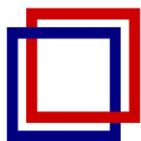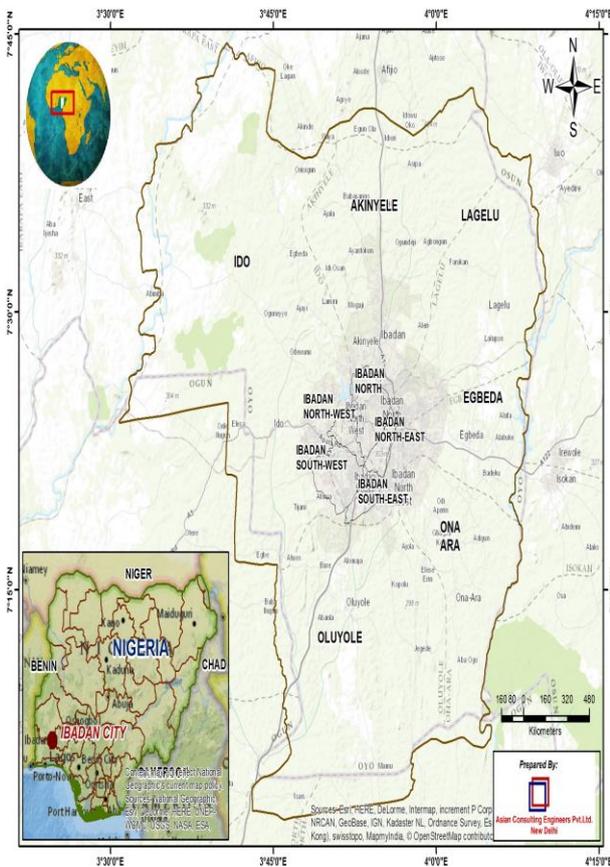# IBADAN URBAN FLOOD MITIGATION PROJECT

Consultancy Service for Baseline survey on Flood Mitigation and Resilience for Ibadan City in Nigeria.

INCEPTION REPORT

Asian Consulting Engineers Pvt. Ltd., India
In Joint Venture with
Asian Consulting Enterprises Pte. Ltd., Singapore

NOVEMBER 2017

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List of Abbreviations

%	Percentage
^{0}C	Degree Centigrade
ACE	Asian Consulting Enterprises Pte. Ltd.
CBOs	Community Based Organizations
FGDs	Focus Group Discussions
GPS	Global Positioning System
IUFMP	Ibadan Urban Flood Management Project
LGAs	Local Government Areas
m	Meter
MDAs	Ministries, Departments and Agencies
mm	Millimeter
NEMA	National Emergency Management Agency
NGOs	Non-Governmental Organization
NIMET	Nigeria Hydrological Services Agency
OSEMA	Oyo State Emergency Management Agency
PIU	Project Implementation Unit
PSC	Project Steering Committee
PTC	Project Technical Committee
RFP	Request for Proposal
SPSS	Statistical Package for the Social Sciences
sq.km	Square kilometer
ToR	Terms of Reference
WB	World Bank
GFDRR	Global Facility for Disaster Reduction and Recovery
PDO	Project Development Objective
NIHSA	Nigeria Hydrological Services Agency
SRS	Stratified Random Sampling
WCOS	Water Cooperation of Oyo State
LULC	Land Use Land Cover

1

PROJECT BACKGROUND

1

PROJECT BACKGROUND

1.1 BACKGROUND

Ibadan Urban Flood Management Project (IUFMP) is a World Bank supported project which is being implemented by the Oyo State Government, Nigeria. Overall project duration is about eight years and it was initiated in the year 2014. IUFMP contributes to the growth and resilience goals of Nigeria's Vision 20:2020 and the Country's Transformation Agenda and the World Bank's objective of reducing poverty and ensuring shared prosperity.

Given the history of flood occurrence in the city of Ibadan, the World Bank is supporting the IUFMP to improve the infrastructure of Ibadan City, especially those destroyed during the flood in August 26, 2011. The Bank's support will also aid Ibadan to reduce flood risks, improve waste collection and treatment as well as improve the quality and condition of existing infrastructural assets. The program will keep a good balance between urgent post disaster needs as well as medium to long term needs.

1.2 OBJECTIVES

The IUFMP aims to develop a long-term flood risk management framework and resilience strategy by initiating risk assessment, community awareness, and providing enough flexibility in the project design to make changes based on learning. The project also supports capacity building for flood risk management in the city of Ibadan. The Project Development objective PDO of the project is to improve the capacity of OYO state to effectively manage flood risk in the city of Ibadan. The program comprises of three components, explained in the following section.

1.3 COMPONENTS OF IUFMP

The project has three major components, they are:

1) **Flood Risk Identification, Prevention and Preparedness Measures:** The objective of this component is to assess flood risk in the city of Ibadan, plan risk reduction measures, and finance preventive structural and non-structural measures to enhance flood preparedness.

2) **Flood Risk Reduction:** The objective of this component is to ensure flood risk mitigation through structural measures by financing public infrastructure investments for flood mitigation and drainage improvements.

3) **Project Administration and Management Support:** will finance incremental operational costs related to the implementation of the project for goods, equipment, staff, travel, and Project Management Unit's consultant services.

1.4 SIGNIFICANCE OF IUFMP

The Ibadan city is experiencing an increasing number of flood events since last 50 years. The most recent flood of 26th August 2011 induced by the overflow from Eleyele reservoir causing

the death of more than 120 people and serious damages to infrastructure (many bridges collapsed, roads washed away, and substantial property loss) resulted in significant human and economic losses in the city. It is observed that a majority of urban poor in Ibadan city lives in crowded slums which are at the risk from flood events due to their location in low lying areas. Severe flood events are increasingly affecting the Ibadan city – where people and economic activities are concentrated. Ibadan the third largest metropolitan in Nigeria is highly exposed to flooding.

Recognizing the need for the integrated and long-term solution to the flooding, Oyo State government has requested the World Bank's support to finance a flood mitigation project in the city. So far, the response to the past flooding is fragmentary; mainly focusing on alleviating immediate and short-term needs such as rebuilding of damaged assets. However, in line with the global focus on disaster prevention following Hyogo Framework of Action, the Oyo State Government has realized the importance of moving from merely responding to pro-actively managing and preventing flood risk in the city. Moreover, the Global Facility for Disaster Reduction and Recovery (GFDRR)'s support following 2011 floods, primarily a small training and awareness exercise, also recommended the need for urban flood risk assessment and an urban flood risk management program. Building on these recommendations, the Government of Nigeria and Oyo State Government requested the World Bank's support to finance a flood management project in Ibadan.

1.5   OUTCOME OF IUFMP

The major outcome of the project is to develop a long-term flood risk management framework and supports capacity building for flood risk management in the city of Ibadan. The project is designed to keep a good balance between urgent post disaster needs (dredging, reconstruction of roads, bridges, etc.) and medium to long term needs (institutional support, upgrading existing and building new infrastructure to upgrade services and mitigate future risks). The project emphasizes on maximizing the benefits of the infrastructure investment to the beneficiary communities in the long run.

IUFMP activities involve medium sized civil works such as construction of infrastructure and /or stabilization or rehabilitation in and around the state.

1.6   IMPLEMENTATION OVERSIGHT OF IUFMP
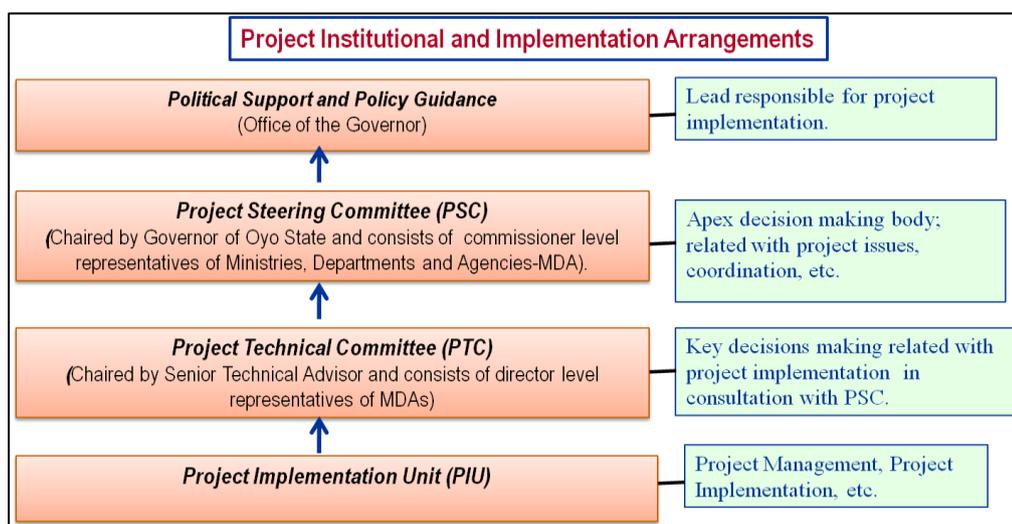
Figure 1.1: Institutional Arrangements of IUFMP

Figure 1.1 represents the institutional arrangements of IUFMP. The Office of the Governor has the lead responsibility for IUFMP implementation. It also ensures that the development objectives of IUFMP are met during project implementation. The Project Steering Committee (PSC) for flood management is an apex body for decision making related with project issues, coordination etc. It is chaired by the Governor of Oyo State and involving State Commissioners from relevant MDAs. It will also ensure that IUFMP is implemented in line with Oyo State Government's integrated flood management approach.Technical oversight and vertical coordination will be achieved through the ProjectTechnical Committee (PTC). The PTC is chaired by a senior technical advisor with appropriate technical skills and background. The Committee will also include Director levelmembers from partner state MDAs as well as representatives from relevant LGAs and Federal MDAs. The PTC will consult and involve relevant local governments, civil societyorganizations, and community representatives to ensure oversight and transparency. IUFMP is implementing under Project Implementation Unit (PIU) that is reporting directly to the PTC.

1.7 CONSULTANT'S COMPONENT OBJECTIVE

Under this project ACE has been assigned a sub-component titled "Baseline survey on Flood Mitigation and Resilience" having the following objectives:

❖ Methodology development for impact evaluation: associated with IUFMP effectiveness to check the following entities.

- Improvement in risk identification, risk prevention and preparedness.
- Increase in investments in flood risk reduction.
- Preventing flood damage and prediction of flooding event.

❖ Production of baseline data: associated with evaluating the IUFMP progress producing

- Baseline data of vulnerable sites and households.

1.8 STRUCTURE OF REPORT

This inception report presents the details approach and activities to be carried out over the time to carry out baseline study on flood mitigation and resilience. The report is organized into following chapters:

Chapter 2:	**Project Description:** This chapter describes the project (Baseline Survey in Flood Mitigation and Resilience) assigned to ACE. It focuses on the objective of the assignment, scope of work, project location, and environmental and social condition of project location. This chapter also briefs on the flood situation in Ibadan City (Project area).
Chapter 3:	**Site Reconnaissance:** This chapter discusses about the site visits are undertaken by ACE during Inception phase. It gives a general view about the condition of the site area visited and the initial work started by ACE.
Chapter 4:	**Approach and Methodology**: This chapter discusses the steps, methodology, instruments, tools, protocol etc that will be followed to carry out baseline survey.
Chapter 5:	**Deliverables and Schedule:** The deliverables and time schedule for each of them is clearly shown in this Chapter.

2

PROJECT DESCRIPTION

2   PROJECT DESCRIPTION

2.1.   INTRODUCTION

Under the program IUMFP, baseline survey on flood mitigation and resilience is being carried out with an aim to generate data/information and identify vulnerable households and locations. In order to carry out baseline survey, IUFMP has retained Asian Consulting Enterprises Pte. Ltd. (ACE).

This baseline survey (hereafter termed as "Project") will help in tracking progress of IUFMP and aid in comparing the vulnerability status during the project completion phase, evaluate impacts of future events, and facilitate learning.

2.2.   OBJECTIVES OF THE PROJECT

There are two major objectives of the project, they are:

❖ Methodology development for impact evaluation: It is associated with IUFMP effectiveness to check the following entities:

▪ Improvement in risk identification, risk prevention and preparedness.
▪ Increase in investments in flood risk reduction activities /interventions.
▪ Preventing flood damage and prediction of flooding events.

❖ Production of baseline data that informs the selection of investments by identifying vulnerable sites and households and serves as benchmark for evaluating how IUFMP improves the capacity of Oyo State to effectively manage flood risk in Ibadan city throughout the project's lifecycle. This objective is associated with evaluating the IUFMP progress by producing baseline data.

2.3.   SCOPE OF WORK

The study is concentrated on two major elements, they are:

• Documents' Review, and
• Household Survey.

2.3.1   Documents Review:

Principle focus of this element is to identify current status of flood risk identification, prevention, preparedness and investments in the Ibadan city. This element is associated with Component 1 of IUFMP. Major tasks included in this element are: review of policy documents and secondary literature; conducting interview with key informants, and conducting focus group discussions. Documents will be reviewed to gather the information on following attributes (but not limited to):

• Existing plans and policies related to flood risk management.
• Role and responsibilities of different Ministries, Departments and Agencies (MDAs) in flood risk identification, prevention and preparedness.
• Degree of adherence to performance contracts by relevant MDAs.

- Digitized asset data inventory and their condition/operation/management needs.
- Resource allocation in Government Plans for assets management.
- Number and percentage of flood risk reduction structures and their effectiveness.
- Rate and timeliness disseminating flood warning information.

Specific tasks associated with documents review are:
- Development of a protocol for documents review, including review of policy documents, expert interviews and focus group discussions.
- Preparation of a repository of existing policies and secondary data for the policy review.
- Expert interviews and focus group discussions.
- Analysis of policy review to identify the current status of flood risk identification, prevention and preparedness.

2.3.2   Household Surveys:

Socio-economic data would be collected to examine exposure, vulnerability, and socio-economic impacts. This socio-economic data will be collected through household surveys. Major outcome of this survey is to determine the current living conditions and vulnerability to flood events of the affected communities. A geo-referenced household surveys will be carried out leading to recording of geographic coordinates of households and urban facilities. The Household survey would cover following five sections:

- Household structure, location and demography: It would provide information on householder members, gender, age, education level, occupation etc.
- Household economic activities: This section would cover information on income sources, travel time to working place, working time, income earned over 12 months of time etc.
- Housing quality: In this section information on house types, housing materials, house conditions, preventive measures to protect from flood etc. would be collected.
- Exposure to past flooding and their impacts: The information would also be collected related with damages to housing and assets, damage to public infrastructure, travel disruptions, days not at work, loss of income, days not at school, amount spent on reconstruction of house, important funding needs after floods, major problems during floods, availability of water, health impacts from floods, health expenditures, access to finance after floods, government assistance provided, etc.
- Preparedness and adaptation during, and after flooding events: In this section, the information related with early warning system, location of shelters and urban facilities etc. would be collected.

The specific tasks related with household surveys are:

- Development of detailed questionnaire to carry out household surveys.
- Capacity development of field enumerators through training and pre-testing of the developed and revised survey instrument.
- Development of data postcode and codebook and to collaborate with IUFMP in the revision of the codebook.
- Supervise the data collection and data entry.
- Development of methodology and protocol for data analysis.

- Determine the living conditions of households in city of Ibadan and their current vulnerability to flooding events based on survey.
- Preparation of geo-spatial database of public infrastructure (including existing flood risk reduction installations) and households.

2.4.   PROJECT LOCATION

The project location is Ibadan city of Oyo State which lies in South-Western Nigeria. The Constitution of the Federal Republic of Nigeria provides three levels of government, the Federal, State and Local levels. There are 36 States in Nigeria, which form the second tier of the administrative structure while local government is the third tier of the administrative structure in Nigeria. There are eleven Local Governments Areas (LGAs) in Ibadan Metropolitan area consisting of five urban local governments and six semi-urban local governments. Five LGAs are Ibadan North East, Ibadan North West, Ibadan South East, Ibadan South West and Ibadan North. Six semi-urban local governments are Akinyele, Ido, Lagelu, Egbeda, Oluyole and Ona-Arka. These LAGs are institutions created by the military governments but recognized by the 1999 constitution of Nigeria. It is the largest indigenous city in tropical Africa.[1] It lies close to the boundary between forest and grassland at latitude 7° 27' 35'' to 7° 18' 36'' and longitude 3° 49' 50''to 3° 57' 15''. It covers an area of 3,145.96 square kilometers. The location map of Ibadan is given below in **Figure 2.1.**

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[1] Ibadan Urban Flood Management Project (IUFMP), 2013, Resettlement Policy Framework, Oyo State Government.
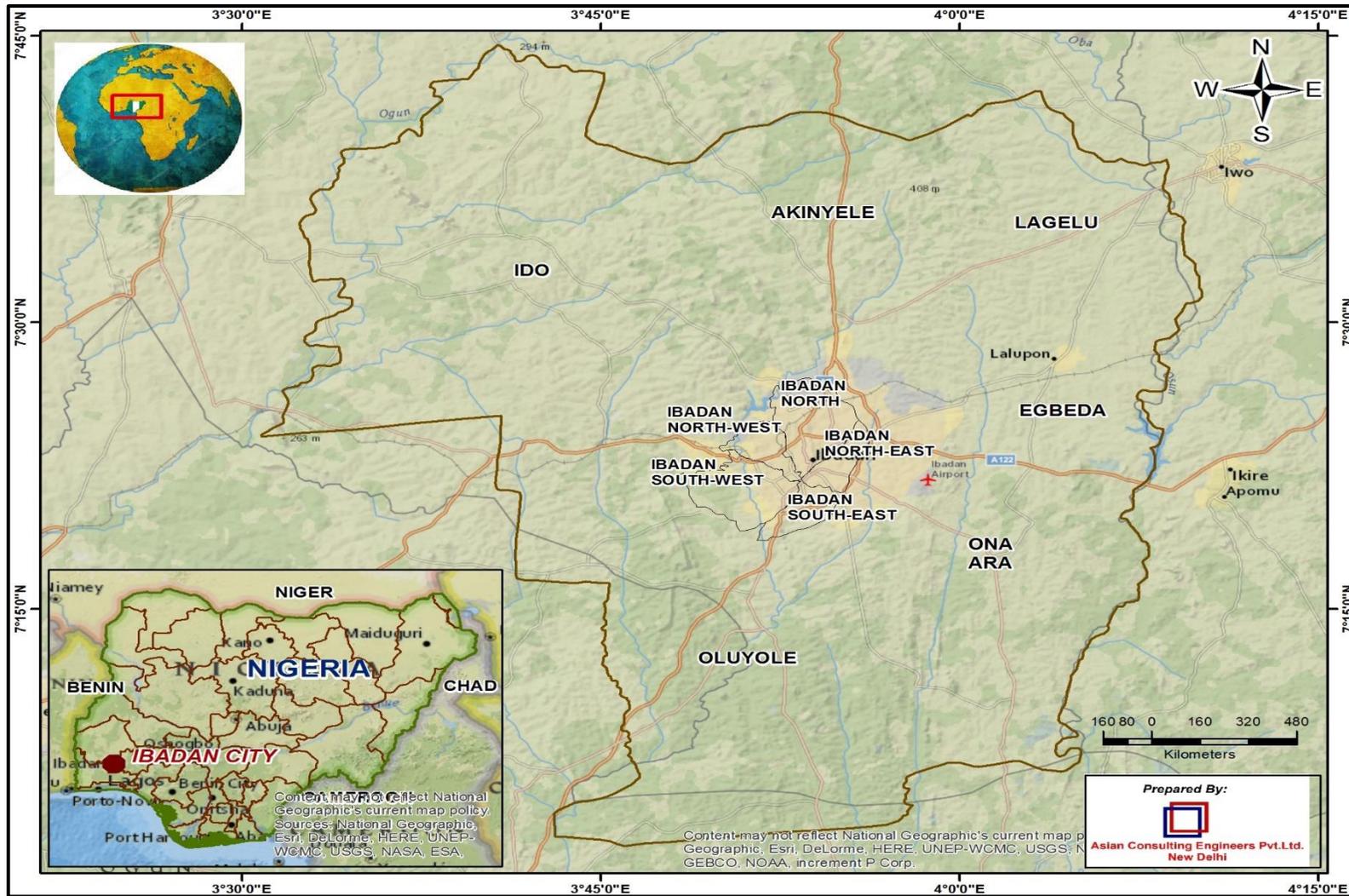
Figure 2.1: Location of Ibadan

2.5.   BASELINE INFORMATION

2.5.1   Demographic Profile

Ibadan is the capital of Oyo State and is the third largest metropolitan area of Nigeria after Lagos and Kano. It comprises of almost 45% of Oyo State's population. As per the data provided by the National Population Commission of census 2006, the total population of the 11 LGAs of the city was 2,559,923 with a growth rate of 3.2%. With this growth rate, the population in year 2017 is projected to be 3,619,958. The total area of the city is 3145.98 square kilometers, of which about 15 per cent is urban and the remaining 85 per cent is classified as Semi-urban. The population grew from around 60,000 in the early 1800s to 200,000 in 1890, and to a million by 1930, the population is projected to reach 6 million by 2033.[2]This increase in population increases the cost of infrastructure development, operations, and maintenance; reduces the urban efficiency and quality of life, and accelerates the loss of agriculture lands.

2.5.2   Infrastructure

The rapid urbanization over the years have increased substantial pressure on the social services and urban infrastructure. The inadequate infrastructure and social service provision in the city leads to ineffective emergency management. This is pronounced in informal settlements leading to increased vulnerability to disease and injury on the urban poor, particularly women and children. The economic crisis along with the natural hazard and other factors, including corruption, results in poor provision of basic infrastructure and facilities in the city. This inadequacy is translated to risk inequality within the city and localities.

The poor infrastructure in the city give rise to issues like poor water supply, electricity supply, poor waste management etc. The poor management of waste disposal has led to uncontrolled and direct dumping of solid wastes in open dumps, wetlands and river. The city has an extensive drainage network which has facilitated the use of surface waters for waste disposal. This is recognized as one of the most critical problem as the use of the rivers and drainage channels for solid waste disposal is damaging the river channel of the city, which triggers flooding.

2.5.3   Environment

The total area occupied by Ibadan is 3,145.96 sq.km which is nearly 11.8% of the Oyo state. The elevation of the city ranges from 150 m in the valley area to 275 m on the major north-south ridge which crosses the central part of the city. The climate of the city is characterized by tropical wet and dry with a lengthy wet season and relatively constant temperature throughout the course of the year. City's wet season runs from March through October with a low downpour during August month. The low rainfall in the month of August divides the wet season into two parts i.e. from March to July and September to October. City's dry season is from November to February, during which it experiences the typical West African climate. The mean total rainfall of the city is 1,420 mm falling in approximately 109 days. The peak rainfall occurs during the months of June and September. The mean maximum temperature of the area is 26.46^0C whereas the minimum temperature is 21.42^0C and relative humidity is 74.55%. It is estimated that mean monthly maximum temperatures of the area will increase by 1.2 to 1.4°C in the years 2040 to 2060. Similarly, it was projected that Ibadan will experience

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[2]Oyo state Ministry of Budget and Planning, Macro-Statistics Department, 2013 (cited in Agbola, 2013, p. 42).

changes in rainfall distribution with an overall increase in annual rainfall by mid-century (2040–2060).[3] As per Adelekan, 2012[4], the high-wind events have increased in Ibadan over 1998-2008 periods as compared to the 1989-1998. These small-scale events can trigger high losses, particularly where housing and other infrastructure is of poor quality.

Ibadan comprises of three major types of landforms viz. plains, rivers and hills and lies mostly on lowlands. The city is drained by a dense network of rivers and streams, most of them are seasonal such that volume of water is reduced during the dry season and increased when the rain on-sets. The built-up area of the city is drained by three North South flowing river streams, namely, River Ona (western), river Ogunpa (central)and river Ogbere (eastern) that flows through the city. The network of rivers and streams is extensive throughout the city as a result of a combination of the topography of the area and the tropical monsoon climate. Ona River drains in the Western part of the city with its numerous tributaries such as Alalubosa, Oshun and Yemoja streams. The major tributary of Ogunpa River is Kudeti River, which drains in the Eastern part. The western part consists of newly developed settlements and other developments. The Ona River is the longest river of the city and has the biggest catchment. Rapid urbanization, deforestation, siltation, waste disposal and appropriately designed culverts obstacle in the flow passage of the river increasing the frequency of flash flood events. The Ona River comprises of two reservoirs Eleyele reservoir and Moniya reservoir. The Eleyele along with Asejire dam supply water to Ibadan City. These two dams supply to three water works operated by Water Cooperation of Oyo State (WCOS). The water supply capacity of the dams per day are:

- Asejire: 82,000 m³/day

- Osegere: 13,500 m³/day

- Eleiyele: 33,000 m³/day

These reservoirs are damaged by previous floods, siltation and waste disposal, which impose several risks to downstream settlements. Ogunpa River is the smallest river among three. Both Ogunda and Ogebe River join Ona River in the south of the city. Issues like siltation, poorly designed culverts are associated with these two rivers also.

There is a geometric increase in the population and physical expansion of the city. Settlement on unstable and risky flood prone areas such as along Ogunpa, Kudeti, Ogbere and Orogun floodplains and hillside of Oke-Are, Oke-Aremo, Sapati and Mokola hills in the center of the city have further resulted in the poor management of urbanization and also lead to flooding risk. This phenomenon is partly responsible for the Ogunpa flood disasters and soil erosion. Vulnerability to natural disasters increases due to lack of comprehensive water and sewage systems within the city core residential areas, inadequate garbage collection and disposition and unstable urban environments. The drainage map of the city is given in **Figure 2.2**.

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[3]Adelekan, I., Olajide-Taiwo, L., Ayorinde, A., Ajayi, D. and Babajide, S. (2014). Building Urban resilience: Assessing Urban and Peri-urban Agriculture in Ibadan, Nigeria. [Padgham, J. and J. Jabbour (eds.)]. United Nations Environment Programme (UNEP), Nairobi, Kenya.
[4]Adelekan, I.O. (2012). Vulnerability to wind hazards in the traditional city of Ibadan, Nigeria. *Environment and Urbanization* 24(2): 597–615.
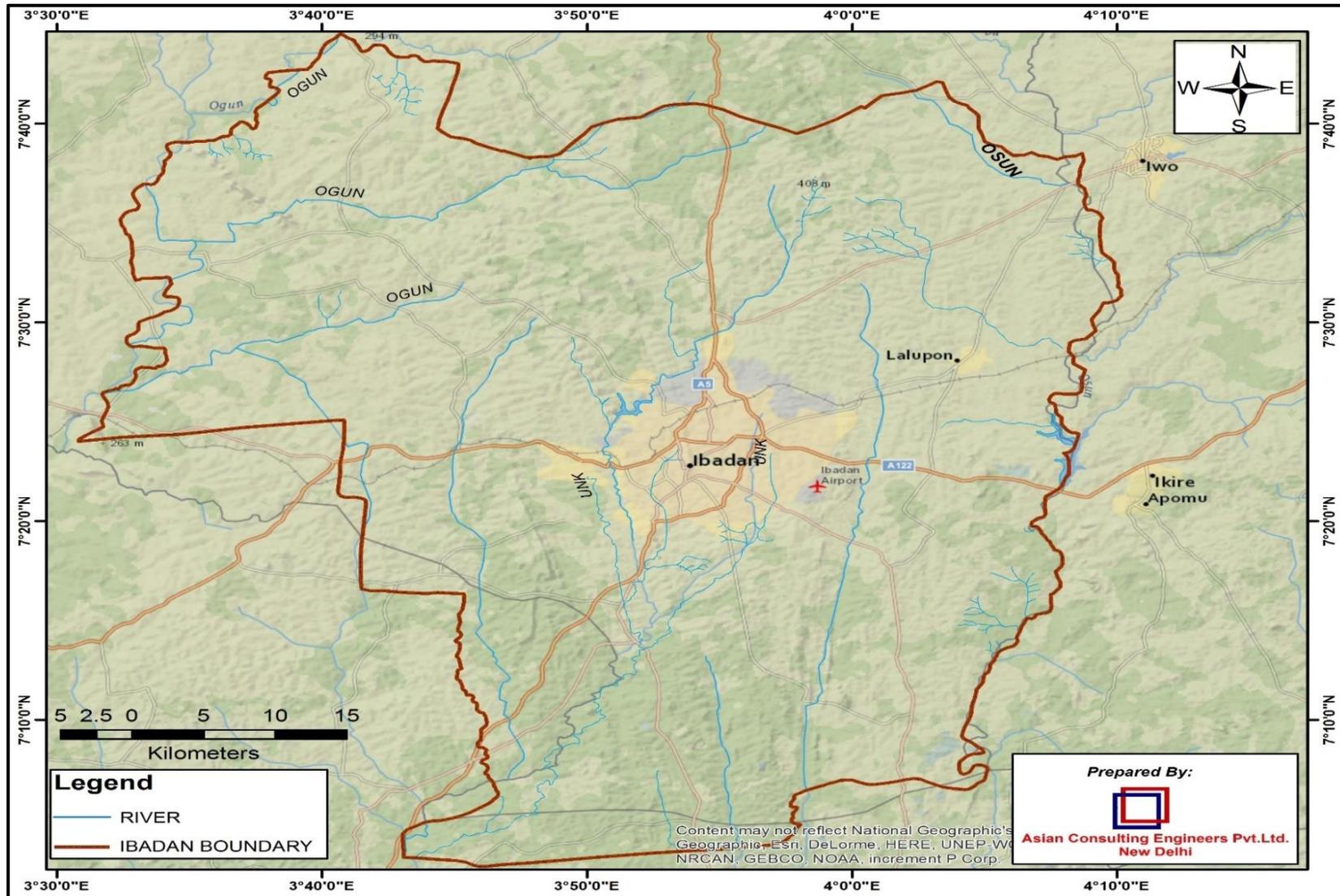
Figure 2.2: Drainage Map of Ibadan City

2.6. FLOOD VULNERABILITY:

Ibadan city is experiencing increasing number of flood events since last 50 years. Main cause of flood in the city is the changes in local climate and environment brought in by urban development.[5] Significant reasons for flood occurrence in the city are as follows:

- The dense network of rivers and streams.
- Heavy rainfall.
- Drainages condition (lack of proper drainage infrastructure).
- Construction of buildings within setbacks.
- Poor management of floodplain and river channel.
- Solid waste disposal in rivers and drainage channel.
- Bridges over the streams act as temporary dam due to blockage from solid waste.
- Construction of buildings within setbacks.
- Low land elevations.
- Growth of weeds and grass in channels.
- Rapid urbanization.

The flood events in Ibadan are associated with varying degrees of physical, social and economic impacts and losses.

Past flood events recorded during various years along with details of incident rainfall, estimated damages and losses in Ibadan city are given below in **Table 2.1**:

Table 2.1: Past Flood Events in Ibadan City

Date	Rainfall (mm)	Estimated damage to properties	Estimated Losses
27–28 August 1963	258	Tens of thousands of naira	At least 2 persons
14 May 1969	137	Tens of thousands of naira	At least 2 persons
1973 (undated)*	Unknown	More than 100,000	3
20 April 1978	126	Over 2,000,000	At least 2 persons
31 August 1980 274	274	More than 300,000,000	More than 500 with over 50,000 displaced
April 1997	151		
26 August 2011	187.5	Over 30 billion	Over 100

(*Source: Agbola et al.2012[6])*

As per 'Project Appraisal Document of IUFMP[7], by World bank in 2014, flooding events in the city are a result of the following factors:

- Lack of policy framework for flood management at State level that clarifies roles and responsibilities of the relevant MDAs.
- Lack of development plans to guide urban development in the city.
- Absence of river/stream management policies, especially with regard to the maintenance of the river/stream channels and the waste disposal behavior of the city residents.
- Outdated regulations on setbacks to rivers/steams.

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[5]Adekekan 2016, "Urban Africa Risk Knowledge: Ibadan City Diagnostic Report. **Ibadan University**
[6]Agbola et al.2012, The August 2011 Flood in Ibadan, Nigeria 2, published in Int. J. Disaster Risk Sci. 2012, 3 (4): 207–217
[7]The World bank, 2014, Project Appraisal Document of IUFMP, Urban Development & Services Practice (AFTU2) Country Department AFCW2, Africa Region

- Limited resources and capacity of the 11 Local Government Authorities to manage flood risk and organize adequate flood responses.
- Focus of the Oyo State Emergency Management (OSEMA) mainly on disaster response.
- Only limited resources are allocated to disaster risk reduction and limited technical capacity in disaster risk reduction.
- Lack of coordinated emergency response between OSEMA and National Emergency Management Agency (NEMA).
- Lack of rainfall data monitoring by the State coupled with limited access to rainfall data through the Nigerian Meteorological Agency's (NIMET). NIMET only provides rainfall alerts for the south west region in Nigeria; however, this is insufficient for early flood warning purposes.

The World Bank report also states that out of 3.1 million people in the city nearly 40,200 persons (approximately 1.3%) reside in the flood prone area of the city.[8] It is imperative to increase the capacity of the State Government for up-to-date climatic/weather-related data collection, precise weather forecasting and dissemination of weather information.

2.7. PURPOSE OF BASELINE STUDY

The IUFMP baseline study is undertaken to help the OYO State Government to develop long-term flood risk management framework. The study aims at developing a methodology for impact evaluation of flooding incidents and produce baseline data that will help in selection of investments by identifying the vulnerable sites and households. This will also help the Oyo government in evaluation on how the project improves the capacity of the Oyo state to effectively manage flood risk in the Ibadan city. The Baseline Study will comprise of the following aspects:

2.7.1 **Document review:** The study would include review of key policy documents and secondary data, and conducting interviews and focus group discussions with key stakeholders to identify the current status of flood risk identification, prevention and preparedness. The key information to be collected will be identified as part of the policy review. Some illustrative examples of information collected may include:

(i) Role and responsibilities of different Ministries, Departments and Agencies (MDAs) in flood risk identification, prevention and preparedness.

(ii) Degree of adherence to performance contracts by relevant MDAs.

(iii) Rate of adoption of a digitized asset data inventory mapping including location, condition, operation and management needs, by the Governor's office and the MDAs.

(iv) Examine the extent of inclusion of the asset management plans in budgeting and allocation of resources.

(v) Existing strategies and plans which include recommendations of relevance for floods risk management, their rate of adoption of institutional reforms and investment programs recommended by these plans and strategies [as well as new adoptions under the Long-Term Flood Resilience Strategy and Integrated Flood Risk Management Masterplan to be developed under the project].

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[8] The World bank, 2014, Project Appraisal Document of IUFMP, Urban Development & Services Practice (AFTU2) Country Department AFCW2, Africa Region

(vi)   Number and percentage of flood risk reduction structures timely maintained under current investment programs.

(vii) Rate and timeliness of disseminating flood warning info.

The Policy Document Review is mainly related to Project Component 1 and Evaluation Questions 1-2. For Project Component 2 and Evaluation Questions 3-4, we require flood hazard data and socio-economic data. The flood hazard data will be developed by flood modeling integrated with the flood through this project. Socio-economic data will need to be collected through a survey and hazard data, to examine exposure, vulnerability, and socio-economic impacts. This socio-economic data will be collected through a household survey.

2.7.2   Household survey: This study involves conducting geo-referenced household surveys to determine the current living conditions and vulnerability to flooding events. A purposive sampling of sites, communities and households in the city will be conducted so as to cover the most vulnerable sites and those likely to form part of the project interventions, as well as other sites that might from a control group. Furthermore, the survey will collect geographic coordinates of household locations and urban facilities (including schools, storm shelters, hospitals, etc.). The survey is to cover five sections:

(i)   Household structure and demography (e.g. list of household members by gender, age, education, occupation), and household location.

(ii)   Household economic activities, time spent (disaggregated by travel time to working place and time at working place), incomes earned over the last 12 months, and sources of income.

(iii) Housing quality, type of house, materials used, and conditions and any preventive measures to protect housing against flood risks.

(iv)   Exposure to past flooding and other extreme events and the impacts caused by these events (e.g. damages to housing and assets, damage to public infrastructure, travel disruptions, days not at work, loss of income, days not at school, amount spent on reconstruction of house, important funding needs after floods, major problems during floods, availability of water, health impacts from floods, health expenditures, access to finance after floods, government assistance provided, etc.)

(v)   Preparedness and adaptation/coping mechanisms utilized in preparation, during, and after flooding events. Includes access to early warning and location of shelters and other urban facilities.

2.7.3   Specific Tasks

The following specific tasks would be undertaken by ACE as per SOW:

(i)   Participate and contribute in the working session in Ibadan city (date TBC) to develop a results framework for the project.

(ii)   Contribute to the discussions (via video conferences and/or email) to set up and manage a result monitoring and reporting system.

(iii) Develop a protocol for the policy document review, including review of policy documents and secondary data, expert interviews and focus group discussions.

(iv)   Prepare a repository of existing policies and secondary data for the policy review.

(v)   Prepare and conduct expert interviews and focus group discussions.

(vi)   Perform an analysis of information collected through the policy review to identify the current status of flood risk identification, prevention and preparedness.

(vii)   Prepare a database of geo-spatial data based on the collection of public infrastructure (including existing flood risk reduction installations) geo-spatial data on household location.

(viii)   Develop a household survey instrument with a detailed questionnaire.

(ix)   Lead the training of field enumerators and pre-testing of the developed and revised survey instrument.

(x)   Develop data postcode and the codebook and collaborate with IUFMP in the revision of the codebook.

(xi)   Supervise the data collection and data entry.

(xii)   Develop a methodology and protocol for data analysis.

(xiii)   Based on the methodology, analyze the collected data to determine the living conditions of households in city of Ibadan and their current vulnerability to flooding events.

(xiv)   Lead and coordinate the preparation of Draft Report for the baseline study.

(xv)   Prepare the final report for presentation based on feedback from stakeholder consultation and expert reviews.

3

SITE RECONNAISSANCE

3

SITE RECONNAISSANCE

Site reconnaissance survey and meeting with the Project Implementing Unit (PIU) were carried out by the team of Asian Consulting Engineers Private Ltd. from 11th September 2017 to 15th September 2017, to sign the agreement and to discuss the strategy for conducting baseline study. A site reconnaissance survey was conducted toobserve the prevalent situation including vulnerable areas, vulnerable communities, urban infrastructure, early warning systems in the field etc. This exercise will also help the team to carry out household survey which is a major task of the assignment. The team appreciates in particular the arrangements made by the PIU staff for a well-attended kickoff meeting, site visit and meetings with stakeholders.

3.1   SITE VISIT

Following flood mitigation structures and vulnerable sites were visited during the site reconnaissance exercise:

1.   Sasa Flood Drain

Construction of 2m × 3m double cell box culvert and ancillary structures were executed under IUFMP. The above picture shows a dumping of garbage in the newly constructed flood drains.

2.   Ola-Adua (Ona River)

Following picture shows a drainage channel Ola-Adua, which is heavily clogged due to refuse and mud. The drainage channel drains into a '2m × 3m cell triple cell box culvert' at Ola Adua.

3. Odoelewe

The following pictures show the Odoelewe Bridge. Vegetation and deposition of waste was observed in the stream.

4. Ogbere River

The bridge of 2m × 15m bridge dimension and ancillary structures at Ogbere were constructed under IUFMP. There was deposition of excessive solid waste at this site. Channels draining in the Ogbere river at the bridge were also filled up with the mud and refuse.

5. Isokun Ojoo Culvert

Isokun Ojoo culvert is a proposed 2 cells 3m × 3.5m culvert at Arulogun road. The site was marked by damaged road.

Damaged road

6. Oke Ayotuntun Culvert

Oke Ayuntuntun is a damaged culvert by 2011 flooding in the Ibadan city. A single cell 3m ×3.5 m culvert is proposed at the site. The road and drainage structures at the site were totally damaged by the 2011 floods.Temporary wooden bridge is constructed to cross the stream.

7. Ebenezeri RC Bridge

Ebenezeri RC Bridge is proposed as single -span 15 m bridge. Thesite was marked by the dumped refuse and clogged streams.

8.   Omni RC Culvert

One three cells 3m × 3.5m RC culvert is proposed for this site. The site is located in low lying area and households are vulnerable to flooding.

9.   Olorungunwa Culvert

Two hydraulic structures are being developed having dimensions of (3 × 3.5) + 2 no. (2.5 × 2.5) as Olorungunwa Culvert. The following pictures show refuse dumped streams and flood marks of 2011 flooding on the walls.

Conclusions:

Site visits of the above flood mitigation structures would help in identification of vulnerable sites and households. These would also help in designing distribution of samples for household survey. The damaged infrastructure observed during the site visit due to 2011flooding in the Ibadan city is depicted in Figure 3.1 as shown below:

Figure 3.1: Damaged Infrastructure Due to 2011 Floods in the Ibadan city

During the reconnaissance field visit, the initial task of document review was also started through identification of Ministries, Departments and Agencies (MDA) associated with flood risk identification, mitigation and preparedness.**Table 3.1** represents the name of various MDAs with their roles.

Table 3.1: Roles of MDAs

S. No	MDAs	Roles
1.	Oyo State Ministry of Environment and water Resources	Management of environmental components and water resources
2.	Oyo State Ministry of Works and Transport	Operation, planning and management of government infrastructure
3.	Oyo State Ministry of Physical Planning and Urban Development	Urban Planning
4.	Oyo State Waste Management Authority	Waste Management
5.	Oyo State Emergency Management Agency (OSEMA).	Manage emergencies and disasters
6.	Oyo State Planning Commission	Policy framework and planning
7.	NIMET (Nigeria Meteorological Agency)	Meteorological data
8.	NIHSA (Nigeria Hydrological Services Agency).	Hydrological services
9.	NEMA (National Emergency Management Agency).	Emergency Management
10.	Ogun Osun River Basin Dev. Authority	Development and management of water resources
11.	National Population Commission	Population and census data
12.	Bureau of Statistics	Providing official statistics

ACE team has received the data request letters addressed to above mentioned MDAs (**Table 3.2**). The team will collect the required information from these MDAs (but not limit to) and will review them following the developed protocols. The ACE team has visited the following MDAs/reginal centers at the time of inception site visit.

Table 3.2: MDAs Visited for Data Collection

S. No	MDAs	Data Needed	Action
1.	The Coordinating Director (Cabinet & Special Services), Office of the Governor	Roles of different MDAs in flood risk identification, prevention and Preparedness, Rate of adoption of a digitized data inventory mapping including location, condition, operation and management needs by the Governor's office and MDAs.	Data request letter submitted
2.	Oyo State Ministry of Works and Transport	Number and percentage of flood risk reduction structures timely maintained under current investment programmes	Data request letter submitted
3.	Oyo State Ministry of Environment and Water Resources	Asset management plans	Data request letter submitted
4.	Oyo State Emergency Management Agency (OSEMA).	Rate and timeliness of disseminating flood warning information Roles of different ministries,	Data request letter to be submitted

S. No	MDAs	Data Needed	Action
		departments and agencies in flood risk identification	
5.	NIHSA (Nigeria Hydrological Services Agency).	Drainage network maps of the Ibadan city, geomorphological data	Data request letter submitted
6.	National Population Commission	Census data	Data request letter submitted, census data 2006 of Ibadan city granted
7.	The Statistician General, Bureau of Statistics	Statistical data of Ibadan city	Data request letter submitted
8.	Office of the Surveyor General	Geographic information of the state, local governments, city boundary map, ward/block/LGA map of Ibadan city	Data request letter submitted
9.	Office of the Accounted General	Number and percentage of flood risk reduction structures timely maintained under current investment programmes	Data request letter submitted
10.	Water Corporation of Oyo state	Watershed management schemes and water supply schemes	Data request letter submitted
11.	Oyo State Solid Waste Management Authority	Solid waste disposal sites, data and reports	Data request letter submitted
12.	Oyo State Planning Commission	Existing strategies and plans which include recommendation of relevance for flood risk management, their rate of adoption of institutional reforms and investment programmes recommended by these plans and strategies	Data request letter submitted

4

APPROACH AND METHODOLOGY

4

APPROACH AND METHODOLOGY

The IUFMP baseline study aims to conduct a document review of key policy documents and secondary data and to undertake georeferenced household surveys of the city for determining the living conditions and vulnerability of the area to flooding events.

4.1. TOOLS AND METHODS

This chapter explains the approach and methodology that would be followed to carry out baseline survey. Based on the objective of the study the tools and methods would be applied to obtain appropriate data. The study involves both primary and secondary data/ information collection. The secondary information is being collected from concerned authorities, authorized websites etc. as per requirement. For primary data collection, various methods such as interviews, household surveys, and focus group discussion would be carried out using tools such as questionnaires, GPS etc. Using these best-known tools and methods, data/ information would be gathered and analyzed to know the baseline conditions of the study area related to flood risk identification, management and preparedness of the Ibadan city. **Figure 4.1** represents tools and methodology that would be deployed for data collection. Appropriate protocol would be developed to decipher required information for policy document review, interviews and focus group discussions.
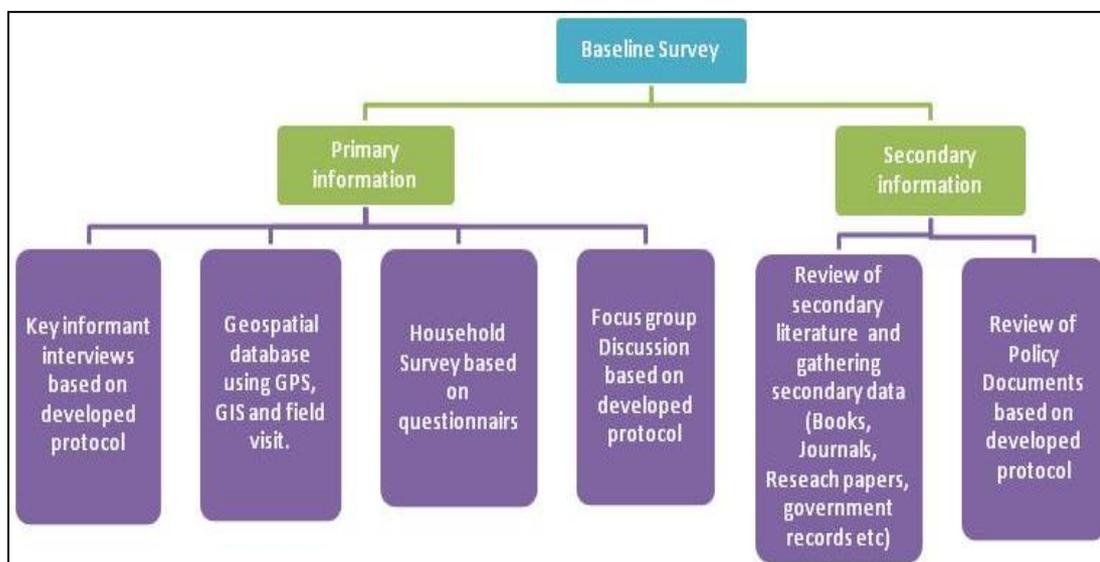
Figure 4.1: Tools and Method

4.2. STUDY APPROACH

Focusing on the objectives of the survey, activities involved in the project are divided into different tasks to collect the required information more efficiently and effectively. These tasks are as follows and presented in **Figure 4.2**.

Task 1: Participation in conference/working session.
Task 2: Development of protocol/Methodology.
Task 3: Documents Review.
Task 4: Stakeholder/experts identification.
Task 5: Key informant interviews and Focus Group Discussions (FGDs).
Task 6: Identification of present government approach to flood risk management.
Task 7: Geospatial database Design and Development.
Task 8: Development of Codebook.
Task 9: Household survey and Data Entry.
Task 10: Develop a methodology and protocol for data analysis.
Task 11: Analyzing living conditions of households in Ibadan City.
Task 12: Report writing and data presentation.
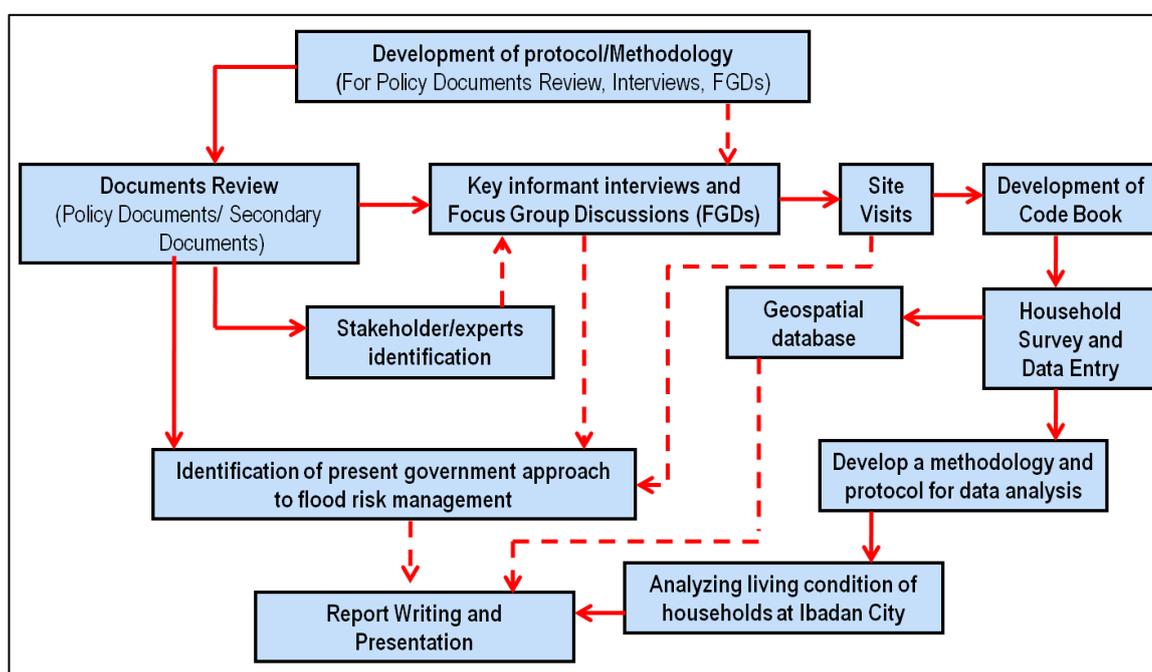
Figure 4.2: Study Approach

As already explained above, this baseline study has two major components, they are document review and household survey.

4.3.   METHODOLOGY

4.3.1   Documents Review:

During the site reconnaissance survey, document review was initiated through identification of Ministries, Departments and Agencies (MDA) associated with flood risk identification, mitigation and preparedness were identified. ACE has requested the MDAs to provide with the relevant information for development of the protocol. Further, the following methodologies would be followed for the review of documents:

i.   Development of Protocol:

In order to bring homogeneity in task performance, appropriate protocol would be developed. This protocol would comprise of research questions, study design, study area, study population, sampling design, sampling procedures, study methods, data management and analysis plan, organizations of field works, time table, references and appendixes. This

protocol would also dovetail aspects of documents review, focus group discussions and interviews with key informants. This protocol not only guides the team but also helps to perform above-mentioned activities systematically and without bias. As mentioned above the developed protocols would ensure that the collection and analysis of data are consistent, reliable, repeatable, and appropriate to address the intended objective. This would also provide room to include enough details to facilitate someone to know what, why, where, by whom, when, and how review/survey/interview to be conducted.

ii. Review of Policy Documents:

The policy documents are being collected from concerned authorities (Oyo state, and local government's areas) with the help of PIU-IUFMP. All these documents would be reviewed and listed. The main purpose behind this policy documents review is to:

- Identity Ministries, Departments and Agencies (MDA) involved in flood risk management and their accountability.
- List out the available plans and policies on flood risk management and figure out the gaps in them.
- Identify the capacity of the MDA to identify and prevent the flood risk.
- Examine the assets management plans in MDAs budgeting.
- Examine the investment plans and strategies under government plan and policies.

iii. Review of Secondary Documents:

ACE team would also review the secondary documents related to flood situation in the Ibadan city. The data / information would be collected from governments, academic institutions, NGOs/CBOs etc., in the form of books, research journals, government records, etc., associated with hydrology, rainfall, climate change, demography etc. This review would help to understand the general scenario of project area including vulnerability towards flood, past historical flood events, measures taken to deal with these events, flood prone areas etc.

iv. Key Informant Interviews:

Prior to interviews and Focus Group Discussions (FGDs), the stakeholders of the city involved in flood identification, mitigation and preparedness would be identified. Relevant stakeholders would be identified with the help of PIU-IUFMP. The key informant interviews will be carried out with experts encompassing government officials, academicians, project beneficiaries, from whom the team can collect detailed information. These interviews would be carried out with close coordination of PIU-IUFMP following developed protocol.

v. Focus Group Discussions (FGDs):

Focus Group Discussions (FGDs) allow exploring thinking of a group on particular issues, the range of opinions and ideas, and the inconsistencies and variations that exist in a particular community in terms of beliefs and their experiences and practices. FGD is an imperative part this study, as it requires collecting information from stakeholders to identify the current status of flood risk identification, prevention and preparedness. Prior to FGDs, protocol would be prepared. It will be a guiding document to carry out discussions. FGDs can be conducted more easily when the participants are homogeneous; therefore, it will be carried out in two levels;

- Project Beneficiaries of IUFMP, and
- Government Authorities (representatives from LGAs)/ CBOs/academicians etc.

Project beneficiaries are people settled in flood-prone areas of Ibadan city. There are 11 Local Government Areas (LGAs) in Ibadan Metropolis, out of which 5 are in core Ibadan City. Representatives from each LGAs would be involved in FGDs. Based on the discussions / guidance from PIU- IUFMP, FGDs events would be decided. The general idea is to involve project beneficiaries from 2 to 3 LGAs in one such event. For the successful discussion and effective outcome, participants will be limited to 7-12 depending upon the ground level situation. FGDs will be carried out in local language. The participants would be decided in coordination with PIU- IUFMP.

Local governments are the third tier of the governance in Nigeria. There are eleven Local Governments in Ibadan that comprises of five urban local governments and six semi-urban local governments. FGDs will be carried out among local government authorities, NGOs/CBOs, academicians etc. associated with flood risk management or identification etc.

The participants will be invited through PIU-IUFMP a week prior to the actual date of FGDs. They will be briefly informed about the subject matter of discussion to prepare them for the same. Each discussion would be of one hour to two hours duration. Each FGD would be properly scheduled and discussion topic would be carefully communicated. All the discussions would be documented for further analysis. In case of necessity, there could be a video recording of the event.

The Government approach towards the flood risk management would be identified based on review of policy documents, secondary documents, consultation with stakeholders, site inspection, etc.

4.3.2   Household Surveys:

Household surveys would be carried out to determine current living conditions and vulnerability to flooding events in Ibadan city. This survey will form as a current database of the socioeconomic structure of the project area, which could be used by the PIU-IUFMP over the time in its evaluation. The major objectives of household's survey include:

- To create a socioeconomic database.
- To determine living standards of Ibadan city.
- To identify past flood events, vulnerable sites, vulnerable groups/communities to flood events.
- To geo reference public and private infrastructures (households, hospitals, etc.).

ACE team would gather secondary information on households, population, communities, past flood events, loss of property/lives etc. prior to conduct household survey, which will help to understand the area, as explained above in Section 4.3.1 (under review of secondary document). The methodologies that will be followed to carry out household surveys are as follows:

i.   Questionnaires Survey:

This household survey will be carried out based on detailed questionnaire. ACE team prepared a questionnaire that is best represented to achieve the targeted results. The team ensured that the questionnaire captured all the important indicators mentioned in project development objective including the well as following aspects:

- Demographic characteristics: To provide the information on age group, gender, family size, education level, occupation, etc.

- Infrastructural capabilities: To collect data on household materials, conditions, and its quality will be collected along with the information on capacities of available structures to prevent from flood risk.
- Economic status: To learn economic activities of the study area. This is one of the indicators that would explain adaptive capacity of the individual household.
- Flood events and involvement of authorities: To understand community perception about historical flood management including past floods, flood risks, flood induced damages, socio-economic impacts, preventive measures, government involvement, private sector's interests etc.

  Preparedness and adaptation mechanism: Data would be collected on available instruments, its capacity in flood warning, mechanism utilized during and after flood events, etc.

A sample questionnaire is given in **Annexure 4.1**. For this household survey stratified sampling method would be deployed as explained below.

ii. Stratified Random Sampling Method:

Stratified Random Sampling (SRS) intends to guarantee that the sample represents specific sub-groups or strata with homogenous characteristics. The strata are collectively exhaustive without exclusion of any population element. Accordingly, application of stratified sampling method involves dividing population into non-overlapping subgroups (strata) and selecting subjects from each stratum in a proportionate manner. The stratified random sampling rather than simple random sampling produces a smaller error of estimation. This result is particularly true if measurements within strata are very homogeneous.

The SRS in the event of identification of population and areas vulnerable to flood will depend on range of variables and their interaction is intricate. Because of this complexity, analyses and estimation of flood vulnerabilities is usually based on fitting a statistical distribution to a sample of specific sub-groups or strata. The stratified random sampling will be done based on the following strata:

a) Political classification
b) Population density
c) Area Elevation
d) Drainage pattern
e) LULC pattern

In total 6000 number of household samples shall be distributed among the above-mentioned strata, and distribution within the strata will depend upon the vulnerability of flooding.

For example, there are eleven LGAs in the Ibadan city. The population densities of different LGAs can be plotted on a map. The number of samples can be selected based on the population density. The areas having higher population density shall have more number of samples and LGAs having lower population density shall have low number of samples. Based on the population data of 2006, the population Map is prepared as shown below in **Figure 4.3.**
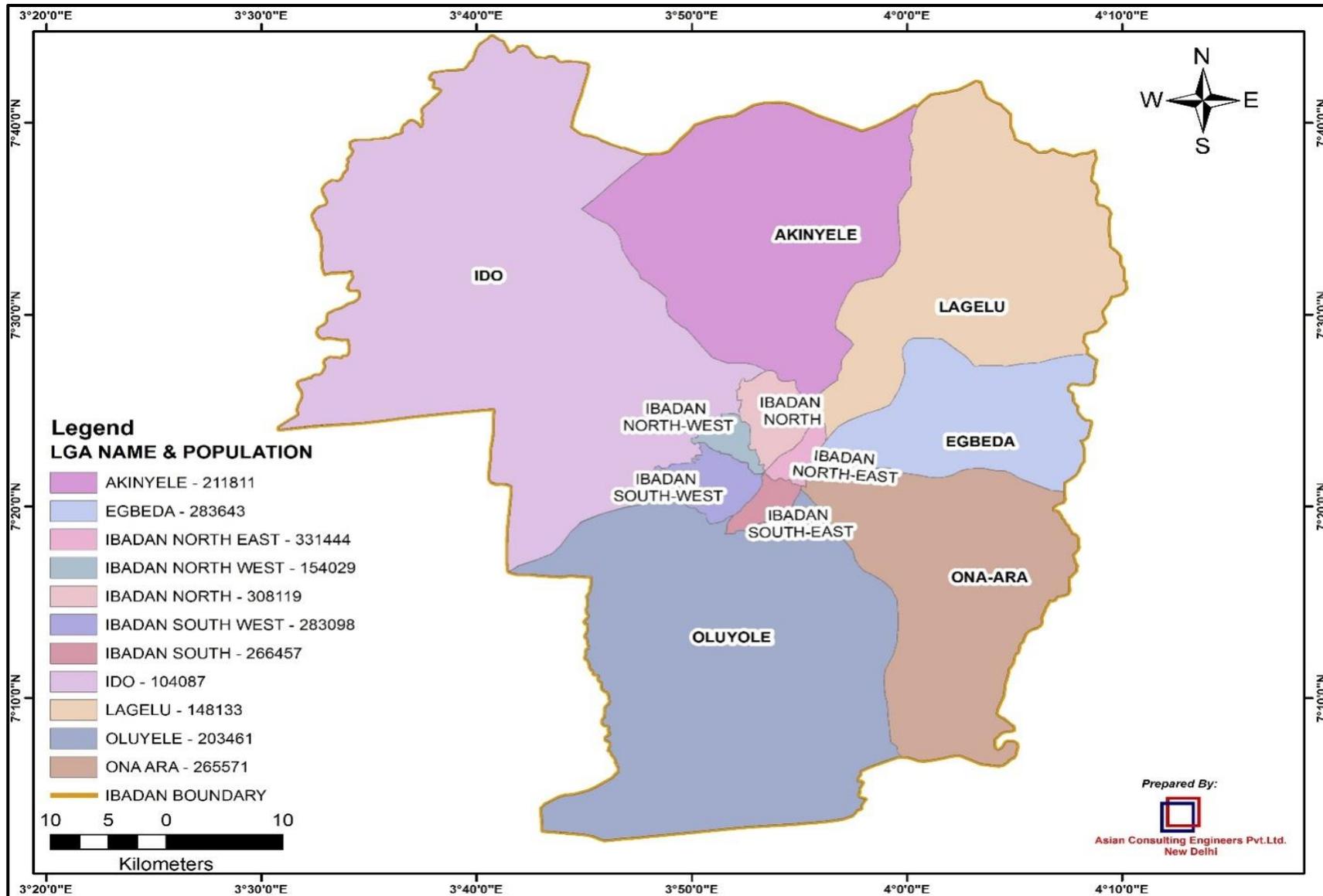
Figure 4.3. Population Map of Ibadan City

The survey team shall have 20 enumerators distributed in the 10 teams of two members each. The survey team is headed by four supervisors and one coordinator. 20 surveys shall be done by one team in a day. In this way 200 households shall be covered in a day, and 6000 households shall be covered in 30 days.

4.3.3   Geo-referencing and Geospatial Database:

Vulnerable sites, communities/groups, urban infrastructures, etc. will be georeferenced using GPS. Thus, collected data would be integrated as Geo-database for the city which would be developed using Database management software. The geo-database stores and organizes the geographic data as points, lines, polygons and attributes with which one could develop models according to real world entities. The processes flow involved in generating Geospatial database are given below in **Figure 4.4.**
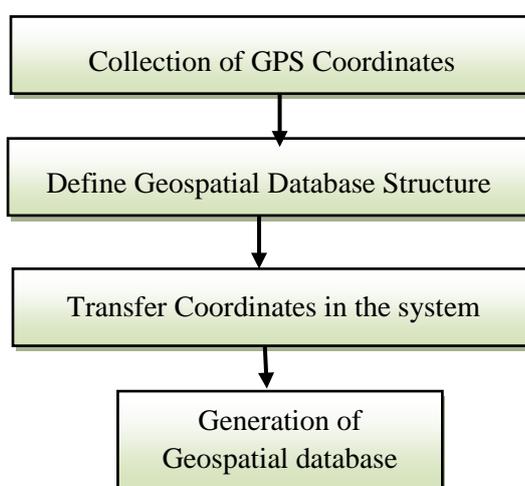
Figure 4.4: Generation of Geospatial Database

4.3.4   Quality Assurance:

Another important factor in data collection is of data quality. The survey analysis/prediction is based on the collected data quality; hence quality assurance is crucial part of the survey. Following procedures would be used to ensure high-quality data collection:

- **Emphasis on data quality during training process:** A training program will be carried out for field enumerators and the supervisors. They will be explained about survey procedure, use of mobile application, survey objectives, survey questions, protocol developed etc. The emphasis will be given to make them aware of the importance of quality of the data collection. As a follow-up dip-stick surveys may be carried out to evaluate the quality of the previous interviews in case of requirements.

- **Strict accountability:** The field enumerators and supervisors are accountable for the quality of the data collection. After the completion of each interview, the enumerators will check all recorded answers, correct any possible errors and conduct re-questioning, if necessary.

- **Easily understandable questionnaire and survey guidelines:** In order to minimize possible confusion about the questionnaire, a survey guideline would be prepared to guide the field enumerators.

- **Communication and coordination:** At the end of each survey day, the field enumerators will communicate with team members/supervisor/coordinator to share their progress of work. In case of confusion, they can contact team members/supervisor/coordinator right from the field.

4.3.5   Survey Instrument Development

As discussed during the kick-off meeting household surveys would be conducted by capturing data electronically with the help of a mobile phone application. The questionnaire would be programmed into a mobile application using appropriate software tools. The data captured by the mobile device shall be stored on a cloud server. The data saved on the cloud server could be viewed at any time by the designated user. Most of the questions have multiple options assigned with the codes. These codes are processed to assign values and stored as raw data that could analyzed by the computer software. This allows researchers to engage in data reduction and simplification. It also allows for data expansion (making new connections between concepts), transformation (converting data into meaningful units), and re-conceptualization (rethinking theoretical association).
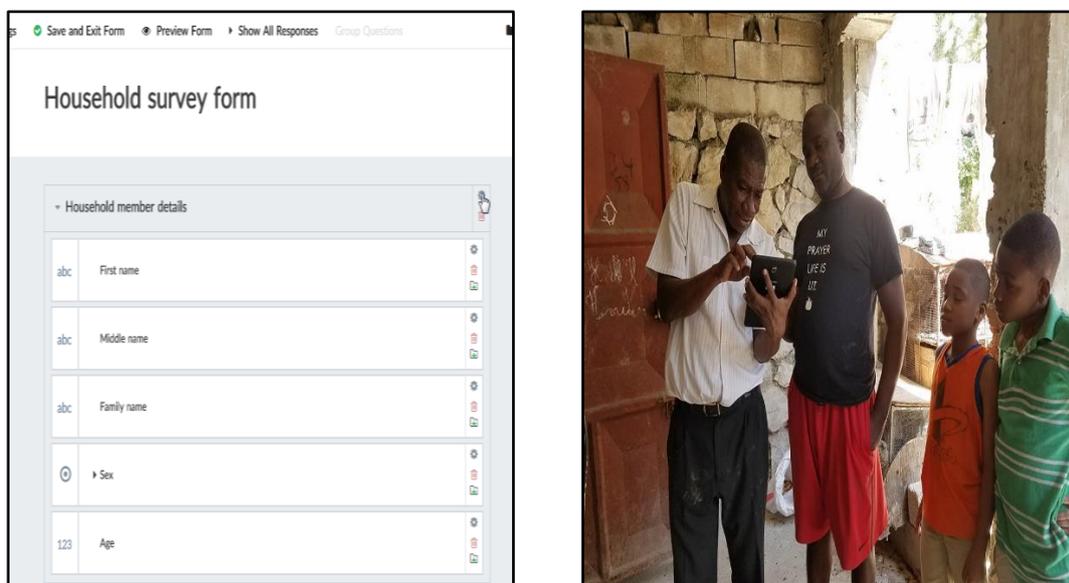
Figure 4.5:Mobile Application based Household Survey

Open Data Kit (ODK) is a tool would be used to manage mobile data collection.

Following are the merits of ODK survey platform:

1. Does not need big screen as only one question appears at one time.
2. GPS location of the Households can be captured to ensure the authenticity of data collected.
3. Real time data entry. No need to enter data manually at a later point in time.
4. ODK setup automatically sends data to could server.
5. Checks and balances are in place, to minimize data entry errors.
6. Easy data cleaning methods.

Following screenshots shows how the screen appears on ODK devices:
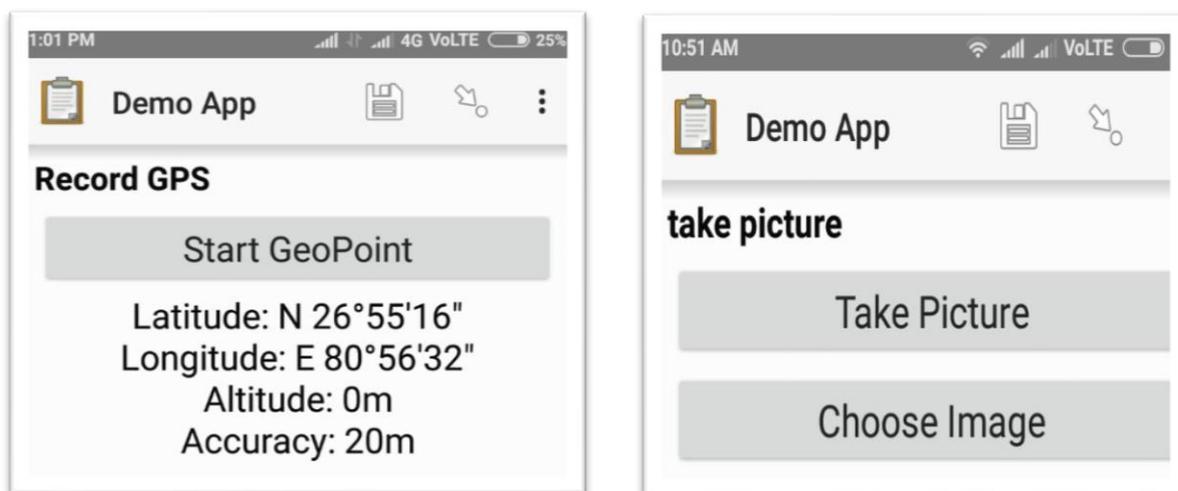
Figure 4.6: Option to insert GPS Coordinates and taking picture
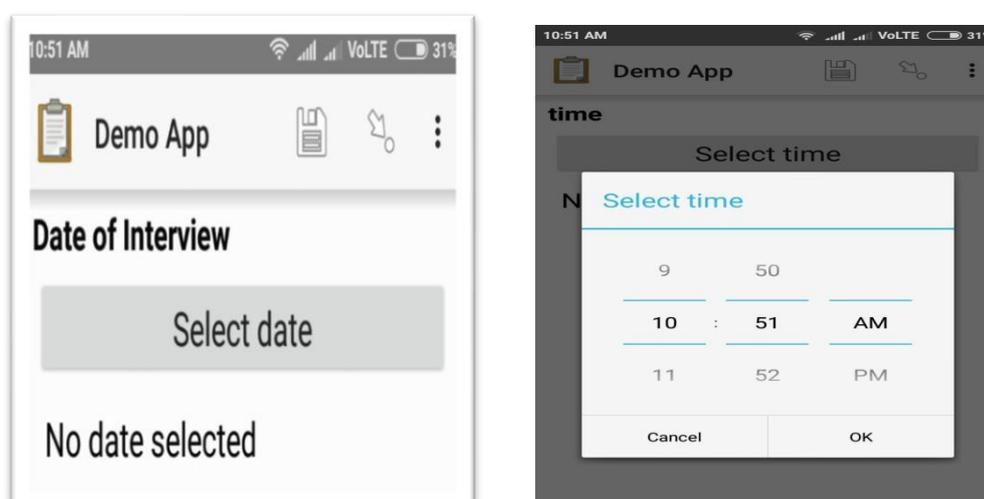
Figure 4.7: Option to Select Date and Time

4.3.6 Data Entry

The data entry will be done with help of mobile application based survey. In the app based survey the questions and answer choices will be shown on the screen which will be coded later for data extraction. This simple method means people with little or no training can enter data quickly, efficiently, and accurately. The data will be extracted in a spreadsheet format. This format lets you insert and delete records and has a search feature. The data can be imported or exported to other programs using ASCII text, CSV and Excel XLS Files.

The information collected through survey will clearly identify each household and sampling unit it belongs to along with the geographic information where the household is located. It will also store the interviewer and supervisor identification. An external file will be built to store the geographic information of each sampling unit the information stored in this external table is as follows: Village name and code, LGA name and code, Urban/Rural and the Area of responsibility code. This will help in avoiding that no household is duplicated or surveyed twice.

The Excel file for the surveyed area will be available in a secured folder. Survey administrator can access it either through his/her computer's browser or by syncing with the designated folder to computer. This file will be an analysis template. The analysis of the data

will later be done through data analysis software. The drift from the traditional survey format towards the application based surveys is widening up with the span of time, since the app based surveys are:

- More versatile. The data of survey can easily be georeferenced along with picture.

- Extensively cover the non-sampling errors. Moreover, the margin of error is greatly reduced in these surveys because the responses are directly feed into the system. Traditional methods rely on the data entry manually after the surveys are conducted and naturally human error can creep in whenever a person performs a repetitive task.

- A well-kept, accurate and easily accessible documentation of the master sampling records can be maintained through this.

- The app based surveys can get real-time or local input. We don't have to wait until the data is fed into a computer.

- The results of the online survey are ready to be analyzed at any time. The results can be viewed real-time so we can act quickly, create graphs for reporting, export data for further analysis.

Figure 4.8: Excel File Data Extraction

4.3.7 Data Analysis

Data analysis is another important part of the survey after data collection. A protocol will be prepared for data analysis. This protocol will analyze both categories questionseither open-end questions and close end.

After the completion of data entry, descriptive statistics will be generated. For each question or variable in the survey, the overall percentages, averages, modes and ranges (where applicable) will be presented in required format. The current vulnerability of the households towards the flood hazard will be analyzed based on the collected data. The team will determine the present living standard of the city through socioeconomic data, geospatial data, available flood control measures, government capabilities etc. present below in **Figure 4.9**.
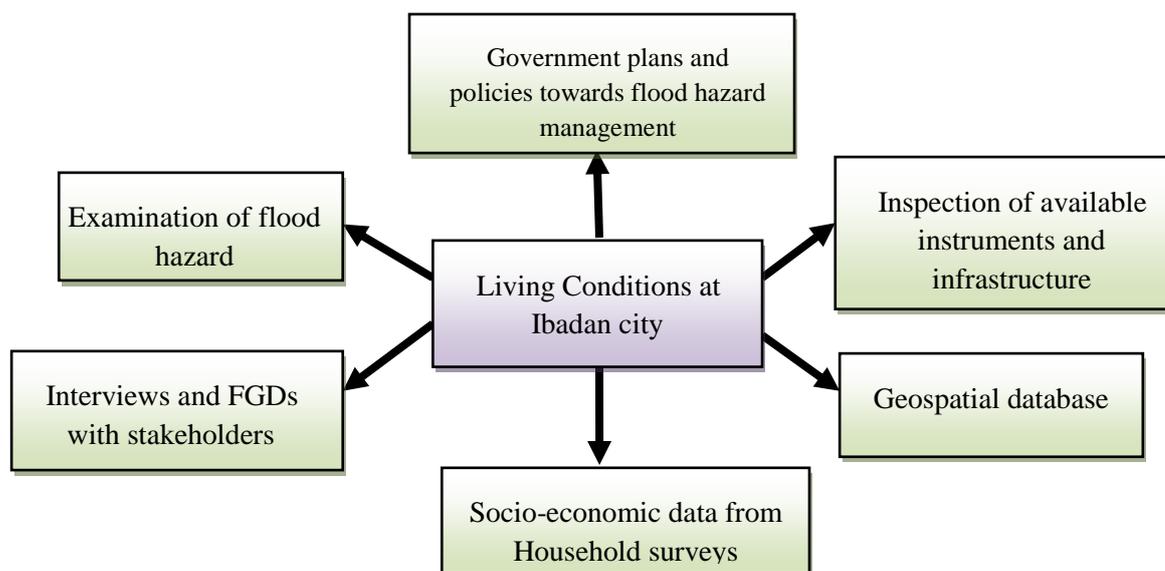
Figure 4.9: Approach to Analyze Living Conditions and Flood Vulnerability

The government capacity will be determined based on review of plans, policies and their execution. The basics approach of these reviews is to find out government involvement in flood hazard identification, preparedness and mitigation measures; their strategies; role and responsibilities; available budget; available instruments and structures, and their capabilities; capacity of the staffs; capacity to forecast flood events; communication and information dissemination system etc. Similarly, the team will inspect the available instruments and infrastructure for flood management. These structures will also begeo-referenced and its capacity will be discussed with the key experts, and other stakeholders, vulnerable households etc.

Conclusions:

Developed questionnaire is presented as annexure 4.1. This needs to be ratified by PIU-IUFMP before finalizing the same and to convert as mobile application.

5

DELIVERABLES & SCHEDULES

5 DELIVEREABLES & SCHEDULES

5.1. DELIVEREABLES

As per the RFP, **Table 5.1** shows the deliverables that will be submitted as per proposed schedule:

Table 5.1: Deliverables with Timeline

Stages	Deliverables	Timeline	Date of Submission
Stage 1	**Inception report**: Draft study approach with detailed methodology description, including preparation of survey instrument.	2 weeks	9th October 2017
Stage 2	**Draft report of baseline study** and all underlying data and information as compiled in the repository for policy review, geospatial and household database.	14 weeks	2nd January 2018
Stage 3	**Draft final report** of the baseline study.	2 weeks	15th January 2018
Stage 4	**Final Report**	2 weeks	29th January 2018

Apart from above mentioned deliverables, ACE will deliver all information/instruments use during the baseline surveys such as

- Database: household database, socio-economic database and Geospatial database;
- Repository of policy documents and secondary data; and
- Questionnaire for the household survey.

5.2. WORK SCHEDULE

The work schedule for the proposed project is given below in **Table 5.2.**

Table 5.2: Work Schedule

Sl. No.	Activity	Month 1				Month 2				Month 3				Month 4				Month 5			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	Kick off Meeting.	★																			
2	Collection and review of secondary data /documents.	▬	▬	▬	▬	▬															
3	Preparation of Approach and Methodology, Protocol for Policy review/Interview/Household surveys.	▬	▬																		
4	Questionnaire preparation (draft)		▬	▬																	
5	Submission of Inception Report inclduing Approach and Methodology and Protocols for survey and review.			★																	
6	Capacity building of field enumerators and Mock Survey			▬	▬																
7	Revised Questionnaire based on Mock survey and suggestions / comments received from Client					▬	▬														
8	Household survey						▬	▬	▬	▬	▬	▬	▬	▬	▬	▬					
9	Interviews and focus group discussion with stakeholders							▬	▬	▬	▬	▬									
10	Geospatial data collection									▬	▬	▬	▬								
11	Data Cleaning, processing, analysis and database preparation												▬	▬	▬	▬	▬				
12	Codebook development					▬	▬	▬													
13	Preparation of repository of existing policies and secondary data for the policy review.					▬	▬	▬	▬												
14	Training of M&E specialist on editing of the digitized maps							▬	▬												
15	Submission of Draft Report of Baseline Study based on analysis of the policy review and the household surveys to Client for their feedback.																★				
16	Incorporation of comments and suggestion (if any) received from Client.																▬	▬			
17	Submission of Draft Final Report including full analysis.																		★		
18	Submission of Final report for Client's approval																				★

Activity ▬▬▬

Deliverables ★

ANNEXURE 4.1
QUESTIONNAIRE FOR HOUSEHOLD SURVEY

Annexure 4.1: Questionnaire for Household Surveys

Questionnaire Code No.:	
Name of the Respondent:	
Contact Number:	
Date of interview:	
Time of interview:	
Household Address:	
Town/ Community:	
Name of the LGA:	
Name of the Interviewer:	
GPS Coordinates of House:	Latitude, Longitude and Altitude
Photograph Number:	

SECTION I: DEMOGRAPHIC CHARACTERISTICS

S.No	Questions	Choice (select one)	Codes	Response
A1	Age group (in years):	0 - 20	1	
		21-40	2	
		41-60	3	
		>60	4	
A2	Gender:	Male	1	
		Female	2	
A3	Marital status	Married	1	
		Widowed	2	
		Divorced	3	
		Single	4	
A4	Relationship with HH head	Self	1	
		Wife	2	
		Husband	3	
		Father	4	
		Mother	5	
		Brother	6	
		Sister	7	
		Son	8	
		Daughter	9	
A5	Religion:	Christian	1	
		Muslim	2	
		Traditional Religion	3	
		Others Specify	96	
A6	Ethnicity	Igbo	1	
		Yoruba	2	
		Hausa	3	
		Hausa-Fulani	4	
		Tiv	5	
		Others Specify	96	

A7	List of household members (starting with head of HH).	Age*	Sex (Male=1, female=2)	Education level**	Occupation#	Total daily working hours##	Income earned in last 12 months (Naira) ###
	1.						
	2.						
	3.						
	4.						
	5.						
	6.						
	7.						
	8.						
	9.						
	10.						

* 0 to 20 =1, 21 to 40 =2, 41 to 60 =3, >60 =4

**(Illiterate=1, Primary Education=2, Secondary education=3, Senior secondary=4, University Graduate= 5, Postgraduate=6, Others (specify)=96)

 # (Civil servant=1, Business/Trading=2, agriculture/farming=3, fishing=4, Skilled based work=5, Retired=6, Education (teaching)=7, wage labor=8, Others (Specify)=96, Child=9)

up to 5 hours=1, 6 to 8 hours=2, > 8 hours=3

0 to 50 k =1, 51 to 125 k =2, 126 to 250 k =3,>250 k= 4

S.No	Questions	Choice (select one)	Codes	Response
A8	How long have you been living in this house? (Years)	0-5	1	
		6-10	2	
		11-15	3	
		>15	4	
A9	Ownership of your house	Self-Owned	1	
		Official quarter	2	
		Rented	3	
		Other (Specify)	96	

SECTION II: ECONOMIC CHARACTERISTICS

S. No	Questions	Choice (select one)	Codes	Response
B1	Distance to your workplace?	< 1 km	1	
		2-5 km	2	
		6 -10 km	3	
		>10 km	4	
B2	Travel time to the working place?	< 15 minutes	1	
		16-30 minutes	2	
		31-60 minutes	3	
		>60minutes	4	

S. No	Questions	Choice (select one)	Codes	Response
B3	Mode of travel to go to work?	Car	1	
		Bus/public transport	2	
		Bike	3	
		Bicycle	4	
		Walking	5	

SECTION III: HOUSING QUALITY

S.No	Questions	Choice (select one)	Codes	Response
C1	Type of House	House on separate yard or stand	1	
		Traditional Hut /structure	2	
		Flat in apartment	3	
		Informal dwellings	4	
		Other(Specify)	96	
C2	How old is your household?	0-5 years	1	
		6-10 years	2	
		11-15 years	3	
		>15 years	4	
C3	What types of materials used in construction of household walls?	Cement/Concrete	1	
		Metal shingles	2	
		Tiles	3	
		Thach, bamboo, wood	4	
		Slate asbestos	5	
		Plastered cement block	6	
		Earth/Mud/Mud Bricks	7	
		others (specify)	96	
C4	What types of materials used in the construction of household roof?	Cement/Concrete	1	
		Metal shingles	2	
		Tiles	3	
		Thach, bamboo, wood	4	
		Slate asbestos	5	
		Plastered cement block	6	
		Earth/Mud/Mud Bricks	7	
		others (specify)	96	
C5	What toilet facility do you have?	Water closet	1	
		Pit latrine	2	
		Bucket/Pan	3	
		Toilet facility in different dwelling	4	
		Public toilet	5	
		Others	96	
		None	99	
	What is the source of water supply to your household?	Inside Pipe-borne	1	
		Outside pipe-borne	2	

S.No	Questions	Choice (select one)	Codes	Response
C6		Tanker supply/water vendor	3	
		Well/Borehole	4	
		Rainwater	5	
		River/stream/Pond/Dam	6	
		Others	96	
C7	Mode of household solid waste disposal? (If answer is not 3 or 4, skip to question C9).	Burning	1	
		Open dumping	2	
		Collection by private organization	3	
		Collection by government	4	
		Dumped in the nearby river channel	5	
		Burying	6	
		Others (Specify)	96	
C8	When the solid waste collection system started in your locality?	0-3 years ago,	1	
		4 – 5 years ago	2	
		>5years ago	3	
		Not Started	4	
C9	What problems you face in solid waste disposal?	No collection mechanism	1	
		No nearby dumping site	2	
		Dumping in the water bodies/ Low lying area	3	
		Others (Specify)	96	
		None	99	

SECTION IV: EXPOSURE TO FLOODING EVENTS

S.No	Questions	Choice (select one)	Codes	Response
D1	What according to you are major reasons of flood in your locality?	Heavy rainfall	1	
		Poor drainage condition	2	
		Location of house in floodplain	3	
		Growing number of households	4	
		Others (Specify)	96	
		No occurrence	99	
D2	Which parts of your assets were affected by the flooding? (If the answer is 99, skip to question D6)	House	1	
		Shop or Business	2	
		Land	3	
		Workplace / worship place	4	
		None	99	
D3	How much amount spent to reconstruct the damaged asset by the flood? (in Naira)	Up to 50,000	1	
		51,000 – 250,000	2	
		251,000 – 500,000	3	
		501,000 – 1,000,000	4	
		>1,000,000	5	
D4	Is there any finance or in-kinds assistance by the Government for reconstruction (Naira) In-kinds to be validated?	Up to 50,000	1	
		51,000 – 250,000	2	
		251,000 – 500,000	3	
		501,000 – 1,000,000	4	
		>1,000,000	5	
		No assistance	99	

S.No	Questions	Choice (select one)	Codes	Response
D5	What has been the impact of the flood event on house hold?	Disconnected access	1	
		Water in the house	2	
		Choked sanitation/latrine	3	
		No impact	99	
		Don't know	90	
D6	What has been the impact of the flood event on public infrastructure in your locality?	Road washed away	Yes or no	1 or 2
		Road got Cut off completely	Yes or no	1 or 2
		Bridges/Culverts damaged	Yes or no	1 or 2
		Electricity poles damaged	Yes or no	1 or 2
		Water supply system damaged / disrupted	Yes or no	1 or 2
		Others (Specify)	Yes or no	1 or 2
		No impact	99	
		Don't know	90	
D7	What has been the impact of the flood event on livelihood in your community? (If the answer is 99, skip to question no. E 1)	Reduced business	1	
		Eroded Farmland	2	
		Loss of working days	3	
		No impact	99	
		Don't know	90	
D8	What has been the impact on Schools? (Days lost)	0 -5	1	
		6 – 10	2	
		11 – 15	3	
		16 – 20	4	
		>20	5	
D9	What has been the impact on work days?	0 -5	1	
		6 – 10	2	
		11 – 15	3	
		16 – 20	4	
		>20	5	
D10	What has been the impact of the flood event on Livestock?	Loss of livestock	1	
		Loss of animal based food (eggs, meat, milk etc.)	2	
		Loss of draft animal power	3	
		Costly treatment of livestock	4	
		Others (specify)	96	
		No impact	99	
		Don't know	90	
D11	What has been the impact of the flood event on Health? (If the answer is 99, skip to question D13)	Cold and cough	1	
		Water borne diseases	2	
		Digestive problems	3	
		Fever	4	
		Skin disease	5	
		Stomach problems	6	
		Disturbed psycho-social behavior of people particularly women and children	7	

S.No	Questions	Choice (select one)	Codes	Response
		Others (specify)	96	
		No impact	99	
		Don't know	90	
D12	How much did you spend on the health because of floods (in Naira)?	0 – 10,000	1	
		11,000 – 20,000	2	
		21,000 – 30,000	3	
		31,000 – 50,000	4	
		>50,000	5	
D13	What has been the impact of the flood event on water (access)?	Disrupted water supply	1	
		Costly availability of water	2	
		Water contamination	3	
		Others (specify)	96	
		No impact	99	
		Don't know	90	
D14	What has been the impact of the flood event on sanitation (access)?	Lack of proper bathing place	1	
		Poor hygiene	2	
		Chocked Toilets	3	
		Others (specify)	96	
		No impact	99	
		Don't know	90	
D15	Were you provided with any assistance during or after the flood event?	Yes	1	
		No	2	
D16	If yes, who provided these assistances?	Government body	1	
		CBOs/NGOs	2	
		The Army	3	
		Foreign Government	4	
		Aid Organization (UN, Red Cross, Oxfam etc.)	5	
		Relatives	6	
		Landlords and Influential local leaders	7	
		Others (Specify)	96	
D17	If yes, what relief material they have provided you?	Food	1	
		Medicine	2	
		Clothes	3	
		Cash	4	
		Grains	5	
		Others (Specify other)	96	
		Nil	99	
D18	How did you find this support?	Very Good- clearly understand the risks and how to prevent/reduce them	1	
		Good	2	
		Satisfactory	3	
		Poor	4	
		Very Poor- don't know	5	

S.No	Questions	Choice (select one)	Codes	Response
		where to obtain any information		
D19	What difficulties you have faced in getting support?	Lack of awareness	1	
		Distance from shelter	2	
		Discrimination in distribution of relief assistance	3	
		Rude behavior of relief functionaries	4	
		Others (Specify)	96	
D20	What preventive measures have you adopted to protect your house from flooding?	Elevated platforms	1	
		Sump pump	2	
		Raised level of house	3	
		Plantation	4	
		None	99	
D21	Can you suggest immediate cost-effective measures to reduce flooding to your house?	Cleaning of Drains	1	
		Building of Culverts	2	
		Solid Waste management	3	
		Tree Plantation	4	
		Don't Know	90	

SECTION V: PREPAREDNESS AND ADAPTATION MECHANISM

S. No	Questions	Choice	Codes	Response
E1	What are the precautionary measures by government introduced in your locality?	Drainage channel maintenance	1	
		Solid waste management	2	
		Building of shelters or alternative accommodation	3	
		Culverts/bridges maintenance/development	4	
		Preparation of evacuation plan	5	
		Others (Specify)	96	
		Don't Know	90	
		None	99	
E2	Is there any early warning system of flood or hazard risk?	Yes	1	
		No	2	
		Don't Know	90	
E3	If Yes, what kind of mechanism available:	Television	1	
		Radio	2	
		News papers	3	
		Announcements	4	
		Outdoor Advertisement	5	
		Others (Specify)	96	
E4	What is the condition of these warning systems?	Well-Functioning	1	
		Not Functioning	2	
		Don't know	90	
E5	Which urban facilities you can access when affected by flood?	Public Hospital	1	
		Private Hospital	2	

S. No	Questions	Choice	Codes	Response
		Schools	3	
		Private Clinic	4	
		Traditional healing home	5	
		Storm Shelter	6	
		Other (Specify)	96	
E6	Are you aware of the World Bank funded Ibadan Urban Flood Management Project (IUFMP)? (If the answer is 2, skip to question no. E 8)	Yes	1	
		No	2	
E7	How do you know about the Ibadan Urban Flood Management Project (IUFMP)?	Visibility of work in the proximity	1	
		Newspaper advertisement	2	
		Radio/TV advertisements	3	
		Posters in government departments	4	
		Project Hoardings	5	
		Friends/Relatives working in the project	6	
		Any other (Specify)	96	
E8	Is there is any improvement in the flood mitigation in last four years? (if response is 2, skip to E10)	Yes	1	
		No	2	
		Don't Know	90	
E9	If, yes what is the improvement?	Existing and damaged roads/bridges/dams rehabilitated	1	
		New Roads / Bridges constructed	2	
		Drainage system rehabilitated	3	
		Improvement in solid waste management	4	
		Effective early warning system	5	
		Any other (specify)	96	
E10	How is the frequency of floods changed in last four years as compared to past flooding before 2013?	Decreased	1	
		Increased	2	
		No change	3	
		Don't Know	90	
E11	What are the causes of the increase/decrease in frequency of floods?	Construction of new drains	1	
		Construction of new culverts	2	
		Clean drains/streams	3	
		Choked drain	4	
		Any other (specify)	96	
E12	Which coping activities you do when your household is potentially or heavily affected by floods? (Multiple options can be selected)	Move to upper floor	1	
		Move to shelters	2	
		Migrate to other relatives in a non-flood prone region	3	
		Stay at home	4	
		Follow local leaders' guide	5	
		Others (specify)	96	
E13	From where you finance these costs? (Multiple options)	Saving	1	
		Public loans	2	
		Private loans	3	
		Relatives	4	

S. No	Questions	Choice	Codes	Response
		Relief	5	
		Others (Specify)	96	
E14	Regarding the flood risks to you and your home; how would you classify the information about flood risk and prevention available to you?	Very Good- clearly understand the risks	1	
		Good	2	
		Satisfactory	3	
		Poor	4	
		Very Poor- don't know where to obtain any information	5	
E15	What information would you like to know more about preparedness?	General emergency Preparedness	1	
		Preparing disaster supply kit	2	
		Emergency information details	3	
		Training on first-aid	4	
		Mock drills	5	
		Other (Specify)	96	