Haitian Aid Survey after Hurricane Matthew

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Abstract

In October, 2016, Hurricane Matthew primarily struck the southern portions of Haiti, where wide spread property damage, injuries, and deaths occurred. Statistics without Borders (SwB) conducted a nationwide household survey to confirm aid distribution and quantify the aftermath of Matthew (five-weeks later). In a small-scale nationwide survey, SwB explored the aid distribution where we found that only 18% of the people received aid. Our results indicate that aid distribution, a thorny issue, needs to be given still more thought. The original Haitian election was to take place October 9, 2016. However due to Matthew's wrath the elections were rescheduled to November 20, 2016 where Jovenel Moise (of the P.H.T.K) won. Preliminary observations from an electoral observation the author participated in will be discussed, along with response fabrication prevention and detection techniques.

Keywords: Haiti, Survey methods, Humanitarian.

On October, 2016, Hurricane Matthew (category 4) pummeled the southern and northwestern portions of Haiti, a Caribbean island, with 140 mph winds and torrential rain storms. Rivers flooded nearby homes, sweeping away personal belongings, crops, animals, and homes, leaving people with little food and shelter. People sought shelter in nearby schools, churches, or with other family members. The winds turned nails, tin roofs, and tree branches into daggers. Such injuries are prone to tetanus if left untreated. Unclean water is the source of cholera and other diseases. Matthew swept away sources of clean water and latrines, thereby increasing the chances that people will drink unclean water. Cholera outbreaks occurred. Medical facilities were destroyed. Hurricane Matthew affected the Haitian elections. The election was to take place Sunday October 9 2016. However due to Matthew's wrath the elections were rescheduled to November 20, 2016.

This article is divided into four sections. In the first section, the "History of Poverty and Poor Health," the medical situation is discussed. In the second section, the "Survey of the Whos," where the aid distribution is discussed. This survey was implemented five weeks after Hurricane Matthew struck. In the third section, "Haitian Election Observation," consists of the author's observation during an election observation mission. This observation mission occurred seven weeks after Matthew struck. The fourth and final section discusses response fabrication, a deliberate deviation from the survey protocol. Using a different data set in the final section, the author evaluates response detection tools in the context of poor interviewer training. In previous sections, the author utilized ways to prevent response fabrication in the Haitian aid and election mission.

I. History of Poverty and Poor Health

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According to UNICEF's 2015 State of the World's Children report, only 58% of Haiti's population had access to an improved drinking water source (water from a well or pipe) and 28% had access to a latrine. As result, people drank unclear drinking water. Unclean drinking water was identified by Center for Disease Control (CDC) officials as the primary source of cholera. The number of suspected cholera cases increased after Matthew. A month prior to Matthew, the number of suspected cases was 2,236. A month after Matthew the number increased to 5,100 cases.

Many people resided in poorly constructed concrete homes. Haiti has poor health indices. The life expectancy at birth is 63 years and the infant mortality rate is 52 per 1, 000 live births. An estimated 69 of every 1,000 children born die by the age of 5 years, and 12% of the surviving children are undernourished. Furthermore, Haiti is ranked 163 out of 183 countries in the UN Human Development Index. This development index is based on life expectancy, years of schooling, and standard of living.

II. Survey of the "Whos"

Typically, aid distribution from large organizations is coordinated through the Haitian government. Aid is typically dropped off at a school or another public facility in a commune center. The people residing in the nearby sub-communes must find a way to obtain the aid from the center. Disasters bring chaos and confusion. Data can clarify the situation. Aid organizations can readily report the "what," "where," and the "how" of the distribution. The UN's Office for the Coordination of Humanitarian Affairs (OCHA) provides weekly updates of aid delivered, and assessments. For example, OCHA provides a count each week of food delivered by the World Food Programme to each department and commune distribution site, along with any security incidents. To the best of the author's knowledge, this food count is based on the amount of food unloaded from the truck at the distribution site in each commune center.

However, it is the "who" of the distribution that is more difficult to identify or even may remain unknown. There are fairly rural parts of Haiti in the South. Are only those people closest to the distribution site receiving the aid? Are only those people, who can afford this supposedly free aid, receiving it? Here is where Statistics without Borders (SwB) stepped in. SwB is a pro-bono Outreach Group of the American Statistical Association (ASA). Knowing that a conclusion that a hurricane occurred and aid was slow would not be meaningful, Rachel Green and the author worked hard to design a questionnaire that covered damage, loss, aid and health care. Likewise, the same care was involved in analyzing the results. This nationwide survey represents a "snapshot" of the aid distribution and aftermath just five weeks after Hurricane Matthew. A more detailed write up the results can be found in a conversation piece by Condon (2017). The present work followed in the footsteps of the two groups of researchers who focused on job loss and home displacement after the Haitian earth quake of 2010 (Kim, Ashley and Corcoran, 2014 and Orelien, Philippe, Wesner, Ashley, Fisher, and Scheuren, 2013).

This household survey approach differs from OCHA's counts in that it includes a representative sample of everyone eligible for aid—those who received it and those who did not. In contrast, the OCHA's counts are more inventory like. To the best of the author's knowledge, this count is based on aid handed out from the truck or distribution site. If SwB only interviewed those people at the truck obtaining aid, we would just learn about those people who received it.

2.1 **Methodology**

The author arrived five weeks after Matthew to conduct the survey. Reaching out to respondents in a timely manner would prove to be a challenge in Haiti. SwB members initially thought a mobile phone survey was the best candidate, because phone penetration is high in Haiti. In addition, people did not have to pay to receive incoming calls. Likewise, the survey could be administered and data collected quickly in tightly controlled conditions. But phone penetration is lower in rural areas than urban areas, and much of Matthew's damage occurred in the rural areas. Likewise, Haiti does not have area codes, making it difficult to target certain regions. As a result, we conducted 100 face-to-face interviews in the south. The data collection was preceded by four hours of training the day before. The interviewer asked a household member about (1) aid received after Matthew, (2) damaged homes and lost possessions after Matthew, (3) job status before and after Matthew, (4) family members who moved in after Matthew, (5) danger signs of diseases, (6) clinic accessibility before and after Matthew, (7) injuries after Matthew and (8) change in dietary habits before and after Matthew. The present work will only discuss the results of the aid distribution. For more details, see a conversation piece by Condon, 2017.

The team visited five communes. Upon arrival at a commune or sub commune, the team coordinated household interview routes at the truck. Afterwards, each interviewer headed out to adjacent houses by foot. No two interviewers went to the same house or in the same direction. A supervisor monitored the team. Repeated face-to-face interviews (re-interviews) were conducted before leaving each commune or sub-commune. Re-interviews, spot checks in the field, and interviewer debriefings allowed the author to assume with certainty that response fabrication did not occur in the field.

Along with face-to-face interviews, 154 phone interviews throughout the entire country (all ten departments). Interviewers asked the same set of questions in the phone survey interviews as in the face-to-face interviews. Nationwide interviews allowed us to compare the effects of Matthew throughout the country. We expected some areas to be unscathed and others destroyed.

During the phone interview phase, the interviewers worked from a randomly generated set of phone numbers. (A list of working phone numbers provided by the phone companies was unavailable.) Every 8^{th} to 25^{th} call was a working phone number. For a more though discussion of procedures involved in generating the random phone numbers see Fisher, 2010.

To reduce interviewer frustration, we tinkered with the randomly generated numbers. The team tried the "last digit up and down" approach and obtained more hits. That is, if the last digit of a working number was a six, a team member dialed a five.

Taking this one step further, the team tinkered again with the last digit of known southern phone numbers (those obtained in the field). The thinking was that the phone companies sold blocks of phone numbers to people in various regions. Our first try led us to someone in the less accessible area of the south, but the remaining attempts led us to the north and west departments. These outcomes gave us an indication that the phone numbers

were not sold in blocks. Again, the supervisor monitored the interviewers and ten repeat interviews were conducted. Phone credit was offered as an incentive.

To ensure that the interviewers reached all ten departments by phone, the geo-spread or the number of calls per department were calculated. Forty-three percent of the phone interviews reached people in the West department where most of the Haitians reside. The remaining 57% of the calls reached people in the remaining nine departments.

2.2 Results/Recommendations

Overall, the survey reached 230 adults whose primary residence is in Haiti at the time of Hurricane Matthew. Among the people, 54% were male and the remaining 46% were female. The average age was 38.5 with a range from 15 to 80 years old. Typically, six people reside in a house (or share the same cooking pot). With respect to aid distribution after Hurricane Matthew, a minority of people, 18% reported receiving aid. Here aid is food, sanitation supplies and tarp/tin roofs. Table 1 describes the aid distribution by area below.

Table 1: Distribution of survey participants who reported receiving aid after Hurricane Matthew by affected area type.

Areas	**No-Aid**	**Yes-Aid**	***Totals***
Highly-affected areas	72	29	101
Less-affected areas	96	8	104
Totals	168	37	205

(Note: Although asked about aid, some survey participant in the less-affected areas chose not to answer the aid questions.)

There are three points to be made about this table. The first point is that little aid went to the less-affected area 8% (8/104). The second point is that what aid was given, went to the highly-affected areas more so than the less-affected area (78% (29/37) vs 22% (8/37)). These two points confirm the expectation that more aid is distributed to those people residing in the highly-affected areas than those in the less-affected areas.

The third and final point is that still only 29% (29/101) of the people in the highly-affected areas received aid. (These people resided in either the commune center or the surrounding sub communes.) The remaining people did not receive aid. When asked "why," the leading answer was "cronyism/sell" (42%), followed by "don't know" (36%) and the remaining answers were "too far away, not enough, or fight for it" (22%). Aid distribution is a tough issue. Clean water, food, seeds, and tarps are sorely needed in the Hurricane Matthew affected areas. Several respondents recommended providing free aid in an orderly manner rather than simply thrown off the truck where people have to fight for it. Others recommended that the aid be distributed from home to home with an armed guard. Neither recommendation is perfect.

After talking to some aid officials about survey findings, the author learned that the aid distribution had some hiccups in the beginning (October, 2016) and that the distribution is more systematic now (February, 2017). To find out if the distribution indeed had changed, Rachel Green and the author designed a follow-up phone survey where the same respondents (interviewed in November, 2016 and again in February, 2017) were asked about (1) aid received, (2) cholera prevention habits and (3) food eaten.

Two interviewers were asked to call 119 known numbers; these numbers were culled from the highly-affected areas only. Of the 119 known numbers, only 32 numbers worked (27%). The principle finding was that when people were asked about aid, only one person (out of 24) received aid. This person received aid right after Hurricane Matthew.

To increase the number of people interviewed in this follow up, the author asked the interviewers to obtain referrals from the original survey participants. Here "originals" refer to those people who were in the original sample of November 2016 and "referrals" were not, but knew someone who was. Both groups of survey participants would receive phone credit. The "originals" would receive extra phone credit for all successful referrals and that might include asking the "referral" to turn on his/her phone. Or the "original" might simply pass his/her phone to the "referral." Unfortunately, this idea was not implemented due to a language barrier.

III. Haitian Election Observation Mission

The election was to take place Sunday October 9. However due to Matthew's wrath the elections were rescheduled to November 20, 2016 where Jovenel Moise (of the P.H.T.K) won. The Haitian ex-pats fielded a team of 62 observers (including the author) to voting centers (e.g., schools) in the following five departments (out of ten): (1) Artibonite, (2) Nippes, (3) North, (4) North East, and (5) West.

Haiti consisted of 10 departments with a population of 10,485,800 (as of July 1, 2016). (A majority of the people reside in Port-au-Prince the nation's capital.) There are 5,835,295 registered voters in all departments. Many of the voting centers were located in schools and churches. The author visited some voting centers in a stadium, market, and unfinished mansion. The number of tables varied per center, as some voting centers were larger than others. Card tables with privacy screens or voting booths along with clearly labeled ballot boxes were provided. The ballots were picture oriented with clear instructions as to how to complete the ballot.

One of the goals of this mission was to look for any inconsistencies in the electoral processes. The observers followed the Office of American States guidelines religiously where observers were present three times a day at a voting center. Unfortunately, 62 observers in this mission was not enough to overturn the results. Interestingly, the number of observers per an organization was capped at 150.

One concern was response fabrication at each polling station. Ideally, two observers should be yoked together and confirm each other's observations at each voting center. Staffing problems led us to modify this scheme so that observers confirm each other's observation only once a day. Here is an example of observer pairings where each voting center is covered by a six observers and all three time of day observations are confirmed.

Table 2: Observers 1 & 2 Pair

Time of Day	Voting Center 1	Voting Center 2	Voting Center 3
Opening: 6am	Observer 1	Observer 2	

Mid-day: 1pm			Observers 1 & 2
Closing: 5pm	Observer 2	Observer 1	

Table 3: Observers 3 & 4 Pair

Time of Day	Voting Center 4	Voting Center 5	Voting Center 6
Opening: 6am	Observer 3	Observer 4	
Mid-day: 1pm	Observer 4	Observer 3	
Closing: 5pm			Observers 3 & 4

Table 4: Observers 5 & 6 Pair

Time of Day	Voting Center 7	Voting Center 8	Voting Center 8
Opening: 6am			Observers 5 & 6
Mid-day: 1pm	Observer 5	Observer 6	
Closing: 5pm	Observer 6	Observer 5	

3.1 Preliminary Observations

On Election Day, the observers witnessed the electoral process from opening of the polls to counting of the ballots, visiting an average of 3.21 centers (per person). All polling stations observed opened on average at 6:30 am. Observers reported enough staff to oversee the voting process, along with a sufficient number of voting materials. The ballots and educational materials were picture-oriented with clear instructions as to how to select and mark the candidate of choice. Fifty-eight observers reported that the ballots were well-designed. Ink was used to indicate that people casted their votes. Political party members were present, along with national observers. The election was held on a Sunday (church day). Voters took an average of six minutes to cast their votes. Twenty-four observers reported long lines in mid-afternoon. The author observed long lines right after Sunday mass ended. Voting centers closed at about 4pm and observers noted that some voters were turned away. Vote counting ended between 5:00 and 9:50 pm and observers reported that it followed legal procedures. The author observed some power outages in voting centers whereby officials were forced to count under the light of lanterns. Digicel (and possibly Natcom) sent out text messages informing each phone subscriber as to their designated voting location. The author observed that Digicel got it wrong sometimes and sent the person to the wrong location. While these results are preliminary and based on the author's observations, the data suggests that it was straightforward election. (The author's observations are not representative of SwB or the Haitian dysphoria.)

IV. Response Fabrication

Response fabrication, a deliberate departure from the survey protocol, can plague all types of surveys and may lead to faulty recommendations. In a humanitarian data set, the author sought to detect and isolate response fabrication using three tools: (1) interview durations, (2) caseloads and (3) duplicate cases. Unfortunately, this work demonstrates that detecting and isolating response fabrication in a dataset can be tricky. That is, what initially appeared to be response fabrication in the data may very well be due to poor interviewer training and questionnaire design. The findings are tangled together and difficult to tease apart. (This data set is different from the ones in the previous sections.)

During training, interviewers typically learn about the importance and nature of the survey. Of equal importance, and sometimes under-emphasized is the instruction as how to properly administer the survey. Proper instruction eliminates any potential biases in the data. Proper administration involves following the prescribed interviewer route, questionnaire format, interview conventions and data processing procedures. Additional tips on implementing surveys for humanitarian efforts are also described by Chu, Dashen, Selva and Suchowski, 2016.

Statisticians and survey methodologists have a lot of tools to detect and reduce fabrication in their tool boxes. At the time of data analyses, survey analysts can conduct three tests: (1) interview duration, (2) case load, and (3) duplicate case analyses. A large number of duplicate cases inserted whole sale by the interviewer may be a sign of fabrication (Kuriakose and Robbins, 2016). Likewise, short interview duration times (interview end - start time) may be indicative of cheating or short cuts (e.g., Bushery, Reichert, Albright and Rossiter, 1999; Murphy, Biemer, Stringer, Thissen, Day, and Hsieh, 2016). This is because it takes less time to complete a questionnaire oneself than asking another person. Lastly, a caseload analyses involves an unusually high number of completed cases in a single day may suggest that the interviewer is cheating.

In theory, these three tests should be fairly robust to poor training. For example, an interviewer's tendency to insert a case wholesale should not be affected by poor training or questionnaire design. Rather, this tendency is probably due to laziness or poor pay. Likewise, interview duration times should be unaffected by poor training with the exception of survey instrument acclimation. That is, longer interview times are expected in the beginning of data collection compared to the end, as interviewers become acclimated to the instrument.

4.1 Survey Description

In a household survey, 1,115 respondents in three countries were asked about their well-being. Twelve questions pertained to type of shelter, education, health employment, and sanitation. Demographic and more broadly speaking foundational questions were not included.

The interviewers were caseworkers for a local NGO partner and received minimal instruction as to how to administer the survey. In this household survey, interviewers were reportedly hesitant about entering certain neighborhoods and were instructed to conduct interviews when they could whether it was within their busy work schedule or during off hours.

4.2 Response Fabrication Tests

Interviewer names (per case), which are a good detection tool for cheaters, were present in the data set. Forty-nine percent of the cases contained interviewer names; 26 interviewers were identified. The remaining cases either contained the respondent name or no name at all (left blank). Though this name question was intended for the interviewer to write in his or her name, many did not know to do so.

Using these "known interviewer cases," three response fabrication tests were conducted at the data analyses stage of the survey. (SwB was not involved in the set up and implementation of this survey.) The first two tests pertain to interview duration and caseloads. The final test pertains to duplicate case analysis. Each test is described in detail below.

4.2.1. Identify speeders

To find out whether the interviewers fabricated the answers, the interview duration per case and interviewer name was calculated. The thinking here is it takes less time to fill out questionnaires on one's own than actually conducting a questionnaire.

Of the 26 interviewers, 21 interviewers completed each interviews 11 minutes on average (a little under a minute per close-ended question). The five remaining interviewers completed each interview in five minutes or under (about 25 seconds per question). The lack of detail in the speeder comments was consistent with the short interview durations too. This finding is suggestive of fabrication. Or could it be poor training? Perhaps, the speeders failed to say the question as is. The interviewers were not instructed to do so otherwise. This finding is suggestive of poor training. There is no clear reason behind the "speeder" finding.

4.2.2. Identify unusually large interviewer caseloads

To determine whether interviewers had an unusually high caseload, the number of cases completed per day by interviewer (speeder and non-speeder) was calculated. The average number of cases completed per day was 16.3 with a range of 1-33 cases per a day. Three interviewers exceeded this average caseload; 18, 22, and 33 cases per day. The three interviewers were designated speeders too.

4.2.3. Identify suspicious cases

To find out whether fabricators inserted the same case whole sale, the number of unusually high duplicate cases per interviewer was calculated. Interestingly, 6% (32/553) of the known interviewer cases were duplicates. A closer look at the data indicates that these duplicate cases "belonged" to 4 of the 26 interviewers. That is to say, these interviewers appeared to have inserted the same case whole sale for either part of the case load or in its entirety. (One interviewer only completed four cases, which had identical values). Interestingly, these were the same three interviewers who were speeders and had an unusually high case load. This finding is consistent with response fabrication.

To give the interviewers the "benefit of the doubt," a frequency analyses of responses was conducted by interviewer and case. That is, it is quite possible that many of the respondents are all in the "same boat" and minimal variation is expected. For example, 90% of the people reported being unemployed or working temporarily. Likewise, when asked about food, 56% of the respondents did not have a balanced diet that met their nutritional needs. This "same boat" hypothesis is akin to the identical neighbor hypothesis

put forth by Kuriakose and Robbins (2016). Here people who live near each other share a lot of commonalities and minimal variation is expected.

To sort out the identical responses, the author looked for the respondent demographic information. No such information was recorded. Demographic or more broadly speaking background information (e.g., phone numbers and physical address), for example, can all be information used together to uniquely identify the individual. When a physical address is not available, detailed two-block maps are a good substitute. (Such information is vital for respondent re-contacts involving missing information or unclear answers.)

4.3 Discussion

Is there response fabrication in the data set? Maybe. The results are suggestive of response fabrication, but not definitive. This is because the tests originally selected to detect response fabrication were affected by poor training and questionnaire design. For example, an interviewer's tendency to insert a case wholesale is usually due to poor pay or laziness rather than poor training. However, the lack of background information (a questionnaire design flaw) tainted this duplicate case test, thereby making it difficult to tell whether the interviewer really did (1) insert the same case whole sale or (2) talk to people who were all alike with regard to living and employment situations. Likewise, the interview duration will be shorter for those people who did not read the question in its entirety compared to those who did. And finally the failure to provide a definitive time frame for data collection can weaken a caseload analyses. Poor training and questionnaire design infiltrated even the most robust of fabrication tests.

The present study adds to the body of work examining fabrication in humanitarian data sets. Some researchers advocates auditing administrative data in fisheries using Bellini's model (e.g. Tsagbey, De Carvalho and Page, 2017). Such audits allow one to find out whether the number of fish caught were under reported. This study is similar in spirit, yet differs in that household interviewers were verified rather than administrative records.

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