centre of Wewak town (Panel A, column (3)). However, there was a negative point estimate (statistically significant at the 10 per cent level) of the effect of the programme on the ownership of active bank accounts for these more remote respondents (Panel A, column (4)).

5.3.2. Frequency of attendance to Wewak town. Relatedly, we consider how the treatment varies by the frequency with which respondents visit Wewak town in Panel B. Expected impacts follow a similar logic to the previous section, whereby frequency of visits can serve as an alternative measure of proximity.

We detect a large, positive statistically significant effect on savings behaviour from the programme on respondents who rarely visited Wewak town (Panel B, column (3)), while the effect was much smaller for the respondents who frequently visited Wewak town as shown by the negative and statistically significant interaction term.

5.3.3. Ownership of a mobile phone. We also examine the effect of the treatment based on whether respondents had a mobile phone as only programme participants with a mobile phone that opened an account received the SMS reminders. Consistent with the administrative data on bank account use (see Section 5.1), Panel C shows there were very few differences between respondents on this dimension, except for the positive treatment effect on savings behaviour among respondents who did not own a mobile phone.

6. Discussion and conclusion

Our results show there is a strong interest in learning more about savings and budgeting in the communities in Wewak district, and high demand for opening of bank accounts. According to the programme data, around 25 per cent of the adult population participated in the training in treatment wards and as part of the programme over 1000 people that had previously been ‘unbanked’ gained access to a bank account. The level of popularity of this programme in this setting appears to be higher than other types of financial inclusion programmes around the world (Bruhn et al., 2014; Dupas et al., 2018). This is particularly remarkable in light of the fact that the programme in Wewak was offered to the entire population in each treatment ward, whereas most financial inclusion programmes rely on bridging institutions and established networks (Jamison et al., 2014; Wagh, 2017).

A potential reason for the relatively high level of interest in the programme compared to similar programmes in other developing countries is that many of the treatment wards are very remote and most people lack access to secure savings options (either formal or informal) outside of their household. This means there are very few opportunities for people in these wards to access any kind of training, formal financial institutions and/or safe places to store their savings.

Despite the popularity of the programme, there is little to no evidence to suggest participation resulted in improvements in downstream outcomes, at least in the short term, as our follow-up survey took place on average 9 months after the intervention. The survey data shows there were no large improvements in financial inclusion as a result of the programme. There
was some evidence that people increased informal (non-bank) savings, particularly those with less access to information and less exposure to the financial system, whether due to living in a more remote ward, visiting Wewak town less frequently or not owning a mobile phone. A potential reason why we see no impact on financial knowledge but some limited impact on reported savings is that the financial knowledge components of the programme, such as how division, percentages, and compound interest works in the context of financial management, were subsumed under the various examples given during the training related to savings and budgeting. As such it is reasonable to expect that the programme would be more likely to have an impact on the general lessons from the training (e.g. that it is important to regularly save money) as opposed to specific aspects of financial knowledge. The administrative data from banks reinforces the overall finding from this study that there were little to no benefits from the programme as less than 20 per cent of the accounts that were opened as part of the programme were actually ever used. The lack of downstream effects from this programme is in line with evidence from similar financial inclusion programmes around the world (Burgess et al., 2005; Dupas et al., 2018; Fernandes et al., 2014).

The programme was designed in a way to maximise the likelihood of having a positive impact by combining multiple aspects of financial inclusion into a single intervention (i.e. training sessions using best practice approaches, no-fee bank accounts with reduced administrative hurdles, and SMS reminders). However, even though it was substantially more comprehensive than many previous programmes that have been rigorously evaluated, we still fail to detect even moderate effects across the large majority of outcomes. This suggests that the limited impact of financial inclusion programmes around the world is not simply due to the fact they do not address multiple binding constraints simultaneously. Instead, there may be more fundamental reasons why interventions that aim to improve financial inclusion are typically unsuccessful, such as targeting people who have limited involvement in the cash economy and consequently do not need a bank account, or people who live in areas too remote to make regular bank account usage practical. To illustrate that having limited involvement in the cash economy may be a reason why people are not benefiting from owning a bank account we have included additional analysis in the Supplementary Materials (S10). This shows that in the control wards there was a statistically significant, negative relationship between owning and using a bank account and having a lower household income.

This study also points to some of the challenges that policymakers face in promoting financial inclusion among the next frontier of underserved and hard-to-reach populations. The programme was far more popular further away from Wewak town and the heterogeneous treatment effects provide evidence suggesting that respondents in these remote wards, who likely have less financial literacy and knowledge at baseline, are more likely to save as a result of the training. However, these individuals also face larger transaction costs (in terms of transport costs and time) with accessing the physical bank infrastructure within Wewak town where over 80 per cent of transactions are made. The inability of the programme to lead participants to make transactions via mobile phone and the limited agent network within Wewak district mean that physical access to the bank branch is likely to be a constraint to greater use of accounts. Perhaps individuals in remote areas would benefit more from encouraging behavioural changes relevant to their local context, than taking up bank accounts whose usage is not likely to be sustainable. In addition, we show that a high take-up of no-fee bank accounts did not lead to considerable use of accounts and as a result it was unlikely that the banks profited from investing in improving financial access, in spite of receiving a subsidy from the ADB.

While evidence from elsewhere in the world suggests that sustained interventions are more likely to be effective (Kaiser & Menkhoff, 2017), this would require even greater investment beyond the already high costs involved in the current version of this programme (K65 or US$20 per participant for the 2-day training alone). Our findings suggest that greater investment to increase access to bank accounts may not be warranted, especially given the high...
transaction costs involved in accessing a bank branch. However there are ways that these high transaction costs in accessing bank branches can be overcome. For example, increasing the use of mobile money services could potentially reduce the transaction costs which are present in the existing banking infrastructure. With increasing numbers of people with access to mobile phones in PNG, there is potential for further increasing financial access through mobile money (Jack & Suri, 2014). Another example is through building a comprehensive bank agent network, which would also mean that people do not need to travel to Wewak town to use their account. This approach has been found to be effective in other parts of the world (e.g. see Buri, Cull, Gine, Harten, and Heitmann (2018) or Cull, Gine, Harten, Heitmann, and Rusu (2018)).

Future research could build on our study by taking at least two directions. First, there may be value in investigating the impact of more comprehensive financial inclusion programmes, similar to the one we study, in less remote areas, especially among people who are part of the cash economy but do not currently have a bank account. Second, greater efforts could be made to examine the impact of financial inclusion programmes, particularly those that heavily promote the use of mobile money services, in remote and insecure areas similar to our setting as little is known about what programmes, if any, are able to effectively involve this next frontier of underserved and hard-to-reach populations.

Ethics approval

We have human subjects approval from the University of Sydney Human Research Ethics Committee. Our project title and number are as follows:

Project Title: Evaluation of financial inclusion training program in Wewak district, Papua New Guinea

Project number: 2018/113

Notes

1. A ward is the lowest level of government demarcation. In rural areas, a ward typically covers one village. In urban areas, a ward typically refers to a neighbourhood.
2. The population sample in Doi, McKenzie, and Zia (2014) is mixed between an urban area and a rural area.
3. In terms of administrative divisions in PNG, there are 22 provinces, 87 districts, and 326 local-level governments (or sub-districts) comprising around 6112 wards.
4. This is a more comprehensive version of the program than was rolled out elsewhere in PNG as SMS reminders were added, and the ADB partnered with the banks to reduce or remove the account opening fees, and reduce or remove ongoing usage fees. We preregistered the program with the American Economic Association’s randomised controlled trials (AEA RCT) registry on 30 August 2017 (AEARCTR-0002402).
5. In PNG, all banks charge either an account operating fee or a monthly account keeping fee. As part of this program, MiBank offered customers no-fee bank accounts over the life of the account; Bank South Pacific and People’s Micro Bank only removed bank fees for the first three months. See Supplementary Materials S4 for details.
6. The list of treatment and control wards included in the follow-up survey is available in Supplementary Materials S1.
7. There are no existing household listings in East Sepik. As a result, enumerators began interviewing households at a central location in each ward and then walked in a circular pattern out of the ward interviewing every third household on the left.
8. A video documenting the random selection is available here: https://www.youtube.com/watch?v=t000IAmZxM.
9. As a robustness check, we conduct logit regression analysis for binary outcomes regression and the results are qualitatively similar.
10. One question is about whether respondents have a bank account (the extensive margin), one question is about the number of accounts (the intensive margin), and one question relates to account usage.
11. It is possible that participants opened an account with more than one bank. We are not able to verify whether this took place because it would be a breach of participants’ confidentiality. However, it is unlikely. Participants waited for long periods of time to open accounts (typically 1–2 h), which means they would have had to queue up twice. In addition, only around half of wards had two banks attend.
12. We received incomplete data from the other two banks, Bank South Pacific and People’s Micro Bank, which is why we focus our discussion solely on data from MiBank. The limited analysis that could be conducted of the other data from the other two banks showed very similar patterns of very limited use of accounts.

13. The banks required an initial deposit to open an account. As such, every program participant made one deposit at the time of account opening.

14. As shown in Table S9 in the Supplementary Materials, we find that the wards with high share of participation tended to be further away from Wewak town (less likely to be located within 30 min away from Wewak town, though the cost to Wewak was more likely to be less than K5).

Disclosure statement
During the research period, Christopher Hoy and Russell Toth were employed as consultants by the Asian Development Bank (ADB). The ADB supported all costs of the study (i.e. field survey costs, backcheck, etc), and this was the ADB’s preferred way to contract the authors under TA-8993 REG: Developing Impact Evaluation Methodologies, Approaches, and Capacities in Selected Developing Member Countries (Subproject 2). The funding was meant to cover some of the authors’ time in designing the study and helping to manage its implementation, and to guarantee that the authors would produce internal policy reports and presentations for the ADB at key points in the project cycle. However, the researchers formed an agreement with the ADB that they would be free to independently publish the results of the study, and that their time spent in doing so would not be covered under the consultancy. This agreement was affirmed by official letters from the ADB on two separate occasions, which are available on request.

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Brune, L., Giné, X., Goldberg, J., & Yang, D. (2016). Facilitating savings for agriculture: Field experimental evidence from Malawi. Economic Development and Cultural Change, 64(2), 187–220. doi:10.1086/684014
Appendix A: Further details about survey and experimental design

1. Attrition at the household and individual level between the baseline and follow-up survey

Every effort was made to avoid attrition, including registering the GPS coordinates of all households at baseline and taking photos of respondents. However, there are challenges with conducting surveys in an insecure and remote part of PNG, which resulted in a moderate rate of attrition at the household level. For example, some enumerators experienced car-jacking and got caught in the crossfire of an armed conflict between rival gangs, which meant it was not always possible to return to households multiple times to try to reduce attrition to our survey.

As a result, only 35% of respondents in our follow-up survey also participated in the baseline survey. Among the attrited individuals, we visited their houses and were able to interview another adult in the household. This reduces the attrition rate to 17% at the household level. Nevertheless, in both instances, we find that that there is no differential attrition between treatment and control wards (Table B3 in Appendix B).

When the initial household was not contactable, we interviewed the neighbouring household. As such we only use the follow-up survey data in our analysis of the effect of the program through a cross-sectional randomised control trial. This reduces the power we have to detect an effect but as discussed above, we ensured that our study was reasonably powered in the event that this occurred. We show that the differences in means between treatment and control wards across key background characteristics in the follow-up data are not statistically significant (Table B2 in Appendix B).

2. Reducing the risk of people in the control wards attending the program

We took a number of steps to minimise the risk that respondents from control wards joined the program in the treatment wards. First, training workshops were conducted at the ward level. There is a clear territorial demarcation at this level in this part of PNG due to tribal tensions. As a result, it is common knowledge which ward each adult belongs to and a person from a neighbouring ward could not attend the program without being noticed. Second, ward members were only informed about the program within a week or two of the training taking place. As such, there was little time for people from the control wards to relocate to the treatment wards just to receive the training. Third, program participants had to enroll for the training in advance and the chief of each ward had to verify that the people registered were actually ward members. Fourth, the commercial banks only offered bank accounts to program participants as the subsidy they received for removing bank fees was only for participants. They were briefed that the administrative data provided by the bank would be crosschecked with the program administrative data to ensure they did not offer fee-free bank accounts to non-participants. Besides, the SMS reminders to save were only sent to the training participants.

3. Addressing concerns about the possibility of post-treatment spillovers

The program involved much more than an information transfer as easy access to fee free bank accounts (around 70% of participants took up these accounts) and SMS reminders were also provided. Obviously we cannot rule out the possibility that program participants may have spoken to others from the control wards about what they have learnt. However, there was no statistically significant improvements in financial knowledge between the baseline and follow-up surveys in both the treatment and control wards. This would suggest even information spillovers did not occur.
## Appendix B: Additional Tables

### Table B1. Balance table based on baseline survey

| Variable                                      | Control | Treatment | t-test | p-value |
|-----------------------------------------------|---------|-----------|--------|---------|
| Own phone                                     | 1461    | 1662      |        | 0.609   |
|                                               | [37]    | [41]      |        |         |
|                                               | [0.022] | [0.020]   |        |         |
| Cost less than PGK5 to visit Wewak town       | 1461    | 1662      |        | 0.703   |
|                                               | [37]    | [41]      |        |         |
|                                               | [0.081] | [0.070]   |        |         |
| Less than 30 mins to Wewak town               | 1461    | 1662      |        | 0.896   |
|                                               | [37]    | [41]      |        |         |
|                                               | [0.081] | [0.069]   |        |         |
| Male                                          | 1461    | 1662      |        | 0.837   |
|                                               | [37]    | [41]      |        |         |
|                                               | [0.019] | [0.025]   |        |         |
| Head of household                             | 1461    | 1662      |        | 0.515   |
|                                               | [37]    | [41]      |        |         |
|                                               | [0.019] | [0.021]   |        |         |
| Attended secondary school                     | 1461    | 1662      |        | 0.198   |
|                                               | [37]    | [41]      |        |         |
|                                               | [0.027] | [0.021]   |        |         |

Notes: The value displayed for t-tests are p-values. Standard errors are clustered at the ward level. ***, **, and * indicate significance at the 1, 5, and 10 percent level. The baseline survey was not able to be implemented in one control ward, which is why there are only 37 control wards (as opposed to 38 control wards in the follow-up survey).

### Table B2. Balance table based on follow-up survey

| Variable                                      | Control | Treatment | t-test | p-value |
|-----------------------------------------------|---------|-----------|--------|---------|
| Own phone                                     | 1454    | 1617      |        | 0.927   |
|                                               | [38]    | [41]      |        |         |
|                                               | [0.026] | [0.021]   |        |         |
| Cost less than PGK5 to visit Wewak town       | 1454    | 1617      |        | 0.765   |
|                                               | [38]    | [41]      |        |         |
|                                               | [0.086] | [0.077]   |        |         |
| Less than 30 mins to Wewak town               | 1454    | 1617      |        | 0.786   |
|                                               | [38]    | [41]      |        |         |
|                                               | [0.079] | [0.069]   |        |         |
| Male                                          | 1454    | 1617      |        | 0.490   |
|                                               | [38]    | [41]      |        |         |
|                                               | [0.026] | [0.019]   |        |         |
| Head of household                             | 1454    | 1617      |        | 0.101   |
|                                               | [38]    | [41]      |        |         |
|                                               | [0.024] | [0.021]   |        |         |
| Attended secondary school                     | 1454    | 1617      |        | 0.991   |
|                                               | [38]    | [41]      |        |         |
|                                               | [0.023] | [0.024]   |        |         |

Notes: The value displayed for t-tests are p-values. Standard errors are clustered at the ward level. ***, **, and * indicate significance at the 1, 5, and 10 percent level.
Table B3. Patterns of Attrition

| Variable                  | Control          | Treatment         | t-test | p-value (1)–(2) |
|---------------------------|------------------|-------------------|--------|-----------------|
|                           | N/[Clusters]     | Mean/SE           | N/[Clusters] | Mean/SE |          |
| Non-attrited individuals  | 1454 [38]        | 0.339 (0.016)     | 1617 [41] | 0.358 (0.016)  | 0.389    |
| Non-attrited households   | 1454 [38]        | 0.829 (0.010)     | 1617 [41] | 0.829 (0.013)  | 0.972    |

Notes: The value displayed for t-tests are p-values. Standard errors are clustered at the ward level. ***, **, and * indicate significance at the 1, 5, and 10 percent level.

Table B4: Assumptions underpinning statistical power calculations

| Preregistered assumptions | Actual outcomes |
|---------------------------|-----------------|
| Share of adults that attend training in ward | 25%<sup>a</sup> | 25% |
| Existing account ownership by participants | 40%<sup>b</sup> | 34% |
| Share of participants opening an account | 67%<sup>c</sup> | 70% |
| Intra-cluster correlations | 0.08<sup>d</sup> | 0.075 |

Notes: <sup>a</sup> Based on the experience of program managers.  
<sup>b</sup>Based on program data from other parts of PNG.  
<sup>c</sup>Based on program data from other parts of PNG.  
<sup>d</sup>Based on what was used in other RCTs in similar settings.

Appendix Notes

15. These attrition rates are quite comparable to those found in other studies. In a more urban setting, Jack and Suri (2014) documented 24% attrition rate.

16. We also provide results from our analysis restricting the sample to individuals (households) who were present at the baseline and endline surveys in Supplementary Materials (see Sections S7 and S8).