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SUDAN INFRASTRUCTURE SERVICES PROJECT

BASELINE ASSESSMENT STUDY REPORT

July, 2008

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CHAPTER 1: INTRODUCTION

1.1 STATEMENT OF PURPOSE

This Baseline Assessment Study evaluates the current social and economic conditions in five geographical areas of South Sudan:

- **A narrow corridor tracking the Juba-Nimule Road**
- **City of Juba**
- **City of Nimule**
- **Selected communities within in the City of Juba**
- **City of Yei**

These geographical areas of concern or Zones of Influence (ZOI) directly correspond to three major projects the Sudan Infrastructure Services Program (ISP) is undertaking in the transport (Juba-Nimule Road Upgrade), water (Juba Community Water Projects), and energy (Yei Energy Project) sectors.

The Baseline Assessment Study implements the Draft Performance Management Plan (PMP) submitted to USAID on March 1, 2008. The draft PMP established protocols for assessing ISP project impacts, presented proposed survey questionnaires, and created a series of outcome performance indicators to address a broad range of social and economic factors. For the current study, outcome performance indicators address socioeconomic conditions likely to be affected by the ISP projects, such as such as travel time and cost to use the Juba-Nimule Road, household incidence of acute watery diarrhea, household employment, and water and electricity expenditures. It should be noted that since submission of the Draft PMP, numerous refinements have been made to survey questionnaires and performance indicators that will be used to measure baseline and future conditions. This study reflects these changes.

Over the course of the ISP contract, changes in ZOI socioeconomic conditions will be quantified using the outcome performance indicators, the measures of change and the results of follow-up surveys and assessments as the input data. The Monitoring and Evaluation (M&E) Program will also track the contractual performance of ISP through the use of Standard Element Indicators. These indicators report the project's progress in constructing roads (i.e., kilometers of road built); installing pipelines, and training residents in public hygiene. They are not discussed further in this document, because by definition, the baseline values for these standard element indicators are zero¹.

Because the assessed projects will impact different sectors and different populations, the ISP Baseline assessment Study is subdivided into three separate baseline assessments. As the M&E Program is implemented over the next three years, the resulting information can then be used to adjust ISP and better target resources if objectives are not being fully met. Conversely, projects demonstrating strong success could be replicated in other geographical areas.

¹ Standard Element Indicators measure the progress of a project in meeting its contractual obligations; outcome performance indicators measure the effects to populations from meeting those obligations (e.g., the impact of the road on the social economy of the ZOI)

1.2 BACKGROUND ON THE ISP PROJECTS

The signing of the Comprehensive Peace Agreement (CPA) in January 2005 and its subsequent implementation has provided South Sudan with an opportunity to develop its economy through the provision of public infrastructure, investment in its human capital, and creation of an accountable and responsive government. The conflict, which has affected the region for more than 25 years, has left its infrastructure and institutions in ruins. The socioeconomic and public health problems facing the region are substantial given the large influx of returning refugees, lack of basic services and inadequate employment creation.

To assist in the region's economic development, USAID initiated the ISP, which will provide transport, water and power infrastructure, technical assistance to the region's nascent public institutions over a five year period.

The first three major projects approved and funded for implementation include:

- **Transport Sector: Juba-Nimule Road Upgrade**
- **Water Sector: Juba Community Water Projects**
- **Energy Sector: Yei Energy Project**

Each project is anticipated to confer major benefits on the targeted populations.

1.2.1 The Juba-Nimule Road Upgrade

The Juba-Nimule Road, which extends for about 200 kilometers on the east side of the River Nile connecting Juba to Uganda, is in extremely poor condition. It takes approximately five hours to traverse the road during the dry season. Conditions during the rainy season are considerably worse and the road is completely impassible at times. Paving of the road is expected to generate significant economic activity in the South. Together with improved security, the higher grade road surface will significantly reduce the time and cost for transporting goods and people from Kampala, Nairobi and Mombasa to Juba. Travel to health clinics and access to other public and private services within South Sudan should also be greatly facilitated by the new road.

1.2.2 Juba Community Water Project

The Juba Community Water Project includes Quick Impacts Projects (QIP) designed to have immediate impacts on reducing the incidence of water-borne diseases and one longer term project designed to improve public hygienic practices. During 2007, in the two-month period (January 20 and March 20) prior to the full onset of the rainy season, Juba reported 4,543 cases and 88 deaths from cholera and AWD. With an ever-increasing population, the threat of future large outbreaks of these and other waterborne diseases remains high.

The Juba Community Water Project includes four subcomponents:

- **Chlorination of Mobile Tankers at Three Pumping Stations (QIP)**
- **Community Water Storage Tank Installation (QIP)**
- **Community Daily Water Supply Program (QIP)**
- **Juba Community Hygiene Improvement Initiative**

1.2.3 Yei Energy Project

Energy supply in South Sudan is primarily limited to private generators providing electricity to individual establishments or to very small groups of customers. For all practical purposes, there is no electrical grid in the region. Under a separate program, a pilot project has been initiated in the City of Yei, which has received a 400 kw power plant and distribution system. System capacity is currently being expanded to 1,200 kw. The electricity is provided mainly to businesses, the local hospital, and for lighting the main streets at night.

The ISP energy project focuses on capacity building for the Ministry of Housing, Land and Public Utilities. Specifically, training is designed to address both the technical and managerial aspects of the Sub-Directorates as well as the State Electric Distribution Companies (SEDCs). The final task for the energy component will be to select and develop the electrification plan for several towns in Southern Sudan.

Establishing a baseline for the energy component is inherently different from the transport and water infrastructure projects. Because there is no regulatory framework in place, functioning electricity plan, nor trained staff, a baseline assessment was not possible. Structured interviews were conducted to assess the effectiveness of the training already provided by NRECA. Interviews with business customers and households were also conducted to ascertain how the power system benefited them.

1.3 OVERVIEW OF THE REPORT

Following this introduction, the report is broadly organized into five major sections: Chapter 2: Overview of Survey Methodology, Chapter 3: Juba-Nimule Road Baseline Assessment; Chapter 4: Juba Community Water Project Baseline Assessment, Chapter 5: Yei Energy Project Baseline Assessment, and Chapter 6: Conclusions and Recommendations.

Chapter 2 presents the rationale and methodology for conducting the Surveys. It also describes the process of integrating local communities into the process to obtain the maximum cooperation.

Chapter 3 presents the baseline assessment for the Juba-Nimule Road. It describes the zone of influence, presents data findings, and summarizes overall socioeconomic conditions within the ZOI.

Chapter 4 presents the baseline assessment for the Juba Community Water Projects. It describes the zone of influence for each of the community water projects and presents data findings and overall summary of baseline conditions within the ZOI.

Chapter 5 presents the baseline assessment for the Yei Energy Project. It describes the capacity building program and the analytical approach for assessing its effectiveness. Data

findings for both the structured interviews with the trainees and customers of the power station are presented.

Chapter 6 identifies the follow-up steps for fully implementing the Monitoring and Evaluation Program

CHAPTER 2: SURVEY METHODOLOGY FOR ISP BASELINE ASSESSMENT STUDY

2.1 OVERVIEW OF SURVEY METHODOLOGY

2.1.1 Introduction

The protracted war and lack of investment in public institutions have resulted in a dearth of socioeconomic and demographic data for Southern Sudan. Until the national census was conducted this past April, no census had been undertaken for the last 34 years². The data obtained for the Baseline Assessment Study will provide the first economic and social assessment of Juba, Nimule and the villages along the Juba-Nimule Road.

Other recent efforts have produced limited information on socioeconomic indicators. The World Food Program recently prepared a Crop and Food Security Assessment for Southern Sudan as well as an Annual Needs and Livelihoods Assessment. Additionally, the Government of National Unity and Government of South Sudan (GOSS) implemented a household health survey in 2006 that collected information on women's and children's health and access to water and sanitation services at the state level. None of these surveys provide information specific to the geographical areas of concern, nor would they support the outcome performance indicators that will be employed to assess the impacts of ISP projects.

Accordingly, the baseline assessment required new survey instruments to support the outcome performance indicators. Surveys were designed to obtain both basic information on the targeted beneficiary populations as well as information on socioeconomic indicators most likely to be affected by the ISP projects. The primary objective was to obtain detailed and focused profiles of the various demographic groups within the projects' ZOIs. These profiles will then become the basis for comparison when follow-up surveys are conducted after project completion.

It is recognized that indicators established in the baselines will also be impacted by other factors such as the overall development of the South Sudan. However, the ISP projects will serve as major catalysts of future economic growth and improvements in public health status in the ZOI.

² The Census data were not available in time for use in this assessment; however, in the future, census data could be used to develop survey protocols, such as selecting specific representative locations within ZOIs to sample.

2.2 SURVEY AND INTERVIEW PROTOCOL DEVELOPMENT

2.2.1 Surveys and Interviews

There are six surveys and three interview protocols for the baseline assessment of the Juba-Nimule Road project and the Juba Community Water Projects. As noted earlier, the Yei energy project will be assessed using structured interviews.³

The Juba-Nimule road project surveys and interview protocol include:

- **Community Leaders Interview**
- **Vehicle Operator Survey**
- **Paid Passenger Survey**
- **Freight Operator Interview Protocol**
- **Business Survey**
- **Market Overview Survey**

It should also be noted that in support of the feasibility study performed for the Juba-Nimule Road Project, traffic counts were taken along the road. This information is incorporated into this assessment as future follow-up surveys will include a subtask to collect traffic counts on the completed new road.

The Juba community water project surveys include:

- **Community Leader Interview**
- **Household Water Survey**

The Yei Energy project structured interviews were conducted with:

- **Trainees**
- **Yei Hospital/Schools**
- **Businesses**

2.2.2 Survey Design

The two household surveys were modeled after the World Bank's Living Standards Measurement Surveys (LSMS) to collect detailed information on consumption, expenditures, household wealth and household livelihood, in addition to information on transport activities and water and sanitation needs. The LSMS was chosen as a model because it has proven to be an effective survey instrument for collecting economic household information in developing countries.

The collection of such detailed economic household information is important for understanding the economic benefits of both the road, and water and sanitation project.

³ The surveys and interviews conducted for this Baseline Assessment Study are presented in Annex I.

These data allow researchers to compare income and consumption patterns at one point in time with income and consumption patterns at another point in time. If the intervening transport and water projects have had an impact on these variables, then any changes from one point in time to another should be reflected in the results.

The LSMS model uses pre-coded, close-ended questions. These questions are designed to elicit consistent data across households. In addition, the LSMS model uses extensive skip patterns to ensure respondents are not answering irrelevant or non-applicable questions. These features contribute to consistency and comparability of the data between households and across time.

While the household surveys were modeled after the LSMS, care was taken to ensure the questions reflected the social, political and cultural realities in Juba, Nimule and in the villages along the road. In the first stages of survey development, existing research and publications were used to shape both the questions and the pre-coded answers. For example, the list of foods for the “consumption roster” was taken from *The South Sudan Annual Needs and Livelihood Assessment, 2007* (ANLA 2007), an annual collaborative report prepared by the World Food Program (WFP), the Food and Agricultural Organization (FAO), the GOSS Ministry of Agriculture and Forestry, the South Sudan Commission for the Census, Statistics and Evaluation (SSCCSE) and the South Sudan Relief and Rehabilitation Commission. The ANLA 2007 outlines common staple foods cultivated and consumed in Central and Eastern Equatorial states, where the transportation and water and sanitation surveys are taking place. Thus, these items were used as a basis for the list of foods presented in the “consumption roster.”

In addition, several questions from the long-form questionnaire from the upcoming South Sudan Census were used as the model for the housing typologies and water collection alternatives in the surveys.

Lastly, even at the earliest stages of development, household questionnaires were informed both by regular consultations with local survey managers and international staff as well as formal meetings with stakeholders such as USAID and payam directors. These interactions and consultations helped ensure the household questionnaires were culturally appropriate and did not violate accepted social norms.

The remainder of the surveys were not directly patterned after LSMS, but were developed in a similar manner. This is because LSMS is a household-specific survey-instrument and not directly applicable to business, community resource or intercept surveys.

While a survey instrument was originally designed for the Freight Survey, which was administered to freight companies, after pre-testing (discussed below), it was determined that an interview protocol with open-ended questions would be a more appropriate research tool. This is because:

- **There are relatively few freight companies to be interviewed (between 5-10 in addition to some private drivers); and**
- **Various businesses may face significantly different cost and price realities based on the size of the business, the type of goods they ship and what kind of vehicles they use.**

In addition, open-ended questions give respondents an opportunity to describe in greater detail the challenges their companies face when operating on the Juba-Nimule road.

2.3 STAFFING OF THE SURVEY WORKFORCE

The staff administering the surveys consisted entirely of South Sudanese nationals who reside within the ZOI. A total of about 60 survey managers, enumerators and drivers were selected from an applicant pool of approximately 150. An additional seven were hired for data entry. A formal interview process was initiated and all hires were at minimum, high school graduates and fluent in English and at least one local language. Several of the survey managers had college degrees. A key requirement to be hired was residence in the villages surveyed as well as familiarity with the cultural norms of the sampled respondents.

The enumerators were not permitted to survey their own village, but were transported to other villages where they would be less likely to survey relatives or friends. The enumerators, however, were placed in villages where they would be accepted by the local population and would speak the language of the respondents. The surveys were conducted in four languages, based on the English version provided to the enumerators.

2.4 PRE-TESTING OF SURVEYS

Once all the preliminary survey drafts were developed, the M&E team set about the task of pre-testing all nine instruments. The pre-testing process took place in mid-March and consisted of field testing the survey instruments on a very small sample of the population as well as focus-grouping the instruments with the survey managers.

For the field testing, the six survey managers in Juba were first given a two-day training session in Juba, conducted by two LBG expatriate economists. Because the group was small and the survey managers were already involved in developing the preliminary questionnaires, training sessions were led using the Socratic Method. Using this method, one of the expatriate economists instructed the survey managers on how to complete the survey and allowed them to then discuss the questions and ask for clarification. During this stage, they were also able to voice any concerns they had and offer suggestions to improve the instrument.

Once the training was complete, the survey managers tested the survey on a small sample of respondents over two days. Each of the six survey managers was responsible for pre-testing the following surveys on Day 1:

- **2 Household Water Surveys**
- **1 Water Community Leaders Interview**

On the second day, the remainder of the surveys was split between the male and female survey managers. This was done in the interest of time and because the road-intercept surveys would only be conducted by the men because of safety concerns. Thus, the women were responsible for pre-testing the following surveys on Day 2:

- **2 Household Transport Surveys**
- **1 Transport Community Leaders Interview**
- **1 Small Business Survey**
- **1 Observational Market Overview**

Simultaneously, the men were responsible for pre-testing the following surveys:

- **2 Vehicle Operator Surveys**
- **2 Paid Passenger Surveys**
- **1 Freight Company Interview Protocol**

When the field pre-testing was completed, the survey managers sat down with the LBG expatriate economists to discuss: 1) how the surveys were received overall; 2) specific issues or problems with certain questions; and 3) ways to improve the surveys. The survey managers provided invaluable information on how to improve the surveys from the perspective of the enumerator as well as from the perspective of the respondent.

Based on this input, the surveys were re-drafted and then informally focus grouped again with the survey managers. During this process, the survey managers were asked about the cultural appropriateness and clarity of the newly drafted questions. The final surveys were then drafted based on their comments and suggestions.

2.4.1 Sampling and Juba/Nimule Mapping Exercise

As noted in the draft Performance Management Plan, because there are no data on domicile locations, it was not possible to obtain a preselected random sample of the households or businesses in the defined zones of influence. Therefore, a modified area sampling technique was used to obtain the most representative sample possible for both the water and transport household and business surveys. This technique involved breaking up the large population centers in Juba and Nimule into smaller sampling blocks and then into even smaller sampling sections. The sampling blocks and sections are loosely based on already existing administration for ease of identification for enumerators.

There are 55 sampling sections in Juba nine and sampling sections in Nimule. Enumerators were then responsible for sampling a fixed number of households or businesses within each sampling section using the following procedure:⁴

1. From the center of the sampling section, a pen was spun to determine the sampling direction;
2. Enumerators then used a random number sheet to count off the number of houses they needed to pass before deciding the first house to sample. For instance, if the first number in this list was “13”, the enumerator would sample the thirteenth house in the direction he or she was walking.
3. After sampling that house, he or she would continue to move down the random number list to determine which houses to sample.

Using this method, all sampling sections in Juba and Nimule were sampled for the transport household and business surveys, ensuring full geographic coverage. While this technique is considered to produce less reliable results than choosing a pre-selected random sample, it is the only technique that will produce reasonably representative results given the constraints.

The sectioning technique was not used for most of the villages along the road because their small population size ensured full geographical coverage. For the relatively larger villages

⁴ This is a modified technique from what was presented in the PMP. It is a simplified version of the original, which was deemed too complicated and time consuming.

with 1,000 to 2,000 people, survey managers were instructed to place enumerators in various parts of the village to ensure full geographic coverage.

Because the water household surveys targeted only toward certain areas of Juba, sampling for these surveys only took place within the five sections that contained these neighborhoods. These neighborhoods included Blocks A, B and C and Nyakuron in Munuki Payam, Hai Cassava in Kator Payam, and Jebel Nyok and Gabat in Juba Town Payam.

For the transport community leader interviews, local survey managers surveyed Payam directors in Juba and Nimule and village chiefs along the road. Because water surveys only cover select neighborhoods in Juba, only Boma chiefs in those neighborhoods were interviewed for the water community resource interviews.

The driver and passenger surveys are intercept surveys, in which enumerators stand at known transportation hubs in Juba, Nimule and along the road, and intercept respondents for the survey. Like the surveying techniques described above, intercept surveying is a non-probability sampling technique and prone to bias. Therefore, the interviews took place over a series of several days and enumerators were given the following rules:

1. Enumerators must ask every fifth passenger and driver to take the survey.
2. Enumerators will keep an “observational log” of each person who refuses to take the survey.

The “observational log” collected observational data on which types of respondents refused to take the survey. For example, if many women riding busses refused to take the passenger survey, then the M&E team would have knowledge of the missing demographic groups in the survey.

For the transport/freight companies, local survey managers identified all transport companies that use the Juba-Nimule road and conduct structured interviews. Interviews were conducted with eight different companies that might consider using the Juba-Nimule road once it has been rehabilitated.

2.4.2 Enumerator Training

All enumerators were thoroughly trained in all aspects of the survey administration. Training sessions were held in Juba and in Pageri and Nimule. The following summarizes these efforts.

2.4.2.1 Juba Training Course

Formal enumerator training in Juba took place from March 24 to 28. An LBG expatriate economist was the lead trainer and was assisted by four local survey managers. The 17 enumerators⁵ were formally trained from March 24 to 26, administered a practice survey on March 27 and attended a debriefing session on March 28.

During the formal training sessions, the enumerators were trained on the following surveys:

⁵ One enumerator had to be terminated on the last day of training because he did not understand the material or how to administer the survey.

- **Household Transport Survey**
- **Business Survey**
- **Market Overview**
- **Paid Passenger Survey (Males Only)**
- **Vehicle Operator Survey (Males Only)**
- **Household Water Survey**

Enumerators were not trained on the water or transport community leaders interview or the freight operator interview protocol because those were to be administered by trained survey managers.

A variety of training techniques were used during the formal training sessions. First, the LBG expatriate economist went through the surveys with the whole class. During these sessions, she explained each section of the survey and then asked the enumerators to help her fill out an example survey. She also randomly questioned the enumerators to ensure they were paying attention and absorbing the material.

Following this first training session, enumerators broke into smaller groups of four to six headed by the survey managers. In these groups, the survey managers reviewed the surveys in greater detail with the enumerators and answered any outstanding questions they had. This process reinforced the material and allowed those who did not understand certain sections an opportunity to get extra help.

Lastly, the enumerators paired up and conducted mock surveys with each other. During these mock survey sessions, the expatriate economist and the survey managers walked around and helped enumerators with outstanding questions.

Following the conclusion of the formal training sessions, each enumerator was given an extra transport household survey and an extra water household survey and told to administer them to friends or neighbors. This process helped enumerators to gain some practical experience administering the surveys to a respondent. The next day, they returned for a formal de-briefing session in which their surveys were reviewed by two expatriate economists and the survey managers.

2.4.2.2 Nimule and Pageri Training Course

The training on the road was conducted in a similar manner. During the first week, (March 24 to 26) the expat economists set up two training sessions: one in Pageri and one in Nimule. The women enumerators were trained and asked to administer the following surveys over a one week period:

- **2 Household Transport Surveys**
- **2 Business Surveys**
- **1 Observational Market Overview**

Simultaneously, the men were trained and responsible for administering the following surveys:

- **2 Vehicle Operator Surveys**
- **2 Paid Passenger Surveys**

- **2 Community Leaders Surveys**

The following week, (March 31 to April 2) a second training session was conducted in Pageri and Nimule. During this session the expat economists and survey managers reviewed the surveys administered by the enumerators and provided additional training. Actual surveying in Nimule and along the road started on April 4.

2.5 NUMBER OF SURVEYS AND INTERVIEWS CONDUCTED

The total number of surveys and structured interviews conducted for the baseline assessment was approximately 2,100, including 750 households for the Juba-Nimule Road baseline assessment and 250 households for the Juba Community Water Projects baseline assessment. The Community Leaders were interviewed regarding water and health care resources as well as demographic trends in the community. For the Juba-Nimule Road project, approximately 500 vehicle operators and paid passengers were queried on time and travel costs. Around 500 businesses and eight freight companies were surveyed and interviewed about transport impacts on business viability and costs. Finally, for the Yei Energy Project as noted above, structured interviews were conducted with a total of 24 stakeholders, including trainees, hospital and school administrators, and businesses. Approximately 150 surveys were omitted from the evaluation due to gross errors or because some sections were left blank.

CHAPTER 3: TRANSPORT SECTOR: JUBA-NIMULE ROAD UPGRADE

3.1 HOUSEHOLD SURVEY

3.1.1 Community Leaders Interview and Household Survey

A series of interviews were conducted with community leaders to obtain information on demographics and community resources. The survey managers were not able to interview all payam leaders and village elders. In Juba, the team interviewed representatives of Kator and Munuki. **Exhibit 3.1** presents the best estimates of the community leaders of the current population levels and the monthly flow of returnees for Juba, Nimule and some of the villages along the road.

Exhibit 3.1: Population and Monthly Returnee Estimates

CITY	POPULATION	RETURNEES/MONTH
NIMULE	15,062	300
JUBA	157,888	1,100
KIT ONE	5,000	950
ARU	966	500
PAGERI	1,740	970

The population for Nimule was estimated at 15,062 by the Boma chief. However, some of the numbers appear to be of limited utility. Discussions with residents and enumerators indicated that the number may be in the vicinity of 100,000. The Boma chiefs and village elders do not have records of returnees or the current population. Several of the administration departments in the smaller villages have some written records; however, frequent visits to the villages led to the conclusion that the records were not up-to-date. The numbers of returnees were not registered as well as some of the children not attending school.

According to the leaders queried, the ratio of girls to boys who attend secondary school is 49 percent to 51 percent. The average distance most children walk to get to school is 2.5 km. However this number is primarily for the students in Juba and Nimule. Those who live in the villages and are at secondary school level have to travel by motorized vehicle. There are no secondary schools in any of the villages.

According to village/payam leaders and as shown in **Exhibit 3.2**, individuals receive treatment at either public hospitals or public and private clinics. In the villages, patients rely on foreign assistance, traditional healers and churches. Along the Juba-Nimule Road, there are no public hospitals or major clinics. In Aru/Pageri there is a health unit and the church, which provide some basic health care and medicine.

Exhibit 3.2: Selected Resources in ZOI City/Villages

City/Village	Number of Post Offices	Number of Petrol Pumps	Healthcare Available	Secondary Schools
Juba	4	9	Hospitals & Clinics	3
Nimule		4	Public Hospital	2
Kit One			Foreign Assistance	
Aru			Church	
Pageri			Health Unit	

According to the interviewee, the majority of the population in Juba collects water from boreholes and water trucks. In Nimule and the villages along the road, water is collected from boreholes and from shared pumps. Leaders reported that in Juba and Nimule some individuals do pay for water. However, according to the village elders, none of the residents from the villages along the Juba-Nimule road pay for water.

3.1.2 Household Transportation Survey Results

The Household Transportation Survey was designed to collect demographic and socioeconomic data as well as information on the accessibility and cost of different transport modes (i.e. personal, commercial transport) for travel along the Juba-Nimule Road. As shown in **Exhibit 3.3**, a total of 748 households provided responses to surveys conducted in the ZOI, including households in the following towns and villages⁶:

Exhibit 3.3: Total Number of Household Responses

City	
Arapi	55
Aru	63
Juba	261
Karepi	38
Kit One	26
Loa	51
Moli	36
Nimule	168
Pageri	49
Total	748

Juba and Nimule households accounted about 57 percent of the total sample. Most of the rest of the villages along the road have populations of less than 4,000 and required much smaller samples to obtain a reasonably representative population. The following sections summarize the survey results.

⁶ In total, 750 surveys were conducted, but two surveys were either incomplete or improperly filled out and were removed from the analysis.

3.1.3 Household Demographics

3.1.3.1 Household Size and Composition

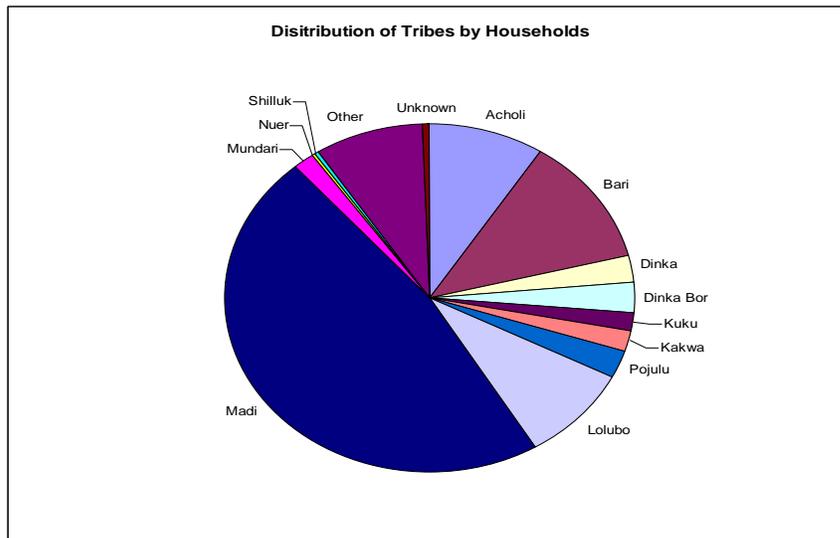
As shown in **Exhibit 3.4**, the average household size for the ZOI is 5.9; the village of Pageri has on average the smallest households (5.3 members) and Kit One village the largest households (6.5). Both Juba and Nimule have household sizes averaging six members. The female population accounted for 51.3 percent of the total surveyed population. Only in the village of Loa was the male population significantly higher than the female population (53.1 percent to 46.9 percent). The population of the surveyed households is very young, with 43 percent of the population aged 15 years or younger. Only four percent of the surveyed population is 51 years or older.

Exhibit 3.4: Household Size

Average HH Size by Location	
Arapi	5.7
Aru	5.9
Juba	6.0
Karepi	5.9
Kit One	6.5
Loa	5.8
Moli	5.8
Nimule	6.0
Pageri	5.3
ZOI Average	5.9

As seen in **Exhibit 3.5**, the Madi Tribe is the most prevalent tribe in the ZOI, accounting for 47 percent of the surveyed households. If the Juba households are removed, Madis comprise 83 percent of the population. Baris, which comprise about 29 percent of the Juba population and 12 percent of the surveyed households, are the second most populous tribe. The Acholi and Lolubo Tribes were represented by nine percent and 8.9 percent of the surveyed households, respectively. Although the Dinka and Dinka Bor populations account for only about five percent of the surveyed ZOI, the populations comprise more than 15 percent of the surveyed households in Nimule.

Exhibit 3.5: Distribution of Tribes by Households



As would be expected, based on tribal demographics, Madi is the most frequently spoken language followed by Arabic, Bari, Lolubo and Acholi.

3.1.3.2 Household Construction and Tenure

The types of housing construction vary significantly between the City of Juba and villages along the road and Nimule. Juba housing is dominated by mud houses, followed by mud-brick tukuls. In contrast, as seen in [Exhibit 3.6](#), stick tukuls are common in many of the villages. In places such as Aru and Kit One they are the dominant structures. Tents, presumably provided by UNHCR, are also common in Loa and in Kerepi, where almost 32 percent of the surveyed households reside in tents. Nimule’s housing profile more closely resembles Juba, with mud houses and mud brick tukuls accounting for the majority of houses. The vast majority of houses are owned by resident. Only in Juba and Nimule is there any semblance of a rental market. In Juba, almost 20 percent of the houses are rented, while the figure reaches almost eight percent for Nimule. In most of the villages the percentage of houses rented is one percent or less.

Exhibit 3.6: Housing Types by Location and Construction Type

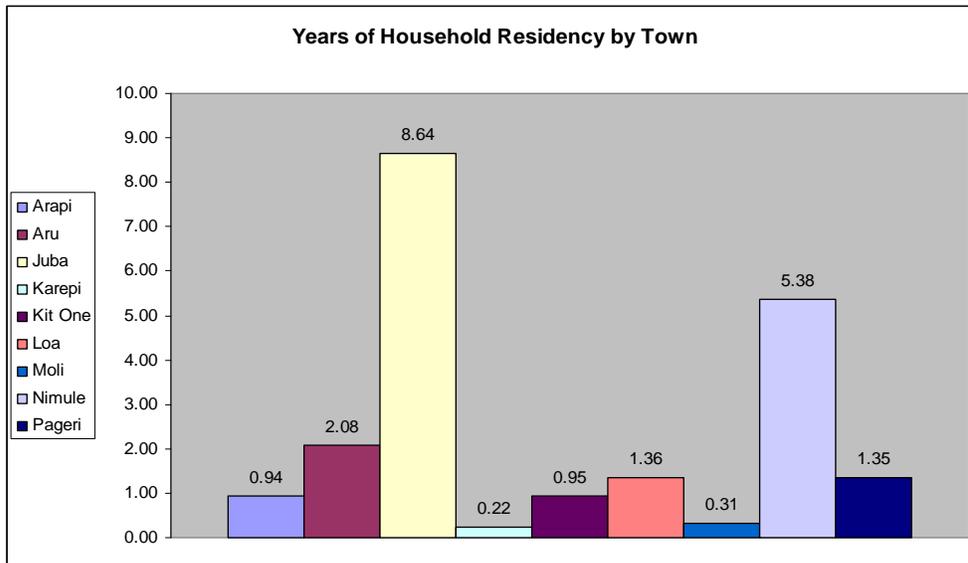
City	Mud	Concrete	Wood	Corrugated metal	Apartment	Stick Tukul	Mud Brick Tukul	Tent	Other	Unknown
Arapi	9.1%	0.0%	10.9%	0.0%	0.0%	3.6%	65.5%	10.9%	0.0%	0.0%
Aru	0.0%	0.0%	1.6%	0.0%	0.0%	46.9%	50.0%	0.0%	1.6%	0.0%
Juba	58.2%	11.9%	1.9%	4.6%	0.0%	5.7%	17.2%	0.4%	0.0%	1.1%
Karepi	5.3%	0.0%	0.0%	0.0%	0.0%	5.3%	57.9%	31.6%	0.0%	0.0%
Kit One	11.5%	0.0%	0.0%	0.0%	0.0%	65.4%	15.4%	7.7%	0.0%	0.0%
Loa	3.9%	0.0%	0.0%	0.0%	0.0%	0.0%	74.5%	21.6%	0.0%	0.0%
Moli	27.8%	2.8%	8.3%	0.0%	0.0%	13.9%	30.6%	16.7%	0.0%	0.0%
Nimule	32.7%	6.5%	1.2%	0.0%	0.6%	0.6%	58.3%	0.0%	0.0%	0.0%
Pageri	16.0%	2.0%	14.0%	0.0%	0.0%	2.0%	50.0%	14.0%	2.0%	0.0%
All Locations	31.6%	5.9%	3.2%	1.6%	0.1%	9.7%	41.5%	6.0%	0.3%	0.4%

The length of residency also varies by location and housing type. Average length of tenure across the entire ZOI exceeds 4.7 years. However, this figure is greatly skewed by households in Juba, where those have resided in their current residence on average 8.64 years. Removing Juba surveyed households from the calculation reduces average household tenure to just 1.68 years. When both Juba and Nimule are removed, the average tenure decreases even more to 0.49 years. As shown in [Exhibit 3.7](#), average residency in Kerepi and Moli is less than six months. These data correspond very well to answers provided regarding overall residency status of households. With the exception of Juba and Nimule, the large majority of households indicated they have returned to South Sudan within the last two years. In Karepi, 100 percent of the surveyed households have returned in the last year. This large disparity between Juba and Nimule and the rest of the surveyed villages is graphically depicted in [Exhibit 3.8](#). The longest residency tenures are for those residing in houses made of corrugated metal and concrete. Those living in stick tukuls and tents have the shortest tenure.

Exhibit 3.7: Tenure of Residence by Housing Type and Location

City	Mud	Concrete	Wood	Corrugated Metal	Apt.	Stick Tukul	Mud Brick Tukul	Tent	Other	Unknown	All housing types
Arapi	1.47		0.75			0.05	1.08	0.14			0.94
Aru			2.50			1.83	2.31		2.00		2.08
Juba	8.32	9.42	9.23	9.20		9.54	8.62	2.00		12.00	8.64
Karepi	0.58					0.13	0.26	0.11			0.22
Kit One	1.85					0.26	0.44	6.46			0.95
Loa	0.13						1.80	0.07			1.36
Moli	0.28	0.42	0.37			0.62	0.27	0.16			0.35
Nimule	5.61	6.81	10.01		1.19	13.00	4.95				5.38
Pageri	1.49	5.33	1.24			0.75	1.54	0.33	0.02		1.35
ZOI	6.76	8.47	3.46	9.20	1.19	3.01	3.54	0.47	1.01	12.00	4.72

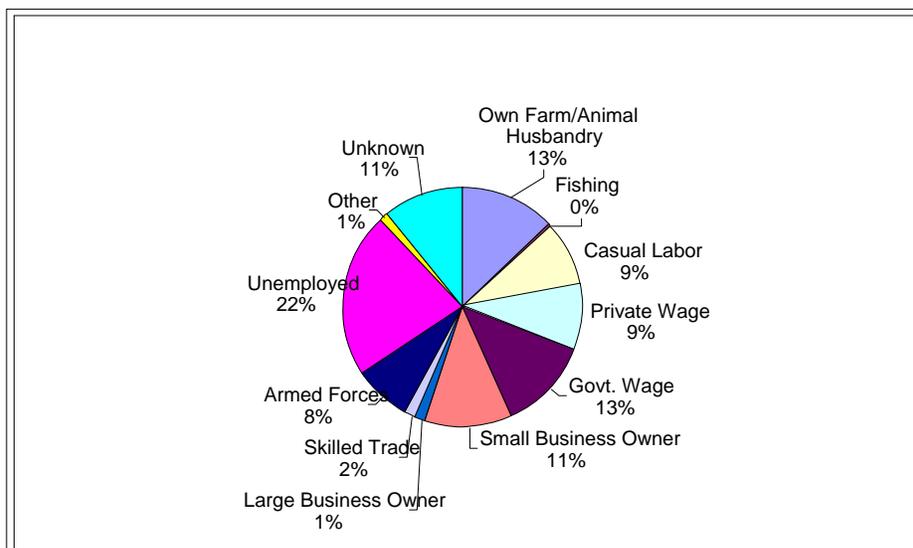
Exhibit 3.8: Years of Household Residency by Town



3.1.3.3 Household Employment, Education and Income

The very youthful population of South Sudan assures a relatively low labor participation rate. In fact, 50 percent of the surveyed household population was identified as students or too young to participate in the labor force. Approximately 68 percent of the surveyed population was too young, too old, or too physically disabled to work. Of the remaining population, 22 percent reported being unemployed. As shown in **Exhibit 3.9**, civilian (Government Wage) and military (Armed Forces) account for 21 percent of the employment. Private employment accounts for only nine percent of the jobs. When households from Juba and Nimule are removed, the unemployment rate increases to 27 percent and private employment drops to three percent. Employment from self-owned farm or animal husbandry increases from 10 percent to 30 percent. Casual labor increases to 12 percent of the employment.

Exhibit 3.9: Household Employment Activities



Wage income varies significantly between Juba and Nimule and the villages along the road. As shown in **Exhibit 3.10A**, surveyed households in Juba estimated an average monthly income of 614 pounds and Nimule 575 pounds, whereas the rest of the ZOI had a monthly wage income of just 209 pounds.

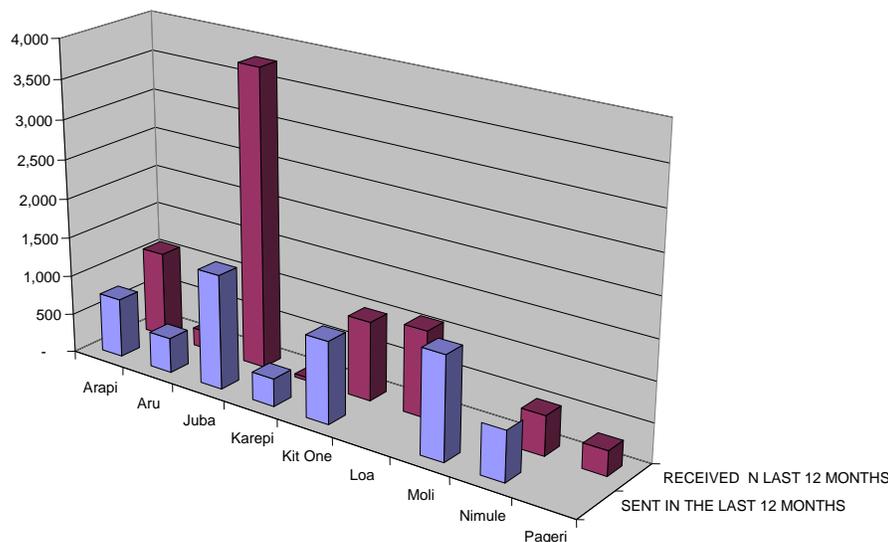
Exhibit 3.10A: Household Wage income by Location

Location	HH Average Monthly Income from Wages
Arapi	283
Aru	207
Juba	614
Karepi	242
Kit One	141
Loa	120
Moli	263
Nimule	575
Pageri	208
ZOI Average	295

Remittances contributed significantly to those households receiving funds from relatives and friends. In Juba, the average amount received from remittances was 3,500SP, far more than households in any other location. Without Juba, the average drops to 539SP.

It must be emphasized, however, that relatively few households actually sent or received funds outside Juba and Nimule. Households in those two locations accounted for 85 percent of the households sending money and 76 percent of the households receiving remittances. For the rest of the ZOI surveyed, only six percent sent monies and 7.8 percent received remittances. Therefore, remittances contributed relatively little to the overall well being of the households outside of Juba and Nimule.

Exhibit 3.10B: Household Remittances by Location



The illiteracy rate varies significantly from village to city. Juba and Nimule both reported an average of 18 percent whereas Kit One and Moli reported 42 percent. Individuals who are returning and have some education tend to relocate in the cities. There is more employment available in Juba in comparison to the villages.

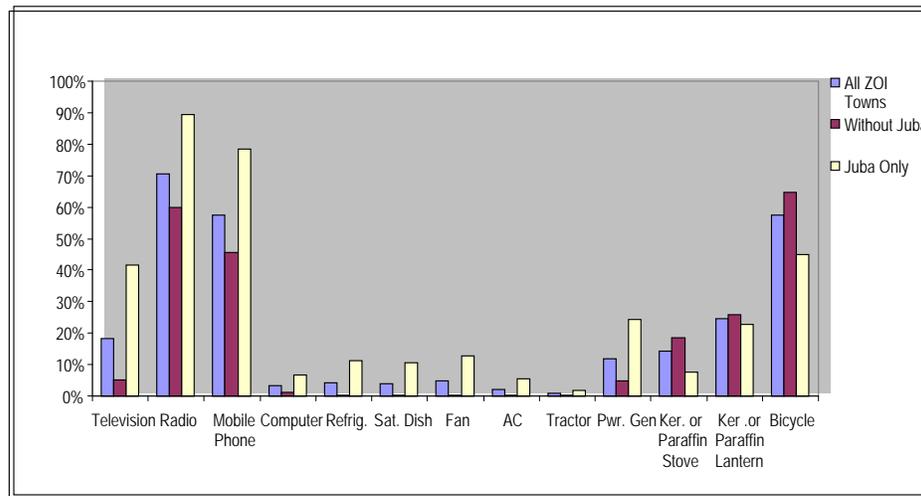
Exhibit 3.11

City	% of Illiteracy
Arapi	20%
Aru	42%
Juba	18%
Karepi	17%
Kit One	42%
Loa	19%
Moli	22%
Nimule	18%
Pageri	22%
ZOI	26%

3.1.3.4 Household Assets

Respondents were queried about household ownership of various appliances, electronic and devices, and other durable household goods that would be an indicator of wealth. These items ranged from television sets to bicycles. Similar to the preceding responses, there is a significant disparity between the surveyed residents in Juba and the residents of the other towns and villages within the ZOI. The apparent wealth disparity is shown in **Exhibit 3.12**, which presents the survey results for the entire ZOI, for all households except those in Juba, and for Juba only. For major appliances requiring electricity, Juba residents own all or the majority of the ZOI's assets, including televisions, refrigerators, air conditioners, and fans. Whereas 42 percent of the Juba households possessed a television, only five percent of the non-Juba residents queried reported owning one. No residences outside of Juba reported owning a fan, refrigerator, air conditioner, or computer. It would appear the households surveyed in Juba are quite affluent by even Juba standards. These results fall into the high-end of results conducted for the water survey. These results are similar to those from the Munkui Household Water Survey presented in Chapter 4.

Exhibit 3.12: Household Assets by Location



Three household items are common to residents throughout the ZOI: radios, mobile phones, and bicycles. Radios are owned by 70 percent of the households and bicycles were present in about 57 percent of those surveyed. Almost 90 percent of Juba residents had a radio and 80 percent possessed a mobile phone. The ownership rate for the rest of the ZOI is 60 percent and 46 percent, respectively. The mobile phone ownership rates drop to about 33 percent or less in the towns of Loa, Moli, Kit One, Aru, Arapi, and Pageri. Bicycle ownership actually increases when Juba is excluded. About 65 percent of non-Juba surveyed households own bicycles compared to 45 percent in Juba.

The survey also queried households about motorized vehicle ownership. Again, Juba households had a profile that strongly differed from the rest of the ZOI. Approximately 21 percent of the Juba households reported owning or leasing a motorized vehicle compared to 3.8 percent of other households. If the town of Nimule, with a six percent ownership rate, is removed from the sample, motorized vehicle ownership/lease for the ZOI drops to just 2.6 percent.

3.1.3.5 Household Expenditures

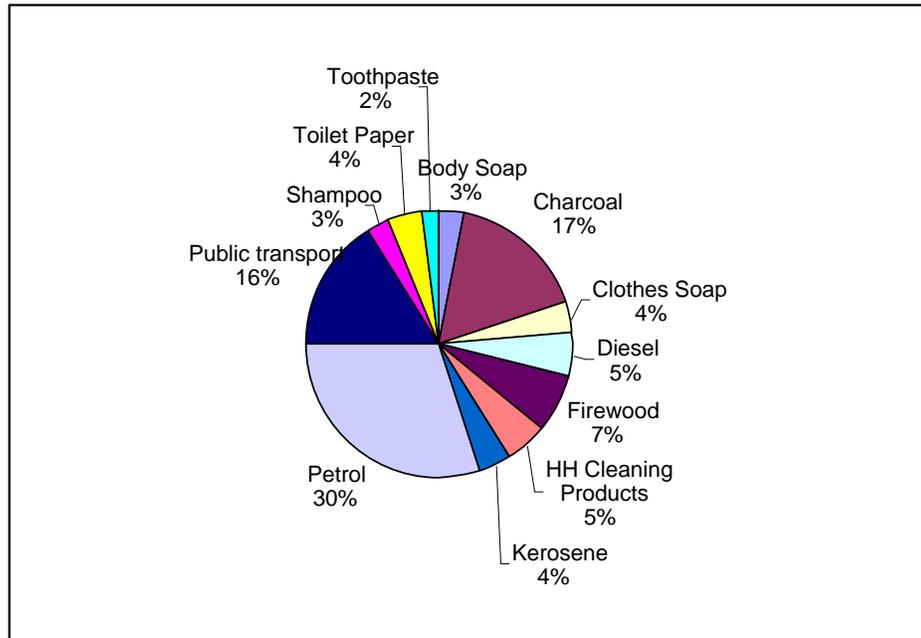
Households were questioned on various types of expenditures including monthly expenditures for non-food consumable products such as soap and shampoo, food, and annual expenditures on more durable goods such as clothing and services including health care and education. For most of the villages along the road, the largest expenditures for non-food consumable goods and services are public transport, charcoal, and petrol. As shown in **Exhibit 3.13**, total expenditures for households in Juba and Nimule are considerably higher than for the rest of the ZOI. When these households are removed from the calculations, the ZOI monthly expenditure drops from 308SP to 162SP.

Exhibit 3.13: ZOI Average Monthly Household Expenditures for Non-Food Consumable Goods by Location

	Arapi	Aru	Juba	Karepi	Kit One	Loa	Moli	Nimule	Pageri	ZOI Average
Body Soap	4	7	13	8	13	4	6	8	8	10
Charcoal	18	31	65	48	2	2	42	38	22	53
Clothes Soap	7	9	18	7	12	10	10	11	7	13
Diesel	6	9	56	4	13	4	15	7	6	16
Fire wood		17	32	0		0	5	16	14	21
HH Cleaning Products	3	20	19	2		4	2	7	4	14
Kerosene	9	24	22	5	5	4	10	10	5	14
Petrol	8	37	105	93		65		93	9	92
Public Transport	30	47	70	33	20	36	NA*	96	57	49
Shampoo	3		14					5	15	10
Toilet paper	4	17	16	3	10		15	5	10	11
Toothpaste	2	5	9	5	11	4	4	5	5	7

Similarly, when the two large cities are removed from the ZOI average, the proportion of expenditures for public transport increases. For example, as shown in **Exhibit 3.14**, the average proportion of monthly expenditures devoted to public transport is 16 percent. When Nimule and Juba are excluded the percentage increases to 26 percent.

Exhibit 3.14: ZOI Average Allocation of HH Monthly Expenditures on Consumable Non-Food Products

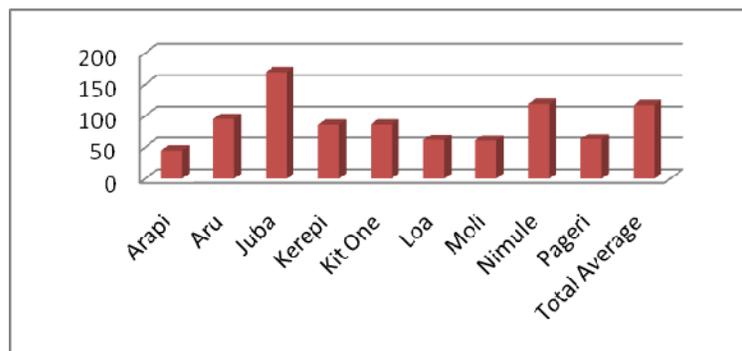


The size and distribution of household expenditures on food items expenditures differs significantly between Juba and Nimule and the villages along the road. As shown in **Exhibit 3.15**, the more affluent Juba and Nimule households pay larger sums on a greater variety of foods than do the other surveyed households along the road. For most households the largest expenditures are for chicken, fish, sorghum, rice, and maize.

Exhibit 3.15A: ZOI Average Household Monthly Expenditures for Food items

	Arapi	Aru	Juba	Kerepi	Kit	Loa	Moli	Nimule	Pageri
Banana	2.0	9.4	13.2					9.0	6.0
Beans	7.2	12.0	15.9	18.8	14.7	9.1	13.8	8.7	10.3
Beef	16.0	20.9	25.1			12.0	16.0	18.2	4.9
Bread	73.1	6.2	14.1	4.2	12.0	1.7	9.5	12.9	2.5
Cassava	5.3	9.7	12.9		10.0	9.3	2.7	8.5	5.2
Chicken	25.0	28.5	31.3		42.0			25.9	22.2
Eggs	19.3	15.3	15.4		10.0	1.3	5.0	7.9	24.8
Fish	22.3	17.0	17.1	18.1	17.8	15.5	53.5	19.7	28.9
Goat	6.7	-	18.2			20.0		34.7	13.3
Groundnuts	13.6	10.9	15.4	20.2	14.0	14.2	8.7	11.8	6.2
Honey	5.8	12.4	27.9	4.0	17.1	10.7	4.5	8.0	10.1
Maize	18.0	12.0	33.7	33.9	17.5	32.2	40.6	30.8	27.8
Milk	4.7	15.1	22.1	42.5	5.0	32.2	12.0	18.1	5.0
Millet	4.0	13.2	22.0			4.7		26.3	40.0
Mutton/Sheep	3.2	-	20.9					36.0	5.3
Oil/Ghee	7.4	8.1	15.3	15.1	9.4	6.5	12.7	10.1	5.4
Okra	1.8	7.6	7.2	6.7	6.0	6.1	3.6	3.3	4.3
Onions	3.3	4.6	9.8	6.2	5.3	6.4	4.7	4.7	4.6
Pineapple		9.3	11.9					6.3	4.0
Rice	5.0	16.5	19.4	40.0			45.0	19.5	25.8
Sorghum	26.1	16.7	32.4	30.6	29.5	22.8	27.4	21.8	20.3
Sugar	4.7	7.9	15.1	7.7	11.6	7.6	30.4	10.2	6.6
Sweet Potato	3.5	5.3	12.4			10.1	5.0	8.8	10.7
Tomatoes	2.3	5.5	8.8	8.4	11.0	7.2	5.4	5.8	8.0

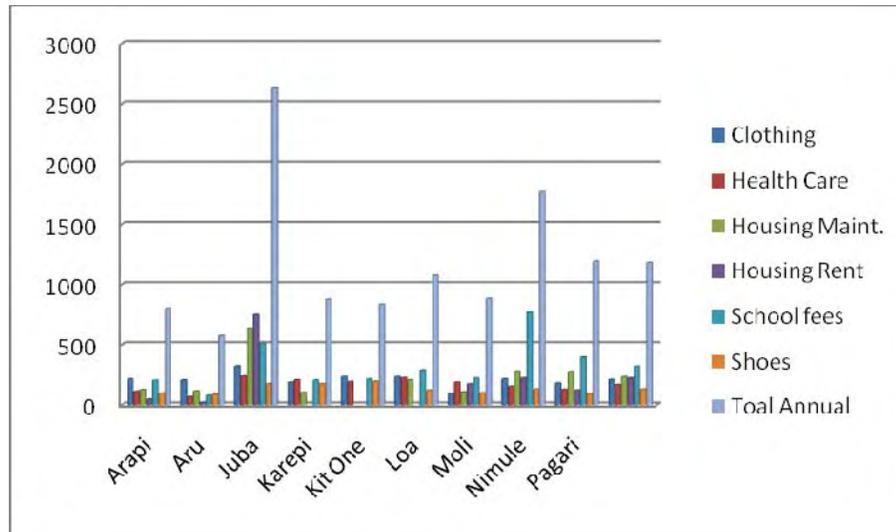
Exhibit 3.15 B shows the total weekly expenditures for food items. Families in Juba reported spending an average of 170SP per week, whereas village residents spent between 45SP-90SP.

Exhibit 3.15B: Weekly Average Expenditures on Food Items

The survey also inquired about annual expenditures for durable goods and ongoing services such as clothing, school fees and health care. As shown in the **Exhibit 3.16**, Juba residents spend more on all goods and services than households in other locations. Health care expenditures were somewhat consistent across the different locations, ranging from a low of 66SP per household in Aru to 237SP in Juba. Excluding Aru and Juba, the range of annual

health care expenditures was 112 to 224SP. Clothing expenditures were also somewhat consistent across the different locations averaging about 210SP per year per household.

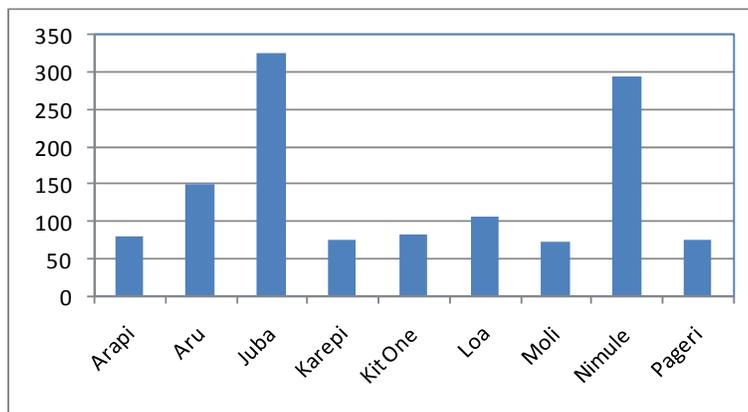
Exhibit 3.16: Annual Household Expenditures for Selected Goods and Services



3.1.3.6 Household Health Care Access

To assess the impact of the road on travel time and cost to obtain health care, households were asked several questions regarding this topic. Approximately 50 percent of the population surveyed experienced high fever/malaria symptoms during the past year. Among the other most common symptoms/diseases were: diarrhea, vomiting, stomach-aches and skin problems. The exhibit below provides a summary of individuals who sought treatment for their symptoms.

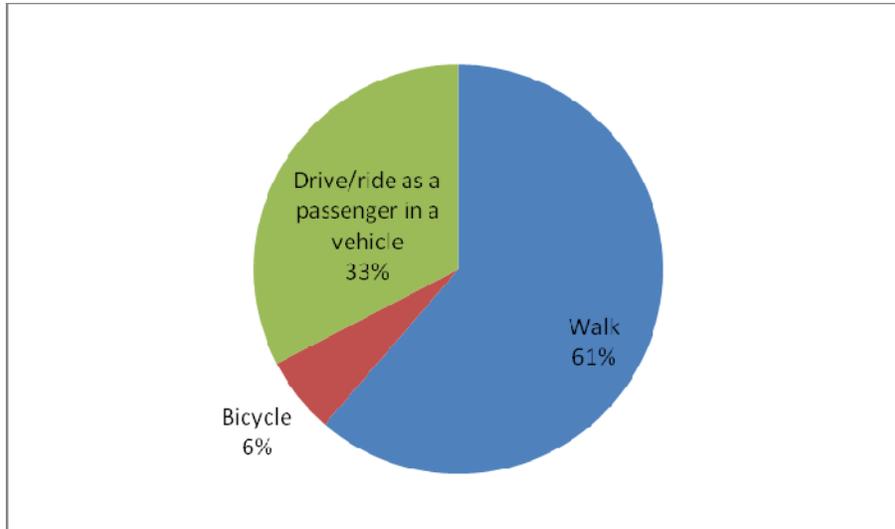
Exhibit 3.17: Number of Households that Sought Medical Treatment



The majority of individuals surveyed in Juba and Nimule went to public facilities for treatment. The main reasons they chose the particular facility is due to proximity and affordability. There were also some cases where individuals simply bought the medicine they needed or went to a traditional healer. Exhibit 3.18 provides information regarding the mode of transportation for the 1,220 individuals who sought medical treatment outside the home. Vehicle transport was used by a majority of respondents only in Juba, where 61

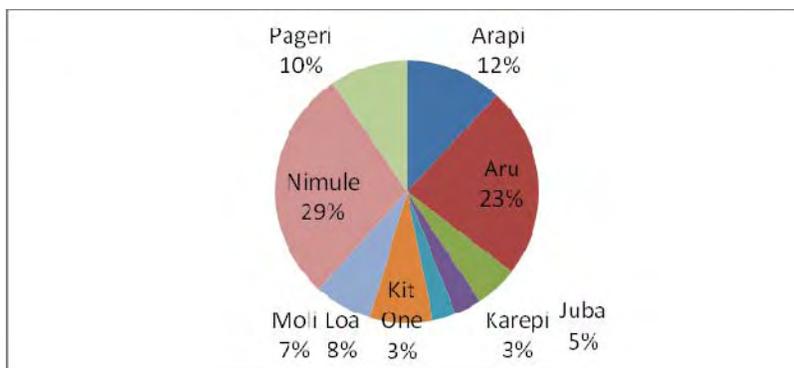
percent reported driving or riding a vehicle to a health care facility. More than 83 percent of the Kit One residents in contrast walked to a facility, while six percent drove or rode in a vehicle.

Exhibit 3.18: Mode of Transportation Used to Obtain Health Care



Patients in Juba generally find treatment in the city and do not use the Juba-Nimule Road. Of the patients who use the road to travel to a health care facility, more than half originate from Nimule and Aru. The Nimule traffic is due to the fact that the hospital is approximately one kilometer from the city center. It is clear from the pie chart that village residents are the most dependent on the road to obtain health care since most locations have limited or no medical services.

Exhibit 3.19: Origin of Individuals Who Use Road to Travel to Health Care Facilities



The time for patients to travel to health facilities ranges from 30 minutes to four hours. Individuals in Kit One and Pageri reported the longest travel time of four hours. This may be due to numerous bridge closures at the Kit One Bridge impacting those traveling to the Nimule Hospital, although as noted above more than 83 percent of the households in Kit One reported walking to a health care facility when seeking treatment. Travel to facilities from the villages is also problematic because most buses and mini-vans do not make regular stops in the villages located along the Juba-Nimule Road.

Exhibit 3.20A: Travel Time (Hrs) to Obtain Health Services

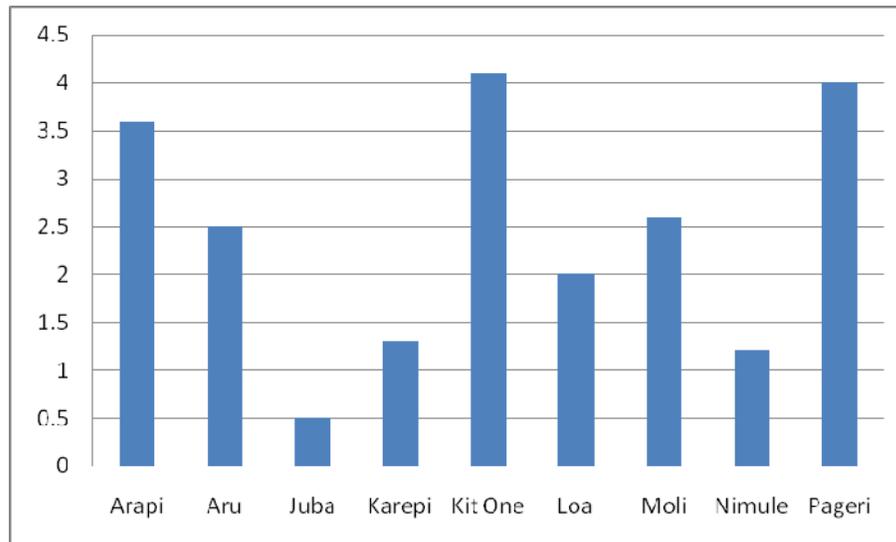
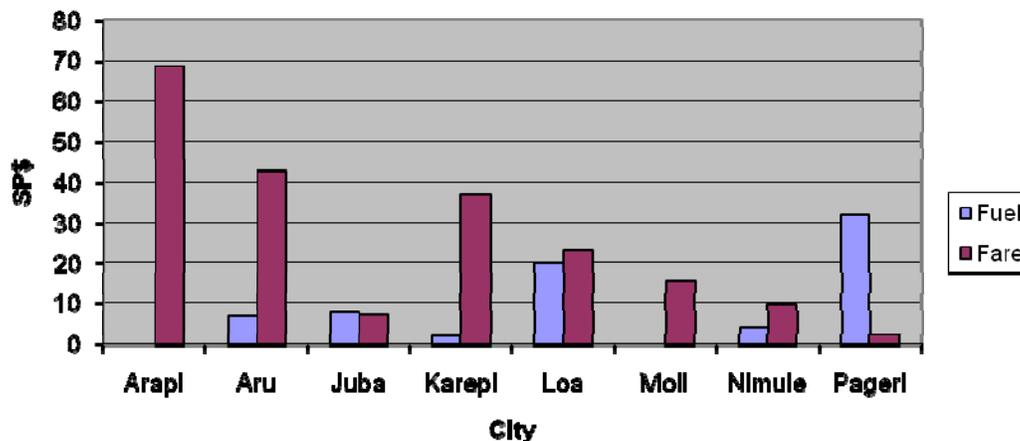


Exhibit 3.20B

Average Fare and Fuel Paid for Transport to Health Care Facility per City



The cost for transportation varies drastically between villages and the cities. As expected, Aru has the highest fare cost of approximately 68SP. Patients in Juba and Nimule pay seven to ten SP for fare to the hospital.

3.2 TRAFFIC COUNT, VEHICLE, PASSENGER, FREIGHT AND BUSINESS SURVEYS

3.2.1 Traffic Counts on the Juba-Nimule Road

In support of the Juba-Nimule Road feasibility study, traffic counts were performed at five key locations during February 2007⁷.

The traffic counts were implemented over a one-week period for each location, starting February 4 to 7, 2007, depending on the station. Each day consisted of 12-hour counts, from 7 am to 7 pm, which roughly corresponded to daytime to main traffic movements. The seven-day/12-hour counts were deemed appropriate to prevent any distortions due to the day of the week or the time of day.

When the location was deemed safe enough, the traffic counts included one or two night counts to assess the night traffic ratio. These night counts were carried out in the outskirts of Juba: (i) on the Nimule Road – two night counts; and (ii) on the Yei Road – one night count. Otherwise, and according to the results of interviews with drivers and local authorities, the Consultant made the assumption that there was no traffic during the night due to security issues. The AADT for the base year and for each section of the Juba Nimule Road is presented in **Exhibit 3.21**.

⁷ The Improvement Works of the Juba to Nimule Road Feasibility Study was submitted to USAID in May 2007.

Exhibit 3.21: Juba-Nimule Road Traffic CountsFrom **Juba Bridge** to **Bor Jct.** **3.4 km**

	M/cycle	Car	4WD	Minibus	Big Bus	Light Truck	Medium Truck	Heavy Truck	Articulated Truck	Total
Average	341	5	235	148	22	145	133	65	30	1,125
Diverted traffic	-	2	31	20	4	14	18	23	15	126
AADT base case	341	6	266	167	26	159	151	89	45	1,251
In % of AADT	27%	1%	21%	13%	2%	13%	12%	7%	4%	100%

From **Bor Jct.** to **Torit Jct.** **17.4 km**

	M/cycle	Car	4WD	Minibus	Big Bus	Light Truck	Medium Truck	Heavy Truck	Articulated Truck	Total
Average	5	6	33	2	7	19	53	23	9	158
Diverted traffic	-	2	31	20	4	14	18	23	15	126
AADT base case	5	7	64	22	11	32	72	47	24	284
In % of AADT	2%	3%	23%	8%	4%	11%	25%	16%	8%	100%

From **Torit Jct.** to **Nimule Center** **169.2 km**

	M/cycle	Car	4WD	Minibus	Big Bus	Light Truck	Medium Truck	Heavy Truck	Articulated Truck	Total
Average	3	4	11	1	7	17	44	16	6	111
Diverted traffic	-	2	31	20	4	14	23	31	18	142
AADT base case	3	6	43	21	12	32	67	47	24	254
In % of AADT	1%	2%	17%	8%	5%	12%	27%	19%	9%	100%

From **Nimule Center** to **Ugandan Border** **2.0 km**

	M/cycle	Car	4WD	Minibus	Big Bus	Light Truck	Medium Truck	Heavy Truck	Articulated Truck	Total
Average	683	2	117	74	11	73	66	33	15	1,074
Diverted traffic	-	2	31	20	4	14	23	31	18	142
AADT base case	683	4	149	94	15	87	89	64	33	1,217
In % of AADT	56%	0%	12%	8%	1%	7%	7%	5%	3%	100%

M/cycles = 2 times Juba - Bor Jct

Other vehicles = half Juba - Bor Jct

se

3.2.2 Transport Intercept Survey

Drivers of motorized vehicles were surveyed at key stopping points in Juba, Nimule, and at selected points along the Juba-Nimule Road. Vehicles were classified into three categories based on purpose of use:

- **Personal/Business**
- **Commercial Transport**
- **Paid Passenger Transport**

Vehicles classified for personal/business use are those used for the following purposes: travel to self-owned business, place of work, family or friend visit, or any type of personal appointment. Commercial vehicles are those used to transport any type of commodity (e.g., household goods, livestock, and equipment) for commercial use. Finally, paid passenger transport vehicles are used to transport people from one destination to another, including buses, trucks, and taxis and for which a fee is charged.

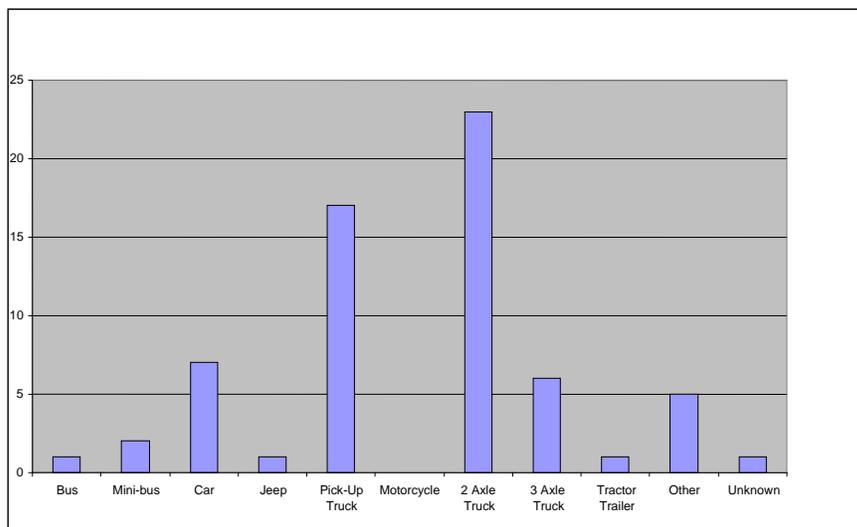
A total of 292 vehicle operator surveys were conducted with 64 of the vehicles classified as vehicles used for personal or business use, 170 for commercial transport, and 58 for paid passenger transport. All of the drivers were male for all types of vehicles.

3.2.2.1 Driver and Vehicle Characteristics for Vehicles used for Personal/Business Purposes

More than half the drivers surveyed were between 26 and 45 years old and educational attainment was much higher than for the other surveyed populations, with less than five percent illiterate.

The majority of vehicles surveyed in this category were 2-axle trucks and pick-up trucks (63 percent), with passenger cars accounting for only about 11 percent of the total. The remaining vehicles included 3-axle trucks, mini-buses, and jeeps. More than 90 percent of the drivers claimed their vehicle was insured. The distribution of vehicle types is shown in **Exhibit 3.22** below. About 61 percent of the drivers indicated they do not drive the Juba-Nimule Road at nighttime because of safety concerns.

Exhibit 3.22: Distribution of Vehicles by Type Used for Personal/Business



3.2.2.1.a Travel Times

Vehicle operators were queried on their trip origin and destination and were asked to estimate their projected times for completing their trip based on average travel times for past journeys. The most frequent journey origin was Juba and the most frequent destination was Kampala. Fewer surveyed vehicles used for personal business were traveling within South Sudan. **Exhibit 3.23** shows that the average time for travel from Juba to Nimule was 5.48 hours and the average time to Kampala was 56.90 hours. Numerous other vehicles used for personal business were traveling to other parts of Uganda and onto Kenya. Especially for vehicles originating in Nimule, improvements in the Juba-Nimule Road will have little or no impact on travel times to these other destinations and hence are not used for the baseline assessment.

Exhibit 3.23: Average Travel Times for Vehicles Used for Personal Business

Origin	Destination			
	Nimule	Loa	Other South Sudan	Kampala
Juba	5.48 hrs		24 hrs	61.7 hrs
Nimule	--	1.00	4 hrs	

3.2.2.1.b Fuel Expenditures

Fuel costs to travel along the road were very high. Reported fuel costs per liter were 3.5-4SP. As shown in **Exhibit 3.24**, the average estimated fuel cost to go from Juba to Nimule was estimated at 204SP. The cost to travel from Juba to Kampala was estimated at 523SP. Other destinations in South Sudan from Juba were estimated to cost 180SP in fuel.

Exhibit 3.24: Average Fuel Costs for Vehicles Used for Personal Business

Origin	Destination			
	Nimule	Loa	Other South Sudan	Kampala
Juba	204SP	--	-180SP-	523SP
Nimule	--	80SP		

3.2.2.2 Driver and Vehicle Characteristics for Vehicles Used for Commercial Transport

As shown in **Exhibit 3.25**, 2-axle vehicles accounted for more than half of the commercial vehicles surveyed. These vehicles along with pick-up trucks and 3-axle vehicles were used by 80 percent of the surveyed commercial vehicle operators.

The types of goods transported by commercial vehicles were quite varied, ranging from livestock to diesel to furniture. Food-related goods, including livestock, packaged foods, bottled or packaged drinks, accounted for almost 62 percent of the cargo type transported by the surveyed vehicles. Various household items, ranging from furniture to cleaning products, were the primary cargo for about 20 percent of the vehicles surveyed.

Exhibit 3.25: Surveyed Commercial Transport Vehicles by Type

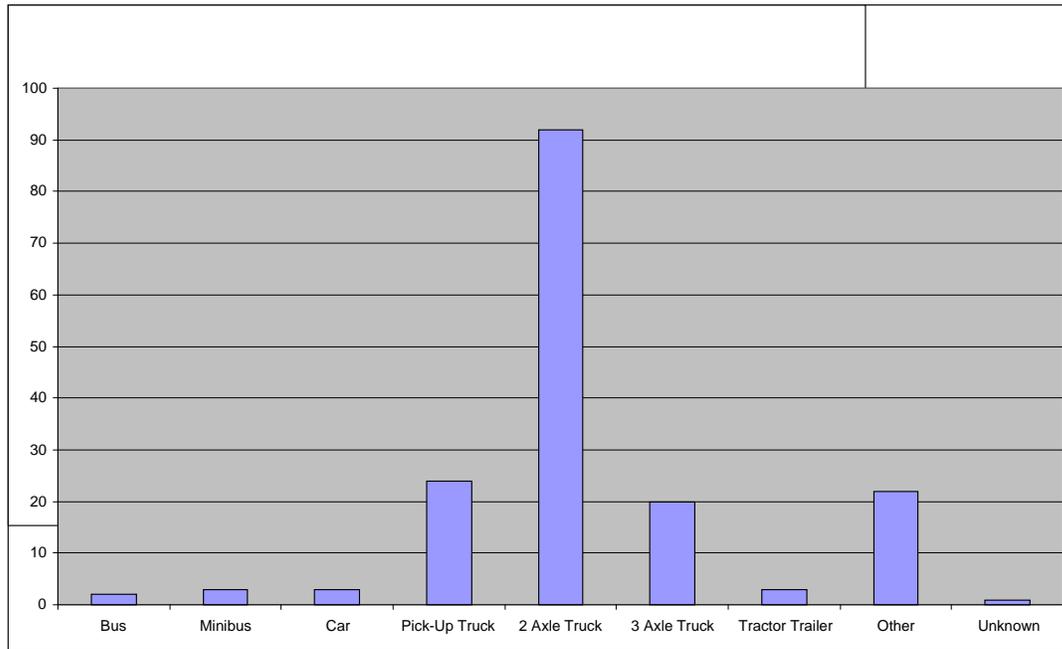
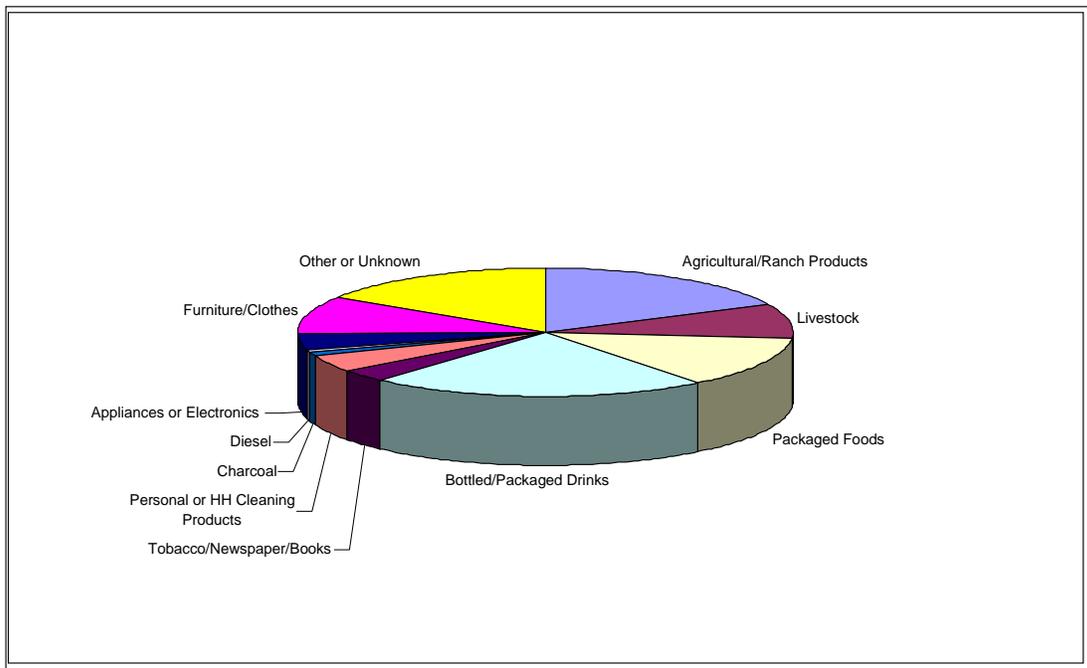


Exhibit 3.26: Cargo Transported by Surveyed Commercial Vehicles



3.2.2.2.a Travel Times

Travel times for commercial vehicles were comparable to those used for personal business. The two most frequent origin-destinations trips were Juba-Nimule, and Juba-Kampala. Almost 75 percent of the respondents supplying information on travel times were traveling these routes. As shown in the **Exhibit 3.27**, average travel times for these trips were five hours and 57 hours, respectively. These estimates are about 10 percent shorter than for the personal business trips.

Exhibit 3.27: Average Travel Times for Commercial Vehicles

Origin	Destination			
	Nimule	Kerepi	Other South Sudan	Kampala
Juba	5.00 hrs		20.9 hrs	56.90 hrs
Nimule	--	4	4 hrs	

3.2.2.2.b Fuel Expenditures

Fuel expenditures for commercial vehicles were higher than for personal business vehicles. The Juba to Nimule trip was estimated to cost about 270SP compared to 204SP for personal business vehicles. As shown in **Exhibit 3.28**, a trip to Kampala is estimated to cost 631SP for a commercial vehicle. Given the types of vehicles used for commercial transport and the load they transport, this result appears reasonable. However, as also seen in **Exhibit 3.28**, the estimated cost to travel to Kampala from Juba is less than from Nimule. This result is attributable to the fact that there was only one data point for the Nimule-Kampala estimate compared to 84 data points for the Juba-Kampala trip. Clearly the latter estimate is the more reliable one.

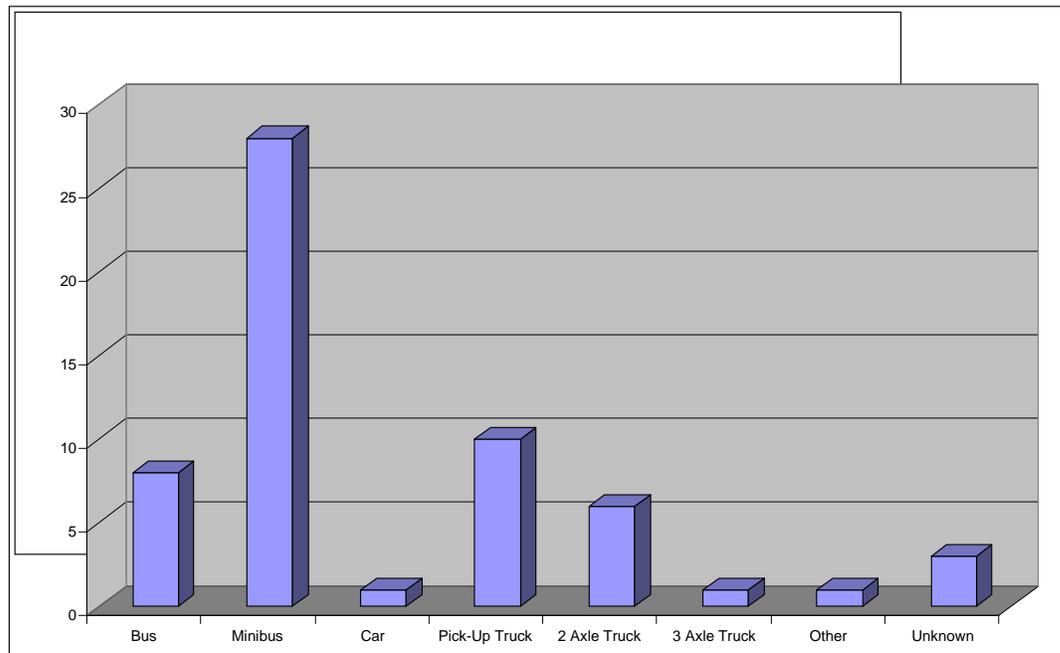
Exhibit 3.28: Average Fuel Costs for Commercial Vehicles

Origin	Destination			
	Nimule	Kerepi	Other South Sudan	Kampala
Juba	270SP	--	-443SP-	548SP
Opari	80SP			
Nimule	--	80SP		631SP

3.2.2.3 Driver and Vehicle Characteristics for Vehicles used for Paid Passenger Transport

As shown in **Exhibit 3.29**, the primary vehicle types used for paid passenger transport are mini-buses, pick-up trucks, and buses. Mini-buses accounted for 48 percent of the vehicles surveyed while buses, pick-up trucks, and 2-axel trucks comprised about 41 percent of the surveyed vehicles. Passenger capacity varied with vehicle type; most of the mini-buses reported a capacity of 214 passengers.

Exhibit 3.29: Surveyed Paid Passenger Vehicles by Type



3.2.2.3.a Travel Times

The estimated travel times for vehicles used for paid passenger transport are comparable with the other vehicles types for trips within South Sudan. In particular, the estimated time to travel from Juba to Nimule is 5.40 hours. Travel time to Pageri is 3.25 hours. Travel in the other direction from Nimule appears to be consistent with the north-south trips. The major disparity between paid passenger vehicles and the other transport vehicles is for the trip from Juba to Kampala. As shown in **Exhibit 3.30**, paid passenger vehicles report that trips require on average 31, hours compared to more than 50 hours for the other transport vehicle categories. This difference might be largely due to paid passenger vehicles driving straight through, whereas drivers of the other vehicles typically make more and longer stops. However, because this question was not specifically asked of respondents, this explanation must be considered speculative.

Exhibit 3.30: Average Travel Times for Vehicles Used for Paid Passenger Vehicles

Origin	Destination				
	Nimule	Pageri	Moli	Other South Sudan	Kampala
Juba	5.40 hrs	3.25 hrs		5.2 hrs	31 hrs
Nimule		--2.5 hrs	3 hrs	8.5 hrs	

3.2.2.3.b Fuel Expenditures

Fuel expenditures for paid passenger vehicles were generally less than the other two categories of vehicles surveyed. For example, as shown in **Exhibit 3.31**, paid passenger vehicles reportedly incurred almost half the fuel costs of commercial vehicles for travel from Juba to Kampala; travel costs to Nimule were also lower. The vehicles used for passenger travel are likely to be more fuel efficient than those used for commercial transport, especially

the large commercial transport vehicles used to move livestock and other commodities. It should also be noted that because of fewer observations for the paid passenger category, the results might not be as robust as for the other categories.

Exhibit 3.31: Average Fuel Costs for Paid Passenger Vehicles

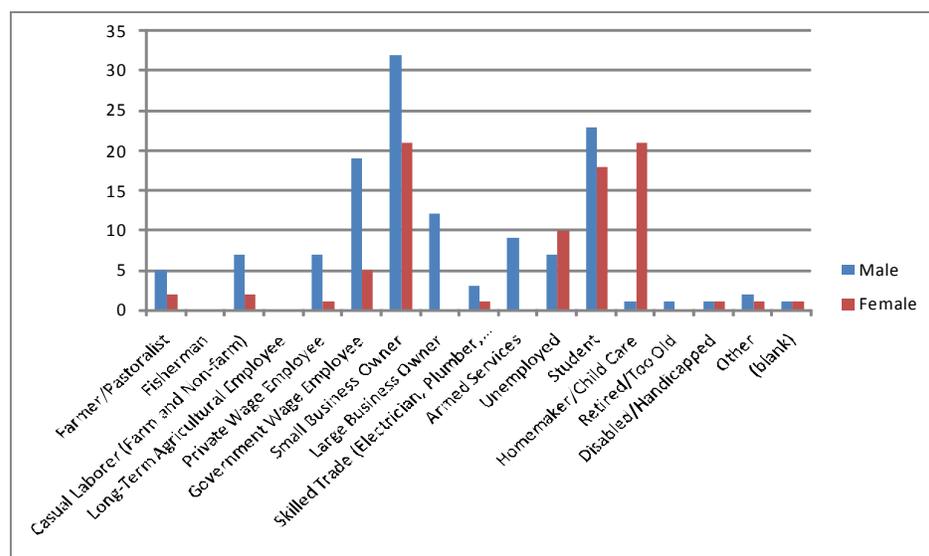
Origin	Destination			
	Nimule	Pageri	Other South Sudan	Kampala
Juba	176SP	--130SP	-159SP-	363SP
Nimule	--	37SP	49SP	--

3.2.2.4 Paid Passenger Intercept Survey

3.2.2.4.a Paid Passenger Demographics, Destination and Purpose of Travel

The passenger intercept survey was conducted in Juba, Nimule and in every village along the Juba-Nimule Road. Passengers were queried about travel time, travel cost and frequency of travel. A total of 212 surveys were conducted. **Exhibit 3.32** shows the occupational breakdown of those interviewed.

Exhibit 3.32: Passengers queried by occupations and sex



Approximately 25 percent of the men and women interviewed were small business owners and 20 percent students. The majority of passengers interviewed had attended secondary school and/or a high school. Of the total surveyed, 40 percent were women.

Discussions with local staff indicated that a primary reason that such significant numbers of the passengers surveyed were students was due to the economic opportunities in South Sudan. The younger generation, who have recently finished school speak English well and are returning to South Sudan first to locate jobs. The majority assist the rest of the family in relocating. However, a significant amount of younger returnees are going back to Uganda for school. The majority of passengers interviewed had attended secondary school and/or high school.

The most common destination for those queried was Kampala, Uganda. The preferred method of transportation was a mini-bus and coach bus. The majority of passengers were traveling to the respective destination for the following reasons:

1. Visit Family
2. For Business
3. For School
4. For Daily Work

3.2.2.4.b Travel Time and Cost

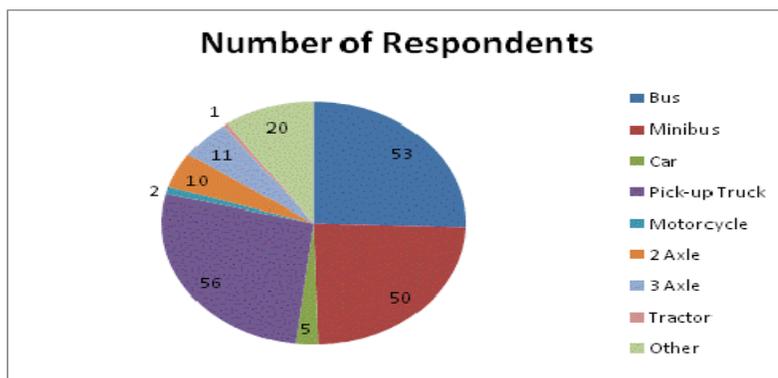
Passengers were queried on travel time and cost. As shown in **Exhibit 3.33**, the average travel time to Nimule from Juba reported by interviewees was 9.4 hours and from Juba to Kampala 19.4 hours. This report average time significantly exceeded the average time for the M&E Team and also for the vehicle operators surveyed. One likely reason is that the paid passenger surveys were being conducted bridge repairs and some re-grading of road sections were being performed, which caused significant delays. Also due to the recent heavy rains there were large potholes and destroyed bridge diversions further hampering travel along the road.

Exhibit 3.33: Average Travel Times for Passengers

Origin	Destination			
	Nimule	Pageri	Other South Sudan	Kampala
Juba	9.4hrs	4.2hrs	10.5 hrs	19hrs
Nimule	--	3 hrs	--	6hrs

As shown in **Exhibit 3.34**, the most common forms of transport vehicles for passengers are pick-up trucks and buses. Cost varies depending on vehicle type. The most common means of traveling from Juba to Kampala are large coach buses that charge approximately 40SP to Nimule and another 30-40SP from Nimule to Kampala. However it is not uncommon to see small pick-up trucks and mini-buses overloaded with passengers.

Exhibit 3.34: Type of Vehicle Used by Passengers



As shown in **Exhibit 3.35**, the average cost to travel from Juba to Nimule is 34.4SP and to Kampala 100SP. The cost tends to vary with the condition of the road and with fuel costs. Close to 80 percent of those surveyed do not buy a round trip ticket. Private bus companies do not offer a reduction in cost for buying round trip tickets and minibuses work on an informal system.

Exhibit 3.35: Average Fare for Paid Passenger Vehicles

Origin	Destination			
	Nimule	Pageri	Other South Sudan	Kampala
Juba	34.4SP	22SP	47.5SP	100SP
Nimule	--	39SP	---	80SP

3.2.2.5 Transport Freight Company Interviews

Interviews were conducted with freight companies to gain an understanding of the factors affecting freight cost and routes used by businesses in South Sudan. Six companies were interviewed in Juba and two companies in Nimule. **Exhibit 3.36** summarizes the results of these structured interviews:

Exhibit 3.36

Company Name	Head-quarters	Number of years Shipping to South Sudan	Types of Goods	Number of Vehicles Shipping to South Sudan	Most frequently used Road
Barcode Logistics	Dubai	2 ½	Construction Material and food	8-10	Juba-Nimule
Akok and Abiem Company	Khartoum	3	Construction Materials, Petroleum, Foods	101	Aweil & Abeyi
Civicon	Mombasa	3	Food and construction materials	200	Yei-Juba
World Wide Movers	Dubai	4	Relief goods (food, tents, medicine)	7	Juba-Nimule
Nile Star	Kenya	20	Appliances, Electronics	5	Kaya-Yei
SDV Transami	France	---	Goods (fertilizer, food, appliances, military hardware)	80	Yei-Juba
Guru Investment Company	Nimule	2	Food, drinks & petroleum	5	Juba-Nimule
Alliance Brother Company	Nimule	N/A	Food and beverages	2	Kampala-Rulu

The headquarters of all freight companies interviewed in Juba are located outside of South Sudan: Kenya, Khartoum, Dubai and France. The two companies in Nimule were founded and are still based in Nimule. All companies interviewed own and rent the trucks used for shipping freight. The drivers hired by the companies do not own their own vehicles.

The managers interviewed were asked several questions to determine how important the Juba-Nimule Road was to conducting business in South Sudan. All individuals interviewed reported that the Juba-Nimule Road will have a significant impact on transport costs as well as the economy of South Sudan. Three of the companies use the road as the primary route for transporting their goods. All companies reported that transport costs increase significantly during the rainy season. The condition of all roads during this season worsens, which impedes the flow of traffic. At times, it can take up to 14 hours to travel the Juba-Nimule Road. The road from Nimule to Uganda is also in poor condition and significantly affects travel time to Kampala.

Security was also listed as a concern for companies using the Juba-Nimule Road. Over the last few years, there were approximately two to three security-related incidences per week. Some business owners were concerned with the security of their staff as well as the merchandise.

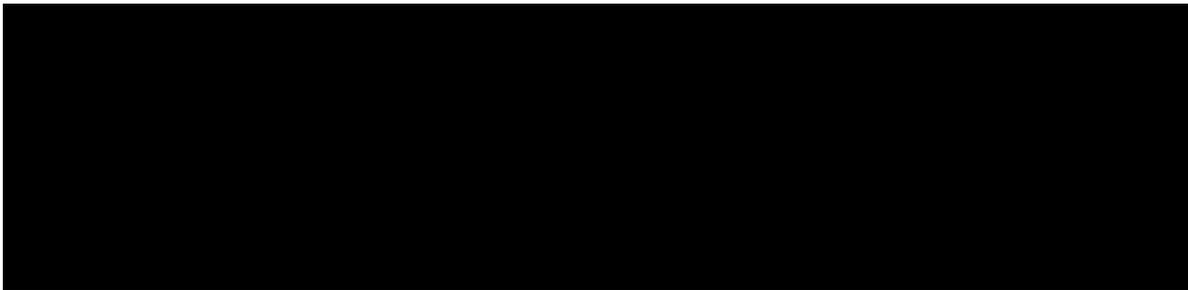
Freight company managers were asked to elaborate on the particular problems on the Juba Nimule Road. One of the greatest factors impeding travel on the road is the Juba Bridge, which is not part of the SISF program. Large trucks are unable to cross it. The remaining seven bridges also present a hindrance. The companies interviewed transport freight ranging from 10 to 120 tons. The Juba-Nimule Bridge is very narrow, which impedes passage for some containers. The remaining seven bridges before rehabilitation were in very poor condition and could not safely sustain trucks over 50 tons. The Kit One Bridge had to be closed due to fear of collapse.

Companies were hesitant to disclose any information regarding freight cost. They did acknowledge that costs increase when the roads/bridges worsen and during the rainy season. However there are no controls on freight rates in South Sudan. The prices are fixed for some goods being imported in the country; however, freight rates are set by the business owners. The general consensus was that improvements to the Juba-Nimule Road will have a significant impact on transport cost and time.

3.2.2.6 Businesses Survey Results

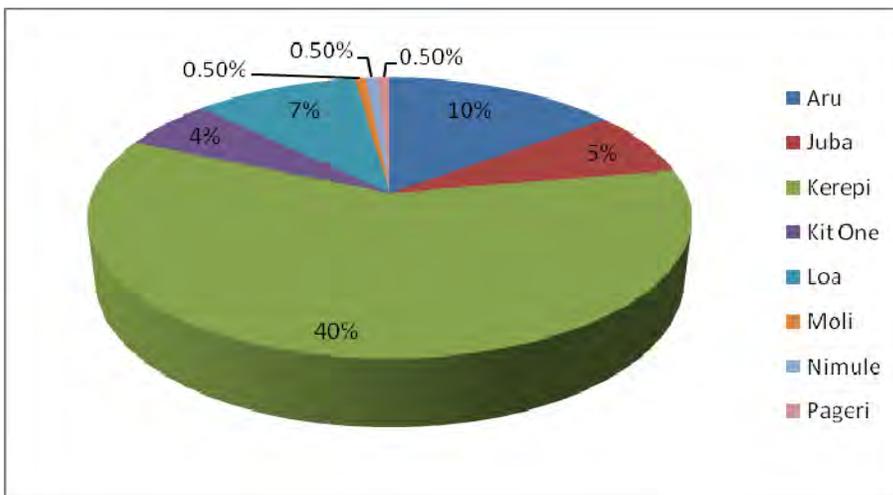
A total of 500 business surveys were conducted within the ZOI, although eight were removed from the analysis because they were either incomplete or improperly filled out. The majority of surveyed businesses were located in three cities/villages; Juba, Nimule and Pageri. The inconsistency between the survey numbers conducted and presented in the table below is due to lack of information regarding type of business. Over 120 surveys had an incomplete in this section.

Exhibit 3.37: Cities and Villages by Business Type



The majority of businesses classified themselves as either service or small scale industry establishments. Service-oriented businesses include restaurants, bars, cell phone charging booths, hair salons, etc. Retail goods range from agricultural goods to electronics to medicines. As illustrated in **Exhibit 3.38**, the majority of the goods in South Sudan are imported. Only Kerepi business owners responded that approximately 40 percent of the goods made were in South Sudan. All the surveyed businesses in Kerepi were service-oriented, mainly restaurants. Frequent visits to Kerepi also identified that the majority of retail stores sell mainly locally produced agricultural goods.

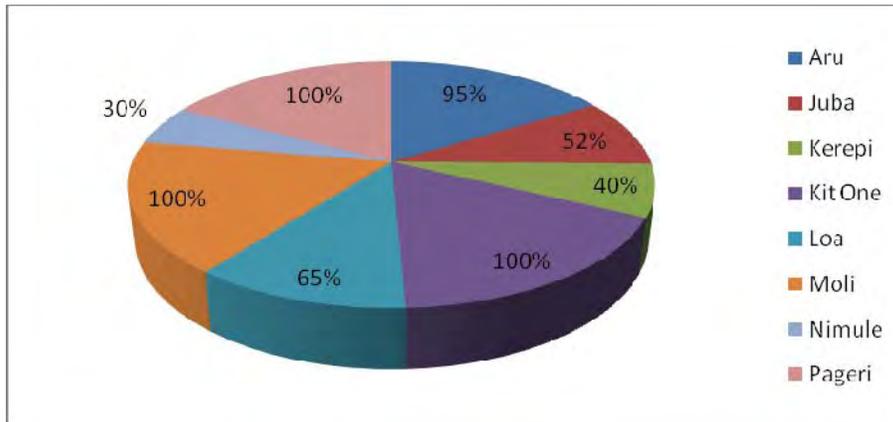
Exhibit 3.38: Percentage of Goods Made in South Sudan



3.2.2.6.a Business Usage of the Juba-Nimule Road

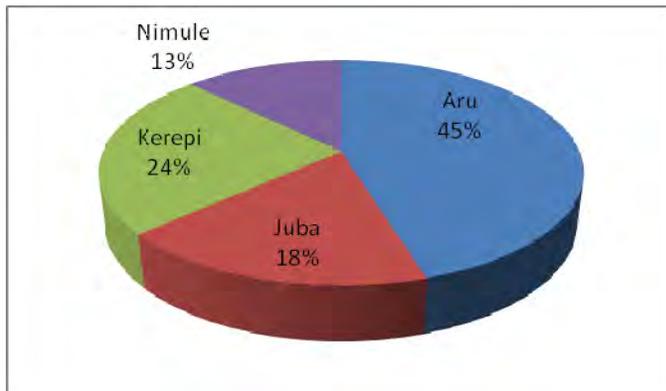
Currently, 53 percent of businesses within the ZOI use the Juba-Nimule Road to receive goods. The largest sector reportedly using the road was retail trade with 47 percent of businesses. Noteworthy is the observation that although Juba dominates the retail trade sector, only 22 percent of Juba retail businesses reported using the Juba-Nimule road. The reason is that goods come directly from Uganda and have no need to stop at Nimule on the way. The primary users of the Juba-Nimule road were located in the smaller villages in the ZOI.

Exhibit 3.39: Percentage of Businesses within the ZOI using the Juba-Nimule Road



Respondents who did not use the road were asked: “If the Juba-Nimule road were improved, would you use it?” Respondents in the retail trade sector, the largest sector, responded that 56 percent would use the Juba-Nimule road if it were improved. Villages including Moli and Pageri were excluded from the analysis below because all the business reported use the Juba-Nimule Road to transport goods.

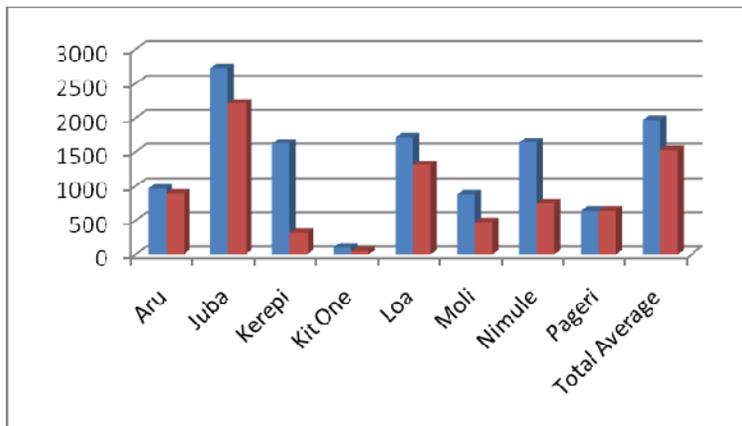
Exhibit 3.40: Percentage of Businesses within the ZOI that Would Use the Road



3.2.2.6.b Business Income

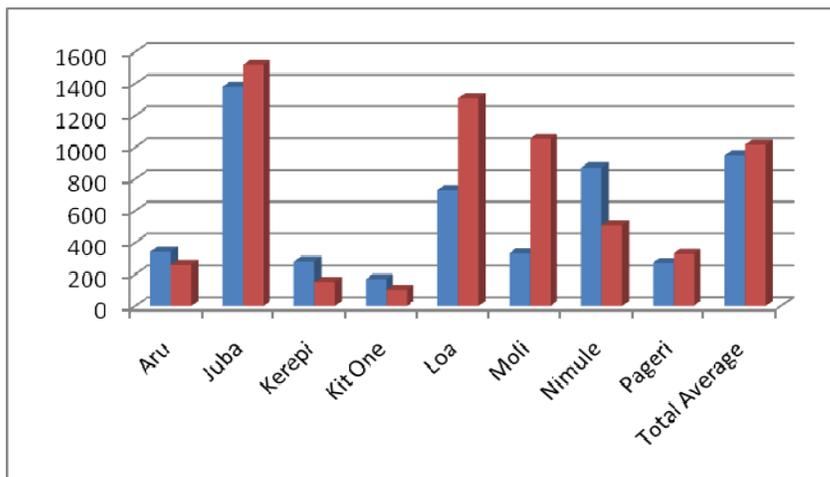
Exhibit 3.41 below illustrates the Average Business Income in each of the specified cities and villages of the ZOI. As expected, Juba has the highest monthly income of 2,721SP during the dry season and 2,211SP during the rainy season. The income in the villages ranges from approximately 50SP to 1,625SP. Business in general reported a higher income in the dry season.

Exhibit 3.41: Total Monthly Revenue during the Dry and Rainy Season



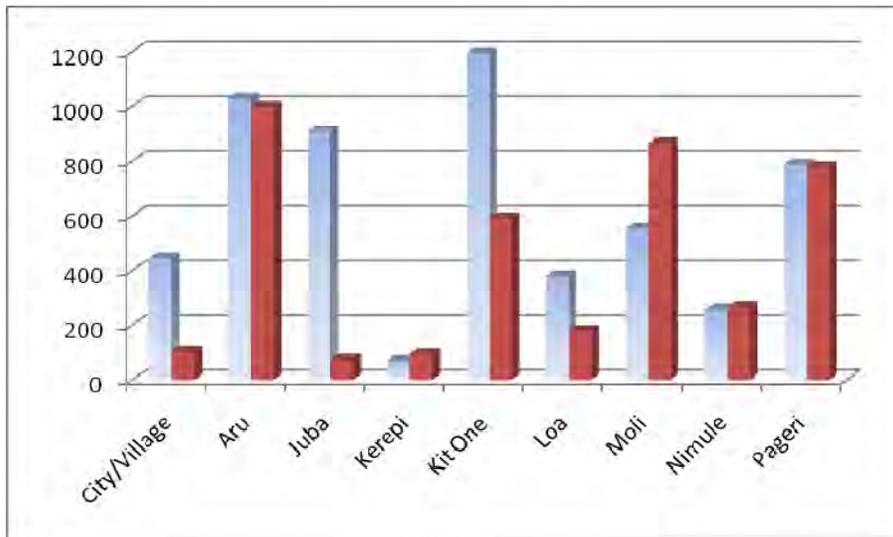
During the interviews, business owners were asked about total expenses and transport costs, which are identified in Exhibits 3.42 and 3.43. In evaluating the responses, a number of inconsistencies were identified. The most prominent inconsistency is the amount of expenses during the rainy season. Some businesses, particularly in the villages, reported higher expenditures during the dry season. However, this could be due some businesses not located on the Juba-Nimule road may close because of poor conditions of feeder roads.

Exhibit 3.42: Total Monthly Expenses during the Dry and Rainy Season



For individual business sectors across the ZOI, transportation expenses are greater in general during the dry season. This could be attributed to the fact that businesses are “stocking up” on supplies and raw material when transportation costs are less, in order to continue operating during the rainy season.

Exhibit 3.43: Transport Expenses during the Dry and Rainy Season



The most common form of transportation for business in the ZOI is pick-up trucks and semi-trucks. A few businesses also reported using small vehicles and carts/wagons. Monthly transportation costs were highest in Juba at 1,150SP and lowest in Kerepi at 72SP.

3.2.2.6.c Businesses and Goods Sold

In general, the surveyed businesses sell a wide array of products mostly in small quantities. **Exhibit 3.45** highlights the items businesses reported selling most often and their average costs.

Exhibit 3.45: Products Sold in the ZOI and their Average Cost (SP)

Item	Quantity	Average Cost (SP)
Batteries*	Each	3.00
Charcoal	Small Bag	1.14
Clothing/Shoes/Fabric	Shoes (Men, Women, Children)	35.00
	Clothing (Men, Women, Children)	28.85
	Fabric (Bolt)	209.50
Food Stuffs	Liter of Oil	3.00
	Meat/Kilo	4.00
	Flour	9.00
	Biscuit/Each	1.00
	Salt/Gram	1.00
	Sugar/Kilo	3.00
Kerosene	Liter	1.00
Diesel	Liter	3.00
Petroleum	Liter	4.00
Medicine/Pharmaceuticals	Individual Packet	1.58
	Doctor Visit	15.00
	Medicines (Bottles)^	14.79
Personal Care	Soap, Shampoo, Toothpaste	2.42
	Cell Phone Charging	5.50
Prepared Meals and Drinks (Restaurants)	Meal	4.41
	Drinks	0.60
Tobacco and Cigarettes	Pack	1.79
	Carton	9.83
	Case	27.33

*The majority of batteries are sold by the each; small boxes 12SP; large boxes 28SP; and cartons, 350SP.

^ Medicines commonly mentioned were: Panadol; Quinine; Mebendazole; Aspirin; and Fansidar.

3.2.2.7 Market Overview

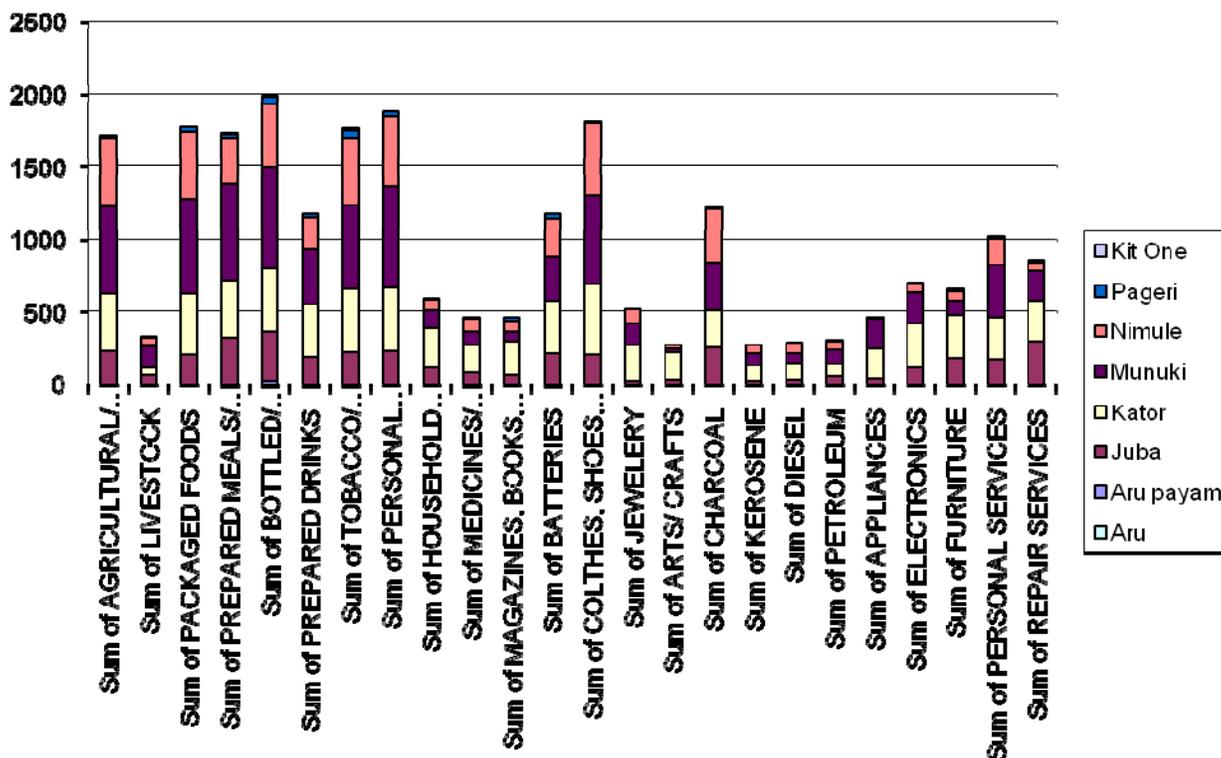
Market overview surveys were conducted to assess business activity in the ZOI. Survey managers counted all business operating in major markets in Juba and Nimule and all existing business in the villages along the Juba Nimule Road. Businesses are defined as any stand, stall or entity that sells at least one good or a service. **Exhibit 3.46** clearly shows that Juba has the most economic activity.

Exhibit 3.46

City/Payam/Village	Number of businesses/stalls
Juba Town	1009
Kator	715
Munuki	2936
Nimule	310
Aru	41
Kit One	12
Moli	9
Loa	18
Pageri	99

Enumerators conducting the market overview survey also noted the primary goods and services provided. The majority of business sold packaged food and drinks, agricultural goods, books, cigarettes and electronics. The most common facilities in the ZOI include: restaurants, barber shops, and phone charging booths. [Exhibit 3.47](#) provides a detailed breakdown of the goods and services in the ZOI.

Exhibit 3.47



3.2.2.8 Baseline Values for Outcome Performance Indicators

Using data generated by the surveys and analysis discussed above, a series of outcome performance indicators have been developed to support the Monitoring and Evaluation Program for the Juba-Nimule Road Project. Exhibit 3.48 presents the baseline values for each of the outcome performance indicators. As discussed in the PMP, after the road has been built, the M&E team will re-survey ZOI Households, Businesses, Vehicle Operators and Passengers, and Freight Companies to measure changes in the baseline values.

Exhibit 3.48 Performance Outcome Indicators for Transport: Baseline Values

Household (HH) Socioeconomic Indicators			
Indicator	Juba	Rest of ZOI	ZOI
Employment Rate	17%	27%	22%
Average HH Monthly Wage Income	614 sp	254 sp	295 sp
Adult Illiteracy Rate	18%	34%	26%
Average Monthly Expenditures on Non Food Items: Transport	70sp	44sp	62sp
Average Monthly Expenditures on Non Food Items: Soap for Washing Clothes	18sp	10sp	12sp
Average Monthly Expenditures on Non Food Items: Diesel	56sp	8sp	16sp
Average Yearly Expenditure on Non Food Items: Clothing	332sp	206sp	252sp
Average Yearly Expenditure on Non Food Items: School Fees	509sp	266sp	452sp
Average Yearly Expenditure on Non Food Items: Health Care	237sp	150sp	186sp
Average Yearly Expenditure on Non Food Items: Housing Rent	747sp	116sp	581sp
Percentage Of HH Owning A Mobile Phone	78.6%	45%	57.4%
Percentage Of HH Sending Money To Friends And Relatives In The Previous 12 Months	24.7%	13.2% 5.9%*	17%
Percentage Of HH Receiving Remittances In The Previous 12 Months	16.9%	9.6% 6.8%**	12%
Juba-Nimule Road Travel Times and Cost Indicators			
Indicator	ZOI		
Average Commercial Vehicle Operator Travel Time: Juba To Nimule	5.0 hrs.		
Average Commercial Vehicle Operator Travel Time: Juba To Kampala	56.9 hrs.		
Average Paid Passenger Vehicle Operator Time: Juba To Nimule	5.4 hrs.		
Average Personal/ Business Vehicle Operator Time: Juba To Nimule	5.5 hrs.		
Average Paid Passenger Fare: Juba To Nimule	34.4 SP		
Average Fuel Cost For Commercial Vehicle: Juba To Nimule	270 SP		
Average Fuel Cost For Paid Passenger Vehicle: Juba-Nimule	176 SP		
Average. Fuel Cost for Personal/Business Vehicles	204 SP		
Household Access to Health Care			
Indicator	Juba	Nimule	Villages
Average Travel Time To Health Clinics	4.35 hrs.	5.7 hrs.	5.4 hrs.
Average Fare Cost For Transport To Health Clinics	8 SP	4.4 SP	15.3 SP
Percent Using Motorized Transport to Health Clinic	61%	17%	15%
Business Activities and Expenditures			
Number Of Businesses Operating In Surveyed Markets	4,660***	310	179****
	Juba	Rest of ZOI	ZOI
Average Monthly Revenue Dry Season	2,721sp	1,081sp	1,973sp
Average Monthly Revenue Rainy Season	2,211sp	691sp	1,525sp
Average Monthly Expenditures: Dry Season	1,380sp	429sp	950sp
Average Monthly Expenditures: Rainy Season	1,520sp	510sp	1,016sp
Average Monthly Transport Costs: Dry Season	1,029sp	544sp	789sp
Average Monthly Transport Costs: Rainy Season	999sp	311sp	780sp
	Juba	Nimule	Villages
Percentage Of Businesses Using Juba-Nimule To Transport Merchandise	52%	30%	83%
Percentage Of Goods Sold That Are Made In South Sudan	5%	0.5%	10%

*If Nimule is also removed from the sample, the percent drops to 5.9 percent

** If Nimule is also removed from the sample, the percent drops to 5.9 percent

***Juba Town, Kator, Munuki

****Aru, Kit One, Moli, Loa, Pageri

CHAPTER 4: JUBA COMMUNITY WATER PROJECT BASELINE ASSESSMENT

4.1 OVERVIEW OF JUBA COMMUNITY WATER PROJECT

The Juba Community Water Project has four component projects of two types. The first three projects are Quick Impact Projects (QIP) that will provide potable water to large segments of Juba's population to reduce water-borne diseases. The QIP projects are as follows:

- **Chlorination of Mobile Tankers at three Pumping Stations**
- **Community Water Storage Tank Installation**
- **Community Daily Water Supply Program**

A fourth project, the Juba Community Hygiene Improvement Initiative (JCHII), is directed at improving hygienic practices of Juba residents. Improper disposal of human waste, poor personnel hygiene and improper storage of clean water could negate the benefits of the three QIP projects. This component project is longer term and its impact on the beneficiary population will take some time to materialize.

4.2 QIP PROJECTS

4.2.1 Chlorination of Mobile Water Tankers

The chlorination of water distributed by mobile water tankers ensures a large segment of the Juba population will be impacted. It has been estimated that up to 70 percent of the water used by Juba households is supplied by these mobile tankers. Currently these trucks pump raw River Nile water into the tanker trucks and sell it to households without any treatment. Injecting chlorine into the tanks prior to departure from the three major pumping sites in Juba (Kator, Jebel Nyoka, and Juba na Bari) should significantly reduce exposure to water-borne diseases.

4.2.2 Community Water Storage Tank Installation

The Community Water Storage Tank Installation will install a total of eight polyethylene storage tanks and two water distribution tap stands at designated locations in Jebel Nyoka and Munuki Nyonkuron. The purpose of this project is to provide these communities with temporary emergency water storage during the rainy season and for the duration of this project.

4.2.3 Community Daily Water Supply Program

This project dovetails with the Community Water Storage Tank Installation Project. Its primary activity is to provide a daily chlorinated water supply to the storage tanks installed in Jebel Nyoka and Munuki Nyonkuron. The primary purpose of this activity is to ensure the installed water tanks are used as a reliable source of safe water, especially during the rainy season, when the incidence water-borne diseases reach a peak.

4.3 JUBA COMMUNITY HYGIENE IMPROVEMENT INITIATIVE (JCHII)

The program will be community driven and will mainly target the resettlement areas of Juba where the poorest and most vulnerable population has settled. This will be a coordinated effort to provide point of use water treatment, improve hygiene awareness and promote behavioral change. Particular emphasis will be given to hand washing, safe disposal of feces, and the storage and use of safe domestic water. The strategy will be implemented through social marketing, community education and capacity building initiatives.

4.4 ZONES OF INFLUENCE

The water project has multiple ZOIs due to the four different components. The first project, which involves chlorination of water distributed by mobile tankers, will target the following communities: Kator, Gabat–Juba na Bari through Prison Area to Juba Grand Hotel Vicinity, Jebel Nyoka-Kasav and Munuki–Nyokuron, and Munuki Prope. The second and third projects (tank installation and provision of chlorinated water) are limited in their geographical scope to the communities of Nyoka and Munuki Nyonkuron. The JCHII project targets: Kator, Gabat–Juba na Bari through Prison Area to Juba Grand Hotel Vicinity, Jebel Nyoka-Kasav and Munuki–Nyokuron, and Munuki Proper.

It is important to note the overlap in the water project's geographical scope. For example, the communities of Jebel Nyoka-Kasav and Munuki–Nyokuron are the intended beneficiaries of all of the projects. Accordingly, any changes indicated by future surveys of these communities would have to be attributed to the overall water project and not to any of the particular subcomponents. **Exhibit 4.1** shows the locations of the main communities within Juba that are the focus of the baseline assessment.

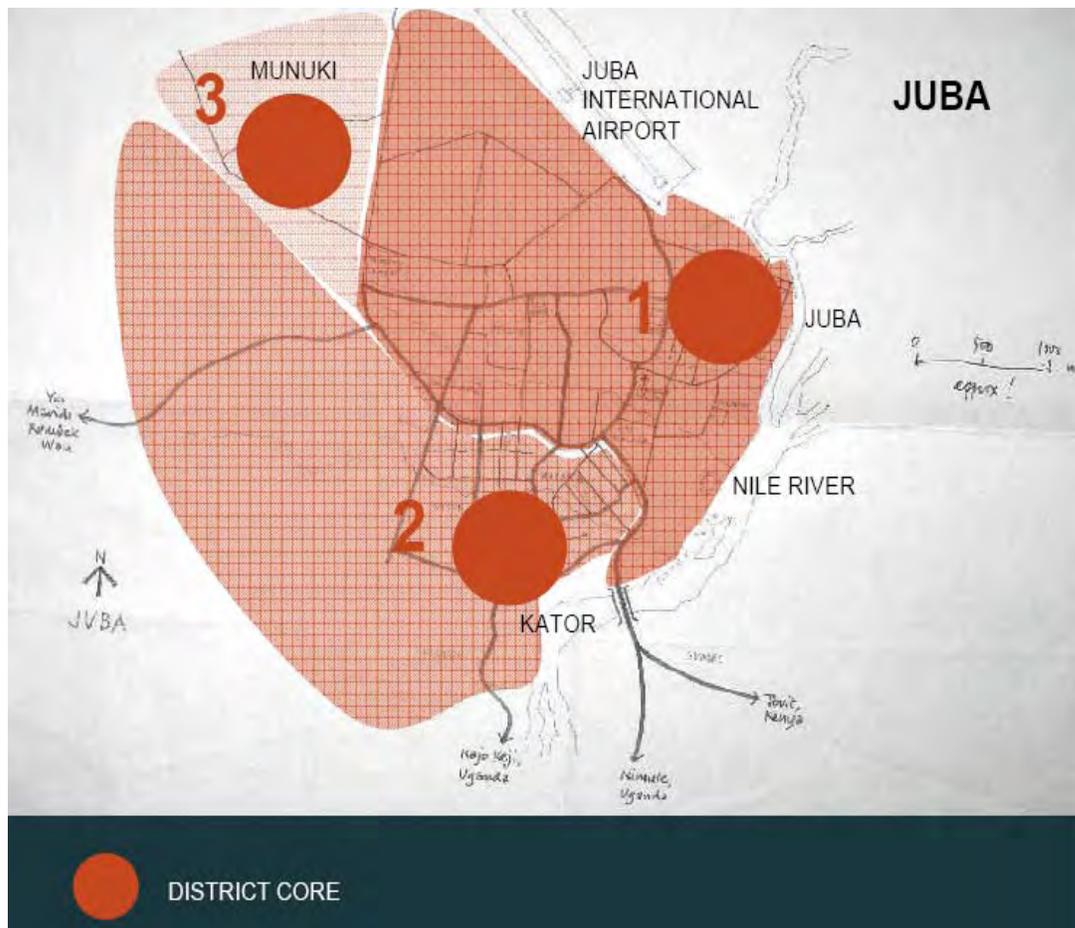
4.5 SURVEYS CONDUCTED FOR THE COMMUNITY WATER PROJECTS

4.5.1 Community Leader Resource Survey

The Community Leader Resource Survey was administered to five community leaders for the sections in Juba most likely to be impacted by the community water projects. The purpose of the survey was to obtain an overview of community resources from the perspective of the Boma leaders. It must be emphasized that none of the leaders had access to data while responding to the survey, so the responses must be considered estimates based on their knowledge of the local communities. None of the Boma chiefs hold technical positions.

Two surveys were taken in Juba Town (Gabat and Jebel Nyoka Blocks), two surveys in Munuki (Munuki Blocs A, B, C and Munuki Nyokuron), and one survey in Kator. The

Exhibit 4.1: Communities Benefiting from the Juba Water Projects



respondents were queried about community water, sanitation, and health care resources as well as their perspectives on changing demographics. The two Juba sections accounted for the smallest populations (estimated at 9,000 for the two Bomas), while the chief of the Munuki Boma estimated his community population to total 300,000. The populations of Munuki Nyokuron and Kator were estimated at 60,000 and 22,400, respectively.

In total, the respondents estimated that approximately 800 returnees were arriving on a monthly basis, with the two Bomas in Munuki accounting for 700 (or 87 percent) of the total. The Boma chief for Kator could not estimate returnee numbers.

4.5.1.1 Community Water Supply Resources

According to the Boma chiefs, the major water supply resources in the communities are:

- **Bore Holes**
- **Water Trucks**

- **Nile river or other streams**
- **Water Tanks**

Bore holes were cited by the community leaders as the only source of water receiving pretreatment with chlorine. Only Kator had no bore holes, and the primary water source cited by the Boma chief was untreated river water. Except in Juba Gabat, users were charged for water from the bore holes. The estimated water charges ranged from 5SP per liter in Juba jebel and Munuki to 10SP per liter in Munuki Nyokuron. The estimated average distance to a borehole for household users ranged from 0.5 kilometers in Munuki to 1.5 kilometers in Munuki Nyokuron. The Boma chiefs estimated water costs for untreated water from mobile tankers ranged from 4SP to 5SP per liter.

In terms of accessibility, the Boma chiefs did not appear to have a good grasp of numbers of people using the different water resources. For Munuki, the Boma chief estimated only 3,000 people used the primary sources of water out of a total estimated population of 300,000. In contrast, the Boma chief for Munuki Nyokuron estimated that 50,000 out of a population of 60,000 obtained water from the bore hole.

4.5.1.2 Community Sanitation Resources

The three most common receptors for human waste according to the Boma chiefs are:

- **Shared Pit latrines**
- **Private Pit latrines**
- **Open field Areas**

Private flush toilets were cited by only one of the Boma chiefs, who estimated that 50 individuals out of a population of 300,000 have access to this technology. The Boma chiefs did not appear to have strong knowledge of the percentage of community members using these different approaches to handling human waste needs. For example, the Boma chief for Munuki estimated that only about 2,500 of a population of 300,000 use the top three methods for disposal of human waste. Only one of the Boma chiefs (Juba Gabat) cited a cost of 1SP per use for shared and private pit latrines. None of the other community leaders provided cost estimates. Finally, the community leaders estimated on average, residents travel from 50 to 500 meters to use pit latrines.

4.5.1.3 Community Health Care Facilities

The respondents indicated that health care facilities are available at reasonable distances in each of the Bomas. In Kator, there is at least one Church facility, public hospital, or private clinic within 600 meters of the average residence. Based on the responses, households in Munuki had the longest distances to travel for health care, with the public hospital located approximately five kilometers from the average resident. All of the facilities were noted as offering services to treat severe diarrhea, but the costs varied. In Kator, the cost ranged from 12SP (church facility) to 20SP (private clinic). The private clinic in Juba Gabat was estimated to charge 60SP and the public hospital 30SP. In Munuki, these costs were estimated at only 10SP and 5SP, respectively.

4.5.2 Household Water Survey

The Household Survey was administered to 150 households containing 846 residents in the three Payams of Juba Town, Kator, and Munuki. Of the 150 surveys, four were found to be deficient and were not included in the analysis. A total of 72 Surveys were conducted in Munuki, 35 in Juba, and 35 in Kator. Location information was left off two surveys, which were otherwise complete and properly filled. The Household Survey was divided into multiple sections addressing demographics, socioeconomic status access to water resources, sanitation resources, and water borne disease incidence.

4.5.2.1 Demographics

The populations surveyed included members of 11 tribes, although as seen in **Exhibit 4.2**, five tribes accounted for 74 percent of the total. Bari households constituted 40 percent of all the households surveyed, but accounted for 64 percent in Kator and only 23 percent in Munuki. Members of the Acholi Tribe were the second most populous tribe followed by the Mundari, Madi, and Kuku. Other Tribal groups accounted for about 22 percent of the households.

Exhibit 4.2: Distribution of Households by Major Tribes

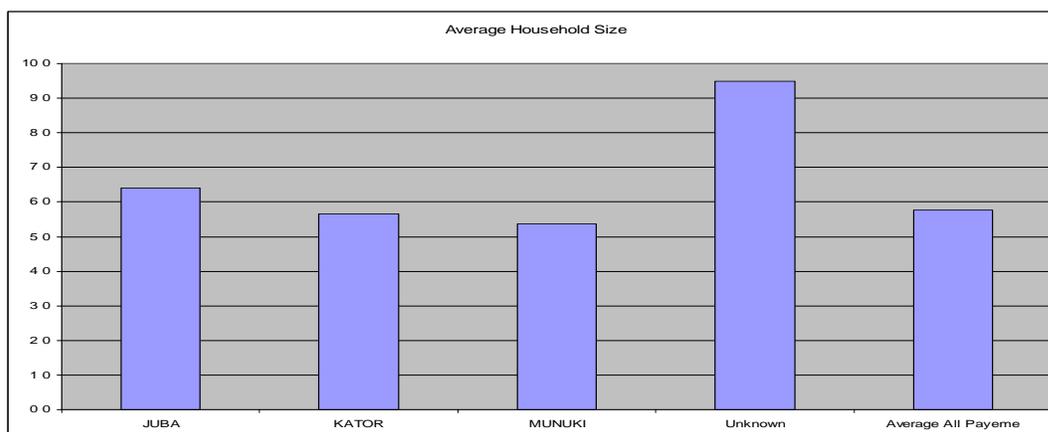
Payam	Acholi	Bari	Madi	Mundari	Kuku
Juba Town	13%	47%	9%	13%	3%
Kator	12%	64%		3%	
Munuki	7%	23%	13%	11%	9%
Unknown*	50%	-	-	-	50%
Total	11%	40%	8%	9%	6%

*Two surveys had missing information on Payam location.

Bari language is the primary language of 36 percent of the households, while Juba Arabic was the primary language for 34 percent and Acholi for 11 percent of the households.

The average size of the households surveyed is 5.8. As seen in **Exhibit 4.3**, household size is smallest in Munuki with an average of 5.4 residents per household, and the largest in Juba with an average household size of 6.4 persons.

Exhibit 4.3



*Two surveys had missing information on Payam location.

The survey also queried respondents about household construction type and length of tenure. **Exhibit 4.4** shows that mud house construction followed by mud-brick tukuls are the most common building type among households surveyed. Munuki has the highest percentage of mud-brick tukuls and Kator is the only payam with a significant percentage of corrugated metal houses. It also has the highest percentage of houses made of sticks. In contrast, more than eight percent of the houses surveyed in Munuki were made of concrete.

Exhibit 4.4: Housing Construction by Type

Payam	Mud	Concrete	Wood	Corrugated Metal	Apartment	Stick Tukul	Mud Brick Tukul
Juba Town	81.1%	8.1%	0.0%	5.4%	0.0%	2.7%	2.7%
Kator	71.4%	5.7%	0.0%	11.4%	0.0%	5.7%	5.7%
Munuki	52.8%	8.3%	4.2%	2.8%	1.4%	4.2%	26.4%
Unknown*	50.0%	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grand Total	64.4%	8.2%	2.1%	5.5%	0.7%	4.1%	15.1%

*Two surveys had missing information on Payam location.

The survey indicated an unexpectedly long tenure in current households. Overall, the survey found that the average length of tenure for the three Payams was about 7.5 years. However, there is a large disparity among the Payams; the average length of tenure in Kator was under three years, whereas in Munuki and Juba Town, the length of tenure is about nine years. In Kator, where 71 percent of the respondents live in mud houses, the average tenure in those houses was less than two years.

4.5.2.2 Socioeconomic Characteristics

The survey queried respondents about educational attainment, assets, expenditures, and sources of income.

4.5.2.2.a Educational Attainment

Educational attainment of the surveyed population is the lowest in Juba Town and the highest in Munuki. Removing the youngest population (those too young to be in school) gives an overall illiteracy rate of 21 percent. **Exhibit 4.5** indicates only nine percent of the adult population graduated high school and four percent are college graduates.

Exhibit 4.5: Educational Attainment

	Illiterate	Primary Graduate	High School Graduate	College Graduate
Juba Town	28%	13%	4%	0%
Kator	18%	9%	12%	4%
Munuki	19%	12%	11%	6%
Unknown*	21%	21%	16%	11%
Total	21%	12%	9%	4%

*Two surveys had missing information on Payam location.

4.5.2.2.b Household Assets

Household assets include appliances and other amenities used to support the daily functions of the family residence. These range from radios to kerosene stoves. **Exhibit 4.6** presents the percentage of households owning selected items.

Exhibit 4.6: Household Assets

Payam	Television	Radio	Mobile Phone	Computer	Refrigerator	Fan	Power Generator	Kerosene or Paraffin Stove	Kerosene or Paraffin Lantern	Bicycle
Juba Town	11%	59%	54%		6%	8%	3%	11%	33%	25%
Kator	25%	80%	77%	6%	6%	11%	20%		20%	47%
Munuki	49%	85%	82%	6%	10%	11%	31%	8%	15%	46%
Unknown*	100%	100%	100%		100%	100%	50%	100%		50%
Overall	35%	77%	74%	4%	9%	12%	22%	8%	21%	41%

Two surveys had missing information on Payam location.

Similar to the household characteristics, households in Munuki appear to be more affluent than in the other two payams. Households in this payam own more of each of the listed assets than in Kator and Juba. Residences in Juba owned the fewest of all of the items listed except for kerosene stoves and lamps. The relatively high level of affluence among households surveyed in Munuki is indicated by the high percentage of surveyed households possessing a television.

4.5.2.2.c Household Purchases and Expenditures

Household purchases and expenditures for selected items over the previous month and the previous 12 months were also requested by the survey. Responses are shown in **Exhibits 4.7 through 4.9**.

Exhibit 4.7: Percent of Households Making Purchases in Previous Month

Payam	Body Soap	Clothes Soap	Toothpaste	Toilet paper	Shampoo	HH cleaning products (dish soap etc.)	Petrol	Diesel	Charcoal	Kerosene	Fire wood
Juba Town	81%	89%	56%	9%	6%	0%	3%	0%	65%	38%	49%
Kator	92%	97%	67%	8%	8%	3%	17%	14%	94%	32%	36%
Munuki	93%	82%	79%	29%	15%	25%	25%	15%	83%	16%	33%
Unknown*	100%	100%	100%	100%	100%	50%	100%	100%	100%	50%	67%
Overall	90%	88%	71%	20%	13%	14%	19%	13%	82%	26%	38%

*Two surveys had missing information on Payam location.

Exhibit 4.8: Average Household Expenditure in Previous Month

Payam	Body Soap	Clothes Soap	Toothpaste	Toilet paper	Shampoo	HH cleaning products (dish soap etc.)	Petrol	Diesel	Charcoal	Kerosene	Fire wood
Juba Town	13.10	28.22	6.55	5.33	22.50		100.00		81.67	20.08	13.41
Kator	7.76	9.19	6.08	4.00	4.50	4.00	123.00	33.60	58.26	5.82	10.54
Munuki	18.89	20.53	10.55	11.47	9.00	15.61	126.12	103.91	89.80	14.70	46.26
Unknown*	68.33	82.50	30.00	17.50	20.00	30.00	150.00	250.00	107.50	50.00	40.00
Average	15.89	20.32	9.12	10.41	11.35	15.75	126.23	100.61	79.99	14.91	27.44

*Two surveys had missing information on Payam location.

The majority of households in all three payams purchased basic personal hygiene products including body and clothes soap and toothpaste, but relatively few procured toilet paper, shampoo or household cleaning products. Charcoal and firewood purchases were common for most households, although kerosene was less commonly used. The largest expenditures were for petrol and diesel for motorized vehicle or power generator use.

Exhibit 4.9: Percent of Households Purchasing Items in the Previous 12 Months

Payam	Clothing	Shoes	School Fees	Health Care Services	Housing Maintenance (repairs and improvements)	Housing Rent
Juba Town	61%	58%	49%	56%	15%	21%
Kator	89%	89%	83%	83%	40%	14%
Munuki	88%	86%	78%	84%	21%	19%
Unknown*	100%	100%	100%	100%	100%	
Total	81%	80%	72%	77%	25%	18%

Two surveys had missing information on Payam location.

As seen in **Exhibit 4.9**, most households were able to procure durable goods such as clothing as well as educational and health care services. Relatively few households spent funds on housing maintenance.

4.5.2.2.d Income

Households were surveyed on sources of income, including wage income, income from businesses and from the sales of animals or crops. It should be noted that income data are often the least reliable information for estimating socioeconomic status in developing countries, since so much employment is informal and irregular. Although the respondents were asked about length of employment and periodicity of payment, this information is often incorrectly conveyed to the enumerators. Complicating issues of responses, only 108 households of the 150 surveyed responded to questions on income. Therefore, these results must be viewed very cautiously.

Exhibit 4.10 shows almost 90 percent of the households responding to the income section indicated that at least one member was receiving wage income. Unexpectedly, the Juba Town residents reported the highest income of the three payams, with a monthly income of 812SP. Munuki was slightly lower at 803SP, while Kator reported monthly wage incomes of just 619SP. Because Juba Town lags behind the other two communities in almost all other socioeconomic indicators, these figures are somewhat suspect. This result could have arisen from poor estimates provided by the survey respondents as discussed above as well as possible improper entries by the enumerators.

Exhibit 4.10: Household Income from Wages

Payam	Total HH	HH Reporting Wage Income	Percent of HH Reporting Wage Income	Average Monthly Household Wage Income (SP)
Juba Town	27	22	88%	812
Kator	26	26	100%	619
Munuki	55	46	84%	803
Unknown*	2	2	100%	2,001
Total	108	96	89%	780

*Two surveys had missing information on Payam location.

In contrast, Munuki households, which operate businesses, reported incomes of more than twice that of the two other payams, although as shown in [Exhibit 4.11](#), a smaller percentage of households in that payam operated business compared to Juba Town and Kator. Only two households reported income from the sale of crops, while one household reported income from the sale of animals.

Exhibit 4.11: Household Income from Operating Business Enterprises

Payam	HH receiving Business Income	Percent of Households Having Business Income	Average Monthly Income
Juba Town	16	64%	499
Kator	13	50%	550
Munuki	21	38%	1,123
Unknown*		0%	
Overall	50	46%	816

Two surveys had missing information on Payam location.

Another indicator of wealth is the degrees to which households send money to relatives and friends compared to the frequency and amount they receive from relatives and friends to support their households.

As seen in [Exhibit 4.12](#), the households of Kator were the most frequent recipients of remittances, while Juba Town residents were the least likely to receive or send money. Munuki households sent money to relatives or friends more frequently than surveyed residents in the other two payams. Still, about 20 percent of the households surveyed receive remittances and 17 percent send money to friends or relatives.

Exhibit 4.12: Household Remittances and Donations

Payam	Percent of HH Receiving Money Last 12 Months	Percent of HH Sending Money in Last 12 Months
Juba Town	14%	6%
Kator	31%	17%
Munuki	17%	23%
Unknown*	50%	
Overall	20%	17%

*Two surveys had missing information on Payam location.

As shown in [Exhibit 4.13](#), for households either receiving or sending money, Munuki residents were either the largest recipients or benefactors, with households receiving on average more than 9,000SP in the previous year or sending almost 3,000SP. In contrast, surveyed households in Juba sent only 255SP or about 20SP per month. These figures comport overall with the other sections of the survey that indicate Munuki households are significantly more affluent than households in the other two payams. As noted above, Juba Town households, despite the reported income figures, appears to be the least affluent of the three populations.

Exhibit 4.13: Size of Remittances Received or Sent by Surveyed Households

Payam	Average Amount Received in previous 12 Months	Average Amount Sent in Past Previous 12 Months
Juba Town	770	255
Kator	1,270	1,317
Munuki	9,118	3,279
Unknown*	5,000	
Overall	4,560	2,536

*Two surveys had missing information on Payam location.

4.5.2.3 Water, Sanitation and Health Status of Surveyed Populations

The main section of the survey covers public accessibility to and cost of water resources, sanitation facilities, and health and productivity impacts of poor drinking water quality and sanitary conditions.

4.5.2.4 Water Sources and Treatment

The survey queried sources for household water use and whether the respondent obtained water that was treated, and also whether the household added chlorine after it was obtained and prior to actual usage. **Exhibit 4.14** presents household responses to queries about sources of drinking water. The three Payams have very different profiles with Munuki residents receiving their drinking water primarily from boreholes and mobile tanker trucks. In Kator, rivers and canals were the major sources of drinking water followed by mobile tanker trucks. Juba Town had the highest percentage of households with tap, but was also dependent on open waterways such as the Nile River. Boreholes provided drinking water to only 1.9 percent of the households in Juba Town.

Exhibit 4.14: Household Drinking Water Sources

Type of Drinking Water Source	Juba Town	Kator	Munuki
Household Tap	28.1%	1.4%	0.8%
Public Tap	4.4%		
Borehole	1.9%	7.1%	58.6%
Well			1.5%
Still Open Water (Lake, Pond, Reservoir)	10.4%		
Open Running Water (River, Canal)	37.4%	58.6%	0.2%
Water Truck	17.8%	21.4%	36.6%
Water Tank		6.4%	2.4%
Other		5.0%	

*Two surveys had missing information on Payam location.

The survey responses indicate a large difference among the Payams in terms of water service. In Munuki, the vast majority indicated the water they use is pretreated, whereas in Juba Town only 25 percent indicated the water has been pre-treated. In Kator, about a third of respondents believed their household water has been pretreated. This perception is reflected in that households in Juba and Kator are much more likely to chlorinate their water than households surveyed in Munuki (**See Exhibit 4.15**). The responses also comport with the responses of the community leaders who indicated that borehole drinking water is treated with chlorine. However, the perceptions of the household respondents regarding the quality of the water they receive might not always be accurate. For example, as seen in

Exhibit 4.14, 37 percent of the Munuki Households receive water from mobile tanker trucks, which do not sell chlorinated water, yet 92 percent of the respondents (**See Exhibit 4.16**) asserted that their drinking water is always pre-treated.

Exhibit 4.15: Households Chlorinating Water

Payam	No	Sometimes	Yes
Unknown			7.7%
Juba Town			7.7%
Kator	49.4%		50.6%
Munuki	33.6%	5.7%	60.7%
Unknown*	76.5%	0.2%	23.2%
Total	72.2%	0.6%	27.3%

*Two surveys had missing information on Payam location.

Exhibit 4.16: Households Reported to be Receiving Pre-Treated Water

Payam	No	Sometimes	Yes
Juba Town	75.5%	0.0%	24.5%
Kator	57.9%	8.6%	33.6%
Munuki	6.5%	1.0%	92.5%
Unknown*			100.0%
Total	17.9%	1.3%	80.8%

*Two surveys had missing information on Payam location.

4.5.2.5 Household Monetary and Time Expenditures for Water Resources

Households were queried on monthly expenditures for water and time spent collecting water. For costs, respondents were asked to differentiate between the dry and wet seasons. As shown in **Exhibit 4.17**, the range of monthly expenditures among the Payams is quite large. Residents in Munuki report spending 31.60SP in the wet season and 53SP in the dry season. At the other extreme, Juba residents spend only about 8SP and 9SP per month, respectively for the wet and dry seasons. Kator residents pay about half the amount Munuki residents pay. It would appear that the differences in cost might be attributable to the manner in which residences of the Payams receive their water. Munuki residents who pay for water primarily obtain the water from boreholes. Juba and Kator residents appear to receive more of their delivered water from mobile tankers, which according to the Boma chiefs are a less expensive source of water than the boreholes.

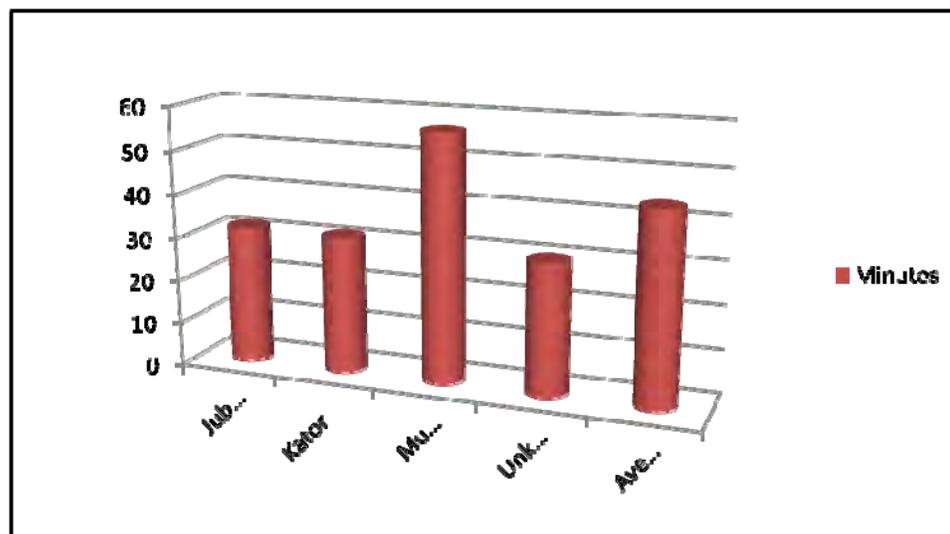
Exhibit 4.17: Average Household Expenditures for Water

	Average Dry Season Monthly Expenditure (SP)	Average Wet Season Monthly Expenditure (SP)	Average Monthly Expenditure (SP)
Juba Town	9.18	7.73	8.45
Kator	22.44	18.66	20.55
Munuki	53.87	31.60	42.74
Unknown*	30.00	15.00	22.50
Overall	35.38	22.47	28.92

*Two surveys had missing information on Payam location.

Exhibit 4.18 indicates the amount of time spent per day collecting water ranged from 31 minutes in Juba to 56 minutes in Munuki. Presumably, this is because of the distance to the boreholes and the queues to obtain the water. The majority of the respondents in all three Payams collect water at least twice a day on average. In addition, the survey indicates that about 75 percent of the identified household members performing this task fall into these two demographic groups.

Exhibit 4.18: Household Daily Time Collecting Water



Unknown: *Two surveys had missing information on Payam location

The reported time to collect water comports well with responses to distance travel. As seen in **Exhibit 4.19**, a far higher percentage of Munuki residences travel more than one kilometer to obtain water.

Exhibit 4.19: Distance from Households to Primary Water Source

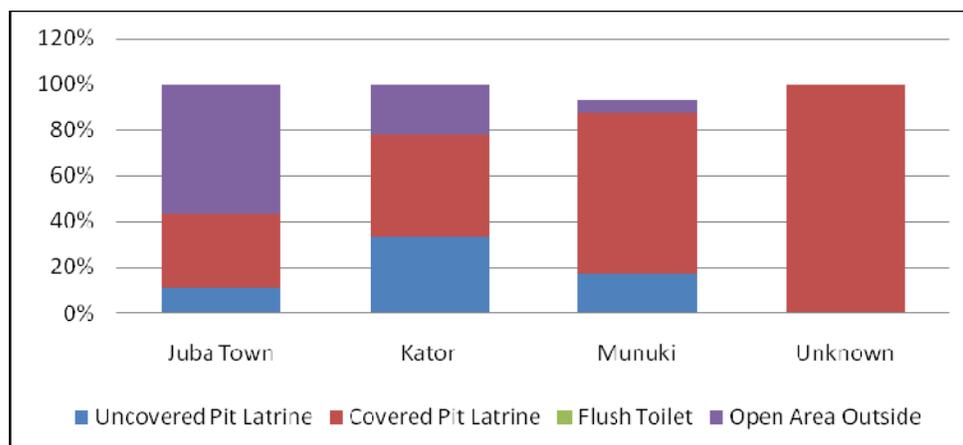
Payam	Within Premises	Less than 0.5 KM	0.5 to 1 KM	1 KM or more	Delivered by truck
Juba Town	27%	49%	16%	8%	
Kator	23%	31%	43%	3%	
Munuki	32%	31%	16%	18%	3%
Unknown*	50%	50%			
Overall	29%	36%	23%	11%	1%

*Two surveys had missing information on Payam location.

4.5.2.6 Access to Sanitation Facilities

The Water Survey also queried respondents on availability of public and private latrines for their household members. Respondents were also questioned on the cost of using these facilities and quality of service. As seen in the **Exhibit 4.20**, Juba Town residents had the least access to sanitation facilities, whereas Munuki residents surveyed had almost universal access to some type of latrine. Consistent with the other survey questions, Kator residents had a degree of accessibility less than Munuki, but more than Juba.

Exhibit 4.20: Use of Sanitation Facilities by Location



*The total for Munuki is less than 100 percent because two respondents did not answer this question. Two surveys had missing information on Payam location

Only a relative few households in all of the Payams are charged for latrine use maintenance. Kator and Munuki residents are the most likely to pay a user fee, with Munuki residents being charged the highest, at about 27SP per month (**Exhibit 4.21**).

Exhibit 4.21: Household Expenditures for Latrines

Payam	Percent of HH Paying for Latrine Maintenance	Percent of HH not Paying for Latrine Maintenance	Average Monthly cost for HH who Pay for Maintenance (SP)
Juba Town	14%	86%	17
Kator	23%	77%	13
Munuki	21%	79%	27
Unknown*	50%	50%	4
Total	20%	80%	15

*Two surveys had missing information on Payam location.

4.5.2.7 Household Hygienic Practices

Households were queried on hygienic practices, including bathing practices, and hand-washing prior to eating and after use of latrines.

4.5.2.8 Bathing

All of the respondents indicated that household members bathe at least once a day. As shown in **Exhibit 4.22**, nearly 80 percent of the respondents stated that household members bathe on average twice a day.

Exhibit 4.22: Reported Frequency of Bathing

	More than twice per day	Twice per day	Once per day	Total
Juba Town	11%	70%	19%	100%
Kator	20%	74%	6%	100%
Munuki	6%	86%	8%	100%
Unknown*	50%	50%	0%	100%
Average	11%	79%	10%	100%

*Two surveys had missing information on Payam location.

4.5.2.9 Hand Washing

The household surveys suggested that these populations are aware of and employ reasonably sound personal hygiene practices. As shown in **Exhibit 4.23 and Exhibit 4.24**, the vast majority of respondents stated that hand washing is performed prior to eating and after latrine use. Juba Town residents were the least likely to perform hand washing compared to the surveyed residents of Munuki and Kator.

Exhibit 4.23: Percentage HH Members Washing After Use of Latrine

Payam	Always	Sometimes	Rarely
Juba Town	57%	30%	14%
Kator	81%	17%	3%
Munuki	88%	6%	7%
Unknown*	50%	50%	
Overall	78%	15%	7%

*Two surveys had missing information on Payam location.

Exhibit 4.24: Percentage HH Members Washing Prior to Meals

Payam	Always	Sometimes	Rarely
Juba Town	76%	11%	14%
Kator	94%	6%	
Munuki	96%	3%	1%
Unknown*	100%		
Overall	90%	5%	4%

*Two surveys had missing information on Payam location.

The reported percentages would appear to be higher than expected given the lack of sanitary facilities in much of the surveyed area, especially in Juba Town. Local staff, however, indicated that the majority of the population is aware of proper hygiene practices and will answer appropriately rather than based on actual daily actions. Hence, the accuracy of these responses must be viewed with some caution.

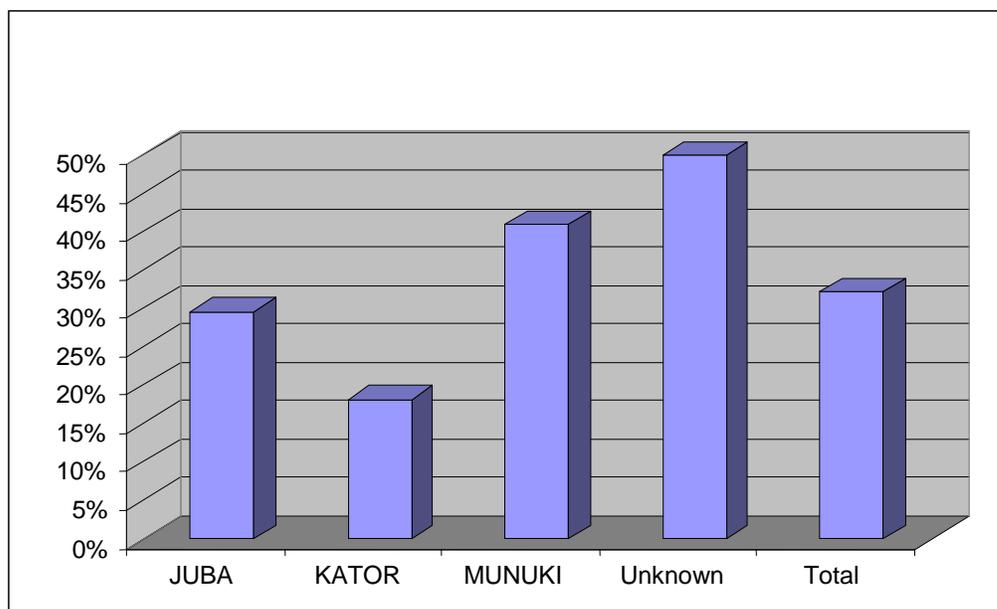
4.5.2.10 Incidence of Water Borne Illness

The combination of poor quality drinking water and inadequate sanitation facilities can lead to the proliferation of water borne diseases. Much of South Sudan was affected by an outbreak of cholera in 2007. Because respondents are not likely able to differentiate between cholera and other diseases resulting in acute diarrhea, the survey queried only about incidences of the latter.

As shown in **Exhibit 4.25**, more than 30 percent of the households reported that members suffered from at least one case of severe diarrhea during the previous 12 months.

Surprisingly, Munuki had the highest incidence, given that more of its populations appear to use chlorinated water and practice appropriate personal hygienic habits prior to meals and after latrine use. Kator residences surveyed reported the lowest incidence with only 18 percent of the surveyed households reporting cases of severe diarrhea. The respondents reported that a total of 88 persons suffered severe diarrhea and seven died during the previous 12 months (see Exhibit 4.26). The incidence of morbidity and mortality rates were about the same for adults as children.

Exhibit 4.25: Percent of Households with Incidences of Severe Diarrhea During the Previous 12 Months



*Two surveys had missing information on Payam location.

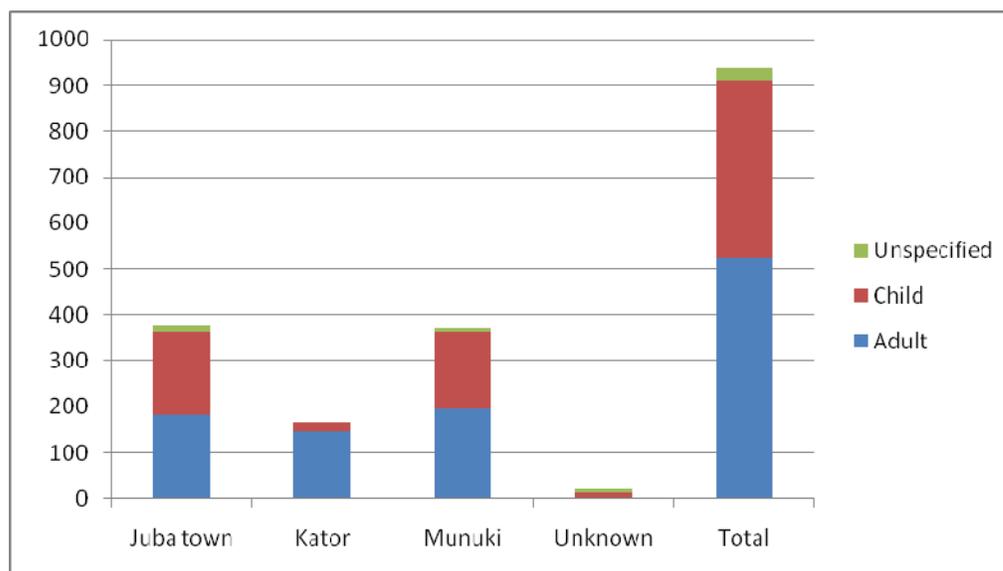
Exhibit 4.26: Total Number of Deaths from Water-Borne Illnesses

Payam	Total	Adult	Child	Unknown Age
Juba Town	6	2	2	2
Kator				
Munuki	1	1		
Unknown*				
Total	7	3	2	2

*Two surveys had missing information on Payam location.

As shown in Exhibit 4.27, the households affected by diarrhea estimated that individuals were sick for a total of 938 days or for almost three person-years. The respondents also estimated that children missed 233 days of school due to illness, of which half the lost school days were in Juba Town. These responses do indicate that despite the relatively affluent status of many of the households surveyed, severe diarrhea from exposure to contaminated water remains a serious problem.

Exhibit 4.27: Number of Reported days of Illness for Households Reporting Cases of Severe Diarrhea



*Two surveys had missing information on Payam location.

4.5.2.11 Willingness to Pay for Improved Water Sources and Latrine Facilities

The Water Survey also queried households on their willingness to pay for improved drinking water and latrine facilities. As seen in **Exhibit 4.28 through Exhibit 4.31**, the vast majority of residents in all three Payams are willing to pay up to one pound per day for improved water and sanitation services. For both types of services, the respondents are willing to pay additional costs for more continuous and more conveniently located services. As would be anticipated based on the other sections of the survey, the residents surveyed in Munuki and Kator are more willing to pay more for convenient services than those in Juba. For example, 47 percent of those surveyed in Kator and 34 percent in Munuki are willing to pay 2SP/day for 12 hours of water service located within 100 meters of their residence, whereas only three percent of those surveyed in Juba would pay such a price.

Exhibit 4.28: Willingness to Pay for Water Source Not More Than 500 Meters away and Service is Available for 2 Hours in the Morning and Evening

Payam	50 Piestras/day	1 SP/day	1.50 SP/day	2 SP/day
Juba Town	65%	32%		3%
Kator	42%	42%	6%	11%
Munuki	46%	32%	10%	11%
Unknown*	50%	50%		
Overall	50%	35%	6%	9%

*Two surveys had missing information on Payam location.

Exhibit 4.29: Willingness to Pay for Water Source Not More Than 100 Meters Away and Service is Available for 12 hours Everyday

Payam	50 Piestras/day	1SP/day	1.50 SP/day	2 SP/day
Juba Town	56%	29%	12%	3%
Kator	6%	31%	17%	47%
Munuki	24%	31%	10%	34%
Unknown*	50%	50%		
Overall	27%	31%	12%	30%

*Two surveys had missing information on Payam location.

Exhibit 4.30: Willingness to Pay for Latrine Not More Than 500 meters Away and Cleaned Once a Week

Payam	50 Piestras/day	1SP/day	1.50 SP/day	2 SP/day
Juba Town	57%	27%		17%
Kator	20%	43%	23%	14%
Munuki	47%	36%	7%	10%
Unknown*	50%		50%	
Overall	42%	35%	10%	12%

*Two surveys had missing information on Payam location.

Exhibit 4.31: Willingness to Pay for Latrine Not More Than 100 Meters Away and Cleaned Once a Day

Payam	50 Piestras/day	1SP/day	1.50 SP/day	2 SP/day
Juba Town	47%	37%	3%	13%
Kator	8%	19%	28%	44%
Munuki	21%	31%	20%	28%
Unknown*	50%	50%		
Overall	24%	29%	18%	29%

*Two surveys had missing information on Payam location.

4.6 ANALYSIS OF WATER SURVEY DATA

Overall, the data provided by the households surveyed appear to be internally consistent and for the most part reasonable given what is known about the populations living in Juba. That is, for the most part, the data characterizing the three Payams were generally consistent across the different sections of the survey. The households surveyed in Munuki had more income, wealth, and access to clean water and sanitation than the other Households

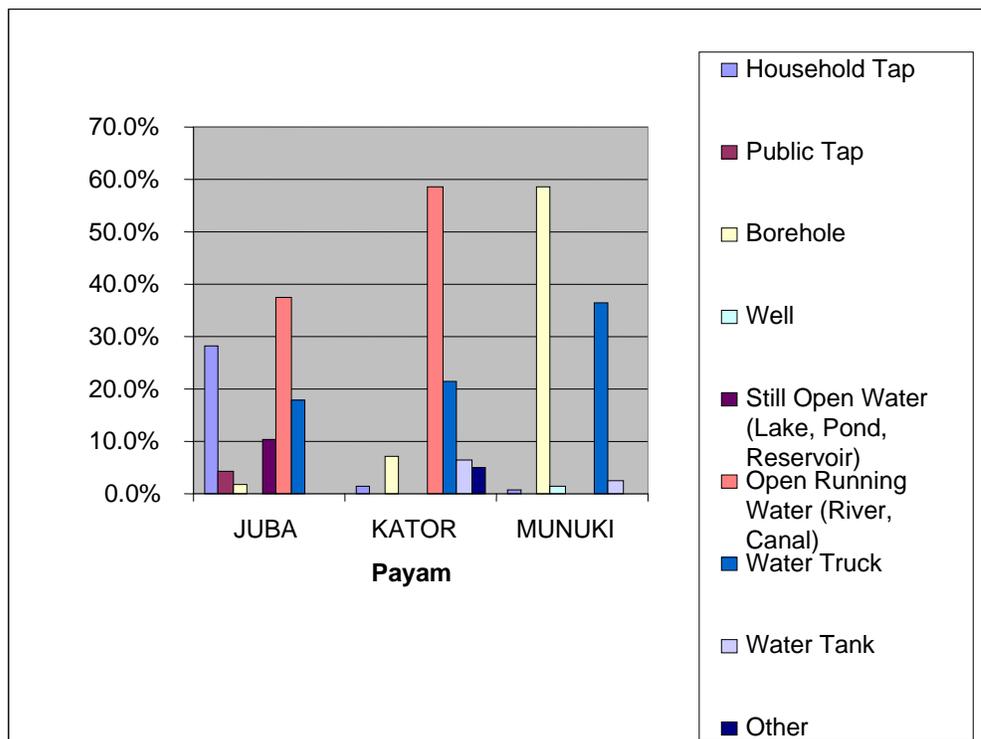
However, because the 2008 Census data are not available and no equivalent surveys have been conducted in recent years, it is not possible to accurately state how representative the surveyed population is of the population likely to benefit from the community water projects that will be implemented under the ISP.

Some of the responses would appear to indicate that the surveyed population in Munuki in particular might be more affluent than the general population of that community. The average Munuki resident surveyed had been in the current household for almost nine years; and more than 80 percent of those households own a mobile phone and radio, with another 31 percent having a power generator. Almost 50 percent of the surveyed residents in

Munuki possess a television. Until Census data become available, however, it is not possible to validate this suspicion.

Consistent with the income and asset response data, the residents of Munuki appear to have the best access to pre-treated water, since more than 56 percent obtain water from boreholes. As shown in **Exhibit 4.32**, residents of Kator and Juba are far more reliant on open running water sources that are likely to be contaminated. Munuki residents also assert that 90 percent of the households receive pre-treated water. Given that 32 percent receive water from mobile tankers that do not pre-treat the water, it appears the residents may be misinformed.

Exhibit 4.32: Primary Sources of Water Supply by Location

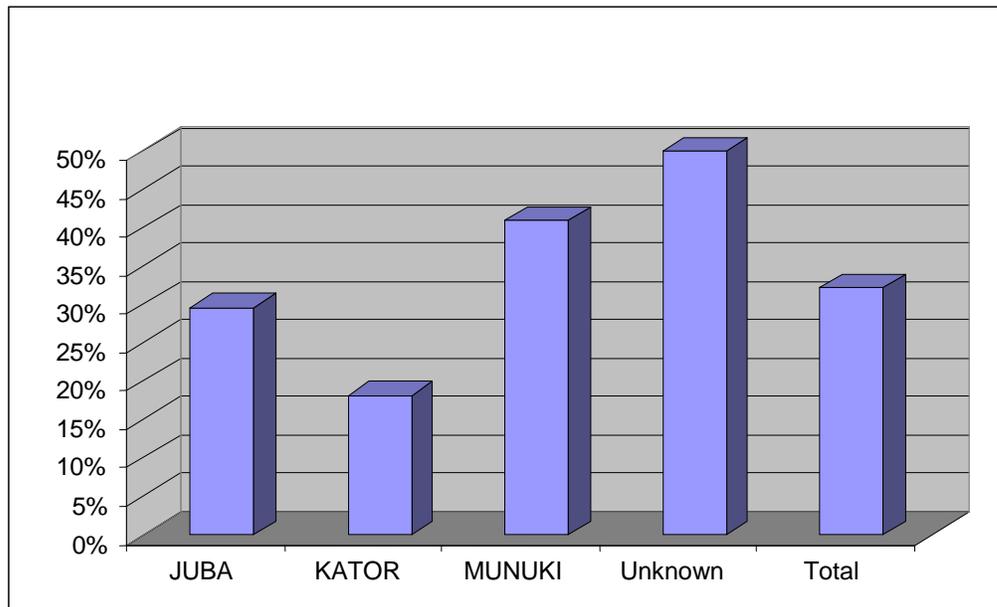


This misperception is supported by the survey data which indicate that Munuki residents are the least likely to chlorinate their water. As the charts below show, only 23 percent of Munuki residents treat their water regularly. In contrast, 67 percent of the Kator residents surveyed treat their water occasionally or regularly; 51 percent of the Juba residents treat their water regularly.

This misinformation on quality of water received from mobile tankers can have consequences. For example, although the surveyed population of Munuki appears to be the most literate and affluent of the three surveyed populations, they have the highest reported incidence of severe diarrhea. As shown in **Exhibit 4.33**, Munuki reported 41 percent of households with at least one incidence of severe diarrhea, whereas Kator only reported 18 percent. In terms of mortality rates, a total of seven individuals were reported to have died from severe diarrhea in the past year, which would account for 0.8 percent of the total surveyed household population. Juba Town residents accounted for six of the seven total deaths. Applied to the entire population of Juba (assuming a population of 400,000) would yield an annual mortality rate of more than 3,000. Also, the households affected by diarrhea

estimated that individuals were sick for a total of 938 days or for almost three person-years. These responses do indicate that despite of stable status of many of the households surveyed, severe diarrhea from exposure to contaminated water remains a serious problem.

Exhibit 4.33: Percent of Households with Incidences of Severe Diarrhea During Previous 12 Months

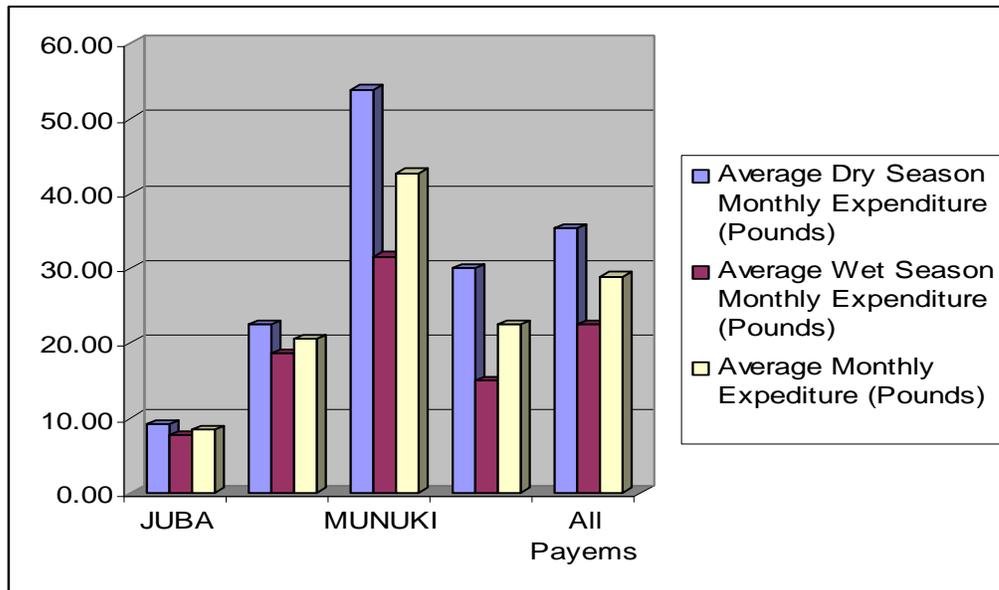


*Two surveys had missing information on Payam location.

In terms of personal hygiene, the surveyed population reports a relatively high compliance with sound hygienic practices. The large majority of populations surveyed in Munuki and Kator report that household members usually wash their hands prior to meal consumptions and after use of latrines. In Juba, only about 25 percent wash hands prior to meals and only 47 percent wash after using a latrine. The Juba population also had the least access to latrines, with 57 percent of the households using open fields as a latrine. In contrast, 71 percent of the Munuki residents used covered latrines.

The survey results on expenditures and willingness to pay for improved water and sanitation comport with the other survey sections. For example, Juba residents pay the lowest monthly costs for water precisely because a higher percentage of the households obtain their water from open water sources, including the Nile. Munuki residents pay the most because they obtain the largest percentage of water from regulated boreholes. Munuki residents also pay a time cost for this water source as they travel on average longer for water than the residents of the other Payams. Residents in Munuki travel about 56 minutes per day collecting water compared to 32 minutes and 31 minutes in Juba and Kator, respectively. Residents also pay more for water during the dry season than during the rainy season, particularly those who rely more on public and private sources of water for which a fee is charged. These differences are shown in [Exhibit 4.34](#).

Exhibit 4.34: Seasonal Costs of Drinking Water



Finally, the water surveys provide insight on the willingness of residents to pay for improved water and sanitation service. Again consistent with other sections of the survey, the residents of Munuki and Kator appeared to be the most willing to expend additional income for these services, with about half of those surveyed willing to pay 1.50 to 2 SP per day for more continuous and better located water and latrine services.

4.7 BASELINE VALUES FOR OUTCOME PERFORMANCE INDICATORS

Using data generated by the surveys and analysis discussed above, a series of outcome performance indicators have been developed to support the Monitoring and Evaluation Program for the Juba Community Water Projects. Exhibit 4.35 presents the baseline values for each of the outcome performance indicators. As discussed in the PMP, after the projects have been fully implemented and operating for approximately six months to one year, the M&E team will resurvey ZOI Households to measure changes in the baseline values.

Exhibit 4.35: Performance Outcome Indicators for Community Water Project Baseline Values

Household (HH) Socioeconomic Indicators				
Indicator	Juba Town	Kator	Munuki	ZOI
Average HH Monthly Wage Income	812 SP	619 SP	803 SP	780 SP
Adult Illiteracy Rate	28%	18%	18%	21%
Average HH Monthly Expenditures For 10 Major Non-Food Items*	344 sp	314 sp	570 sp	409 sp
Percentage Of HH Owning A Mobile Phone	57%	77%	82%	74%
Percentage Of HH Sending Money To Friends And Relatives In The Previous 12 Months	6%	17%	23%	17%
Percentage Of HH Receiving Remittances In The Previous 12 Months	14%	31%	17%	20%
Water And Sanitation Accessibility Indicators				
Indicator	Juba Town	Kator	Munuki	ZOI
Percentage Of HH Receiving Water From Clean Or Treated Sources (Boreholes, Taps, Wells)	20%	9%	76%	45%
Percentage Of HH Chlorinating Water	7.7%	50.6%	60.7%	27.3%
Average Time Spent Daily Collecting Water	31 min.	32 min.	56 min.	44 min.
Percentage Of HH Traveling 0.5 Km Or Less To Primary Water Source	73%	54%	63%	64%
Percentage Of HH Using Private Or Shared Latrine	43%	77.8%	91.7%	76.2%
Average HH Monthly Expenditures For Water	8.45 sp	20.55 sp	42.74 sp	28.92 sp
Household Health Indicators				
Indicator	Juba Town	Kator	Munuki	ZOI
Percentage Of HH Reporting AWD During The Previous 12 Months	30 %	18%	41%	32%
Incidence Of Deaths From Water Borne Diseases	6	0	1	7
Number Of Days Sick In The Previous Year Due To Water Borne Illnesses	378	168	371	938
Number Of Missed School Days	133	21	70	238
Percentage Of HH Members Always Hand Washing After Using The Latrine/HH	57%	81%	88%	78%
Percentage Of HH Members Always Hand Washing Before Meals/HH	76%	94%	96%	90%
Willingness To Pay For Water And Sanitation Facilities				
Willingness To Pay Up To 1 Sp For Clean Water (Within 100 Meters And 12 Hours Service)	84%	27%	52%	53%
Willingness To Pay For Latrine Facilities (Within 100 Meters, Cleaned Once Day)	37%	19%	31%	29%

*Body soap, clothes soap, toothpaste, toilet paper, shampoo, house cleaning products, petrol, diesel, charcoal, kerosene, firewood, public transport

CHAPTER 5: ENERGY SECTOR: YEI ENERGY PROJECT

5.1 YEI ENERGY PROJECT BASELINE ASSESSMENT

The energy component of the ISP program focuses primarily on providing capacity building for the Ministry of Housing, Land and Public Utilities. Fiscal Year 2008 objectives are to provide electric sector policy support for the State Electric Distribution Companies (SEDCs) and establish Sub Directorates of Distribution (SDD) and Regulation (SDR) as well as hire and train key staff for these entities. The baseline assessment has been developed using the results of a series of interviews conducted during May 2008 and evaluates two different components of the Yei Energy Project: energy infrastructure and training. Even though the infrastructure program was not implemented under SISF, a broad assessment was conducted to estimate the project's impact on business owners, hospitals, schools and clinics. If future electrification projects are initiated under ISP, baseline studies that would include a willingness to pay study would be conducted followed by annual surveys to assess impacts of the additional power supply. The project survey area within a defined ZOI would be determined randomly to include households, shops, public buildings and light industrial establishments.

As discussed in the draft PMP submitted to USAID on March 1, 2008, the initial M&E method for the energy component of the ISP entailed conducting structured interviews. The interviews were administered in May and will be administered again per client request in six to 12 months to assess how well the cooperative is functioning. A total of 20 structured interviews were conducted that assessed the following:

- **Impact of training on staff and cooperative members**
- **Impact of access to electricity on businesses and households**
- **Impact of access to electricity on schools, hospitals and government**

Exhibit 5.1 presents an overview of some of the standard elements impact indicators already achieved. These indicators are submitted to USAID on a regular basis through the monthly reports. They include:

1. Transformers and Poles Installed
2. People employed by NRECA
3. People trained by NRECA
4. New businesses created as a result of increased access to energy
5. Customers added

Exhibit 5.1: Indicators-April 2008

Transforms Installed	60
Poles Installed	394
Distribution Line Constructed (meters of line)	20939
Residential Customers	35
Commercial Customers	326
Industrial/Compounds	34
People benefiting from newly available electricity	18,522
Streetlights installed in Yei	141
Employment Direct	47
New Businesses	359
People Trained	60

Currently, the cost of maintaining the generators per kilowatt hour is approximately 1US cent. The average monthly cost to maintain the generators is 500USD. Electricity is available for 13 hours per day however, the availability will increase to 18 hours once the additional generators are functioning. The monthly tariff/kw hour changes with fuel prices. The project manager estimated that the charge will be approximately 0.5 cents for the next month. There are approximately 400 customers receiving electricity and an average of 10 percent added each month. The primary challenge to collecting revenues is violence by the police, soldier and the country. However, despite these difficulties, the cooperative has achieved a 96 percent collection rate.

5.2 INTERVIEW RESULTS

The following presents the major findings of the structured interviews.

5.2.1 Assistant Executive Director-Yei County

The assistant director stated that the YEI Administration Building, Hospital and Commissioner's residence all receive electricity. The county pays for these services except for the street lights, which are paid by the business community. He acknowledged that increased access has led to better security as well as increased use of computers. Concerns were expressed about the timing of the handover and operation and maintenance.

5.2.2 Board Members

There are four board members who are appointed by the cooperative. One of the members works for the Public Administration Building and the other for Reconcile. Both members noted that the training in Uganda and by the US specialist were effective, however insufficient. The complaints regarded the lack of policy and guidance for an independent functioning cooperative. Board members also expressed concern about the timing of the handover and lack of transparency in the current management structure. They highly recommend additional assistance to manage the cooperative from NRECA as well as additional funding to expand and maintain services.

5.2.3 Trainees

The linesmen interviewed received approximately two weeks of training, which focused on setting poles, pulling electric wire, connections, disconnections and meter readings. The training was two weeks long and continued at the job. The linesmen agreed that more training focusing on wiring and meter repair would be helpful.

The customer service representative interviewed received training on pole and meter installation, meter repair as well as payment and warning letter distribution. The individual felt that he needed additional training, particularly in management.

The accountant interviewed was trained to prepare petty cash, track invoices and reconcile. The training lasted a month. The accountant also requested some additional training on accounting software as well as some management training.

In Juba, four participants from the NRECA training were interviewed: three engineers and one inspector. The training lasted approximately three weeks and focused on accounting systems, management, utility management, and rehabilitation of systems. The general consensus was that the training contributed to job performance but needed to be more hands on and a few weeks longer. The participants also recommended that the training is extended to include more individuals, including the mechanical engineer.

5.2.4 Schools and Hospitals/Clinics

Staff at the two primary schools interviewed reported an increase in the number of students after receiving electric power. The number of students at Kinji Primary School increased from 800 to 1,240 and the number for Jicomoni primary schools increased from 1,250 to 1,541. Both teachers recognized that an increase in electricity would be beneficial to future course work. The largest impact has been on security particularly at night, as a result of the streetlights. The schools had no problems paying their bills on time and plan to invest in an IT department in the near future.

The clinic interviewed did not indicate that there was a significant improvement in provision of services as a result of an increase in electricity. However, that is partially due to the fact that the only two machines that require electric power are a refrigerator and the light. The clinic reported paying 50SP per month. In contrast, the hospital staff observed significant benefits from access to electricity. Although no data were provided on patient numbers, the provision of electricity has allowed the hospital to have functioning ultrasound machine, examination equipment and water pumps. This equipment has increased the level of service to the patients. The electrical bills for the hospital according to the administrator are being paid by the Government Commissioner.

5.2.5 Businesses/Households

A total of nine interviews were conducted: two households and seven businesses. The responses in general were very positive. All interviewees noted that they received electricity for 13 hours per day and minimal outages. The majority of business owners are making additional investments as a result of the increased access to electricity. The customers also admitted that they received sufficient training to perform their duties as cooperative board members.

The table below (**Exhibit 5.2**) gives a detailed breakdown of monthly bills and revenue prior and after access to electricity. Given the size of the monthly bills and the changes in revenues being received by the businesses, it would appear that some establishments, such as the bar and the restaurant, are more sustainable than some of the others firms. For example, the monthly electric bill for the hair salon exceeds its total business proceeds. However, if the salon is able to expand its clientele over time, economic viability might look more promising. Future assessments will provide greater insight regarding the affordability to sustain the power system.

Exhibit 5.2: Monthly Bill and Revenue

Business Type	Monthly Bill	Revenue Prior to Access to Electricity per Day (SP)	Revenue after Access to Electricity (SP)
Hair Salon	90	15	50
Bar	218	250	500
Restaurant	109	200	400
Restaurant	217	N/A	N/A
Business Shop	113	N/A	N/A
Secretarial Services	82	60	100
Pharmacy	112	50	150
Households			
1	113	N/A	N/A
2	97	N/A	N/A

CHAPTER 6: RECOMMENDED NEXT STEPS FOR ISP MONITORING AND EVALUATION

The Baseline Assessment Study Report is the first step towards monitoring the Outcome Performance Indicators for the ISP. The report presents baseline values for the Outcome Performance Indicators for the water and transport sectors as well as a general overview assessing the impact of the 1,200kw of electric power provided to the City Yei and an associated training program. The Baseline Assessment Study Report does not address Standard Element indicators such as kilometers of road built, cost per kilometers of road or number of trucks chlorinated daily. These indicators are reported on in the ISP Monthly Report. The M&E team is also working on the monthly and quarterly reports to ensure that all of the F framework indicators are reported on accurately and in a timely manner.

To properly monitor the impact of the SISIP projects as well as establish baseline conditions for future projects in all sectors the following timeline is recommended:

September 2008

Follow-up Assessment of Quick-Impact Water Projects in Juba
Willingness to Pay Study for any proposed Water and Energy Projects
Baseline Studies for any New Water and Energy Projects

October 2009

Follow-up Assessment of Water Medium-Term Projects
Follow-up Assessment of Training Programs in the Energy Sector

May 2010

Follow-up Assessment for the Juba-Nimule Road
Follow-up Assessment of Water Long-Term Projects
Follow-up Assessment of Existing and New Energy Infrastructure and Training Projects

In conducting future surveys and assessments, the M&E Team will revisit the information provided from this effort to adjust and streamline future surveys and interview protocols. The core of the questions will not be altered but some will be simplified and tailored to best assess the project being monitored. The baseline survey sample sizes and data gathering effort will also vary depending on the size of future projects.