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GEOGRAPHY | RESEARCH ARTICLE

Exploring the lives of women smallholder farmers in Papua New Guinea through a collaborative mixed methods approach

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Abstract: This paper analyzes the design, implementation, and challenges associated with mixing methods within a baseline study involving the collaboration of rural women smallholders and their families in three regions of Papua New Guinea. We first describe the context of the research and how the baseline study was conceptualized as part of a participatory research and development project designed to provide a rich collaborative learning exchange between participants and researchers. We explain how three qualitative participatory techniques used alongside a small-scale quantitative livelihoods survey to gain an understanding of the social, economic, and agricultural factors impacting upon the lives women smallholders and their families. We follow this with a critical discussion of the challenges and benefits of utilizing mixed methods in an international development context

Subjects: Agricultural Economics; Development; Development Economics; Rural Development

Keywords: mixed methods; participatory research; development; smallholder farmers

1. Introduction

This paper reports on a four-year research and development project incorporating mixed methods into the baseline phase of a study designed to examine, develop, and facilitate ways to build the business acumen of women smallholder subsistence food crop farmers in three geographically

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PUBLIC INTEREST STATEMENT

Papua New Guinea women farmers provide most of the food for the country; however, because of their low literacy rates, direct research with women can be challenging. Our research methods used visual and group activities combined with a survey. We developed participatory methods that encouraged group discussion and farmer learning, incorporated with a baseline survey. The collaborative participatory activities gave us important data that we could analyze immediately with our local partners while the survey provided details of key differences between communities. A mixed methods approach drew out different data that, in combination, gave a deeper understanding of the complexities of the lives of farming families. The study provided an essential platform for our subsequent development activities that are building the business acumen of the women as they move from subsistence farming to marketing their food crops.

diverse regions of Papua New Guinea (PNG): Western Highlands, East New Britain, and Central Province. Our research sought to understand women smallholders: agricultural context and practice in each region; financial and business knowledge, practices, and issues; and cultural, gender, family, and regional factors impacting on their economic development.

The first 12 months of the project involved a mixed method baseline study utilizing community workshops and a small-scale livelihood survey with women smallholders. The paper outlines how the study was conducted in the PNG context and then discusses the quantitative small-scale livelihood survey followed by some of the participatory qualitative methods used in the community workshops (*Ten Seed Technique*, *Talking Tables*, and *A Day in the Life of a Smallholder Farmer*). The paper explores the value and complexity of using mixed approaches in the PNG developing country context and highlights the challenges and benefits of mixed methods when working with village communities.

PNG is made up of approximately 7.3 million people spread across diverse geographical terrain. The nation faces formidable development challenges, ranking 176 of 187 countries on the Human Development Index (a composite measure of health, education, and income) and with a gender inequality index of 133 out of 149 countries (United Nations Development Program, [UNDP], 2014). PNG can be described as a dual economy with a prosperous formal sector (largely but not exclusively mining) focused on export and an informal sector dominated by subsistence and semi-subsistence activities (Asian Development Bank, 2012). Despite the booming resource economy, income, and human poverty persist in PNG, particularly in the rural areas. The Gross National Income per capita was US\$2,010 in 2013 (UNDP, 2014).

The country has poor infrastructure, limited power, and communication networks, and ongoing problems with security and safety. Health and education services are generally poor; as a result, life expectancy is short and all measures of health, education, and literacy are among the worst in the Asia-Pacific region (Bourke & Harwood, 2009, p. 4). Nutritional deficiency also continues to be of concern, with a high prevalence of malnutrition in children under 5 years (Food and Agriculture Organization of the United Nations, [FAO], 2003).

Rural poverty continues to be a significant issue for PNG, with over 90% of the nation's poor living in rural areas and an estimated 38% of the population living below the poverty line (UNDP, 2014). Literacy rates in PNG are among the lowest in the Pacific region, with literacy levels of women lower than those of men (Asian Development Bank, 2012). Subsistence food production remains a central part of PNG agriculture. It is estimated that local agriculture provides 83% of the food energy and 76% of the nation's protein requirements (Bourke & Harwood, 2009).

While there is a long tradition of agricultural extension/training in PNG, much of this form of farmer education has primarily benefited men, who typically control cash crop production, and has excluded women, whose low levels of literacy and education, family responsibilities and daily work on subsistence crops preclude participation in this form of farmer learning. Although women smallholders¹ are the major producers of subsistence food in PNG, as in other developing countries, women's inputs to agricultural production and their roles as economic agents are not always recognized, as women's family care and household roles are prioritized (Koczberski, 2007; Manchón & Macleod, 2010). Traditionally, PNG women smallholders produce food crops, while men work on commodity crops (coffee, cocoa, oil palm, and coconut). Even though women produce goods, men may still control the resultant income (Cahn & Liu, 2008). This means that men are often in control of considerably higher incomes, while women gain comparatively small incomes from the sale of surplus food crops.

As women are the key to food production, research into this area has become an urgent priority. While our focus is on women, the project worked with both men and women to ensure the support and engagement of men, who are culturally considered the head of the family. Our project

recognizes the importance of a gender-inclusive approach and seeks to promote gender-equitable relationships and the importance of asset sharing (see e.g. Quisumbing et al., 2014).

2. Participatory research approaches in developing countries

Over the past half century, a range of postcolonial rural development approaches has evolved. These began with community development in the 1950s and were followed by integrated rural development. Most recently, the focus has been on the sustainable livelihoods approach (Chambers, 1993; Fliert, 2003; Green, 2014; Hopwood, Mellor, & O'Brien, 2005; Ramish, 2012). Concomitantly, a range of methods for understanding and measuring the complex processes and outcomes of rural development projects has also emerged, featuring a move away from positivist quantitative methods using large-scale surveys toward more qualitative, interpretive methodologies using participatory techniques including rapid rural appraisal, participatory rural appraisal, and participatory action research. When combined with small-scale surveys, these have been found to be more efficient, effective, economical, and inclusive (see e.g. Bird, Campbell-Hall, Kakuma, & MHaPP Research Programme Consortium, 2013; Chambers & Conway, 1991; Ellis, 2000; Ghaye et al., 2008; Kondon, Pain, & Kesby, 2007; Malleson, Asaha, Burnham, & Egot, 2008).

However, participatory approaches are not without challenge, with critics noting that they are often more rhetoric than reality and/or that they can be manipulative, be non-transparent about funder motivation and become a way of capturing communities by defusing potentially legitimate citizen action for change (Chambers, 2005; Cooke & Kothari, 2001; Hickey & Mohan, 2005; Leach, Sumner, & Waldman, 2008). Ramish (2012, p. 347) argues that many projects dress up their top-down activities in the politically correct language of “participation,” thereby debasing the potential for truly participatory work. Some researchers openly acknowledge their participatory research as top-down, meaning that the population was defined and that the research was funder driven and designed by academics and experts rather than the grassroots community who are the subject of the research (see e.g. Low, Shelley, & O'Connor, 2000). They suggest that this leads to power differences that can impact on the project in problematic ways, including the development of ambiguous relationships, problematic assumptions and conflict. Such critiques have led to divergent paradigms of participatory research with different methods and levels of involvement by participating communities (Smucker, Campbell, Olson, & Wangui, 2007).

In response to these critiques, we turned our attention to collaboration as the benchmark for our research. While all stakeholders would have the opportunity to gain knowledge through the process of the research, in particular we wanted to design methods that would support the fullest engagement and learning of the participants from the local communities. To this end, we turned to the principles of asset-based community development, (Green & Haines, 2012; Kretzmann & McKnight, 1993) and the process of appreciative inquiry (AI) (Cooperrider, Whitney, & Stavros, 2003). Both these approaches share an “empowerment” philosophy which understands that local communities and community members are resilient and resourceful, aims to collaboratively identify and build on the assets in a community, and directs research attention toward “what works” and “what strengths can be built on” rather than focusing on deficits and needs. While we recognize the critiques of these approaches—for example, the risk of constraining discussion of critical or negative experiences or issues, the effects of using large or small numbers of participants, and the importance of facilitator skill in the success or failure of AI (Bushe, 2011; Curato, Niemeyer, & Dryzek, 2013)—our goal in this phase of the research was to design opportunities for facilitating dialogs that could enable collaboration within the community itself as well as between the researchers and the community members. The goal of integrating AI in the early stages of the project was to minimize power differentials between researcher and subject. In our design, we rejected any dichotomous sense of knowledge, holding that knowledge in both developed and developing countries are not homogenous but rather highly localized and dynamic (Smucker et al., 2007). We recognized that there will always be power dynamics both within communities and between researchers and the community. To keep this in focus, we opted for a collaborative exploration of issues wherever possible rather than only the participatory collection of data.

3. The research sites

The project was conducted in seven villages in three regions: Baiyer Valley (Western Highlands), Gazelle Peninsula (East New Britain), and Kairuku-Hiri district (Central Province). The three selected provinces provided contrasting settings: Western Highlands has a history of tribal warfare, poor market access due to being relatively remote, and low levels of education and literacy; East New Britain has more stable communities, access to local markets, and higher literacy rates; Central Province has mixed communities which are closer to main regional markets, and higher levels of formal employment. The criteria for selection of villages were made on the basis of expert local knowledge by partner agencies, accessibility, the extent of sufficient infrastructure to support project activities, and ensuring the sites differed geographically and in their agricultural diversity, but had a majority of people engaged in subsistence farming as their main source of income. To ensure accessibility for our collaborative work, all villages were within 3 hours by road of a regional center's markets, with each village having basic infrastructure supporting the local communities, such as schools, aid posts, trade stores, and churches. By choosing sites with differing characteristics and issues, we hoped to deepen our understanding of barriers and enablers in relation to women's agricultural and business practices. By understanding regional issues, we could identify place-based approaches to support the development of women farmers in the different locations.

4. Baseline study overview

Initial information about the broad characteristics of each village and region was gathered from partner organizations, local key informants, and available literature. The baseline study involved a small-scale household livelihood survey of women smallholders, and workshops with community leaders and smallholder vegetable growers in each of the seven villages. Table 1 provides details of participants who responded to the survey ($n = 329$) and attended community workshops ($n = 283$), with a gender breakdown of workshop participants by village. Due to poor census data, the total population size of each village is unknown. This does not affect the inferences drawn from the data, as tests were able to identify statistical differences among the different groups/categories.

In order to develop collaborative community links and recruit participants, we first identified and engaged a regional project leader for each of the three regions. The local project leader in each region then led the selection and mobilization of local women who were willing and able to become co-researchers and village facilitators. The development of small village research groups provided an opportunity to support the capacity development of local women as well as develop an important team which contributed their local contextual knowledge to the analytical processes of co-constructing meaning from the baseline results. The co-researchers included local community development workers, community health practitioners, teachers, agricultural extension workers, and unpaid community leaders.

Table 1. Baseline study participant numbers

Province/district	Village	Community leader participants (men/women)	Community workshop participants (men/women)	Women survey participants $n = 329$
Central/Kairuku-Hiri	Hisiu	2/3	30/70	34
	Tubersereia	4/7	9/12	27
	Kerekadi	2/4	5/25	32
East New Britain/Gazelle	Tinganagalip	6/3	15/20	42
	Vunapalading	4/2	12/23	39
Western Highlands/Mul-Baiyer	Kumbareta	6/8	9/24	79
	Kwinkya	3/0	6/23	76

The initial training of local community research teams covered the administration of the baseline survey and ethical protocols², and enabled out-of-country researchers to seek advice on local socio-cultural and language issues associated with the survey. This is particularly important in PNG, where there are more than 800 totally distinct language groups. While English and Tok Pisin are the official languages, at a community level the local language (Tok Ples) is usually the most commonly used language. Therefore, an essential part of the collaboration with local teams was to tailor the terms used in each village survey according to the appropriate Tok Ples.

Gender relationships were also considered carefully. PNG has highly defined gender roles. Even in the matrilineal areas of the study (East New Britain), men are the head of the household and maintain a dominant role in decision-making. While this research is focused on working with women, local research partners advised that it was not appropriate to engage women in the study without the consent of the male community leaders, and in some cases, the husband. Hence, in every community the baseline study began with an open public meeting in which the research team outlined to the community leaders the research aims, the proposed activities and the rights of participants, in the presence of both men and women from the community. The senior male community leaders endorsed the project and gave consent for village members to participate in the study.

5. Study methods

The following sections discuss in more detail the livelihood survey and some of the qualitative participatory methods used in the community workshops, *Ten Seed Technique*, *Talking Tables*, and *A Day in the Life of a Smallholder Farmer*.

5.1. Livelihood survey

The survey aimed to collect household data from the most senior woman in a household who was responsible for growing and selling produce. We collected data on agricultural activities, household division of labor, training experiences and needs, business and financial practices, income, health, education, and literacy. The survey design was developed by both local PNG research team members and out-of-country researchers, and it was informed by a number of existing livelihood surveys from international development agencies (Brocklesby & Fisher, 2003; CARE, 2002, 2004; Chambers & Conway, 1991; FAO, 2011; Lindenberg, 2002; Spriggs, 2012). Recruitment was by invitation from community leaders and was open to all who wished to participate and who were able to overcome the logistical problems of difficult terrain and poor roads. Thus, subjects' randomization was not possible, and a non-probability convenience sampling approach was applied. To overcome the potential introduction of bias, we used validation activities with the stakeholders and to contrast qualitative (direct feedback) against quantitative results. The survey was administered orally by local research teams, and participating women had the choice to conduct the survey in English, Tok Pisin, or Tok Ples. The majority of women chose their local Tok Ples.

From the survey we gained an appreciation of differences between the villages and regions in relation to demographic characteristics, income, spending and saving patterns, growing and selling practices, training needs, and the future aspirations of women. For example, from the demographic data, we found that most women participating in the survey were married (85%) and the mean age was 40 years. The average number of children per family was 3.6, approximate to the national population statistic of 3.4.

To examine regional differences in income, we conducted a factorial, between groups analysis of variance, to assess the statistical difference between mean incomes for the three regions under study (see Table 2a). The test showed that a difference existed at 0.05 level, $F(2,296) = 19.96$, $p < 0.05$, Cohen's $f = 0.36$. The latter indicates a medium to large effect size (Cohen, 1988). Tukey's honestly significant difference (HSD) post hoc test (Berger & Maurer, 2002) was used to assess the extent of these differences in income among the three regions. The results are shown in Table 2b. Tukey's HSD test revealed the Western Highlands region that had the lowest income among the three regions at a 0.05 level ($SE = 0.155$, $p < 0.05$ Western Highlands–East New Britain; $SE = 0.161$,

Table 2a. Mean usual monthly income from sale of food crops (descriptive)

Province	Mean (SD) usual monthly income (Kina)
Central Province	456.39 (534.21)
East New Britain	316.11 (216.18)
Western Highlands	170.86 (189.34)

Table 2b. Mean monthly income from sale of food crops (Tukey's test)

Contrasts		Standard error	Sig.	Confidence interval
Western Highlands	East New Britain	0.155	0.000	(-1.67, -0.93)
	Central Province	0.161	0.000	(-1.27, -0.50)
East New Britain	Central Province	0.181	0.068	(-0.02, 0.85)

$p < 0.05$ Western Highlands–Central Province). No statistical differences were found for the mean incomes between East New Britain and Central Province regions ($p = 0.068$).

Confidence intervals in Table 2b show the likely differences between income means at a 95% level. Furthermore, the standard errors show a priori the magnitude of the mean differences effects and their corresponding significance (Montgomery, Runger, & Hubele, 2012). In this case, the standard errors for comparisons made with Western Highlands differ from the ones obtained between East New Britain and Central Province. There were large variances across regions and between villages, taking in consideration that some villages reported very low incomes, while others reported large incomes of up to 3,200 Kina, with the Western Highlands region reporting the lowest incomes.

We also attempted to gain a sense of the women's and families' incomes, through a variety of sources: the survey, national statistics, the literature, and a collaborative validation process with community members in workshops. This involved asking the community to examine the survey results in light of their local knowledge. These workshops had three aims: to return key data to the community for their own use, to validate findings, and to locally contextualize and deepen the analysis of the quantitative data. The available information about PNG literacy levels indicated that literacy levels in the adult population in PNG remain low, with only 57% of women reporting they could read and write, compared with 69% of men. Respondents in urban populations were 30% more likely to report being literate than rural respondents (UNDP, 2014). In light of this, we utilized materials that were designed for groups in our study population who had low literacy levels. We used workshops to present the key findings in oral, visual, and basic written formats, explaining and discussing the meaning of the data. We presented data on frequencies and proportions in the form of simple charts and tables and used the *Ten Seed Technique* (Jayakaran, 2002) to explain percentages and proportions where appropriate.

In the workshops, community members worked in gender-specific groups to verify, deepen, or dispute the findings. For example, in one Western Highlands' village, men disagreed with the survey finding that most families budget weekly, stating that families budget seasonally. The ensuing discussion revealed that women gain most of their income from weekly sales of excess food crops, hence they reported budgeting weekly. However, as men have control over cash crops, their orientation to budgeting was seasonal. The validation workshop enabled us to more deeply explore the agricultural and financial practice of families, and new information surfaced about the roles and perspectives of men and women. As researchers, we were also able to bring questions back to the community for further clarification. For example, through discussion in the workshops we were able to explore in more detail the reasons for lower incomes in the Western Highlands (Table 2a). Community members in the highlands identified that this was directly linked to lack of markets for their produce, few employment opportunities, poor roads, costly transport, and the impact of tribal

fighting. The feedback workshops provided a collaborative opportunity to both validate much of the information as well as provide “new” information for both the community members and the research team.

5.2. Collaborative community workshops

These workshops were designed to gather data on agricultural, economic, and cultural practices, such as local food crops, seasonal calendars, the gendered division of labor, and influence on family livelihoods, income sources, and financial practices. The activities were also designed to enable the participants to surface their own knowledge and analyze it together, in order to begin to come to an awareness of where families might consider changing practices, as well as to share their insights with the outside researchers. The processes were especially effective in these goals. Three qualitative participatory methods were incorporated into these workshops: *Ten Seed Technique*, *A Day in the Life of a Smallholder Farmer*, and *Talking Tables*.

5.2.1. Ten Seed Technique

These workshops were conducted with mixed-gender groups of village leaders to identify the history, context, strengths, and vulnerabilities of the communities from the leaders’ perspective. The *Ten Seed Technique* (Jayakaran, 2002) allowed the leaders to describe and explore the demographics of the community in areas such as housing, education levels, poverty, and food security. The process is a form of group interview integrating both oral and visual means to explore different dimensions of an issue. The technique is best used with groups of between 8 and 12 people, maintaining a breadth of knowledge in the group and the opportunity for in-depth discussion. Any local material can be used for the activity; we used stones instead of Seed.

The process started with a simple question—for example, “What are the typical types of housing in this village?” The group then discussed the types of housing and decided together which categories should be included. One member wrote the agreed locally named categories—local materials, semi-permanent, and permanent house (Figure 1). The group was then asked to think of the 10 stones as representing the whole community and to divide them into the categories accordingly. One person started by placing the stones and explained why they placed the stones as they did, and then others began a discussion around this. Any person could pick up the stones and move them, and with the movement of stones discussion continued until consensus was reached. As shown in Figure 1, the resultant allocations can be taken to represent estimated percentages of housing types in the community. The discussion that led to the final allocation provided detailed qualitative information to contextualize the data. These data were cross-checked against information gained through community workshops or the survey where possible. For example, data gained from the 10 stones activity about educational completion at the village level closely matched the data on educational levels reported in the baseline survey provided by participants in each village. Where the community leaders indicated low secondary school completions, this was confirmed by the baseline survey within each village showing very low levels of secondary school completion (between 4 and 43% completion rates).

However, the strength of the data is in the rich group discussion led by the participants themselves. We felt that the group responses did not contain normative social influence, as the dialog often included robust discussion or disagreement before consensus was gained. For example, in one group’s discussion about food security the conversation focused on what caused people to not have enough food and the circumstances that might lead to this situation. “Some do not make gardens or sell anything to earn money, so they continuously ask others to give them food.” Another community focused on income: “Those that work hard all the time can get ‘rich’, those that don’t stay poor, although it’s more than just not working that makes someone poor, as it is also spending habits and their mentality and approach to life.” We found the technique enhanced the dialog within the group and enabled us to gather both quantitative and qualitative data from each group.

Figure 1. Image of 10 stones arranged by community leaders representing types of housing within the community (East New Britain).



5.2.2. A Day in the Life of a Smallholder Farmer

Understanding gender relations and dynamics is recognized as being critical in gaining an understanding of livelihoods for individuals and households (CARE, 2002). The *A Day in the Life of a Smallholder Farmer*, activity was informed by the FAO's *Social analysis for agriculture and rural investment projects: field guide* (FAO, 2011). This process was designed to enable community members to explore and analyze the typical daily activities of a smallholder man or woman and provided an opportunity for the research team to gain an understanding of the influence of gender and age on the work patterns and distribution of labor in the family. Seasonal patterns of work within agricultural activity were explored elsewhere through workshop activities.

Traditionally, PNG women smallholders produce food crops, while men work on commodity crops (coffee, cocoa, oil palm, and coconut). Variations in the intensity of daily work vary across the commodity crop production, harvest, and post-harvest cycles. There are differences in the literature about the gendered nature of work in agricultural production in PNG. Cahn and Liu (2008) note that gender roles are very strongly delineated in agriculture, while Bourke and Harwood (2009, p. 432) argue that both men and women work together in their gardens, sharing almost all of the labor. Given such diverse views, we were interested in exploring the gendered nature of work in smallholder families during the baseline study workshops.

The process involved dividing the participants into four groups by gender and age (young women, older women, young men, and older men). Each group was given a sheet of paper marked with hours and asked to record what they perceived to be their activities for a typical day. Each group was then given a new sheet and asked to record the activities of the opposite gender. A group discussion was facilitated which explored the patterns and differences in the lives of men and women across different ages. Table 3 provides an example of the perceptions of men's and women's daily activities as reported by a group of older women. Similar tables were produced by men's groups. (These have been reported elsewhere in Pamphilon, Chambers, Simeon, and Mikhailovich (2013).)

In this activity, it was the discrepancy between what men said they did and what women said men did that created the greatest opportunity for reflection and discussion. The activity raises awareness of the gendered nature of work in the community in a non-threatening way. In all communities, men

Table 3. A day in life of a smallholder as perceived by older women (Baiyer Valley, Western Highlands, PNG)

Men's activities as seen by older women	Time	Women's activities as seen by older women
Still asleep	5am	Wake up, pray, and devotion
Get up	6	Prepare breakfast for children, fetch water
Breakfast	7	Gardening, weeding, clearing, planting, digging
	8	
Garden	9	Collect food for family, go to market, return home
	10	
Rest	11	Wash, have lunch, go to market to sell surplus. If there is a fellowship time, no marketing.
	12	
Look for firewood	1	While at the market, make bilums*
Few men help with pigs, most meet with other men in community chatting until dinner time	2	
	3	
	4	
Eating dinner	5	Fetch water, feeding pigs, prepare dinner
	6	Worship, dinner with family
Tell stories with family	7	Make bilums/family story time.
	8	Sometimes go out for prayer nights
Sleep	9 pm	Sleep

*A bilum is a traditional bag made from natural or acrylic fibers. It is used for carrying goods or babies.

and women came to a consensus that there were differences in the distribution of labor between men and women, young and old, and concluded that women had longer working hours and a greater number of responsibilities than men, especially when work within the home was added to work in the gardens. Participants engaged in the activity with lively discussion, and often with humor. We asked a similar question in the survey (identifying who contributed to a comprehensive list of daily tasks in the house and gardens) and found that the survey data were consistent with the findings obtained from the workshops. However, unlike the survey data, the workshops enabled both male and female participants to collaboratively make meaning of the gendered dimensions of family labor.

5.2.3. Talking Tables

This activity was a group process adapted from the World Café (Brown & Isaacs, 2005). The idea is to create spaces that are informal and that encourage friendly but in-depth discussions on selected topics—Brown and Isaacs call them “conversations that matter” (2005). In this study, we were interested in family finances and explored the following questions: “What do women spend money on?”; “What do men spend money on?”; What are the positives and negatives of wantok³ giving?; and “Why don’t people use banks?” Four tables were set up, each with one question, and participants were divided into four groups (young women, older women, young men, and older men). In PNG, we observed strong conventions about who can speak in certain situations and, especially who can challenge the ideas of senior community members. We held that the conversations would be more open and frank in like groups.

At the first table, each group discussed and wrote all their responses to that table’s question. After 10–15 min, participants moved as a group to the next table, where again they discussed the question and added to, challenged, or extended on what the first group had written. This was repeated

at the next table. At the third table, people were encouraged to look for patterns, insights, and emerging perspectives; that is, they began the data analysis. At the last table, each group was asked to nominate a participant to report back to the large group the major themes of that table and question. The whole group then discussed and analyzed what had emerged. This process is effective for gathering a broad range of responses on each question. Most importantly, this process ensured that in the final display and reporting of data no individual's comment could be identified. Hence, the process surfaced a wide range of responses for discussion without putting an individual person with a divergent or contentious view under scrutiny. It enabled a collective and open discussion of culturally and individually sensitive issues. As can be seen in Box 1, the participants' short summary reveals a complex range of reasons people do not use banks.

Box 1: Talking Tables: why people don't use banks (Central Province, PNG)

- Because they don't have enough finance.
- Distance from the village to bank services: not everyone can travel for long hours just to queue up in the bank again.
- Long line-up, waste of time and give up.
- Illiteracy: making it hard for people to understand the rules and follow them.
- Too many rules and requirements to fulfil before one can open a bank account.
- Banks are good but it is not for simple people like us.

Across the three regions, very similar reasons were given for not using banks, including illiteracy, complex bank processes, and insufficient money, with many men and women sharing that they preferred to hide their money in their homes. Some regions had specific issues: in the Western Highlands personal safety and security were also significant factors, as both men and women participants had been robbed on the roads or had experienced assaults when traveling to the main town for banking.

6. The pragmatics of collaborative mixed methods in a developing country

Our baseline study was designed primarily as a qualitative participatory study in which we integrated quantitative methods to add value to a specific phase of the research project and to seek answers to specific questions (Plano Clark & Creswell, 2008). In particular, we needed to understand the demographic, social, and economic circumstances of these communities. While maintaining a strong commitment to collaborative and participatory methods, we adopted a pragmatic orientation to our baseline study. We use the term pragmatic in two ways. Firstly, we position ourselves as methodological pragmatists who seek to integrate both qualitative and quantitative methods into a single study, in which the research questions drive the methods used (Onwuegbuzie & Leech, 2005). Secondly, we understood the pragmatic approach as a means of understanding community issues within our participatory research practice (Smucker et al., 2007). Our study needed to provide data that could help us understand the diverse communities with which we were working (Brannen, 2009) and inform the training and development components of the project, during the life of the project.

As our project had both development and research components, we wanted to gain baseline data that could be revisited after the development activities had been completed. Although the survey did generate much of the needed data, we encountered a number of challenges as novice mixed-method researchers in the PNG context. Our development agenda required the survey to be designed, implemented, and analyzed in as short a time as possible so that the development activities could begin. This proved to be difficult. Our desire to make decisions collaboratively with our in-country research partners meant that the final design of the survey took longer than anticipated, as the survey was developed across a number of partners and locations, each with different orientations (e.g. to agriculture, gender, and community development). In the implementation phase, we

faced varied challenges: different local languages requiring changes to the survey instrument; different recruitment strategies in each region; limited local resources for administering surveys; various transport and communication challenges; and varying time availability and capacity among local regional research teams to administer the survey. Pragmatic decisions were essential at every point.

The time allowed for analyzing and interpreting data presented further difficulties, partly due to the volume of data generated, some data anomalies due to varying skills of the in-country research team, and the need to re-examine the quantitative data as meaning was made of the qualitative data. As we believed it was important to bring data back to communities for ethical and validation purposes, this added further time to our analysis phase. Our pragmatic response was to work incrementally by staggering the analysis of survey data in relation to upcoming training and development activities. We prioritized which data would be useful and when they would be needed.

In contrast, the participatory qualitative methods provided a more immediate source of data for practical application. Drawing out the content and themes during the workshops enabled us to develop a form of “analysis on the run,” although in some instances this may have resulted in trading off depth of analysis for the pragmatic demands related to the delivery of training activities. It is well known that the greater the complexity of the study design, the greater the challenges for analysis (Thurston, Cove, & Meadows, 2008). Although our baseline study only had two phases, the concurrent analysis of quantitative and qualitative data proved difficult.

On the other hand, the clear advantage of combining qualitative and quantitative methods was the opportunity for triangulation. Although the approaches to triangulation in social research are complex (see special edition *Journal of Mixed Methods Research*, 2012), our form of triangulation is best described as between-method, or across-method, triangulation (Creswell & Plano Clark, 2010). We used triangulation as a form of validation and examined where our methods had led to comparative data. We also benefited from Brannen’s (2007) four ways to examine the outcomes of the combination of multiple methods: corroboration, elaboration, complementarity, and contradiction. Each of Brannen’s categories was useful in our analysis of data emerging from differing methods in our baseline study. For example, we were able to *corroborate* data from the survey about daily work activities with matching data produced through the *A Day in the Life of the Smallholder Farmer* activity; this in turn allowed *elaboration* of our understanding of the gendered nature of daily work. We found *complementarity* between the data generated from the *Talking Tables* activity and survey data about low levels of banking and saving in communities; but we found *contradictions* in the data about poverty and food security between data reported through the *Ten Seed Technique* and the survey.

This prompted us to examine this data in more detail. For example, through the *Ten Seed* process, community leaders in four villages reported that families almost always have food, yet in the baseline survey between 7 and 28% of women reported that they only sometimes had enough food to eat. Although the discrepancy was only small, this prompted us to explore in more detail perceptions of poverty and food security in the community. This highlights that data collected from multiple methods cannot simply be added together to produce a rounded or unitary reality (Brannen, 2007, p. 176). Rather, it expanded our understanding of the communities which contained our research participants and partners.

7. Conclusion

We have shown how a mix of methods were applied in a baseline study within a participatory research and development project in PNG. The collaborative mixed methods used in our baseline study provided valuable contributions to both our engagement with communities and the generation of foundational information. Using collaborative processes, we were able to hear and more deeply understand the complexities of the lives of smallholder farmers from their own perspectives and in their own words. Given the low levels of literacy, it was essential to complement the livelihood

survey with oral, visual, and group activities to ensure that the smallholders had the opportunity to both surface and share their local knowledge of the context and complexities of their lives. We gained valuable demographic and socioeconomic data from the inclusion of a small-scale livelihood survey, but found no single method on its own could have provided the depth or breadth of understanding we were able to gain from bringing together a range of methods. This mix of methods added both rigor and depth to the baseline study phase of our research and provided the knowledge required to begin the next cycle of research for the following phases of the broader research project. The paper highlights the opportunities these methods provided for rich two-way learning across the research teams and between communities and researchers. The qualitative participatory methods were highly effective in gathering data with low-literacy farmers and provided an understanding of the complex contextual influences that impact upon women smallholders' livelihoods and agricultural practices.

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Notes

1. The definition of a smallholder farmer differs by country. However, in the PNG areas of this project a smallholder's garden or block (the local terms for cultivated land) typically ranges from half a hectare to five hectares.
2. The research gained approval from both the Australian and PNG universities.

3. Wantok is a term used across Melanesia to express patterns of relationships and networks that link people in families and regional localities. It has been described as a socioeconomic and political network, a set of relationships (or obligations) between individuals characterized by common language, kinship group, geographical area of origin, social associations or religious groups, and a belief in the principle of mutual reciprocity (Nanau, 2011).

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