

The Best of Both Worlds: Producing National Statistics using Participatory Methods

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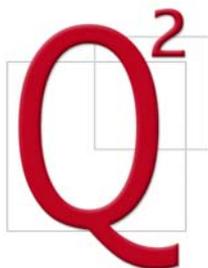
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1. Introduction

This paper discusses how statistical methods and participatory approaches can be integrated into a methodology that allows the estimation of statistics such as population totals and proportions, and through this integration take advantage of the strengths of both approaches. We refer to the methodology as 'research using participatory methods'.

The paper is based on studies carried out in Malawi in 1999-2002, coordinated by the authors as part of the evaluation of a program that distributed free agricultural inputs to smallholder farmers. The study teams included researchers from Malawi and elsewhere.

At first sight, the methodology that we developed in Malawi might appear to be merely a collection of approaches which have been developed elsewhere as part of the World Bank's Participatory Poverty Assessments (Norton *et al*, 2001; Robb, 2002), the 'Consultations with the Poor' studies (World Bank, 1999), the work on participatory census mapping in the 1990s in India, the Philippines, Uganda and the Gambia (Chambers, 1997) and other studies incorporating participatory counting methods. However, there is a crucial difference: the numerical data (statistics) that we produced in Malawi using participatory methods were designed to be capable of analysis not only in the community where they were produced, but also at national level. This was because the demand for the studies came from policy makers and donors who needed answers that could inform national government policies. So the results had to be representative of the country as a whole.

How could this be achieved? We decided to try to integrate statistical principles into the studies right from the beginning, at the design stage. In addition to using tools that were capable of generating totals and proportions at village level, we followed an approach that allowed the data to be aggregated to produce national statistics that would have credibility with people from quantitative science backgrounds. This, we argue, makes our work unique. As far as we are aware, no previous study based on participatory methods has been capable of producing reliable national statistics. We discuss the reasons for this in Section 6.

It should be noted from the outset that our Malawi studies included work with participants from rural communities, but they were not community-led in the sense of having an agenda determined by the participants and evolving in response to local development needs. Barahona and Levy (2003) point out that:

"... The main objective of our research is to generate action at a higher level. Nevertheless, if the right measures are put in place, we believe it is possible: a) to consult communities affected by a policy in order to generate actions by stakeholders at higher levels that will benefit those at the grassroots; b) to observe participatory principles in terms of behaviors, approaches and methods during the process of consultation at grass-roots level; and c) to share learning processes and outcomes (including data analysis) which can empower communities and contribute to local development."

The Starter Pack program and the TIP

The studies were commissioned as part of the evaluation of Starter Pack, a program of the Government of Malawi (with support from multiple donors) that distributed small amounts of free seed and fertilizer to all smallholder farmers in the 1998-99 and 1999-2000 main agricultural seasons. The program aimed to provide every smallholder household with a pack containing roughly 0.1 ha-worth of fertilizer, maize seed and legume seed¹. In the 2000-01 and 2001-02 seasons, Starter Pack was modified by reducing the number of packs distributed, and an attempt was made to target the benefits to the poorest households; its name was changed to the Targeted Inputs Program (TIP).

The studies

Six research studies that fall into the category of 'research using participatory methods' were coordinated by the authors in Malawi between 1999 and 2002². This paper presents two of them from which national statistics were estimated: 'Measuring the size of the rural

population in Malawi' (Wingfield Digby, 2000), which attempted to provide an estimate of the rural population; and 'TIP Messages: Beneficiary selection and community targeting' (Chinsinga *et al*, 2002), which estimated the proportion of rural households that deserved to be targeted by the TIP and looked at whether the poorest households had received packs in 2001-02.

2. Measuring the size of the rural population in Malawi³

The research question

In 1999-2000, the first year of our involvement in the evaluation of the Starter Pack program, we were presented with a controversial question: 'What is the size of the rural population in Malawi?' Policymakers and donors were facing difficulties because the 1998 census had found 1.95 million households and 8.5 million people in rural areas, while the process of registration for Starter Pack in 1999 reported 2.89 million households in rural areas. If multiplied by the average household size found by the census, 2.89 million households would imply a rural population size of 12.6 million (48% higher than the census figure). This was a serious discrepancy. Policy makers and donors needed to know the size of the population in order to calculate the scale of resources needed for government programs and aid. More generally, population statistics are used to estimate key data such as GDP per capita, which feed into indices of poverty and development.

At the start of our research, most people felt that the 1998 census was a reliable source and the data from the Starter Pack Logistics Unit (SPLU) - the unit in charge of registering beneficiaries for Starter Pack - lacked credibility. Observers felt that registration for Starter Pack would have encouraged over-registration of households, because more benefits would be received if more households were registered. Moreover, as registration for Starter Pack in 1999 took place in the run-up to an election, with politicians using the pack as part of the election campaign, the initial lists submitted to the SPLU by Ministry of Agriculture field staff looked set to be wildly exaggerated. The SPLU had to get the ministry's field staff to make strenuous efforts to be realistic when compiling the register (Wingfield Digby, 2000).

We set out to discover whether the SPLU data was an overestimate, using a Ground Truth Investigation Study (GTIS). We knew that if we could establish in a sample of villages how many households existed and what was the size of the village population, we would be able to scale up the results to establish the number of households and population size at national level. A team led by M.N.S. Mswoya from Mzuzu Agricultural Development Division (ADD) was commissioned to do a full enumeration (census) of a sample of villages.

Selection of villages using statistical sampling

Villages were selected for the study using statistical sampling (Wingfield Digby, 2000). The sampling scheme and sample size were determined by the Statistical Services Centre (SSC) of The University of Reading (UK) and a statistician from the Centre for Social Research of the University of Malawi. The sampling frame was the list of villages in the country according to the register of beneficiaries for Starter Pack, which listed all the villages in Malawi⁴. The register classified villages by Extension Planning Area (EPA), Rural Development Project (RDP) and ADD⁵. Selection of villages was done in two stages as follows:

Stage 1: Selection of EPAs. These were selected from within ADDs that were treated as strata. From each ADD, EPAs were selected using simple random sampling. The number of EPAs in each ADD was allocated bearing in mind the spread of EPAs by ADD, and the number of farm families in each ADD. The final allocation was as follows: Karonga 3, Mzuzu 3, Kasungu 4, Lilongwe 5, Salima 3, Machinga 4, Blantyre 5 and Shire Valley 3.

Stage 2: Selection of villages. Within each of the selected EPAs, two villages were selected at random. In total, 60 villages were selected for the study, although in the end only 54 villages were covered in the time available.

We did not sample within villages. The use of participatory mapping and marking of

households allowed the study to collect information about every household in each village (see below), with the advantage that the data at village level did not have sampling error.

Participatory component of the study

When planning how the work would be done at village level, we anticipated two key problems: first, how would we know where the boundaries of each village were? and second, what definition of household should be used? Problems of defining rural vs. urban areas and the different administrative boundaries used by local government and the Ministry of Agriculture were also anticipated when scaling up and comparing with data from the 1998 census and the SPLU (Wingfield Digby, 2000).

This affected our choice of methodology for carrying out the fieldwork at village level. We needed to know the boundaries of the village and agree how many households there were in each village. We decided that a participatory approach based on community mapping would be the best way of doing this. It should be possible to establish the extent of the village and its boundaries by asking a group of knowledgeable people from the community acting as 'key informants' to draw a map. This approach was based on social mapping, which is an established PRA technique that involves drawing a map of the community and marking geographical, institutional and social reference points that are of interest to the participants (e.g. rivers, churches, schools and meeting places). Social mapping has proven advantages for reliability of information in that it promotes visual checking and verification (Chambers, 1997).

We could then ask the participants to mark every household in the village on the map. In order to do this, the participants had to agree on what was a household, using the guideline definition that a household is a group of people who 'eat from the same pot'. Broadly speaking, this definition of household was shared by the 1998 census and the SPLU.

During the GTIS, we found that the mapping was effective and straightforward as far as establishing the extent of the village and its boundaries. But the question of marking households was more complicated, as participants often argued that the 'eating from the same pot' definition was not appropriate. Indeed, defining a household in rural Malawi is not easy. The Malawi National Statistical Office (NSO) definition used for the 1998 census provides an indication of the complexity of the 'eating from the same pot' definition:

"A household consists of one or more persons, related or unrelated, who make common provision for food and regularly take their food from the same pot and/or share the same grain store (*nkhokwe*) or pool incomes for the purpose of purchasing food" (NSO, 1998, in Wingfield Digby, 2000).

There are further complications to defining households in societies where polygamy is prevalent, as several wives living in the same compound may or may not eat together but often regard themselves as separate households. Also, people who would not normally be considered as belonging to the same household may come together temporarily during times of food shortage and go their own ways in times of plenty. Because of these complications, we felt that the participatory approach of the GTIS was more likely to provide reliable results on numbers of functional households than a survey-style listing of households, in which there is no discussion of these issues⁶.

Through the mapping and marking of households, the study produced a 'participatory household listing'. A total of 6,326 households were listed in the 54 villages studied. Each household was given a unique number which could be used to identify it. The fact that the household listing was done by a group using a visual tool (the map) contributed to its reliability, as each of the participants was able to check that the information being recorded was correct. Thus, the final household listing incorporated cross checking by several knowledgeable members of the community.

The household questionnaire

The researchers visited every household marked on the map and interviewed the household head using a two-page questionnaire identified with the same number as on the map

(Wingfield Digby, 2000, Annex B). The main purpose was to collect data on the number of people in each household. Additional demographic data and some basic information about individual members were also collected.

Statistical analysis

The aim of the study was to provide a reliable national estimate of the total number of households in rural areas, which would allow us to estimate the potential number of Starter Pack beneficiaries. The opportunity would also be taken to attempt a reconciliation of GTIS and SPLU data for each village, in order to understand any differences between them.

A former UK government statistician with experience of handling demographic data in Africa (Wingfield Digby) was able to provide a national population estimate by scaling up the data for the sampled villages. He calculated the ratio of households found in the GTIS to 'farm families'⁷ recorded on the SPLU register and applied this to the number of farm families registered by the SPLU in each EPA in order to calculate the number of households in each EPA. Then he used the EPA estimates of households to scale up, generating estimates at ADD and national levels. The scaling up process used weights and adjustments for non-response, including the failure of the GTIS to visit six of the sampled villages.

On the basis of the GTIS and the SPLU list of villages, Wingfield Digby estimated that there were 2.78 million households and a population of 11.52 million in rural Malawi. A pre-condition for calculating such estimates is the existence of a reliable set of weights. In this study, the weights came from the register of farm families provided by the SPLU, which was a list of all farm families in rural Malawi⁸. Weights can also be obtained from other sources such as the national census. Work by Leidi *et al* (2004) to improve the estimate by including both the design effect and the weights yielded a total number of households of 2.65 million with a 95% confidence interval between 2.06 and 3.23 million households. Appendix 1 shows the statistical formulae used by Leidi *et al*.

Conclusions

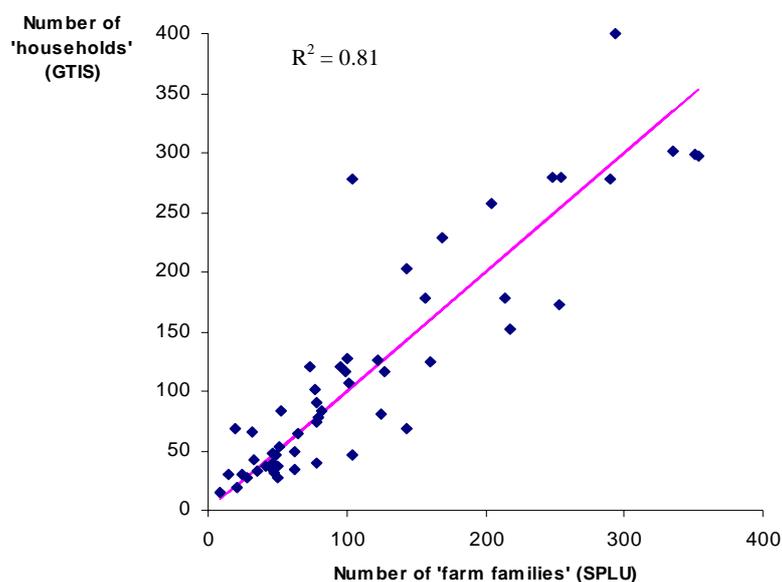
The methodology used in this study combined statistical sampling principles, participatory mapping techniques and the use of a household questionnaire to record information about every member of each household in the villages visited. The data from the household questionnaires could be analyzed using statistical methods to estimate population statistics. This analysis included derivation of weights and estimation of population totals.

The study found that participatory household listing based on community mapping - combined with full household enumeration using a simple questionnaire - was a reliable way of counting people in rural areas. The approach amounted to a census of every household⁹, thereby providing figures for the total number of households and size of population in our sample of villages.

What evidence did this study provide to policy makers and donors? First, it showed that the SPLU register was quite reliable, and could therefore be used for planning purposes (e.g. by agricultural programs and food aid interventions). The total number of households estimated by the GTIS was close to that registered by the SPLU, and the linear relationship between the two was strong (see Figure 1). Wingfield Digby (2000) reported that:

"The R² value is 0.81, indicating a fairly high degree of correlation (0.9) between the two counts. We can also see that the trend line is at about 45 degrees through the origin, suggesting a direct link between the two counts. If we wanted to estimate the number of households in a village, the number of farm families shown on the register would provide a good indicator".

Figure 1: Sample villages classified by number of 'households' in them and by number of 'farm families' registered for Starter Pack



Source: Wingfield Digby (2000).

Second, the study's findings were surprising, "in that they suggested that the size of the rural population was considerably larger than the figures obtained in the 1998 population census" (Wingfield Digby, 2000). The GTIS and the analysis by Wingfield Digby suggested that the rural population was three million people larger than the census (at 11.5 million compared with 8.5 million), only two years later. The further analysis by Leidi *et al* (2004) found that the number of households in the 1998 national census (1.95) was not within the 95% confidence interval for the total number of households. It would be possible to cross check the findings by comparing, for each village visited by the GTIS, the census counts and the figures generated by the GTIS. However, the census counts are not publicly available at village level and the NSO did not respond to our invitation to make this comparison.

This study demonstrated that it was possible to estimate population totals at national level by integrating statistical methods and participatory approaches. The rigor and structure borrowed from statistics allowed the research team to treat the outputs of a set of participatory village censuses and associated household questionnaires in exactly the same manner as if the data had been collected using traditional survey-based approaches. However, the use of participatory community mapping allowed the study to deal more effectively with the problems of boundaries and complex definitions of households. It also made the process transparent, which helped in ensuring that every household in the village was included. The participatory methods were carefully thought out and implemented to achieve this goal (Barahona and Levy, 2003).

The derivation of weights for the estimation of totals was facilitated by the existence of the SPLU register. Without such a good sampling frame, the derivation of weights might not be as straightforward; but it should still be possible to arrive at weights that can be considered useful. This is not a new problem and a good sampling statistician should be able to provide advice on suitable strategies to solve such problems.

An important point that is illustrated by this study is the need for more collaboration between people working with statistical methods and people who argue for the use participatory approaches to gather information to inform policy. We believe that this study would have been unreliable if only one of the approaches had been used. The integration of

both approaches made the final product better than the sum of its parts.

3. Estimating proportions of households for poverty targeting

In the 2001-02 TIP, one million packs were distributed – enough for around one-third of households in rural areas. The packs were intended to go to the poorest households through a process of community targeting in which Village Task Forces, made up of the village head and his/her advisers, were to select beneficiaries. As part of the evaluation of the 2001-02 TIP, the ‘TIP Messages: Beneficiary selection and community targeting’ study (Chinsinga *et al*, 2002) aimed to answer the question ‘What proportion of rural households are poor?’ It also aimed to find out whether the 2001-02 TIP had been successful in targeting the poor.

Sampling structure

The sampling frame used to select villages for the study was the register of beneficiaries for the 2001-02 TIP, which was the most complete and up to date list of villages in the country. The study was conducted in two phases: a preliminary phase for testing the methodology, and a main phase. For the preliminary phase, two villages were selected at random from the list. For the main phase, the selection of villages involved a two-stage sampling process. In the first stage, districts were selected randomly from within each region. The northern, central and southern regions were allocated 5, 6 and 9 districts respectively (a total of 20 districts). The districts visited during the preliminary phase were excluded at this stage. In the second stage, a village was selected at random from within each district. The work conducted within each village was equivalent to a full village census (see below), so the data at village level is free from sampling error.

The interface between statistics and participatory approaches

In order to answer the question ‘What proportion of rural households are poor?’, we needed to draw on statistical principles: data had to be collected in the same way in all sites (Barahona and Levy, 2003) so that it could be aggregated to allow us to estimate the percentage of poor households in rural Malawi. However, the well-being/poverty categories normally used in participatory wealth ranking activities make it difficult to compare results between different sites because they are based on relative measurements of poverty/well-being in each community. An example of such an approach was one of our earlier studies entitled ‘Consultations with the Poor on Safety Nets’ (Chinsinga *et al*, 2001), which used a form of wealth ranking based on local definitions¹⁰, producing outcomes that were not comparable between sites. For instance, in Chikadza village in Chikwawa (southern region), households were classified into three categories – poor, medium and rich. Meanwhile, in Chakuwereka village in Karonga (northern region), the participants identified four categories – the relatively well-to-do; the ‘struggling’; the very poor; and the vulnerable. And in Kasalika village in Lilongwe (central region), they distinguished six categories of household – the ‘struggling’; the very, very poor; the poor; the elderly; households with orphans; and ‘average’ households.

For the estimation of national statistics, we needed a more *absolute* yard-stick: something that would be able to consistently distinguish the ‘poor’ and the ‘very poor’ in all communities, so that we could aggregate the results and analyze them at a national level¹¹.

Thus, we decided to work with a more absolute definition of poverty. In our view, such definitions are quite specific to each developing country (or part of it), and should be developed through discussions with communities about how they see poverty, and by consulting previous research. We had the benefit of the Chinsinga *et al* (2001) study, as well as research by Van Donge (2001), which assessed how the poor perceive poverty. Both of these studies found that food security is perceived as a key indicator of poverty in rural Malawi¹². We therefore decided to use food security as a proxy for poverty. We agreed to use the following definitions in all study sites:

- **Food Secure (FS):** Households that have enough to eat throughout the year from

harvest to harvest.

- **Food Insecure (FI):** Households that have enough food to last from harvest up to Christmas but not between Christmas and the next harvest.
- **Extremely Food Insecure (EFI):** Households that have a longer period of not having enough to eat. These households start facing severe food shortages before Christmas.

The aim of these definitions was simply to document whether households had enough to eat or not, and, if not, for how long they were short of food. We used Christmas as a reference point because it is a clearly identifiable event that participants could recall, and it coincides with the onset of the 'hungry period' (January to March/April) before the main season harvest in April/May.

Food security is by no means a perfect indicator of poverty, and it might be argued that others are better - but the principle is to find something which is:

- a) meaningful to participants (and means the same in every place),
- b) simple - so that it is clear which category each household fits into, and
- c) capable of differentiating between the groups of interest to the study, such as the well-off, the poor and the extremely poor.

Unlike when asking communities to define poverty/vulnerability in their own terms, it should be stressed that the aim here was to *avoid complexity*. Of course the two approaches are not mutually exclusive - it is possible to have a full discussion of poverty/vulnerability on the basis of local definitions and then use a simple, absolute poverty indicator to divide the village into broad groups.

Participation at village level

For the 'TIP Messages: Beneficiary selection and community targeting' study, the process at village level began with a community mapping exercise. The participants¹³ were asked to show on the map the location of every household in the village and to prepare a card for each household with the name of the household head and a household number in the top right-hand corner (Chinsinga *et al*, 2002). Every household in the village appeared on the map and a card was prepared for each household with the same number that appeared on the map¹⁴. As information was recorded for each household in the village, the result was equivalent to a village census.

The facilitator then introduced the discussion of food insecurity, explaining our definitions and asking participants what were the characteristics of households in each category. After some discussion, participants were asked to put each household card into the appropriate food security category, and its Food Security Status - FS, FI or EFI - was marked on the card by the facilitator. Finally, participants were asked to say which households received a TIP pack, and the facilitator marked the TIP Status of the household (beneficiary or non-beneficiary) on the card.

Data analysis

The analysis of the data collected in all villages produced the results shown in Table 1.

Table 1: Relationship between receipt of TIP and food security status

Food Security Status	TIP beneficiaries (%)	Non-beneficiaries (%)	Total households (%)
FS	21.2	33.5	28.9
FI	38.5	39.7	39.3
EFI	40.3	26.8	31.8
Total	100.0	100.0	100.0

Note: This table presents information from 20 study sites. Two of the 22 study villages were excluded from the analysis: one because TIP packs were shared between households, making it impossible to distinguish beneficiaries from non-beneficiaries; the other (a preliminary phase site), because the methodology used to collect the data was not compatible with that used in the other sites.

Source: Adapted from Chinsinga *et al* (2002).

What did we achieve by using this method? First, we know for each village and for all villages together, what proportion of households are extremely food insecure (very poor). Table 1 shows that 32% of households in the villages visited were extremely food insecure in the 2001-02 season. A national weighted estimate of the percentage of households has been calculated at 27%, with an approximate standard error of 2.3 percentage points¹⁵ and an approximate 95% confidence interval between 22% and 31%.

Second, we know that TIP was not very successful in targeting these households. If targeting had been successful, all extremely food insecure households should have received a pack; and food secure households should not have received one. Table 1 shows that this was not the case: 21% of TIP beneficiaries were food secure (an inclusion error), and 27% of non-beneficiaries were extremely food insecure (an exclusion error). A formal statistical test could be used to check if the distribution of inputs really matched food security status. However, in our view a formal test is unnecessary because the exploratory analysis provides enough evidence to show that TIP distribution did not target the most food insecure. Chinsinga *et al* (2002) concluded that: "There were considerable 'inclusion' and 'exclusion' errors in the poverty targeting process".

Conclusions

A method that involves a participatory community census can be used to estimate the proportion of extremely food insecure households in the country if it is combined with an appropriate sampling scheme. With a suitable sample size, it should also be possible to provide such estimates at regional or district levels. This approach might be used to estimate how many people should be targeted as beneficiaries of an intervention.

For evaluation purposes, this approach is an efficient way to answer questions about whether specific interventions have succeeded in targeting the poor. We found that at the targeting level of 2001-02 (one million packs, or roughly one-third of rural households), TIP was not very effective in targeting the poor.

4. Why do we claim that these studies can be used to inform national policy?

In order to use evidence for decision making, it must be representative of the population of interest and it must be reliable. This section looks at how this can be achieved.

Statistical methods claim to be able to produce representative results if:

- 1) The researcher can demonstrate that the sample has been selected without biases. This is best achieved using a probability-based method of selection.
- 2) The sample captures the variability of the issue of interest. Its ability to do this reliably depends on its size and on the variability of the population of interest. If the sample is small, its ability to capture variability will be limited. Wilson (2002)

discusses this topic in relation to qualitative research.

To ensure reliability, the quality of the evidence needs to be assessed. This applies to both evidence that comes from research that is based on surveys and evidence that comes from participatory approaches. In order to make a judgment about quality, the user of the evidence needs to have access to detailed descriptions of the approaches followed by the researcher to collect the information (the design of the study and the approaches used to manage information), the procedures followed for data analysis and a detailed researcher assessment of the reliability of the evidence presented. This implies full disclosure of the research methodology and provision of objective assessments of reliability, such as standard errors in the case of statistics, or at least a good description of where problems were found during the study and how they were solved.

The two studies described in this paper - Wingfield Digby (2000) and Chinsinga *et al* (2002) - have results that are representative of the smallholder population of Malawi (although the number of villages sampled in the Chinsinga *et al* study was smaller than we would have liked), and the quality of the process of information gathering is sufficient to inform evidence-based decision making. The study reports are available on CD (SSC, 2004) together with all the data collected for the studies and copies of the participatory tools used in the field. Each report includes a full description of the methodology used.

5. Designing research that integrates statistical methods and participatory approaches

Our research teams made an effort to think carefully about how to address the questions that were posed by those who commissioned the studies. The integration of statistics and participatory approaches did not come from our desire to experiment with methodologies but from the requirements of the research. Integrating statistical principles and participatory approaches was possible because researchers from different disciplines felt comfortable about contributing to the work and were not defensive about their own fields. This enabled us to challenge each others' perceptions and approaches, and generated a useful set of principles that should help in the design of similar studies. These can be summarized in three broad areas¹⁶:

- a) Learn from the statistical methods that seek to understand and integrate into the design of the research the *structure* of the population of interest. This refers to the fact that populations are interconnected, grouped, organized in hierarchies and can be classified in several ways. Statistical methods have developed principles that allow the researcher to take advantage of existing knowledge about this *structure* to design an efficient research process.
- b) A minimum level of *standardization* is required. The key to achieving the right type of standardization is to keep it to the minimum necessary. This means imposing standardized procedures on the research teams while keeping the flexible nature of participatory approaches when working with people in their communities.
- c) In selecting the sites where participatory activities are to be conducted, make use of sampling principles. This includes the selection of a reasonable number of sites and ensuring that the sample has a good *coverage* of the population of interest.

At the village level, the Wingfield Digby (2000) study was based on participatory mapping to produce a reliable household listing, accompanied by a simple questionnaire administered to all households. This was used to produce total population estimates. The Chinsinga *et al* (2002) study, with its emphasis on estimating proportions of poor households, was able to take the integration of statistics and participation at village level a step further with the development of the participatory technique known as 'community mapping with cards'. The advantages of this approach were:

1. The same definitions were used in every site, and the card game was standardized across sites. Because of this, the information produced was comparable between villages and could be aggregated to national level.
2. The study recorded information at household level. This allowed us to explore and

measure relationships between different factors (e.g. poverty and receipt of a benefit). However, instead of visiting every household in the village, the information was produced efficiently by asking group participants to act as 'key informants'. Barahona and Levy (2003) point out that a necessary condition for doing this is that the information of interest is 'common knowledge' (knowledge shared by the members of communities).

3. The study collected information for all households in the villages visited, i.e. a full census of each village. Therefore there was no risk of having a biased selection of households within villages and there was no within-village sampling error.
4. The approach was simple to do and could be understood by most participants. This meant that it had a good chance of producing reliable results.

However, there remain some challenges. For example:

1. Large villages or urban settings are likely to present problems for mapping and producing cards. However, it may be possible to divide large villages and urban areas into smaller, more manageable units.
2. The study missed the opportunity to carry out analysis of some of the data in the community. It should be possible to produce village-level tables similar to Table 1 with participants. These could be the focus for feedback and further discussion¹⁷.

6. What is different about our approach?

Beyond participatory census mapping and PPAs

The Malawi studies are not the first to use household cards in combination with maps to conduct participatory censuses at the village level. Chambers (1997) describes a number of studies in India, Africa and the Philippines in the 1990s where 'participatory census maps' were drawn in order to count the number of people in the village. In some cases, additional information was marked on the maps or on associated household cards. However, these exercises were designed to produce information at the village level only. They did not select a national probability-based sample of villages and conduct community mapping, accompanied by questionnaires or household cards, in the same way in each village. It was this incorporation of statistical principles (in particular probability-based sampling and standardization) which allowed us to aggregate the data and generate an estimate of the rural population or of the proportion of poor households in the population.

Parallels may also be drawn between our work in Malawi and traditional PRA-based studies which use poverty/wealth ranking techniques, such as the World Bank's Participatory Poverty Assessments (PPAs). However, PPAs select sites purposively (not with probability-based methods) and they avoid any form of standardization that would allow the generation of nationally representative statistics from the participatory work that they undertake. Instead, they favor an approach which allows each community visited to define poverty in its own terms. This is a deliberate choice in favor of qualitative information. The only linkages with numerical information sources are in the form of (i) allowing data from a relevant (separate) household survey to inform the design of the PPA and vice versa, preferably in a qualitative-quantitative-qualitative type of iterative sequence, and (ii) using survey data in the final report. As Robb (2002) points out, the philosophy of the PPAs is that:

"Traditional survey data can be used to count, compare, and predict. The strength of the PPA is not in counting but rather in understanding the hidden dimensions of poverty and analyzing the causality and processes by which people fall into and get out of poverty".

These approaches represent choices on the part of those who design the studies. In the case of the participatory census mapping carried out in India and elsewhere in the 1990s, the aim was to generate data to be used in the communities where it is produced.

Therefore, there was no need for the type of approach that we followed in Malawi. However, if questions about numbers are extended beyond the village level, our approach becomes a powerful tool.

In the case of the PPAs, the philosophy is clearly that qualitative information is the best way for the poor to influence policy. This is, of course, a valid point of view. However, as the target audience of the PPAs is national policy makers and World Bank officials, and we have shown that it is possible to generate numbers using participatory methods without detracting from the collection of qualitative information, it may be worth considering whether, in future, PPAs and other similar national-level studies should be designed to make this possible.

Beyond surveys and censuses

So far our discussion has addressed the issues from the perspective of two important stakeholder groups: policymakers and researchers from the social science traditions (including those involved in participation). But there is a third group which sees things very differently: statisticians and others whose professional experience is predominantly quantitative. From their perspective, does our methodology contribute anything?

First, it provides a way of checking whether information collected by national surveys and censuses is of an acceptable standard. The traditional method of conducting checks on a census is to use a post-enumeration survey. However, such surveys can reproduce the same problems. For instance, if the census failed to ensure that all households within communities were enumerated, a post-enumeration survey based on a similar approach may simply replicate the problem. Chambers (1997) argues that participatory mapping may produce more reliable information than a survey because: "Different people add details, and crosscheck and correct each other. The learning is progressive. The information is visible, semi-permanent, and public to the group, and can be checked, verified, amended, added to, and owned, by the participants".

In our Malawi studies, we deliberately collected information on proportions of the population that were food insecure and extremely food insecure using both surveys and participatory methods that could produce national statistics. The surveys proved to be a good way of collecting information on food security (Barahona, 2005), as did the studies that used participatory methods. Comparing the two provided a cross check: if both methods agreed - as they did - we felt that we could be confident about our findings.

Second, in some cases the complexity of the issues make it inappropriate to use traditional tools such as questionnaires. Nevertheless, policymakers need statistics and researchers may be called upon to provide them. A good example of this was the 'TIP Messages: Beneficiary selection and community targeting' study. A survey would not have enabled us to answer the more complex questions about why the TIP was failing to target the poor. Barahona and Levy (2003) show how community mapping with cards was used by the TIP Messages study to explore the reasons for the failure of targeting and to find out if altering the number of packs distributed would improve the outcome. Specifically, the study looked at the criteria used by communities for selecting beneficiaries, the problems of inclusion errors related to village power structures, disagreements on specific cases, perceived unfairness and inter-regional and local variations. All of these issues were not only discussed but also quantified, so that national statistics could be used to complement the insights from the discussions. Most of these issues would have been impossible to research using a household survey¹⁸.

7. The decision makers' response

Many of the key findings of the Malawi studies were taken on board by policy makers and donors (Barahona and Levy, 2003). However, there were a number of factors that restricted the linkages between our research and decision making (Levy, 2003a). Policy makers'

receptiveness to the findings depended mainly on whether they fitted the government's political imperatives, while donors tended to be receptive only if the results supported their existing policy agendas. The Malawi experience suggested that in order to promote better linkages between research and policy, there needed to be greater ownership of the research process from the outset, and also - in the case of government - there needed to be mechanisms for feeding back research findings into the policy debate (Levy, 2003a).

Where decision makers and government institutions are not committed in advance to examining research findings, there is often little incentive to take them on board. There are particular complications when the methodology used to generate national statistics is unfamiliar, as in this case. For example, the Wingfield Digby study report was not taken seriously by the NSO, Malawi Government policy makers or donors, who continue to uphold the 1998 census. This is not surprising, as the findings were based on methods that had not been used before. They also represented a serious challenge to the validity of the census, which was important for the reputation of the NSO. Nevertheless, it is surprising that policy makers did not require the NSO to investigate the matter further, because if the 1998 census is indeed a serious underestimate of the rural population, this has important consequences for government and donor-funded interventions as well as national statistics.

8. Ethical issues

Integrating statistics and participatory approaches leads to questions about researchers' conduct. Most of these questions do not have clear answers and need to be debated by the community of practitioners who are involved in this type of research. Some academic disciplines have already provided guidelines independently of each other. The reason to highlight ethical issues here is that in the process of integrating approaches, they can be ignored, forgotten or assumed to have been addressed by people coming from different traditions and experiences. Some of the issues¹⁹ are:

1. Use of the evidence. Research using participatory methods requires an intensive use of resources, not least in terms of time spent by the members of communities who take part in the studies. While community-led participatory studies are designed to feed back into local communities or groups within them by empowering them to make improvements, research using participatory methods that aims to influence policy at a higher level will only impact positively on the lives of the participants if policymakers use them to reduce poverty, increase livelihood opportunities or otherwise benefit the target populations. Therefore it is important to ask: should the researcher collect data for bodies (national, regional or local) that have no commitment to using the evidence as a basis for policymaking? In our view, we should not ask people to spend time on research if we do not believe that the policymakers will take the findings seriously. The converse of this argument is that researchers need to involve decision-makers from the start of any research process where participatory methods are to be used in such a way that they are committed to using the findings.
2. Consent. The issue of consent is well defined in codes of conduct for research that involve human subjects. But who checks on research carried out in rural areas of developing countries? Do all researchers observe standards for consent? If the information is to be used locally, it may be possible to argue that consent is not an important issue as the owners of the information are using it to modify their own reality. However, when we acquire information from people and take it away from the community, this issue becomes particularly relevant. It is important that such studies should seek participants' consent for carrying out the research.
3. Transparency. A related issue is whether it is right to restrict information flow to participants at any stage in the process. Practitioners of participation generally favor complete openness, but in the study using community mapping with cards, the information on the cards was deliberately coded during the mapping so that participants in subsequent group discussions would not be confronted with information that might bias their responses. This system worked well and produced reliable statistics. However, some participatory practitioners will feel that our procedure is not open enough. If it is felt that the principle of openness should not be sacrificed, it may

not be possible to collect certain types of information.

A compromise - which we call the 'contract system' - is to collect the information by keeping some participants 'blind' to information provided by others using codes, and then feed back the results so that participants can learn from them. This is based on a 'contract' whereby participants agree to 'play the game' first, with some elements unexplained; and facilitators agree to 'reveal all' at the end. Participants may want to 'correct' some information in the light of the full picture. They are allowed to do so, and both initial and final positions are recorded.

4. Sharing of information. In the short term, research using participatory methods takes more from communities that participate in the research than it gives back to them. One possible improvement would be to include a commitment to information-sharing and feedback as part of the terms of reference of studies of this type. This has the implication that resources need to be allocated for this purpose. Researchers brought up within traditional research environments often fail to realize how important they are as carriers of information when they visit communities that move in less information-rich environments. They should become more aware of this, particularly when involved in participatory processes.
5. Confidentiality. In survey work, there are clear rules to ensure that confidentiality of responses is honored, including requirements to aggregate responses to a level where no individual respondent can be identified. However, participatory approaches are usually open about who provided the information and encourage acknowledgement of sources and ownership of information. This reflects the fact that the information collected is intended only for use at local level, where confidentiality is frequently not an issue. However, when taking information out of the local context, confidentiality becomes an issue again. Even within the local context, confidentiality is important when dealing with sensitive or personal issues. In such cases, how does the researcher reconcile the need for sharing information and debate with the right to confidentiality of the information provider?

9. Conclusion

This paper has presented our experience with combining statistical principles and participatory research methods. The research was carried out in Malawi between 1999 and 2002 as part of the evaluation of Starter Pack and the TIP. The two studies discussed here found that by adapting PRA tools and taking statistical principles into account at the design stage, it was possible to generate national-level data that could be considered statistically representative and reliable. The studies were able to provide policymakers with:

- Total population statistics;
- Estimates of proportions of households with certain characteristics, e.g. the very poor/extremely food insecure, or those benefiting from an intervention; and
- Numerical data on complex issues about which questionnaire surveys are not able to produce reliable statistics, such as community poverty targeting.

The demand for these studies came from policy makers and donor organizations with a need for evidence which would inform government policies. They were not community-led in the sense of having an agenda determined by the participants and evolving in response to local needs. The authors believe that the approach is compatible with the principles of participation. However, there is a need for debate on some ethical issues - such as use of the evidence, consent and confidentiality - which are affected by the involvement of stakeholders outside the communities that provide the information.

Will the approach piloted in Malawi become more widespread in the future? There is still a lot of mutual mistrust between those who have been educated in the 'qualitative' and 'quantitative' traditions. Practitioners of participation often believe that qualitative evidence is enough, while statisticians and economists assume that 'hard data' should be produced by household surveys. Meanwhile, governments and donors, who are in a position to demand more innovative and creative solutions, frequently leave decisions about

research methods to technical advisers. However, there are more and more examples of successful communication and collaboration between those who see the world in terms of narratives and those who see the world in terms of numbers. As attitudes change, it is to be hoped that there will be increasing opportunities for studies which integrate the best of both worlds.

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Appendix 1: Method of estimation of totals and their variances used by STATA Release 8

The standard errors were calculated using the *svytotal* command in STATA release 8, which uses the following estimator for the population total and variance:

Let $h = 1, \dots, L$ enumerate the strata in the survey, and let (h, i) denote the i th primary sampling unit (PSU) in stratum h for $i = 1, \dots, N_h$, where N_h is the total number of PSUs in stratum h in the population. Let M_{hi} be the number of elements in PSU (h, i) , and let

$M = \sum_{h=1}^L \sum_{i=1}^{N_h} M_{hi}$ be the total number of elements in the population.

Let Y_{hij} be a survey item for element j in the PSU (h, i) in stratum h . The associated population total is

$$Y = \sum_{h=1}^L \sum_{i=1}^{N_h} \sum_{j=1}^{M_{hi}} Y_{hij}$$

Let y_{hij} be the items for those elements selected in our sample; here, $h = 1, \dots, L$; $i = 1, \dots, n_h$; and $j = 1, \dots, m_{hi}$. The total number of elements in the sample is $m = \sum_{h=1}^L \sum_{i=1}^{n_h} m_{hi}$.

Our estimator \hat{Y} for the population total Y is

$$\hat{Y} = \sum_{h=1}^L \sum_{i=1}^{n_h} \sum_{j=1}^{m_{hi}} w_{hij} y_{hij}$$

Where w_{hij} are the user-specified sampling weights.

To compute an estimate of the variance of \hat{Y} given the estimate of the population total, we first define

$$z_{yhi} = \sum_{j=1}^{m_{hi}} w_{hij} y_{hij} \quad \text{and} \quad \bar{z}_{yh} = \frac{1}{n_h} \sum_{i=1}^{n_h} z_{yhi}$$

Our estimate of the variance of \hat{Y} is

$$\hat{V}(\hat{Y}) = \sum_{h=1}^L (1 - f_h) \frac{n_h}{n_h - 1} \sum_{i=1}^{n_h} (z_{yhi} - \bar{z}_{yh})^2$$

Where f_h is the finite population correction.

Source: STATA (2003).

Endnotes

¹ Starter Pack was designed to make available to smallholder farmers promising technologies that would increase maize yields and food security. A full discussion of the Starter Pack experience in Malawi can be found in Levy (ed.) (2005).

² These studies formed part of a wider program of monitoring and evaluation (M&E) comprising 18 studies carried out between 1999 and 2003, including ten nationwide surveys, six studies based on participatory approaches, one set of case studies and one monitoring exercise. The methodology is described in detail in Barahona (2005) and the full M&E archive (SSC, 2004) is available on CD from c.e.barahona@reading.ac.uk.

³ The descriptions of participatory methods in this and the following section draw heavily on Barahona and Levy (2003).

⁴ This was regarded as the most complete and up to date list of villages in the country and was therefore suitable as a sampling frame.

⁵ The ADD is the largest administrative unit of the Ministry of Agriculture. There are 8 ADDs in Malawi. These are divided into RDPs, EPAs and sections (the smallest unit).

⁶ It should be noted that local variations in household definition did not affect the total rural population estimate because the identification of households was only a starting point for counting the number of people in each village using questionnaire-based interviews of every household unit.

⁷ A 'farm family' - the unit used by the SPLU - was similar to a rural household, but there was a lack of clarity about its definition (as acknowledged by the SPLU).

⁸ See Wingfield Digby (2000) for a full explanation of the derivation of weights.

⁹ In fact, there were 72 non-responses due to absence or sickness of household head, and some households were removed during data processing, leaving 6,134 households (Wingfield Digby, 2000).

¹⁰ This study followed the approach of the World Bank's 'Consultations with the Poor' studies, conducted in 23 countries including Malawi, which used local definitions of well-being/poverty. The methodology guide for these studies (World Bank, 1999) asks the facilitator to carry out well-being ranking by establishing:

- "Different well-being groups/categories of households/individuals, as identified by the local people. Allow the community to come up with their own categories. Do not impose ideas. There is no fixed number of categories that a community can come up with. Usually these vary between three-to-six categories, but could be more...
- [The] proportion of households/individuals in each of these categories. This could be exact numbers or indicative scores (out of 100, or any predetermined fixed maximum score). This will give an idea about the proportion of poor or deprived people in a community".

¹¹ Levy (2003b) notes that: "Mukherjee's guide to field methods for PLA (Mukherjee, 2001) describes more sophisticated methods of social grouping on the basis of well-being/poverty/wealth. These are based on social mapping and one of them - Grandin's

Method - uses numbered household cards. But they still group or rank only on the basis of 'local people's perceptions' and 'locally generated criteria', missing the opportunity to include an absolute poverty yardstick".

¹² This is true for rural areas in many developing countries. Brock (1999), reviewing participatory work on poverty and illbeing worldwide for the World Bank's Consultations with the Poor workshop, observed that: "Respondents in rural areas placed a strong emphasis on food security in their definitions of poverty, illbeing and vulnerability, as well as lack of work, money and assets".

¹³ Following the PRA tradition of social mapping, the participants for the mapping exercise were volunteers with sufficient knowledge of the community. It was not necessary to select a representative sample of participants, as the information being recorded was for *every household in the village*, not only for the participants' households. The volunteers merely acted as 'key informants', in the same way that in a household survey a household head acts as a key informant providing information about members of a household.

¹⁴ For further information, see Chinsinga *et al* (2002) Appendix 3: Field Manual.

¹⁵ Calculation by Carlos Barahona. The number of villages - which in sampling terminology would be regarded as clusters - used for this analysis (20) is relatively small. The main implication is that the estimates obtained have lower precision than estimates derived from a larger sample. Although this implies that the results must be interpreted with caution, this problem does not occur because of the integration of statistical principles and participatory approaches but because of the small sample size - which was constrained by the time available to carry out the study and the shortage of experienced local researchers. In particular, with the current sampling size and sampling design we were unable to estimate within-district variability and standard errors are likely to be an underestimate.

¹⁶ These points are discussed in detail in Barahona and Levy (2003).

¹⁷ An attempt was made to introduce simple community-level data analysis and discussion of findings in Chinsinga *et al* (2004).

¹⁸ A year after the TIP Messages study, in 2003, some NGOs in Malawi began to promote the use of 'community scoring cards' to quantify levels of access to and quality of health services. The approach originated in Bangalore, India, where it is known as the 'report card' method (McGee and Norton, 2000; Goetz and Gaventa, 2001). In India, the method involves commissioning a market research firm to conduct standard client satisfaction-type surveys. The results are presented in the form of 'report cards' which NGOs and consumer associations can use to put pressure on service providers. This can support participatory processes of local empowerment and service development in urban areas. It is a good example of the use of survey data to support participatory learning and action, but its aims and methods are very different from those of our work in rural Malawi, which aimed to quantify information from research based on participatory methods.

¹⁹ People are beginning to debate these issues. However adoption of codes of conduct, or even awareness of the need for such codes, is still at an early stage of development. A draft code of conduct produced by a group of UK-based practitioners of research using participatory methods can be found at www.ssc.rdg.ac.uk/workareas/participation.html.