Mitigating Survey Fraud and Human Error:

Lessons Learned from A Low Budget Village Census in Bangladesh[1]

by Muhammad F. Bhuiyan[2] and Paula Lackie

Abstract

The paper suggests effective strategies for collecting high quality data in developing countries based on lessons learned from implementing a household level census of three villages in Bangladesh. In particular, we focus on low cost but effective techniques for reducing survey fraud (e.g. curbstoning) and human error (e.g. transcription errors) in conducting face-to-face questionnaire-based interviews by hired surveyors. We find the following strategies to greatly improve data quality: use of a geographic information system (GIS) and audio-capturing smart pens; daily monitoring; surveyor retraining; and swift firing of those showing consistent errors in judgment. Transcribing the data as soon as the surveys were completed helped locate and contain human errors, as well as fraudulent activities. The techniques suggested here are geared towards prevention of errors, rather than detecting fraud during post-survey validation.

Keywords

Curbstoning, Survey Fraud, Low Budget Survey, Developing Country, Data Quality

Introduction

"[i]n spite of early evidence of cheating in market research and other fields where professional surveyors are employed ..., the problem of surveyor cheating has largely been ignored in recent literature." – Harrison and Krauss (2002)

The process of mitigating data falsification is more difficult than it may seem at first. While the challenges of collecting reliable interview-based data are well known (Biemer and Stokes, 1989; Crespi, 1945), the literature on dealing with these challenges, particularly with regard to falsified data (Harrison and Krauss, 2002), is sparse. This lack of attention began to change in 2003 with the publication of the best practices list by AAPOR (2003). It succinctly describes the reality that "[e]ffective control of falsification is not the result of any single method, but of the combined aspects of the study-specific environment in which surveyors conduct their work." In this paper, we briefly outline lessons learned during the implementation of a census of three contiguous villages in Bangladesh (Bhuiyan and Szulga, 2013), denoted the Tangail Survey (TS). We focus on the strategies employed during the data collection process to mitigate human errors and data falsification. The research project had minimal funding so budgetary restrictions dictated many of the methods employed.

Roughly a dozen local graduate students were hired for the TS, which used a geographic information system (GIS) and smart pens to conduct face-to-face interviews (approximately 40 minutes each) at the household level. Our top priority was to gather a highly reliable and robust dataset on the villagers' subjective well-being (SWB) and their perceptions of relative economic position, by identifying households with international migrants, and collecting the geographic (latitude/ longitude) coordinates of household locations with a global positioning system (GPS). In agreement with the techniques suggested by Koczela et al. (2015), we provide evidence that the use of smart pens, a GIS mapping of the household location prior to conducting the interviews, and daily on-site monitoring of the hired surveyors, to be quite effective in catching survey fraud and reducing unintentional errors. The use of the mentioned technologies also made post-survey validation and catching transcription errors a relatively easy task.

Curbstoning, Falsified Data, and Cheating

The most common terms used to describe survey fraud are curbstoning (where face-to-face interview data are faked), partial falsification (where only a portion of the survey data are faked), and cheating (when the convenience of the surveyor takes precedence over the protocols of the survey). Blasius and Friedrichs (2012) provide a concise summary of the literature and describe faked interviews. They conclude that it is remarkably easy for surveyors to fabricate interviews in face-to-face surveys which may remain undetected when basic monitoring protocols are not followed. Basic protocols, while essential to achieving high quality data, do not necessarily guarantee this quality of data:

> [While] there has been an old and long discussion on the reasons why surveyors fake interviews (cf. Crespi, 1945, 1946; Bennet, 1948; Nelson and Kiecker, 1996), the most elementary reason has hardly been discussed. Falsifiers save a lot of time/earn more money if they (partly) fake their interviews. ... [and] the risk of getting detected is relatively low since control mechanisms as those proposed by AAPOR (2003) and Murphy et al. (2004) are relatively easy to bypass. ... Furthermore, a detailed introduction, good payment, no time pressure, and an interesting study do not necessarily guarantee well-done interviews.

Harrison and Krauss (2002), Waller (2012) and Koczela et al. (2015) focus on the motivations for surveyors to cheat. Waller (2012) provides the most comprehensive study of the motivations for and methods of falsifying data by the surveyors. In general, the literature focuses mostly on methods of detecting falsified survey data in pre-existing data (Bredl et al., 2011, 2012; Kuriakose and Robbins, 2015) and less so on the on-site prevention of the collection of falsified data. We contribute to the latter.

The Tangail Survey Process

The accuracy of survey data may be compromised due to a variety of reasons, ranging from human errors or misaligned incentives to technical problems before, during, and after the data gathering process. These errors are further intensified when the survey site is in a developing economy and the project has tight budgetary constraints. Both are true for the TS. To understand how the TS methodology was driven by the overarching goal of collecting robust accurate data, we provide a brief overview of the research agenda and the project workflow.

Research Objectives

The choice of topics covered in the TS is primarily determined by the principal investigators' (PIs) research interest - relative income, subjective well-being (SWB) and international migration. While the literature on relative consumption is vast, there is very little empirical work looking into the economic position of individuals relative to local reference groups. For instance, when talking about income relative to neighbors, most papers operationalize the definition of neighbors as all individuals who live within broad geographical regions such as villages (Fafchamps and Shilpi, 2008), areas within the same zip code (Knies et al., 2007), primary census units (Luttmer, 2005), states (Blanchflower and Oswald, 2004) or even countries (Easterlin, 1995). The PIs decided to collect data fine enough to be connected to more realistic definitions of local reference groups such as neighbors.

The TS gathers data on both objective and perceptive measures of relative economic position, as the literature does not provide a strong preference for either measure (Fafchamps and Shilpi, 2008; Ferrer-i-Carbonell, 2005; Luttmer, 2005; Mayraz et al., 2009; McBride, 2001; Senik, 2009). Although asking respondents about their perception of relative income compared to neighbors, siblings, colleagues, etc., is somewhat straightforward, data of this type are largely missing for developing countries. Hence, we decided to ask respondents about their perceptions of relative economic position directly. In terms of objective measures, we recognized that having geographic coordinates for every household in each village along with objective measures of their income, would be the best possible type of objective data on relative economic position that we could hope for.

One of the PIs research interests is understanding how local networks affect the choice of destination when it comes to international migration. For instance, if a potential migrant's neighbor is already an international migrant in the Middle East, is it more likely that they will put more weight on that region when choosing between multiple destinations. No data are available that can adequately address this question. After preliminary visits to Bangladesh and in consultation with local experts, villagers, government agencies, and development workers, the PIs chose three contiguous villages in the Tangail district of Bangladesh. These villages have a significant number of households with at least one international migrant and they are going to different regions of the world. The census nature of the survey along with the geographic coordinates of the household location, makes it possible to more closely study local neighborhood effects on migration decisions and subjective well-being.

From a policy standpoint, the TS offers valuable insights into the interaction of local neighborhood/community effects with international migration, conspicuous consumption and quality of life measures in rural Bangladesh. The paucity of data of this type, especially in the context of developing countries, makes this a very useful dataset for those interested in the aforementioned topics.

Project Workflow

In the pre-fieldwork and preparation phases, the PIs enhanced their local social network and improved their rapport with the hired surveyors

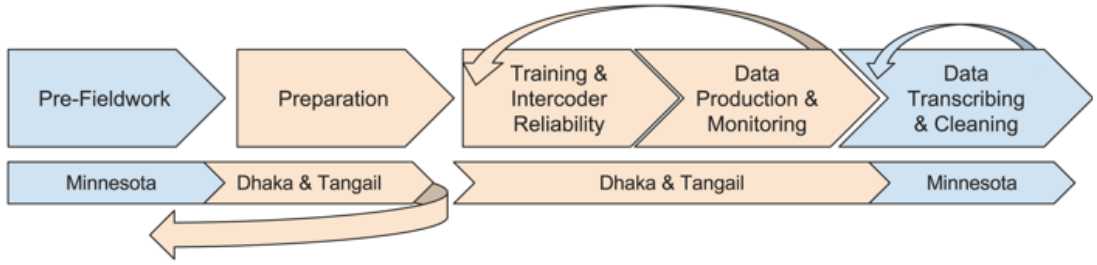

Figure 1: Overview of Data and Project Workflow

(figure 1). Once the training and inter-coder reliability development stage commenced, the personal ties strengthened and surveyor specific

weaknesses with the delivery of certain survey questions became more apparent. During data production and monitoring, it was easy to verify suspicions and fire the surveyors who exhibited serious errors in judgement. The surveyors met to discuss questions of the survey, improve their understanding of how to deliver questions and interpret answers on a daily basis. This was both time consuming and exhausting, but an effective impediment to the would-be cheaters. (See appendix A for the overall project time-line and a daily schedule of survey activities.)

Due to financial and infrastructural constraints, we chose to (a) create a geographic information system of the survey area, and (b) use the inexpensive audio-capturing Livescribe™ smart pen technology. It not only allowed for collecting the data efficiently but also helped with monitoring and catching survey fraud and errors. It is worth noting that we were able to borrow the necessary GPS equipment from a local institution for free which kept our costs in check.

The Use of a GIS

Figure 2 provides a schematic example of the type of map employed for this project. The use of a GIS made sense on several levels. Mapping out the spatial location of households offered a nuanced understanding of local neighborhood effects. Additionally, the development of the GIS gave the supervisors, who were also the GIS mappers, experience inside each village. This familiarity came in handy during the survey process. The GIS also offered a simplified solution to:

- dividing the villages into specific areas that were then assigned to surveyors.
- assigning unique identifiers to the households.
- managing the paradata (which households were non-responders, unavailable, or chose to delay the survey), and tracking the overall survey progress.
- following up with the households to screen for fraudulent activities.
- randomly choosing households during post-survey validation efforts.

Developing the GIS itself produced some limited errors. A concrete example of this showed up during the TS when a son claimed he and his family ate separately while his father claimed the opposite. It was later found that the father and son had recently split and the father did not want to think of his son as living separately. These GIS errors became evident during the questionnaire survey phase and it was relatively simple to correct them. Yet another example of errors occurred when the responders would get confused about the definition of "household" and provide inaccurate answers. When the surveyors returned and found such households they were instructed to report them. The daily reporting session held every evening was a chance to discover these households and address the situation.

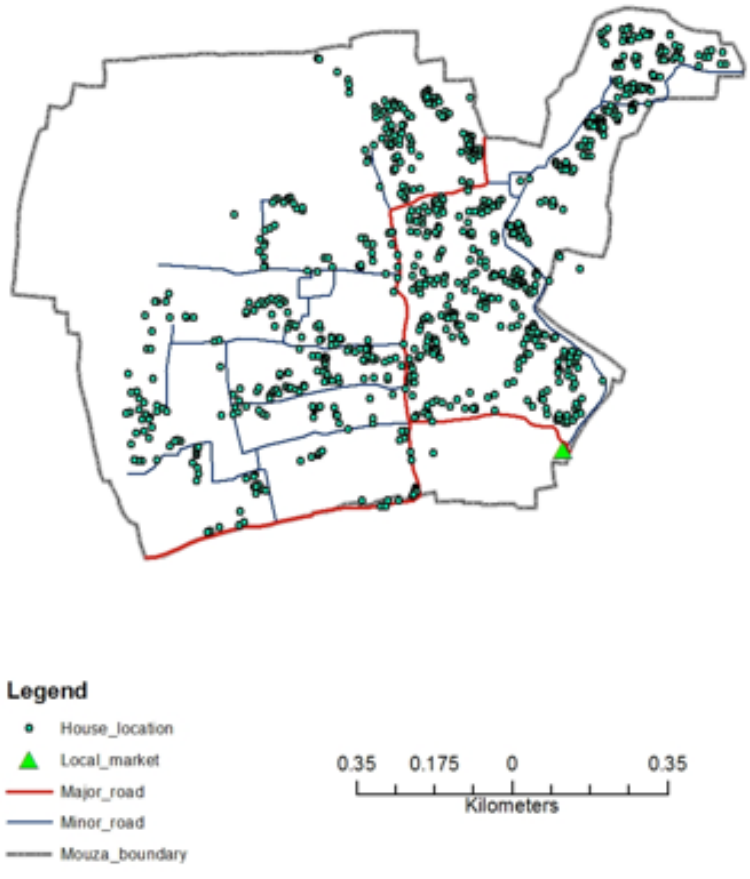

Figure 2: Example Household Location/GIS

The Use of Smart Pens

The basic feature of the smart pen is to have anything written on a special dot-paper recorded into the pen and synchronized with all audio that accompanies this writing. The resulting audio can be "played back" using Paper Replay™ with the pen and paper itself. It can also be replayed as an encapsulated Pencast™ using desktop software such as Adobe Flash®, PDF, PNG or M4A or within the Livescribe desktop software. A feature of this pen is that it captures only what the pen itself writes on special dot-paper and not what has been pre-printed (e.g. the survey form), on the paper (Lackie et al., 2014).

Once the survey process was underway, the benefits and problems of the smart pens became clear. At the end of each survey day the interviewing teams returned to the base (where there was more reliable access to electricity than in the villages). The supervisors immediately began processing the day's data: logging the survey forms, transferring the recorded "data" and audio from each pen to a computer, and backing all of that up again. Most importantly, the smart pen provided a rapid recap of every recorded survey. Each day the supervisors transcribed the paper surveys and listened to specific areas of the surveys that were suspect (transition points, questions that had been difficult to read or were simply skipped on the paper form). The

Pencast™ made it possible for the supervisors to immediately fast-forward the recording to a specific point in the survey where surveyors were facing challenges.

With this immediate and convenient method of double-checking the data, the surveyors and supervisors met daily to follow up on errors, specifically focusing on survey questions that were not being asked or recorded consistently across the surveyors. This daily iterative process continuously improved the quality of the data. It became clear to the surveyors that they had to conduct the surveys as instructed or risk getting caught and fired. The Echo™ smart pens:

- are significantly less expensive than any computer tablet or screen-based device.
- are small, easy to use, and not distracting in an interview.
- are robust enough to withstand intense heat and humidity.
- run on a single battery charge for the entire day (necessary as there was no way to recharge mid-day.)
- are capable of storing a full day of interview data with full audio within the pen.
- provides backup for every survey (i.e. paper forms and a digital document with full audio).

Lessons Learned and Effective Strategies

There are multiple ways of classifying errors that compromise data quality. Certain errors are intentional while others unintentional. An example of an intentional error is turning in fake data to avoid the effort of conducting a genuine survey. Reframing the survey question by modifying the language and mistakenly assuming this causes no bias is another type of unintentional error. From the PIs' perspective, the tools used to mitigate and repair these errors caused by unintentional mistakes, negligence, imprecision or fraud tend to be very similar. Where it is clear that the hired surveyor is intentionally conducting fraud, it is best to terminate their contract right away. However, in cases where it is not as obvious, the surveyor's ability to incorporate feedback and the magnitude of damage caused by their potentially unintentional errors, is the appropriate metric for deciding on termination decisions. As will become clear from the discussion below, the following four aspects of the TS significantly improved our ability to catch and prevent survey fraud and human errors:

- Having at our disposal the pre-survey GIS map of the study area.
- The use of Livescribe™ smart pens for audio-capturing the full interview.
- Checking the surveys daily (e.g. listening to the audio recording) for deviations from the survey protocols and debriefing the surveyors instantly.
- Sending supervisors to verify if certain households were surveyed properly when survey fraud was suspected.

Issues Mitigated by Requiring a Full Audio Transcript of the Interview

In this section, we provide scenarios of survey fraud and human errors along with techniques used to mitigate the errors during the implementation of TS. In particular, we focus on survey fraud and errors that were effectively mitigated using the smart pens. Scenarios 1- 3 are examples of curbstoning while scenarios 4-9 are examples of cheating or unintentional errors.

Scenario 1: The surveyor was unsure whether the respondent would cooperate once they were located, and so ventured into the market place and asked some random individual to complete the survey. As surveyors were able to start or pause the audio recording of the smart pen as they wanted, some thought they would be able to hide the fact that they were interviewing the wrong person.

Solution: The fact that the audio capturing was turned off strategically to avoid recording the name of the respondent raised red flags. Subsequently, supervisors were sent to these households to verify whether they were properly surveyed, if at all. Fraudulent surveyors were caught and fired.

Scenario 2: Surveyors claimed that the background noise from a weaving machine was too loud. Consequently, the interview could not be heard in the audio-capture.

Solution: The supervisors were aware that the audio-capturing features of these smart pens are robust to these types of noises. Thus, such claims also raised red flags and resulted in subsequent verification.

Scenario 3: Surveyors claimed that the pen was not working on a specific day.

Solution: Two approaches were used to deal with this. First, the surveyors were told that they could keep the smart pen at the end of the project, but only if it worked throughout the survey process. If their pen did not work, they would not be allowed to keep it. They valued the pen and consequently had proper incentives to protect the device. Second, when they reported a pen not working at the end of a particular day, a supervisor was sent out to verify if households were actually surveyed the day for which the audio could not be captured.

Scenario 4: Surveyors rephrased the questions incorrectly. For instance, replacing the phrase "life satisfaction" with "happy" in the question "How satisfied are you with your life?" Note that in the SWB literature they have very different meanings.

Solution: From the training sessions the supervisors and PI knew which questions would be most challenging and could quickly check the audio directly on the Paper Replay™ when the surveyors returned each evening. The surveyors who were caught not having followed their training were retrained. Repeat offenders faced the prospect of being fired.

Scenario 5:: Surveyors changed the language of the survey and assumed answers. For instance, when asking a question on the perception of relative economic position compared with neighbors, the surveyor might truncate the response from a five-point scale of "much worse", "worse", "same", "better" and "much better" to a three-point scale of "worse", "same" and "'better'. The surveyor then uses their own judgement to convert the answer to a five-point scale response.

Scenario 6: Surveyor unintentionally reverted to a pre-training way of speaking.
Solution (both 5 and 6): As a part of the training, the surveyors discussed their language use and developed a feeling for which questions were most likely to cause these problems. The immediate Paper Replay™ made it a simple matter to focus on the audio of how specific questions were asked and review them as the surveys were completed. In many cases, this was an unintentional result of fatigue and the tendency to revert back to their usual way of speaking. This was confirmed by listening to many of their surveys and hearing that they framed the questions properly during most interviews but slipped up on a few. Repeated listening made them more aware of their language use and they quickly learned not to do it.

Scenario 7: Socioeconomic differences played a role. The surveyors were educated and from the city, while the population surveyed are poor and rural. In the Bangladeshi context there is an implicit understanding of socioeconomic hierarchies which lead both sides to act in certain ways. For example: A surveyor harshly demanding answers to questions. "Why does it take you so long to answer this? answer quickly!" or showing anger or impatience with the respondent in any way. This lead to the respondents not thinking about their answers and answering quickly to get out of the circumstance.

Solution: The surveyors had to be trained about the deleterious effects of such behavior on the survey process and then to overcome these tendencies. They were regularly reminded that for the survey to be taken seriously, socioeconomic biases needed to be addressed. As the audio was being checked as they turned in their forms each night, this behavior was quickly detected.

Scenario 8:: Although trained not to, sometimes the surveyor would prompt the respondents with an answer in trying to explain the question.

Scenario 9:: When transcribing multiple fields of data, sometimes it does not show internal consistency. For instance, a family indicated as not having an international migrant, nonetheless, seems to be receiving a non-zero remittance from one of its household members. Another example involves transcribing the gender of a son of the household head to be a female. While it is obvious that there is a mistake here, it is not clear which field between the two contradictory ones is incorrect.

Solution (both 8 and 9): The audio playback provided the supervisor or PI with the necessary tools to repair the data entry.

Issues Mitigated by the GIS and Post-survey Validation
The pre-survey GIS data developed for the study area included information on the geographic coordinates of the household locations and the name of the household head. These data played a very important role in monitoring coverage, avoiding duplication of surveys, and dealing with erroneous transcription of household identifiers. It also made post survey validation a very quick and cost-effective process. Here are some problematic scenarios that the GIS helped to resolve:

Scenario A: Occasionally the surveyors miscommunicate which houses had already been surveyed and would duplicate efforts and skip other households altogether.

Solution: This was caught when the household identifier was matched between the GIS records and the survey data.

Scenario B: Transcription errors of household identification numbers were more difficult to catch. It resulted in certain households mistakenly connected with a different GIS location, such that two sets of data were then suspect.

Solution: Comparing the name of the household head in the GIS survey, with the questionnaire survey usually made it clear which survey had the incorrect household identification number.

Scenario C: Some cheating was caught by re-surveying 20% of the households. These were chosen at random and the households were asked three verifying questions about, (a) whether someone surveyed their household (b) the name of all individuals who lived in the household, and (c) whether the surveyor instructed the respondent to not cooperate or answer in a fraudulent manner.

Solution: While the basic questions are simple, the process of verification is still a weak link. Especially in the case of a violation of (c), the respondents may choose not to answer truthfully in the verification stage, out of fear that they would have to make the time to do the survey again.

Scenario D: Surveyors occasionally chose to skip some households, but claimed that the household said they did not want to take part in the survey. It did not happen very often legitimately, due to the good relationship they had developed with the villagers.

Solution: All households who refused to participate were followed up on.

Issues Mitigated by the GIS and Post-survey Validation

The tips from the few articles about mitigating surveyor fraud seemed to hold true for the TS (e.g. recording the interviews, providing random checks to confirm that the interview took place as expected, following up on protocol violations, and rigorous oversight with little isolation of surveyors). In addition, some new issues arose with this group. These hired surveyors were hand-picked, well-paid graduate university students who were gaining excellent field experience. Several had hopes of attending school in the US or elsewhere and needed letters of reference. Still, they required a great deal of attention and persistent following.

A few students did not like being monitored and in retrospect conducted much of the survey fraud. This group tried to unionize and extort a higher wage early in the process. They started rumors about the PI making money off their hard work and being involved in financial fraud. They realized that the PI was under a binding time constraint and so started to engage in extortionary behavior. The solution to these issues included persistence, openness, and being willing to fire and replace them very quickly. These surveyors were also the ones who worked to cheat whenever possible and exhibited a disdain that their "usual" methods of survey fulfillment (e.g. survey fraud tactics) would not work because of the rigorous and prompt data verification process. When they were fired, the rest of the survey team took notice and worked very well. A few proactive bad apples can seriously hamper the process and it is important to deal with them swiftly and transparently.

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Notes

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4. See McGuire et al. (1995); Van De Stadt and de Geer (1985); Blanchflower and Oswald (2004); Clark and Oswald (1996); Dynan and Ravina (2007); Easterlin (2001); Duncan (1975); Cole et al. (1998); Diener et al. (1999); Deaton and Stone (2013); Luttmer (2005); J. Solnick and Hemenway (1998); Bhuiyan (2012); Mayraz et al. (2009).

5. While the survey was conducted in Bengali, the answers were interpreted onto the survey form in English during the interview. Surveyors needed to learn to deliver the survey in a strict format and interpret the answers onto each form in a consistent way.

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