ERDC/CERL SR-17-2

Construction Engineering Research Laboratory

US Army Corps of Engineers®
Engineer Research and Development Center

ERDC
INNOVATIVE SOLUTIONS for a safer, better world

Human-Infrastructure System Assessment for Military Operations

Specific, Measureable, Attainable, Relevant, and Timely (SMART) Document

Utilized in Assessing Socioeconomic Impacts of Cascading Infrastructure Disruptions

Tina M. Hurt, Ellen R. Hartman, Carey L. Baxter, and Natalie R. Myers

February 2017

Approved for public release; distribution is unlimited.

The U.S. Army Engineer Research and Development Center (ERDC) solves the nation's toughest engineering and environmental challenges. ERDC develops innovative solutions in civil and military engineering, geospatial sciences, water resources, and environmental sciences for the Army, the Department of Defense, civilian agencies, and our nation's public good. Find out more at www.erdc.usace.army.mil.

To search for other technical reports published by ERDC, visit the ERDC online library at http://acwc.sdp.sirsi.net/client/default.

Cover Photo: Accessing water in Africa (source: United Nations Environment Programme, http://www.unep.org).

ERDC/CERL SR-17-2
February 2017

Specific, Measureable, Attainable, Relevant, and Timely (SMART) Document

Utilized in Assessing Socioeconomic Impacts of Cascading Infrastructure Disruptions

Tina M. Hurt, Ellen R. Hartman, Carey L. Baxter, and Natalie R. Myers

Construction Engineering Research Laboratory
U.S. Army Engineer Research and Development Center
2902 Newmark Drive
Champaign, IL 61822

Final report

Approved for public release; distribution is unlimited.

Prepared for Assistant Secretary of the Army for Acquisition, Logistics, and Technology
103 Army Pentagon
Washington, DC 20314-1000

Under Project No. 405479, "Human Infrastructure System Assessment for Military Operations"

Abstract

U.S. Army doctrine requires that commanders understand, visualize, and describe the infrastructure component of the Joint Operating Environment to accomplish the Army's missions of protecting, restoring, and developing infrastructure. The functionality of modern cities relies heavily on interdependent infrastructure systems such as those for water, power, and transportation. Disruptions often propagate within and across physical infrastructure networks and result in catastrophic consequences. The reaction of communities to disasters may further transfer and aggravate the burden on infrastructure and facilitate cascading secondary disruptions. Hence, a holistic analysis framework that integrates infrastructure interdependencies and community behaviors is needed to evaluate vulnerability to disruptions and to assess the impact of a disaster. Specific, Measureable, Attainable, Relevant, and Timely (SMART) documents are used to assess, measure, and predict the impact of potential infrastructural interdictions. Assessing individuals within the population allows analysis of social well-being in relation to potential cascading infrastructure failure.

DISCLAIMER: The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such commercial products. All product names and trademarks cited are the property of their respective owners. The findings of this report are not to be construed as an official Department of the Army position unless so designated by other authorized documents.

DESTROY THIS REPORT WHEN NO LONGER NEEDED. DO NOT RETURN IT TO THE ORIGINATOR.

Contents

Abstract ii

List of Figures iv

Abbreviations v

Preface vi

Unit Conversion Factors vii

1 Introduction 1
- 1.1 Background 1
  - *1.1.1 Infrastructure failure 1*
  - *1.1.2 Human-Infrastructure Systems Assessment (HISA) Project 2*
  - *1.1.3 Maiduguri case study 3*
- 1.2 Objectives 3
- 1.3 Approach 4

2 SMART Documents 5
- 2.1 Developing the SMART documents and supplemental materials 5
  - *2.1.1 SMART documents (Appendix A) 5*
  - *2.1.2 Survey dictionaries (Appendix B) 6*
  - *2.1.3 Field guides (Appendix C) 7*

3 Summary and Recommendations 8
- 3.1 Selecting capabilities 8
- 3.2 Recommendations 12

References 13

Appendix A: SMART Documents 15

Appendix B: Survey Dictionaries 48
- HISA Survey Dictionary: Electricity (E) 48
- HISA Survey Dictionary: Water (W) 62
- HISA Survey Dictionary: Transportation (T) 73
- HISA Survey Dictionary: Communications (C) (cellular/wireless) 85
- HISA Survey Dictionary: Food/Agriculture (F) (food security) 95

Appendix C: Field Guides 105
- HISA Field Guide: Electricity (E) 105
- HISA Field Guide: Water (W) 149
- HISA Field Guide: Transportation (T) 183
- HISA Field Guide: Communications (C) (cellular/wireless) 219
- HISA Field Guide: Food/Agriculture (F) (food security) 249

Figures and Tables

Figures

Figure 1. Example of a SMART document question sequence for electrical infrastructure. 6
Figure 2. Capability of accessing potable water (Water Scarcity, Daily Post Nigeria, Ugwuanyi, 20 January 2015). 11
Figure 3. Capability of being mobile (Bella Africana.com) 11
Figure 4. Capability of having access to electricity (www.news24.com) 12

Tables

Table 1. Matrix of the 10 capabilities and the 16 supporting indicators. 9

Abbreviations

Term	Meaning
ASA(ALT)	Assistant Secretary of the Army for Acquisition, Logistics, and Technology
BH	Boko Haram
CERL	Construction Engineering Research Laboratory
DHS	Department of Human Services
ERDC	Engineering Research and Development Center
GIS	Geographic Information System
GPS	Global Positioning System
HISA	Human-Infrastructure System Assessment (for Military Operations)
IDP	internally displaced person
IPUMS	Integrated Public Use Microdata Series
LGA	local government area
MPC	Minnesota Population Center
NBS	National Bureau of Statistics, Nigeria
NGO	nongovernment organizations
NPR	National Public Radio
SMART	specific, measurable, attainable, relevant, and timely
UNICEF	United Nations Children's Emergency Fund
USACE	United States Army Corps of Engineers
VEO	violent extremist organization
VK	Vkontakte (Russia)
WHO	World Health Organization

Preface

This study was conducted for the Assistant Secretary of the Army for Acquisition, Logistics, and Technology (ASA(ALT)) under Project No. 405479, "Human Infrastructure System Assessment for Military Operations." The technical monitor was Mr. Ritchie L. Rodebaugh of the U.S. Army Engineer Research and Development Center's technical transfer office (CEERD-TZ-T).

The work was performed by the Ecological Processes Branch (CNN) of the Installation Division (CN), U.S. Army Engineer Research and Development Center, Construction Engineering Research Laboratory (ERDC-CERL). At the time of publication, Dr. Chris C. Rewerts was Chief, CEERD-CNN; Ms. Michelle Hanson was Chief, CEERD-CN; and Mr. Ritchie L. Rodebaugh, was the Technical Director for Geospatial Research and Engineering (CEERD-TZ-T). The Deputy Director of ERDC-CERL was Dr. Kirankumar Topudurti, and the Director was Dr. Ilker Adiguzel.

COL Bryan S. Green was the Commander of ERDC, and Dr. Jeffery P. Holland was the Director.

Unit Conversion Factors

Multiply	By	To Obtain
square miles	2.589998 E+06	square meters

(This page intentionally blank.)

1 Introduction

1.1 Background

1.1.1 Infrastructure failure

Modern cities are comprised of complex infrastructure networks, such as those for power, water, and transportation, which interact with one another and jointly function to provide resources and services to city residents. As cities continue to expand and prosper, the ever-growing population imposes pressing challenges to the urban infrastructure systems in every aspect. Even with properly designed infrastructures that satisfy people's needs in normal-functioning scenarios, infrastructure performance is often vulnerable to unexpected disruptions from factors such as natural disasters or hostile human activities. In these situations, the performance of the city and the well-being of the society can be significantly impacted, resulting in social disruptions related to economic loss, humanitarian crisis, and demographic loss.

In reality, infrastructure failures and community reactions to the failures are mutually dependent, further complicating the problem of infrastructure disruptions. Urban infrastructure failures are especially likely to stimulate strong reactions from the population. A direct consequence of most system failure is difficulty for residents to access life-supporting resources. For example, people may have to line up at gas stations to purchase overpriced fuel, travel a longer distance to access water, and/or turn to diesel generators when the power grid is disrupted. In addition, people may have to travel through the transportation network to deliver or retrieve resources, while some infrastructural interdependencies are realized by delivering commodities from one facility to another via transportation. When congestion increases due to people's response to system failure, the fluidity of commodity flow may be compromised and the cascading effect could be further exacerbated.

Therefore, instead of considering only one-directional impacts from system failure to population response, the impacts of human activities on physical system performances should also be considered.

1.1.2 Human-Infrastructure Systems Assessment (HISA) Project

The Human-Infrastructure Systems Assessment (HISA) research project is sponsored by the U.S. Army Corps of Engineers – Engineer Research Development Center (USACE-ERDC). This research area evaluates the effects of infrastructure disruptions on the well-being of civilian populations. Critical infrastructure systems (e.g., electricity, water, transportation, communication, and food security) provide vital services that support and enable a society to function. Consequently, loss of these systems due to disasters, terrorism, population migrations, or military operations can potentially result in widespread, catastrophic disruptions.

Of particular concern are the interdependencies between infrastructures—failures in one system can rapidly lead to failures in other systems, creating a chain reaction that greatly exacerbates the original situation. Given the physical placement and interconnections of the various components of the infrastructure networks, HISA performs three calculations, as listed below:

- HISA estimates the cascading physical damage on infrastructure components (e.g., generators, storage tanks, and bridges).
- HISA translates that damage estimate into a change in available infrastructure services.
- HISA utilizes societal traits to compute changes in safety, health, shelter, and income.

As an example of cascading damage, the failure of a critical water pump may shut down the power plant due to the need for cooling the plant with water. The water pump's failure translates into a restricted loss of water services, but it also causes a *widespread* loss of electricity. The significance, or effect, of these types of failures is dependent on how communities use the services. Households unconnected to the electrical grid will not be impacted by electrical failure. On the other hand, commercial vendors dependent on the electrical grid to refrigerate food supplies could potentially affect regional health conditions and ultimately, local food supplies. Utilizing societal traits enables agencies to plan for the potential effects of the loss of infrastructure services, and to focus efforts towards rehabilitation and/or the creation of additional services.

The goal of HISA is to build a model that represents combined human-infrastructure systems so that the potential impacts of infrastructure

changes on social well-being in Army-relevant contexts can be explored. This model will be designed to provide possible policy insights into how best to protect crucial infrastructures, reserve emergency supplies, and avoid humanitarian disasters.

1.1.3 Maiduguri case study

Maiduguri is the capital city of Borno State in northeastern Nigeria (11°51'N, 13°05'E), with an estimated total population of 1.2 million. Concurrent with rapid urban growth, the local government has been facing additional severe challenges. Challenges include natural hazards such as drought and floods that cause significant adverse effects (Odihi 1996), both active military events and terrorist attacks that threaten people's daily lives and the security of urban infrastructure (Ibeh 2015), and large numbers of internally displaced persons (IDPs) fleeing into Maiduguri after terrorist attacks, which exhaust the resources in the city and result in further pressure on the infrastructure systems (Haruna 2015). From this angle, the HISA model aims to better understand and interpret these pressing social concerns and to provide possible policy insights into how best to protect crucial infrastructures, reserve emergency supplies, and avoid humanitarian disasters.

The HISA pilot study of Maiduguri, Nigeria, is a beta application of the HISA process for a 12-square-mile region in northeastern Nigeria that includes the municipal jurisdiction of Maiduguri (Lu et al. 2016). Maiduguri is located in the heart of the rebel activity of Boko Haram (BH) and experiences frequent attacks on its infrastructure. The Alau Reservoir is the primary source of water for Maiduguri residents. The shrinking of Lake Chad has also caused several conflicts to emerge as sources for water, food, and livelihoods disappear. The pilot study illustrates the value of the HISA capability and validates results by using scenarios that mimic past events.

1.2 Objectives

The goal of the overall HISA project is to build a model that represents combined human-infrastructure systems so that the potential impacts of infrastructure changes on social well-being in Army-relevant contexts can be evaluated.

As a next step in the HISA research project, this work's primary objective was to develop specific, measurable, attainable, relevant, and timely

(SMART) documents to collect community-level data on basic infrastructure and its daily use.

Objectives included accomplishing the following additional tasks:

- Define sociocultural data needs to understand how a society uses infrastructure and, consequently, the impact of disruptions to that infrastructure.
- Standardize data collection so that responses will support streamlined data collection to be used in subsequent human-infrastructure analyses.
- Develop survey dictionaries to aid individual being surveyed in interpreting and understanding what is being asked of them.
- Create field guides as instructions for observers and data collectors working in the field.

1.3 Approach

Through a combination of literature reviews, examinations of quantitative data sets, and evaluation of census data, gaps were identified to help frame the information needed to understand the societal impacts of infrastructure disruption. Chapter 2 discusses the phases of development, and Chapter 3 summarizes the capability and indicator selections. SMART questions were developed to cover the five infrastructure components (Appendix A). Guides were then developed to assist respondents and observers with completing the SMART documents (Appendices B and C). Significant work remains to operationalize this reliability-based capability approach by utilizing the SMART documents and transforming the methodology into practical tools. That work is expected to be completed in follow-on studies.

2 SMART Documents

Assessing individuals within a population and their relationships to infrastructure networks is a relatively unexplored research area. For the military, on-the-ground data and observations of those relationships is currently minimal. This lack of data limits the extent of analyses that can be conducted to understand a population's social well-being in relation to the infrastructures they use for daily life. Because that data is lacking, this HISA project developed a series of SMART documents (Appendix A) to capture and characterize important aspects of how people use infrastructure and how, in an infrastructure failure, people are impacted. The information collected through the SMART documents can be used by decision makers to assess, measure, and predict the impact of potential infrastructural interdictions.

2.1 Developing the SMART documents and supplemental materials

A series of five SMART documents were created to address specific aspects of the five infrastructure layers investigated through this project—electricity, water, transportation, communication, and food security. The SMART documents were designed to be used in the field to encourage interaction between local residents and military personnel through asking questions for the data collection and information-gathering processes and observing the daily actions of the population when using local infrastructures (Appendix A). Supplemental survey dictionaries (Appendix B) and field guides (Appendix C) were developed to explain and expand the question sets outlined within the SMART documents.

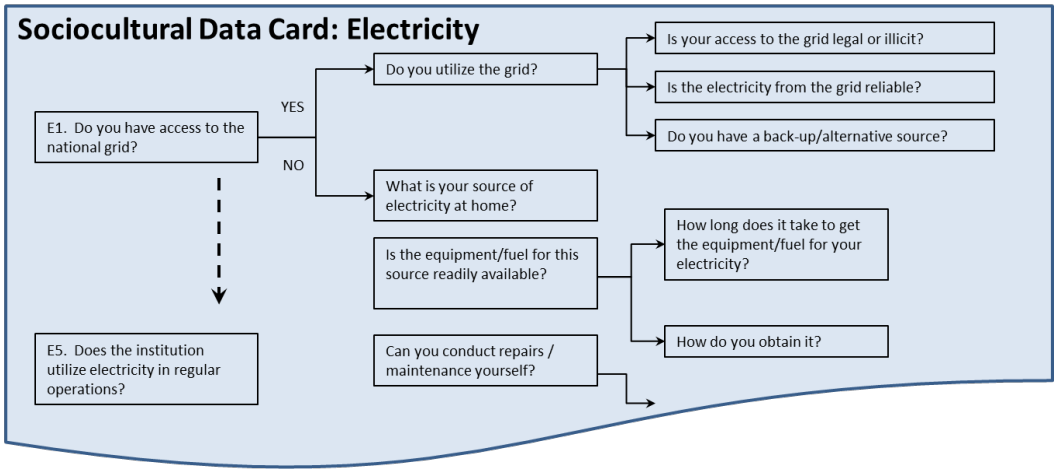
2.1.1 SMART documents (Appendix A)

To create the SMART documents, researchers generated question sets through reviews of academic literature, journalistic stories, internet searches for images and videos, and geospatial data. The question sets are designed to capture how people interface with infrastructure while conducting daily activities. The case study of Maiduguri, Nigeria, focused the scope of this initial user-characterization and provided a geographic context (Lu et al. 2016). For each infrastructure, the group of researchers would collect remotely sourced information about the area and then extrapolate characteristics about the infrastructure under investigation. Through creating narratives about place and use, general questions were

determined that would aid in collecting relevant data to illustrate how people use infrastructure and what is most important for the military to know and understand about those interactions, particularly in the case of disruption.

The question sets for each of the five types of infrastructure are divided into four broad categories based on population type: residential, community, commercial and industrial, and institutional. In each category, the infrastructure assessment questions start broad and become more specific as the questions progress to include more detailed answers. The answers are standardized to streamline future data processing and analysis. Figure 1 provides a sample of the progression of questions and answers in a SMART document.

Figure 1. Example of a SMART document question sequence for electrical infrastructure.



To complement the questions, survey dictionaries and field guides were developed. In those, questions from the SMART documents are expanded to describe the intention of the question, how the collected data could be applied to analysis, and what to take note of in the physical environment when observing the surrounding infrastructure.

2.1.2 Survey dictionaries (Appendix B)

Census datasets often have associated dictionaries to explain the questions being asked and the answers that might be provided. To complement the SMART document question sets, HISA researchers compiled survey dictionaries for each of the five infrastructures (Appendix B). The survey dictionaries contain the SMART document questions, answer options, and

question purposes. This information explains why the question is being asked, and what the question (in particular) is assessing.

2.1.3 Field guides (Appendix C)

The field guides in Appendix C were developed not only to explain further how the collected data could be used for analysis, but also to provide individuals collecting the data with notes on physical indicators of infrastructure in an area. The field guide for each physical infrastructure has the SMART document question, answer options, purpose of the question, and data collection guidance pertaining to remote sensing, direct observation, and local information sources. These guides are for visual assessment of the geographic area to identify key aspects of the society, to determine the well-being of individuals, and to determine daily routines of an area or community. All input can be combined to guide decision making and analyze potential impacts of infrastructure disruption.

3 Summary and Recommendations

The SMART documents, survey dictionaries, and field guides provide a method for collecting data that is relevant to characterizing the interactions between populations and infrastructures. This type of interaction is often overlooked in current military decision-making processes.

In summary, the SMART documents in HISA accomplish the following tasks:

- **Define sociocultural data needs** to understand how a society uses infrastructure and, consequently, the impact of disruptions to that infrastructure.
- **Standardize data collection** so that responses will support streamlined data collection to be used in subsequent human-infrastructure analyses.
- **Develop survey dictionaries** to aid analysts in interpreting and understanding infrastructure user data.
- **Create field guides** as instructions for observers and data collectors working in the field.

3.1 Selecting capabilities

The SMART documents were developed in conjunction with the selection of 10 human well-being capability factors. The most widely applicable capability factors were determined through a combination of reviewing pertinent literature, examining quantitative datasets, and analyzing qualitative aspects of the SMART documents. The most relevant capabilities were selected through a combination of three processes:

- brainstorming guided by the existing literature on human well-being and capability,
- examining the availability of data that represent human capabilities, and
- developing and qualitatively analyzing the SMART documents.

The 10 relevant capabilities are listed below:

1. Meeting physiological needs.
2. Being physically safe.

3. Being sheltered.
4. Having access to energy.
5. Earning income.
6. Owning property.
7. Being mobile.
8. Being educated.
9. Having access to medical services.
10. Being socially connected.

After selecting the 10 capabilities, 16 indicators were chosen to more fully explain the capabilities (Table 1). These 16 indicators were derived from two Nigerian surveys to ground the process in available data (Akali 2014, 1–5; Land 1975, 5–36). Again, a literature review was used to test and augment the indicator selection process and prove that the indicators could characterize the capability dimensions. Figure 2–Figure 4 show a variety of ways that people use and modify infrastructure to meet their physiological needs, including accessing energy and being mobile.

Table 1. Matrix of the 10 capabilities and the 16 supporting indicators.

Capability	Indicator
Meeting physiological needs.	Main source of drinking water.
	Frequency of problems with supply of drinking water.
	Frequency of problems satisfying food needs.
Being physically safe.	Do members feel safe walking on the street at night?
Being sheltered.	Frequency of problems paying house rent.
Having access to energy.	Source of electricity.
	Number of hours without electricity in previous 24 hours.
Earning income.	Household financial situation.
Owning property.	Number of household durables.
	Dwelling ownership.
Being mobile.	Time to nearest food market.
Being educated.	Time to nearest primary school.
	Frequency of problems paying school fees.
Having access to medical services.	Time to nearest hospital.
	Frequency of problems paying for healthcare.

Capability	Indicator
Being socially connected.	Can household depend on religious association during difficult period?

Researchers evaluated the existing quantitative datasets that were used to reflect the human capabilities in the communities of Maiduguri, Nigeria. The datasets included Nigeria's National Core Welfare Indicators Survey (NBS [National Bureau of Statistics, Nigeria] 2006), the Harmonised Nigeria Living Standards Survey (NBS 2009), and the online datasets associated with Nigeria from the websites of Integrated Public Use Microdata Series, International (IPUMS International) and Minnesota Population Center (MPC). Attention was given to (a) what variables were applied, and (b) to what extent the variables were applied to represent the capability dimensions that were identified and conceptualized by researchers.

During examination of the quantitative datasets (as outlined above), researchers discovered three limitations with them, as listed below:

- There is a lack of highly pertinent variables of interest, such as the crime rate in a community to manifest the capability of "being physically safe" (Capability #2) or annual household income to reflect the capability of "earning income" (Capability #5).
- A number of highly relevant variables of interest are present in separate datasets (nation-state and LGA), while the regression model used here requires them to be in one single dataset.
- Researchers examined the data collected within the datasets, but they discovered the data had a relatively coarse granularity. For example, the database of IPUMS International only has data at the nation-state level, and the two Nigerian surveys have data (at a maximum) for the local government area (LGA) level, which lacks neighborhood, community, or household levels of information.

Despite these limitations, examination of the datasets confirmed that conceptualization of capability dimensions through development of a matrix of capabilities is meaningful and can be operationalized. SMART documents collect data to augment available census data, which can be inconsistently available and if available, then only at course granularities. Because of the limited existing data collection possibilities, the SMART

documents were designed to ask questions that show how people are actually using the available infrastructure—it's one thing to know that people are getting water from a communal source

Figure 2. Capability of accessing potable water (Water Scarcity, Daily Post Nigeria, Ugwuanyi, 20 January 2015).

Figure 3. Capability of being mobile (Bella Africana.com)

Figure 4. Capability of having access to electricity (www.news24.com)

3.2 Recommendations

For the most effective use of this work, researchers recommend referring to the detailed review of capabilities and indicators within the human-infrastructure network in a previous HISA reports from ERDC-CERL researchers, *Assessing Socioeconomic Impacts of Cascading Infrastructure Disruptions in a Dynamic Human-Infrastructure Network* (Lu et al. 2016) and *Assessing Socioeconomic Impacts of Cascading Infrastructure Disruptions Using the Capability Approach* (Wang et al. 2016).

Significant work remains for the team to complete in operationalizing this reliability-based capability approach by utilizing the SMART documents and transforming the methodology into practical tools. It is recommended that this work be the subject of follow-on research.

References

Akali, D. M., O. T. Iorhemen, J.A. Otun, and M. I. Alfa 2014. "Provision of Sustainable Water Supply System in Nigeria: A Case Study of Wannune-Benue State." *World Journal of Environmental Engineering* 2(1): 1–5.

Haruna, K. January 2015. "Maiduguri, A Troubled Capital City Overtaken By IDPs." Available: http://leadership.ng/features/401050/maiduguri-troubled-capital-city-overtaken-idps.

Ibeh, N. 18 February 2015. "Nigerian Military Kills Over 300 Terrorists, Captures Many Others." Available: http://www.premiumtimesng.com/news/top-news/177064-nigerian-military-kills-over-300-terrorists-captures-many-others.html

Land, K. C. 1975. "Social Indicator Models: An Overview." Chapter 2 in *Social Indicator Models*, edited by K.C. Land and S. Spilerman, 5–36. New York, NY: Russell Sage Foundation.

Lu, Liqun, Xin Wang, Zhaodong Wang, Yanfeng Ouyang, Jeanne Roningen, Scott Tweddale, Patrick Edwards, and Natalie Myers. July 2016. *Assessing Socioeconomic Impacts of Cascading Infrastructure Disruptions in a Dynamic Human-Infrastructure Network*. ERDC TR-16-11. Vicksburg, MS: Engineer Research and Development Center.

MPC (Minnesota Population Center). 2016. *Integrated Public Use Microdata Series, International*. Minneapolis, MN: University of Minnesota. Accessed 13 June 2016. https://international.ipums.org/international/.

NBS (National Bureau of Statistics, Nigeria). 2006. *Nigeria – National Core Welfare Indicators Survey, 2006, Third Edition*. Abuja, Nigeria: National Bureau of Statistics, Federal Government of Nigeria. Accessed 15 March 2016. http://www.nigerianstat.gov.ng/nada/index.php/catalog/30.

_____. 2009. *Nigeria – Harmonised Nigeria Living Standards Survey 2009, First Round: Education Housing and Subjective Poverty*. Abuja, Nigeria: National Bureau of Statistics, Federal Government of Nigeria. Accessed 17 Feb 2016: http://nigerianstat.gov.ng/nada/index.php/catalog/38/study-description.

Odihi, John O. 1996. "Urban Droughts and Floods in Maiduguri: Twin Hazards of a Variable Climate." *Berichte des Sonderforschungsbereichs* 268(8): 303–319.

UNICEF (United Nations Children's Emergency Fund), and WHO (World Health Organization). 2003. "Water, Sanitation, and Hygiene: WASH and Women." www.unicef.org/wash/index_womenandgirls.html.

_____. 2012. *Progress on Drinking Water and Sanitation: 2012 Update*. New York, NY: UNICEF.

_____. 2015. *25 Years Progress on Sanitation and Drinking Water: 2015 Update and MDG Assessment*. Geneva, Switzerland: World Health Organization.

Wang, Yi (Victor), Armin Tabandeh, Paolo Gardoni, Tina M. Hurt, Ellen R. Hartman, and Natalie R. Myers. August 2016. *Assessing Socioeconomic Impacts of Cascading Infrastructure Disruptions Using the Capability Approach*. ERDC TR-16-15.

Appendix A: SMART Documents

A series of five SMART documents were created to address specific aspects of the five infrastructure layers investigated through this project: electricity, water, transportation, communication, and food security. The SMART documents were designed to be used in the field to encourage interaction between local residents and military personnel through asking questions for the data collection and information-gathering processes and observing the daily actions of the population when using local infrastructures.

Supplemental survey dictionaries (Appendix B) and field guides (Appendix C) were developed to explain and expand the question sets outlined within the SMART documents.

ELECTRICITY	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
Residential	**E1.** Does this household have access to the grid?	YES	**E1A.** Does this household use power from the grid?	YES	**E1a1.** Is this household's access to the grid legal or illicit?	Legal		
						Illicit		
					E1a2. Is the electricity from the grid reliable?	Yes		
						No		
					E1a3. How do you pay for electricity?	Flat fee		
						Amount used (kW/hr)		
					E1a4. What happens if you don't pay your bill?	Power shut off		
						Additional fees until paid		
						Nothing		
					E1a5. How many hours per day do you get electricity from the grid?	0–4 hours		
						4–8 hours		
						8–12 hours		
						12–24 hours		
					E1a6. What is the cost of electricity from the grid?	0%–24% of annual income		
						25%–50% of annual income		
						50%+ of annual income		
					E1a7. Do your appliances run like they should when using grid electricity?	Yes		
						No		
					E1a8. Does the grid have regularly scheduled outages?	Yes		
						No		
					E1a9. If power from the grid is unavailable, do you have a back-up/alternative source?	Yes		
						No		
					E1a10. Do you own the back-up source of power or buy it from a local source?	Own		
						Buy from local source		
					E1a12. What are the reasons this household does not use power from the grid?	Not reliable	**E1a11.** Would you use the grid if your concerns were addressed?	YES
						Too expensive		
						Do not want to		NO
				NO				
		NO	**E1b.** What is your source of electricity in the home?	Generator	**E1b1.** What type of fuel does your generator use?	Gas/petrol		
				Solar		Diesel		
				Wind		Propane		

ELECTRICITY	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
				Other		Natural gas		
				Do not utilize electricity in the home		other		
			E1c. Is the equipment and fuel for this power source readily available?	YES	E1c1. How long does it take to get the equipment and fuel for the household's electricity?	Less than an hour		
						1-2 hours		
						2-4 hours		
						4-8 hours		
						More than 8 hours		
					E1c2. How does this household obtain fuel for a primary source of power?	Carried by hand		
						Transported by animal		
						Transported by motor vehicle		
						Delivered		
						Other		
					E1c3. Do you use batteries to store energy for nighttime use?	YES		
						NO		
					E1c4. Can you store enough energy for your night time needs?	YES		
						NO		
				NO				
			E1d. Is someone in this household able to conduct repairs and maintenance on the power source?	YES	E1d1. If the household's power source fails, what is the downtime?	Hours		
						Days		
						weeks		
				NO				
	E2. Do you use electricity in this household?	NO	E2a. What is/are the reason(s) electricity is not used in this household?	No access				
				Cannot afford				
				Access it at another location through personal or private arrangement (including at work location)				
				Utilize a communal or shared access point				
				Social, cultural, or religious prohibition				
				No Need				
		YES	E2b. How important is electricity in the household?	Very important				
				Somewhat important				
				Not important				
			E2c. How many hours a day do you use electricity?	0–4 hours				
				4–8 hours				
				8–12 hours				

ELECTRICITY	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
				12–24 hours				
			E2d. In what season does this household use the most electricity?	Summer/dry season	**E2d1.** During the summer/dry season, what time of day does this household use the most electricity?	Morning		
						Mid-Day		
						Evening		
						Night		
				Winter/wet season	**E2d2.** During the winter/wet season, what time of day does this household use the most electricity?	Morning		
						Mid-Day		
						Evening		
						Night		
				Spring/planting season	**E2d3.** During the spring/planting season, what time of day does this household use the most electricity?	Morning		
						Mid-Day		
						Evening		
						Night		
				Fall/harvest season	**E2d4.** During the fall/harvest season, what time of day does this household use the most electricity?	Morning		
						Mid-Day		
						Evening		
						Night		
			E2e. What does this household use electricity for? (Check all that apply.)	Lighting				
				Climate control				
				Cooking				
				Household appliances				
				Charging communication devices				
				Personal computer				
				Television/radio				
				Entertainment devices				
				To conduct business in the home				
Community	**E3.** Do you regularly utilize communal electricity or electrical appliances?	YES	**E3a.** Who provides the communal electricity?	Private Business	**E3a1.** Why is communal electricity important? (Check all that apply.)	Entertainment (including sporting events on TV or radio)		
				Government				
						Access to news		
				Community elite		Access to the political process (including election campaigns)		
				Nongovernmental organizations (NGOs)				
						Access to financial systems		

ELECTRICITY	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
				Violent extremist organizations (VEOs) or criminal organization		Security		
						Communication (including social media)		
				Other				
			E3b. How does the availability of electricity affect the community? (Check all that apply.)	Places where electricity is available become gathering/socialization spots				
				Socialization stops when electricity is available as everyone stays home to take advantage of it				
				Socialization increases when electricity is available as people go out for entertainment or to conduct business				
				Activity outside the home is reduced or restricted after dark				
				Crime rates increase after dark				
				Work stops after dark				
		NO						
	E4. Are there working streetlights in your area?	YES	E4a. Are the streetlights powered from the municipal electrical grid?	YES				
				NO				
			E4b. Are the streetlights solar powered?	YES				
				NO				
		NO						
Commercial/Industrial								
	E5. What kind of commercial facility is this?	Retail	E5a. Does this commercial/industrial facility have a fixed location?	YES	E5a1. Does this commercial/industrial facility employ people other than the owners?	YES		
		Industrial				NO		
		Service						
		Wholesale		NO				
		Distribution center						
	E6. Does this commercial/industrial facility use electricity in regular operations?	NO	E6a. Why is electricity not used in this facility?	No access				
				Can't afford				
				Social, cultural, or religious prohibition				
				No need				
		YES	E6b. What is the primary source of the electricity used at this commercial / industrial facility?	National grid	E6b1. How long did it take to acquire a connection to the grid for this facility?	One day	E6b1a. Did it take a bribe to acquire the connection?	YES
						One week		NO
						One month		
						More than a month		
				Generator	E6b2. Why is the grid not used at this commercial/industrial facility?	No access	E6b2a. Why is your electricity not reliable?	Intermittent service
				Solar		Not reliable		Unstable frequency
				Wind		Too expensive		Unstable voltage

ELECTRICITY	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
				Other		Other		Insufficient power
			E6c. Is electricity available from the primary source at all times and on all days?	Yes	E6c1. If the primary power source fails, are there back-up sources available?	YES		
				Yes - but the expense limits access/use				
				No - there are scheduled times when electricity is not available				
						NO		
				No - there are unscheduled blackouts and brownouts				
			E6d. Without electricity could this commercial/industrial facility continue to operate?	NO, electricity is critical for operations.				
				YES, if the loss was of short duration but could not sustain protracted outages.				
				YES, electricity is not necessary for operations.				
			E6e. Does a lack of electricity limit hours of operation at this facility?	YES				
				NO				
			E6f. Does a lack of electricity limit output at this facility?	YES				
				NO				
			E6g. If you had more reliable electrical access, could this business expand?	YES				
				NO				
			E6h. In this commercial/industrial facility, what operations require electricity? (Check all that apply.)	Lighting				
				Communication devices				
				Employee and/or public safety and health?				
				Equipment related to product creation/manufacture/modification/storage?				
				Computers or other forms of data management/processing				
				Financial transactions (e.g., cash register or credit card readers)				
				Provide security to the premises				
Institutional Facilities	E7. Does the institution use electricity in regular operations?	NO	E7a. Why is electricity not used in this institution?	No access				
				Can't afford				
				Social, cultural, or religious prohibition				
				No Need				

ELECTRICITY	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
		YES	**E7b.** What kind of institution is this?	Administration	**E7b1.** What is the level of occupancy of this institution?	Facility is occupied during normal business hours (12 hours a day or less).		
				Hospital				
				School				
				Detention Center		Facility is occupied at all times by shift workers.		
				Police Station				
				Fire or EMT Station				
				Financial Institution				
				Religious Institution or Place of Worship		Facility is a permanent or part-time residence and has dining, sleeping, and/or bathing facilities.		
				Military Facility				
				Other				
			E7c. What is the primary source of the electricity used in this institution?	Grid	**E7c1.** How long did it take to acquire a connection to the grid for this institution?	One day	**E7c1a.** Did it take a bribe to acquire the connection?	Yes
						One week		No
						One month		
						More than a month		
				Generator	**E7c2.** Why is the grid not utilized?	No access	**E7c2a.** Why is your electricity not reliable?	Intermittent service
				Solar		Not reliable		Unstable frequency
				Wind		Too expensive		Unstable voltage
				Other		Other		Insufficient power
			E7d. Is electricity available from the primary source at all times and on all days?	Yes	**E7d1.** If the primary source of power fails is there a backup available?	Yes		
				Yes - but the expense limits access/use.				
				No - there are scheduled times when electricity is not available.		No		
				No - there are unscheduled blackouts or brownouts.				

ELECTRICITY	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
			E7e. Without electricity can the institution continue to operate?	NO, electricity is critical for operations.	E7e1. Are there serious/critical repercussions to the general public if this institution cannot operate at full or partial capacity?	YES, there are public or state security repercussions.		
				YES, if the loss was of short duration but could not sustain protracted outages.		YES, there are health and human safety repercussions		
						YES, there are serious and general economic repercussions.		
				YES, electricity is not necessary for operations.				
						NO		
				YES, if the loss was of short duration, and back-up source is functional.				

WATER	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
Residential	**W1.** Does this home or home compound have access to potable water on the premises?	YES	W1a. What is this household's primary source of water?	Municipal or piped source	**W1a1.** Is your primary source of water available all year?	YES
				Personal well		
				Cistern		
				Water delivery		NO
				Other		
			W1b. If your primary residential source of water is unavailable, do you have an alternative?	YES	**W1b1.** Is the available alternative a communal source of water?	YES
						NO
				NO		
		NO	**W1c.** What is your source of water?	River or lake	**W1c1.** Is your primary source of water available all year?	YES
				Communal well		
				Communal cistern		NO
				Purchased		
				Other		
			W1d. How long does it take to acquire water for the household each day?	Less than an hour		
				1–3 hours		
				3–6 hours		
				More than 6 hours		
			W1e. Who is tasked with collecting water for the household?	Adult males	**W1e1.** What is the mode of water transport?	Carried by hand
				Adult females		Transported by animal
				Male children		Transported by motor vehicle
				Female children		Other
				NGO/charity		
			W1f. Who (in reality) controls access to your source of water?	No controlling authority or limit to access		
				Community elders or elites	**W1f1.** Does the household have to pay either an official or illicit fee for access to your primary source of water (including payment in currency, labor or trade, and/or expectations of political or social support)?	YES
				Religious elders or elites		
				Local or regional government		
				Private business		
				The military		NO
				Criminal organizations		
				VEOs		

WATER	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
	W2. Do religious/cultural practices conducted in the home and/or home compound require use of specially treated or sourced water?	YES	**W2a.** How frequently is specially treated or sourced water needed or utilized?	Daily	**W2a1.** Is the source of this water sufficient for the needs?	YES
				Weekly		
				Monthly		
				Once or a few times every year		
						NO
				Once or a few times in a life time.		
		NO				
	W3. What do you use water for in this household? (Check all that apply.)	Drinking (Note - if no source of water is available for consumption, people must go to where water is available or risk death.)		This is done in the home year-round.		
				This is an episodic/seasonal activity where water availability meets the periodic needs/requirements.		
				This is an episodic/seasonal activity due to water shortfalls.		
				This activity is never done in the home due to lack of water.		
				This activity is not done I the household because cultural/religious practices indicate it should be done elsewhere.		
				This activity is not done.		
		Food preparation (including cleaning of eating or cooking implements)		This is done in the home year-round.		
				This is an episodic/seasonal activity where water availability meets the periodic needs/requirements.		
				This is an episodic/seasonal activity due to water shortfalls.		
				This activity is never done in the home due to lack of water.		
				This activity is not done in the household because cultural/religious practices indicate it should be done elsewhere.		

WATER	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
				This activity is not done.		
		Personal hygiene (including bathing, flushing toilets, cleaning clothes and/or bedding, etc.)		This is done in the home year-round.		
				This is an episodic/seasonal activity where water availability meets the periodic needs/requirements		
				This is an episodic/seasonal activity due to water shortfalls.		
				This activity is never done in the home due to lack of water.		
				This activity is not done in the household because cultural/religious practices indicate it should be done elsewhere.		
				This activity is not done.		
		Production of goods for use or for sale (including maintaining animals for labor or food, gardening for food or medicine or for residential industry/business).		This is done in the home year-round.		
				This is an episodic/seasonal activity where water availability meets the periodic needs/requirements.		
				This is an episodic/seasonal activity due to water shortfalls.		
				This activity is never done in the home due to lack of water.		
				This activity is not done in the household because cultural/religious practices indicate it should be done elsewhere.		
				This activity is not done.		
		Recreation (including decorative landscaping, pools, and spas).		This is done in the home year-round.		
				This is an episodic/seasonal activity where water availability meets the periodic needs/requirements.		
				This is an episodic/seasonal activity due to water shortfalls.		
				This activity is never done in the home due to lack of water.		
				This activity is not done in the household because cultural/religious practices indicate it should be done elsewhere.		
				This activity is not done.		

WATER	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
		Religious and/or cultural activities.		This is done in the home year-round.		
				This is an episodic/seasonal activity where water availability meets the periodic needs/requirements.		
				This is an episodic/seasonal activity due to water shortfalls.		
				This activity is never done in the home due to lack of water.		
				This activity is not done in the household because cultural/religious practices indicate it should be done elsewhere.		
				This activity is not done.		
	W4. How does this household dispose of human waste?	Indoor plumbing				
		Outhouse/pit toilet				
		Stored and hauled away				
		Used as fertilizer				
COMMUNITY	**W5.** Is there a local system for hauling human waste?	YES				
		NO				
	W6. Is there a municipal sewer system?	YES	**W6a.** Is it an open-channel system?	YES		
				NO		
			W6b. Is it a closed-pipe system?	YES		
		NO		NO		
Commercial and Industrial	**W7.** What kind of facility is this?	Retail	**W7a.** Does this commercial or industrial facility have a fixed location?	YES	**W7a1.** Does this commercial or industrial facility employ people other than the owners?	YES
		Industrial		NO		NO
		Service				

WATER	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
		Wholesale Distribution				
	W8. Does the facility utilize water in regular operations?	YES	**W8a.** Why is water not used at this facility?	No access		
				Can't afford		
		NO		Social, cultural, or religious prohibition		
				No need		
			W8b. What is the primary source of the water used at this facility?	Municipal or piped source	**W8b1.** Is the primary source of water available all year?	YES
				Private well		NO
				Cistern	**W8b2.** If the primary source of water is unavailable, is there an alternative?	YES
				Water delivery		NO
				Stream, river, or lake		
				Public well		
				Purchase		
				Other		
			W8c. Who (in reality) controls access to the source of water?	No controlling authority or limit to access	**W8c1.** Do you have to pay either an official or illicit fee for access to your primary source of water (including payment in currency, labor or trade, and/or expectations of political or social support?	YES
				Community elders or elites		NO
				Religious elders or elites		
				Local or regional government		
				Private business		

WATER	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
				Military		
				Criminal organizations		
				VEOs		
			W8d. Without water, could the facility continue to operate?	NO, water is critical for operations.		
				NO, this is a seasonal operation and is only open when sufficient water is available.		
				YES, if the loss was of short duration but could not sustain protracted outages		
				YES, water is not necessary for operations.		
			W8e. Does lack of water limit hours of operation?	YES		
				NO		
			W8f. Does lack of water limit services provided or output?	YES		
				NO		
			W8g. What is water used for? (Check all that apply.)	Drinking		
				Food preparation		
				Water and/or ice is the product of this facility.		
				Hygiene and cleaning		
				Cooling equipment		
				Power source including water mill		
				Fire suppression systems		
				Product manufacture or modification		

WATER	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
				Recreation or exercise activities		
				Agriculture, horticulture, animal husbandry		
	W9. Do religious/cultural practices require use of specially treated or sourced water at this facility?	YES	**W9a.** How frequently is specially treated or sourced water needed or utilized?	Daily		
				Weekly		
				Monthly		
				Once or a few times every year		
				Once or a few times in a lifetime		
		NO				
Institutional Facilities	**W10.** Does the institution utilize water in regular operations?	NO	**W10a.** Why is water not used in this facility?	No access		
				Can't afford		
				Social, cultural, or religious prohibition		
				No need		
		YES	**W10b.** What kind of institution is this?	Administration	**W10b1.** What is the level of occupancy of this facility?	Occupied during normal business hours (12 hours a day or less)
				Hospital		Occupied at all times by shift workers
				School		Is a permanent or part-time residence and has dining, sleeping, and/or bathing facilities
				Detention center		
				Police station		

WATER	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
				Fire or EMT station		
				Financial institution		
				Religious institution or place of worship		
				Military facility		
				Other		
			W10c. What is the primary source of the water used in this operation?	Municipal or piped source	**W10c1.** Is your primary source of water available all year?	YES
				Private well		NO
				Cistern	**W10c2.** If your primary institutional source of water is unavailable, do you have an alternative?	YES
				Water delivery		NO
			W10d. Who (in reality) controls access to the source of water?	No controlling authority or limit to access	**W10d1.** Do you have to pay either an official or illicit fee for access to your primary source of water (including payment in currency, labor or trade, and/or expectations of political or social support)?	YES
				Community elders or elites		NO
				Religious elders or elites		
				Local or regional government		
				Private business		
				Military		
				Criminal organizations		
				VEOs		

WATER	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
			W10e. Without water, could the facility continue to operate?	NO, water is critical for operations.		
				NO, this is a seasonal operation and is only open when sufficient water is available.		
				YES, if the loss was of short duration but could not sustain protracted outages.		
				YES, water is not necessary for operations.		
			W10f. Does lack of water limit hours of operation?	YES		
				NO		
			W10g. Does lack of water limit services provided?	YES		
				NO		
			W10h. What does this institution use water for? (Check all that apply.)	Drinking		
				Food preparation		
				Water and/or ice is the product of the facility		
				Cooling equipment		
				Cleaning and hygiene		
				Fire suppression systems		
				Product manufacture or modification		
				Health care, including sterilization		
				Cultural or religious practices		
				Recreation or exercise activities		
				Agriculture, horticulture, animal husbandry		

WATER	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
	W11. Do religious/cultural practices require use of specially treated or sourced water at this facility?	YES	**W11a.** How frequently is specially treated or sourced water needed/utilized?	Daily		
				Weekly		
				Monthly		
				Once or few times every year		
				Once or few times in a lifetime		
			W11b. Is this facility a location where culturally or religiously processed or sourced water is produced?	YES		
				NO		
		NO				

Transportation	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible answers
Residential	**T1.** What are the roads made of that you routinely travel?	Pavement/Concrete	**T1a.** Why do you prefer to travel on those roads?	Convenience		
				Access		
				Safety		
				Security		
		Tar/Gravel		No choice (only way to get from here to there)		
		Dirt	**T1b.** Who maintains the roads you use the most?	Government		
				Local citizens		
				NGOs		
				VEOs		
				Others		
			T2a. What time of day is traffic heaviest on major roads?	Morning	**T2a1.** How does the traffic on major roads negatively affect your quality of life?	Noise pollution
				Afternoon		Air pollution
	T2. What type of traffic is on the major roads?	Trucks and buses		Evening		Safety
				Night		Security
		Passenger cars		All times		Heavy traffic limits access to road
				Traffic is never heavy		Long commute
		Motorized bikes		Sporadically heavy due to specially scheduled events		No negative effect
					T2a2. How does the traffic on major roads positively affect your quality of life?	Increases business
		Human-powered (bike, rickshaw, etc.)				Increases services
						Ease of transportation
		Animals				No positive effect
		Walking				
	T3. What type of traffic is on the minor roads?	Trucks and buses	**T3a.** What time of day is traffic heaviest on minor roads?	Morning	**T3a1.** How does the traffic on minor roads negatively affect your quality of life?	Noise pollution
						Air pollution
				Afternoon		Safety
		Passenger cars		Evening		Security
				Night		Heavy traffic limits access to road
		Motorized bikes		All times		No negative effect
				Traffic is never heavy		

Transportation	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible answers
		Human-powered		Sporadically heavy due to specially scheduled events	T3a2. How does the traffic on minor roads positively affect your quality of life?	Increase business
						Increase services
						Ease of transportation
		Animals		Sporadically heavy in unpredictable manner		No positive effect
		Walking				
	T4. What are the roads used for other than transportation?	Festivals	T4a. How often do you attend and/or participate in those other functions?	Daily	T4a1. How often do the other road uses impede your use of the roads as a transportation network?	Regularly
		Parking				
		Permanent street markets				
				Weekly		
						Occasionally
		Episodic street markets		Monthly		
				Once or a few times a year		Never
		Recreation				
		Protests		Never		
	T5. What are the regulatory requirements to drive?	Licensing	T5a. What fees do you pay for road access?	Road tax	T5a1. Who are fees paid to?	Government
		Official training				
				Tolls		VEOs
		Vehicle taxes and fees				
				Bribes (at road blocks)		Criminal organizations
		Political connections				
				Other		Other
		None		None		
			T5b. Do people obey the regulatory requirements?	Yes		
				No		

Transportation	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible answers
	T6. What factors affect choice of transportation?	Economic	T6a. What seasonal or environmental considerations affect transportation choices?	Wet		
		Environmental		Dry		
		Weather		Harvest		
		Congestion		Festivals/holidays		
		Availability		Seasonal variation in fuel prices		
		Cultural norms		Availability of transportation mode		
		Legal prohibitions		Transportation needs fluctuate		
	T7. What kind of transportation method/conveyance do you utilize?	Trucks and Buses	T7a. How many hours are you on the road per day?	Less than 1 hour	T7a1. What long-distance journeys are taken during the year?	Familial obligations/visits
		Public motorized vehicles		1–3 hours		Religious obligations/visits
		Tram/Trolley		3–6 hours		Cultural obligations/visits
		Passenger cars		6–9 hours		Political obligations/visits
		Motorized bikes		9–12 hours		Migratory work
		Human powered vehicles		12+ hours		Vacations
		Animals		Do not use the roads		None
		Walking		Cannot use the roads		
	T8. Do you own a vehicle (motorized)?	YES	T8a. Who can drive the vehicle?	Only males	T8a1. Why are there limitations on who can drive a vehicle?	Legal restrictions
				Only females		Preference
						Cultural norms
				Both males and females		Physical limitations
						Safety
						No limitations
			T8b. What do you use the vehicle for?	Work	T8b1. Do you have multiple vehicles?	YES
				Trade/business		
				School		
				Healthcare		
				Religion		NO
				Status symbol		
				Social gatherings		
				Entertainment		
				Procure food and water		
		NO	T8c. Why do you not own a vehicle?	Cannot afford		
				Don't need one		
				Don't want one		

Transportation	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible answers
				Not allowed		
	T9. Which shared transportation do you use?	Govt/City/ Municipal	T9a. What do you use the shared transportation for?	Work	T9a1. How often do you use shared transportation?	Multiple times a day
				Trade		
				School		Multiple times a week
		Private company		Healthcare		
				Religion		A few times a month
				Protest		
		Ad hoc/individual		Social gathering		Occasionally
				Procure food and water		
				Entertainment		
		None	T9b. Why do you not use shared transportation?	Too expensive		
				Not available		
				Not convenient		
				Limited operation		
				Own a Vehicle		
				Not safe		
				No need		
	T10. How do you acquire basic food/supplies?	Private motorized vehicle	T10a. What is the source of the majority of the basic food supplies acquired?	Regional market	T10a1. How consistent is your source of basic provisions (based on transportation used)?	Same source all year.
		Pack animal or animal cart		Local source/shops		
		Public Transportation		Street vendors		The source changes due to seasonal variations but these are predictable.
		Walk, bike or human powered cart		Commercial district		
				Delivery service		Shortages result in regular uncertainty concerning provision source.
		Delivered to residence		Personally produce majority of food		
	T11. How often is travel necessary to procure basic food/supplies?	Daily	T11a. How does your access to the transportation network influence how you procure basic provisions?	Trips are more frequent due to limited carrying capacity.		
		A few times a week		Trips are less frequent to avoid road use.		
		A few times a month		Variety of goods available are limited due to travel restrictions/limitations.		
		A few times a year		Shopping is done in groups due to safety concerns.		
		Never		Time of day that shopping is done is decided by traffic and/or parking availability.		
Community	T12. Are there certain roads/routes you do not use due to safety and security reasons?	YES	T12a. Why are these roads/routes not used?	Not lit		
				Scared of VEOs		
				Scared of military		
				Scared of police		

Transportation	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible answers
				Female, cannot travel alone		
		NO				
	T13. How is household waste disposed of?	Private hauler	T13a. How often is household waste disposed of?	Daily		
		City hauler		Biweekly		
		Personal hauler		Weekly		
		Other (onsite burn or bury)		Monthly		
				Infrequently		
	T14. How available/costly is fuel?	Cheap/easy/no issue				
		Cost limits other spending but buy fuel anyway.				
		Expensive to the point of limiting vehicle use				
Commercial/Industrial	T15. What type of establishment do you have?	Retail	T15a. Where is your establishment located?	In the main commercial district/market	T15a1. How do you access/interact with your customers?	Customers come to establishment
		Food services				
		Personal services		In a secondary commercial district/market		Establishment delivers a product
		Professional services				
		Manufacturing		In a suburban commercial district/market		Establishment delivers a service
		Mechanic/technician				
		Recreation/entertainment		Outside the city		Third party/middle man
		Wholesale/distribution center		In a private residence		
		Private transportation		In a movable structure/vehicle		
		Fuel services		On person		Telephone/Internet
		Agriculture/animal husbandry				
				Other		Other
		Waste disposal				
		Other				
	T16. Do you depend on others to provide inventory for your establishment?	YES	T16a. How is the inventory delivered?	Directly from manufacturer/producer	T16a1. How often do you require deliveries to your establishment to maintain operations?	Daily
						Multiple times a week
				Private cargo/shipping company		Weekly
						Bi-weekly
				Government mail service		Monthly
						Multiple times a year

Transportation	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible answers
			T16b. Do road closures affect deliveries?	Always	T16b1. Is there a back-up delivery mechanism?	YES
				Frequently		NO
				Periodically		
				Never		
		NO				
	T17. Do clients depend on you to provide inventory for their establishment?	YES	T17a. Do road closures affect deliveries?	Always	T17a1. Is there a back-up delivery mechanism?	YES
				Frequently		NO
				Periodically		
				Never		
		NO				
Institutional Facilities	T18. What type of institution do you operate?	Administration	T18a. Are roads crucial to your operation?	YES	T18a1. How are roads used?	To get services to others?
		Hospital				For others to come to get services?
		School		NO		
		Detention center	T18b. Does the condition or safety or usability of the road network affect decisions on where employees live?	YES		
		Police station		NO		
		Fire or EMT station				
		Financial Institution				
		Religious institution or place of worship				
		Military facility				
		Other				

Communication	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
Residential	C1. Do you depend on cellular networks and Wi-Fi networks for communication?	YES	C1a. What type of cellular device do you own?	Cellphone	C1a1. What is the primary type of wireless use?	Voice calls
				Smartphone		Texts
				Tablet		Social media/Facebook/banking
			C1b. How many cellphones are there in the household?	Multiple devices	C1b1. Where do you get adequate cellphone reception? (Check all that apply.)	Home/neighborhood
						Work (outside of the home)
						Commercial district/institution
				One device (or share)		Organization
					C1b2. Are there areas without coverage?	YES
						NO
				None		
			C1c. What is the purpose of your mobile communications?	Education	C1c1. Do you transfer money via smartphone?	YES
				Business/financial		
						NO
				Social/social media	C1c2. How dependent are you on social media?	Monitor sites but do not post
						Communicate with friends/family
						Occasionally post to public
						Active social media blogger
				Other		
			C1d. How do you access cellular and Wi-Fi networks?	Government-operated cellular networks	C1d1. How are the cellular and Wi-Fi networks paid for?	Purchased
				Commercially operated cellular networks		Taxes
				Purchased Wi-Fi networks		Employer
						Organization
				Free Wi-Fi network	C1d2. Who provides or operates the free Wi-Fi network?	Government
						Commercial
						Organization
						Ad hoc/illegal
				Illegally		
				Other		
			C1e. How much of your income is spent on cellular and Wi-Fi devices and services?	Majority	C1e1. Is paying for cellular and Wi-Fi network devices and services a priority purchase over food, water, or education fees?	YES
				Half		NO
				Minimal		
					C1e2. Where do you buy cellphones?	Market
						Retailer

Communication	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
						Illegal source
			C1f. Are there government controls on cell service?	YES, firewalls		
				YES, benefits censorship		
				YES, provider restrictions		
				NO		
		NO	C1g. What alternate type(s) of communication do you use, and how do you get information/news?	Land line		
				Use someone else's phone		
				Broadcast media		
				Print media		
				Social interactions/community		
				Satellite		
				Cable		
				Shortwave radio		
			C1h. Does not having a cellular and Wi-Fi connectivity negatively affect your life?	YES		
				NO		
Community	C2. Do you rely on the cellular network/Wi-Fi network for 911/emergency services?	YES	C2a. Does the government issue information over the cellular/Wi-Fi network?	YES		
		NO		NO		
	C3. Where are cell towers located? (Check all that apply.)	Neighborhoods	C3a. Who controls placement of cell towers?	Government		
		Commercial areas		Commercial		
		City Center		Individuals		
		Government District	C3b. Who owns land where cell towers are located?	Government	C3b1. Who maintains the cell towers?	Government
		On buildings		Commercial		Commercial
		In fields		Individuals		Individuals
		Along roads				
Commercial/Industrial	C4. Do you depend on cellphones for communication?	YES	C4a. What type of communication device is used?	Cellphone	C4a1. Is your device the primary source of communication among the staff?	YES
				Smartphone		NO
				tablet	C4a2. Do you supply the device to employees?	YES
						NO
			C4b. Do you rely on global positioning service (GPS) for transportation services?	YES		
				NO		

Communication	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
			C4c. How do you access the cellular and Wi-Fi networks?	Government-operated cellular network	C4c1. How are the cellular and Wi-Fi networks paid for?	Purchased by establishment
				Commercially operated cellular network		Paid for through taxes
				Purchased Wi-Fi network		
				Free Wi-Fi network	C4c2. Who provides/operates the free Wi-Fi network?	Government
						Commercial
				Illegally		
				Other		
			C4d. How much of your budget is spent on wireless devices and services?	Majority		
				Half		
				Minimal		
		NO	C4e. What alternate types of communication do you use/how do you communicate with customers?	Land line		
				Broadcast media		
				Print media		
				Social interactions/community		
			C4f. Does not having cellular or Wi-Fi connectivity negatively impact business?	YES		
				NO		
	C5. What type of commercial establishment do you have?	Retail	C5a. How do you access/interact with your customers?	Customers come to establishment	C5a1. Where is your establishment located?	In the main commercial district/market
		Food services		Establishment delivers a product		In a secondary commercial district/market
		Personal services		Establishment delivers a service		In a suburban commercial district/market
		Professional services		Third party/middle man		Outside the city
		Manufacturing		Other (telephone/internet/cellphone)		In a private residence
		Mechanic/technician				In a movable structure or mobile vehicle
		Recreation/entertainment				Other
		Private transportation	C5b. How/why is Wi-Fi used? (Check all that apply.)	Marketing and advertising		
		Fuel services		Communicating with customers		
		Agriculture/animal husbandry		Communicating with employees		
		Other		Compliance with regulations/laws		
Institutional Facilities	C6. Does your institution depend on cellular and Wi-Fi networks for communication?	YES	C6a. What type of communication device is used?	Cellphone	C6a1. Do you have a back-up means of communication?	YES
				Smartphone		NO
				tablet		
			C6b. Are the cellular and Wi-Fi networks the primary sources of communication with the institution?	YES		

Communication	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
				NO		
			C6c. How do you access cellular and Wi-Fi networks?	Government operated cellular network	C6c1. How are the cellular and Wi-Fi network services paid for?	Purchased by the institution
				Commercially operated cellular network		Paid for through taxes
				Purchased Wi-Fi network		Patron/Sponsor
				Free Wi-Fi network	C6c2. Who provides/operates the free Wi-Fi network?	Government
				Illegally		Commercial
				Other		Organization
			C6d. How much of your budget is spent on cellular and Wi-Fi devices and services?	Majority	C6d1. Where are cellphones purchased?	Market
				Half		Retailer
				Minimal		Illegal source
			C6e. For transportation services, do you rely on GPS?	YES		
				NO		
		NO	C6f. What alternate types of communication do you use/how do you get and provide information/news?	Land line		
				Broadcast media		
				Print media		
				Social interactions/community		
			C6g. Does not having access to cellular or Wi-Fi networks negatively impact the institution?	YES		
				NO		
	C7. What type of institution do you operate?	Hospital	C7a. Does this institution provide cellular or Wi-Fi communication devices to employees or staff?	YES		
		Clinic				
		University				
		School				
		Church/mosque				
		Police				
		Fire department		NO		
		Emergency services				
		Government office				
		Military				
		Prison				
		Other				

Food	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
Residential	**F1.** Do you have periods of time where you go without or have limited access to food?	YES	**F1a.** How frequently is there a shortage of food?	Every day	**F1a1.** Why do you go without food?	Market availability		
				A few days a week		Growing seasonality		
				A few days a month				
				A few days a year		Lack of money		
				Seasonal				
			F1b. If there is an insufficient amount of food, who goes without?	Everyone equally				
				Children				
				Elderly				
				Women				
				Men				
				In-laws				
			F1c. Do you utilize food aid?	YES	**F1c1.** Where do you obtain food aid?	No food aid		
						From the government		
						NGOs		
						Local charity or social network donation		
						Religious organization		
						Criminal organization/VEOs		
				NO				
		NO						
	F2. How often do you purchase food?	Daily	**F2a.** Describe the experience of purchasing food.	A social networking activity/opportunity				
		A few days a week		Stressful due to food shortages/competition (including long lines)				
		Weekly		Stressful due to lack of funds				
		Monthly		Stressful due to safety/harassment issues				
		Never		Enjoyable				
	F3. How much of a food supply is kept in the residence?	1 day's worth	**F3a.** How is food stored/preserved? (Check all that apply.)	Refrigerator	**F3a1.** What factors limit the quantity of food stored in the house?	Cannot afford to buy in large quantities.	**F3a1a.** How do you dispose of food waste?	Compost
		A few days' worth		Cold storage				Trash
		1 week's worth		On the shelf/pantry		Do not have enough room to store large quantities.		Fertilizer
				Not stored/consumed immediately				Animal feed
		A few weeks' worth		Canned		Larger quantities of food are not available for purchase.		
				Dried				

Food	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
		A month or longer		Pickled/salted		Food will spoil.		
				Smoked		Security concerns		
	F4. How has food availability affected decisions about family/livelihood?	Relocate the household	F4a. Where do the majority of your meals occur?	Home or family home				
		Send children/family members to locations (including with extended family members or to institutions) where food is more available		School or place of employment				
		Joining military		Community facility				
		Job choice		Religious facility				
		Application for government assistance		Restaurant or food vending location				
		Application for NGO assistance						
		Participation, support or condonation of criminal activity						
		Not at all						
	F5. Are there official or social restrictions on particular types of food?	None						
		Government restrictions on food due to source (restriction of imports from a particular country)						
		Government restrictions on food due to regulations (example - no consumption of endangered species or limits on production practices)						
		Community taboo due to food source						
		Community taboo due to nature of food						
		Religious/cultural dietary restrictions	F5a. What kind of dietary restrictions does the household observe?	Kosher	F5a1. Does the entire community observe these restrictions or only a portion of the community?	All		
				Halal				
				Ovo-lacto vegetarian		Majority		
				Lacto vegetarian				
				Vegan		Minority		
				Other				
			F5b. Does your religion/culture practice periods of fasting?	Yes	F5b1. When does fasting occur?	Regularly (e.g., Catholic meatless Fridays)		
						Reoccurring holidays (e.g., Ramadan)		
						Life events (e.g., initiation, mourning)		
				No				

Food	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
	F6. Do you have the ability to produce food or raise animals?	YES	F6a. What type of food/crop?	Grains	F6a1. Where is your food grown/raised?	Residence		
				Vegetables		Community farm/garden		
				Legumes		Distant farm		
				Nuts/fruits		Periphery farm		
				Herbs and spices		Other		
				Large land animals	F6a2. What is the livestock used for?	Processed for meat		
				Small land animals		Harvested for by-products such as milk, eggs, blood etc.		
				Poultry		Draft power for farming and transportation		
				Freshwater fish and shellfish		Animal sales/trade		
				Saltwater fish and shellfish				
				Medicinal plants				
				Alcohol				
				Bees for honey				
			F6b. Who does the primary tending of crops/animals?	Men	F6b1. Does the production of food require household members to be absent from the house for extended periods of time (including hunting and fishing)?	YES		
				Women				
				Children		NO		
				Extended family				
				Head of household				
				Paid labor				
				Indentured labor				
				Unpaid/intermittent labor				
			F6c. How much of your income is from the sale of food?	Most	F6c1. Do you use food as an alternative currency?	YES		
				Half		NO		
				Minimal				
		NO	F6d. Where do you get your perishable food supplies?	Through social network				
				From local producers/venders including local markets				
				Commercial store				
				NGO				
				Government (including military)				
				Criminal organization or VEOs				

Food	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
Community	F7. If food distribution and access to food is controlled, who is it controlled by?	Government	F7a. Is access to food provided equally throughout the community?	YES				
		Religious organizations						
		Community leaders		NO	F7a1. How is food allotment determined?	Only to their members or supporters of the ruling group or individuals		
		Family or clan leader						
		NGOs				Unequally based on social status		
		Criminal organizations						
		VEOs				Unequally based on need		
		Not controlled						
		Other				Other		
	F8. Is food theft common?	YES						
		NO						
Commercial/Industrial	F9. Is large-scale commercial agriculture prevalent?	YES	F9a. Who owns the large farms in the region?	Locals	F9a1. Do large farms get preferential treatment for water by suppliers?	YES		
				Non-local nationals				
				Internationals				
				National corporations		NO		
				International corporations				
				Government				
			F9b. What products are primarily grown on large farms in the region?	Local food supply				
				Cash crops for local consumption				
				Food for export				
				Cash crops for export				
				Crops for biofuels				
				Bees for honey				
			F9c. Where do the products of large-scale farming go?	Local				
				Regional				
				National				
				International				
			F9d. What is the source of the workforce on large farms?	Local population	F9d1. What is the nature of the labor on large farms?	Large-scale unskilled labor		
				Seasonal migrant workers		Small-scale skilled labor		
				Long-term migrant workers		Large-scale skilled labor		
				Indentured labor (including convicts)		Small-scale skilled labor		
				Children		Other		
		NO						

Food	Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers	Follow-on Question	Possible Answers
	F10. Are there large-scale food factories or food-processing plants in the area?	YES	F10a. How is the food distributed?	Provided to the region	F10a1. Who is the source of the workforce at food-processing plants?	Local population		
				Provided for export		Seasonal migrant workers		
				Other		Long-term migrant workers		
						Indentured labor (including convicts)		
						Other		
		NO						
Institution Facilities	F11. Is food service a part of the institution's operations?	YES, food is provided for free to all employees.	F11a. What type of institution is this?	Hospital	F11a1. What is the source of the food?	Government		
		YES, food is provided so some based on income.		Clinic		Local population		
				University		Local corporations		
		YES, food is available for all for purchase at a discounted/subsidized rate.		School		Military		
				Church/mosque		NGOs		
		YES, food is available for some for purchase at a discounted/subsidized rate.		Police		Religious organizations		
				Fire department		Community/tribal leaders		
		YES, food is available for purchase at normal rates.		Emergency services		Criminal organizations and VEOs		
				Government office		Institution produces all food it consumes		
		NO		Military		Other		
				Prison				
				Other				

Appendix B: Survey Dictionaries

Survey dictionaries aid individuals being surveyed in interpreting and understanding what is being asked of them. Survey dictionaries describe the intent of the question and contain the SMART document questions, answer options, and question purposes. This information explains why the question is being asked and what the question, in particular, is assessing.

HISA Survey Dictionary: Electricity (E)

Residential households

Question E1.	Does this household have access to the grid?
Choice of Answers	YES / NO
Purpose of Question	Assesses a household's access to the grid.

Question E1a.	Does this household use power from the grid?
Choice of Answers	YES / NO
Purpose of Question	Assesses a household's use of power from the grid.

If answer is "Yes" to Question E1a:

Question E1a1.	Is this household's access to the grid legal or illicit?
Choice of Answers	LEGAL / ILLICIT
Purpose of Question	Assesses legality of a respondent's connection to the grid.

Question E1a2.	Is the electricity from the grid reliable?
Choice of Answers	YES / NO
Purpose of Question	Assesses reliability of power coming from the grid.

Question E1a3.	How do you pay for electricity?
Choice of Answers	FLAT FEE / AMOUNT USED (kW/hr)
Purpose of Question	Assesses cost structure for access to electricity.

Question E1a4.	What happens if you don't pay your bill?
Choice of Answers	POWER SHUTOFF / ADDITIONAL FEES UNTIL PAID / NOTHING
Purpose of Question	Assesses governance and potential restriction to electrical access.

Question E1a5.	How many hours per day do you get electricity from the grid?
Choice of Answers	0–4 HOURS / 4–8 HOURS / 8–12 HOURS / 12–24 HOURS
Purpose of Question	Assesses availability and use of electricity from the grid.

Question E1a6.	What is the cost of electricity from the grid?
Choice of Answers	0%–24% OF ANNUAL INCOME /25%–50% OF ANNUAL INCOME / 50%+ OF ANNUAL INCOME
Purpose of Question	Assesses percentage of income that a household pays to access electricity from the grid.

Question E1a7.	Do your appliances run like they should when using grid electricity?
Choice of Answers	YES / NO
Purpose of Question	Assesses quality of electricity obtained from the grid.

Question E1a8.	Does the grid have regularly scheduled outages?
Choice of Answers	YES / NO
Purpose of Question	Assesses schedule and regularity of grid outages.

Question E1a9.	If power from the grid is unavailable, do you have a back-up/alternative source?
Choice of Answers	YES / NO
Purpose of Question	Assesses respondent's source of alternate power.

Question E1a10.	Do you own the back-up source of power, or do you buy it from a local source?
Choice of Answers	OWN / BUY FROM LOCAL SOURCE
Purpose of Question	Assesses accessibility of a household's back-up power source.

Question E1a11.	What are the reasons this household does not use power from the grid?
Choice of Answers	NOT RELIABLE / TOO EXPENSIVE / DO NOT WANT TO (NO NEED)
Purpose of Question	Assesses reason(s) a household does not use power from the grid.

Question E1a11a.	*Would you use the grid if your concerns were addressed?*
Choice of Answers	*YES / NO*
Purpose of Question	*Assesses potential demand for electricity from the grid.*

If answer is "No" to Question E1a:

Question E1b.	What is your source of electricity in the home?
Choice of Answers	GENERATOR / SOLAR / WIND / OTHER / DO NOT UTILIZE ELECTRICITY IN THE HOME
Purpose of Question	Assesses a household's alternate source of power, when not drawing from the grid.

Question E1b1.	What type of fuel does your generator use?
Choice of Answers	GAS OR PETROL / DIESEL / PROPANE / NATURAL GAS / OTHER
Purpose of Question	Assesses the type of fuel used in back-up generators.

Question E1c.	Is the equipment and fuel for this power source readily available?
Choice of Answers	YES / NO
Purpose of Question	Assesses availability of equipment and fuel for alternate sources of power generation.

If answer is "Yes" to Question E1c:

Question E1c1.	How long does it take to get the equipment and fuel for the household's electricity?
Choice of Answers	LESS THAN AN HOUR / 1–2 HOURS / 2–4 HOURS / 4–8 HOURS / MORE THAN 8 HOURS
Purpose of Question	Assesses time that a household spends on obtaining equipment and fuel for a primary source of power other than the grid.

Question E1c2.	How does this household obtain fuel for a primary source of power?
Choice of Answers	CARRIED BY HAND / TRANSPORTED BY ANIMAL / TRANSPORTED BY MOTOR VEHICLE / DELIVERED / OTHER
Purpose of Question	Assesses methods a household uses to obtain fuel for power generation.

Question E1c3.	Do you use batteries to store energy for nighttime use?
Choice of Answers	YES / NO
Purpose of Question	Assesses availability of batteries and the capability to store electricity when not connected to a power source.

Question E1c4.	Can you store enough energy for your nighttime needs?
Choice of Answers	YES / NO
Purpose of Question	Assesses capacity of power storage.

If answer is "No" to Question E1c:

Question E1d.	Is someone in this household able to conduct repairs and maintenance on the power source?
Choice of Answers	YES / NO
Purpose of Question	Assesses household's capability to repair a primary source of power that is not the grid.

If answer is "yes" to Question E1d:

Question E1d1.	If the household's power source fails, what is the downtime?
Choice of Answers	HOURS / DAYS / WEEKS
Purpose of Question	Assesses duration of a respondent's power source failure(s).

Question E2.	Do you use electricity in this household?
Choice of Answers	YES / NO
Purpose of Question	Assesses respondent's use of electricity.

If answer is "no" to Question E2:

Question E2a.	What is (are) the reason(s) that electricity is not used in this household?
Choice of Answers	NO ACCESS / CAN'T AFFORD / ACCESS IT AT ANOTHER LOCATION THROUGH PERSONAL OR PRIVATE ARRANGEMENT (INCLUDING AT WORK LOCATION) / UTILIZE A COMMUNAL OR SHARED ACCESS POINT / SOCIAL, CULTURAL, OR RELIGIOUS PROHIBITION / NO NEED
Purpose of Question	Assesses reason(s) electricity is not used in a respondent's household.

If answer is "yes" to Question E2:

Question E2b.	How important is electricity in the household?
Choice of Answers	VERY IMPORTANT / SOMEWHAT IMPORTANT / NOT IMPORTANT
Purpose of Question	Assesses importance of electricity in household operations.

Question E2c.	How many hours a day do you use electricity?
Choice of Answers	0–4 HOURS / 4–8 HOURS / 8–12 HOURS / 12–24 HOURS
Purpose of Question	Assesses duration of electricity use in a household.

Question E2d.	In what season does this household use the most electricity?
Choice of Answers	SUMMER- DRY SEASON / WINTER- WET SEASON / SPRING- PLANTING SEASON / FALL- HARVEST SEASON
Purpose of Question	Assesses season in which a household uses the most electricity.

Question E2d1.	During the summer/dry season, what time of day does this household use the most electricity?
Choice of Answers	MORNING / MID-DAY / EVENING / NIGHT
Purpose of Question	Assesses daily peak power use during the summer/dry season.

Question E2d2.	During the winter/wet season, what time of day does this household use the most electricity?
Choice of Answers	MORNING / MID-DAY / EVENING / NIGHT
Purpose of Question	Assesses daily peak power use during the winter/wet season.

Question E2d3.	During the spring/planting season, what time of day does this household use the most electricity?
Choice of Answers	MORNING / MID-DAY / EVENING / NIGHT
Purpose of Question	Assesses daily peak power use during the spring/planting season.

Question E2d4.	During the fall/harvest season, what time of day does this household use the most electricity?
Choice of Answers	MORNING / MID-DAY / EVENING / NIGHT
Purpose of Question	Assesses daily peak power use during the fall/harvest season.

Question E2e.	What does this household use electricity for? (Check all that apply.)
Choice of Answers	LIGHTING / CLIMATE CONTROL / COOKING / HOUSEHOLD APPLIANCES / CHARGING COMMUNICATION DEVICES / PERSONAL COMPUTER / TELEVISION or RADIO / ENTERTAINMENT DEVICES / TO CONDUCT BUSINESS IN THE HOME
Purpose of Question	Assesses use(s) of electricity in a household.

Community

Question E3.	Do you regularly utilize communal electricity or electrical appliances?
Choice of Answers	YES / NO
Purpose of Question	Assesses respondent's use of communal electricity or electrical appliances.

Question E3a.	Who provides the communal electricity?
Choice of Answers	PRIVATE BUSINESS / GOVERNMENT / COMMUNITY ELITE / NGOs / VEOs OR CRIMINAL ORGANIZATION / OTHER
Purpose of Question	Assesses entity that supplies communal electricity to the respondent.

Question E3a1.	Why is communal electricity important? (Check all that apply.)
Choice of Answers	ENTERTAINMENT (INCLUDING SPORTING EVENTS ON TV OR RADIO)/ACCESS TO NEWS/ACCESS TO THE POLITICAL PROCESS (INCLUDING ELECTION CAMPAIGNS)/ACCESS TO FINANCIAL SYSTEMS/SECURITY/COMMUNICATION (INCLUDING SOCIAL MEDIA)
Purpose of Question	Assesses legality of respondent's connection to the grid.

Question E3b.	How does the availability of electricity affect the community? (Check all that apply.)
Choice of Answers	PLACES WHERE ELECTRICITY IS AVAILABLE BECOME GATHERING OR SOCIALIZATION SPOTS / SOCIALIZATION STOPS WHEN ELECTRICITY IS AVAILABLE AS EVERYONE STAYS HOME TO TAKE ADVANTAGE OF IT / SOCIALIZATION INCREASES WHEN ELECTRICITY IS AVAILABLE AS PEOPLE GO OUT TO CONDUCT BUSINESS / ACTIVITY OUTSIDE THE HOME IS REDUCED OR RESTRICTED AFTER DARK / CRIME RATES INCREASE AFTER DARK / WORK STOPS AFTER DARK
Purpose of Question	Assesses ways in which electricity availability affects the community.

Question E4.	Are there working streetlights in your area?
Choice of Answers	YES / NO
Purpose of Question	Assesses availability of working streetlights in an area.

Question E4a.	Are the streetlights powered from the municipal electrical grid?
Choice of Answers	YES / NO
Purpose of Question	Assesses type of power used for street lighting.

Question E4b.	Are the streetlights solar powered?
Choice of Answers	YES / NO
Purpose of Question	Assesses type of power used for street lighting.

Commercial/Industrial Facilities

Question E5.	What kind of commercial facility is this?
Choice of Answers	RETAIL / INDUSTRIAL / SERVICE / WHOLESALE / DISTRIBUTION CENTER
Purpose of Question	Assesses type of commercial facility.

Question E5a.	Does this commercial/industrial facility have a fixed location?
Choice of Answers	YES / NO
Purpose of Question	Assesses location type of a commercial/industrial facility.

Question E5a1.	Does this commercial/industrial facility employ people other than the owners?
Choice of Answers	YES / NO
Purpose of Question	Assesses employment levels at a commercial/industrial facility.

Question E6.	Does this commercial/industrial facility use electricity in regular operations?
Choice of Answers	YES / NO
Purpose of Question	Assesses use of electricity in operations of a commercial/industrial facility.

If answer is "no" to E6:

Question E6a.	Why is electricity not used at this facility?
Choice of Answers	NO ACCESS / CAN'T AFFORD / SOCIAL, CULTURAL, OR RELIGIOUS PROHIBITION / NO NEED
Purpose of Question	Assesses reason(s) why electricity is not used at a commercial/industrial facility.

If answer is "yes" to E6:

Question E6b.	What is the primary source of the electricity used at this commercial / industrial facility?
Choice of Answers	NATIONAL GRID / GENERATOR / SOLAR / WIND / OTHER
Purpose of Question	Assesses primary source of electricity used at a commercial/industrial facility.

Question E6b1.	How long did it take to acquire a connection to the grid for this facility?
Choice of Answers	ONE DAY / ONE WEEK / ONE MONTH / MORE THAN A MONTH
Purpose of Question	Assesses waiting period for connecting to the grid.

Question E6b1a.	*Did it take a bribe to acquire the connection?*
Choice of Answers	*YES / NO*

Question E6b2.	Why is the grid not used at this commercial/industrial facility??
Choice of Answers	NO ACCESS / NOT RELIABLE / TOO EXPENSIVE / OTHER
Purpose of Question	Assesses reason(s) a facility does not use the grid.

Question E6b2a.	*Why is your electricity not reliable?*
Choice of Answers	*INTERMITTENT SERVICE / UNSTABLE FREQUENCY / UNSTABLE VOLTAGE / INSUFFICIENT POWER*

Question E6c.	Is electricity available from the primary source at all times and on all days?
Choice of Answers	YES / YES - BUT THE EXPENSE LIMITS ACCESS AND USE / NO - THERE ARE SCHEDULED TIMES WHEN ELECTRICITY IS NOT AVAILABLE / NO - THERE ARE UNSCHEDULED BLACKOUTS AND BROWNOUTS
Purpose of Question	Assesses reliability of a commercial/industrial facility's primary power source.

Question E6c1.	If the primary power source fails, are there back-up sources available??
Choice of Answers	YES / NO
Purpose of Question	Assesses availability of alternate power sources at a commercial/industrial facility.

Question E6d.	Without electricity, could this commercial/industrial facility continue to operate?
Choice of Answers	NO, ELECTRICITY IS CRITICAL FOR OPERATIONS / YES, IF THE LOSS WAS OF SHORT DURATION BUT COULD NOT SUSTAIN PROTRACTED OUTAGES / YES, ELECTRICITY IS NOT NECESSARY FOR OPERATIONS.
Purpose of Question	Assesses ability of a facility to operate without power.

Question E6e.	Does a lack of electricity limit hours of operation at this facility?
Choice of Answers	YES / NO
Purpose of Question	Assesses impacts of electricity availability during a commercial/industrial facility's hours of operation.

Question E6f.	Does a lack of electricity limit output at this facility?
Choice of Answers	YES / NO
Purpose of Question	Assesses impacts of electricity availability on a commercial/industrial facility's production.

Question E6g.	If you had more reliable electrical access, could this business expand?
Choice of Answers	YES / NO
Purpose of Question	Assesses impacts of insufficient power on a commercial/industrial facility's production.

Question E6h.	In this commercial/industrial facility, what operations require electricity? (Check all that apply.)
Choice of Answers	LIGHTING / COMMUNICATION DEVICES / EMPLOYEE AND PUBLIC SAFETY AND HEALTH / EQUIPMENT RELATED TO PRODUCT CREATION, MANUFACTURE, MODIFICATION, OR STORAGE / COMPUTERS OR OTHER FORMS OF DATA MANAGEMENT AND PROCESSING / FINANCIAL TRANSACTIONS (e.g., CASH REGISTER OR CREDIT CARD READERS) / TO PROVIDE SECURITY TO THE PREMISES
Purpose of Question	Assesses operation(s) that require electricity at a commercial/industrial facility.

Institutional Facilities

Question E7.	Does the institution use electricity in regular operations?
Choice of Answers	YES / NO
Purpose of Question	Assesses institution's use of electricity in regular operations.

If answer is "no" to Question E7:

Question E7a.	Why is electricity not used in this institution?
Choice of Answers	NO ACCESS / CAN'T AFFORD / SOCIAL, CULTURAL, OR RELIGIOUS PROHIBITION / NO NEED
Purpose of Question	Assesses reason(s) electricity is not used at an institution.

If answer is "yes" to Question E7:

Question E7b.	What kind of institution is this?
Choice of Answers	ADMINISTRATION / HOSPITAL / SCHOOL / DETENTION CENTER / POLICE STATION / FIRE OR EMT STATION / FINANCIAL INSTITUTION / RELIGIOUS INSTITUTION OR PLACE OF WORSHIP / MILITARY FACILITY / OTHER
Purpose of Question	Assesses general type of institution.

Question E7b1.	What is the level of occupancy of this institution?
Choice of Answers	OCCUPIED DURING NORMAL BUSINESS HOURS (12 HOURS A DAY OR LESS) / OCCUPIED AT ALL TIMES BY SHIFT WORKERS / IS A PERMANENT OR PARTTIME RESIDENCE AND HAS DINING, SLEEPING, AND OR BATHING FACILITIES
Purpose of Question	Assesses an institution's occupancy levels.

Question E7c.	What is the primary source of the electricity used in this institution?
Choice of Answers	GRID / GENERATOR / SOLAR / WIND / OTHER
Purpose of Question	Assesses primary source of power at an institution.

Question E7c1.	How long did it take to acquire a connection to the grid for this institution?
Choice of Answers	ONE DAY / ONE WEEK / ONE MONTH / MORE THAN A MONTH
Purpose of Question	Assesses time period for an institution to gain a connection to the grid.

Question E7c1a.	*Did it take a bribe to acquire the connection?*
Choice of Answers	*YES / NO*
Purpose of Question	*Assesses existence of connection between connectivity and bribery.*

Question E7c2.	Why is the grid not utilized??
Choice of Answers	NO ACCESS / NOT RELIABLE / TOO EXPENSIVE / OTHER
Purpose of Question	Assesses reason(s) power from the grid is not used at an institutional facility.

Question E7c2a.	*Why is your electricity not reliable? (Check all that apply.)*
Choice of Answers	*INTERMITTENT SERVICE / UNSTABLE FREQUENCY / UNSTABLE VOLTAGE / INSUFFICIENT POWER*
Purpose of Question	*Assesses reasons why electricity is not reliable.*

Question E7d.	Is electricity available from the primary source at all times and on all days?
Choice of Answers	YES / YES, BUT THE EXPENSE LIMITS ACCESS OR USE / NO, THERE ARE SCHEDULED TIMES WHEN ELECTRICITY IS NOT AVAILABLE / NO, THERE ARE UNSCHEDULED BLACKOUTS OR BROWNOUTS.
Purpose of Question	Assesses availability of primary power source at an institution.

Question E7d1.	If the primary source of power fails, is there a back-up source available?
Choice of Answers	YES / NO
Purpose of Question	Assesses availability of a back-up power source.

Question E7e.	Without electricity, can the institution continue to operate?
Choice of Answers	NO, ELECTRICITY IS CRITICAL FOR OPERATIONS / YES, IF THE LOSS WAS OF SHORT DURATION BUT COULD NOT SUSTAIN PROTRACTED OUTAGES / YES, ELECTRICITY IS NOT NECESSARY FOR OPERATIONS.
Purpose of Question	Assesses ability of an institutional facility to operate without power.

Question E7e1.	Are there serious/critical repercussions to the general public if this institution cannot operate at full or partial capacity?
Choice of Answers	YES, THERE ARE PUBLIC OR STATE SECURITY REPERCUSSIONS / YES, THERE ARE HEALTH AND HUMAN SAFETY REPERCUSSIONS / YES, THERE ARE SERIOUS AND GENERAL ECONOMIC REPERCUSSIONS / NO
Purpose of Question	Assesses potential impacts to the general public if an institutional facility cannot operate due to power shortages.

HISA Survey Dictionary: Water (W)

Residential households

Question W1.	Does this home or home compound have access to potable water on the premises?
Choice of Answers	YES / NO
Purpose of Question	Assesses a residential infrastructure's access to a potable water supply.

If answer is "yes" to Question W1:

Question W1a.	What is this household's primary source of water?
Choice of Answers	MUNICIPAL OR PIPED SOURCE / PERSONAL WELL / CISTERN / WATER DELIVERY / OTHER
Purpose of Question	Assesses the type of a household's primary source of water.

Question W1a1.	*Is your primary source of water available all year?*
Choice of Answers	YES / NO
Purpose of Question	Assesses year-round availability of a household's primary source of water.

Question W1b.	If your primary residential source of water is unavailable, do you have an alternative?
Choice of Answers	YES / NO
Purpose of Question	Assesses availability of an alternative water source for a household.

Question W1b1.	Is the available alternative a communal source of water?
Choice of Answers	YES / NO
Purpose of Question	Assesses the communality of a household's alternative water.

If answer is "no" to Question W1:

Question W1c.	What is your source of water?
Choice of Answers	RIVER OR LAKE / COMMUNAL WELL / COMMUNAL CISTERN / PURCHASED / OTHER
Purpose of Question	Assesses the primary water source of a respondent who does not have access to municipal water in the household.

Question W1c1.	Is your primary source of water available all year?
Choice of Answers	YES / NO
Purpose of Question	Assesses the year-round availability of a household's primary source of water.

Question W1d.	How long does it take to acquire water for the household each day?
Choice of Answers	LESS THAN AN HOUR / 1–3 HOURS / 3–6 HOURS / MORE THAN 6 HOURS
Purpose of Question	Assesses the time it takes a household to meet daily water requirements/needs.

Question W1e.	Who is tasked with collecting water for the household?
Choice of Answers	ADULT MALES / ADULT FEMALES / MALE CHILDREN / FEMALE CHILDREN / NGO OR CHARITY
Purpose of Question	Assesses the household member responsible for collecting water.

Question W1e1.	What is the mode of water transport?
Choice of Answers	CARRIED BY HAND / TRANSPORTED BY ANIMAL / TRANSPORTED BY MOTOR VEHICLE / OTHER
Purpose of Question	Assesses a respondent's method(s) for transporting household water supply.

Question W1f.	Who (in reality) controls access to your source of water?
Choice of Answers	THERE IS NO CONTROLLING AUTHORITY OR LIMIT TO ACCESS / COMMUNITY ELDERS OR ELITES / RELIGIOUS ELDERS OR ELITES / LOCAL OR REGIONAL GOVERNMENT / PRIVATE BUSINESSES / THE MILITARY / CRIMINAL ORGANIZATIONS / VEOs
Purpose of Question	Assesses the entity that controls access to a respondent's source of water.

Question W1f1.	Does the household have to pay either an official or illicit fee for access to your primary source of water (including payment in currency, labor or trade and/or expectations of political or social support)?
Choice of Answers	YES / NO
Purpose of Question	Assesses the possibility a respondent has to pay illicit fees or bribes to access water supply.

Question W2.	Do religious/cultural practices conducted in the home and/or home compound require use of specially treated or sourced water?
Choice of Answers	YES / NO
Purpose of Question	Assesses if specially treated or sourced water is used in the household.

If answer is "yes" to Question W2:

Question W2a.	How frequently is specially treated or sourced water needed or utilized?
Choice of Answers	DAILY / WEEKLY / MONTHLY / ONCE OR A FEW TIMES EVERY YEAR /ONCE OR A FEW TIMES IN A LIFETIME
Purpose of Question	Assesses the frequency that specially treated or sourced water is used in a household.

Question W2a1.	Is the source of this water sufficient for the needs?
Choice of Answers	YES / NO
Purpose of Question	Assesses if there is enough specially treated or sourced water to meet household needs.

If answer is "no" to Question W2:

Question W3.	What do you use water for in this household? (Check all that apply.)
Choice of Answers	DRINKING/ FOOD PREPARATION (INCLUDING CLEANING OF EATING OR COOKING IMPLEMENTS)/ PERSONAL HYGIENE (INCLUDING BATHING, FLUSHING TOILETS, CLEANING CLOTHES AND/OR BEDDING, ETC)/ PRODUCTION OF GOODS FOR USE OR FOR SALE (INCLUDING MAINTAINING ANIMALS FOR LABOR OR FOOD, GARDENING FOR FOOD OR MEDICINE, OR RESIDENTIAL INDUSTRY/BUSINESS/ RECREATION (INCLUDING DECORATIVE LANDSCAPING, POOLS AND SPAS)./ RELIGIOUS AND/OR CULTURAL ACTIVITIES. For each activity above select a frequency of the activity from the list below: • THIS IS DONE IN THE HOME YEAR ROUND. • THIS IS AN EPISODIC/SEASONAL ACTIVITY WHERE WATER AVAILABILITY MEETS THE PERIODIC NEEDS/REQUIREMENTS. • THIS IS AN EPISODIC/SEASONAL ACTIVITY DUE TO WATER SHORTFALLS. • THIS ACTIVITY IS NEVER DONE IN THE HOME DUE TO LACK OF WATER • THIS ACTIVITY IS NOT DONE IN THE HOUSEHOLD BECAUSE CULTURAL/RELIGIOUS PRACTICES INDICATE IT SHOULD BE DONE ELSEWHERE. • THIS ACTIVITY IS NOT DONE.
Purpose of Question	Assesses type and frequency of household water use.

Question W4.	How does this household dispose of human waste?
Choice of Answers	INDOOR PLUMBING / OUTHOUSE OR PIT TOILET / STORED AND HAULED AWAY / USED AS FERTILIZER
Purpose of Question	Assesses community infrastructure for human waste disposition.

Community

Question W5.	Is there a local system for hauling human waste?
Choice of Answers	YES / NO
Purpose of Question	Assesses the community's level of infrastructure development for managing human waste.

Question W6.	Is there a municipal sewer system?
Choice of Answers	YES / NO
Purpose of Question	Assesses the community's level of infrastructure development for managing human waste and sewage.

Question W6a.	Is it an open-channel system?
Choice of Answers	YES / NO
Purpose of Question	Assesses the type of infrastructure available and its associated health risks.

Question W6b.	Is it a closed-pipe system?
Choice of Answers	YES / NO
Purpose of Question	Assesses the community's level of infrastructure development and associated health risks.

Commercial and Industrial Facilities

Question W7.	What kind of facility is this?
Choice of Answers	RETAIL / INDUSTRIAL / SERVICE / WHOLESALE DISTRIBUTION
Purpose of Question	Assesses facility type.

Question W7a.	Does this commercial or industrial facility have a fixed location?
Choice of Answers	YES / NO
Purpose of Question	Assesses fixed location potential for a commercial or industrial facility.

Question W7a1.	Does this commercial or industrial facility employ people other than the owners?
Choice of Answers	YES / NO
Purpose of Question	Assesses employment other than owners for a commercial or industrial facility.

Question W8.	Does the facility utilize water in regular operations?
Choice of Answers	YES / NO
Purpose of Question	Assesses use of water in regular operations at a facility.

If answer is "no" to Question W8:

Question W8a.	Why is water not used at this facility?
Choice of Answers	NO ACCESS/ CAN'T AFFORD/ SOCIAL, CULTURAL OR RELIGIOUS PROHIBITION/ NO NEED
Purpose of Question	Assesses reason(s) water is not used at a facility.

If answer is "yes" to Question W8:

Question W8b.	What is the primary source of the water used at this facility?
Choice of Answers	MUNICIPAL OR PIPED SOURCE / PRIVATE WELL / CISTERN / WATER DELIVERY / STREAM, RIVER OR LAKE / PUBLIC WELL / PURCHASED / OTHER
Purpose of Question	Assesses the primary water source at a commercial or industrial facility.

Question W8b1.	Is the primary source of water available all year?
Choice of Answers	YES / NO
Purpose of Question	Assesses year-round availability of a facility's primary water source.

Question W8b2.	If the primary source of water is unavailable, is there an alternative?
Choice of Answers	YES / NO
Purpose of Question	Assesses availability of an alternative source of water for a facility, when the primary source is unavailable.

Question W8c.	Who (in reality) controls access to the source of water?
Choice of Answers	NO CONTROLLING AUTHORITY OR LIMIT TO ACCESS / COMMUNITY ELDERS OR ELITES / RELIGIOUS ELDERS OR ELITES / LOCAL OR REGIONAL GOVERNMENT / PRIVATE BUSINESS / MILITARY / CRIMINAL ORGANIZATIONS / VEOs
Purpose of Question	Assesses the entities that control water access in an area.

Question W8c1.	Do you have to pay either an official or illicit fee for access to your primary source of water (including payment in currency, labor or trade, and/or expectations of political or social support)?
Choice of Answers	YES / NO
Purpose of Question	Assesses payment of illicit fees or bribes by respondent/facility to access the primary water supply.

Question W8d.	Without water, could the facility continue to operate?
Choice of Answers	NO, WATER IS CRITICAL FOR OPERATIONS. / NO, THIS IS A SEASONAL OPERATION AND IS ONLY OPEN WHEN SUFFICIENT WATER IS AVAILABLE. / YES, IF THE LOSS WAS OF SHORT DURATION BUT COULD NOT SUSTAIN PROTRACTED OUTAGES. / YES, WATER IS NOT NECESSARY FOR OPERATIONS.
Purpose of Question	Assesses a facility's operational dependency on water.

Question W8e.	Does lack of water limit hours of operation?
Choice of Answers	YES / NO
Purpose of Question	Assesses water availability's limit of facility operations.

Question W8f.	Does lack of water limit services provided or output?
Choice of Answers	YES / NO
Purpose of Question	Assesses water availability's limit of production outputs.

Question W8g.	What is water used for? (Check all that apply.)
Choice of Answers	DRINKING / FOOD PREPARATION / WATER and/or ICE IS THE PRODUCT OF THIS FACILITY / HYGIENE AND CLEANING / COOLING EQUIPMENT /POWER SOURCE INCLUDING WATER MILL / FIRE SUPPRESSION SYSTEMS / PRODUCT MANUFACTURE OR MODIFICATION / RECREATION OR EXERCISE ACTIVITIES / AGRICULTURE, HORTICULTURE, ANIMAL HUSBANDRY
Purpose of Question	Assesses water's uses at a facility.

Question W9.	Do religious/cultural practices require use of specially treated or sourced water at this facility?
Choice of Answers	YES / NO
Purpose of Question	Assesses uses of specially treated or sourced water at a commercial or industrial facility.

If answer is "yes" to Question W9:

Question W9a.	How frequently is specially treated or sourced water needed or utilized?
Choice of Answers	DAILY / WEEKLY / MONTHLY / ONCE OR A FEW TIMES EVERY YEAR / ONCE OR A FEW TIMES IN A LIFETIME
Purpose of Question	Assesses the frequency that specially treated or sourced water is used at a commercial or industrial facility.

Institutional Facilities

Question W10.	Does the institution utilize water in regular operations?
Choice of Answers	YES / NO
Purpose of Question	Assesses uses of water in an institutional facility's regular operations.

If answer is "no" to Question W10:

Question W10a.	Why is water not used in this facility?
Choice of Answers	NO ACCESS /CAN'T AFFORD /SOCIAL, CULTURAL, OR RELIGIOUS PROHIBITION / NO NEED
Purpose of Question	Assesses reason(s) water is not used in an institutional facility.

If answer is "yes" to Question W10:

Question W10b.	What kind of institution is this?
Choice of Answers	ADMINISTRATION / HOSPITAL / SCHOOL / DETENTION CENTER / POLICE STATION / FIRE OR EMT STATION / FINANCIAL INSTITUTION / RELIGIOUS INSTITUTION OR PLACE OF WORSHIP / MILITARY FACILITY / OTHER
Purpose of Question	Assesses the type of institution at a location.

Question W10b1.	What is the level of occupancy of this facility?
Choice of Answers	OCCUPIED DURING NORMAL BUSINESS HOURS (12 HOURS A DAY OR LESS) / OCCUPIED AT ALL TIMES BY SHIFT WORKERS / IS A PERMANENT OR PART-TIME RESIDENCE AND HAS DINING, SLEEPING, and/or BATHING FACILITIES
Purpose of Question	Assesses occupancy levels at an institutional facility.

Question W10c.	What is the primary source of the water used in this operation?
Choice of Answers	MUNICIPAL OR PIPED SOURCE / PRIVATE WELL / CISTERN / WATER DELIVERY / STREAM, RIVER, OR LAKE / PUBLIC WELL / PURCHASED / OTHER
Purpose of Question	Assesses an institutional facility's primary water source.

Question W10c1.	Is your primary source of water available all year?
Choice of Answers	YES / NO
Purpose of Question	Assesses year-long availability of an institution's primary water source.

Question W10c2.	If your primary institutional source of water is unavailable, do you have an alternative?
Choice of Answers	YES / NO
Purpose of Question	Assesses availability of alternative water sources for an institutional facility.

Question W10d.	Who (in reality) controls access to the source of water?
Choice of Answers	NO CONTROLLING AUTHORITY OR LIMIT TO ACCESS / COMMUNITY ELDERS OR ELITES / RELIGIOUS ELDERS OR ELITES / LOCAL OR REGIONAL GOVERNMENT / PRIVATE BUSINESS / MILITARY / CRIMINAL ORGANIZATIONS / VEOs
Purpose of Question	Assesses the entity controlling access to an institution's primary water supply.

Question W10d1.	Do you have to pay either an official or illicit fee for access to your primary source of water (including payment in currency, labor or trade, and/or expectations of political or social support)?
Choice of Answers	YES / NO
Purpose of Question	Assesses the use of illicit fees or bribes to access primary water supplies.

Question W10e.	Without water, could the facility continue to operate?
Choice of Answers	NO, WATER IS CRITICAL FOR OPERATIONS. / THIS IS A SEASONAL OPERATION AND IS ONLY OPEN WHEN SUFFICIENT WATER IS AVAILABLE. / YES, IF THE LOSS WAS OF SHORT DURATION BUT COULD NOT SUSTAIN PROTRACTED OUTAGES. / YES, WATER IS NOT NECESSARY FOR OPERATIONS.
Purpose of Question	Assesses the possibility an institutional facility can operate without water.

Question W10f.	Does lack of water limit hours of operation?
Choice of Answers	YES / NO
Purpose of Question	Assesses limits of lack of water on an institution's hours of operation.

Question W10g.	Does lack of water limit services provided?
Choice of Answers	YES / NO
Purpose of Question	Assesses impact of lack of water to an institution's output.

Question W10h.	What does this institution use water for? (Check all that apply.)
Choice of Answers	DRINKING / FOOD PREPARATION / WATER AND/OR ICE IS THE PRODUCT OF THE FACILITY/COOLING EQUIPMENT / CLEANING AND HYGIENE / FIRE SUPPRESSION SYSTEMS / PRODUCT MANUFACTURE OR MODIFICATION / HEALTH CARE, INCLUDING STERILIZATION / CULTURAL OR RELIGIOUS PRACTICES / RECREATION OR EXERCISE ACTIVITIES / AGRICULTURE, HORTICULTURE, ANIMAL HUSBANDRY
Purpose of Question	Assesses uses of water by an institution.

Question W11.	Do religious/cultural practices require use of specially treated or sourced water at this facility?
Choice of Answers	YES / NO
Purpose of Question	Assesses an institution's need for specially treated or sourced water for religious or cultural practices.

If answer is "yes" to Question W11:

Question W11a.	How frequently is specially treated or sourced water needed/utilized?
Choice of Answers	DAILY / WEEKLY / MONTHLY / ONCE OR A FEW TIMES EVERY YEAR / ONCE OR A FEW TIMES IN A LIFETIME
Purpose of Question	Assesses the frequency specially treated or sourced water is used at this institution.

Question W11b.	Is this facility a location where culturally or religiously processed or sourced water is produced?
Choice of Answers	YES / NO
Purpose of Question	Assesses production of specially treated or sourced water by this institution.

HISA Survey Dictionary: Transportation (T)

Residential households

Question T1.	What are the roads made of that you routinely travel?
Choice of Answers	PAVEMENT OR CONCRETE / TAR OR GRAVEL / DIRT
Purpose of Question	Assesses the primary type of road available to respondents in an area.

Question T1a.	Why do you prefer to travel on those roads?
Choice of Answers	CONVENIENCE / ACCESS / SAFETY / SECURITY / NO CHOICE (ONLY WAY TO GET FROM HERE TO THERE)
Purpose of Question	Assesses a reason for road preference. Depending on the answer(s), can illustrate the quality of the roads, the efficiency or connectivity, of the road network, and the safety and security along the road.

Question T1b.	Who maintains the roads you use the most?
Choice of Answers	GOVERNMENT / LOCAL CITIZENS / NGOs / VEOs / OTHERS
Purpose of Question	Assesses the organization responsible for road maintenance.

Question T2.	What type of traffic is on the major roads?
Choice of Answers	TRUCKS AND BUSES / PASSENGER CARS / MOTORIZED BIKES / HUMAN-POWERED VEHICLES (bikes, rickshaw, etc.) / ANIMALS / WALKING
Purpose of Question	Assesses primary method of transportation on major roads; a predominant type could be determined through observation/surveying in an area.

Question T2a.	What time of day is traffic heaviest on major roads?
Choice of Answers	MORNING / AFTERNOON / EVENING / NIGHT / ALL TIMES / TRAFFIC IS NEVER HEAVY / SPORADICALLY HEAVY DUE TO SPECIALLY SCHEDULED EVENTS / SPORADICALLY HEAVY IN UNPREDICTABLE MANNER
Purpose of Question	Assesses potential for peak flow/congestion times for traffic on major roads.

Question T2a1.	How does the traffic on major roads negatively affect your quality of life?
Choice of Answers	NOISE POLLUTION / AIR POLLUTION / SAFETY / SECURITY / HEAVY TRAFFIC LIMITS ACCESS TO ROAD / LONG COMMUTE / NO NEGATIVE EFFECT
Purpose of Question	Assesses the negative impacts of traffic volume on residents living near a major roadway. Answers to this question imply perceived safety and security issues, accessibility problems (to the road and wider community that impact employment, education, and other social limitations) , and the introduction of environmental hazards that could negatively affect health.

Question T2a2.	How does the traffic on major roads positively affect your quality of life?
Choice of Answers	INCREASES BUSINESS / INCREASES SERVICES / EASE OF TRANSPORTATION / NO POSITIVE EFFECT
Purpose of Question	Assesses the positive impacts that a major roadway has on residents living nearby, including increased mobility (benefiting choices in employment, education, where to live, etc.) and increased safety.

Question T3.	What type of traffic is on the minor roads?
Choice of Answers	TRUCKS AND BUSES / PASSENGER CARS / MOTORIZED BIKES / HUMAN-POWERED VEHICLES / ANIMALS / WALKING
Purpose of Question	Assesses the types of vehicles on minor roads, illustrating a potential division of traffic between major and minor roads. Minor roads might be more accommodating to slower, non-motorized forms of transportation.

Question T3a.	What time of day is traffic heaviest on minor roads?
Choice of Answers	MORNING / AFTERNOON / EVENING / NIGHT / ALL TIMES / TRAFFIC IS NEVER HEAVY / SPORADICALLY HEAVY DUE TO SPECIALLY SCHEDULED EVENTS / SPORADICALLY HEAVY IN UNPREDICTABLE MANNER
Purpose of Question	Assesses possibility of peak flow/congestion times for traffic on minor roads.

Question T3a1.	How does the traffic on minor roads negatively affect your quality of life?
Choice of Answers	NOISE POLLUTION / AIR POLLUTION / SAFETY / SECURITY / HEAVY TRAFFIC LIMITS ACCESS TO ROAD / NO NEGATIVE EFFECT
Purpose of Question	Assesses the negative impact that traffic volume has on residents living near a minor roadway.

Question T3a2.	How does the traffic on minor roads positively affect your quality of life?
Choice of Answers	INCREASE BUSINESS / INCREASE SERVICES / EASE OF TRANSPORTATION / NO POSITIVE EFFECT
Purpose of Question	Assesses the positive impacts that a minor roadway has on residents living nearby.

Question T4.	What are the roads used for other than transportation?
Choice of Answers	FESTIVALS / PARKING / PERMANENT STREET MARKETS / EPISODIC STREET MARKETS / RECREATION / PROTESTS
Purpose of Question	Assesses all uses for roads in a given area apart from transportation-based use.

Question T4a.	How often do you attend and/or participate in those other functions?
Choice of Answers	DAILY / WEEKLY / MONTHLY / ONCE OR A FEW TIMES A YEAR / NEVER
Purpose of Question	Assesses frequency that a respondent attends functions which use roads for purposes other than transportation.

Question T4a1.	How often do other road uses impede your use of the roads as a transportation network?
Choice of Answers	REGULARLY / OCCASIONALLY / NEVER
Purpose of Question	Assesses frequency that other road uses impact a respondent's use of the transportation networks in an area.

Question T5.	What are the regulatory requirements to drive?
Choice of Answers	LICENSING / OFFICIAL / TRAINING / VEHICLE TAXES AND FEES / POLITICAL CONNECTIONS / NONE
Purpose of Question	Assesses requirements to legally drive.

Question T5a.	What fees do you pay for road access?
Choice of Answers	ROAD TAX / TOLLS / BRIBES (AT ROADBLOCKS) / OTHER / NONE
Purpose of Question	Assesses fees that a respondent potentially pays to access the road network. Possible answers include formalized taxation and informal bribes.

Question T5a1.	Who are fees paid to?
Choice of Answers	GOVERNMENT / VEOs / CRIMINAL ORGANIZATIONS / OTHER
Purpose of Question	Assesses the organization to which a respondent pays fees for road network access.

Question T5b.	Do people obey the regulatory requirements?
Choice of Answers	YES / NO
Purpose of Question	Assesses the state of the regulatory structure and its enforcement.

Question T6.	What factors affect choice of transportation?
Choice of Answers	ECONOMIC / ENVIRONMENTAL / WEATHER / CONGESTION / AVAILABILITY / CULTURAL NORMS / LEGAL PROHIBITIONS
Purpose of Question	Assesses reasoning/decision making behind a respondent's choice of transportation.

Question T6a.	What seasonal or environmental considerations affect transportation choices?
Choice of Answers	WET / DRY / HARVEST / FESTIVALS OR HOLIDAYS / SEASONAL VARIATIONS IN FUEL PRICES / AVAILABILITY OF TRANSPORTATION MODE / TRANSPORTATION NEEDS FLUCTUATE
Purpose of Question	Assesses potential alterations of transportation choices based on seasonal or environmental disruptions to the network as well as type(s) of disruption.

Question T7.	What kind of transportation method/conveyance do you utilize?
Choice of Answers	TRUCKS AND BUSES / PUBLIC MOTORIZED VEHICLES / TRAM OR TROLLEY / PASSENGER CARS / MOTORIZED BIKES / HUMAN POWERED VEHICLES / ANIMALS / WALKING
Purpose of Question	Assesses the method(s)/modes of transportation used by a respondent in an area.

Question T7a.	How many hours are you on the road per day?
Choice of Answers	LESS THAN 1 HOUR / 1–3 HOURS / 3–6 HOURS / 6–9 HOURS / 9–12 HOURS / 12+ HOURS / DO NOT USE THE ROADS / CANNOT USE THE ROADS
Purpose of Question	Assesses the duration a respondent spends using the transportation network per day.

Question T7a1.	What long-distance journeys are taken during the year?
Choice of Answers	FAMILIAL OBLIGATIONS OR VISITS / RELIGIOUS OBLIGATIONS OR VISITS / CULTURAL OBLIGATIONS OR VISITS / POLITICAL OBLIGATIONS OR VISITS / MIGRATORY WORK / VACATIONS / NONE
Purpose of Question	Assesses likelihood that a respondent takes long-distance journeys during the year as well as reasons for those trips.

Question T8.	Do you own a vehicle (motorized)?
Choice of Answers	YES / NO
Purpose of Question	Assesses potential that respondents own a motorized vehicle(s).

If answer is "yes" to Question T8:

Question T8a.	Who can drive the vehicle?
Choice of Answers	ONLY MALES / ONLY FEMALES / BOTH MALES AND FEMALES
Purpose of Question	Assesses who can drive the vehicle in a respondent's household.

Question T8a1.	Why are there limitations on who can drive a vehicle?
Choice of Answers	LEGAL RESTRICTIONS / PREFERENCE / CULTURAL NORMS / PHYSICAL LIMITATIONS / SAFETY / NO LIMITATIONS
Purpose of Question	Assesses reason(s), if any, governing restrictions on driving.

Question T8b.	What do you use the vehicle for?
Choice of Answers	WORK / TRADE OR BUSINESS / SCHOOL / HEALTHCARE / RELIGION / STATUS SYMBOL / SOCIAL GATHERINGS / ENTERTAINMENT / PROCURE FOOD AND WATER
Purpose of Question	Assesses how a respondent's household uses their vehicle.

Question T8b1.	Do you have multiple vehicles?
Choice of Answers	YES / NO
Purpose of Question	Assesses potential that a respondent's household has more than one vehicle.

If answer is "no" to Question T8:

Question T8c	Why do you not own a vehicle?
Choice of Answers	CANNOT AFFORD / DON'T NEED ONE / DON'T WANT ONE / NOT ALLOWED
Purpose of Question	Assesses reason(s) a household does not have a vehicle.

Question T9.	Which shared transportation do you use?
Choice of Answers	GOVERNMENT, CITY, MUNICIPAL / PRIVATE COMPANY / AD HOC OR INDIVIDUALS / NONE
Purpose of Question	Assesses a respondent's use(s) of shared transportation as well as how (or by what entity) shared transportation is operated.

Question T9a.	What do you use the shared transportation for?
Choice of Answers	WORK / TRADE / SCHOOL / HEALTHCARE / RELIGION / PROTEST / SOCIAL GATHERING / PROCURE FOOD AND WATER / ENTERTAINMENT
Purpose of Question	Assesses reason(s) a respondent uses shared transportation.

Question T9a1.	How often do you use shared transportation?
Choice of Answers	MULTIPLE TIMES A DAY / MULTIPLE TIMES A WEEK / A FEW TIMES A MONTH / OCCASIONALLY
Purpose of Question	Assesses the frequency that a respondent uses shared transportation.

Question T9b.	Why do you not use shared transportation?
Choice of Answers	TOO EXPENSIVE / NOT AVAILABLE / NOT CONVENIENT / LIMITED OPERATION / OWN A VEHICLE / NOT SAFE / NO NEED
Purpose of Question	Assesses the reason(s) shared transportation is not used by a respondent.

Question T10.	How do you acquire basic food/supplies?
Choice of Answers	PRIVATE MOTORIZED VEHICLE / PACK ANIMAL OR ANIMAL CART / PUBLIC TRANSPORTATION / WALK, BIKE, OR HUMAN-POWERED CART / DELIVERED TO RESIDENCE
Purpose of Question	Assesses the form(s) of transportation a respondent uses to acquire basic goods.

Question T10a.	What is the source of the majority of the basic food supplies acquired?
Choice of Answers	REGIONAL MARKET / LOCAL SOURCE OR SHOPS / STREET VENDORS / COMMERCIAL DISTRICT / DELIVERY SERVICE / PERSONALLY PRODUCE MAJORITY OF FOOD
Purpose of Question	Assesses where a respondent obtains the majority of their basic food supplies.

Question T10a1.	How consistent is your source of basic provisions (based on transportation used)?
Choice of Answers	SAME SOURCE ALL YEAR / THE SOURCE CHANGES DUE TO SEASONAL VARIATIONS BUT THESE ARE PREDICTABLE / SHORTAGES RESULT IN REGULAR UNCERTAINTY CONCERNING PROVISION SOURCE
Purpose of Question	Assesses the reliability of the road network for a respondent obtaining basic household necessities.

Question T11.	How often is travel necessary to procure basic food / supplies?
Choice of Answers	DAILY / A FEW TIMES A WEEK / A FEW TIMES A MONTH / A FEW TIMES A YEAR / NEVER
Purpose of Question	Assesses the frequency that people travel to obtain food and supplies.

Question T11a.	How does your access to the transportation network influence how you procure basic provisions?
Choice of Answers	TRIPS ARE MORE FREQUENT DUE TO LIMITED CARRYING CAPACITY. / TRIPS ARE LESS FREQUENT TO AVOID ROAD USE. / VARIETY OF GOODS AVAILABLE IS LIMITED DUE TO TRAVEL RESTRICTIONS OR LIMITATIONS. / SHOPPING IS DONE IN GROUPS DUE TO SAFETY CONCERNS. / TIME OF DAY SHOPPING IS DONE IS DECIDED BY TRAFFIC and/or PARKING AVAILABILITY.
Purpose of Question	Assesses the effectiveness and reliability of the road network in relationship to obtaining basic household supplies.

Community

Question T12.	Are there certain roads or routes you do not use due to safety and security reasons?
Choice of Answers	YES / NO
Purpose of Question	Assesses likelihood that certain roads in the area are not safe to use.

Question T12a.	Why are these roads or routes not used?
Choice of Answers	NOT LIGHTED / SCARED OF VEOs / SCARED OF MILITARY / SCARED OF POLICE / FEMALE, CANNOT TRAVEL ALONE
Purpose of Question	Assesses the reason(s) why certain roads are not safe to use.

Question T13.	How is household waste disposed?
Choice of Answers	PRIVATE HAULER / CITY HAULER / PERSONAL HAULER / OTHER (ONSITE BURN OR BURY)
Purpose of Question	Assesses how household waste is disposed of.

Question T13a.	How often is household waste disposed of?
Choice of Answers	DAILY / BIWEEKLY / WEEKLY / MONTHLY / INFREQUENTLY
Purpose of Question	Assesses how often household waste is disposed of.

Question T14.	How available / costly is fuel?
Choice of Answers	CHEAP AND EASY AND NO ISSUE / COST LIMITS OTHER SPENDING BUT BUY FUEL ANYWAY / EXPENSIVE TO THE POINT OF LIMITING VEHICLE USE
Purpose of Question	Assesses availability and affordability of fuel, and if fuel costs limit vehicle use.

Commercial / Industrial Facilities

Question T15.	What type of establishment do you have?
Choice of Answers	RETAIL / FOOD SERVICES / PERSONAL SERVICES / PROFESSIONAL SERVICES / MANUFACTURING / MECHANIC OR TECHNICIAN / RECREATION OR ENTERTAINMENT / PRIVATE TRANSPORTATION / FUEL SERVICES / AGRICULTURE OR ANIMAL HUSBANDRY / WASTE DISPOSAL / OTHER
Purpose of Question	Assesses type of establishment the respondent has.

Question T15a.	Where is your establishment located?
Choice of Answers	MAIN COMMERCIAL DISTRICT OR MARKET / SECONDARY COMMERCIAL DISTRICT OR MARKET / SUBURBAN COMMERCIAL DISTRICT OR MARKET / OUTSIDE THE CITY / IN A PRIVATE RESIDENCE / IN A MOVABLE STRUCTURE OR VEHICLE / ON PERSON / OTHER
Purpose of Question	Assesses type of location for the respondent's establishment.

Question T15a1.	How do you access / interact with your customers?
Choice of Answers	CUSTOMERS COME TO ESTABLISHMENT / ESTABLISHMENT DELIVERS A PRODUCT / ESTABLISHMENT DELIVERS A SERVICE / THIRD PARTY OR MIDDLE MAN / TELEPHONE OR INTERNET / OTHER
Purpose of Question	Assesses how a business delivers a product or service to customers.

Question T16.	Do you depend on others to provide inventory for your establishment?
Choice of Answers	YES / NO
Purpose of Question	Assesses source of inventory for a business or industry.

Question T16a.	How is the inventory delivered?
Choice of Answers	DIRECTLY FROM MANUFACTURER OR PRODUCER / PRIVATE CARGO OR SHIPPING COMPANY / GOVERNMENT MAIL SERVICE
Purpose of Question	Assesses delivery method for an industry's inventory.

Question T16a1.	How often do you require deliveries to your establishment to maintain operations?
Choice of Answers	DAILY / MULTIPLE TIMES A WEEK / WEEKLY / BI-WEEKLY / MONTHLY / MULTIPLE TIMES A YEAR
Purpose of Question	Assesses frequency of deliveries to the business or industry.

Question T16b.	Do road closures affect deliveries?
Choice of Answers	ALWAYS / FREQUENTLY / PERIODICALLY / NEVER
Purpose of Question	Assesses frequency and effect of road closures on a business or industry's deliveries.

Question T16b1.	Is there a backup delivery mechanism?
Choice of Answers	YES / NO
Purpose of Question	Assesses likelihood that a business or industry has access to alternate delivery options.

Question T17.	Do clients depend on you to provide inventory for their establishments?
Choice of Answers	YES / NO
Purpose of Question	Assesses likelihood the respondent's business or industry supplies goods to other establishments.

Question T17a.	Do road closures affect deliveries?
Choice of Answers	ALWAYS / FREQUENTLY / PERIODICALLY / NEVER
Purpose of Question	Assesses frequency that road closures affect a respondent's business or industry.

Question T17a1.	Is there a back-up delivery mechanism?
Choice of Answers	YES / NO
Purpose of Question	Assesses access of the respondent's business or industry to alternate delivery options.

Institutional Facilities

Question T18.	What type of institution do you operate?
Choice of Answers	ADMINISTRATION / HOSPITAL / SCHOOL / DETENTION CENTER / POLICE STATION / FIRE OR EMT STATION / FINANCIAL INSTITUTION / RELIGIOUS INSTITUTION OR PLACE OF WORSHIP / MILITARY FACILITY / OTHER
Purpose of Question	Assesses type of institution respondent operates.

Question T18a.	Are roads crucial to your operation?
Choice of Answers	YES / NO
Purpose of Question	Assesses importance of roads to operation of the respondent's institution.

Question T18a1.	How are roads used?
Choice of Answers	TO PROVIDE SERVICES TO OTHERS / FOR OTHERS TO COME TO RECEIVE SERVICES
Purpose of Question	Assesses uses of roads by an institution's operations.

Question T18b.	Does the condition or safety or usability of the road network affect decisions on where employees live?
Choice of Answers	YES / NO
Purpose of Question	Assesses effect of road network conditions on where employees live.

HISA Survey Dictionary: Communications (C) (cellular/wireless)

Residential households

Question C1.	Do you depend on cellular networks and Wi-Fi networks for communication?
Choice of Answers	YES / NO
Purpose of Question	Assesses likelihood that a cellular network is the primary means of communication in an area.

If answer is "yes" to Question C1:

Question C1a.	What type of cellular device do you own?
Choice of Answers	CELLPHONE/ SMARTPHONE/ TABLET
Purpose of Question	Assesses the type of cellular device(s) a respondent owns.

Question C1a1.	What is the primary type of wireless use?
Choice of Answers	VOICE CALLS / TEXTS / SOCIAL MEDIA, FACEBOOK, BANKING
Purpose of Question	Assesses primary types of cellular use.

Question C1b.	How many cellphones are there in the household?
Choice of Answers	MULTIPLE DEVICES / ONE DEVICE (OR SHARE) / NONE
Purpose of Question	Assesses quantity of cellphones per household in the region.

Question C1b1.	Where do you get adequate cellphone reception? (Check all that apply.)
Choice of Answers	HOME OR NEIGHBORHOOD / WORK (OUTSIDE OF HOME) / COMMERCIAL DISTRICT OR INSTITUTION / ORGANIZATION
Purpose of Question	Assesses location(s) where a respondent receives adequate cellphone reception.

Question C1b2.	Are there areas without coverage?
Choice of Answers	YES / NO
Purpose of Question	Assesses likelihood there are areas without cellular service in the region.

Question C1c.	What is the purpose of your mobile communications? (Check all that apply.)
Choice of Answers	EDUCATION / BUSINESS OR FINANCIAL / SOCIAL OR SOCIAL MEDIA / OTHER
Purpose of Question	Assesses a respondent's general reason(s) for communications.

Question C1c1.	Do you transfer money via smartphone?
Choice of Answers	YES / NO
Purpose of Question	Assesses likelihood that a respondent transfers money using a cellular network.

Question C1c2.	How dependent are you on social media?
Choice of Answers	MONITOR SITES BUT DO NOT POST / COMMUNICATE WITH FRIENDS OR FAMILY / OCCASIONAL POST TO PUBLIC / ACTIVE SOCIAL MEDIA BLOGGER
Purpose of Question	Assesses frequency of a respondent's use of social media.

Question C1d.	How do you access cellular and Wi-Fi networks?
Choice of Answers	GOVERNMENT OPERATED CELLULAR NETWORKS / COMMERCIALLY OPERATED CELLULAR NETWORKS / PURCHASED WI-FI NETWORKS / FREE WI-FI NETWORKS / ILLEGAL / OTHER
Purpose of Question	Assesses the primary cellular service provider in a region.

Question C1d1.	How are the cellular and Wi-Fi networks paid for?
Choice of Answers	PURCHASED / TAXES / EMPLOYER / ORGANIZATION
Purpose of Question	Assesses type of payment for wireless service.

Question C1d2.	Who provides or operates free Wi-Fi networks in the area?
Choice of Answers	GOVERNMENT / COMMERCIAL / ORGANIZATION / AD HOC OR ILLEGAL
Purpose of Question	Assesses the provider (and operator) of free Wi-Fi networks in an area.

Question C1e.	How much of your income is spent on cellular and Wi-Fi devices and services?
Choice of Answers	MAJORITY / HALF / MINIMAL
Purpose of Question	Assesses how much of a respondent's income is spent on cellular devices and services.

Question C1e1.	Is paying for cellular and Wi-Fi network devices and services a priority purchase over food, water, or education fees?
Choice of Answers	YES / NO
Purpose of Question	Assesses priority of paying for cellular devices and services over paying for food, water, or education fees.

Question C1e2.	Where do you buy cellphones?
Choice of Answers	MARKET / RETAILER / ILLEGAL SOURCE
Purpose of Question	Assesses location for a respondent's purchase of cellphones and devices.

Question C1f.	Are there government controls on cell service?
Choice of Answers	FIREWALLS / BENEFITS CENSORSHIP / PROVIDER RESTRICTIONS / NO
Purpose of Question	Assesses government controls on cell service.

If answer is "no" to Question C1:

Question C1g.	What alternate type(s) of communication do you use, and how do you get information/news? (Check all that apply.)
Choice of Answers	LAND LINE / USE SOMEONE ELSE'S DEVICE / BROADCAST MEDIA / PRINT MEDIA / SOCIAL INTERACTIONS OR COMMUNITY / SATELLITE / CABLE / SHORTWAVE RADIO
Purpose of Question	Assesses forms of communication available other than cellular/wireless services.

Question C1h.	Does not having cellular and Wi-Fi connectivity negatively affect your life?
Choice of Answers	YES / NO
Purpose of Question	Assesses impacts to person's life of not having access to cellular services.

Community

Question C2.	Do you rely on the cellular network/Wi-Fi network for 911/emergency services?
Choice of Answers	YES / NO
Purpose of Question	Assesses a respondent's reliance on a cellular network for emergency services.

Question C2a.	Does the government disseminate information over the cellular/Wi-Fi network?
Choice of Answers	YES / NO
Purpose of Question	Assesses government's use of cellular network to issue warnings and advisories.

Question C3.	Where are cell towers located? (Check all that apply.)
Choice of Answers	NEIGHBORHOODS / COMMERCIAL AREAS / CITY CENTER / GOVERNMENT DISTRICT / ON BUILDINGS / IN FIELDS / ALONG ROADS
Purpose of Question	Assesses location(s) of cellular towers.

Question C3a.	Who controls placement of cell towers?
Choice of Answers	GOVERNMENT / COMMERCIAL / INDIVIDUALS
Purpose of Question	Assesses control of cellular tower placements.

Question C3b.	Who owns land where cell towers are located?
Choice of Answers	GOVERNMENT / COMMERCIAL / INDIVIDUALS
Purpose of Question	Assesses owners of the land where cellular towers are located.

Question C3b1.	Who maintains the cell towers?
Choice of Answers	GOVERNMENT / COMMERCIAL / INDIVIDUALS
Purpose of Question	Assesses who maintains cellular towers.

Commercial/Industrial Facilities

Question C4.	Do you depend on cellphones for communication?
Choice of Answers	YES / NO
Purpose of Question	Assesses dependence of a commercial/industrial facility on the cellular network for communications.

Question C4a.	What type of communication device is used?
Choice of Answers	CELLPHONE / SMARTPHONE/ TABLET
Purpose of Question	Assesses type of cellular device(s) used by the facility for communications.

Question C4a1.	Is your device the primary source of communication among the staff?
Choice of Answers	YES / NO
Purpose of Question	Assesses primary device for communication between employers and employees.

Question C4a2.	Do you supply the device to employees?
Choice of Answers	YES / NO
Purpose of Question	Assesses supply of cellular devices by a commercial or industrial facility to employees.

Question C4b.	Do you rely on global positioning service (GPS) for transportation services?
Choice of Answers	YES / NO
Purpose of Question	Assesses reliance on GPS services by a commercial or industrial facility for transportation routing.

Question C4c.	How do you access the cellular and Wi-Fi networks?
Choice of Answers	GOVERNMENT OPERATED CELLULAR NETWORK / COMMERCIALLY OPERATED CELLULAR NETWORK / PURCHASE WI-FI NETWORK / FREE WI-FI NETWORK / ILLEGALLY / OTHER
Purpose of Question	Assesses access by a commercial or industrial facility to the cellular network.

Question C4c1.	How are the cellular and Wi-Fi networks paid for?
Choice of Answers	PURCHASED BY ESTABLISHMENT / PAID THROUGH TAXES
Purpose of Question	Assesses method of payment for cellular services by a commercial or industrial facility.

Question C4c2.	Who provides/operates the free Wi-Fi network?
Choice of Answers	GOVERNMENT / COMMERCIAL
Purpose of Question	Assesses provider and operator of the free Wi-Fi networks in the area.

Question C4d.	How much of your budget is spent on wireless devices and services?
Choice of Answers	MAJORITY / HALF / MINIMAL
Purpose of Question	Assesses portion of a commercial or industrial facility's budget that is spent on cellular devices and services.

If answer is "no" to Question C4:

Question C4e.	What alternate types of communication do you use/how do you communicate with customers?
Choice of Answers	LAND LINE / BROADCAST MEDIA / PRINT MEDIA / SOCIAL INTERACTIONS or COMMUNITY
Purpose of Question	Assesses alternative types of communications that a commercial or institutional facility uses to communicate with customers.

Question C4f.	Does not having cellular or Wi-Fi connectivity negatively impact business?
Choice of Answers	YES / NO
Purpose of Question	Assesses negative impacts of not having cellular services on the commercial or industrial facility's business.

Question C5.	What type of commercial establishment do you have?
Choice of Answers	RETAIL / FOOD SERVICE / PERSONAL SERVICES / PROFESSIONAL SERVICES / MANUFACTURING / MECHANIC or TECHNICIAN / RECREATION or ENTERTAINMENT / PRIVATE TRANSPORTATION / FUEL SERVICES / AGRICULTURE or ANIMAL HUSBANDRY / OTHER
Purpose of Question	Assesses the type(s) of commercial establishments in a region.

Question C5a.	How do you access/interact with your customers?
Choice of Answers	CUSTOMER COME TO ESTABLISHMENT / ESTABLISHMENT DELIVERS A PRODUCT / ESTABLISHMENT DELIVERS A SERVICE / THIRD PARTY or MIDDLE MAN / OTHER (Telephone/Internet/Cellphone)
Purpose of Question	Assesses how a respondent/establishment communicates with customers.

Question C5a1.	Where is your establishment located?
Choice of Answers	MAIN COMMERCIAL DISTRICT OR MARKET / SECONDARY COMMERCIAL DISTRICT OR MARKET / SUBURBAN COMMERCIAL DISTRICT OR MARKET / OUTSIDE THE CITY / PRIVATE RESIDENCE / MOVABLE STRUCTURE OR MOBILE VEHICLE / OTHER
Purpose of Question	Assesses location of the commercial facility.

Question C5b.	How/why is Wi-Fi and cellular data used? (Check all that apply.)
Choice of Answers	MARKETING AND ADVERTISING / COMMUNICATING WITH CUSTOMERS / COMMUNICATING WITH EMPLOYEES / COMPLIANCE WITH REGULATIONS AND LAWS
Purpose of Question	Assesses how cellular/wireless networks are used by a commercial establishment.

Institutional Facilities

Question C6	Does your institution depend on cellular and Wi-Fi networks for communication?
Choice of Answers	YES / NO
Purpose of Question	Assesses an institution's dependence on cellular or other wireless networks for communications.

Question C6a.	What kind of communication device is used?
Choice of Answers	CELLPHONE / SMARTPHONE/ TABLET
Purpose of Question	Assesses type of cellular or wireless device used by an institution for communications.

Question C6a1.	Do you have a back-up means of communication?
Choice of Answers	YES / NO
Purpose of Question	Assesses an institution's access to a back-up / alternative form of communication.

Question C6b.	Are the cellular and Wi-Fi networks the primary sources of communication with the institution?
Choice of Answers	YES / NO
Purpose of Question	Assesses an institution's use of cellular or other wireless services for its primary means of communication.

Question C6c.	How do you access the cellular and Wi-Fi networks?
Choice of Answers	GOVERNMENT-OPERATED CELLULAR NETWORK / COMMERCIALLY OPERATED CELLULAR NETWORK / PURCHASED WI-FI NETWORK / FREE WI-FI NETWORK / ILLEGALLY / OTHER
Purpose of Question	Assesses an institution's accesses to cellular or other wireless networks.

Question C6c1.	How are the cellular network and Wi-Fi network services paid for?
Choice of Answers	PURCHASED BY INSTITUTION / PAID FOR THROUGH TAXES / PAID FOR BY PATRON OR SPONSOR
Purpose of Question	Assesses an institution's method of payment for cellular or other wireless network services.

Question C6c2.	Who provides/operates the free Wi-Fi network?
Choice of Answers	GOVERNMENT / COMMERCIAL / ORGANIZATION
Purpose of Question	Assesses the provider(s) of free wireless network(s).

Question C6d.	How much of your budget is spent on cellular and Wi-Fi devices and services?
Choice of Answers	MAJORITY / HALF / MINIMAL
Purpose of Question	Assesses portion of an institution's budget spent on cellular and other wireless devices and services.

Question C6d1.	Where are cellphones purchased?
Choice of Answers	MARKET / RETAILER / ILLEGAL SOURCE
Purpose of Question	Assesses where an institution purchases cellphones.

Question C6e.	For transportation services, do you rely on GPS?
Choice of Answers	YES / NO
Purpose of Question	Assesses likelihood that an institution's employees rely on GPS/cellular navigation services to perform duties.

If answer is "no" to Question C6:

Question C6f.	What alternate types of communication do you use / how do you communicate with the institution?
Choice of Answers	LAND LINE / BROADCAST MEDIA / PRINT MEDIA / SOCIAL INTERACTIONS or COMMUNITY
Purpose of Question	Assesses alternate types of communication an institution uses.

Question C6g.	Does not having a cellular or Wi-Fi connectivity negatively impact the institution?
Choice of Answers	YES / NO
Purpose of Question	Assesses negative impact on an institution's operations of not having cellular or wireless services.

Question C7.	What type of institution do you operate?
Choice of Answers	HOSPITAL / CLINIC / UNIVERSITY / SCHOOL / CHURCH or MOSQUE/ POLICE / FIRE DEPARTMENT / EMERGENCY SERVICES / GOVERNMENT OFFICE / MILITARY / PRISON / OTHER
Purpose of Question	Assesses type of institution a respondent operates.

Question C7a.	Does this institution provide cellular or Wi-Fi communication devices to employees or staff?
Choice of Answers	YES / NO
Purpose of Question	Assesses access to cellular or Wi-Fi by employees or staff.

HISA Survey Dictionary: Food/Agriculture (F) (food security)

Residential households

Question F1.	Do you have periods of time where you go without or have limited access to food?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether a respondent has periods without food, or with limited access to food.

Question F1a.	How frequently is there a shortage of food?
Choice of Answers	EVERY DAY / A FEW DAYS A WEEK / A FEW DAYS A MONTH / A FEW DAYS A YEAR / SEASONAL
Purpose of Question	Assesses frequency of food shortage within a household.

Question F1a1.	Why do you go without food?
Choice of Answers	MARKET AVAILABILITY / GROWING SEASONALITY / LACK OF MONEY
Purpose of Question	Assesses reason(s) a respondent goes without food.

Question F1b.	If there is an insufficient amount of food, who goes without?
Choice of Answers	EVERYONE EQUALLY / CHILDREN / ELDERLY / WOMEN / MEN / IN-LAWS
Purpose of Question	Assesses who goes without food if there is an insufficient amount to feed the household.

Question F1c.	Do you utilize food aid?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether a household uses food aid, including what type—from food stamps to large shipments of staple food items.

Question F1c1.	Where do you obtain food aid?
Choice of Answers	NO FOOD AID / FROM THE GOVERNMENT / NGOs / LOCAL CHARITY OR SOCIAL NETWORK DONATION / RELIGIOUS ORGANIZATION / CRIMINAL ORGANIZATION OR VEOs
Purpose of Question	Assesses from what organization a household receives food aid.

Question F2.	How often do you purchase food?
Choice of Answers	DAILY / A FEW DAYS A WEEK / WEEKLY / MONTHLY / NEVER
Purpose of Question	Assesses frequency that a respondent purchases food.

Question F2a.	Describe the experience of purchasing food. (Check all that apply.)
Choice of Answers	A SOCIAL NETWORKING ACTIVITY OR OPPORTUNITY / STRESSFUL DUE TO FOOD SHORTAGES OR COMPETITION (INCLUDING LONG LINES) / STRESSFUL DUE TO LACK OF FUNDS / STRESSFUL DUE TO SAFETY OR HARASSMENT ISSUES / ENJOYABLE
Purpose of Question	Assesses the food-shopping experience.

Question F3.	How much of a food supply is kept in the residence (in general)?
Choice of Answers	1 DAY'S WORTH / A FEW DAYS' WORTH / 1 WEEK'S WORTH / A FEW WEEKS' WORTH / A MONTH OR LONGER
Purpose of Question	Assesses quantity of food stored in a respondent's residence.

Question F3a.	How is food stored/preserved? (Check all that apply.)
Choice of Answers	REFRIGERATOR / COLD STORAGE / ON THE SHELF OR PANTRY / NOT STORED, CONSUMED IMMEDIATELY / CANNED / DRIED / PICKLED OR SALTED / SMOKED
Purpose of Question	Assesses how a respondent preserves and stores food.

Question F3a1.	What factors limit the quantity of food stored in the house?
Choice of Answers	CANNOT AFFORD TO BUY IN LARGE QUANTITIES / DO NOT HAVE ENOUGH ROOM TO STORE LARGE QUANTITIES / LARGER QUANTITIES ARE NOT AVAILABLE FOR PURCHASE / FOOD WILL SPOIL / SECURITY CONCERNS
Purpose of Question	Assesses potential limitations to storing food by a household.

Question F3a1a.	*How do you dispose of food waste?*
Choice of Answers	*COMPOST / TRASH / FERTILIZER / ANIMAL FEED*
Purpose of Question	*Assesses household's method for disposing food waste.*

Question F4.	How has food availability affected decisions about family/livelihood?
Choice of Answers	RELOCATE THE HOUSEHOLD / SEND CHILDREN OR FAMILY MEMBERS TO LOCATIONS (INCLUDING WITH EXTENDED FAMILY MEMBERS OR TO INSTITUTIONS) WHERE FOOD IS MORE AVAILABLE / JOINING MILITARY / JOB CHOICE / APPLICATION FOR GOVERNMENT ASSISTANCE / APPLICATION FOR NGO ASSISTANCE / PARTICIPATION, SUPPORT OR CONDONATION OF CRIMINAL ACTIVITY / NOT AT ALL
Purpose of Question	Assesses impact of food availability on a household's family/livelihood decisions.

Question F4a.	Where do the majority of your meals occur?
Choice of Answers	HOME OR FAMILY HOME / SCHOOL OR PLACE OF EMPLOYMENT / COMMUNITY FACILITY / RELIGIOUS FACILITY / RESTAURANT OR FOOD VENDING LOCATION
Purpose of Question	Assesses location where meals occur.

Question F5.	Are there official or social restrictions on particular types of food?
Choice of Answers	NONE / GOVERNMENT RESTRICTIONS ON FOOD DUE TO SOURCE (restriction of imports from a particular country) / GOVERNMENT RESTRICTIONS ON FOOD DUE TO REGULATIONS (example - no consumption of endangered species or limits on production practices) / COMMUNITY TABOO DUE TO FOOD SOURCE / COMMUNITY TABOO DUE TO NATURE OF FOOD / RELIGIOUS OR CULTURAL DIETARY RESTRICTIONS
Purpose of Question	Assesses if there are [household] restrictions on particular types of foods.

Question F5a.	What kind of dietary restrictions does the household observe?
Choice of Answers	KOSHER / HALAL / OVO-LACTO VEGETARIAN / LACTO VEGETARIAN / VEGAN / OTHER
Purpose of Question	Assesses type of dietary restrictions in a household.

Question F5a1.	Does the entire community observe these restrictions or only a portion of the community?
Choice of Answers	ALL / MAJORITY / MINORITY
Purpose of Question	Assesses proportion of the community that observes dietary restrictions.

Question F5b.	Does your religion/culture practice periods of fasting?
Choice of Answers	YES / NO
Purpose of Question	Assesses observance by a household of religious or cultural periods of fasting.

Question F5b1.	When does fasting occur?
Choice of Answers	REGULARLY (e.g., Catholic meatless Fridays) / REOCCURRING HOLIDAYS (e.g., Ramadan)/LIFE EVENTS (e.g., initiation, mourning)
Purpose of Question	Assesses timing of a household's religious or cultural periods of fasting.

Question F6.	Do you have the ability to produce food or raise animals?
Choice of Answers	YES / NO
Purpose of Question	Assesses ability of a household/respondent to grow or produce their own food.

Question F6a.	What type of food/animals? (Check all that apply.)
Choice of Answers	GRAINS / VEGETABLES / LEGUMES / NUTS / FRUITS / HERBS AND SPICES / LARGE LAND ANIMALS / SMALL LAND ANIMALS / POULTRY / FRESHWATER FISH AND SHELLFISH / SALTWATER FISH AND SHELLFISH / MEDICINAL PLANTS / ALCOHOL / BEES FOR HONEY
Purpose of Question	Assesses types of food a household is able to grow or produce.

Question F6a1.	Where is your food grown/raised?
Choice of Answers	RESIDENCE / COMMUNITY FARM OR GARDEN / DISTANT FARM / PERIPHERY FARM / OTHER
Purpose of Question	Assesses location of a household's food production area.

Question F6a2.	What is the livestock used for? (Check all that apply.)
Choice of Answers	PROCESSED FOR MEAT / HARVESTED FOR BY-PRODUCTS SUCH AS MILK, EGGS, BLOOD, ETC. / ANIMAL SALES OR TRADE
Purpose of Question	Assesses use of livestock to produce food stuffs.

Question F6b.	Who does the primary tending of crops/animals?
Choice of Answers	MEN / WOMEN / CHILDREN / EXTENDED FAMILY / HEAD OF HOUSEHOLD / PAIN LABOR / INDENTURED LABOR / UNPAID OR INTERMITTENT LABOR
Purpose of Question	Assesses who tends to the crops and livestock.

Question F6b1.	Does the production of food require household members to be absent from the house for extended periods of time (including hunting and fishing)?
Choice of Answers	YES / NO
Purpose of Question	Assesses household routines and absences related to food production.

Question F6c.	How much of your income is from the sale of food?
Choice of Answers	MOST / HALF / MINIMAL
Purpose of Question	Assesses income level from food sales.

Question F6c1.	Do you use food as an alternative currency?
Choice of Answers	YES / NO
Purpose of Question	Assesses use of food for currency.

Question F6d.	Where do you get your perishable food supplies? (Check all that apply.)
Choice of Answers	THROUGH SOCIAL NETWORK / FROM LOCAL PRODUCERS OR VENDORS INCLUDING LOCAL MARKETS / COMMERCIAL STORES / NGO / GOVERNMENT (INCLUDING MILITARY) / CRIMINAL ORGANIZATIONS OR VEOs
Purpose of Question	Assesses source of perishable food supplies.

Community

Question F7.	If food distribution and access to food is controlled, who is it controlled by?
Choice of Answers	GOVERNMENT / RELIGIOUS ORGANIZATIONS / COMMUNITY LEADERS / FAMILY OR CLAN LEADER / NGOs / CRIMINAL ORGANIZATIONS / VEOs / NOT CONTROLLED / OTHER
Purpose of Question	Assesses direct control of food distribution or access in a region.

Question F7a.	Is access to food provided equally throughout the community?
Choice of Answers	YES / NO
Purpose of Question	Assesses equality of food access throughout a community.

Question F7a1.	How is food allotment determined?
Choice of Answers	ONLY TO MEMBERS OR SUPPORTERS OF THE RULING GROUP OR INDIVIDUALS / UNEQUALLY BASED ON SOCIAL STATUS / UNEQUALLY BASED ON NEED / OTHER
Purpose of Question	Assesses allotment of food throughout a community.

Question F8.	Is food theft common?
Choice of Answers	YES / NO
Purpose of Question	Assesses likelihood of food theft in an area.

Commercial / Industrial facilities

Question F9.	Is large-scale commercial agriculture prevalent?
Choice of Answers	YES / NO
Purpose of Question	Assesses if large-scale agriculture is prevalent [in what area? at what scale?].

Question F9a.	Who owns the large farms in the region?
Choice of Answers	LOCALS / NON-LOCAL NATIONALS / INTERNATIONALS / NATIONAL CORPORATIONS / INTERNATIONAL CORPORATIONS / GOVERNMENT
Purpose of Question	Assesses large-farm ownership.

Question F9a1.	Do large farms get preferential treatment for water by suppliers?
Choice of Answers	YES / NO
Purpose of Question	Assesses likelihood that large farms get preferential access to the water supply.

Question F9b.	What products are primarily grown on large farms in the region?
Choice of Answers	LOCAL FOOD SUPPLY / CASH CROPS FOR LOCAL CONSUMPTION / FOOD FOR EXPORT / CASH CROPS FOR EXPORT / CROPS FOR BIOFUELS / BEES FOR HONEY
Purpose of Question	Assesses dominate products grown on large farms in the region.

Question F9c.	Where do the products of large-scale farming go?
Choice of Answers	LOCAL / REGIONAL / NATIONAL / INTERNATIONAL
Purpose of Question	Assesses the distance that products from large-scale farming are shipped or used.

Question F9d.	What is the source of the workforce on large farms?
Choice of Answers	LOCAL POPULATION / SEASONAL MIGRANT WORKERS / LONG TERM MIGRANT WORKERS / INDENTURED LABOR (INCLUDING CONVICTS) / CHILDREN
Purpose of Question	Assesses primary workforce demographics for large farms in an area.

Question F9d1.	What is the nature of the labor on large farms?
Choice of Answers	LARGE-SCALE UNSKILLED LABOR / SMALL-SCALE UNSKILLED LABOR / LARGE-SCALE SKILLED LABOR / SMALL-SCALE SKILLED LABOR / OTHER
Purpose of Question	Assesses the primary type of labor on large farms.

Question F10.	Are there large-scale food factories or food-processing plants in the area?
Choice of Answers	YES / NO
Purpose of Question	Assesses likelihood of large-scale food-processing industry in an area.

Question F10a.	How is the food distributed?
Choice of Answers	PROVIDED TO THE REGION / PROVIDED FOR EXPORT / OTHER
Purpose of Question	Assesses distribution of food from large-scale food-processing plants in a region.

Question F10a1.	Who is the primary source of the workforce at food-processing plants?
Choice of Answers	LOCAL POPULATION / SEASONAL MIGRANT WORKERS / LONG-TERM MIGRANT WORKERS / INDENTURED LABOR (including convicts) / OTHER
Purpose of Question	Assesses demographics of food-processing plant workers.

Institutional facilities

Question F11.	Is food service a part of the institution's operations?
Choice of Answers	YES, FOOD IS PROVIDED FOR FREE TO ALL EMPLOYEES. / YES, FOOD IS PROVIDED TO SOME, BASED ON INCOME. / YES, FOOD IS AVAILABLE TO ALL FOR PURCHASE AT A DISCOUNTED OR SUBSIDIZED RATE. / YES, FOOD IS AVAILABLE TO SOME FOR PURCHASE AT A DISCOUNTED OR SUBSIDIZED RATE / YES, FOOD IS AVAILABLE FOR PURCHASE AT NORMAL RATES / NO
Purpose of Question	Assesses likelihood that food service is a component of the institution's operations.

Question F11a.	What type of institution is this?
Choice of Answers	HOSPITAL / CLINIC / UNIVERSITY / SCHOOL / CHURCH OR MOSQUE / POLICE / FIRE DEPARTMENT / EMERGENCY SERVICES / GOVERNMENT OFFICE / MILITARY / PRISON / OTHER
Purpose of Question	Assesses functional type of the institution.

Question F11a1.	What is the main source of the food?
Choice of Answers	GOVERNMENT / LOCAL POPULATION / LOCAL CORPORATIONS / MILITARY / NGOs / RELIGIOUS ORGANIZATIONS / COMMUNITY OR TRIBAL LEADERS / CRIMINAL ORGANIZATIONS AND VEOs / INSTITUTION PRODUCES ALL FOOD IT CONSUMES / OTHER
Purpose of Question	Assesses [main] source of food for the institution's food services.

Appendix C: Field Guides

Field guides are instructions for observers and data collectors working in the field. Field guides not only explain how the collected data could be used for analysis, but also provide individuals collecting the data with notes on physical indicators of infrastructure in an area. The field guide for each physical infrastructure has the SMART document question, answer options, purpose of the question, and data collection guidance on observation techniques and indicators pertaining to remote sensing, direct observation, and local information sources. These guides are for visual assessment of the geographic area to identify key aspects of the society, to determine the well-being of individuals, and to determine daily routines of an area or community

HISA Field Guide: Electricity (E)

Objectives

Electricity is a key infrastructure that is important to a community's health and safety and economic development. Electrical networks include the grid system, but also include less formal networks such as individual generators, solar panels, and wind turbines. The following questions focus on determining how a local population uses the available electrical network, and what aspects of normal life would be affected by impacts to that network.

Residential households

Question E1.	Does this household have access to the grid?
Choice of Answers	YES / NO
Purpose of Question	Determines access to the grid and indicates that a respondent lives in an area with formalized/regulated electrical infrastructure, can afford to connect to the system, and can afford to buy the electricity.

Data Collection:

- Remote Sensing – Do aerial photographs or land-based photographs from the web show power lines, substations, transformers, etc.?
- Direct Observation – Does observer see electrical grid infrastructure?
- Local Informant – Ask locals.

Question E1a.	Does this household use power from the grid?
Choice of Answers	YES / NO
Purpose of Question	Determines if people who have access to the grid actually use it. Answers of "NO" might indicate that there are aspects of society, culture, or religion that discourage using the grid or that service provided in the grid is not reliable.

Data Collection:

- Remote Sensing – View government-conducted surveys and local utility data if available. Check local media outlets for relevant utility access news.
- Direct Observation –Are there electrical wires from the street lines to the houses? Are there generators in housing compounds? Are there large numbers of people filling up gas cans at filling stations?
- Local Informant – Ask locals.

Question E1a1.	Is this household's access to the grid legal or illicit?
Choice of Answers	LEGAL / ILLICIT
Purpose of Question	Assesses type of grid access by a household. In many places, stealing electricity off of the grid is fairly common, if not the dominant form of access to electricity. "YES" answers may indicate a failure/weakness/discrimination of the government in service provision. Large-scale stealing from the grid can weaken it, causing more brownouts and blackouts, and such theft may foster ill will between sectors of the community where electricity theft is common and where it is rare. Finally, theft of electricity means that the household has access to this resource without accruing monetary cost that might limit other financial choices.

Data Collection:

- Remote Sensing – Are there frequent blackouts that indicate line splicing? Are there newspaper accounts concerning electricity theft? Do ground-based photos show an electrical grid that appears to be improperly or unsafely wired that may indicate nonprofessional work? Are the poorest parts of the city lit up in night aerial photos?

- Direct Observation – Do the poorest parts of the city have electrical appliances in the houses? Do the electrical wires on the street look like they have been tampered with or spliced? Are there frequent blackouts that indicate power is being disrupted for slicing or that there is much more draw on the system then was planned and/or allotted for?
- Local Informant – Ask locals, but it is possible that asking if the household is taking part in illegal activity may generate false responses and be seen as a hostile act.

Figure C1. Stealing electricity in India (india-forums.com, 2014).

Question E1a2.	Is the electricity from the grid reliable?
Choice of Answers	YES / NO
Purpose of Question	Assesses the reliability of electricity from the grid. Answers of "NO" may indicate the system is being taxed beyond its capacity, either through inadequate infrastructure or through illegal activity that is damaging the system. If the answer to this question is "NO," then the people may be adjusting their lifestyle to accommodate the power failures (e.g., not keeping spoilable food in the house/refrigerator). Additionally, areas that have less reliable power from the grid may have a higher occurrence of alternative power supplies such as generators. Locations where the frequency of "YES" and "NO" answers is very different from other locations may indicate distribution of preferred and/or discriminated against subpopulations.

Data Collection:

- Remote Sensing – Are there frequent blackouts or brownouts visible in aerial or satellite imagery? An Enterprise Survey conducted for the World Bank* asks private business owners about the frequency of power outages and the effect it has on their operations. Check travel blogs and/or hotel reviews to see if foreigners complain about power outages. Check local media, but if the unreliability of the grid is long-standing, it may be viewed as what is normal and not worthy of news coverage.
- Direct Observation – Does the power go down frequently?
- Local Informant – Ask locals about frequency of power outages.

* An Enterprise Survey is a representative sample of any economy's private business sector, covering a broad range of business topics.

Question E1a3.	How do you pay for electricity?
Choice of Answers	FLAT FEE / AMOUNT USED (kW/hr)
Purpose of Question	Determines method of payment for electricity. Answers of "flat fee" may indicate a standardized rate for use and imply a more abundant and reliable source, while an answer of "amount used" may indicate an increasing rate with increasing use, resulting in judicious use of electricity.

Data Collection:

- Remote Sensing – View government-conducted surveys and local utility data if available. Check local media outlets for relevant utility access news.
- Local Informant – Ask locals about electricity fees and use.

Question E1a4.	What happens if you don't pay your bill?
Choice of Answers	POWER SHUT OFF / ADDITIONAL FEES UNTIL PAID / NOTHING
Purpose of Question	Assesses penalty for nonpayment of electrical bill. Answers indicate the governance structure applicable to electricity access, show how structured the system is, and show the level of controls applied.

Data Collection:

- Remote Sensing – View government-conducted surveys and local utility data if available. Check local media outlets for utility access news.
- Local Informant – Ask locals about electricity fees and use.

Question E1a5.	How many hours per day do you get electricity from the grid?
Choice of Answers	0–4 HOURS / 4–8 HOURS / 8–12 HOURS / 12–24 HOURS
Purpose of Question	Assesses daily hours of electricity use from the grid. Answers indicate either level of reliable electricity or the amount of electricity used/needed daily.

Data Collection:

- Remote Sensing – View government-conducted surveys and local utility data if available. Check local media outlets for relevant utility access news.
- Local Informant – Ask locals about average electricity use, peak hours, and electricity concerns.

Question E1a6.	What is the cost of electricity from the grid?
Choice of Answers	0%–24% OF ANNUAL INCOME / 25%–50% OF ANNUAL INCOME / 50%+ OF ANNUAL INCOME
Purpose of Question	Assesses relation between electricity cost and income. Answers will indicate how much households are willing to pay for electricity based on their income.

Data Collection:

- Remote Sensing – View government-conducted surveys and local electricity data if available. Check local media outlets for relevant electricity access news.
- Local Informant – Ask locals about electricity use, cost, and affordability for the household.

Question E1a7.	Do your appliances run like they should when using grid electricity?
Choice of Answers	YES / NO
Purpose of Question	Assesses operation of appliances when connected to the grid. Answers will indicate the strength, quality, and reliability of electricity from the grid.

Data Collection:

- Remote Sensing – View government-conducted surveys. Check local media outlets for relevant electricity access news.
- Local Informant – Ask locals about their appliance usage, maintenance, and operation. Check with local repair services and appliance sales outlets for information on appliance operation.

Question E1a8.	Does the grid have regularly scheduled outages?
Choice of Answers	YES / NO
Purpose of Question	Assesses schedule of grid outages. In some parts of the world, the electrical grid is only powered on specific days or hours of the day. Regularly scheduled power outages are an indication of inadequate infrastructure or production instead of disruption to the lines. Community life rhythms may be significantly affected; for example, if the location only has two hours of power a day, people may choose to be home at that time to take advantage of it. Answers of "YES" may also indicate a higher need for alternative power sources. Locations where the frequency of "YES" and "NO" answers is very different from other locations may indicate distribution of preferred and/or discriminated against subpopulations.

Data Collection:

- Remote Sensing – Regularly scheduled blackouts/brownouts should be posted. Check government websites, travel sites, NGO sites, etc. Is electrical grid in place, but area is never lit up at night?
- Direct Observation – Is power available only on specific days or specific hours of the day?
- Local Informant – Ask locals about frequency and regularity of power outages.

Question E1a9.	If power from the grid is unavailable, do you have a back-up/alternative source?
Choice of Answers	YES / NO
Purpose of Question	Assesses availability of alternative power sources. If grid failure is common or predictable, then the population may have alternative sources of electricity such as generators. If widespread use of alternative power sources is present in the community, then it may be more critical to ensure adequate fuel instead of restoring the grid.

Data Collection:

- Direct Observation – What is the prevalence of alternative sources of electricity in the region? Listen; sound is a good indicator as well.
- Local Informant – Ask locals about the presence of alternative sources of electricity.

Figure C2. Solar-panel street lights in Nigeria (prlog.org, 2008).

Question E1a10.	Do you own the back-up source of power, or do you buy it from a local source?
Choice of Answers	OWN / BUY FROM LOCAL SOURCE
Purpose of Question	Assesses source of back-up power. If a back-up source of power is owned, it will show availability and reliability of electricity if needed. If they buy back-up power from a local source, availability and reliability of that source whenever immediate access is needed may be a concern, especially in a crisis situation.

Data Collection:

- Direct Observation – What is the prevalence of alternative sources of electricity in the region? Listen; sound is a good indicator as well.
- Local Informant – Ask locals about backup sources of power, and check with store owners and service providers to identify use patterns.

Question E1a11.	What are the reasons this household does not use power from the grid?
Choice of Answers	NOT RELIABLE / TOO EXPENSIVE / DO NOT WANT TO (NO NEED)
Purpose of Question	Determines the reason people are not using the grid. Look for clusters of similar answers. Answers will help target efforts at supplying or resuming service. For example, if many respondents say that electricity from the grid is too expensive, then improving the grid without finding a way to lower the costs to the average person will fail to provide any additional electricity to the population.

Data Collection:

- Remote Sensing – View NGO or nonprofit survey data on infrastructure and economic development. Check local media outlets for relevant electricity access news.
- Direct Observation – How reliable is the electrical service provided by the grid? How expensive? Does the cost and/or reliability of the grid make it impossible to use? Are there public sentiments against the power supplier (e.g., a perception of graft).
- Local Informant – Ask locals about grid reliability and concerns.

Question E1a11a.	*Would you use the grid if your concerns were addressed?*
Choice of Answers	*YES / NO*
Purpose of Question	*Assesses whether use of grid is related to concerns held by the respondent. If use of the grid would increase if concerns were met, then the demand appears to be there, and determining why concerns are present and what is being done about them could be investigated. If use would not increase if concerns were met shows that an alternative source is more reliable, affordable, and available or that having electricity is not of great importance.*

Data Collection:

- Remote Sensing – View surveys pertaining to grid use.
- Direct Observation – What is the prevalence of alternative sources of electricity in the region? Listen; sound is a good indicator as well.
- Local Informant – Ask locals about the presence of alternative sources of electricity and discuss their concerns with the grid.

If answer is "No" to Question E1a:

Question E1b.	What is your source of electricity in the home?
Choice of Answers	GENERATOR / SOLAR / WIND / OTHER / DO NOT UTILIZE ELECTRICITY IN THE HOME
Purpose of Question	Assesses source of electricity in the home. If they are not utilizing the grid, are they going without electricity or do they have an alternate source? If the majority of the population is using an alternate source, then maintenance of the grid may not be a high priority.

Data Collection:

- Remote Sensing – Are solar panels, wind turbines, propane tanks, or gas tanks visible in pictures?
- Direct Observation – What equipment is used to generate power?
- Local Informant – Ask locals.

Question E1b1.	What type of fuel does your generator use?
Choice of Answers	GAS OR PETROL / DIESEL / PROPANE / NATURAL GAS / OTHER
Purpose of Question	Assesses type of fuel used by generator. If they are not utilizing the grid, are they going without electricity or do they have an alternative source? If the majority of the population is using an alternative source, then maintenance of the grid may not be a high priority.

Data Collection:

- Remote Sensing – Are solar panels, wind turbines, propane tanks, or gas tanks visible in pictures?
- Direct Observation – What equipment is used to generate power?
- Local Informant – Ask locals.

Figure C3. Communal biofuel generators in Garalo, Mali (homepower.com, 2010).

Question E1c.	Is the equipment and fuel for this power source readily available?
Choice of Answers	YES / NO
Purpose of Question	Determines the availability of alternative sources of electricity.

Data Collection:

- Remote Sensing – Review newspaper or web-based articles concerning fuel shortages.
- Direct Observation – Are houses/structures with alternative power sources using those sources? Are areas dominated by alternative sources illuminated at night? Are there stores for generator repair/sales? Are their long lines at gas stations?
- Local Informant – Ask locals.

If answer is "Yes" to Question E1c:

Question E1c1.	How long does it take to get the equipment and fuel for the household's electricity?
Choice of Answers	LESS THAN AN HOUR / 1–2 HOURS / 2–4 HOURS / 4–8 HOURS / MORE THAN 8 HOURS
Purpose of Question	Assesses the amount of time spent getting the material(s) to generate electricity. Time spent gathering fuel or equipment cannot be spent on gainful employment or in procurement of other necessities.

Data Collection:

- Remote Sensing – Review newspaper or web-based stories about fuel shortages.
- Direct Observation – How long are lines at gas stations? How far do people appear to be walking?
- Local Informant – Ask locals.

Figure C4. People waiting for fuel in Cairo, Egypt. Stations ran out of fuel (al-monitor.com, 2013).

Question E1c2.	How does this household obtain fuel for a primary source of power?
Choice of Answers	CARRIED BY HAND / TRANSPORTED BY ANIMAL / TRANSPORTED BY MOTOR VEHICLE / DELIVERED / OTHER
Purpose of Question	Assesses the dependency that a household or community has on other infrastructure systems to get the material they need to generate electricity.

Data Collection:

- Remote Sensing – What do pictures online show to be the dominate mode of transportation of goods?
- Direct Observation – How do people transport electrical equipment and fuel?
- Local Informant – Ask locals.

Figure C5. People lining up to purchase and transport fuel by hand in Ondo, Nigeria (dailynewsegypt.com, 2013).

Question E1c3.	Do you use batteries to store energy for nighttime use?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether a respondent has the capability to store energy for later use. Answers can indicate the availability of electricity, and its importance during times of outages or times of day when electricity is not available or access is limited.

Data Collection:

- Remote Sensing – View NGO/nonprofit surveys, local news outlet information.
- Local Informant – Ask locals about battery use and store owners about sales of batteries.

Question E1c4.	Can you store enough energy for your nighttime needs?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether a respondent can store enough energy for their needs during periods without electricity. Answers can be used to determine demand and level of access to maintain energy use for nighttime needs.

Data Collection:

- Remote Sensing – View NGO/nonprofit surveys and local news outlet information.
- Local Informant – Ask locals about energy storage and nighttime use.

If answer is "No" to Question E1c:

Question E1d.	Is someone in this household able to conduct repairs and maintenance on the power source?
Choice of Answers	YES / NO
Purpose of Question	Assesses ability of a household to maintain a power source. Is access to electricity through methods other than the electrical grid an individual or community effort? If communication and transportation are disrupted, does this automatically lead to disruptions in electricity because maintenance and fueling become problematic?

Data Collection:

- Remote Sensing – Look for online advertisements or yellow page listings for related repair services or supply shops.
- Direct Observation – How much cooperation is observable in the community?
- Local Informant – Ask locals.

If answer is "yes" to Question E1d:

Question E1d1.	If the household's power source fails, what is the downtime?
Choice of Answers	HOURS / DAYS / WEEKS
Purpose of Question	Assesses duration of power source failures. If alternative sources of electricity go down, how long do people have to do without electricity? This downtime may affect their access to things such as communication, perishable food, water, etc.

Data Collection:

- Remote Sensing – Look at news outlet information.
- Direct Observation – Observe evening electricity consumption and daily routines.
- Local Informant – Ask locals.

Question E2.	Do you use electricity in this household?
Choice of Answers	YES / NO
Purpose of Question	Assesses household use of electricity. People who have access to the resource may not use it, and therefore, they are not part of any drain on the system. Compare frequency of "YES" responses to determine socioeconomic status of locations.

Data Collection:

- Remote Sensing – Pattern of lighted areas at night.
- Direct Observation – Do homes use electricity? Are electrical appliances located in homes?
- Local Informant – Ask locals.

Figure C6. TV antennas in a shanty town in Dhaka, Bangladesh, indicate the presence of available electricity (flickr.com, 2011).

Figure C7. Kowloon Walled City, Hong Kong, at night. The 350 buildings (approximate) had no official access to utilities. This community was demolished during 1993–1994 (businessinsider.com, 2015).

If answer is "no" to Question E2:

Question E2a.	What is/are the reason(s) that electricity is not used in this household?
Choice of Answers	NO ACCESS / CAN'T AFFORD / ACCESS IT AT ANOTHER LOCATION THROUGH PERSONAL OR PRIVATE ARRANGEMENT (INCLUDING AT WORK LOCATION) / UTILIZE A COMMUNAL OR SHARED ACCESS POINT / SOCIAL, CULTURAL, OR RELIGIOUS PROHIBITION / NO NEED
Purpose of Question	Determines the reason the electricity is not used in the home. If reason is no access, can't afford, access it at another location or utilize a communal shared access point, then lack of access may be addressed by making a change in infrastructure system. Also, it may be useful to recognize that there is a pool of potential users that are not in the system, so any additional infrastructure may be quickly utilized (even to capacity). If answer is due to prohibition or no need, then the system will not be utilized even if it is made available. In that case, changes to the system's capacity will not necessarily result in changed use patterns and/or rates.

Data Collection:

- Local Informant – ask locals.

If answer is "yes" to Question E2:

Question E2b.	How important is electricity in the household?
Choice of Answers	VERY IMPORTANT / SOMEWHAT IMPORTANT / NOT IMPORTANT
Purpose of Question	Assesses importance of electricity to a household. Different segments of the population will have different levels of need for electricity. A middle-class or wealthy family with a large number of electrical appliances or one that uses electricity to conduct business will have a high need, while a poor family that cannot afford appliances may be unable utilize electricity even if it made available to them. Relative feelings of goodwill or ill will toward the authorities and/or monetary damages may be more or less intense if the network goes down based on the need of each community. Look for clusters of similar answers to discern patterns of use.

Data Collection:

- Remote Sensing – In many countries, questions about electrical appliances appear in census questionnaires. Look to see if households are reporting the presence of large quantities and types of appliances.
- Direct Observation – How much electricity is used in homes of different sub-populations? Who is buying appliances?
- Local Informant – Ask locals.

Question E2c.	How many hours a day do you use electricity?
Choice of Answers	0–4 HOURS / 4–8 HOURS / 8–12 HOURS / 12–24 HOURS
Purpose of Question	Assesses daily use of electricity. Answers determine level of impact to various subpopulations or communities if system were to go down.

Data Collection:

- Remote Sensing – View NGO or nonprofit surveys and census questionnaires.
- Direct Observation – Observe individual electricity use and nighttime needs.
- Local Informant – Ask locals about electricity use, peak hours of use, and reasons for the amount of hours used each day.

Question E2d.	In what season does this household use the most electricity?
Choice of Answers	SUMMER- DRY SEASON / WINTER- WET SEASON / SPRING- PLANTING SEASON / FALL- HARVEST SEASON
Purpose of Question	Determines seasonal use patterns that affect the need for electricity and predicts the response if system goes down.

Data Collection:

- Remote Sensing – View NGO or nonprofit surveys and census questionnaires.
- Direct Observation – Observe individual electricity used in daily activities.
- Local Informant – Ask locals about electricity use, peak hours of use, and activities requiring electricity.

Question E2d1.	During the summer/dry season, what time of day does this household use the most electricity?
Choice of Answers	MORNING / MID-DAY / EVENING / NIGHT
Purpose of Question	Determines seasonal use patterns that affect the need for electricity and predicts the response if system goes down. For example, if electricity (and therefore air conditioning) went down for 6 hours mid-day in summer, it might be an inconvenience and people might lose some perishable foods. If it went down during extremely hot days, it could be a life-threatening problem for vulnerable portions of the population. At the grid level, this can also give a picture of cyclical demand. Generation capacity must be sized based on peak demand, which means idle capacity during periods of low demand. This is true on both a daily and yearly basis.

Data Collection:

- Remote Sensing – View NGO or nonprofit surveys and census questionnaires.
- Direct Observation – Observe individual electricity use in daily activity.
- Local Informant – Ask locals about electricity use, peak hours of use, and activities requiring electricity.

Question E2d2.	During the winter/wet season, what time of day does this household use the most electricity?
Choice of Answers	MORNING / MID-DAY / EVENING / NIGHT
Purpose of Question	Determines seasonal use patterns that affect the need for electricity and to predict the response if system goes down. For example, if electricity (and therefore heat source) went down for 6 hours mid-day in winter/wet season it might be an inconvenience and people might lose some perishable foods. If it went down in the extreme cold weather, it could be a life-threatening problem for vulnerable portions of the population. At the grid level, this can also give a picture of cyclical demand. Generation capacity must be sized based on peak demand, which means idle capacity during periods of low demand. This is true on both a daily and yearly basis.

Data Collection:

- Remote Sensing – View NGO or nonprofit surveys and census questionnaires.
- Direct Observation – Observe individual electricity use in daily activity.
- Local Informant – Ask locals about electricity use, peak hours of use, and activities requiring electricity.

Question E2d3.	During the spring/planting season, what time of day does this household use the most electricity?
Choice of Answers	MORNING / MID-DAY / EVENING / NIGHT
Purpose of Question	Determines seasonal use patterns that affect the need for electricity and predicts the response if system goes down. For example, if electricity (and therefore air conditioning) went down for 6 hours mid-day during spring/planting season, it may or may not be an inconvenience, but the potential to lose some perishable foods may be a concern. If it went down during extreme heat, it could be a life-threatening problem for venerable portions of the population. At the grid level, this can also give a picture of cyclical demand. Generation capacity must be sized based on peak demand, which means idle capacity during periods of low demand. This is true on both a daily and yearly basis.

Data Collection:

- Remote Sensing – View NGO or nonprofit surveys and census questionnaires.
- Direct Observation – Observe individual electricity use in daily activity.
- Local Informant – Ask locals about electricity use, peak hours of use, and activities requiring electricity.

Question E2d4.	During the fall/harvest season, what time of day does this household use the most electricity?
Choice of Answers	MORNING / MID-DAY / EVENING / NIGHT
Purpose of Question	Determines seasonal use patterns that affect the need for electricity and predicts the response if system goes down. For example, if electricity (and therefore air conditioning) went down for 6 hours mid-day during harvest, it may or may not be an inconvenience, but the potential to lose some perishable foods may be a concern. If it went down during the morning hours and evening, it may complicate harvest and mealtime. At the grid level, this can also give a picture of cyclical demand. Generation capacity must be sized based on peak demand, which means idle capacity during periods of low demand. This is true on both a daily and yearly basis.

Data Collection:

- Remote Sensing – View NGO or nonprofit surveys and census questionnaires.
- Direct Observation – Observe individual electricity use in daily activity.
- Local Informant – Ask locals about electricity use, peak hours of use, and activities requiring electricity.

Question E2e.	What does this household use electricity for? (Check all that apply.)
Choice of Answers	LIGHTING / CLIMATE CONTROL / COOKING / HOUSEHOLD APPLIANCES / CHARGING COMMUNICATION DEVICES / PERSONAL COMPUTER / TELEVISION or RADIO / ENTERTAINMENT DEVICES / TO CONDUCT BUSINESS IN THE HOME
Purpose of Question	Assesses use of electricity by a household. The tasks and applications that people use electricity for are a critical aspect of determining the need for quick return of service if it is disrupted, and how the disruption in the electrical system may spill over into other sectors of life. These are disruptions that are really critical, and they indicate the potential for cascading failure. There will only be a few places for "possible cascading failure." If the only use of electricity is for entertainment devices, the resumption of service is not critical. If it is used for food storage, food preparation, or climate control, then a loss of electricity could cause health issues. If it is used for communication devices then, failures could result in distress at not being able to contact family members, friends, employers, etc. Are there temporary mitigating efforts that could counteract a disruption (e.g., cellphone charging stations)?

Data Collection:

- Remote Sensing – In many countries, questions about electrical appliances appear in census questionnaires. Look at them to see if households are reporting the presence of large quantities and types of appliances.
- Direct Observation – What appliances do people own? What are the most common kinds of appliances that are for sale in shops
- Local Informant – Ask locals.

Figure C8. Bicycle-powered charging station that was set up at a fire station in New York City, in aftermath of Hurricane Sandy (bussfeed.com, 2012).

Community

Question E3.	Do you regularly utilize communal electricity or electrical appliances?
Choice of Answers	YES / NO
Purpose of Question	Determines the extent of electrical use, including access to internet and/or television, even if power is not available within each dwelling.

Data Collection:

- Remote Sensing – View survey and census data.
- Direct Observation – Do people gather a public places where electricity is available? Do communal locations (including religious centers) advertise the availability of a charging service?
- Local Informant – Ask locals.

Question E3a.	Who provides the communal electricity?
Choice of Answers	PRIVATE BUSINESS / GOVERNMENT / COMMUNITY ELITE / NGOs / VEOs OR CRIMINAL ORGANIZATION / OTHER
Purpose of Question	Determines who is providing basic electrical services to the community. The group/organization that is seen to be providing basic services to a community may generate support or loyalty from community. Communal electricity is often used for information-sharing devices such as TVs and internet access, and whoever controls the electricity may conduct censorship and/or propaganda activities.

Data Collection:

- Remote Sensing – View survey and census data.
- Direct Observation – Observe electricity source and who control access.
- Local Informant – Ask locals.

Question E3a1.	Why is communal electricity important? (Check all that apply.)
Choice of Answers	ENTERTAINMENT (INCLUDING SPORTING EVENTS ON TV OR RADIO) / ACCESS TO NEWS/ACCESS TO THE POLITICAL PROCESS (INCLUDING ELECTION CAMPAIGNS) / ACCESS TO FINANCIAL SYSTEMS/SECURITY / COMMUNICATION (INCLUDING SOCIAL MEDIA)
Purpose of Question	Determines which aspects of the community are impacted by the availability or lack of availability of electricity. For example, gathering for entertainment (e.g., major sporting events) causes concentrations of people to form, during which many things can happen, both negative and positive. Are communal activities well attended, or are they viewed as negative and avoided?

Data Collection:

- Remote Sensing – View surveys and census data.
- Direct Observation – Observe gatherings and determine purpose, who attends, how many, atmosphere, level of engagement.
- Local Informant – Ask locals.

Figure C9. People watching the World Cup at a communal TV (2014).

Question E3b.	How does the availability of electricity affect the community? (Check all that apply.)
Choice of Answers	PLACES WHERE ELECTRICITY IS AVAILABLE BECOME GATHERING OR SOCIALIZATION SPOTS / SOCIALIZATION STOPS WHEN ELECTRICITY IS AVAILABLE AS EVERYONE STAYS HOME TO TAKE ADVANTAGE OF IT / SOCIALIZATION INCREASES WHEN ELECTRICITY IS AVAILABLE AS PEOPLE GO OUT TO CONDUCT BUSINESS / ACTIVITY OUTSIDE THE HOME IS REDUCED OR RESTRICTED AFTER DARK / CRIME RATES INCREASE AFTER DARK / WORK STOPS AFTER DARK
Purpose of Question	Assesses effect on community of electricity availability. In many communities, electricity is only available in limited areas and/or for limited hours a day or week. How does the availability of electricity affect the patterns of daily life, commerce and/or social gatherings and interactions? How does it affect retail businesses?

Data Collection:

- Remote Sensing – View surveys and census data.
- Direct Observation – Observe social gathering places, retail activity, restaurant occupancy, and parks.
- Local Informant – Ask locals and business owners.

Figure C10. Solar-powered kiosk that provides TV, electrical charging station, internet access, electrical lighting, water purification, medical refrigeration services and food vending. Provided to the community through a cooperative venture between multiple U.S. private corporations, these facilities often become hotspots of community social activity in Africa (assets.coca-colacompany.com, 2015).

Question E4.	Are there working streetlights in your area?
Choice of Answers	YES / NO
Purpose of Question	Determines level of activity in the evenings and may determine safety during the evening hours.

Data Collection:

- Remote Sensing – View surveys and census data.
- Direct Observation – Observe nighttime streets.
- Local Informant – Ask locals.

Question E4a.	Are the streetlights powered from the municipal electrical grid?
Choice of Answers	YES / NO
Purpose of Question	Determines reliance on the grid or whether other sources of power are used to light the streets if streetlights are present.

Data Collection:

- Remote Sensing – View surveys and census data.
- Direct Observation – Observe power sources for streetlights.
- Local Informant – Ask locals and business owners.

Question E4b.	Are the streetlights solar powered?
Choice of Answers	YES / NO
Purpose of Question	Shows the reliability or availability of the grid and the advanced nature of power use in the community.

Data Collection:

- Remote Sensing – View surveys and census data.
- Direct Observation – Observe power sources for streetlights. Are solar panels visible?
- Local Informant – Ask locals and business owners.

Commercial/Industrial Facilities

Question E5.	What kind of commercial facility is this?
Choice of Answers	RETAIL / INDUSTRIAL / SERVICE / WHOLESALE / DISTRIBUTION CENTER
Purpose of Question	Determines type of commercial facility. The type of facility will impact how it uses electricity and will also impact how a disruption in service might affect the wider community.

Data Collection:

- Remote Sensing – Enterprise Surveys, as available from World Bank.
- Direct Observation – What is the nature of the facility?
- Local Informant – Ask locals and employees.

Question E5a.	Does this commercial/industrial facility have a fixed location?
Choice of Answers	YES / NO
Purpose of Question	Determines nature of a facility's location. The amount of electricity used and how it is accessed will vary greatly depending on if the facility is in fixed location or is a moveable/mobile facility.

Data Collection:

- Remote Sensing – Enterprise Surveys, as available from World Bank.
- Direct Observation – What kind of facility is dominant in the area?
- Local Informant – Ask locals.

Figure C11. Street vendors in Tunis, Tunisia.

Question E5a1.	Does this commercial/industrial facility employ people other than the owners?
Choice of Answers	YES / NO
Purpose of Question	Determines the social and/or economic effects that a disruption to facility operations might have on the wider community. Disruption to a facility with a large number of employees may economically impact a large portion of the community.

Data Collection:

- Remote Sensing – Enterprise Surveys, as available from World Bank.
- Direct Observation – What industry is conducted in the community? Where are daily commuters going?
- Local Informant – Ask locals.

Question E6.	Does this commercial/industrial facility use electricity in regular operations?
Choice of Answers	YES / NO
Purpose of Question	Assesses if electricity is used in a facility's regular operations. If facility does not utilize electricity in regular operations, then it is not part of the system and a disruption in service will not affect its operations.

Data Collection:

- Remote Sensing – Enterprise Surveys, as available from World Bank.
- Direct Observation – Is the facility fitted with electrical appliances, lighting, or machinery?
- Local Informant – Ask locals.

If answer is "no" to E6:

Question E6a.	Why is electricity not used at this facility?
Choice of Answers	NO ACCESS / CAN'T AFFORD / SOCIAL, CULTURAL, OR RELIGIOUS PROHIBITION / NO NEED
Purpose of Question	Determines the reason that electricity is not used. If reason is "no access, can't afford, access it at another location, or utilize a communal shared access point," then lack of access may be addressed by change in infrastructure system. It may be useful to recognize that there is a pool of potential users that are not in the system, so any additional infrastructure may be quickly utilized (even to capacity). If answer is "prohibition or no need," then the system will not be utilized if it is made available and changes to the system capacity will not necessarily result in changed use patterns and/or rates.

Data Collection:

- Remote Sensing – View Enterprise Survey data, as available from World Bank.
- Direct Observation – How reliable is the electrical service provided by the grid? How expensive? Does the cost and/or reliability of the grid make its use impossible? Are there public sentiments against the power supplier (e.g., a perception of graft)?
- Local Informant – Ask locals.

If answer is "yes" to E6:

Question E6b.	What is the primary source of the electricity used at this commercial/ industrial facility?
Choice of Answers	NATIONAL GRID / GENERATOR / SOLAR / WIND / OTHER
Purpose of Question	Determines the source of the electricity and thereby the level of interdependency of a facility with the local area and/or the regional or electrical grid.

Data Collection:

- Remote Sensing – View survey data.
- Direct Observation – Observe power sources, solar panels, generators, and power lines.
- Local Informant – Ask locals.

Question E6b1.	How long did it take to acquire a connection to the grid for this facility?
Choice of Answers	ONE DAY / ONE WEEK / ONE MONTH / MORE THAN A MONTH
Purpose of Question	Determines the extent that government services affect the startup of companies. Long delays in getting access to the grid may indicate a weakness or corruption in national systems, inadequate grid infrastructure, or unequal provision of services based on subpopulations.

Data Collection:

- Remote Sensing – Enterprise Surveys as available from World Bank. World Bank metadata also provides statistics on business start-up fees and time frames.
- Local Informant – Ask locals and service providers.

Question E6b1a.	*Did it take a bribe to acquire the connection?*
Choice of Answers	*YES / NO*
Purpose of Question	*Determines source of the electricity and the lengths individuals go to get it.*

Data Collection:

- Remote Sensing – View survey data.
- Local Informant – Ask locals.

Question E6b2.	Why is the grid not used at this commercial/industrial facility??
Choice of Answers	NO ACCESS / NOT RELIABLE / TOO EXPENSIVE / OTHER
Purpose of Question	Determines the reason people are not using the grid. Look for clusters of similar answers not only by geographic area but also by sector of the commercial enterprise and subpopulation of owner. Clusters of the answers "No Access" or "Too Expensive" may indicate social effects on vulnerable subpopulations that have spilled over to economic opportunities.

Data Collection:

- Remote Sensing – View surveys and census data.
- Direct Observation – How reliable is the electrical service provided by the grid? How expensive? Does the cost and/or reliability of the grid make it impossible? Are there public sentiments against the power supplier (e.g., a perception of graft)?
- Local Informant – Ask locals.

Question E6b2a.	*Why is your electricity not reliable?*
Choice of Answers	*INTERMITTENT SERVICE / UNSTABLE FREQUENCY / UNSTABLE VOLTAGE / INSUFFICIENT POWER*
Purpose of Question	*Assesses why electricity is not reliable. Answers may indicate problems with providers, infrastructure, or maintenance.*

Data Collection:

- Remote Sensing – Governmental agencies and NGOs might publish statistics on electricity availability and reliability.
- Direct Observation – Does the electrical infrastructure look sound? Is maintenance being conducted on electrical infrastructure?
- Local Informant – Ask locals.

Question E6c.	Is electricity available from the primary source at all times and on all days?
Choice of Answers	YES / YES - BUT THE EXPENSE LIMITS ACCESS AND USE / NO - THERE ARE SCHEDULED TIMES WHEN ELECTRICITY IS NOT AVAILABLE / NO - THERE ARE UNSCHEDULED BLACKOUTS AND BROWNOUTS
Purpose of Question	Determines if commercial or production activity is limited by the availability of resources, and if limited availability is predictable and can be scheduled around. In many parts of the world electricity off the grid is not available at all times. For example, an employer can schedule employee work shifts around regularly predicted blackouts but not around unpredictable ones.

Data Collection:

- Remote Sensing – Enterprise Surveys, as available from World Bank. Regularly scheduled blackouts/brownouts should be posted—check government websites, travel sites, NGO sites, etc. Is electrical grid in place, but the area is never lit up at night?
- Direct Observation – Is power available only on specific days or for specific hours of the day?
- Local Informant – Ask locals.

Question E6c1.	If the primary power source fails are there back-up sources available??
Choice of Answers	YES / NO
Purpose of Question	Determines how much redundancy there is in the system, and how long the business can continue if the primary source of electricity is disrupted.

Data Collection:

- Remote Sensing – View survey and census data.
- Direct Observation – Observe solar panels and generator use.
- Local Informant – Ask locals and business owners/service providers.

Question E6d.	Without electricity, could this commercial/industrial facility continue to operate?
Choice of Answers	NO, ELECTRICITY IS CRITICAL FOR OPERATIONS / YES, IF THE LOSS WAS OF SHORT DURATION BUT COULD NOT SUSTAIN PROTRACTED OUTAGES / YES, ELECTRICITY IS NOT NECESSARY FOR OPERATIONS.
Purpose of Question	Assesses if electricity is essential to a facility's operation. If primary electricity fails and backups are not available or fail as well, could the business continue?

Data Collection:

- Remote Sensing – View survey and census data.
- Direct Observation – Observe commercial/industrial establishment hours of operation and activity.
- Local Informant – Ask locals, employees, and facility owners.

Question E6e.	Does a lack of electricity limit hours of operation at this facility?
Choice of Answers	YES / NO
Purpose of Question	Determines the impact of electrical grid on employee hours and subsequent income. If the facility provides services such as medical care, the limited hours of operation may affect people's access to that service.

Data Collection:

- Remote Sensing – View survey and census data.
- Direct Observation – Observe facility hours of operation and activity.
- Local Informant – Ask locals and business owners/employees.

Question E6f.	Does a lack of electricity limit output at this facility?
Choice of Answers	YES / NO
Purpose of Question	Determines the impact of electrical supply on production and subsequent profit. If a facility is limiting operations due to a lack of electricity, this may indicate that any additional electricity that is made available may be quickly utilized to capacity.

Data Collection:

- Remote Sensing – View survey and census data.

- Direct Observation – Observe facility hours of operation and activity.
- Local Informant – Ask locals and business owners/employees.

Question E6g.	**If you had more reliable electrical access, could this business expand?**
Choice of Answers	YES / NO
Purpose of Question	Assesses relationship of electricity reliability to business expansion. If the facility produces items that are dependent on electricity, then local electrical shortages may affect the business, with related impact on the facility's employees. This question is much more applicable to areas undergoing profound and/or long-term loss of electrical service.

Data Collection:

- Remote Sensing – View survey and census data.
- Direct Observation – Observe facility hours of operation and activity.
- Local Informant – Ask locals and business owners/employees.

Question E6h.	In this commercial/industrial facility, what operations require electricity? (Check all that apply.)
Choice of Answers	LIGHTING / COMMUNICATION DEVICES / EMPLOYEE AND PUBLIC SAFETY AND HEALTH / EQUIPMENT RELATED TO PRODUCT CREATION, MANUFACTURE, MODIFICATION, OR STORAGE / COMPUTERS OR OTHER FORMS OF DATA MANAGEMENT AND PROCESSING / FINANCIAL TRANSACTIONS (I.E. CASH REGISTER OR CREDIT CARD READERS) / TO PROVIDE SECURITY TO THE PREMISE
Purpose of Question	Determines business areas that would be impacted by a loss of electricity, their responses to electricity loss, and their viability without electrical service. For example if electricity is used for financial transactions, the facility may be able to continue by switching to cash transactions. If it is used to provide security to the premises, then guards may be hired. In both cases, regular operations may be able to continue. However, if electricity is used for equipment related to manufacture, then the facility may be shut down as long as electricity shortages continue or until an alternative source may be found.

Data Collection:

- Direct Observation – Look to see how operations are being conducted at the facility.
- Local Informant – Ask employees.

Institutional Facilities

Question E7.	Does this institution use electricity in regular operations?
Choice of Answers	YES / NO
Purpose of Question	Determines if the institution would be affected by a disruption in services.

Data Collection:

- Direct Observation – Are there electrical lines running to the institution's buildings? Are electrical appliances or lights being used at the facility?
- Local Informant – Ask locals, employees, and staff.

If answer is "no" to Question E7:

Question E7a.	Why is electricity not used in this institution?
Choice of Answers	NO ACCESS / CAN'T AFFORD / SOCIAL, CULTURAL, OR RELIGIOUS PROHIBITION / NO NEED
Purpose of Question	Determines the reason that electricity is not used. If reason is "No Access, Can't Afford, Access It At Another Location or Utilize A Communal Shared Access Point," then lack of access may be addressed by changes in infrastructure system. It may be useful to recognize that there is a pool of potential users that are not in the system, so any additional infrastructure may be quickly utilized (even to capacity). If answer is "Prohibition" or "No Need," then the system will not be utilized if it is made available, and changes to the system capacity will not necessarily result in changed use patterns and/or rates.

Data Collection:

- Remote Sensing – Governmental agencies and NGOs might publish data on regions where electricity is unavailable.
- Local Informant – Ask locals, employees, and staff.

If answer is "yes" to Question E7:

Question E7b.	What kind of institution is this?
Choice of Answers	ADMINISTRATION / HOSPITAL / SCHOOL / DETENTION CENTER / POLICE STATION / FIRE OR EMT STATION / FINANCIAL INSTITUTION / RELIGIOUS INSTITUTION OR PLACE OF WORSHIP / MILITARY FACILITY / OTHER
Purpose of Question	Assesses type of institution. The nature of the institution will help determine the level of need and/or use. For example, a hospital may have a critical need for electricity, while a fire station may not need electricity as long as communication networks are not affected.

Data Collection:

- Remote Sensing – Geographic information service (GIS) data.
- Direct Observation – Determine what activities occur at the institution.
- Local Informant – Ask locals, employees, and staff.

Question E7b1.	What is the level of occupancy of this institution?
Choice of Answers	OCCUPIED DURING NORMAL BUSINESS HOURS (12 HOURS A DAY OR LESS) / OCCUPIED AT ALL TIMES BY SHIFT WORKERS / IS A PERMANENT OR PARTTIME RESIDENCE AND HAS DINING, SLEEPING, AND OR BATHING FACILITIES
Purpose of Question	Assesses institution's level of occupancy. Some institutions are only occupied during business hours, while others provide living quarters for employees/inmates. The level and duration of occupancy may affect the need for electricity.

Data Collection:

- Direct Observation – Does it look like the facility can house workers? Are there employees at the facility all day and throughout the night?
- Local Informant – Ask locals, employees, and staff.

Question E7c.	What is the primary source of the electricity used in this institution?
Choice of Answers	GRID / GENERATOR / SOLAR / WIND / OTHER
Purpose of Question	Determines the primary source of electricity at institutions and thereby, how the institution will be affected by disruption in one or more infrastructure sectors (particularly electrical grid and/or transportation network).

Data Collection:

- Remote Sensing – Government agencies or NGOs might publish data on primary sources of electricity in a region.
- Direct Observation – Are there electrical lines connecting the institution with the local grid? Are there solar panels, generators, wind turbines, or other electrical producing infrastructure around the facility?
- Local Informant – Ask locals, employees, and staff.

Figure C12. Installation of solar panels in Africa (inhabit.com. 2015).

Question E7c1.	How long did it take to acquire a connection to the grid for this institution?
Choice of Answers	ONE DAY / ONE WEEK / ONE MONTH / MORE THAN A MONTH
Purpose of Question	Determines the extent that government services affect the formation of companies. Long delays in getting access to the grid may indicate a weakness or corruption in national systems, inadequate grid infrastructure, or unequal provision of services based on subpopulations.

Data Collection:

- Local Informant – Ask locals, employees, and staff.

Question E7c1a.	*Did it take a bribe to acquire the connection?*
Choice of Answers	*YES / NO*
Purpose of Question	Assesses whether an institution had to pay bribes to connect to the local electrical infrastructure.

Data Collection:

- Local Informant – ask locals, employees, and staff.

Question E7c2.	Why is the grid not utilized??
Choice of Answers	NO ACCESS / NOT RELIABLE / TOO EXPENSIVE / OTHER
Purpose of Question	Determines the reason people are not using the grid. Look for clusters of similar answers. The responses will help target efforts at supplying or resuming service. For example, if many respondents are saying that the electricity from the grid is too expensive, then improving the grid without finding a way to lower the costs to the average person will fail to provide any additional electricity to the population.

Data Collection:

- Direct Observation – Observe if there are maintenance issues with the electrical infrastructure.
- Local Informant – Ask locals, employees, and staff.

Question E7c2a.	*Why is your electricity not reliable? (Check all that apply.)*
Choice of Answers	*INTERMITTENT SERVICE / UNSTABLE FREQUENCY / UNSTABLE VOLTAGE / INSUFFICIENT POWER*
Purpose of Question	*Assesses reason(s) why electricity is not reliable.*

Data Collection:

- Direct Observation – Observe if there are maintenance issues with the electrical infrastructure.
- Local Informant – Ask locals, employees, and staff.

Question E7d.	Is electricity available from the primary source at all times and on all days?
Choice of Answers	YES / YES, BUT THE EXPENSE LIMITS ACCESS OR USE / NO, THERE ARE SCHEDULED TIMES WHEN ELECTRICITY IS NOT AVAILABLE / NO, THERE ARE UNSCHEDULED BLACKOUTS OR BROWNOUTS.
Purpose of Question	Determines if commercial or production activity is limited by the availability of resources and if limited availability is predictable and can be scheduled around. In many parts of the world, electricity off the grid is not available at all times. For example, an employer can schedule employee work shifts around regular, predicted blackouts but not around unpredictable ones.

Data Collection:

- Remote Sensing – Enterprise Surveys, as available from World Bank. Regularly scheduled blackouts/brownouts should be posted—check government websites, travel sites, NGO sites, etc. Is electrical grid in place, but area is never light up at night?
- Direct Observation – Is power available only on specific days or at specific hours of the day?
- Local Informant – Ask locals.

Question E1d1.	If the primary source of power fails, is there a back-up source available?
Choice of Answers	YES / NO
Purpose of Question	Determines how much redundancy there is in the system, and how long the business can continue if the primary source of electricity is disrupted.

Data Collection:

- Direct Observation – Are there solar panels, generators, wind turbines, or other electrical producing infrastructure around the facility?
- Local Informant – Ask locals, employees, and staff.

Question E7e.	Without electricity, can the institution continue to operate?
Choice of Answers	NO, ELECTRICITY IS CRITICAL FOR OPERATIONS / YES, IF THE LOSS WAS OF SHORT DURATION BUT COULD NOT SUSTAIN PROTRACTED OUTAGES / YES, ELECTRICITY IS NOT NECESSARY FOR OPERATIONS.
Purpose of Question	Assesses need for electricity for operation. If primary electricity fails and backups are not available or fail as well, could the facility continue to operate?

Data Collection:

- Local Informant – ask locals, employees, and staff.

Figure C13. Memorial Hospital in New Orleans after primary and back-up electrical power failed in the aftermath of Hurricane Katrina (memorialhospitaltruth.com, 2005).

Question E7e1.	Are there serious/critical repercussions to the general public if this institution cannot operate at full or partial capacity?
Choice of Answers	YES, THERE ARE PUBLIC OR STATE SECURITY REPERCUSSIONS / YES, THERE ARE HEALTH AND HUMAN SAFETY REPERCUSSIONS / YES, THERE ARE SERIOUS AND GENERAL ECONOMIC REPERCUSSIONS / NO
Purpose of Question	Determines the impact of an institutional shutdown on the surrounding and regional communities.

Data Collection:

- Local Informant – Ask locals, employees, and staff.

HISA Field Guide: Water (W)

Objective

Water is a necessity of life for people, livestock, and crops. It is also an important element of many industrial processes. If water is not available, people must move to another location. Water can also be a vector for many diseases and parasites, so the availability of improved water may drastically affect the ability of the population to function adequately. Water hauling in areas without piped water is often a task assigned to vulnerable populations such as children, elderly, and females. The time devoted to this chore results in lower participation in education, production, economic activities, and/or leisure time (UNICEF 2003).

Because of its importance for a sustainable population, water and water rights often figure heavily in the cultural and political arenas of an indigenous population. Understanding a population's need for and relationship with water is critical for a successful interaction.

Residential households

Question W1.	Does this home or home compound have access to potable water on the premises?
Choice of Answers	YES / NO
Purpose of Question	Assesses a respondent's access to potable water at home.

Data Collection:

- Remote Sensing – Some cities' water distribution agencies have web sites that include service maps. Also, census data often includes questions on type of water used in the house, as do Department of Human Services (DHS) survey data. Newspaper or magazine articles (both local and international) and radio stories (e.g., BBC World Service, National Public Radio [NPR]).
- Direct Observation – Are people transporting water to and from their homes? Are there communal water source locations?
- Local Informant – Ask locals.

If answer is "yes" to Question W1:

Question W1a.	What is this household's primary source of water?
Choice of Answers	MUNICIPAL OR PIPED SOURCE / PERSONAL WELL / CISTERN / WATER DELIVERY / OTHER
Purpose of Question	Determines the source of water to help determine which water delivery systems are most critical to the local populations. Additionally this information will help determine how vulnerable the population is to environmental/social/political factors that may affect the availability of water.

Data Collection:

- Remote Sensing – Census data, DHS data.
- Direct Observation – Are there visible pumps, wells, or cisterns associated with houses? Are water trucks visible on the streets?
- Local Informant – Ask locals.

Question W1a1.	Is your primary source of water available all year?
Choice of Answers	YES / NO
Purpose of Question	Determines availability of primary source of water throughout the year. Is the population reliant on only one source of water or on multiple sources depending on the season?

Data Collection:

- Remote Sensing – Is there a wet and dry season?
- Direct Observation – Are water access patterns the same all year?
- Local Informant – Ask locals.

Question W1b.	If your primary residential source of water is unavailable, do you have an alternative?
Choice of Answers	YES / NO
Purpose of Question	Assesses if a respondent has alternate sources of water if their primary source becomes unavailable. Answers can indicate how dependent the population is on a single source of water. How much preplanning has been done in case of a shortage? Would the population know what to do if their water dried up, or would they be scrambling for a solution?

Data Collection:

- Remote Sensing – Governmental agencies or NGOs might publish statistics on water source availability.
- Local Informant – Ask locals.

Figure C14. Nearly dry well in India (commons.wikimedia.org, 2014).

Question W1b1.	Is the available alternative a communal source of water?
Choice of Answers	YES / NO
Purpose of Question	Assesses availability of an alternative to a communal water source. Would access to alternative sources of water require community cooperation? If so, this might lead to a community united by hardship or one fragmented by social tension if some people feel that they are being given less than their neighbors or the community elite. Possession or control of the communal source could also be an indicator of the local social and political power structures, particularly if it has to be used often.

Data Collection:

- Remote Sensing – Does WHO or DHS report water problems for only part of the year?
- Direct Observation – Are there public access water sources that are visited regularly by citizens or are the visits intermittent?
- Local Informant – Ask locals.

Figure C15. India, back-up well. Municipal water is only available once every 15 days due to drought (newscientist.com, 2016).

If answer is "no" to Question W1:

Question W1c.	What is your source of water?
Choice of Answers	RIVER OR LAKE / COMMUNAL WELL / COMMUNAL CISTERN / PURCHASED / OTHER
Purpose of Question	Assesses the possible sources of water for a respondent. Answers can indicate decision-making criteria when the population does not have water available to them in their homes or home compound. Where are they going to get water?

Data Collection:

- Remote Sensing – Census data, DHS data.
- Direct Observation – Where are people traveling to get water? Observe where people are walking carrying liquid containers. Are there water venders in the market places or on the main streets?
- Local Informant – Ask locals.

Figure C16. Water sachet seller, Nigeria (kessbentv.com, 2015).

Figure C17. Communal deep-bore well (jenniebeth.wordpress.com, 2010).

Question W1c1.	Is your primary source of water available all year?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether the population is reliant on only one source of water or on multiple sources depending on the season.

Data Collection:

- Remote Sensing – Does the area have a wet and dry season? Does WHO, DHS, or census data have information on wet and dry season water sourcing?
- Local Informant – Ask locals.

Question W1d.	How long does it take to acquire water for the household each day?
Choice of Answers	LESS THAN AN HOUR / 1–3 HOURS / 3–6 HOURS / MORE THAN 6 HOURS
Purpose of Question	Assesses amount of time needed daily to acquire water. The amount of time needed to acquire water for the household is time that cannot be spent on other activities such as income or food production.

Data Collection:

- Remote Sensing – DHS or other surveys that ask questions related to water acquisition.
- Direct Observation – What is the distance between dwellings and the water source? What is the means of transportation?
- Local Informant – Ask locals.

Question W1e.	Who is tasked with collecting the water for the household?
Choice of Answers	ADULT MALES / ADULT FEMALES / MALE CHILDREN / FEMALE CHILDREN / NGO OR CHARITY
Purpose of Question	When getting water is a time-consuming activity, it is often delegated to household members who do not contribute economically to the household (e.g., children and in particular, females). In turn, this custom leads to those individuals having less economic, social, and educational opportunities because of a lack of time. Persons tasked with fetching water may be more vulnerable to criminal and/or violent activity, since the water source would be a well-known destination.

Data Collection:

- Remote Sensing – DHS or other surveys that ask questions related to water acquisition.
- Direct Observation – Who is observed carrying liquid containers? What is the demographics of people observed at the water source?
- Local Informant – Ask locals.

Figure C18. Children hauling water near Nakudi, Uganda (alamy.com 2012).

www.alamy.com - BJE70F

Question W1e1.	What is the mode of water transport?
Choice of Answers	CARRIED BY HAND / TRANSPORTED BY ANIMAL / TRANSPORTED BY MOTOR VEHICLE / OTHER
Purpose of Question	Assesses how dependent the household is on other infrastructure systems (particularly the transportation network) to get water. Does limited access to the transportation network also affect access to water? If draft animals or motor vehicles are the principal mode of water transportation, it may require the participation of adults. For example, cross culturally, work with heavy animals is predominantly done by adult or young adult males.

Data Collection:

- Remote Sensing – Government agencies and NGOs might publish statistics on water availability that would include how water is transported to a residence.
- Direct Observation – What is the observed method of water transportation?
- Local Informant – Ask locals.

Figure C19. Water carrier in Islamabad, Pakistan, amid drought (news.nationalgeographic.com, 2010).

Question W1f.	Who (in reality) controls access to your source of water?
Choice of Answers	THERE IS NO CONTROLLING AUTHORITY OR LIMIT TO ACCESS / COMMUNITY ELDERS OR ELITES / RELIGIOUS ELDERS OR ELITES / LOCAL OR REGIONAL GOVERNMENT / PRIVATE BUSINESSES / THE MILITARY / CRIMINAL ORGANIZATIONS / VEOs
Purpose of Question	Assesses who controls access to a respondent's water source. Water is such a valuable commodity, control of it may be manipulated for political, economic, or social gains. Water rights are often inherited and may be the source of conflict between different subpopulations. Providing an easier/safer/more reliable source of water may significantly improve the standard of living for the entire household, and therefore may garner significant loyalty or support.

Data Collection:

- Remote Sensing – Government agencies or NGOs might publish data on water rights and ownerships.
- Local Informant – Ask locals.

Figure C20. Police guarding water tanks in Nagpur, India (ndtv.com, 2009).

Question W1f1.	Does the household have to pay either an official or illicit fee for access to your primary source of water (including payment in currency, labor or trade, and/or expectations of political or social support)?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether a household has to pay fees to access water. Answers to this question may indicate who owns or controls water sources in a region, and if those fees are considered a normal living expense.

Data Collection:

- Remote Sensing – Government agencies or NGOs might publish data on water rights and controls.
- Local Informant – Ask locals.

Figure C21. Citizens of Detroit, Michigan, USA, protesting mass shutoffs conducted by the Detroit Water and Sewerage Department (ibtimes.com, 2014).

Question W2.	Do religious/cultural practices conducted in the home and/or home compound require use of specially treated or sourced water?
Choice of Answers	YES / NO
Purpose of Question	Assesses the community's needs for water for specialized activities. Many cultures and religions require the use of some form of holy or ritual water.

Data Collection:

- Remote Sensing – Government agencies or NGOs might publish data on areas where specially treated or sourced water is used.
- Local Informant – Ask locals.

Figure C22. Students taking a holy bath ahead of Magh Mela festival in Ahmedabad, India (blogs.voanews.com, 2012).

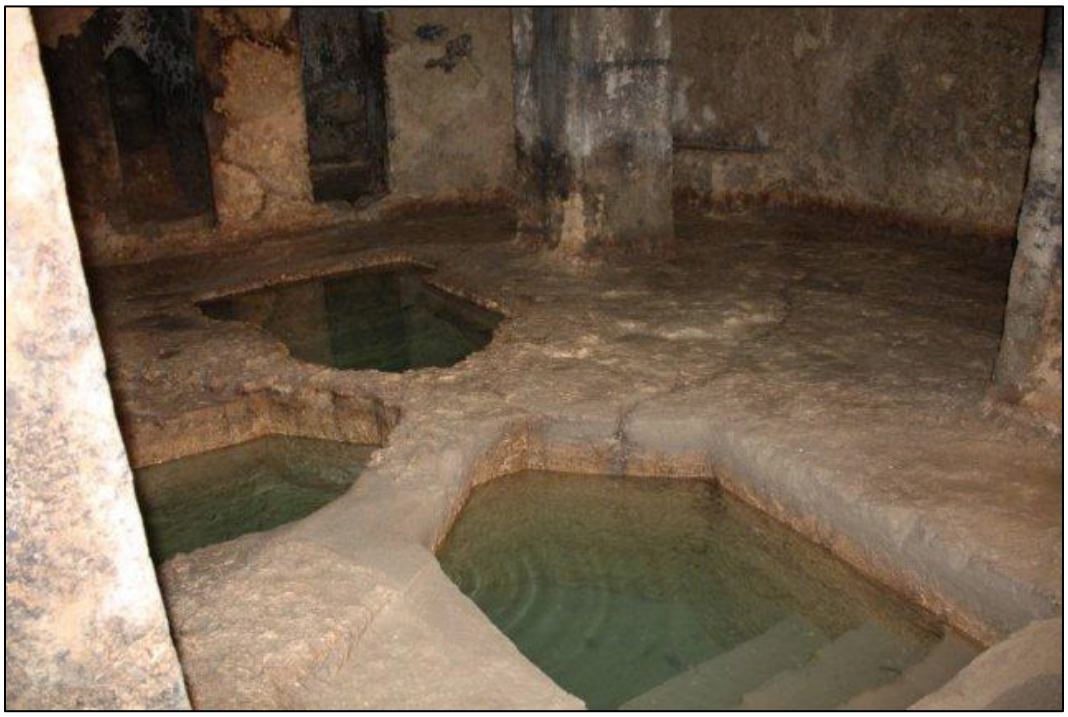
If answer is "yes" to Question W2:

Question W2a.	How frequently is specially treated or sourced water needed or utilized?
Choice of Answers	DAILY / WEEKLY / MONTHLY / ONCE OR A FEW TIMES EVERY YEAR / ONCE OR A FEW TIMES IN A LIFETIME
Purpose of Question	Assesses a community's need for ritual water.

Data Collection:

- Remote Sensing – Census data often contains information on the religious beliefs of the citizens. What are the cultural practices of those religions?
- Local Informant – Ask locals.

Figure C23. Mikveh in Ortigia, Italy (italymagazine.com, 2012).



Question W2a1.	Is the source of this water sufficient for the needs?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether the source of specially treated or sourced water is sufficient to meet the needs of the population.

Data Collection:

- Local Informant – Ask locals.

If answer is "no" to Question W2:

Question W3.	What do you use water for in this household?
Choice of Answers	DRINKING/ FOOD PREPARATION (INCLUDING CLEANING OF EATING OR COOKING IMPLEMENTS)/ PERSONAL HYGIENE (INCLUDING BATHING, FLUSHING TOILETS, CLEANING CLOTHES AND/OR BEDDING, ETC)/ PRODUCTION OF GOODS FOR USE OR FOR SALE (INCLUDING MAINTAINING ANIMALS FOR LABOR OR FOOD, GARDENING FOR FOOD OR MEDICINE, OR RESIDENTIAL INDUSTRY/BUSINESS/ RECREATION (INCLUDING DECORATIVE LANDSCAPING, POOLS AND SPAS)./ RELIGIOUS AND/OR CULTURAL ACTIVITIES. For each use chosen from above, select its frequency from the list below: • THIS IS DONE IN THE HOME YEAR-ROUND. • THIS IS AN EPISODIC OR SEASONAL ACTIVITY WHERE WATER AVAILABILITY MEETS THE PERIODIC NEEDS/REQUIREMENTS. • THIS IS AN EPISODIC OR SEASONAL ACTIVITY DUE TO WATER SHORTFALLS. • THIS ACTIVITY IS NEVER DONE IN THE HOME DUE TO LACK OF WATER. • THIS ACTIVITY IS NOT DONE IN THE HOUSEHOLD BECAUSE CULTURAL OR RELIGIOUS PRACTICES INDICATE IT SHOULD BE DONE ELSEWHERE. • THIS ACTIVITY IS NOT DONE.
Purpose of Question	Assesses how water is used in a household. Answers may determine how and with what intensity water is used in the household and what activities would be affected by a shortage of water. Answers could also give a sense of the potential for cascading failures.

Data Collection:

- Direct Observation – What water related tasks are being performed in the households?
- Local Informant – Ask locals.

Figure C24. Washing dishes in Boeung Kak Lake, Cambodia (asiasociety.org, 2012).

Question W4.	How does this household dispose of human waste?
Choice of Answers	INDOOR PLUMBING / OUTHOUSE OR PIT TOILET / STORED AND HAULED AWAY / USED AS FERTILIZER
Purpose of Question	Assesses how a household disposes of human waste.

Data Collection:

- Direct Observation – Do houses have outhouses or pit toilets? Are there open sewers?
- Local Informant – Ask locals.

Community

Question W5.	Is there a local system for hauling human waste?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether there is a municipal system for disposing of human waste. Answers may indicate if there are potential health concerns.

Data Collection:

- Direct Observation – Look for trucks or other vehicles and transport mechanisms for hauling human waste. Also note how human waste is managed at households.
- Local Informant – Ask locals.

Question W6.	Is there a municipal sewer system?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether there is a centrally managed and maintained system for human waste disposal.

Data Collection:

- Direct Observation – Are there sewage treatment plants? Is there sewage in ditches, streams, or other bodies of water? Is indoor plumbing common? Do municipal buildings have indoor plumbing?
- Local Informant – Ask locals.

Question W6a.	Is it an open-channel system?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether sewage is conveyed in an open-channel system.

Data Collection:

- Direct Observation –Look for open sewage channels. Is there sewage in ditches, streams, or other bodies of water?
- Local Informant – Ask locals.

Question W6b.	Is it a closed-pipe system?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether sewage is conveyed in a pipe system.

Data Collection:

- Direct Observation – Look for sewage treatment plant. Look for outflow pipes, manholes, or other infrastructure related to closed-pipe systems. Look for open sewage channels. Is there sewage in ditches, streams, or other bodies of water?
- Local Informant – Ask locals.

Commercial and Industrial Facilities

Question W7.	What kind of facility is this?
Choice of Answers	RETAIL / INDUSTRIAL / SERVICE / WHOLESALE DISTRIBUTION
Purpose of Question	Assesses type of facility. Answers can indicate what types of activities are conducted at the facility and how they use water.

Data Collection:

- Remote Sensing – Online yellow pages, Google Earth places, Enterprise Survey, as available from World Bank.
- Direct Observation – What kind of facility is it?
- Local Informant – Ask locals and employees.

Question W7a.	Does this commercial or industrial facility have a fixed location?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether a commercial or industrial facility has a fixed location.

Data Collection:

- Direct Observation – What kind of facility is it?
- Local Informant – Ask locals and employees.

Figure C25. Traditional water sellers in Marrakech, Morocco (dreamstime.com, 2013).

Question W7a1.	Does this commercial or industrial facility employ people other than the owners?
Choice of Answers	YES / NO
Purpose of Question	Assesses how many people are employed at a commercial or industrial facility. Answers may indicate the impact this facility has on the wider community, and potentially how far an economic impact would spread if the facility could not operate.

Data Collection:

- Remote Sensing – Enterprise Survey, as available from World Bank.
- Direct Observation – What is the scale of the facility? Is it too large to be only family-run?
- Local Informant – Ask locals and employees.

Question W8.	Does the facility utilize water in regular operations?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether a facility uses water in regular operations.

Data Collection:

- Remote Sensing – Enterprise Survey, as available from World Bank. What kind of facility is it (refer to Google Earth or Yellow Pages)? Do operations of that type require water?
- Direct Observation – Does the facility use water? Are there storage tanks, municipal access, or drains?
- Local Informant – Ask locals and employees.

Figure C26. Dying vats in DBL Textile factory, Bangladesh (citiscope.org, 2015).

If answer is "no" to Question W8:

Question W8a.	Why is water not used at this facility?
Choice of Answers	NO ACCESS / CAN'T AFFORD / SOCIAL, CULTURAL, OR RELIGIOUS PROHIBITION / NO NEED
Purpose of Question	Assesses reason(s) water is not used at a facility. Answers can indicate problems along the supply chain, etc.

Data Collection:

- Local Informant – Ask locals and employees.

If answer is "yes" to Question W8:

Question W8b.	What is the primary source of the water used at this facility?
Choice of Answers	MUNICIPAL OR PIPED SOURCE / PRIVATE WELL / CISTERN / WATER DELIVERY / STREAM, RIVER OR LAKE / PUBLIC WELL / PURCHASED / OTHER
Purpose of Question	Assesses the primary water source at a commercial or industrial facility.

Data Collection:

- Remote Sensing – Enterprise Survey from World Bank or other surveys that have questions dealing with commercial sources and uses of water.
- Direct Observation – Are storage tanks, wells, or cisterns visible?
- Local Informant – Ask locals and employees.

Question W8b1.	Is the primary source of water available all year?
Choice of Answers	YES / NO
Purpose of Question	Assesses year-round availability of a facility's primary water source.

Data Collection:

- Remote Sensing – Does the area have wet/dry seasons? Is the type of water used susceptible to seasonal variations?
- Local Informant – Ask locals and employees.

Question W8b2.	If the primary source of water is unavailable, is there an alternative?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether a commercial or industrial facility has alternative sources of water available if its primary source is unavailable. Answers may indicate how dependent the population is on a single source of water, and how much preplanning has been done in case of a shortage.

Data Collection:

- Direct Observation – Are there visible water tanks or wells in the facility?
- Local Informant – Ask locals.

Question W8c.	Who (in reality) controls access to the source of water?
Choice of Answers	NO CONTROLLING AUTHORITY OR LIMIT TO ACCESS / COMMUNITY ELDERS OR ELITES / RELIGIOUS ELDERS OR ELITES / LOCAL OR REGIONAL GOVERNMENT / PRIVATE BUSINESS / THE MILITARY / CRIMINAL ORGANIZATIONS / VEOs
Purpose of Question	Assesses who controls access to alternative sources of water. Water is such a valuable commodity, control of it may be manipulated for political, economic or social gains. Water rights are often inherited and may be the source of conflict between different subpopulations. Providing an easier/safer/more reliable source of water may significantly improve operations for the enterprise and therefore, may garner significant loyalty or support.

Data Collection:

- Local Informant – Ask locals and employees.

Question W8c1.	Do you have to pay either an official or illicit fee for access to your primary source of water (including payment in currency, labor or trade, and/or expectations of political or social support)?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether a commercial or industrial facility pays fees for access to its primary source of water. Is this fee considered a normal expense or is it considered a form of graft? Is the payment resented? Are some subpopulations unequally affected by the cost of getting water?

Data Collection:

- Remote Sensing – Enterprise Survey, as available from World Bank.
- Direct Observation – Is there an authority or agency that controls access to water? Government buildings associated with water? Where are the water sources (e.g., wells)? Which buildings have direct line of sight on the water sources, and who occupies those buildings? Does there appear to be any level of control or intimidation around water sources?
- Local Informant – Ask locals and employees.

Question W8d.	Without water, could the facility continue to operate?
Choice of Answers	NO, WATER IS CRITICAL FOR OPERATIONS. / THIS IS A SEASONAL OPERATION AND IS ONLY OPEN WHEN SUFFICIENT WATER IS AVAILABLE. / YES, IF THE LOSS WAS OF SHORT DURATION BUT COULD NOT SUSTAIN PROTRACTED OUTAGES. / YES, WATER IS NOT NECESSARY FOR OPERATIONS.
Purpose of Question	Assesses whether a facility could operate without water. If water was not available, would the facility have to shut down? What would the effect be on the workers in terms of income?

Data Collection:

- Remote Sensing – Enterprise Survey, as available from World Bank.
- Direct Observation – Is the facility open all year? Does there appear to be large amounts of water use? Are there water storage tanks on the property?
- Local Informant – Ask locals and employees.

Question W8e.	Does lack of water limit hours of operation?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether a limited water supply restricts hours of operation at a commercial or industrial facility.

Data Collection:

- Remote Sensing – Enterprise Survey, as available from World Bank.
- Direct Observation – Are facilities closed outside of normal business hours? Do these closures coincide with water shortages?
- Local Informant – Ask locals and employees.

Question W8f.	Does lack of water limit services provided or output?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether lack of water restricts the services or production of a commercial or industrial facility.

Data Collection:

- Remote Sensing – Enterprise Survey, as available from World Bank.
- Direct Observation – Are goods and services that are dependent on water in short supply?
- Local Informant – Ask locals and employees.

Question W8g.	What is water used for? (Check all that apply.)
Choice of Answers	DRINKING / FOOD PREPARATION /WATER and/or ICE IS THE PRODUCT OF THIS FACILITY / HYGIENE AND CLEANING / COOLING EQUIPMENT /POWER SOURCE INCLUDING WATER MILL / FIRE SUPPRESSION SYSTEMS / PRODUCT MANUFACTURE OR MODIFICATION / RECREATION OR EXERCISE ACTIVITIES / AGRICULTURE, HORTICULTURE, ANIMAL HUSBANDRY
Purpose of Question	Assesses water use at a commercial or industrial facility.

Data Collection:

- Local Informant – Ask locals and employees.

Question W9.	Do religious/cultural practices require use of specially treated or sourced water at this facility?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether a facility uses specially treated or sourced water. Answers may indicate if specially treated water is needed for the facility or if water from any source will suffice. If specially treated or sourced water is needed, then there is no advantage to providing direct access to any other source of water.

Data Collection:

- Remote Sensing – What are the cultural and religious affiliations of the area? Do these religions or cultures require specialized water for particular tasks, and do these tasks occur at the facility in question?
- Local Informant – Ask locals and employees.

If answer is "yes" to Question W9:

Question W9a.	How frequently is specially treated or sourced water needed or utilized?
Choice of Answers	DAILY / WEEKLY / MONTHLY / ONCE OR A FEW TIMES EVERY YEAR / ONCE OR A FEW TIMES IN A LIFETIME
Purpose of Question	Assesses the frequency that specially treated or sourced water is used at a commercial or industrial facility. If it is needed daily or weekly, then restoring the source is much more critical than if it is only needed annually.

Data Collection:

- Remote Sensing – What is the cultural/religious affiliation of the area? Do these religions or cultures require specialized water for particular tasks, and do these tasks occur at the facility in question?
- Local Informant – Ask locals and employees.

Institutional Facilities

Question W10.	Does the institution utilize water in regular operations?
Choice of Answers	YES / NO
Purpose of Question	Assesses use of water in an institutional facility's regular operations.

Data Collection:

- Direct Observation – Do the facilities include sinks, bathrooms, kitchens, etc.? Do people occupy the facility 24/7? Do people live at the facility?
- Local Informant – Ask locals, employees, and staff.

Figure C27. Inadequate and unequipped sinks at Chittagong Medical Hospital, Bangladesh, before implementation of the WHO hand hygiene improvement strategy (www.who.int, 2016).

If answer is "no" to Question W10:

Question W10a.	Why is water not used in this facility?
Choice of Answers	NO ACCESS / CAN'T AFFORD / SOCIAL, CULTURAL OR RELIGIOUS PROHIBITION / NO NEED
Purpose of Question	Assesses reason(s) water is not used in an institutional facility. The responses will help target efforts at supplying or resuming service. For example, if many respondents say that water is too expensive, then improving the supply without finding a way to lower the costs to the average person will fail to provide any additional services to the population.

Data Collection:

- Local Informant – Ask locals, employees, and staff.

If answer is "yes" to Question W10:

Question W10b.	What kind of institution is this?
Choice of Answers	ADMINISTRATION / HOSPITAL / SCHOOL / DETENTION CENTER / POLICE STATION / FIRE OR EMT STATION / FINANCIAL INSTITUTION / RELIGIOUS INSTITUTION OR PLACE OF WORSHIP / MILITARY FACILITY / OTHER
Purpose of Question	Assesses the type of institution at a location. Answers may indicate the activities conducted at the facility, and how water is used for those activities.

Data Collection:

- Remote Sensing – View Google Earth, aerial imagery, online yellow pages.
- Direct Observation – What is the facility used for? Are children present? Are people in uniform present?
- Local Informant – Ask locals, employees, and staff.

Question W10b1.	What is the level of occupancy of this facility?
Choice of Answers	OCCUPIED DURING NORMAL BUSINESS HOURS (12 HOURS A DAY OR LESS) / OCCUPIED AT ALL TIMES BY SHIFT WORKERS / IS A PERMANENT OR PART-TIME RESIDENCE AND HAS DINING, SLEEPING and/or BATHING FACILITIES
Purpose of Question	Assesses occupancy levels at a facility. Answers may indicate how occupants need and use water.

Data Collection:

- Local Informant – Ask locals, employees, and staff.

Figure C28. Communal shower at Gymnazium Brno-Řečkovice, Czech Republic (commons.wikimedia,org, 2009).

Question W10c.	What is the primary source of the water used in this operation?
Choice of Answers	MUNICIPAL OR PIPED SOURCE / PRIVATE WELL / CISTERN / WATER DELIVERY / STREAM, RIVER OR LAKE / PUBLIC WELL / PURCHASED / OTHER
Purpose of Question	Assesses an institutional facility's primary water source.

Data Collection:

- Remote Sensing – Are water tanks or hydrants visible in photographs?
- Direct Observation – Water tanks or cisterns indicate water delivery or gathering. Fire hydrants in the area indicate that municipal water pipes are present. Is a well or pumps visible in the facility? Are water trucks seen at the facility? Are people observed carrying water into the facility?
- Local Informant – Ask locals.

Question W10c1.	Is your primary source of water available all year?
Choice of Answers	YES / NO
Purpose of Question	Assesses year-long availability of an institution's primary water source.

Data Collection:

- Remote Sensing – Does the area have wet and dry seasons?
- Direct Observation – Is the type of water source used (see previous question) prone to climatic variations? For example, if cisterns are the primary source of water, do they have the capacity to see the facility through the dry season?
- Local Informant – Ask locals, employees, and staff.

Question W10c2.	If your primary institutional source of water is unavailable, do you have an alternative?
Choice of Answers	YES / NO
Purpose of Question	Assesses availability of alternative water sources for an institutional facility. Answers may indicate how dependent the population is on a single source of water.

Data Collection:

- Direct Observation – Are there visible water tanks or wells in the facility?
- Local Informant – Ask locals, employees, and staff.

Question W10d.	Who (in reality) controls access to the source of water?
Choice of Answers	THERE IS NO CONTROLLING AUTHORITY OR LIMIT TO ACCESS / COMMUNITY ELDERS OR ELITES / RELIGIOUS ELDERS OR ELITES / LOCAL OR REGIONAL GOVERNMENT / PRIVATE BUSINESS / MILITARY / CRIMINAL ORGANIZATIONS / VEOs
Purpose of Question	Assesses the entity controlling access to an institution's primary water supply. Water is such a valuable commodity, control of it may be manipulated for political, economic, or social gains. Water rights are often inherited, and they may be the source of conflict between different subpopulations. Providing an easier/safer/more reliable source of water may significantly improve operations for the enterprise and therefore, may garner significant loyalty or support.

Data Collection:

- Local Informant – Ask locals, employees, and staff.

Question W10d1.	Do you have to pay either an official or illicit fee for access to your primary source of water (including payment in currency, labor or trade, and/or expectations of political or social support)?
Choice of Answers	YES / NO
Purpose of Question	Assesses the use of illicit fees or bribes to access primary water supplies. Is this fee considered a normal expense or is it considered a form of graft? Is the payment resented? Are some subpopulations unequally affected by the cost of getting water?

Data Collection:

- Remote Sensing – Enterprise Survey, as available from World Bank.
- Direct Observation – Is there an authority or agency that controls access to water? Government buildings associated with water? Where are the water sources (e.g., wells)? Which buildings have direct line of sight on the water sources, and who occupies those buildings? Does there appear to be any level of control or intimidation around water sources?
- Local Informant – Ask locals.

Question W10e.	Without water, could the facility continue to operate?
Choice of Answers	NO, WATER IS CRITICAL FOR OPERATIONS. / THIS IS A SEASONAL OPERATION AND IS ONLY OPEN WHEN SUFFICIENT WATER IS AVAILABLE. / YES, IF THE LOSS WAS OF SHORT DURATION BUT COULD NOT SUSTAIN PROTRACTED OUTAGES. / YES, WATER IS NOT NECESSARY FOR OPERATIONS.
Purpose of Question	Assesses the possibility an institutional facility can operate without water. What would the effect be on the workers in terms of income?

Data Collection:

- Remote Sensing – Enterprise Survey, as available from World Bank.
- Direct Observation – Is the facility open all year? Does there appear to be large amounts of water use? Are there water storage tanks on the property?
- Local Informant – Ask locals, employees, and staff.

Question W10f.	Does lack of water limit hours of operation?
Choice of Answers	YES / NO
Purpose of Question	Assesses limits of lack of water on an institution's hours of operation. If hours of operation are limited due to water shortages, this may the amount of services provided to the community and/or the country.

Data Collection:

- Direct Observation – Are facilities closed outside of normal business hours? Do these closures coincide with water shortages?
- Local Informant – Ask locals, employees, and staff.

Question W10g.	Does lack of water limit services provided?
Choice of Answers	YES / NO
Purpose of Question	Assesses impact of lack of water to an institution's output.

Data Collection:

- Direct Observation – Are goods and services that are dependent on water in short supply?
- Local Informant – Ask locals, employees, and staff.

Question W10h.	What does this institution use water for? (Check all that apply.)
Choice of Answers	DRINKING / FOOD PREPARATION / WATER AND OR ICE IS THE PRODUCT OF THE FACILITY/COOLING EQUIPMENT / CLEANING AND HYGIENE / FIRE SUPPRESSION SYSTEMS / PRODUCT MANUFACTURE OR MODIFICATION / HEALTH CARE, INCLUDING STERILIZATION / CULTURAL OR RELIGIOUS PRACTICES / RECREATION OR EXERCISE ACTIVITIES / AGRICULTURE, HORTICULTURE, ANIMAL HUSBANDRY
Purpose of Question	Assesses uses of water by an institution. Answers may be used to determine relative need and potential impact of water shortages.

Data Collection:

- Local Informant – Ask locals, employees, and staff.

Figure C29. Ntare School's kitchens, Uganda (peter.fremlin.de, 2011).

Question W11.	Do religious/cultural practices require use of specially treated or sourced water at this facility?
Choice of Answers	YES / NO
Purpose of Question	Assesses an institution's need for specially treated or sourced water for religious or cultural practices. Answers may indicate that if specially treated or sourced water is needed, then there is no advantage to providing direct access to any other source of water.

Data Collection:

- Remote Sensing – What is the cultural/religious affiliation of the area? Do these religions or cultures require specialized water for particular tasks, and do these tasks occur at the facility in question?
- Local Informant – Ask locals, employees, and staff.

Figure C30. Use of holy water to bless children during a celebration at the Immaculate Conception School, Los Angeles, CA, USA (ics.la.org, 2014).

If answer is "yes" to Question W11:

Question W11a.	How frequently is specially treated or sourced water needed/utilized?
Choice of Answers	DAILY / WEEKLY / MONTHLY / ONCE OR A FEW TIMES EVERY YEAR / ONCE OR A FEW TIMES IN A LIFETIME
Purpose of Question	Assesses the frequency that specially treated or sourced water is used at this institution. Answers may indicate that if it is needed daily or weekly, then restoring the source is much more critical than if it is only needed annually.

Data Collection:

- Remote Sensing – What is the cultural/religious affiliation of the area? Do these religions or cultures require specialized water for particular tasks, and how frequently do these tasks occur at the facility in question?
- Local Informant – Ask locals, employees, and staff.

Question W11b.	Is this facility a location where culturally or religiously processed or sourced water is produced?
Choice of Answers	YES / NO
Purpose of Question	Assesses production of specially treated or sourced water by this institution. Answers may indicate that if the facility is a place where specially treated or sourced water is produced, then shortages could impact the social or religious lives of a much larger portion of the population than is directly involved with the institution.

HISA Field Guide: Transportation (T)

Objective

Transportation is a key infrastructure that is critical for the movement of materials such as food, fuel, and water. Road networks may include a vast range of road types and types of vehicles on them that will impact their usability in operations. Military monopolization of roads may cause considerable hardships for the local population, as roads may be a key location for public gatherings and interactions and for commercial activity such as markets and street vendors. The questions below are focused on determining how a local population uses roads in their area, and what aspects of normal life would be affected by impacts to the road network.

Residential households

Question T1.	What are the roads made of that you routinely travel?
Choice of Answers	PAVEMENT OR CONCRETE / TAR OR GRAVEL / DIRT
Purpose of Question	Assesses the primary type of road available to respondents in an area. Type of road and level of maintenance can represent the level of wealth in an area; prioritization of accessibility for social, religious, or economic reasons; and availability of resources (e.g., materials, tools, labor, and equipment) to create and maintain infrastructure. Paved roads infer that there is money available (by some entity—governmental, military, NGO, VEO) to support the construction of paved roads. If paved roads are in good condition, it also implies there is money for ongoing maintenance. Paved roads in disrepair could signal a change in leadership, conflict, or availability of resources. However, dirt roads don't necessarily signify the opposite. A well-maintained dirt road could also signify the willingness of the government or other leadership to spend money on transportation infrastructure. Good maintenance indicates a process for taxing, collecting taxes, and allocating funds for proper maintenance. However, other factors such as environmental conditions could dictate that the road remain unpaved. Moderately to minimally maintained dirt roads could signify the lack of resources or willingness of the government, community, or other leadership to invest in roads.

Data Collection:

- Remote Sensing – View aerial imagery including Google Earth.
- Direct Observation – What kind of traffic is on what kind of roads at certain times of day?
- Local Informant – Ask locals.

Figure C31. Shapla Circle in Dhaka, Bangladesh (routeandgo.net, 2013).

Question T1a.	Why do you prefer to travel on those roads?
Choice of Answers	CONVENIENCE / ACCESS / SAFETY / SECURITY / NO CHOICE (ONLY WAY TO GET FROM HERE TO THERE)
Purpose of Question	Assesses a reason for road preference. Depending on the answer(s), can illustrate the quality of the roads, the efficiency or connectivity of the road network, and the safety and security along the road. Analysis of road network will indicate if there is a choice in road selection.

Data Collection:

- Remote Sensing – View survey results and census data.
- Direct Observation – Observe road condition and traffic patterns/routes. Are these roads safe? Are they in remote areas or heavily populated areas?
- Local Informant – Ask locals.

Figure C32. Solar-powered streetlights in Maiduguri (http://www.distancebetweencities.net/maiduguri_borno_nigeria_and_ibadan_oyo_nigeria/photos, 2008).

Question T1b.	Who maintains the roads you use the most?
Choice of Answers	GOVERNMENT / LOCAL CITIZENS / NGOs / VEOs / OTHERS
Purpose of Question	Determines organizational structure that is responsible for road maintenance. If VEOs is selected, it would indicate a possible displacement of normal governmental functions, which then highlights a more serious issue.

Data Collection:

- Remote Sensing – Do the local or federal government websites have road work departments? Newspapers and magazine articles are a good source as well as informational websites such as http://finance.yahoo.com/nigeria-construction-market-report-2016-202800794.html.
- Direct Observation – Are the people who are associated with repair trucks wearing any kind of livery? Are the roads constructed of a material that requires special equipment to repair? Do existing repairs look professionally done?
- Local Informant – Ask locals.

Figure C33. Locals repair potholes on Juba-Bor road, South Sudan (voanews.com, 2011).

Question T2.	What type of traffic is on the major roads?
Choice of Answers	TRUCKS AND BUSES / PASSENGER CARS / MOTORIZED BIKES / HUMAN-POWERED VEHICLES (bikes, rickshaw, etc.) / ANIMALS / WALKING
Purpose of Question	Assesses primary method of transportation on major roads; a predominant type could be determined through observation/surveying in an area.

Data Collection:

- Remote Sensing – Review travel websites and online photography to identify types of vehicles on the roads.
- Direct Observation – What mix of traffic is on major roads at times throughout the day?
- Local Informant – Ask locals.

Figure C34. Human-powered carts in Dhaka, Bangladesh (metro.co.uk, 2013).

Figure C35. Scooter parking lot in Rome, Italy (dreamstime.com, 2016).

Question T2a.	What time of day is traffic heaviest on major roads?
Choice of Answers	MORNING / AFTERNOON / EVENING / NIGHT / ALL TIMES / TRAFFIC IS NEVER HEAVY / SPORADICALLY HEAVY DUE TO SPECIALLY SCHEDULED EVENTS / SPORADICALLY HEAVY IN UNPREDICTABLE MANNER
Purpose of Question	Assesses potential for peak flow/congestion times for traffic on major roads.

Data Collection:

- Remote Sensing – View websites that track traffic congestion, such as https://www.waze.com/.
- Direct Observation—Identify peak traffic flows throughout the day.
- Local Informant – Ask locals.

Figure C36. Rush hour in Saigon, Vietnam (peterlanlloyd.com, 2015).

Question T2a1.	How does the traffic on major roads negatively affect your quality of life?
Choice of Answers	NOISE POLLUTION / AIR POLLUTION / SAFETY / SECURITY / HEAVY TRAFFIC LIMITS ACCESS TO ROAD / LONG COMMUTE / NO NEGATIVE EFFECT
Purpose of Question	Assesses the negative impacts of traffic volume on residents living near a major roadway. Answers to this question imply perceived safety and security issues, accessibility problems (to the road and wider community) that impact employment, education, and other social limitations, and the introduction of environmental hazards that could negatively affect health.

Data Collection:

- Remote Sensing – View survey and census data.
- Direct Observation – Identify, if possible, the effects on residents who live near major roadways. Issues to look for could be: the inability of pedestrians to cross roads; unsafe conditions along road edges for pedestrians (for example, is there a physical divider between road and pedestrian space?); excessive dust, fumes, or noise; the presence of street trees; and the accessibility of houses and business along the road.
- Local Informant – Ask locals.

Figure C37. Street traffic and street vendors in Dhaka, Bangladesh [pollution also] (piccoleverita.com, 2015).

Question T2a2.	How does the traffic on major roads positively affect your quality of life?
Choice of Answers	INCREASES BUSINESS / INCREASES SERVICES / EASE OF TRANSPORTATION / NO POSITIVE EFFECT
Purpose of Question	Assesses the positive impacts that a major roadway has on residents living nearby, including increased mobility (benefiting choices in employment, education, where to live, etc.) and increased safety.

Data Collection:

- Direct Observation – Identify activities that indicate a minor road has a positive impact by noting things such as shops and business getting pedestrian traffic, a variety of traffic using the roadway, how well the traffic flows, the existence of and obedience to traffic rules (e.g., signs, lights, traffic police), and essential shops and business located near residential areas. Cargo trucks, produce trucks, etc. making thru-transit and local stops are indications of commerce. Cargo that passes through and never stops can cause resentment and be an indicator of some forms of inequality, leading to potential instability.
- Local Informant – Ask locals.

Question T3.	What type of traffic is on the minor roads?
Choice of Answers	TRUCKS AND BUSES / PASSENGER CARS / MOTORIZED BIKES / HUMAN-POWERED VEHICLES / ANIMALS / WALKING
Purpose of Question	Assesses the types of vehicles on minor roads, illustrating a potential division of traffic between major and minor roads. Minor roads might be more accommodating to slower, nonmotorized forms of transportation.

Data Collection:

- Direct Observation – Identify what kinds of vehicles and modes of transportation are used on minor roads.
- Local Informant – Ask locals.

Question T3a.	What time of day is traffic heaviest on minor roads?
Choice of Answers	MORNING / AFTERNOON / EVENING / NIGHT / ALL TIMES / TRAFFIC IS NEVER HEAVY / SPORADICALLY HEAVY DUE TO SPECIALLY SCHEDULED EVENTS / SPORADICALLY HEAVY IN UNPREDICTABLE MANNER
Purpose of Question	Assesses possibility of peak flow/congestion times for traffic on minor roads.

Data Collection:

- Remote Sensing – View websites that track traffic congestion, such as https://www.waze.com/.
- Direct Observation – Observe traffic over time to determine what time of day that minor roads have heavy traffic.
- Local Informant – Ask locals.

Question T3a1.	How does the traffic on minor roads negatively affect your quality of life?
Choice of Answers	NOISE POLLUTION / AIR POLLUTION / SAFETY / SECURITY / HEAVY TRAFFIC LIMITS ACCESS TO ROAD / NO NEGATIVE EFFECT
Purpose of Question	Assesses the negative impact that traffic volume has on residents living near a minor roadway.

Data Collection:

- Direct Observation— Identify, if possible, the effects on residents near minor roadways. Issues to look for could be: the inability of pedestrians to cross roads; unsafe conditions along road edges for pedestrians (for example, is there a physical divider between road and pedestrian space?); excessive dust, fumes, or noise; the presence of street trees; and the accessibility of houses and business along the road.
- Local Informant – Ask locals.

Question T3a2.	How does the traffic on minor roads positively affect your quality of life?
Choice of Answers	INCREASE BUSINESS / INCREASE SERVICES / EASE OF TRANSPORTATION / NO POSITIVE EFFECT
Purpose of Question	Assesses the positive impacts that a minor roadway has on residents living nearby.

Data Collection:

- Direct Observation—Identify activities that indicate a minor road has a positive impact by noting things such as shops and business getting pedestrian traffic, a variety of traffic using the roadway, how well the traffic flows, the existence of and obedience to traffic rules (e.g., signs, lights, traffic police), and essential shops and business that are located near residential areas.
- Local Informant – Ask locals.

Question T4.	What are the roads used for other than transportation?
Choice of Answers	FESTIVALS / PARKING / PERMANENT STREET MARKETS / EPISODIC STREET MARKETS / RECREATION / PROTESTS
Purpose of Question	Assesses all uses for roads in a given area, apart from vehicle use.

Data Collection:

- Remote Sensing – View Google Earth street scene or posted photographs to identify street activity. Are there other places in the community where economic activity can occur (such as market squares or shopping malls)?
- Direct Observation – Requires observation over time to determine what types of activities occur on or near roadways.
- Local Informant – Ask locals.

Figure C38. Traffic sharing the road with street vendors in Lagos, Nigeria (flickriver.com, 2010).

Figure C39. Protests organized by an Islamic political party occupying the streets of Dhaka, Bangladesh. (alkawni.com, 2013).

Question T4a.	How often do you attend and/or participate in those other functions?
Choice of Answers	DAILY / WEEKLY / MONTHLY / ONCE OR A FEW TIMES A YEAR / NEVER
Purpose of Question	Estimates how often and how many people attend functions that use roads for purposes other than transportation.

Data Collection:

- Remote Sensing – Local newspaper articles will discuss special events like festivals or protests, and they often include calculations of attendance.
- Direct Observation— Are the markets on the roadside the only sources for some goods? Are the street markets present daily or only weekly? Are they well attended by a broad range of the population, or are there trends in class, gender, etc. in the people you see on the streets? How frequent are protests?
- Local Informant – Ask locals.

Question T4a1.	How often do those other road uses impede your use of the roads as a transportation network?
Choice of Answers	REGULARLY / OCCASIONALLY / NEVER
Purpose of Question	Assesses frequency that other road uses impact a respondent's use of the transportation networks in an area.

Data Collection:

- Remote Sensing – View websites that track traffic congestion, such as https://www.waze.com/.
- Direct Observation – Requires observation over time to determine what types of activities occur on or near roadways, and if those activities cause congestion that impedes traffic flow.
- Local Informant – Ask locals.

Question T5.	What are the regulatory requirements to drive?
Choice of Answers	LICENSING / OFFICIAL / TRAINING / VEHICLE TAXES AND FEES / POLITICAL CONNECTIONS / NONE
Purpose of Question	Assesses legal requirements to drive. Establishes a potential barrier to entry if legal requirements have to be followed or are harshly enforced.

Data Collection:

- Remote Sensing/data collection – Determine the governmental requirements for driving.
- Direct Observation – Car license plates with expiration stickers, safety inspection tags, and personal drivers licenses.
- Local Informant – Ask locals.

Question T5a.	What fees do you pay for road access?
Choice of Answers	ROAD TAX / TOLLS / BRIBES (AT ROADBLOCKS) / OTHER / NONE
Purpose of Question	Assesses other potential barriers for use and illustrates formal and/or informal (illegal) governance of roads.

Data Collection:

- Remote Sensing – Travel warnings issued by the U.S. State Department.
- Direct Observation – Identify any formal or informal roadblocks, toll booths, or checkpoints.
- Local Informant – Ask locals about paying taxes, tolls, or bribes.

Figure C40. Syrian Rebels manning road blocks in Tel Abyda, Syria (haaertz.com, 2012).

Question T5a1.	Who are fees paid to?
Choice of Answers	GOVERNMENT / VEOs / CRIMINAL ORGANIZATIONS / OTHER
Purpose of Question	Determines organization that controls road access.

Data Collection:

- Direct Observation – Identify any formal or informal roadblocks, toll-booths, or checkpoints and determine who controls those points.
- Local Informant – Ask locals.

Question T5b.	Do people obey the regulatory requirements?
Choice of Answers	YES / NO
Purpose of Question	Assesses the state of the regulatory structure and its enforcement.

Data Collection:

- Direct Observation – Identify any regulatory requirements posted or other rules/guidelines and observe if they are obeyed.
- Local Informant – Ask locals.

Question T6.	What factors affect choice of transportation?
Choice of Answers	ECONOMIC / ENVIRONMENTAL / WEATHER / CONGESTION / AVAILABILITY / CULTURAL NORMS / LEGAL PROHIBITIONS
Purpose of Question	Determines which factors that affect the transportation choices of the population are actionable.

Data Collection:

- Remote Sensing – View surveys and census data.
- Direct Observations – Identify noticeable patterns in transportation that are related either to weather or to cultural practices.
- Local Informant – Ask locals.

Question T6a.	What seasonal or environmental considerations affect transportation choices?
Choice of Answers	WET / DRY / HARVEST / FESTIVALS OR HOLIDAYS / SEASONAL VARIATIONS IN FUEL PRICES / AVAILABILITY OF TRANSPORTATION MODE / TRANSPORTATION NEEDS FLUCTUATE
Purpose of Question	Assesses potential alterations of transportation choices based on seasonal or environmental disruptions to the network as well as type(s) of disruption.

Data Collection:

- Remote Sensing – What type of roads are predominate in the area? What are the weather conditions in that area? Are the types of roads in the area particularly susceptible to weather conditions (e.g., dirt roads in a monsoonal climate)? If a flood overlay layer/map is available, it could help in this determination, and one is probably readily available. Here is a flood risk map for Nigeria: https://www.arcgis.com/home/web-map/viewer.html?webmap=e9c74669583b4411810171248c4d5ae8 (ArcGIS software is needed).
- Direct Observation – Would have to occur over a period of time to capture seasonal and environmental variations.
- Local Informant – Ask locals.

Figure C41. Monsoon flooding in Dhaka, Bangladesh (water-news.info, 2011).

Figure C42. Frequent flooding in Dhaka, Bangladesh, may be a contributing factor in the predominance of rickshaw use, as motor engines would be prone to flooding out in these conditions (water-news.info, 2011).

Question T7.	What kind of transportation method/conveyance do you utilize?
Choice of Answers	TRUCKS AND BUSES / PUBLIC MOTORIZED VEHICLES / TRAM OR TROLLEY / PASSENGER CARS / MOTORIZED BIKES / HUMAN POWERED VEHICLES / ANIMALS / WALKING
Purpose of Question	Assesses the method(s) available and used by a respondent for commuting in an area.

Data Collection:

- Remote Sensing – View survey and census data.
- Direct Observation – Observe what appears to be the most common form of transportation.
- Local Informant – Ask locals.

Question T7a.	How many hours are you on the road per day?
Choice of Answers	LESS THAN 1 HOUR / 1–3 HOURS / 3–6 HOURS / 6–9 HOURS / 9–12 HOURS / 12+ HOURS / DO NOT USE THE ROADS / CANNOT USE THE ROADS
Purpose of Question	Assesses the duration a respondent spends using the transportation network per day.

Data Collection:

- Remote Sensing – Local traffic studies and internet key word searches for: traffic, traffic study, congestion, transport routes.
- Direct Observation – Identify peak travel times, and if any particular conveyance is prevalent.
- Local Informant – Ask locals and service/retail providers.

Question T7a1.	What long-distance journeys are taken during the year?
Choice of Answers	FAMILIAL OBLIGATIONS OR VISITS / RELIGIOUS OBLIGATIONS OR VISITS / CULTURAL OBLIGATIONS OR VISITS / POLITICAL OBLIGATIONS OR VISITS / MIGRATORY WORK / VACATIONS / NONE
Purpose of Question	Assesses whether respondent undertakes long-distance travel in a year. What are the social/cultural/religious/economic situations that put people on the roads for long distances? Are these events predictable and can they be accommodated in operations schedules? For example, in the United States, there are abnormally large amounts of travel in the days before and after the Thanksgiving holiday.

Data Collection:

- Local Informant – Ask locals.

Figure C43. Roads leading to the Woodstock Festival in New York state became jammed with traffic (womenonwheels.,co.za, 1969).

Figure C44. Hajj pilgrims in Mecca, Saudi Arabia (indiatoday.intoday.in, 2014).

Figure C45. Check-in lines at Fort Lauderdale International Airport spilled out into the streets during the 2014 Thanksgiving holiday weekend in Fort Lauderdale, Florida, USA (ibtimes.com, 2014).

Question T8.	Do you own a vehicle (motorized)?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether respondents own their own vehicles. Vehicle ownership can imply a certain level of wealth, mobility, and increased opportunity (economic, social, and educational). Back-up options identify how essential having a vehicle is to daily life.

Data Collection:

- Remote Sensing – Some census data includes car ownership.
- Direct Observations – Are there cars parked on the streets in residential areas? Do houses have garages?
- Local Informant – Ask locals.

If answer is "yes" to Question T8:

Question T8a.	Who can drive the vehicle?
Choice of Answers	ONLY MALES / ONLY FEMALES / BOTH MALES AND FEMALES
Purpose of Question	Assesses social norms around gender-based vehicle operation. If there are restrictions on who can drive the vehicle, there could be impacts on the transportation system such as the number of vehicles on the road, peak traffic times, and demands for public transportation or other forms of transportation. Can be an indicator of other gender inequality issues in a society, along with associated impacts.

Data Collection:

- Remote Sensing – U.S. Embassies and State Department communicate travel advisories for U.S. citizens, informing them of cultural and legal differences in countries they may travel to.
- Direct Observation – Broadly evaluate the majority of drivers.
- Local Informant – Ask locals.

Figure C46. Women getting into a car in Riyadh, Saudi Arabia (thetimes.co.uk, 2012).

Question T8a1.	Why are there limitations on who can drive a vehicle?
Choice of Answers	LEGAL RESTRICTIONS / PREFERENCE / CULTURAL NORMS / PHYSICAL LIMITATIONS / SAFETY / NO LIMITATIONS
Purpose of Question	Determines the reason(s), if any, governing any restrictions on driving.

Data Collection:

- Local Informant – Ask locals.

Figure C47. Women-only train cars were introduced in New Delhi, India, in 2014 after a series of highly publicized sexual assaults and murders involving bus drivers and passengers, taxi, and Uber drivers (huffingtonpost.com, 2014).

Question T8b.	What do you use the vehicle for?
Choice of Answers	WORK / TRADE OR BUSINESS / SCHOOL / HEALTHCARE / RELIGION / STATUS SYMBOL / SOCIAL GATHERINGS / ENTERTAINMENT / PROCURE FOOD AND WATER
Purpose of Question	Determines the importance of the vehicle and associated mobility in different segments of household operations.

Data Collection:

- Remote Sensing – View survey or census data pertaining to vehicle use and daily routines.
- Direct Observation – Identify where vehicles are parked and daily vehicle traffic.
- Local Informant – Ask locals.

Question T8b1.	Do you have multiple vehicles?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether a respondent has multiple vehicles. Answers could imply wealth, along with household mobility and daily activity.

Data Collection:

- Remote Sensing – View survey or census data pertaining to vehicle ownership.
- Direct Observation – Identify residents, streets, and garages.
- Local Informant – Ask locals.

Figure C48. Farmers transporting their crop in Shanxi Province, China (metro.co.uk, 2013).

If answer is "no" to Question T8:

Question T8c	Why do you not own a vehicle?
Choice of Answers	CANNOT AFFORD / DON'T NEED ONE / DON'T WANT ONE / NOT ALLOWED
Purpose of Question	Assesses the reason(s) for no more than one vehicle per household.

Data Collection:

- Local Informant – Ask locals.

Question T9.	Which shared transportation do you use?
Choice of Answers	GOVERNMENT, CITY, MUNICIPAL / PRIVATE COMPANY / AD HOC OR INDIVIDUALS / NONE
Purpose of Question	Determines who controls public transportation in the region. Who makes decisions about where shared transportation is available and at what cost?

Data Collection:

- Remote Sensing – Travel websites often contain information on how to get around a city, what is available, and what will it cost.
- Direct Observation – Are there logos or company names on the vehicles?
- Local Informant – Ask locals.

Question T9a.	What do you use the shared transportation for?
Choice of Answers	WORK / TRADE / SCHOOL / HEALTHCARE / RELIGION / PROTEST / SOCIAL GATHERING / PROCURE FOOD AND WATER / ENTERTAINMENT
Purpose of Question	Assesses the reason people use shared transportation. Can indicate the effectiveness of the system (positive) or the lack of other modes of transportation (negative).

Data Collection:

- Remote Sensing – View survey data.
- Direct Observation – Where do you see buses, taxis, and vehicles carrying multiple people going?

- Local Informant – Ask locals.

Question T9a1.	How often do you use shared transportation?
Choice of Answers	MULTIPLE TIMES A DAY / MULTIPLE TIMES A WEEK / A FEW TIMES A MONTH / OCCASIONALLY
Purpose of Question	Assesses the frequency that a respondent uses shared transportation. A high frequency of use could indicate an efficient transportation system, while a low frequency of use could indicate problems with the system.

Data Collection:

- Local Informant – Ask locals.

If answer is "no" to Question T9:

Question T9b.	Why do you not use shared transportation?
Choice of Answers	TOO EXPENSIVE / NOT AVAILABLE / NOT CONVENIENT / LIMITED OPERATION / OWN A VEHICLE / NOT SAFE / NO NEED
Purpose of Question	Assesses the reason(s) shared transportation isn't used. Answers can indicate the existence of a network, the extent of the shared transportation network, the efficiency of the network, and user perception of the service(s).

Data Collection:

- Local Informant – Ask locals.

Question T10.	How do you acquire basic food/supplies?
Choice of Answers	PRIVATE MOTORIZED VEHICLE / PACK ANIMAL OR ANIMAL CART / PUBLIC TRANSPORTATION / WALK, BIKE, OR HUMAN-POWERED CART / DELIVERED TO RESIDENCE
Purpose of Question	Assesses the form(s) of transportation that respondent(s) use in acquiring basic goods. Responses provide a cross-section of the types of vehicles and traffic on roadways.

Data Collection:

- Direct Observation – Observe the composition of traffic leaving food markets.
- Local Informant – Ask locals.

Question T10a.	What is the source of the majority of the basic food/ supplies acquired?
Choice of Answers	REGIONAL MARKET / LOCAL SOURCE OR SHOPS / STREET VENDORS / COMMERCIAL DISTRICT / DELIVERY SERVICE / PERSONALLY PRODUCE MAJORITY OF FOOD
Purpose of Question	Assesses where respondent(s) get household necessities. The road network facilitates this action. More in-depth answers can show from where and to where people are traveling. However, this information only marginally answers decision making for choosing a route. The road network is used for many things, one being goods and services acquisition.

Data Collection:

- Local Informant – Ask locals.

Question T10a1.	How consistent is your source of basic provisions (based on transportation used)?
Choice of Answers	SAME SOURCE ALL YEAR / THE SOURCE CHANGES DUE TO SEASONAL VARIATIONS BUT THESE ARE PREDICTABLE / SHORTAGES RESULT IN REGULAR UNCERTAINTY CONCERNING PROVISION SOURCE
Purpose of Question	Establishes the reliability of the road network in obtaining basic household necessities. May identify disruption issue(s).

Data Collection:

- Direct Observation – During period of observation, are there road network disruptions and do they occur frequently?
- Local Informant – Ask locals.

Question T11.	How often is travel necessary to procure basic food / supplies?
Choice of Answers	DAILY / A FEW TIMES A WEEK / A FEW TIMES A MONTH / A FEW TIMES A YEAR / NEVER
Purpose of Question	Assesses the frequency that people travel to obtain food and supplies and measures elasticity in the system. The more often one travels to get food, the faster a disruption in the transportation system cascades into the food system. For example, if food is procured daily, then a one-day disruption in transportation is immediately felt.

Data Collection:

- Local Informant – Ask locals.

Question T11a.	How does your access to the transportation network influence how you procure basic provisions?
Choice of Answers	TRIPS ARE MORE FREQUENT DUE TO LIMITED CARRYING CAPACITY. / TRIPS ARE LESS FREQUENT TO AVOID ROAD USE. / VARIETY OF GOODS AVAILABLE IS LIMITED DUE TO TRAVEL RESTRICTIONS OR LIMITATIONS. / SHOPPING IS DONE IN GROUPS DUE TO SAFETY CONCERNS. / TIME OF DAY SHOPPING IS DONE IS DECIDED BY TRAFFIC and/or PARKING AVAILABILITY.
Purpose of Question	Assesses the effectiveness and reliability of the road network.

Data Collection:

- Local Informant – Ask locals.

Community

Question T12.	Are there certain roads or routes you do not use due to safety and security reasons?
Choice of Answers	YES / NO
Purpose of Question	Assesses likelihood that certain roads in the area are not safe to use.

Data Collection:

- Direct Observation – Identify roads not utilized and activity that takes place there.
- Local Informant – Ask locals.

Question T12a.	Why are these roads or routes not used?
Choice of Answers	NOT LIGHTED / SCARED OF VEOs / SCARED OF MILITARY / SCARED OF POLICE / FEMALE, CANNOT TRAVEL ALONE
Purpose of Question	Assesses the reason(s) why certain roads are not safe to use.

Data Collection:

- Direct Observation – Observe street lights, military or police presence, and activity on roadways less traveled.
- Local Informant – Ask locals.

Question T13.	How is household waste disposed?
Choice of Answers	PRIVATE HAULER / CITY HAULER / PERSONAL HAULER / OTHER (ONSITE BURN OR BURY)
Purpose of Question	Assesses how household waste is disposed of.

Data Collection:

- Remote Sensing – research local disposal options and who utilizes them.
- Direct Observation – Observe types of waste haulers and routes taken.
- Local Informant – Ask locals.

Question T13a.	How often is household waste disposed?
Choice of Answers	DAILY / BIWEEKLY / WEEKLY / MONTHLY / INFREQUENTLY
Purpose of Question	Assesses how often household waste is disposed of.

Data Collection:

- Direct Observation—Observe waste haulers routes and household waste dumps/accumulation.
- Local Informant – Ask locals.

Question T14.	How available/costly is fuel?
Choice of Answers	CHEAP AND EASY AND NO ISSUE / COST LIMITS OTHER SPENDING BUT BUY FUEL ANYWAY / EXPENSIVE TO THE POINT OF LIMITING VEHICLE USE
Purpose of Question	Assesses how affordable fuel is, and if fuel costs limit vehicle use.

Data Collection:

- Direct Observation – Observe gas prices.
- Local Informant – Ask locals.

Commercial / Industrial Facilities

Question T15.	What type of establishment do you have?
Choice of Answers	RETAIL / FOOD SERVICES / PERSONAL SERVICES / PROFESSIONAL SERVICES / MANUFACTURING / MECHANIC OR TECHNICIAN / RECREATION OR ENTERTAINMENT / PRIVATE TRANSPORTATION / FUEL SERVICES / AGRICULTURE OR ANIMAL HUSBANDRY / WASTE DISPOSAL / OTHER
Purpose of Question	Assesses what type of establishment the respondent operates.

Data Collection:

- Remote Sensing – View aerial maps.
- Direct Observation – Identify facilities and transportation activities.
- Local Informant – Ask locals.

Question T15a.	Where is your establishment located?
Choice of Answers	MAIN COMMERCIAL DISTRICT OR MARKET / SECONDARY COMMERCIAL DISTRICT OR MARKET / SUBURBAN COMMERCIAL DISTRICT OR MARKET / OUTSIDE THE CITY / IN A PRIVATE RESIDENCE / IN A MOVABLE STRUCTURE OR VEHICLE / ON PERSON / OTHER
Purpose of Question	Assesses where the respondent's establishment is located.

Data Collection:

- Remote Sensing – View aerial maps.
- Direct Observation – Identify facilities and transportation activities.
- Local Informant – Ask locals.

Question T15a1.	How do you access/interact with your customers?
Choice of Answers	CUSTOMERS COME TO ESTABLISHMENT / ESTABLISHMENT DELIVERS A PRODUCT / ESTABLISHMENT DELIVERS A SERVICE / THIRD PARTY OR MIDDLE MAN / TELEPHONE OR INTERNET / OTHER
Purpose of Question	Assesses how a business delivers a product or service to customers.

Data Collection:

- Direct Observation – Identify facilities, business activities, and transportation activities.
- Local Informant – Ask locals and facility workers.

Question T16.	Do you depend on others to provide inventory for your establishment?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether a business or industry receives inventory from other parties.

Data Collection:

- Direct Observation – Identify facilities receiving inventory and delivery traffic.
- Local Informant – Ask locals.

Question T16a.	How is the inventory delivered?
Choice of Answers	DIRECTLY FROM MANUFACTURER OR PRODUCER / PRIVATE CARGO OR SHIPPING COMPANY / GOVERNMENT MAIL SERVICE
Purpose of Question	Assesses delivery method for an industry's inventory.

Data Collection:

- Direct Observation – Identify facilities and delivery activities.
- Local Informant – Ask locals.

Question T16a1.	How often do you require deliveries to your establishment to maintain operations?
Choice of Answers	DAILY / MULTIPLE TIMES A WEEK / WEEKLY / BI-WEEKLY / MONTHLY / MULTIPLE TIMES A YEAR
Purpose of Question	Assesses frequency of deliveries to the business or industry.

Data Collection:

- Direct Observation – Identify facilities and transportation activities.
- Local Informant – Ask locals.

Question T16b.	Do road closures affect deliveries?
Choice of Answers	ALWAYS / FREQUENTLY / PERIODICALLY / NEVER
Purpose of Question	Assesses frequency and effect of road closures on deliveries to business or industry.

Data Collection:

- Direct Observation – Observe road closure and delivery/truck traffic.
- Local Informant – Ask locals.

Question T16b1.	Is there a back-up delivery mechanism?
Choice of Answers	YES / NO
Purpose of Question	Assesses likelihood that a business or industry has access to alternate delivery options.

Data Collection:

- Local Informant – Ask locals.

Question T17.	Do clients depend on you to provide inventory for their establishments?
Choice of Answers	YES / NO
Purpose of Question	Assesses likelihood that the respondent's business or industry supplies goods to other establishments.

Data Collection:

- Direct Observation – Observe local delivery services.
- Local Informant – Ask locals.

Question T17a.	Do road closures affect deliveries?
Choice of Answers	ALWAYS / FREQUENTLY / PERIODICALLY / NEVER
Purpose of Question	Assesses frequency that road closures affect a respondent's business or industry.

Data Collection:

- Direct Observation – Observe road closures and business traffic.
- Local Informant – Ask locals.

Question T17a1.	Is there a back-up delivery mechanism?
Choice of Answers	YES / NO
Purpose of Question	Assesses access of the respondent's business or industry to alternate delivery options.

Data Collection:

- Local Informant – Ask locals.

Institutional Facilities

Question T18.	What type of institution do you operate?
Choice of Answers	ADMINISTRATION / HOSPITAL / SCHOOL / DETENTION CENTER / POLICE STATION / FIRE OR EMT STATION / FINANCIAL INSTITUTION / RELIGIOUS INSTITUTION OR PLACE OF WORSHIP / MILITARY FACILITY / OTHER
Purpose of Question	Assesses type of institution the respondent operates.

Data Collection:

- Remote Sensing – View aerial maps.
- Direct Observation – Identify what institutions are located in the study area.
- Local Informant – Ask locals.

Question T18a.	Are roads crucial to your operation?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether roads are crucial to the respondent's institution remaining in operation. Road closure will disrupt access to and from the institution.

Data Collection:

- Remote Sensing – View aerial maps.
- Direct Observation— Identify what roads serve the institution.
- Local Informant – Ask locals.

Question T18a1.	How are roads used?
Choice of Answers	TO PROVIDE SERVICES TO OTHERS / FOR OTHERS TO COME TO RECEIVE SERVICES
Purpose of Question	Assesses how an institution uses roads for their operations.

Data Collection:

- Remote Sensing – View aerial maps.
- Direct Observation – Identify what institutions are located in the study area, and if they depend on roads for daily operations.
- Local Informant – Ask locals.

Question T18b.	Does the condition or safety or usability of the road network affect decisions on where employees live?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether road network conditions affect where employees live. Answers will determine parameters for distance from employment and transportation options.

Data Collection:

- Remote Sensing – View aerial maps.
- Direct Observation – Identify parking lots and bus service to determine transportation methods used at this institution.
- Local Informant – Ask locals.

HISA Field Guide: Communications (C) (cellular/wireless)

Objective

Cellular network and Wi-Fi network connectivity allows for social, cultural, and economic interactions and also gives a sense of security. What type of communication devices are utilized, how are they acquired, and for what purpose are they used? Answers will allow for an assessment of social interaction and social dependency for communities and individuals to function.

Residential households

Question C1.	Do you depend on cellular networks and Wi-Fi networks for communication?
Choice of Answers	YES / NO
Purpose of Question	Assesses the use of cellphones and Wi-Fi in an area. Answers can possibly indicate social standards, social connectivity, security, and possibly wealth of an area.

Data Collection:

- Remote Sensing – Government agencies or NGOs may publish data on cellphone availability and use.
- Direct Observation – Are cellphones used widely? Is cellphone availability visible? Are there shops or street vendors that sell cellphones.
- Local Informant – Ask locals.

Figure C49. Woman on cellphone in the Bolivian highlands (alamy.com, 2013).

www.alamy.com - FEKYME

If answer is "yes" to Question C1:

Question C1a.	What type of cellular device do you own?
Choice of Answers	CELLPHONE/ SMARTPHONE/ TABLET
Purpose of Question	Identifies the amount of social connectivity that individuals have. Are they connected with the internet on mobile devices? Do they have access to information and do they provide information?

Data Collection:

- Remote Sensing – Government agencies or NGOs may publish data on cellphone availability and use.
- Direct Observation – What types of devices are utilized/available/sold?
- Local Informant – Ask locals.

C50. Cellphone shops in Africa (medium.com, 2013).

Question C1a1.	What is the primary type of wireless use?
Choice of Answers	Voice Calls / Texts / Social Media or Facebook or Banking
Purpose of Question	Identifies the most common form of social interaction via the cell network. In many places, texts or data are preferred over voice calls as a means of communication due to expense or reliability of the network.

Data Collection:

- Remote Sensing – Government agencies or NGOs may publish data on cellphone availability and use. Additionally, travel websites often provide information about the main means of mobile communication that are best suited for use in a particular region.
- Direct Observation – What types of devices are utilized/available/sold? What kinds of cell or data plans are sold and/or advertised, and at what cost?
- Local Informant – Ask locals.

Figure C51. Handset dealer in Lagos, Nigeria (phys.org, 2012).

Question C1b.	How many cellphones are there in the household?
Choice of Answers	MULTIPLE DEVICES / ONE DEVICE (OR SHARE) / NONE
Purpose of Question	Identifies how independent a household's members are. Are they connected with society, do they have access to information, and do they provide information? Can women or children use/afford cellphones? Cellphone ownership can be a gauge of wealth.

Data Collection:

- Remote Sensing – Government agencies or NGOs may publish data on cellphone ownership.
- Direct Observation – What types of devices are utilized/available/sold?
- Local Informant – Ask locals.

Question C1b1.	Where do you get adequate cellphone reception? (Check all that apply.)
Choice of Answers	HOME OR NEIGHBORHOOD / WORK (OUTSIDE OF HOME) / COMMERCIAL DISTRICT OR INSTITUTION / ORGANIZATION
Purpose of Question	Assesses location(s) where a respondent receives adequate cellphone reception. Answers may be utilized to develop a map of cellphone coverage and areas where individual may go to get coverage. Some people may have limited cellphone access due to a lack of cell tower infrastructure. This could occur due to either a remote location or socioeconomic factors. How much time and effort do cellphone owners have to expend to use the network?

Data Collection:

- Remote Sensing – Review GIS data that locates cell towers. Government agencies or NGOs may publish data on mobile communications infrastructure.
- Direct Observation – Take note of where cell towers are located.
- Local Informant – Ask locals.

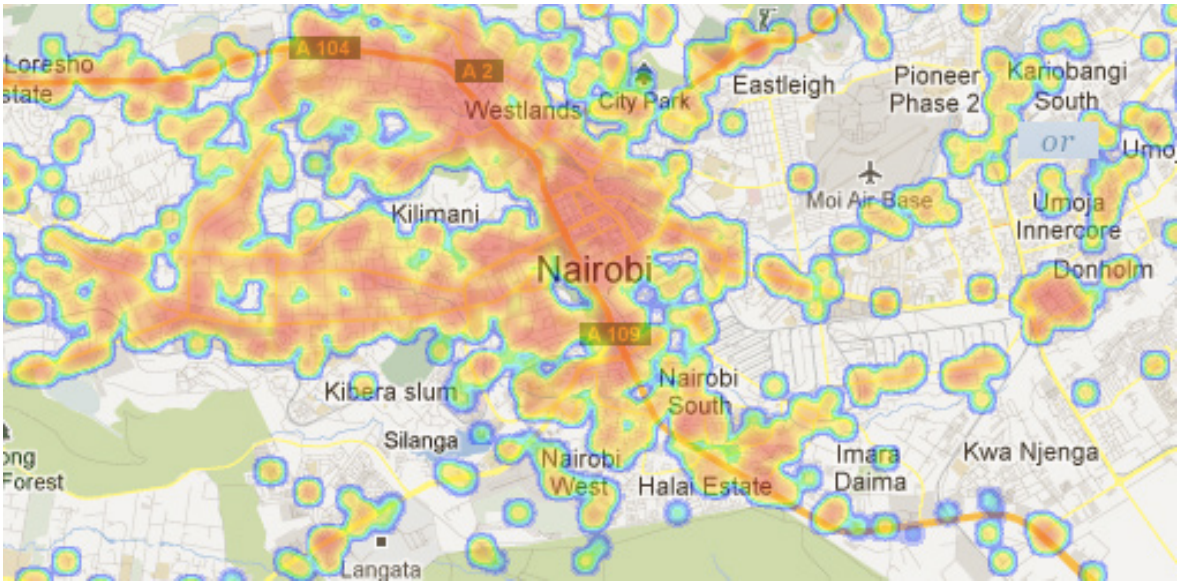
Figure C52. Woman using a cellphone on high ground above Kibera slum, Nairobi, Kenya (slate.com, 2009).

Question C1b2.	Are there areas without coverage?
Choice of Answers	YES / NO
Purpose of Question	Assesses likelihood there are areas without cellular service in the region. Answers potentially will identify areas of limited cell service. Some people may have limited cellphone access due to a lack of cell tower infrastructure. This could either be a result of remote location, inadequate infrastructure, or socioeconomic factors. How much time and effort do cellphone owners have to expend to use the network?

Data Collection:

- Remote Sensing – View GIS data that locates cell towers. Government agencies or NGOs may publish data on mobile communications availability, or websites may publish coverage maps (e.g., Opensignal.com).
- Direct Observation – Observe cell use and assume coverage in those areas.
- Local Informant – Ask locals.

Figure C53. Map of mobile phone coverage in Nairobi, Kenya (ponesignal.com, 2013).



Question C1c.	What is the purpose of your mobile communications? (Check all that apply.)
Choice of Answers	EDUCATION / BUSINESS OR FINANCIAL / SOCIAL OR SOCIAL MEDIA / OTHER
Purpose of Question	Assesses why cellphones and other mobile devices are used. Answers possibly will identify the social dynamics of individuals and communities, including their interests and needs. Is business and commerce reliant on a functioning cell network?

Data Collection:

- Local Informant – Ask locals.

Figure C54. Tea vender in Uttar Pradesh, India, who is checking her bank balance via mobile (gatesfoundation.org).

Figure C55. Farmers in India may receive biweekly weather and market information that is distributed by the government via the cellular network (ccafs.cgiar.org, 2012).

Question C1c1.	Do you transfer money via smartphone?
Choice of Answers	YES / NO
Purpose of Question	Assesses likelihood that a respondent transfers money using a cellular network. Answers possibly will identify how much of the financial interactions and commerce is dependent on the cell network. How much of the rural economy is based on funds sent by family members working elsewhere? How would a cellular network collapse affect families in distant communities?

Data Collection:

- Local Informant – Ask locals.

Question C1c2.	How dependent are you on social media?
Choice of Answers	MONITOR SITES BUT DO NOT POST / COMMUNICATE WITH FRIENDS OR FAMILY / OCCASIONAL POST TO PUBLIC / ACTIVE SOCIAL MEDIA BLOGGER
Purpose of Question	Assesses frequency of a respondent's use of social media sites. Answers possibly will identify daily connectivity activity – how socially connected a respondent is and what they are connected to/with. Social media is sometimes less regulated than regular print media. A population that is very connected via social media may display different behavioral patterns in relationships to the national and/or regional government than a nonconnected population. For example, Arab Spring was heavily driven and coordinated through social media, particularly Twitter.

Data Collection:

- Remote Sensing – monitor activity on social media networks. Are there national restrictions on access to social networks or social network context (e.g., China and India)? Are their country-specific social networks (e.g., VKontakte [VK] in Russia or Sina Weibo in China)?
- Direct Observation –Are there high levels of social network use? Do the local or national authorities distribute information via social media (indicating that this is a viable method of communicating with the population)?
- Local Informant – Ask locals.

Figure C56. Antigovernment protesters in Hong Kong heavily utilized smartphone apps, particularly "FireChat" (free instant messaging with no signal or mobile data needed) to communicate after the cellular network collapsed (pbs,org, 2014).

Question C1d.	How do you access cellular and Wi-Fi networks?
Choice of Answers	GOVERNMENT-OPERATED CELLULAR NETWORKS / COMMERCIALLY OPERATED CELLULAR NETWORKS / PURCHASED WI-FI NETWORKS / FREE WI-FI NETWORKS / ILLEGAL / OTHER
Purpose of Question	Assesses how a respondent accesses cellular and Wi-Fi networks. Answers possibly will identify limitations due to control and who can afford service. Additionally, a government or NGO may have a mandate to provide service to all citizens, while a commercial provider may only be driven to provide service to profitable markets.

Data Collection:

- Remote Sensing – Government and NGOs might publish information or statistics on cellular and other mobile connectivity.
- Local Informant – Ask locals.

Question C1d1.	How are the cellular and Wi-Fi networks paid for?
Choice of Answers	PURCHASED / TAXES / EMPLOYER / ORGANIZATION
Purpose of Question	Assesses how a respondent pays for network access, either cellular or Wi-Fi. Answers may indicate how a population is budgeting for their cellular connectivity, and this may affect access. Is access something they have to pay for out of pocket? Is it deducted from their pay as taxes? Or, is access provided as part of their employment?

Data Collection

- Local Informant – Ask locals and businesses.

Question C1d2.	Who provides or operates free Wi-Fi networks in the area?
Choice of Answers	GOVERNMENT / COMMERCIAL / ORGANIZATION / AD HOC OR ILLEGAL
Purpose of Question	Assesses the provider (and operator) of free Wi-Fi networks in an area.

Data Collection:

- Local Informant – Ask locals and businesses.

Question C1e.	How much of your income is spent on cellular and Wi-Fi devices and services?
Choice of Answers	MAJORITY / HALF / MINIMAL
Purpose of Question	Assesses how much of a respondent's income is spent on cellular devices and services. If people are reliant on the cell network and are spending a significant portion of their resources on cell access, what would be the effect of a dramatic price change?

Data Collection:

- Remote Sensing – Governmental sources or NGOs might publish regional statistics on income spent on cellular access.
- Local Informant – Ask locals.

Question C1e1.	Is paying for cellular and Wi-Fi network devices and services a priority purchase over food, water, or education fees?
Choice of Answers	YES / NO
Purpose of Question	Assesses the relative importance of cellular and Wi-Fi network access.

Data Collection:

- Remote Sensing – Governmental sources or NGOs might publish regional statistics on the prioritization of cellular access.
- Local Informant – Ask locals.

Question C1e2.	Where do you buy cellphones?
Choice of Answers	MARKET / RETAILER / ILLEGAL SOURCE
Purpose of Question	Assesses where respondents are able to buy cellphones.

Data Collection:

- Direct Observation – Look for markets selling cellphones.
- Local Informant – Ask locals.

Question C1f.	Are there government controls on cell service?
Choice of Answers	FIREWALLS / BENEFITS CENSORSHIP / PROVIDER RESTRICTIONS / NO
Purpose of Question	Assesses government restrictions on cellular services.

Data Collection:

- Remote Sensing – NGOs might publish information about governmental restrictions on cellular services.
- Local Informant – Ask locals and cell service providers.

If answer is "no" to Question C1:

Question C1g.	What alternate type(s) of communication do you use/how do you get information/news? (Check all that apply.)
Choice of Answers	LAND LINE / USE SOMEONE ELSE'S DEVICE / BROADCAST MEDIA / PRINT MEDIA / SOCIAL INTERACTIONS OR COMMUNITY / SATELLITE / CABLE / SHORTWAVE RADIO
Purpose of Question	Assesses communication options other than access to cellular and Wi-Fi networks.

Data Collection:

- Remote Sensing – Governmental agencies and NGOs might publish information on communication options in a region.
- Direct Observation – Are there local paper announcements, gathering places?
- Local Informant – Ask locals.

Question C1h.	Does not having cellular and Wi-Fi connectivity negatively affect your life?
Choice of Answers	YES / NO
Purpose of Question	Assesses the effects of not having cellular or Wi-Fi network access. Answers potentially will identify hardships due to connectivity issues, availability of work, wealth indicator, or accessibility issues.

Data Collection:

- Remote Sensing – View survey and census data.
- Local informant – Ask locals.

Community

Question C2.	Do you rely on the cellular network/Wi-Fi network for 911/emergency services?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether a respondent uses cellular or Wi-Fi networks to access emergency services.

Data Collection:

- Remote Sensing – View survey and census data on emergency service access.
- Local Informant – Ask locals.

Question C2a.	Does the government issue information over the cellular/Wi-Fi network?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether government or authorities issue information over cellular or wireless networks. Answers could identify the importance of the cellular network in communication between authorities and citizens in emergency situations or in disseminating information.

Data Collection:

- Remote Sensing – This information may be provided on state or travel websites. Also check State Department travel advisory websites.
- Direct Observation – Are there government notifications over the cellular and wireless network?
- Local Informant – Ask locals.

Question C3.	Where are cell towers located? (Check all that apply.)
Choice of Answers	NEIGHBORHOODS / COMMERCIAL AREAS / CITY CENTER / GOVERNMENT DISTRICT / ON BUILDINGS / IN FIELDS / ALONG ROADS
Purpose of Question	Assesses location(s) of cellular towers. Answers could identify the prioritization of cell tower placement, likely dead zones, and the impact of cell towers on surrounding communities.

Data Collection:

- Remote Sensing – GIS data that locates cell towers. Government agencies or NGOs may publish data on mobile communications availability or websites may publish coverage maps (e.g., OpenSignal.com).
- Direct Observation – Note the locations of cellular towers and areas of high and low signal strength.
- Local Informant – Ask locals.

Question C3a.	Who controls placement of cell towers?
Choice of Answers	GOVERNMENT / COMMERCIAL / INDIVIDUALS
Purpose of Question	Assesses who is responsible for locating and constructing cellular infrastructure. Answers could identify the prioritization of cell-tower placement. If dead zones do exist, are they are result of government policy or economic considerations?

Data Collection:

- Remote Sensing – Review aerial photos, GIS data.
- Direct Observation – Observe cell tower placement and cell use areas.
- Local Informant – Ask locals.

Figure C57. Cell towers, Mumbai, India (mieuxprevenir.blogspot.com, 2014).

Question C3b.	Who owns land where cell towers are located?
Choice of Answers	GOVERNMENT / COMMERCIAL / INDIVIDUALS
Purpose of Question	Determines who owns the land where cell towers are located. Can indicate the level of government and community involvement in the establishment of the cellular network.

Data Collection:

- Direct Observation – Observe where cell towers are placed and identify who may own them.
- Local Informant – Ask locals.

Question C3b1.	Who maintains the cell towers?
Choice of Answers	GOVERNMENT / COMMERCIAL / INDIVIDUALS
Purpose of Question	Assesses the entity responsible for maintaining cell towers/infrastructure. Can indicate the level of government and community involvement in the maintenance of the cellular network.

Data Collection:

- Direct Observation – Observe cell towers and maintenance activities.
- Local Informant – Ask locals and service providers.

Commercial/Industrial Facilities

Question C4.	Do you depend on cellphones for communication?
Choice of Answers	YES / NO
Purpose of Question	Assesses if a facility depends on cellphones for operations. Answers can possibly identify source of communication and how connected the establishment is.

Data Collection:

- Direct Observation – Observe facilities' cell use and tower placement.
- Local Informant – Ask locals and facilities about use.

Question C4a.	What kind of communication device is used?
Choice of Answers	CELLPHONE / SMARTPHONE/ TABLET
Purpose of Question	Assesses what kind of communication device(s) a commercial or industrial facility uses. Answers could possibly identify if Wi-Fi connected or not, and how information is provided and received, and how far-reaching the business is.

Data Collection:

- Direct Observation – Observe devices used.
- Local Informant – Ask locals and facilities.

Question C4a1.	Is your device the primary source of communication among the staff?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether respondent's cellphone is the primary source of communication among the staff. Answers can possibly identify how the establishment communicates with its employees, and how quickly information is provided/received.

Data Collection:

- Direct Observation – Observe cell use around facilities.
- Local Informant – Ask locals and facility's staff and employees.

Question C4a2.	Do you supply the device to employees?
Choice of Answers	YES / NO
Purpose of Question	Assesses if a commercial or industrial business supplies cellular devices to its employees. Answers can identify if all employees have devices because of the employer, or if they have to obtain devices on their own. It will also show how connected the establishment is.

Data Collection:

- Direct Observation – Observe cell use.
- Local Informant – Ask locals, facilities, and employees about how they obtain these devices.

Question C4b.	Do you rely on GPS for transportation services?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether a commercial or industrial facility uses GPS for transportation. Answers can identify access, availability, and connectivity. Answers will also show that connectivity is available where services are provided.

Data Collection:

- Direct Observation – Observe GPS use if possible.
- Local Informant – Ask locals and facilities/service providers.

Question C4c.	How do you access the cellular and Wi-Fi networks?
Choice of Answers	GOVERNMENT OPERATED CELLULAR NETWORK / COMMERCIALLY OPERATED CELLULAR NETWORK / PURCHASE WI-FI NETWORK / FREE WI-FI NETWORK / ILLEGALLY / OTHER
Purpose of Question	Assesses how a commercial or industrial facility accesses cellular and Wi-Fi networks. Answers can potentially identify limitations due to control and identify who can afford the service.

Data Collection:

- Remote Sensing – View survey and census data.
- Local Informant – Ask locals and facilities.

Question C4c1.	How are the cellular and Wi-Fi networks paid for?
Choice of Answers	PURCHASED BY ESTABLISHMENT / PAID THROUGH TAXES
Purpose of Question	Assesses how a commercial or industrial facility pays for cellular and Wi-Fi access. Answers can identify level of affordability and establishments that are offering wireless service.

Data Collection:

- Remote Sensing – View survey results and census data.
- Direct Observation – Observe service providers.
- Local Informant – Ask locals and service providers how most service is paid for.

Question C4c2.	Who provides/operates the free Wi-Fi network?
Choice of Answers	GOVERNMENT / COMMERCIAL
Purpose of Question	Determines provider(s) of free Wi-Fi networks that a commercial or industrial facility might use.

Data Collection:

- Local Informant – Ask locals and facilities.

Question C4d.	How much of your budget is spent on wireless devices and services?
Choice of Answers	MAJORITY / HALF / MINIMAL
Purpose of Question	Assesses portion of a commercial or industrial facility's budget that is spent on cellular devices and services.

Data Collection:

- Local Informant – Ask locals and facilities.

If answer is "no" to Question C4:

Question C4e.	What alternate types of communication do you use/how do you communicate with customers?
Choice of Answers	LAND LINE / BROADCAST MEDIA / PRINT MEDIA / SOCIAL INTERACTIONS or COMMUNITY
Purpose of Question	Assesses types of communication used by commercial or industrial facilities that are not cellular or wireless services. Answers can possibly identify how alternate interactions take place, and how information is provided and received.

Data Collection:

- Direct Observation – Observe facility operations.
- Local Informant – Ask locals and facilities.

Question C4f.	Does not having cellular or Wi-Fi connectivity negatively impact business?
Choice of Answers	YES / NO
Purpose of Question	Assesses the impact on a business when it does not have cellular or Wi-Fi services. Answers can identify accessibility issues, cost issues, if the area does not have availability, or if wireless connectivity is not needed.

Data Collection:

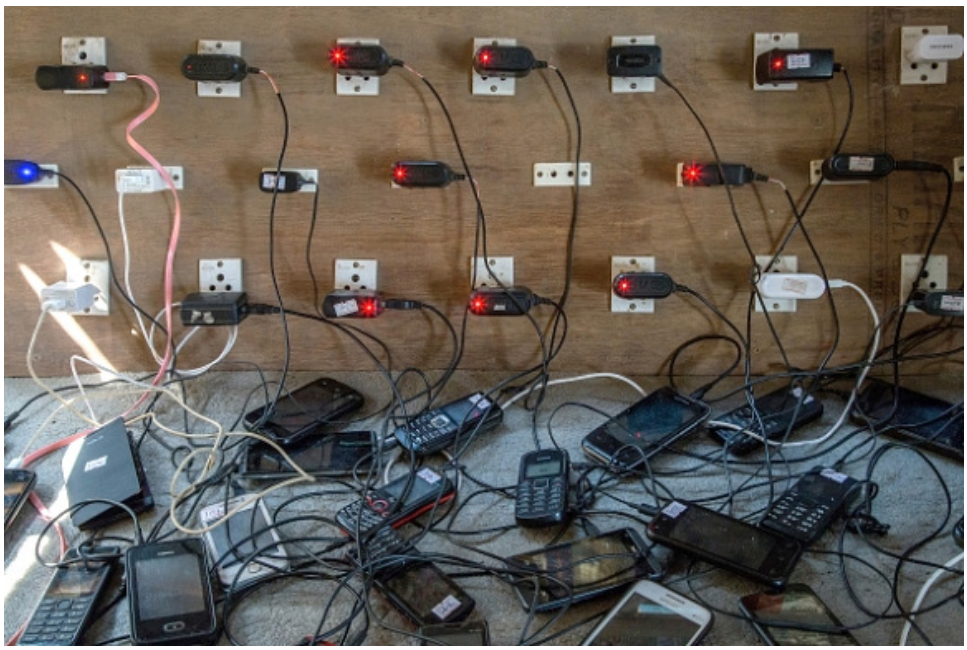
- Local Informant – Ask locals and facility.

Question C5.	What type of commercial establishment do you have?
Choice of Answers	RETAIL / FOOD SERVICE / PERSONAL SERVICES / PROFESSIONAL SERVICES / MANUFACTURING / MECHANIC or TECHNICIAN / RECREATION or ENTERTAINMENT / PRIVATE TRANSPORTATION / FUEL SERVICES / AGRICULTURE or ANIMAL HUSBANDRY / OTHER
Purpose of Question	Assesses the respondent's type of commercial or industrial facility.

Data Collection:

- Remote Sensing – Most cities have "yellow pages" of commercial establishments available on the internet. Google Earth also has locations of businesses available on the internet.
- Direct Observation – What shops and industries are operational in the area?
- Local Informant – Ask locals.

Figure C58. Beldangi 2 Refugee Camp, Nepal—this shop uses a generator to provide cellphone charging service to refugee camp inhabitants at 10 rupees (US $ 0.09) per phone (gettyimages.com, 2015).



Question C5a.	How do you access/interact with your customers?
Choice of Answers	CUSTOMER COME TO ESTABLISHMENT / ESTABLISHMENT DELIVERS A PRODUCT / ESTABLISHMENT DELIVERS A SERVICE / THIRD PARTY or MIDDLE MAN / OTHER (Telephone/Internet/Cellphone)
Purpose of Question	Assesses how commercial or industrial facilities interact with customers. Answers can identify how communication networks work for businesses.

Data Collection:

- Direct Observation – Observe operations.
- Local Informant – Ask locals and facility.

Question C5a1.	Where is your establishment located?
Choice of Answers	MAIN COMMERCIAL DISTRICT OR MARKET / SECONDARY COMMERCIAL DISTRICT OR MARKET / SUBURBAN COMMERCIAL DISTRICT OR MARKET / OUTSIDE THE CITY / PRIVATE RESIDENCE / MOVABLE STRUCTURE OR MOBILE VEHICLE / OTHER
Purpose of Question	Assesses location of the commercial facility. Answers can identify locale and accessibility, connectivity, and community traffic.

Data Collection:

- Remote Sensing – Most cities have yellow pages available on the internet. Google Earth also has locations of businesses available on the internet.
- Direct Observation – Observe where establishments are located.
- Local Informant – Ask locals and facilities.

Question C5b.	How/why is Wi-Fi and cellular data used? (Check all that apply.)
Choice of Answers	MARKETING AND ADVERTISING / COMMUNICATING WITH CUSTOMERS / COMMUNICATING WITH EMPLOYEES / COMPLIANCE WITH REGULATIONS AND LAWS
Purpose of Question	Assesses how cellular/wireless networks are used by a commercial establishment. Answers can indicate how commercial or industrial facilities are using the internet to conduct business.

Data Collection:

- Remote Sensing – Do business in the area have websites? Do government regulatory agencies have websites with customer portals?
- Direct Observation – Observe patterns of use.
- Local Informant – Ask locals.

Institutional Facilities

Question C6	Does your institution depend on cellular and Wi-Fi networks for communication?
Choice of Answers	YES / NO
Purpose of Question	Assesses an institution's dependence on cellular or other wireless networks for communications. Answers can potentially identify source(s) of communication.

Data Collection:

- Direct Observation – How do the institutions communicate? Are telephone wires running into the building?
- Local Informant – Ask locals.

Figure C59. Democratic Republic of the Congo (DRC) soldiers with their cellphone cameras (theatlantic.com, 2012).

Question C6a.	What kind of communication device is used?
Choice of Answers	CELLPHONE / SMARTPHONE/ TABLET
Purpose of Question	Assesses type of cellular or wireless devices used by an institution for communications. Answers may identify if an institution is Wi-Fi connected and how that institution accesses information.

Data Collection:

- Remote Sensing – NGO and government initiatives are usually advertised online, with descriptions of the technology utilized.
- Direct Observation – What devices are the people in the institution using?
- Local Informant – Ask locals.

Figure C60. Children in the Dadaab refugee complex in Kenya, with tablets and internet connection provided by an NGO (telegraph.co.uk, 2014).

Question C6a1.	Do you have a back-up means of communication?
Choice of Answers	YES / NO
Purpose of Question	Assesses an institution's access to a back-up or alternate form of communication. Answers may indicate how crucial the communication network is for the institution, and if connectivity is not accessible.

Data Collection:

- Direct Observation – Apart from cellular, what other devices does the institution use? Are there satellite dishes or radio antennae on the roof? Are there telephone cables entering the building?
- Local Informant – Ask locals.

Question C6b.	Are the cellular and Wi-Fi networks the primary sources of communication with the institution?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether cellular and Wi-Fi networks are the primary source(s) of communication for an institution. Answers may indicate how the establishment communicates with its employees, and how quickly information is provided/received.

Data Collection:

- Direct Observation – Observe operations and activities.
- Local Informant – Ask locals and staff.

Figure C61. Malaria clinic in Tanzania that uses cellphones and texting to help track antimalaria medication and patients. The system was provided as part of a charitable program by a for-profit corporation (thepenbullet.com, 2009).

Question C6c.	How do you access the cellular and Wi-Fi networks?
Choice of Answers	GOVERNMENT-OPERATED CELLULAR NETWORK / COMMERCIALLY OPERATED CELLULAR NETWORK / PURCHASED WI-FI NETWORK / FREE WI-FI NETWORK / ILLEGALLY / OTHER
Purpose of Question	Assesses an institution's access to cellular or other wireless networks for communication. Answers may indicate limitations due to control and affordability.

Data Collection:

- Remote Sensing – Free or government-provided cell or Wi-Fi will often be advertised on government websites. Check travel websites for information about Wi-Fi access.
- Local Informant – Ask locals.

Question C6c1.	How is the cellular network and Wi-Fi network service paid for?
Choice of Answers	PURCHASED BY INSTITUTION / PAID FOR THROUGH TAXES / PAID FOR BY PATRON OR SPONSOR
Purpose of Question	Assesses an institution's method of payment for cellular or other wireless network services. Answers may indicate the level of affordability and any institutions that may have an advantage.

Data Collection:

- Remote Sensing – Free or government-provided cell or Wi-Fi will often be advertised on government websites. Check travel websites for information about Wi-Fi access.
- Local Informant – Ask locals and staff.

Figure C62. Doctor at Mayange Health Center, Rwanda, uses a cellphone to communicate with pregnant women in remote areas. The equipment and service was provided through cooperation between the Rwanda government and private corporations (un.org, 2008).

Question C6c2.	Who provides/operates the free Wi-Fi network?
Choice of Answers	GOVERNMENT / COMMERCIAL / ORGANIZATION
Purpose of Question	Assesses the provider(s) of free wireless network(s). Answers may indicate levels of control, connectivity strength, and availability in an area.

Data Collection:

- Remote Sensing – Free or government-provided cell or Wi-Fi will often be advertised on government websites. Check travel websites for information about Wi-Fi access.
- Local Informant – Ask locals.

Question C6d.	How much of your budget is spent on cellular and Wi-Fi devices and services?
Choice of Answers	MAJORITY / HALF / MINIMAL
Purpose of Question	Assesses portion of an institution's budget spent on cellular and other wireless devices and services. Answers may indicate level of importance and cost structures for network access.

Data Collection:

- Local Informant – Ask locals and staff.

Question C6d1.	Where are cellphones purchased?
Choice of Answers	MARKET / RETAILER / ILLEGAL SOURCE
Purpose of Question	Assesses where an institution purchases cellphones. Answers may indicate how accessible the phones are, how readily available they are, or the length of time to receive one. Answers may show where institutions do business, and who is in control of the availability.

Data Collection:

- Direct Observation – Where are cellphones purchased? Are there shops, or does it occur in more ad hoc environments?
- Local Informant – Ask locals.

Question C6e.	For transportation services, do you rely on GPS?
Choice of Answers	YES / NO
Purpose of Question	Assesses the use of GPS for transportation services provided by an institution. Answers may indicate access, availability, and connectivity. Answers may show that connectivity is available where services are provided. Answers will indicate emergency service accessibility.

Data Collection:

- Direct Observation – Observe GPS use.
- Local Informant – Ask locals and staff.

If answer is "no" to Question C6:

Question C6f.	What alternate types of communication do you use / how do you communicate with the institution?
Choice of Answers	LAND LINE / BROADCAST MEDIA / PRINT MEDIA / SOCIAL INTERACTIONS or COMMUNITY
Purpose of Question	Assesses communications used by an institution that are not cellular or Wi-Fi. Answers may indicate how interactions take place, and how information is provided and received.

Data Collection:

- Direct Observation – Radio coverage, billboards, flyers, papers, hard wired phone use.
- Local Informant – Ask locals.

Question C6g.	Does not having a cellular or Wi-Fi connectivity negatively impact the institution?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether having cellular or Wi-Fi access negatively impacts an institution. Answers can indicate if accessibility or cost are issues, and if the area does not have availability or if it is not needed at all.

Data Collection:

- Local Informant – Ask locals and staff.

Question C7.	What type of institution do you operate?
Choice of Answers	HOSPITAL / CLINIC / UNIVERSITY / SCHOOL / CHURCH or MOSQUE/ POLICE / FIRE DEPARTMENT / EMERGENCY SERVICES / GOVERNMENT OFFICE / MILITARY / PRISON / OTHER
Purpose of Question	Assesses type of institution a respondent operates. Answers can indicate typical activities conducted at the location.

Data Collection:

- Remote Sensing – Use internet yellow pages, Google Earth.

- Direct Observation – What type of institution is it?
- Local Informant – Ask locals.

Question C7a.	Does this institution provide cellular or Wi-Fi communication devices to employees or staff?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether the institution provides cellular or Wi-Fi communication devices to its employees to conduct operations. Answers may indicate cellular or Wi-Fi access available to employees or staff.

Data Collection:

- Direct Observation – Observe use patterns.
- Local Informant – Ask locals and staff.

HISA Field Guide: Food/Agriculture (F) (food security)

Residential households

Question F1.	Do you have periods of time where you go without or have limited access to food?
Choice of Answers	YES / NO
Purpose of Question	Assesses whether a respondent has periods without or with limited access to food.

Data Collection:

- Remote Sensing – Governmental agencies or NGOs have statistics on food shortages. Although this information might be broad, it could inform the area under consideration.
- Direct Observation – Are people asking for food? Is there an abundance of malnourished children? Are there environmental conditions leading to food shortages (e.g., drought or excessive rain)?
- Local Informant – Ask locals.

Question F1a.	How frequently is there a shortage of food?
Choice of Answers	EVERY DAY / A FEW DAYS A WEEK / A FEW DAYS A MONTH / A FEW DAYS A YEAR / SEASONAL
Purpose of Question	Assesses frequency of food shortage within a household.

Data Collection:

- Remote Sensing – Governmental agency or NGO reports document the frequency of food shortages in an area. National/local news reports on food shortages.
- Direct Observation – Can determine if a food shortage is occurring at the time of observation, but observation is limited in determining duration and frequency.
- Local Informant – Ask locals.

Question F1a1.	Why do you go without food?
Choice of Answers	MARKET AVAILABILITY / GROWING SEASONALITY / LACK OF MONEY
Purpose of Question	Assesses reason(s) a respondent goes without food.

Data Collection:

- Remote Sensing – Governmental agency or NGO reports potentially outline why there are food shortages in an area.
- Direct Observation – Can determine some problems in the food supply, such as markets not having food, but is limited in identifying long-term issues leading to food shortages.
- Local Informant – Ask locals.

Question F1b.	If there is an insufficient amount of food, who goes without?
Choice of Answers	EVERYONE EQUALLY / CHILDREN / ELDERLY / WOMEN / MEN / IN-LAWS
Purpose of Question	Assesses who goes without food if there is an insufficient amount to feed the household.

Data Collection:

- Remote Sensing – Governmental agency or NGO reports could identify vulnerable segments of the population.
- Direct Observation – Could provide a snapshot view of who is eating (and conversely the populations going without food) within a limited area/scope.
- Local Informant – Ask locals and include a range of ages and genders.

Question F1c.	Do you utilize food aid?
Choice of Answers	YES / NO
Purpose of Question	Assesses use of food aid by a household and what type—from food stamps to large shipments of staple food items.

Data Collection:

- Remote Sensing – Governmental agency or NGO reports potentially enumerate statistics on food aid in a given area.
- Direct Observation – Look for centralized food aid distribution points.
- Local Informant – Ask if the national or local government offers food aid and in what form. Ask if national food aid is provided. Are food stamps utilized?

Question F1c1.	Where do you obtain food aid?
Choice of Answers	NO FOOD AID / GOVERNMENT / NGOs / LOCAL CHARITY OR SOCIAL NETWORK DONATION / RELIGIOUS ORGANIZATION / CRIMINAL ORGANIZATION OR VEOs
Purpose of Question	Assesses organization from which a household receives food aid.

Data Collection:

- Remote Sensing – Governmental agency or NGO reports potentially enumerate statistics on food aid sources in a given area.
- Direct Observation – Look for food aid distribution points.
- Local Informant – Ask where food aid is obtained.

Question F2.	How often do you purchase food?
Choice of Answers	DAILY / A FEW DAYS A WEEK / WEEKLY / MONTHLY / NEVER
Purpose of Question	Assesses frequency of food purchases by respondent.

Data Collection:

- Direct Observation – Observe if there are peak times at food markets.
- Local Informant – Ask how often a person/family purchases food. Ask if that frequency is common throughout a community.

Question F2a.	Describe the experience of purchasing food. (Check all that apply.)
Choice of Answers	A SOCIAL NETWORKING ACTIVITY OR OPPORTUNITY / STRESSFUL DUE TO FOOD SHORTAGES OR COMPETITION (INCLUDING LONG LINES) / STRESSFUL DUE TO LACK OF FUNDS / STRESSFUL DUE TO SAFETY OR HARASSMENT ISSUES / ENJOYABLE
Purpose of Question	Assesses the food-shopping experience.

Data Collection:

- Direct Observation – Observe human dynamics in food markets.
- Local Informant – Ask if the person enjoys obtaining food. Ask if that sentiment is a general trend across members of the community.

Question F3.	In general, how much of a food supply is kept in the residence?
Choice of Answers	1 DAY'S WORTH / A FEW DAYS' WORTH / 1 WEEK'S WORTH / A FEW WEEKS' WORTH / A MONTH OR LONGER
Purpose of Question	Assesses quantity of food stored in a respondent's residence.

Data Collection:

- Remote Sensing – Some NGOs might provide rough estimates of food supply.
- Local Informant – Ask how much food is kept at a respondent's household. Ask how a respondent/family plans for food shortages. Ask if those food storage practices are common in the community.

Question F3a.	How is food stored/preserved? (Check all that apply.)
Choice of Answers	REFRIGERATOR / COLD STORAGE / ON THE SHELF OR PANTRY / NOT STORED, CONSUMED IMMEDIATELY / CANNED / DRIED / PICKLED OR SALTED / SMOKED
Purpose of Question	Assesses how a respondent preserves and stores food.

Data Collection:

- Remote Sensing – NGOs might record how populations store and preserve food. News reports or information published on local customs might describe food preservation techniques.
- Direct Observation – If possible, take note of household food preservation practices.
- Local Informant – Ask how a respondent/or their family preserves and stores food. Ask if those practices are common throughout the community.

Question F3a1.	What factors limit the quantity of food stored in the house?
Choice of Answers	CANNOT AFFORD TO BUY IN LARGE QUANTITIES / DO NOT HAVE ENOUGH ROOM TO STORE LARGE QUANTITIES / LARGER QUANTITIES ARE NOT AVAILABLE FOR PURCHASE / FOOD WILL SPOIL / SECURITY CONCERNS
Purpose of Question	Assesses potential limitations to storing food by a household.

Data Collection:

- Remote Sensing – Governmental agencies or NGOs might enumerate food storage limitations of an area.
- Direct Observation – If possible, assess average kitchen/storage room sizes and how those areas are managed and utilized.
- Local Informant – Ask a person/household if they are able to store larger quantities of food in their house. Ask if they would store more food if it was possible. Ask if those are general trends throughout the community.

Question F3a1a.	*How do you dispose food waste?*
Choice of Answers	*COMPOST / TRASH / FERTILIZER / ANIMAL FEED*
Purpose of Question	*Assesses household's method for disposing food waste.*

Data Collection:

- Direct Observation – Look for food waste in garbage. Note locations where food waste is disposed. Note how people are disposing food waste.
- Local Informant – Ask how a person/family disposes of food waste. Ask if that method is a general trend among members of the community.

Question F4.	How has food availability affected decisions about family/livelihood?
Choice of Answers	RELOCATE THE HOUSEHOLD / SEND CHILDREN OR FAMILY MEMBERS TO LOCATIONS (INCLUDING WITH EXTENDED FAMILY MEMBERS OR TO INSTITUTIONS) WHERE FOOD IS MORE AVAILABLE / JOINING MILITARY / JOB CHOICE / APPLICATION FOR GOVERNMENT ASSISTANCE / APPLICATION FOR NGO ASSISTANCE / PARTICIPATION, SUPPORT OR CONDONATION OF CRIMINAL ACTIVITY / NOT AT ALL
Purpose of Question	Assesses impact of food availability on a household's family/livelihood decisions.

Data Collection:

- Remote Sensing – Government agencies or NGOs might publish information related to food insecurity and its impact on populations.
- Local Informant – Ask if person/household decision have been affected by food availability. Ask if their situation is common throughout their community.

Question F4a.	Where do the majority of your meals occur?
Choice of Answers	HOME OR FAMILY HOME / SCHOOL OR PLACE OF EMPLOYMENT / COMMUNITY FACILITY / RELIGIOUS FACILITY / RESTAURANT OR FOOD VENDING LOCATION
Purpose of Question	Assesses location where meals occur.

Data Collection:

- Remote Sensing – Sources for local cultural information might provide generalities about meals/eating rituals.
- Local Informant – Ask person/household where the majority of meals are eaten. Ask if this location is a general trend in their community.

Question F5.	Are there official or social restrictions on particular types of food?
Choice of Answers	NONE / GOVERNMENT RESTRICTIONS ON FOOD DUE TO SOURCE (restriction of imports from a particular country) / GOVERNMENT RESTRICTIONS ON FOOD DUE TO REGULATIONS (example - no consumption of endangered species or limits on production practices) / COMMUNITY TABOO DUE TO FOOD SOURCE / COMMUNITY TABOO DUE TO NATURE OF FOOD / RELIGIOUS OR CULTURAL DIETARY RESTRICTIONS
Purpose of Question	Assesses if there are [household] restrictions on particular types of foods.

Data Collection:

- Remote Sensing – Government agencies, NGOs, local guides, or news sources might publish information on food restrictions.
- Local Informant – Ask if person/household observes any official or social restrictions on foods. If so, ask if those restrictions are commonly held throughout the community.

Question F5a.	What kind of dietary restrictions does the household observe?
Choice of Answers	KOSHER / HALAL / OVO-LACTO VEGETARIAN / LACTO VEGETARIAN / VEGAN / OTHER
Purpose of Question	Assesses type of dietary restrictions in a household.

Data Collection:

- Remote Sensing – Government agencies, NGOs, or other information about the population under investigation might provide details on religious or cultural dietary restrictions.
- Local Informant – Ask what kind of dietary restrictions a person/household observes. Ask if those restrictions are common across similar populations/communities.

Question F5a1.	Does the entire community observe these restrictions or only a portion of the community?
Choice of Answers	ALL / MAJORITY / MINORITY
Purpose of Question	Assesses proportion of the community that observes dietary restrictions.

Data Collection:

- Remote Sensing – Government agencies, NGOs, or other information about the population under investigation might provide details on religious or cultural dietary restrictions.
- Local Informant – Ask what kind of dietary restrictions a person/household observes. Ask if those restrictions are common across similar populations/communities.

Question F5b.	Does your religion/culture practice periods of fasting?
Choice of Answers	YES / NO
Purpose of Question	Assesses observance by a household of religious or cultural periods of fasting.

Data Collection:

- Remote Sensing – Government agencies, NGOs, or other information about the population under investigation might provide details on religious or cultural periods of fasting.
- Local Informant – Ask if person's or household's religion or culture has periods of fasting.

Question F5b1.	When does fasting occur?
Choice of Answers	REGULARLY (e.g., Catholic meatless Fridays) / REOCCURRING HOLIDAYS (e.g., Ramadan)/LIFE EVENTS (e.g., initiation, mourning)
Purpose of Question	Assesses timing of a household's religious or cultural periods of fasting.

Data Collection:

- Remote Sensing – Government agencies, NGOs, or other information about the population under investigation might provide details on religious or cultural periods of fasting.

- Local Informant – Ask when person's or household's religion or culture has periods of fasting.

Question F6.	Do you have the ability to produce food or raise animals?
Choice of Answers	YES / NO
Purpose of Question	Assesses ability of a household/respondent to grow or produce their own food.

Data Collection:

- Remote Sensing – Government agencies or NGOs might have information about food- and crop-producing populations or areas within a region.
- Direct Observation – Look to see if households have gardens, livestock, or other mechanisms to grow or produce food/crops.
- Local Informant – Ask if person or household grows or produces food/crops.

Question F6a.	What type of food/animals? (Check all that apply.)
Choice of Answers	GRAINS / VEGETABLES / LEGUMES / NUTS / FRUITS / HERBS AND SPICES / LARGE LAND ANIMALS / SMALL LAND ANIMALS / POULTRY / FRESHWATER FISH AND SHELLFISH / SALTWATER FISH AND SHELLFISH / MEDICINAL PLANTS / ALCOHOL / BEES FOR HONEY
Purpose of Question	Assesses types of food a household is able to grow or produce.

Data Collection:

- Remote Sensing – Government agencies or NGOs might have information about types of food and crops that are produced in a region.
- Direct Observation – Look at what types of crops, livestock, or other animals are being produced/harvested in the area.
- Local Informant – Ask what type of food a person or household produces.

Question F6a1.	Where is your food grown/raised?
Choice of Answers	RESIDENCE / COMMUNITY FARM OR GARDEN / DISTANT FARM / PERIPHERY FARM / OTHER
Purpose of Question	Assesses location of a household's food production land.

Data Collection:

- Remote Sensing – Government agencies or NGOs might have information about where household food production is conducted.
- Local Informant – Ask where person or household produces food. Ask if that condition is common throughout the local community.

Question F6a2.	What is the livestock used for? (Check all that apply.)
Choice of Answers	PROCESSED FOR MEAT / HARVESTED FOR BY-PRODUCTS SUCH AS MILK, EGGS, BLOOD, ETC. / ANIMAL SALES OR TRADE
Purpose of Question	Assesses use of livestock to produce food stuffs.

Data Collection:

- Remote Sensing – Government agencies or NGOs might have information about how households use livestock.
- Local Informant – Ask how person or household uses livestock.

Question F6b.	Who does the primary tending of crops/animals?
Choice of Answers	MEN / WOMEN / CHILDREN / EXTENDED FAMILY / HEAD OF HOUSEHOLD / PAIN LABOR / INDENTURED LABOR / UNPAID OR INTERMITTENT LABOR
Purpose of Question	Assesses who tends the crops and livestock.

Data Collection:

- Remote Sensing – Government agencies or NGOs might have information about who tends to crops/animals.
- Direct Observation – Observe garden/farm activity.
- Local Informant – Ask who tends to crops/animals and reason why.

Question F6b1.	Does the production of food require household members to be absent from the house for extended periods of time (including hunting and fishing)?
Choice of Answers	YES / NO
Purpose of Question	Assesses household routines and absences related to food production.

Data Collection:

- Remote Sensing – Government agencies or NGOs might have information about who tends to crops/animals and for how long daily.
- Direct Observation – Observe garden/farm activity.
- Local Informant – Ask who tends to crops/animals and for how long.

Question F6c.	How much of your income is from the sale of food?
Choice of Answers	MOST / HALF / MINIMAL
Purpose of Question	Assesses income level from food sales.

Data Collection:

- Remote Sensing – Government agencies or NGOs might have information about income from food sales.
- Direct Observation – Observe markets and vendors.
- Local Informant – Ask locals and vendors.

Question F6c1.	Do you use food as an alternative currency?
Choice of Answers	YES / NO
Purpose of Question	Assesses use of food for currency.

Data Collection:

- Remote Sensing – Government agencies or NGOs might have information about food used as currency.
- Direct Observation – Observe vendors.
- Local Informant – Ask locals and vendors.

Question F6d.	Where do you get your perishable food supplies? (Check all that apply.)
Choice of Answers	THROUGH SOCIAL NETWORK / FROM LOCAL PRODUCERS OR VENDORS INCLUDING LOCAL MARKETS / COMMERCIAL STORES / NGO / GOVERNMENT (INCLUDING MILITARY) / CRIMINAL ORGANIZATIONS OR VEOs
Purpose of Question	Assesses source of perishable food supplies.

Data Collection:

- Remote Sensing – Government agencies or NGOs might have information about obtaining perishable food supplies.
- Direct Observation – Observe vendors.
- Local Informant – Ask locals and vendors.

Community

Question F7.	If food distribution and access to food is controlled, who is it controlled by?
Choice of Answers	GOVERNMENT / RELIGIOUS ORGANIZATIONS / COMMUNITY LEADERS / FAMILY OR CLAN LEADER / NGOs / CRIMINAL ORGANIZATIONS / VEOs / NOT CONTROLLED / OTHER
Purpose of Question	Assesses direct control of food distribution or food access in a region.

Data Collection:

- Remote Sensing – Government agencies or NGOs might provide information on food distribution systems in a region.
- Local Informant – Ask about the food distribution system. Ask if anyone directly controls that system and access to food.

Question F7a.	Is access to food provided equally throughout the community?
Choice of Answers	YES / NO
Purpose of Question	Assesses equality of food access throughout a community.

Data Collection:

- Remote Sensing – Government agencies or NGOs might have information about how food distribution systems provide food throughout a community.
- Local Informant – Ask if food distribution system provides food equally throughout the community.

Question F7a1.	How is food allotment determined?
Choice of Answers	ONLY TO MEMBERS OR SUPPORTERS OF THE RULING GROUP OR INDIVIDUALS / UNEQUALLY BASED ON SOCIAL STATUS / UNEQUALLY BASED ON NEED / OTHER
Purpose of Question	Assesses allotment of food throughout a community.

Data Collection:

- Remote Sensing – Government agencies or NGOs might provide information about how food is distributed throughout a community.
- Local Informant – Ask how food allotments are determined.

Question F8.	Is food theft common?
Choice of Answers	YES / NO
Purpose of Question	Assesses likelihood of food theft in an area.

Data Collection:

- Remote Sensing – Government agencies or NGOs might provide information on regional food theft.
- Local Informant – Ask if food theft is common in an area. Ask if food theft is a general trend in the region.

Commercial / Industrial facilities

Question F9.	Is large-scale commercial agriculture prevalent?
Choice of Answers	YES / NO
Purpose of Question	Assesses if large-scale agriculture is prevalent [in what area? at what scale?].

Data Collection:

- Remote Sensing – Government agencies or NGOs might provide information on the commercial agriculture in the region.
- Direct Observation – Look to see if a large portion of land is used for farms, feedlots, or other large-scale agricultural endeavors.
- Local Informant – Ask if large-scale commercial agriculture is prevalent in the region.

Question F9a.	Who owns the large farms in the region?
Choice of Answers	LOCALS / NON-LOCAL NATIONALS / INTERNATIONALS / NATIONAL CORPORATIONS / INTERNATIONAL CORPORATIONS / GOVERNMENT
Purpose of Question	Assesses large-farms' ownership.

Data Collection:

- Remote Sensing – Government agencies or NGOs might provide information on the ownership of commercial agriculture operations in the region.
- Local Informant – Ask who owns the commercial agriculture operations in the regions.

Question F9a1.	Do large farms get preferential treatment for water by suppliers?
Choice of Answers	YES / NO
Purpose of Question	Assesses likelihood that large farms get preferential access to the water supply.

Data Collection:

- Remote Sensing – Government agencies or NGOs might provide information on agricultural water rights.
- Direct Observation – Look for irrigation systems. Are fields being irrigated while other sectors of the society are going without water? (Mostly N/A because of the limited scope of observation.)
- Local Informant – Ask if commercial agriculture businesses receive preferential treatment by water suppliers.

Question F9b.	What products are primarily grown on large farms in the region?
Choice of Answers	LOCAL FOOD SUPPLY / CASH CROPS FOR LOCAL CONSUMPTION / FOOD FOR EXPORT / CASH CROPS FOR EXPORT / CROPS FOR BIOFUELS / BEES FOR HONEY
Purpose of Question	Assesses dominate crops grown on large farms in the region.

Data Collection:

- Remote Sensing – Government agencies or NGOs might provide information on the agricultural products produced in a region.
- Direct Observation – Look to see if there is a dominant product being produced on large farms or in other commercial agricultural operations.
- Local Informant – Ask what is primarily produced on large farms and commercial agricultural operations in the region.

Question F9c.	Where do the products of large-scale farming go?
Choice of Answers	LOCAL / REGIONAL / NATIONAL / INTERNATIONAL
Purpose of Question	Assesses the distance that products from large-scale farming are shipped or used.

Data Collection:

- Remote Sensing – Government agencies or NGOs might provide information on commercial agriculture operation distribution.
- Direct Observation – Observe markets and truck traffic.
- Local Informant – Ask locals, large farm owners, distribution centers.

Question F9d.	What is the source of the workforce on large farms?
Choice of Answers	LOCAL POPULATION / SEASONAL MIGRANT WORKERS / LONG TERM MIGRANT WORKERS / INDENTURED LABOR (INCLUDING CONVICTS) / CHILDREN
Purpose of Question	Assesses primary workforce demographics for large farms in an area.

Data Collection:

- Remote Sensing – Government agencies or NGOs might provide information on commercial agriculture employment demographics.
- Direct Observation – Look to see who is working on large farms/commercial agricultural operations. (Mostly N/A because of the limited scope of observation.)
- Local Informant – Ask who works on large farms/commercial agricultural operations.

Question F9d1.	What is the nature of the labor on large farms?
Choice of Answers	LARGE-SCALE UNSKILLED LABOR / SMALL-SCALE UNSKILLED LABOR / LARGE-SCALE SKILLED LABOR / SMALL-SCALE SKILLED LABOR / OTHER
Purpose of Question	Assesses the primary type of labor used on large farms.

Data Collection:

- Remote Sensing – Government agencies or NGOs might provide information on what kind of labor used on commercial agriculture operations.
- Direct Observation – Look to see what kind of labor is being performed at commercial agriculture operations. (Potentially limited information.)
- Local Informant – Ask what kind of labor occurs in commercial agriculture operations.

Question F10.	Are there large-scale food factories or food-processing plants in the area?
Choice of Answers	YES / NO
Purpose of Question	Assesses likelihood of large-scale food-processing industry in an area.

Data Collection:

- Remote Sensing – Government agencies or NGOs might provide information on the food-processing industry in an area.
- Local Informant – Ask if there are large-scale food-processing plants in the area.

Question F10a.	How is the food distributed?
Choice of Answers	PROVIDED TO THE REGION / PROVIDED FOR EXPORT / OTHER
Purpose of Question	Assesses distribution of food from large-scale food-processing plants in a region.

Data Collection:

- Remote Sensing – Government agencies or NGOs might provide information on the consumers of the processed agricultural products.
- Local Informant – Ask who are the consumers of the region's processed agricultural products.

Question F10a1.	Who is the primary source of the workforce at food-processing plants?
Choice of Answers	LOCAL POPULATION / SEASONAL MIGRANT WORKERS / LONG-TERM MIGRANT WORKERS / INDENTURED LABOR (including convicts) / OTHER
Purpose of Question	Assesses demographics of food-processing plant workers.

Data Collection:

- Remote Sensing – Government agencies or NGOs might provide information on who works in the agricultural products-processing industry.
- Local Informant – Ask who works at agricultural-processing facilities.

Institutional facilities

Question F11.	Is food service a part of the institution's operations?
Choice of Answers	YES - FOOD IS PROVIDED FOR FREE TO ALL EMPLOYEES. / YES - FOOD IS PROVIDED TO SOME, BASED ON INCOME. / YES - FOOD IS AVAILABLE TO ALL FOR PURCHASE AT A DISCOUNTED OR SUBSIDIZED RATE. / YES - FOOD IS AVAILABLE TO SOME FOR PURCHASE AT A DISCOUNTED OR SUBSIDIZED RATE / YES - FOOD IS AVAILABLE FOR PURCHASE AT NORMAL RATES / NO
Purpose of Question	Assesses likelihood that food service is a component of the institution's operations.

Data Collection:

- Remote Sensing – Government agencies or NGOs might provide information on a region's institutional food service.
- Direct Observation – Look to see if any institutions have food service facilities. (Mostly N/A because of the limited scope of observation.)
- Local Informant – Ask if an institution serves food.

Question F11a.	What type of institution is this?
Choice of Answers	HOSPITAL / CLINIC / UNIVERSITY / SCHOOL / CHURCH OR MOSQUE / POLICE / FIRE DEPARTMENT / EMERGENCY SERVICES / GOVERNMENT OFFICE / MILITARY / PRISON / OTHER
Purpose of Question	Assesses functional type of the institution.

Data Collection:

- Direct Observation – Look to see the type of institution.
- Local Informant – Ask the type of institution.

Question F11a1.	What is the main source of the food?
Choice of Answers	GOVERNMENT / LOCAL POPULATION / LOCAL CORPORATIONS / MILITARY / NGOs / RELIGIOUS ORGANIZATIONS / COMMUNITY OR TRIBAL LEADERS / CRIMINAL ORGANIZATIONS AND VEOs / INSTITUTION PRODUCES ALL FOOD IT CONSUMES / OTHER
Purpose of Question	Assesses [main] source of food for the institution's food services.

Data Collection:

- Remote Sensing – Government agencies or NGOs might provide information on food suppliers to institutions.
- Local Informant – Ask locals about the food suppliers for intuitions.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

1. REPORT DATE (DD-MM-YYYY)
February 2017

2. REPORT TYPE
Final

3. DATES COVERED (From - To)

4. TITLE AND SUBTITLE
Specific, Measureable, Attainable, Relevant , and Timely (SMART) Documents: Utilized in Assessing Socioeconomic Impacts of Cascading Infrastructure Disruptions

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Tina M. Hurt, Ellen R. Hartman, Carey L. Baxter, and Natalie R. Myers

5d. PROJECT NUMBER
405479

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
U.S. Army Engineer Research and Development Center (ERDC)
Construction Engineering Research Laboratory (CERL)
PO Box 9005
Champaign, IL 61826-9005

8. PERFORMING ORGANIZATION REPORT NUMBER
ERDC/CERL SR-17-2

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Assistant Secretary of the Army for
Acquisition, Logistics, and Technology
103 Army Pentagon
Washington, DC 20314-1000

10. SPONSOR / MONITOR'S ACRONYM(S)
ASA(ALT)

11. SPONSOR / MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for public release. Distribution is unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

U.S. Army doctrine requires that commanders understand, visualize, and describe the infrastructure component of the Joint Operating Environment to accomplish the Army's missions of protecting, restoring, and developing infrastructure. The functionality of modern cities relies heavily on interdependent infrastructure systems such as those for water, power, and transportation. Disruptions often propagate within and across physical infrastructure networks and result in catastrophic con-sequences. The reaction of communities to disasters may further transfer and aggravate the burden on infrastructure and facilitate cascading secondary disruptions. Hence, a holistic analysis framework that integrates infrastructure interdependencies and community behaviors is needed to evaluate vulnerability to disruptions and to assess the impact of a disaster. Specific, Measureable, Attainable, Relevant, and Timely (SMART) documents are used to assess, measure, and predict the impact of potential infrastructural interdictions. Assessing individuals within the population allows analysis of social well-being in relation to potential cascading infrastructure failure.

15. SUBJECT TERMS
Sociology, Military; Infrastructure (Economics) – Mathematical models; Emergency management; Cities and towns; War; Natural disasters; United States – Armed Forces – Stability operations; Capability Approach; Maiduguri; Human-Infrastructure System Assessment (HISA)

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
					Tina Hurt
a. REPORT	b. ABSTRACT	c. THIS PAGE			19b. TELEPHONE NUMBER (include area code)
Unclassified	Unclassified	Unclassified	UU	280	217-373-3441