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SUSTAINABLE FISHERIES MANAGEMENT PROJECT (SFMP)

Assessment of Progress on Key Factors in Ghana's Marine Fisheries: Comparison of the SFMP 2015 Baseline and a 2019 Repeat Survey

2021

THE UNIVERSITY OF RHODE ISLAND GRADUATE SCHOOL OF OCEANOGRAPHY
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Cover photo: A woman being interviewed at a fish landing site in the Greater Accra Region.

Photo credit: Brian Crawford

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ACRONYMS

CLAT	Child Labor and Trafficking
FASDP	Fisheries and Aquaculture Sector Development Program
FtF	Feed The Future
GIS	Geographic Information System
GOG	Government of Ghana
IUU	Illegal, Unreported and Unregulated
KAP	Knowledge, attitudes and practices
KVIP	Kumasi Ventilated Improved Pit (toilet)
MSL	Material Style of Life
PCA	Principle Component Analysis
SFMP	Sustainable Fisheries Management Project
URI	University of Rhode Island
USAID	United States Agency for International Development
WARFP	West Africa Regional Fisheries Project
WDD	Women's Dietary Diversity
WEFI	Women's Empowerment in Fisheries Index
WEAI	Women's Empowerment in Agriculture Index
ZOI	Zone of Influence

EXECUTIVE SUMMARY

The report

This report is an assessment of progress on key factors in Ghana's Marine Fisheries related to improving the governance of the small pelagic coastal fishery and quality of life of people that depend on it for their livelihood. The report examines changes that have occurred in a number of parameters related to the impacts of interventions made by the USAID Ghana Sustainable Fisheries Management Project (SFMP) between the baseline survey in 2015 and a follow-up survey in 2019. It includes information on changes in perceptions of quality of life and the condition of the fishery, household wealth, household hunger, dietary diversity of women of reproductive age, perceptions regarding awareness and compliance with fishing regulations, empowerment of women within the industry, and aspects of child labor and trafficking. While the project was not expected to impact all these measures over life of project, such as overall quality of life or household wealth, such indicators were tracked as an overall trend analysis of the fishery. Changes in post-harvest processing practices supported by the project are not included in this report, although many of the women's empowerment indicators are related to project activities targeted mainly at women processors and traders such as access to micro-finance and leadership development.

The Project

The project goal was to *"Rebuild targeted fish stocks through adoption of sustainable practices and exploitation levels."* The project duration was originally approved from October 2014 to October 2019. A no cost extension for an additional 11 months was granted in April 2019 with a new end date through October 2020. A cost extension was granted for a COVID-19 response in May of 2020 with a new end date of through April 2021. The purpose of the add on was to, *"reduce the spread of the coronavirus disease in coastal fishing communities"* and wrap up a few outstanding SFMP activities that were delayed due to the COVID-19 pandemic. The add-on purpose and activities are not part of the subject matter this report. The overall project duration was from October 22, 2014 to April 30, 2021 but this report assesses changes through

The Survey

This report is based on a survey conducted in 2015 of 480 fishing households and 715 adult individuals within those households, and of 438 fishing households and 780 individuals surveyed in 2019. Households were randomly selected from a randomly selected set of 10 fishing communities and the target number of households and individuals to be interviewed proportionately distributed in each region relative to the proportion of fishermen in each region. Allocation of household and individual respondents was also proportionate with number of fishermen per village and roughly proportional to the number of fisherfolks per region. The head of household, the senior-most opposite sex of head of household and the food preparer were sampled in each household. Actual sampling exceeded the target allocations per survey period of 450 households and was somewhat below the target of 900 individuals. However, a sample size of 450 respondents will guarantee a power of 0.80 (or larger) for a medium effect size. The actual sample of households and individuals is above a sample size of 383 that is sufficient to obtain a margin of error of 5% and a 95% confidence level.

Results and Conclusions

The summary of the results or trends in the indicators tracked in this survey are show in the table below with green showing improved trends between the baseline and final survey, red showing worsening trends and yellow showing no significant changes.

There were perceived declines in fish catch and fish abundance in the final survey period compared to the baseline. Perceived quality of life of fisherfolks declined between the survey periods along with increases in household hunger and decreases in women's dietary diversity. These are disturbing trends that suggest insufficient actions to prevent the decline in the fishery and resulting negative socio-economic impacts on fishing communities.

There were no discernable trends in several of the household wealth measures including household structure and contents and other amenities even though the above indicators would suggest declining in income and hence eventually lower household wealth. The wealth measures tend to change slowly over time so may not have demonstrated significant changes yet. However, the percentage of households with fishing assets declined significantly suggesting households may be leaving fishing as a result of poor catches, or not replacing worn or old fishing assets due to declining returns on these investments.

Changes in Various Indicators between the Baseline and Final Surveys

Indicator	Predicted Trend	Actual Trend
Livelihoods		
Diversified livelihoods	⇔	↑
MSL Low house structure	⇔	⇔
MSL Fishing assets	⇔	↓
MSL High amenities	⇔	⇔
Food Security		
Household hunger	⇔	↑
Women's dietary diversity	⇔	↓
Quality of Life	⇔	↓
Fish Catch and Abundance	↑	↓
Illegal Fishing	↓	↑
Knowledge of Fishing Laws	↑	↑
Deterrence Factors		
Law enforcement	↑	↓
Arrests and Prosecution	↑	↓
Legitimacy of the Legal Process		
Moral Suasion	↑	↑
Respect for Authorities & Consultation	↑	↑
Child Labor and Trafficking		
Knowledge	↑	↑
Attitudes	↑	↑
Practice / Prevelence	↓	↓
Women's Empowerment		
1. Production	↑	↑
2. Resources - Access to productive capital	↑	⇔
3. Income - control of use	↑	↓
4. Leadership	↑	⇔
Total WEFI score	↑	⇔

There was an increase in the mean number of productive activities or livelihoods (fishing and non-fishing) in households in the final survey compared to the baseline. While diversified livelihoods was not a focus of the project, it suggests natural adaptation and coping by fishing households to the declining fishing resource base and catches and may partly explain no discernable changes in household wealth measures other than fishing assets.

Respondents perceived increases in illegal fishing, and particularly in the use of illegal lights and fine mesh nets. This was attributed to increases in illegal activities by trawlers and canoe fishermen alike. This also may be attributed in part due to the perceived decreases in patrolling at-sea and on-shore by law enforcement officers and a perceived decline in the likelihood that fishermen will be arrested, fined or jailed. However, there was a perception of a decline in political interference in law enforcement which is sometimes mentioned as a reason for lack of enforcement actions by law enforcement officers. On the positive side, fishermen increasingly believe if fishing regulations are obeyed, the fishery will improve and are personally more likely

to take stronger actions against illegal fishermen. Fishermen also show increasing trust of government officials when it comes to decisions on fisheries management and, increasingly believe government officials including the Fisheries Commission and Local Government should be involved in decision-making regarding the fishery. However, perceptions on actual consultations are mixed with some saying there has been less consultation, but in project villages, some perceptions that it has increased.

There are significant positive changes regarding child labor and trafficking with improved knowledge of legal and illegal child labor and child trafficking practices, improved attitudes that illegal practices are not acceptable, and perceptions of a decline in the prevalence of child labor and trafficking. These positive changes occurred in both project and non-project villages, even though project activities were mainly concentrated in project villages in the Central Region. This suggests that actions of the project and other donors active in this space have been successful in improving the situation.

There was no change in the women's empowerment in fisheries index overall score, but the gap between men and women on the overall score narrowed in the final survey, pointing to a declining gender gap for fisherfolks. While the overall score for women remained steady, the score for men significantly declined, potentially due to the economic downturn in the fisheries sector due to declining stocks and catch. A few of the component indicators in the index did improve for women including access to credit and autonomy in production but control over use of income declined considerably for both men and women. These findings suggest some modest gains that may be in part due to project activities, but other declines that may be symptomatic of economic decline in the fishing sector.

Recommendations

Declining catches and fish abundance: The Fisheries Commission should continue to conduct peer reviewed stock assessments annually and share these results with all stakeholders. More urgent action is needed in terms of implementation of regulations to curb excessive fishing effort and address the overcapacity in all fleets.

Declining quality of life and food security in fishing communities: These negative trends are linked to declining catches and likely cannot be improved without fishery recovery. However, promotion of diversified livelihoods should be supported and future activities should start with a review of lessons of past failures and ways to improve success. Engaging fisherfolks in development of such strategies should be part of the design considerations. This report did not examine whether diversified livelihoods increases proclivity towards supporting regulations as posited in the project's theory of change but should be investigated further.

Illegal Fishing: Indicators suggest a lack of progress on reducing illegal fishing and decreased deterrence by law enforcement, future donor efforts need to be continued in this area. As the issues here are complex, it is suggested that a deeper political analysis and review of reasons behind reduced deterrence be discussed with stakeholders prior to design and implementation of further interventions. This should include an in-depth look at the "saiko" transshipment problem. The role of political interference in law enforcement should also be more closely examined.

Child Labor and Trafficking: Given the evident success of the anti-child labor and trafficking campaigns by SFMP and contributions by other donors, it is recommended that USAID continue to support grants to NGOs along the coast supporting anti-child labor and trafficking initiatives.

1. INTRODUCTION

1.1 The Objectives of the Report

This report is an assessment of progress on key factors in Ghana's Marine Fisheries related to improving the governance of the small pelagic coastal fishery and quality of life of people that depend on it for their livelihood. The report examines changes that have occurred in a number of parameters related to interventions made by the USAID Ghana Sustainable Fisheries Management Project (SFMP) between the baseline survey in 2015 and a follow-up survey in 2019. It includes information on changes in perceptions of quality of life and the condition of the fishery, household wealth, household hunger, dietary diversity of women of reproductive age, and perceptions regarding awareness and compliance with fishing regulations, empowerment of women within the industry, and aspects of child labor and trafficking.

The report examines the differences in responses to a household and individual questionnaire administered to a random sample of artisanal (canoe) fishing households in 2015 (see the 2015 baseline report) and again in 2019 The report assesses changes their perceptions, attitudes and knowledge concerning the key project goal and selected intermediate result areas. In addition, the report compares changes over this time period between communities where there were specific SFMP on-the-ground interventions, and sites where there were no direct interventions. In this regard, the report attempts to draw inferences on whether that project has been able to change attitudes or perceptions about the fishery over that time period and has achieved progress towards the intermediate results and goals of the project. .

The surveys were administered to a sampling frame of individuals and households representing the target population of small pelagic fishing-dependent households within coastal communities of Ghana. The household survey was conducted in the four coastal regions adjacent to the marine shoreline. This survey did not attempt to examine or assess changes in any of the estuarine community-based management pilot sites or on the value chain improvement activities of the project, so is limited only to changes related to the small pelagic fishery and associated communities.

The survey instruments and sample sizes were designed to allow for statistically significant comparisons between baseline responses and responses drawn at future time periods. A subset of *Feed The Future (FtF)* indicators and indices were used to allow limited comparisons of results between the FtF and SFMP baseline surveys, specifically between farming households in the FTF northern Zone of Influence with fishing households along the coast.

For additional information on the baseline survey and methodology please see; Crawford, B., L. Gonzales, D. Amin, B. Nyari-Hardi, Y.A. Sarpong (2016) Report on the Baseline Survey of Small Pelagic Fishing Households along the Ghana Coast. The USAID/Ghana Sustainable Fisheries Management Project (SFMP) Narragansett, RI: Coastal Resources Center, Graduate School of Oceanography, University of Rhode Island. 121p.

1.2 Report Layout

This report is a brief overview of the USAID/Ghana Sustainable Fisheries Management Project. This helps provide an understanding and rationale for the indicators chosen for these surveys. The methodology used is also described. Findings are provided on the changes in indicators over

time and between project and non-project sites. Appendices provide additional information including the survey questionnaire used.

1.3 Project Overview

The SFMP focused the majority of its activities on the small pelagics fisheries along the entire coastline. The project also conducted activities on improvements in the value chain of smoked fish, important to tens of thousands of women fish processors and traders. The project also implemented activities aimed at reducing child labor and trafficking in the fisheries sector in the Central Region of Ghana, established pilot community-based management initiatives in three estuaries, and support improved coastal spatial planning of districts in the Central Region. The project goal was to "Rebuild targeted fish stocks through adoption of sustainable practices and exploitation levels."

1.3.1 The USAID SFMP Results Framework

The SFMP's results framework includes four project intermediate result areas to achieve the project goal:

IR 1: Improved legal enabling conditions for implementing co-management, use rights, capacity and effort reduction strategies;

IR 2: Improved information systems and science-informed decision-making, and

IR 3 Increased constituencies that provides the political will and public support necessary to make the hard choices and changed behavior needed to rebuild Ghana's marine fisheries sector. These components feed into

IR 4: Applied management initiatives for several targeted fisheries ecosystems. A set of indicators, described below, will be used to measure progress towards the project goal and intermediate results.

In the last 11 months of the project, a COVID-19 response was added to the project with a purpose to reduce the spread of the disease in coastal fishing communities. That add-on is not part of the subject matter this report. The project duration was from October 22, 2014 to April 30, 2021.

1.3.2 Theory of Change (Development Hypothesis)

The project purpose was to "Rebuild targeted fish stocks through adoption of sustainable practices and exploitation levels." The theory of change articulated that in order to achieve sustainable fishing practices and exploitation levels, reduced fishing effort or harvest must occur in order to end overfishing. This, over the longer term, will lead to safeguards of sufficient spawning biomass to produce higher and more sustainable fishing yields. This signals a causal chain and time lag between ending overfishing and improved stock biomass, and ultimately, improved fish yields and profitability (household income) for fisherfolks. Small pelagics as a short lived and highly fecund species has the capability to rebound in a few years if proper and sufficient management measures are put in place, and such changes may be possible during life of the project.

Building constituencies and political will was seen as critical to insure that the public is aware of the challenges ahead and becomes supportive of short-term restrictions to reverse the diminishing returns on investment in the fisheries sector.

For targeted stocks, effort control requires a suite of measures such as restrictions on the number of fishing units by limiting the number of licenses issued and or restrictions on the amount of fish that units can land. Additional technical measures such as closed seasons, protected areas, fishing gear selectivity, and minimum size must be considered, each with their implications on the biological and socio-economic aspects of the fishery. In the long run, these are designed to ensure exploitation levels are controlled to maximum and sustained yields.

Consistent with the Fisheries and Aquaculture Sector Development Program (FASDP) and West Africa Regional Fisheries Project (WARFP), the project strategy was to support government efforts of both effort-control measures and managed access as first steps towards sustainability. Enabling conditions for effective fisheries management require a legal framework supportive of policy statements made by the Government of Ghana (GoG) on collaborative management and use rights.

When fishing mortality is reduced via effective management measures (i.e., closed season, closed areas, direct catch and effort reduction, etc.), there could be a rapid improvement in biomass and subsequent fish yields, particularly for short-lived species of small pelagics.

Also needed is improved information for decision-making to help both estimate the optimum fleet sizes for Ghana's fisheries and to set adequate harvest controls. To this end, the SFMP also focused on improving stock assessment capabilities within the Fisheries Commission /Marine Fisheries Statistical Support Division and local universities. SFMP also promoted innovative technologies to improve data collection on landings and effort and to aid law enforcement in reducing Illegal, Unreported and Unregulated (IUU) fishing.

An integrated approach requires a close look at shore-based components of the fisheries sector. All post-harvest fish handling, supply chain from sea to market and the infrastructure support for the fishing industry and fishing households occurs in a very narrow strip of the coastline. Without safe and secure places for men and women to live and work on the shore-based side of the industry, it is difficult to ask people to change behavior concerning unsustainable harvesting practices at sea. Reduction in fishing effort is likely to result in economic sacrifices in the short-term, so interventions are also needed to reduce impacts. These measures could include creating safer, more secure and resilient fishing communities using spatial planning to identify the development needs of fishing communities and the exposure to natural hazards as well as threats to water-dependent fisheries uses. Community development programs could also help fishers diversify their livelihoods, reduce dependence on fishing and reduce or eliminate the pressure to force their children into the illegal child labor trade. SFMP efforts included working to improve the fishery value chains and economically empower women involved in processing and marketing. Experience has shown that investing in organizational development and improved processing techniques, handling and infrastructure can lead to additional profits and a greater stewardship ethic among fisherfolks.

1.3.3 Profile of the Zone of Influence

The project zone of influence was the four coastal regions where marine capture fishing takes place (see Figure 1). The project placed emphasis on management of the small pelagic fishery due to the importance of these stocks to local food security, whereby over 60% of the animal protein in the diet comes from fish and where the small pelagics make up most of the local fish catch and almost all of this fish is consumed in Ghana. These fish are sold smoked, dried and fresh, and are transported from harvesting sites along the south coast to major population centers

and areas in the Northern areas of the country. These fish represent a high nutritional value but low cost food protein supply for millions of people.

The SFMP conducted activities focused on resources management coast-wide as well as improvements in the value chain of small pelagics in the Western and Central regions as well as behavior change efforts to reduce child labor and trafficking in the Central Region.

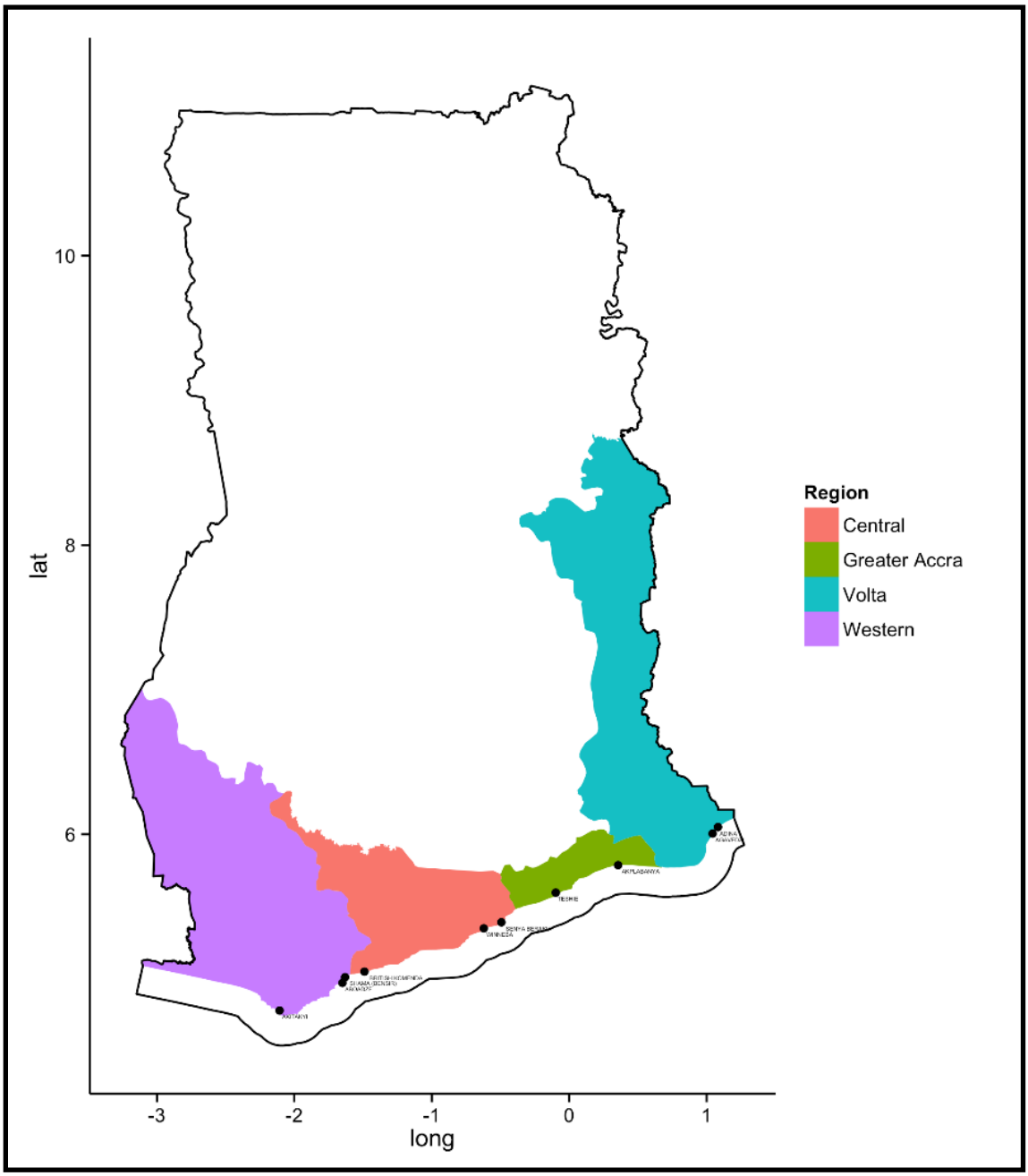

Figure 1. Map of the zone of influence of the SFMP – the four marine coastal regions in Ghana and locations of communities surveyed for the baseline.

Figure 2 below shows the coastal districts in the four coastal regions. These are the districts where all marine fishing and processing takes place.

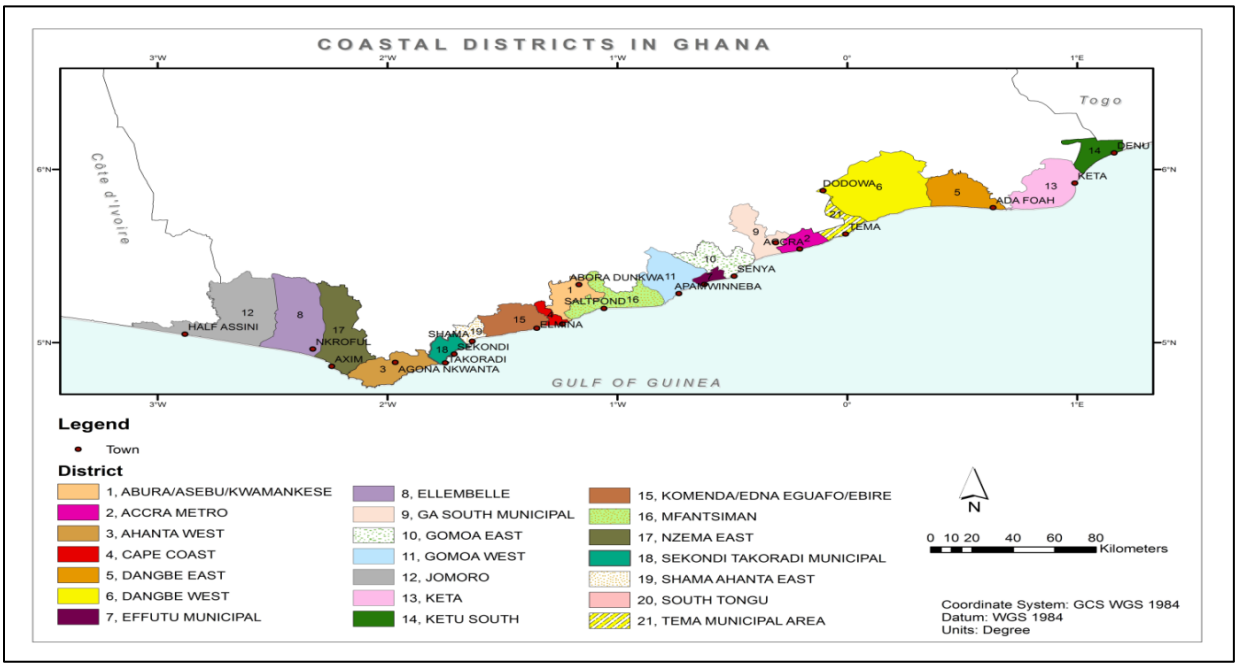

Figure 2. Map of the Zone of Influence of the SFMP showing the 21 coastal districts.

(SOURCE: Fishery FRAME Survey, Fisheries Commission, 2013)

2. METHODOLOGY

2.1 Survey Design

Critical questions of the survey aim at gathering information to assess trends in conditions and the potential impact of project interventions to the small pelagic fishing communities. The surveys gathered quantitative information on key components such as indicators of household wealth, a hunger and dietary diversity scale (using the FtF indicators),perceptions in changes in small pelagic fish catch, and women's empowerment (using a subset of FtF indicators). Additionally, information such as perceptions of changes in fish abundance, prevalence of illegal fishing practices and degree of regulatory compliance, degree of control of fisheries resources / participation in decision making, and child labor and trafficking, were collected. Indicators included in the survey per result area are shown in the table below. The survey instrument that was used for the final 2019 survey is provided in Appendix 1. For the FtF Program goals noted in Table 1 below, the project has no direct target to impact on these variables but nonetheless they were tracked so long term trends can be assessed.

Table 1. Result areas and related impact assessment indicators.

Result and Activity Area	Indicators	Expected Impact (FtF and/or Project)
FtF Program Goals: Reduced Poverty, Hunger and Improved Nutrition	• Changes in material style of life (household assets such as structure, contents and other household wealth indicators comparable with FTF data • Perceptions regarding quality of life • Perceptions of changes in fish catch, abundance and income • Prevalence of households with moderate or severe hunger (FTF ind) • Women's dietary diversity (FTF ind)	• Reduced poverty and hunger • Inclusive agricultural sector growth • Increased resilience of vulnerable communities and households • Improved access to diverse and quality foods
IR 1 Improved enabling conditions	Knowledge, attitudes and practices (KAP) regarding illegal fishing activities: • Perception on prevalence of illegal fishing practices / degree of compliance with rules • Perceptions on level of law enforcement actions taking place at sea and shore based or in ports/landing sites • Perceptions that if arrested, likelihood you will be punished. Knowledge, attitudes and practices (KAP) regarding child labor and trafficking: • Are people aware of what illegal/dangerous child labor and trafficking practices and of what happens to kids that are trafficked? • Do people think these practices are bad? • Extent to which children are engaged in illegal child labor or trafficked	• Reductions in illegal fishing and improved compliance • Improved attitudes towards law enforcement professionals • Improved efficiency of enforcement and prosecutorial chain • Increased knowledge of laws on Child Labor and Trafficking (CLaT) • Increased attitudes that CLaT is bad • Reduced prevalence of CLaT
IR 2 Improved science	Not applicable to this survey	

Result and Activity Area	Indicators	Expected Impact (FtF and/or Project)
IR3 Increased constituencies	Empowerment and participation in decision making in fisheries. • Perceptions regarding degree of empowerment and control of fisheries resources and participation in decision making • Women's empowerment in agriculture index – subset of FTF indicators.	• Improved engagement of stakeholders in decision making • Increased empowerment of women in economic and resource management decision making
IR4 Applied fisheries management	Not applicable to this survey	
Independent variables	<u>Non-project related</u> • Degree of dependence on fishing: number of fishing and non-fishing household livelihoods/income sources • Demographics: Age, gender, years formal education, socioeconomic status, ethnicity, community of residence, district and region of residence, primary livelihood (fisheries and non-fisheries dependent) <u>Project related</u> • Type of participation in project activities (meetings, trainings, grant recipient) • Level of exposure to SFMP communications (radio drama, fliers, billboards, SMS messages, emails)	• Changes in household economic resilience and fisheries dependency • Understanding how responses may be correlated to demographic variables (analysis not included in this report) • Test causality of changes related to project interventions and degree to which project involvement has influenced changes in responses.

2.2 Sampling

The SFMP coastal 2015 baseline and 2019 survey are intended to assess trends and the potential impact of the SFMP interventions on the small pelagic fisheries households along the coastline of Ghana. A subset of the fishing villages recorded in the Report on the 2013 Ghana Marine Canoe Frame Survey, by the Fisheries Scientific Survey Division of the Ministry of Fisheries, comprised the initial sampling frame. These villages (referred to as marine communities) constitute the Zone of Influence (ZOI) of the SFMP. The project specifically targeted small pelagic fisher folks. The sampling procedures for selecting sampled communities and small pelagic fishing households from the frame survey is described in the baseline report (Crawford et al., 2016). The coastal sampling frame was constructed using the 188 fishing villages recorded in the 2013 Canoe Frame Survey. Figure 3 below shows the location of the ten predominantly small pelagic fishing villages that were selected and where the baseline and final surveys were administered. At least two villages per region were selected for household sampling to ensure regional representation. Households within these villages were randomly selected as described in the baseline report. Adult males and females within the household were surveyed.

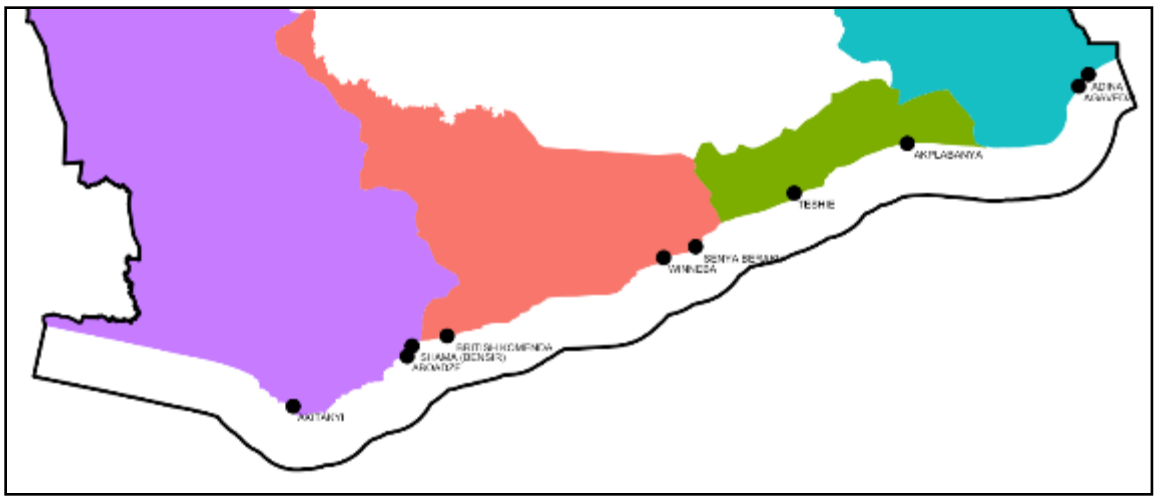

Figure 3: Location of communities selected for sampling.

2.2.1 Sample Size Calculations

The sampling design for the baseline survey calls for random sampling with proportional allocation. Since the response variables include quantitative as well as qualitative (nominal and ordinal) variables, power analysis for several statistical analyses were used to ensure that enough respondents have been included in the survey to guarantee the detection of changes with a probability (power) of 0.80. To detect a medium effect size when comparing three proportions, the needed sample size will range between 166 and 435. That is, a sample size of 450 respondents will guarantee a power of 0.80 (or larger) when comparing several population proportions, irrespective of the percentage of "successes" in the dependent variable. Assuming a population of approximately 100,000 fishermen, a sample size of 383 is sufficient to obtain a margin of error of 5% and a 95% confidence level (see: https://www.calculator.net/sample-size-calculator.html?type=1&cl=95&ci=5&pp=50&ps=100000&x=92&y=23).

2.2.2 Allocation of Samples

Table 2 below shows the number of fishermen in the fishing villages surveyed and the target number of households and individuals to be surveyed per village per time period (baseline and final survey). The number of households and individuals targeted for interviews is roughly proportional to the total number of fishers, canoes and small pelagic gears per region. Sampling methodology is discussed in the methods section below. The 450 targeted household samples were proportionally allocated to the 10 sampled villages. Each village was weighted according to the number of fishermen it contained divided by the overall total number of fishermen within the sampled villages.

Table 2. Number of fishermen and sampling target per community sampled.

REGION/Community	Project Site	Population of Fishers	Sample target of households (individuals)	% of Total
VOLTA			48 (96)	10.7
Adina	N	1328	28 (56)	
Agaveda	N	967	20 (40)	
GREATER ACCRA			113 (226)	25.1
Teshie	N	1264	26 (52)	
Akplabanya		4199	87 (174)	
CENTRAL			137 (274)	30.4
Senya Beraku	N	1731	36 (72)	
Winneba	Y	2941	61 (122)	
British Komenda		1922	40 (80)	
WESTERN			152 (304)	33.8
Shama (Bensir)	Y	1720	36 (72)	
Aboadze	N	4612	96 (192)	
Akitakyi	N	947	20 (40)	
Total			**450 (900)**	**100.0**

2.2.3 Household Sampling

For the initial baseline survey, households were selected using Geographic Information System (GIS) spatial sampling within each community. The spatial sampling was accomplished using aerial photographs of the 10 sampled villages and ArcGIS. For each sampled village, a polygon was created by drawing a boundary along the coastline of landing sites belonging to the village extruding it landward by 200m where most fisherfolk were assumed to reside. Latitude and longitude coordinate pairs were randomly generated within the polygon for a total number of coordinates equal to the target number of households to be surveyed. The generation process also produced extra, "backup", coordinates to account for any issues encountered in the field, for instance, if no fishing household was found near the sample coordinates. Within each village, data enumerators administered the survey to the housing structure nearest each set of coordinates and with occupants engaged in fishing livelihoods. In the case of multiple households per structure or compound, data enumerators arbitrarily ordered the households present in a list and selected the household to be surveyed via a randomly generated number.

2.3 The survey Instrument

A survey instrument was developed to collect the information on indicators and assess impacts as noted in Table 1 previously. See Appendix 1 for a copy of the Excel format of the survey instrument. A paperless survey system was designed using Kobotoolbox and administered via use of Samsung Tablets in the field. Kobotoolbox was the form-based application used where completed survey instruments entered into the tablet were sent via cellular or WIFI connections to a cloud storage database. Data quality control and assurance was conducted by a statistical expert reviewing data stored in the cloud. Feedback was provided to the field team in-situ where

initial concerns were identified with data entry or sample selection via email, Skype and phone calls. The survey instrument was pretested in a coastal community and minor revisions in questions and procedures made based on the pre-test. The survey instruments and informed consent scripts were approved by the University of Rhode Island Institutional Review Board for Human Subjects Research.

2.4 Hypothesis testing and statistical design

Drawing from Table 1 of indicators and expected project impacts, hypotheses were developed as to the direction of change for each indicator measured and statistical tests to be used for comparisons between 2015 and 2019 surveys. These are summarized in Appendix 2.

2.5 Survey Implementation

2.5.1 Enumerator Recruitment and Training

To assess the impact of SFMP over its five years of implementation, the Monitoring and Evaluation Unit of SFMP recruited eight (5 males and 3 females) enumerators from the SFMP enumerators database. These eight enumerators were selected from the list of enumerators based upon their previous experience and performance in data collection as well as their ability to speak the native languages of the survey communities.

To collect quality and credible quantitative data, the eight enumerators were given a 4-day residential training by the SFMP M&E team with support from CRC-URI (see Appendix 3 for an overview of the training program). The strategy used in training the enumerators included hands on training, presentations, role play, group discussion, questions and answers. Multiple approaches were used to ensure that enumerators understood their roles and responsibilities in the field. The training topics included the purpose of the survey, research ethics, techniques for proper community entry, and practical sessions on how to conduct a tablet based household survey. The practical sessions were conducted via role play first without tablets and then with the tablets (an electronic-based version of the questionnaire) in the three local languages (Ewe, Fante, and Ga) to ensure that enumerators could successfully implement the survey. The enumerators were also trained on how to use GPS technology, Google maps, and the survey app on the Samsung tablets to locate their samples and sample backups if they encountered either a non-fishing household or respondent unwilling to participate in the survey.

2.5.2 Pre-testing the Questionnaire

To ensure the aptness of all tools and the draft survey questionnaire, a pre-test was conducted in Teshie in the Greater Accra Region. The main task for each of the enumerators was to locate their assigned structures closet to the sample coordinates and verify if there was a fishing household in that structure, and then interview the fishing household adult members. Two or three people were targeted to be interviewed in each household including the head of household, the senior-most gender opposite household member, and the food preparer. If there was no fishing household in the structure, then the enumerators were directed to locate the next closest household structure and follow the same process, take necessary notes, and identify any issues for group discussion following the pre-test. Three supervisors were assigned to supervise the enumerators and help make necessary corrections and recommendations.

The pre-testing assessed the appropriateness of the questions, formatting, wording, and verbal translation of the questions. The tools (tablets, power banks) were also tested for responsiveness

and battery life including accuracy of the GPS locations. The readiness, understanding, and competencies of the trained enumerators were also determined. The pre-testing exercise allowed for any necessary revisions to the questionnaire prior to full scale implementation of the survey in the field. At the end of the exercise, a group debriefing session was held with the survey supervisors to discuss encountered challenges, concerns, and recommendations for the final revisions of the questionnaire.

2.5.3 Fieldwork

The field coordinator conducted community entry exercises for all surveyed communities prior to the commencement of the main household survey by the enumerators. The purpose of the community entry was to introduce the project, explain the reason for the survey and how it was going to be conducted, to chiefs, chief fishermen, assemblypersons, and queen mothers "kokonhemaa" to seek their consent.

The team started the field data collection in Volta and then subsequently traveled to the Greater Accra, Central, and then Western regions. The enumerators used coded samples and backups on the tablets to locate each surveyed household. In each selected backup or sampled fishing household, the head of household, senior-most gender opposite household member, and food preparer were interviewed. Some of the enumerators who were not as fluent in Ewe and Dangbe were provided with trained translators in the Volta region and Akplabanya in the Greater Accra region to aid in implementation of the survey. All the responses to the survey questionnaire were entered directly into the tablet using the Kobotoolbox data collection software. At the end of each survey, the responses were either immediately uploaded onto a cloud server or queued when the internet connectivity was poor and then later uploaded. The survey supervisors accessed the uploaded data and reviewed it daily with the team of enumerators to ensure the accuracy and quality of data. Identified errors were corrected (e.g., telephone number entered in a field for age) and necessary feedback was given to the enumerators each day before the team left for their daily survey work throughout the survey period.

Baseline data was collected between July 31 and October 18, 2015. The final survey data was collected between June 17 and July 22, 2019.

2.5.4 Actual Number of Sampled Households and Individuals

Table 3 shows the target versus actual households and individuals surveyed per community. The actual number of individuals sampled in each time period were below the target number, but the targets for number of households was more or less met.

Table 3: Actual versus target households and individuals sampled.

REGION/Community	Target sample of households (individuals)	Actual sample in baseline (2015)	Actual sample in final survey (2019)
VOLTA	48 (96)	53 (77)	47 (79)
Adina	28 (56)	31 (42)	27 (49)
Agaveda	20 (40)	22 (35)	20 (30)
GREATER ACCRA	113 (226)	138 (222)	109 (172)
Teshie	26 (52)	28 (46)	25 (40)
Akplabanya	87 (174)	110 (176)	84 (132)
CENTRAL	137 (274)	138 (202)	130 (236)
Senya Beraku	36 (72)	38 (56)	29 (52)
Winneba	61 (122)	61 (91)	61 (106)
British Komenda	40 (80)	39 (55)	40 (78)
WESTERN	152 (304)	151 (214)	152 (293)
Shama (Bensir)	36 (72)	34 (47)	36 (71)
Aboadze	96 (192)	99 (140)	96 (185)
Akitakyi	20 (40)	18 (27)	20 (37)
Total	450 (900)	480 (715)	438 (780)

2.6 Survey Limitations

Some of the challenges included the following:

- Due to the opening of the fishing closed season, most fishermen in the Volta Region were absent in the morning returning home late afternoon, which lengthened the total amount of time required for conducting the surveys.
- Poor network connectivity in some of the communities, such as Agavedze in the Volta Region, made it difficult to submit real-time data while in the field.
- The survey in British Komenda was delayed because the fishermen were staying in other communities to fish since the community had no landing beach. The team rescheduled with the chief fisherman and visited when the fishermen returned.
- At times, there were interruptions by other household members during the interviews.
- Though sensitizations were done through the assembly persons and chief fishermen, some community members still believed that the survey team was in their community to investigate illegal fishing activities and thus avoided the enumerators. Furthermore, others were sometimes reluctant to provide information pertaining to the questions about illegal activities.

3. RESULTS

3.1 Livelihoods, Food Security, Perceptions of Quality of Life and Resource Conditions

3.1.1 Livelihoods

Material Style of Life

Table 4 illustrates the percentage of households with select types of household wealth indicators in the baseline and final survey efforts. Differences in percentage of households with the item for each survey period are compared by examining chi-square statistics and Cramer's V is calculated to examine effect size. Statistically significant differences are noted in Table 4.

Household Structure: For aspects of household structure, materials for floor, roof and walls were examined. The following household structure components showed no statistically significant differences between baseline and final survey samples: corrugated metal sheet roof, palm leaves/raffia/thatch roof, asbestos/slate roof, roofing tile roof, mud bricks/earth roof, bamboo roof, cement/concrete floor, earth/mud/mud brick floor, stone floor, burnt brick floor, ceramic/marble tile floor, mud/mud brick walls, metal sheets/slate/asbestos walls, burnt brick walls, thatch walls, and cardboard walls. There were no instances of the following household structure components in either survey sample: vinyl tile floor, terrazzo floor, and stone walls.

For floor types, the most common is cement floor in both surveys, baseline (71.3%) and final (75.6%), with no statistically significant difference between these time periods. The most common roof type during both surveys was asbestos or slate, baseline (59.7%) and final (63.8%). The most common type of wall in the baseline and final survey was cement or concrete block walls found at 83.6% of households in the baseline and 89.6% of households in the final survey, a statistically significant increase with a small effect size. Percentages of households with wood or bamboo walls were statistically significantly lower in the final survey than in the baseline, also with a small effect size. Although wood floors were only found in a small percentage of households in both surveys, baseline and final, the difference was statistically significantly lower with a small effect size. Wood roofs were found in statistically significantly fewer households in the final survey than in the baseline survey with a small effect size.

Durable goods: For durable goods, both household goods and productive goods related to fishing were examined. The following are fishing-related productive goods with no significant differences between the baseline and final survey samples: trawlers or inshore boats, aquaculture ponds, fish cages, and fish smokers. Durable goods that did not show statistically significant differences in households between baseline and final surveys are as follows: televisions, sewing machines, gas stoves, bicycles, motorbikes, and computers.

Those durable goods with statistically significant different occurrences in households between baseline and final surveys are listed in Table 4 4. The occurrence of motorized canoes decreased statistically significantly from the baseline to final survey, with a small effect size. While fewer nonmotorized canoes were found in households during either survey, their occurrence also statistically significantly decreased between the baseline and final survey. Statistically fewer households owned fishing nets and fishing gear in the final survey as compared to the baseline survey, with a small effect size. TVs were the most common durable good found in the baseline survey (67.2%), and radios were the most common durable good found in the final survey

(74.7%). There was a statistically significant increase in households with radios from baseline to final with a small effect size. Tape/CD/DVD players were found in statistically significantly more households during the baseline as compared to the final survey with a small effect size. Although a very small percentage in both surveys, there were statistically significantly more kerosene stoves in the final survey as compared to the baseline survey, with a small effect size. Electric stoves or hot plates were only found in households in the baseline survey, with none found in households in the final survey. This decrease between baseline and final surveys is statistically significant with a small effect size. Refrigerators were also found in statistically significantly more households in the final survey, compared to in the baseline survey, with a small effect size. Cars were not found in any households in the baseline survey however, cars were found in small percentages of households in the final survey. This increase in cars is statistically significant with a small effect size. Generators were found in statistically significantly fewer households in the final survey compared to the baseline survey, with a small effect size.

Other amenities: Other aspects of household wealth were examined between time periods. Other household wealth indicators that showed no statistically significant differences between baseline and final surveys were; firewood cooking fuel, electricity cooking fuel, kerosene cooking fuel, poor state of dwelling, good state of dwelling, excellent state of dwelling, pit latrine toilet, electricity via national grid, electricity via solar panel, water piped into dwelling, water piped into plat or yard. There were no occurrences of the following other household wealth indicators in either the baseline or final surveys: animal dung cooking fuel, crop residue cooking fuel, and pan bucket toilet. Electricity supply in the household was found in a majority of households in both survey efforts - 85.7% of households in the baseline and 89.8% of households in the final survey. This difference was not statistically significant.

Other household wealth indicators with statistically significant different occurrences in households between baseline and final surveys are listed in Table 4. No toilet facility was the most common response to toilet type in both the baseline (48.0%) and the final survey (58.2%). However, no toilet facilities were found in statistically significantly more households in the final survey than in the baseline survey with a small effect size. Statistically significantly more households had flush toilets in the final survey than the baseline survey with a small effect size. KVIP (Kumasi Ventilated Improved Pit) toilets were found in statistically fewer households during the final survey as compared to the baseline survey, with a small effect size. Public toilet facilities were used by statistically significantly fewer households in the final survey as compared to the baseline survey, with a small effect size. Although few households in either survey use a toilet in another house, the increase from baseline to final survey percentage is statistically significant.

House condition: Households in very bad condition were statistically significantly higher in the final survey as compared to the baseline survey with a small effect size. Similarly, houses in moderate condition were statistically significantly higher in the baseline survey than the final survey with a small effect size. Regarding cooking fuel, the majority of households in both the baseline and final surveys reported they used charcoal, however, the percentage of households in the final survey is statistically significantly lower than in the baseline survey with an effect size value lower than the threshold for small. In contrast, the percentage of households using propane gas cooking fuel was statistically significantly higher in the final survey as compared to the baseline survey with a small effect size.

Table 4: Changes in percent of households with selected wealth indicators.

Household wealth indicator	Baseline (%) n=481	Final (%) n=450	Chi square if significant (p<0.05)
Household Structures			
Cement/sandcrete block walls	83.6	89.6	$X^2(1)=7.104$, p=0.008, Cramer's V=0.087
Wood/bamboo walls	11.0	6.4	$X^2(1)=6.057$, p=0.014, Cramer's V=0.081
Wood floor	2.1	0.4	$X^2(1)=4.882$, p=0.027, Cramer's V=0.072
Wood roof	1.2	0.0	$X^2(1)=5.650$, p=0.017, Cramer's V=0.078
Durable Goods			
Motorized Canoe	49.1	34.7	$X^2(1)=19.771$, p<0.001, Cramer's V=0.146
Nonmotorized Canoe	9.8	3.6	$X^2(1)=14.238$, p<0.001, Cramer's V=0.124
Fishing nets/gear	53.0	36.9	$X^2(1)=24.406$, p<0.001, Cramer's V=0.162
Radio	63.6	74.7	$X^2(1)=13.260$, p<0.001, Cramer's V=0.119
Tape/CD/DVD player	39.7	27.8	$X^2(1)=14.761$, p<0.001, Cramer's V=0.126
Kerosene Stove	0.8	2.9	$X^2(1)=5.489$, p<0.001, Cramer's V=0.077
Electric Stove/Hot Plate	1.0	0.0	$X^2(1)=4.703$, p=0.030, Cramer's V=0.071
Refrigerator	26.2	34.2	$X^2(1)=7.123$, p=0.008, Cramer's V=0.087
Car	0.0	3.1	$X^2(1)=931.000$, p<0.001, Cramer's V=1.000
Generator	18.1	12.0	$X^2(1)=6.704$, p=0.010, Cramer's V=0.085
Other Amenities (Electric, Latrine, Water and Cook Fuel)			
No toilet facility	48.0	58.2	$X^2(1)=9.704$, p=0.002, Cramer's V=0.102
Flush toilet	1.7	4.2	$X^2(1)=5.407$, p=0.020, Cramer's V=0.076
KVIP toilet	14.1	8.2	$X^2(1)=8.129$, p=0.004, Cramer's V=0.093
Public toilet	31.4	23.1	$X^2(1)=8.018$, p=0.005, Cramer's V=0.093
Toilet in another house	0.2	1.8	$X^2(1)=5.985$, p=0.014, Cramer's V=0.080
House in very bad condition	0.8	10.9	$X^2(1)=43.802$, p<0.001, Cramer's V=0.217
House in moderate condition	55.5	43.3	$X^2(1)=13.788$, p<0.001, Cramer's V=0.122
Charcoal cook fuel	80.2	74.4	$X^2(1)=4.485$, p=0.034, Cramer's V=0.069
Propane gas cooking fuel	1.5	4.2	$X^2(1)=6.557$, p=0.010, Cramer's V=0.084

A principle component analysis (PCA) was conducted on the household structure, durable goods and other wealth indicators (electric, latrine, water and cook fuel) to create a material style of life (MSL) scale. The PCA was conducted on 44 individual attributes of household structure, durable goods and other amenities. The Scree test was used to select three components which were then rotated using varimax rotation. Attributes with loadings on all components <0.30 were removed from the analysis and the PCA was run again. This procedure resulted in three components consisting of 8 attributes (see Table 5). These three components explain 69.3% of the variance in these attributes. For more information on procedures for PCA, see Pollnac and Crawford (2000).

Attributes with high positive loadings on the first component are those associated with traditional houses, or less developed structures (Earth or Mud Floors and Wood/Bamboo Walls). One attribute with high negative loadings is associated with more structurally sound houses (Cement Floor). This component is called a *Low House Structure* component due to its association with lower structural integrity.

The second component is called *Fishing Assets* because it is comprised of attributes associated with high productivity in fishing. The three attributes with high positive loadings (Motorized Canoe, Fishing Nets/Gear, and Generator) are important for success in fishing.

Two attributes load highly on component three (Flush Toilet and Water Piped Into Dwelling) associated with high levels of access to water, therefore, the third component is called *High Amenities*.

Table 5: Variable loadings per principle component and percent of variance explained.

MSL Indicator	Low House Structure	Fishing Assets	High Water Access
Household Structure			
Cement Floor	**-0.959**	-0.019	0.019
Earth or Mud Floor	**0.935**	0.042	-0.006
Wood/Bamboo Walls	**0.603**	-0.079	-0.033
Durable Goods			
Motorized Canoe	-0.005	**0.907**	-0.025
Fishing Nets/Gear	-0.010	**0.893**	-0.030
Generator	-0.030	**0.669**	0.092
Electric, Latrine, Water and Cook Fuel			
Flush Toilet	-0.068	0.067	**0.793**
Water Piped Into Dwelling	0.018	-0.025	**0.810**
Percent of variance explained	**27.291**	**25.909**	**16.074**

Scores were calculated on each of the components for each household in the sample as a measure of MSL. Levene's test of equal variances was conducted on each of these samples and equal variances is assumed for all samples in Table 6 and 7. These scores are calculated based on a sum of the attributes weighted with the component scores and standardized with a mean of 0 and standard deviation of 1. Table 6 shows a comparison of these MSL scores between the baseline and final survey samples. Comparing mean MSL component scores, statistically significant more

households in the baseline survey are associated with fishing assets. The difference on low house structure and high water access are not statistically significantly different.

Table 6: Mean scores per MSL component.

MSL Component	Baseline Survey (n=481)	Final Survey (n=450)	T-statistic	P value
MSL 1 – Low House Structure	0.051	-0.055	1.611	0.108
MSL 2 – Fishing Assets	**0.153**	**-0.163**	**4.877**	**<0.001**
MSL 3 – High Amenities	-0.062	0.067	-1.967	0.050

Mean MSL component scores in the final survey were compared between control and project villages. Table 7**Error! Reference source not found.** illustrates the results of this comparison in which statistically significantly more households in the final survey are associated with high water access. Differences on the low structure and high productive goods components are not statistically significant.

Table 7: Mean scores per MSL component (final survey).

MSL Component	Control Villages (n=353)	Project Villages (n=97)	T-statistic	P value
MSL 1 – Low Structure	-0.031	-0.142	1.012	0.312
MSL 2 – High Productive Goods	-0.135	-0.265	1.167	0.244
MSL 3 – High Amenities	**-0.011**	**0.348**	**-2.808**	**0.005**

Household Livelihood Diversity

Table 8 shows the mean number of household livelihood activities reported by individual respondents between the baseline survey and the final survey. Fishing livelihoods were defined as either catching, processing or trading of fish. Non-fishing livelihoods were all other types including farming, livestock rearing or other livelihoods. The mean number of total, fishing and non-fishing livelihoods per household all showed statistically significant increases between the baseline and final survey periods. There were no statistical differences between project participants and non-project participants when comparing the full set of data from both time periods. Figure 4 shows that in the final survey the percentage of households with one and two livelihood activities decreased compared to the baseline while the percentage with three and four livelihoods increased. Figure 5 shows that the percentage of households with only one fishing livelihood decreased while the percentage of households with three increased between the time periods. Figure 6 shows that the percentage of households with no non-fishing livelihoods decreased while the percentage with at least one or more increased considerably. Over time, these sampled households diversified into more fishing and non-fishing livelihoods. However, the increase was greatest in diversification into non-fishing households (Table 8).

Table 8: Mean values for number of livelihood types per household.

Livelihood Type per Household	Baseline Survey (n=715)	Final Survey (n=780)	Difference Final - Baseline	T-statistic	P value
Number of Total Livelihood Activities	2.77	3.11	0.34	6.100	<0.001
Number of Fishing Livelihood Activities	2.23	2.35	0.12	3.156	=0.002

Livelihood Type per Household	Baseline Survey (n=715)	Final Survey (n=780)	Difference Final - Baseline	T-statistic	P value
Number of Non-Fishing Livelihood Activities	0.54	0.76	0.22	5.999	<0.001

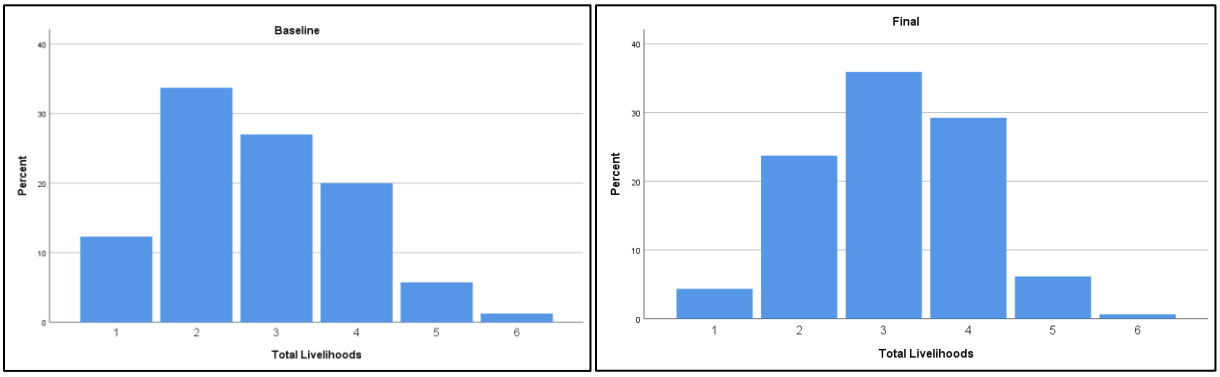

Figure 4. Number of total livelihood activities per household.

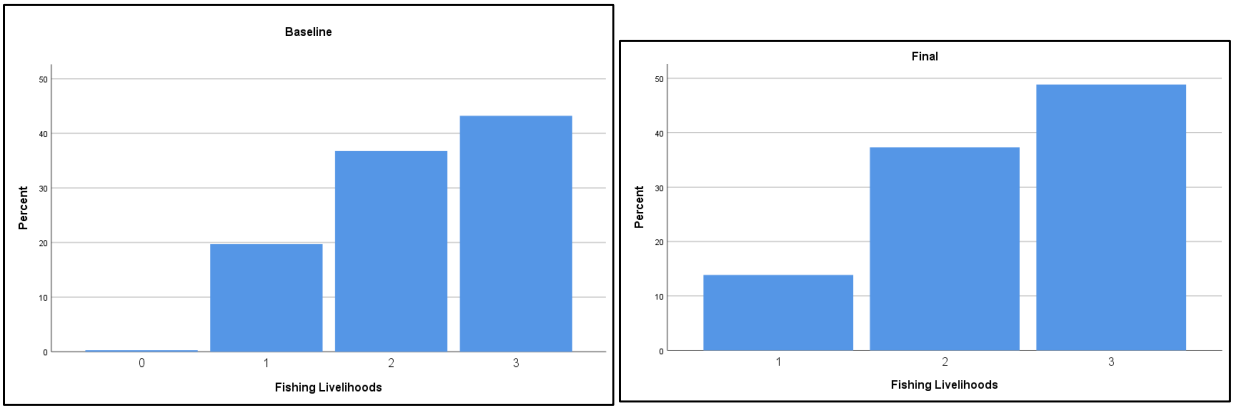

Figure 5. Number of fisheries livelihood activities per household.

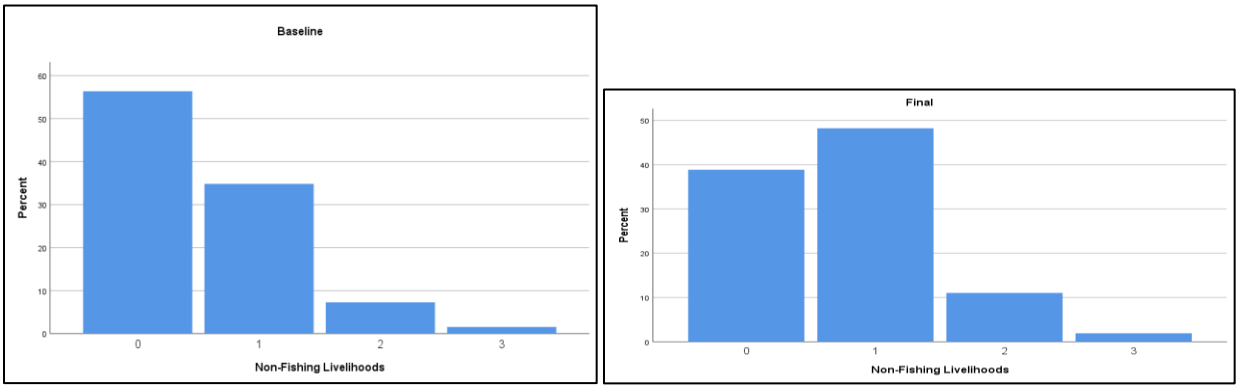

Figure 6. Number of non-fisheries livelihoods per household.

3.1.2 Food Security

Women's Dietary Diversity

Table 9 shows changes in Women's dietary Diversity scores. Women's dietary diversity scores changed significantly between the baseline and final surveys with a small effect size (χ^2 = 11.136, df = 2, p = 0.004, Cramer's V = 0.159). The largest change was the percentage of women reporting a low dietary diversity that increased in the final survey (45%) from the baseline survey (31%) and the percentage of women with a medium dietary diversity decreased from the baseline survey (58%) to the final survey (43%) (11). Women reporting a high dietary diversity slightly increased between the baseline (11%) and final (12%) surveys.

Table 9: Women's Dietary Diversity (WDD) Score.

Women's Dietary Diversity Score Categories	**Baseline Survey (n=239) (%)**	**Final Survey (n=201) (%)**
Low Dietary Diversity (0-3 food groups)	30.5	44.8
Medium Dietary Diversity (4-5 food groups)	58.2	42.8
High Dietary Diversity (6-9 food groups)	11.3	12.4

χ^2 = 11.136, DF = 2, p = 0.004, Cramer's V = 0.159 (small effect size)

Women's dietary diversity scores for participants in SFMP Business-Related activities versus non-participants was not significantly different between groups (Table 10).

Table 10: Women's Dietary Diversity (WDD) Score for participants involved in SFMP business-related activities and non-participants.

Women's Dietary Diversity Score Categories	**Participants (n=29) (%)**	**Non-Participants (n=172) (%)**
Low (0-3 food groups)	31.0	47.1
Medium (4-5 food groups)	58.6	40.1
High (6-9 food groups)	10.4	12.8

χ^2 = 3.535, DF = 2, p = 0.171;

Household Hunger

Household hunger changed (statistically significant) between the baseline and final survey efforts with a small effect size (χ^2 = 18.137, df = 2, p <0.0001, Cramer's V = 0) (10) (Table 11). The largest change was in households reporting little to no hunger, which decreased from the baseline survey (81%) to the final survey (68%) while households reporting moderate hunger increased from the baseline (17%) to the final (28%) survey. Households reporting severe hunger increased slightly from the baseline (2%) to the final (4%). It should be noted that some of the surveys conducted occurred during and within four weeks after the fishing closed season and this could have influenced these results as the questions are asked about hunger over the last four weeks. However, comparing surveys conducted during and 4 weeks after the closed season with those that were conducted more than four weeks after the closed season showed no statistically significant differences.

Table 11: Household Hunger Scale.

Household Hunger Scale Categories	Baseline Survey (n=411) (%)	Final Survey (n=449) (%)
Little to no hunger	81.0	68.4
Moderate hunger	16.6	28.0
Severe hunger	2.4	3.6

$\chi^2 = 18.137$, DF = 2, $p < 0.0001$, Cramer's V = 0.145 (small effect size)

Categories of household hunger as reported by women participants in SFMP business-related activities and non-participants are illustrated below (see Table 12). In comparisons between women participating in SFMP business-related activities and non-participants on household hunger scale categories, there are no statistically significant differences.

Table 12: Household Hunger Scale for Women Participants Involved in SFMP Business-Related Activities and Non-Participants.

Household Hunger Scale Categories	Participants (n=81) (%)	Non-Participants (n=333) (%)
Little to no hunger	77.8	65.2
Moderate hunger	21.0	30.6
Severe hunger	1.2	4.2

$\chi^2 = 5.226$, DF = 2, $p = 0.073$;

3.1.3 Perceptions of Quality of Life

Perceptions of changes in quality of life have worsened from the baseline to the final survey time period (Table 13). Responses between the baseline and final surveys on perceived quality of life compared to five years before were statistically significant with a small effect size ($\chi^2 = 57.085$, DF = 3, $p < 0.0001$, Cramer's V = 0.195). Respondents who reported their quality of life to be worse than five years ago in the baseline survey (72%) has increased in the final to more than four-fifths of the sample (87%).

Table 13: Perceptions on quality of life now Compared to five years ago.

Perceived Quality of Life	Baseline Survey (n=715) (%)	Final Survey (n=780) (%)
Better	19.7	8.7
About the same	8.3	3.7
Worse	71.9	87.2
Do not know	0.1	0.4

$\chi^2 = 57.085$, DF = 3, $p < 0.0001$, Cramer's V = 0.195 (small effect size);

3.1.4 Perceptions of Fish Catch and Abundance

More respondents report decreased abundance and amount of small pelagic fish during the final survey as compared to five years prior, along with greater difficulty in catching fish during the final survey as compared to five years prior (Tables 14,15 and 16).

More respondents also reported they perceived the abundance of small pelagic fish at the time of the final survey to be less than five years prior (80%), as compared to responses to the same question in the baseline survey (72%) (Table 14). There were also statistically significant differences in responses to this question between the baseline survey and final survey with a small effect size ($\chi^2 = 21.061$, df = 3, $p < 0.0001$, Cramer's V = 0.119).

Table 14: Perceptions on abundance of small pelagic fish in the sea now compared to five years ago.

Perceived Abundance of Small Pelagic Fish in the Sea	Baseline Survey (n=715) (%)	Final Survey (n=780) (%)
More	14.8	13.5
About the same	8.0	3.3
Less	72.3	80.1
Do not know	4.9	3.1

$\chi^2 = 21.061$, DF = 3, $p < 0.0001$, Cramer's V = 0.119 (small effect size)

Similarly, the perceived amount of small pelagic fish caught at the time of the final survey was less than compared to five years prior by more respondents (85%), as compared with responses on the baseline survey (76%) (Table 15). These responses were also statistically significant between the baseline and final survey with a small effect size ($\chi^2 = 26.146$, df = 3, $p < 0.0001$, Cramer's V = 0.132).

Table 15: Perceptions on amount of small pelagic fish caught now compared to five years ago.

Perceived Amount of Small Pelagic Fish Caught	Baseline Survey (n=715) (%)	Final Survey (n=780) (%)
More	12.5	7.8
About the same	7.0	2.9
Less	75.5	85.4
Do not know	5.0	3.9

$\chi^2 = 26.146$, DF = 3, $p < 0.0001$, Cramer's V = 0.132 (small effect size)

Respondents also perceived catching fish to be more difficult during the final survey (87%) as compared to five years prior in greater proportion as compared to perceptions of changes in the ease of catching fish in the baseline survey (74%) (Table 16). The differences on these responses were also statistically significant between the baseline and final surveys with a small effect size ($\chi^2 = 57.823$, df= 3, $p < 0.0001$, Cramer's V = 0.197).

Table 16: Perceptions on ease of catching fish now compared to five years ago.

Perceived Ease of Catching Fish	Baseline Survey (n=715) (%)	Final Survey (n=780) (%)
More	17.6	10.4
About the same	3.7	2.3
Less	74.4	87.3
Do not know	4.3	0.0

χ^2 = 57.823, DF = 3 p <0.0001, Cramer's V = 0.197 (small effect size)

Table 17 below illustrates responses to perceived causes of changes in fish abundance, catch and effort for both the baseline and final survey efforts. In the final survey, illegal fishing (75%) is the most frequent response overall followed by an increasing number of canoes (31%), and China-china and trawlers taking fish (35%). Significant differences were found on responses to the baseline and final surveys for illegal fishing (Phi=0.196, small effect size); China-china and trawlers taking fish (Phi=.225, small effect size); God's will (Phi=-0.115, small effect size); increased number of China-china and trawlers (Phi=.159, small effect size); oil and gas development (Phi=0.071, small effect size); and other (Phi=0.3, medium effect size).

Table 17: Main reasons for the perceived changes in abundance, amount caught and ease of catching fish.

Main Reasons for the Changes[1]	Baseline (n=606) (%)	Final (n=780) (%)	Chi-Square Test Results (DF = 1)
Illegal Fishing	**56.1**	**74.7**	**χ^2 = 53.253, p <0.0001**
Increased Number of Canoes & Fishermen	26.6	30.8	χ^2 = 2.727, p = 0.099
China-china and Trawlers Taking the Fish	**15.3**	**35.4**	**χ^2 = 69.074, p <0.0001**
Primarily Due to Actions of Fishermen	14.2	14.6	χ^2 = 0.021, p = 0.884
It is God's Will	**13.4**	**6.5**	**χ^2 = 17.668, p <0.0001**
Increased Number of China-china & trawlers	**12.2**	**24.9**	**χ^2 = 34.241, p <0.0001**
Other	**11.7**	**38.5**	**χ^2 = 123.087, p <0.0001**
Sea Conditions have Changed	10.9	14.0	χ^2 = 2.666, p = 0.103
Oil and Gas Development	**1.8**	**4.4**	**χ^2 = 6.239, p = 0.012**
Sea Spirits (Busom, Nai, etc.)	0.8	1.9	χ^2 = 2.171, p = 0.141
Algal Blooms	0.0	0.0	-----

[1] The respondents could select multiple responses. Differences in reasons between time periods in **bold** are statistically significant.

3.2 Law Enforcement and Regulatory Compliance

3.2.1 Perceptions on Illegal Fishing Practices

The table below presents respondents' perceptions of changes in illegal light fishing for both the baseline and final surveys (Table 18). The percentage of respondents in project villages reporting that illegal light fishing had increased a lot jumped significantly from less than half in the baseline (40%) to four-fifths of the sample in the final survey (80%) while in control villages, a little more than half reported the fishing practice to have increased a lot during the baseline survey (54%) and only slightly more respondents in the final survey (59%). Interestingly, in the final survey, almost a quarter (23%) of respondents from control villages reported that illegal light fishing had decreased a lot compared to five years ago while only a small portion of respondents from project villages (5%) perceived that this type of fishing had decreased a lot.

A Kruskal-Wallis Test revealed a statistically significant difference in the perceived changes in light fishing across the four different groups χ^2 (3, n = 1437) = 38.144, p <0.0001. A Mann-Whitney U test revealed a significant difference in the perceived changes in light fishing in the project villages from the baseline to the final survey (U = 7439.5, z = -6.18, p <0.0001, r = 0.35 (medium effect)). However, there was no significant difference in the perceived changes in light fishing in the control villages from the baseline to the final survey (U = 159129.5, z = -0.058, p = 0.953).

Table 18: Level of illegal light fishing among fishermen compared to five years ago.

Changes in Light Fishing	Baseline Survey		Final Survey	
	Control Villages n=575	Project Villages n=140	Control Villages n=603	Project Villages n=177
Decreased a lot	18.8	13.6	23.4	4.5
Decreased somewhat	4.9	6.4	3.8	4.0
Stayed about the same	2.4	4.3	4.3	3.4
Increased somewhat	14.3	28.6	6.6	9.0
Increased a lot	54.4	40.0	58.9	79.1
Do not know	5.2	7.1	3.0	0.0

Respondent perceptions of changes in illegal use of fine mesh nets over the past five years are presented below (Table 19). Three quarters of respondents in project villages reported that illegal use of fine mesh nets had increased somewhat (23%) or increased a lot (51%) in the final survey. Notably, in project villages in the baseline survey, a much smaller proportion of respondents reported this type of fishing increased somewhat (9%) and increased a lot (27%). In control villages, the most common response was that illegal use of fine mesh nets had increased a lot in both the baseline (38%) and final survey (43%), and responses followed similar between baseline and final surveys in control villages.

A Kruskal-Wallis Test revealed a statistically significant difference in the perceived changes in illegal use of fine mesh nets across the four different groups χ^2 (3, n = 1359) = 36.215, p <0.0001. A Mann-Whitney U test revealed a significant difference in the perceived changes in light fishing in the project villages from the baseline to the final survey (U = 6251.5, z = -6.025, p <0.0001, r = 0.35 (medium effect)). There was no significant difference in the perceived

changes in light fishing in the control villages from the baseline to the final survey (U = 135365.5, z = -1.55, p = 0.121).

Table 19: Level of illegal use of fine mesh nets among fishermen compared to five years ago.

Changes in Light Fishing	Baseline Survey		Final Survey	
	Control Villages n=575	Project Villages n=140	Control Villages n=603	Project Villages n=177
Decreased a lot	16.0	20.7	12.6	2.3
Decreased somewhat	8.2	11.4	8.5	6.8
Stayed about the same	10.8	20.0	12.1	10.7
Increased somewhat	17.6	9.3	14.8	23.2
Increased a lot	38.4	27.1	42.6	50.8
Do not know	9.0	11.4	9.5	6.2

Respondents' perceptions of the source of illegal fishing activities is illustrated below (Table 20). The most common response was that canoes were conducting illegal fishing practices in both control (76%) and project (93%) villages in the final survey, while many respondents in both the control (63%) and project (70%) villages also reported that foreign trawlers were conducting illegal practices in the final survey. The changes between baseline and final surveys on perceptions of who is conducting illegal fishing are all statistically significant differences, with an increase in perceptions that canoes and trawlers are conducting illegal fishing and a decline in perceptions that inshore vessels are conducting illegal fishing.

Table 20: Perception of who is conducting illegal fishing practices.[1]

Fleet Type	Baseline Survey		Final Survey		Chi Square Test Results
	Control Villages n=379	Project Villages n=94	Control Villages n=603	Project Villages n=177	
Foreign Trawlers	17.7	4.3	62.5	69.5	(1,1253)=294.245, p<0.0001, Cramer's V=0.5 (large effect)
Inshore Vessels	68.6	62.8	19.2	6.8	(1,1253)=344.522, p<0.0001, Cramer's V=0.5 (large effect)
Canoes	49.3	56.4	76.3	92.7	(1,1253)=136.633, p<0.0001, Cramer's V=0.3 (med. effect)

[1] The respondents could select multiple responses

Table 21 illustrates responses to the most frequent type of illegal actor in the final survey, respondents in control villages most common response was canoes in the final survey (48%) while respondents in project villages reported foreign trawlers (53%). This differs from responses in the baseline survey in which both control village respondents (60%) and project village respondents (50%) reported inshore vessels to be the most frequent illegal actor. The largest change was an increase in those perceiving foreign trawlers as the most frequent illegal actor. Statistically significant differences were found in the differences between baseline and final survey responses with a large effect size.

Table 21: Perception of who is the most frequent illegal actor.

Fleet Type	Baseline Survey		Final Survey	
	Control Villages n=379	Project Villages n=94	Control Villages n=603	Project Villages n=177
Foreign Trawlers	4.2	1.1	40.5	52.5
Inshore Vessels	60.2	50.0	11.8	0.6
Canoes	35.6	48.9	47.8	46.9

$\chi^2 = 443.036$, DF = 6, $p < 0.0001$, Cramer's V = 0.42 (large effect size)

3.2.2 Knowledge of Fishing Laws

The table below shows respondents' awareness level of fishing regulations in project and control villages for the baseline and final surveys (Table 22). Awareness levels were statistically significant across all four groups with a large effect size – i.e., project and control village responses for baseline and final survey efforts ($\chi^2 = 827.606$, DF = 6, $p < 0.0001$, Cramer's V = 0.56). However, differences between control and project villages in the final survey are not statistically significant (χ^2 (2, n =780) = 3.844, p=0.146). There is a notable increase in respondents reporting they are very aware in the baseline for control and project villages (0% for both samples) to final survey respondents who report they are very aware of these regulations in control (43%) and project villages (38%) showing notable increases. Project village respondents reporting to be barely or not at all aware of these regulations in the baseline survey (96%) decreased statistically significantly in the final survey (6%), and those reporting they were somewhat aware in the baseline survey (4%) increased statistically significantly in the final survey (57%). It should be noted that while there were village level communication campaigns in project villages, national media campaigns nationwide reached all coastal villages including the control villages. The awareness level of the fisheries regulations also increased considerably at the control villages. The difference between the Control and Project villages in the final survey was not significantly different (χ^2 (2, n =780) = 3.844, p=0.146.

Table 22: Awareness of fishing regulations.

Awareness Level	Baseline Survey		Final Survey	
	Control Villages n=449	Project Villages n=110	Control Villages n=603	Project Villages n=177
Very	0.0	0.0	43.1	37.9
Somewhat	19.8	3.6	48.6	56.5
Barely/Not at all	80.2	96.4	8.3	5.6

Respondents were asked twelve questions about legal fishing behaviors. Table 23 illustrates respondents' scores for control and project villages at baseline and final survey time periods. A higher score represents more correct responses to the question, or better knowledge of legal versus illegal fishing behaviors. Mean responses in the final survey had increased, representing increased knowledge of correct fishing behaviors at both control (8.66) and SFMP project (8.93) villages. Statistically significant differences were found in responses with a medium effect level (One-way ANOVA: F (3, 1326) = 25.829, $p < 0.0001$, eta squared = 0.06). Post-hoc comparisons using the Tukey HSD test analyses found statistically significant differences between several

measures on these responses. The mean of control village responses in the baseline survey (8.22) was significantly lower than the control village responses in the final survey (8.66) ($p < 0.0001$). Mean responses in the baseline survey from project villages (8.07) were significantly lower than those in the final survey from project villages (8.93) ($p < 0.0001$). Responses in the final survey from control villages (8.66) were also statistically significantly lower than those in project village in the final survey (8.93) ($p = 0.029$). There was no statistically significant difference between the control and project villages in baseline survey responses ($p = 0.653$). It should be noted that while there were village level communication campaigns in project villages, national media campaigns nationwide reached all coastal villages including the control villages.

Table 23: Mean number of correct responses on legal fishing behaviors (12 represents a perfect score – 100% correct).

Time/Village Type	n	Mean	SD
Baseline Survey Control Villages	453	8.22	1.130
Baseline Survey SFMP Project Villages	98	8.07	1.124
Final Survey Control Villages	599	8.66	1.155
Final Survey SFMP Project Villages	177	8.93	1.123

To further understand where there were gains in understanding of what constitutes an illegal fishing behavior,**Error! Reference source not found.**Table 24. There were declines between the baseline and final surveys at both the control (23% and 15%, respectively) and project (17% and 15%, respectively) villages in the number of respondents that correctly answered that fishing with nets with less than 2.5 cm is an illegal behavior. All other illegal behaviors were trending in the right direction with more respondents correctly identifying them as illegal in the final survey versus the baseline.

Table 24: Percentage of survey respondents correctly answering each fishing behavior question.

Fishing Behavior	Baseline Survey Control Villages	Baseline Survey SFMP Project Villages	Final Survey Control Villages	Final Survey SFMP Project Villages
Set gill nets (legal)	98.5	100.0	99.2	98.9
Monofilament nets (illegal)	20.8	20.4	40.1	50.8
Net mesh <2.5 cm (illegal)	22.7	17.3	14.9	15.3
Beach seines (legal)	***99.8***	***100.0***	***99.3***	***100.0***
Fishing with lights (illegal)	73.1	85.7	75.0	96.6
Net mesh >10 cm (legal)	99.1	99.0	99.3	100.0
Catching swordfish (legal)	***98.5***	***100.0***	***98.8***	***99.4***
Saiko fishing (illegal)	11.0	17.3	25.4	28.2
Catching sea turtles (illegal)	***28.0***	***10.2***	***22.4***	***17.5***
Ali Poli Watcha nets (legal)	***96.0***	***99.0***	***94.9***	***93.8***
Use of dynamite (illegal)	75.1	60.2	92.0	92.7
Drift gill nets (legal)	***99.3***	***98.0***	***98.5***	***99.4***

(Responses in ***Bold italics*** are statistically significant differences using Chi-square test)

It is interesting to note that there were declines over time at both the control and project villages in the number of respondents that correctly answered that fishing with nets with less than 2.5 cm is an illegal behavior. All other illegal behaviors were trending in the direction of increased correct knowledge.

3.2.3 Perceptions on Deterrence

Respondents were asked to determine their frequency of observing law enforcement patrols as a means of examining perceptions on deterrence for illegal fishing activities. Table 25 illustrates the distribution of responses regarding observing law enforcement officers on beaches. In the final survey respondents at both control (64%) and project villages (69%) most often reported they never saw law enforcement officers on beaches. Only small portions of responses reported to have seen officers on the beach frequently, with 2% for control and 6% for project villages, respectively. This trend is the opposite of what was expected, however, the WARFP project that supported increased patrolling ended in 2019, likely resulting in less of an enforcement presence band much of the WARFP enforcement was at-sea patrols – not beach or landing site patrols. The biggest change between the baseline and final surveys was an increase in those saying they never observed law enforcement officers on the beach. The differences between time periods were statistically significantly different at the medium effect size ($\chi^2 = 233.937$, DF = 12, p <0.0001, Cramer's V = 0.23).

Table 25: Frequency distribution of observing law enforcement officers on beaches.

Response	Baseline Survey		Final Survey	
	Control Villages n=575	Project Villages n=140	Control Villages n=603	Project Villages n=177
Not at all / Never	33.4	30.0	64.3	68.9
Rarely	39.7	28.6	27.5	22.0
Frequently	20.2	29.3	2.3	6.2
All the time	0.7	0.0	0.2	0.0
Do not know	6.1	12.1	5.6	2.8

Respondents were also asked to report their frequency of observing marine patrols at sea (see Table 26). These responses follow the same trend as those for observation of law enforcement officers on beaches and inconsistent with expected results. Respondents in the final survey in control (43%) and project (36%) villages most commonly reporting that they never observed marine patrols at sea. In the final survey, only 8% of control and 15% of project villages reported observing marine patrols at sea frequently. Responses to this question also differed statistically significantly across time periods with a medium effect size ($\chi^2 = 128.273$, DF = 12, p <0.0001, Cramer's V = 0.17) with the largest changes being an increase in those stating never and a decrease in those saying rarely.

Table 26: Frequency distribution of observing marine patrols at sea.

Response	Baseline Survey		Final Survey	
	Control Villages n=575	Project Villages n=140	Control Villages n=603	Project Villages n=177
Not at all / Never	24.3	17.9	43.1	36.2
Rarely	34.3	36.4	36.3	37.3
Frequently	28.5	22.9	8.0	14.7
All the time	0.7	0.0	0.7	0.0
Do not know	12.2	22.9	11.9	11.9

In further examining aspects of deterrence, Table 27 illustrates responses on perceptions of how often enforcement officers talked people about the reasons for fisheries laws. In the final survey, a majority of respondents from control (68%) and project (51%) village reported that law enforcement officers never talked to people about the reasons for fisheries laws. Project village respondents reporting that officers discussed reasons for fisheries laws rarely increased from the baseline to the final survey (24% to 39%) while the percentage reporting officers discussed fisheries laws frequently remained low (6% and 9% in baseline and final surveys, respectively). Overall, there were statistically significant differences in responses with a small effect size among all groups (control and project village responses for each the baseline and final survey) ($\chi^2 = 97.905$, DF = 12, $p < 0.0001$, Cramer's V = 0.15). Specifically, no significant differences were found in responses from control villages versus project villages in the baseline survey. However, there are statistically significant differences between control village responses and project village responses in the final survey with a small effect size (χ^2 (4, n = 780) = 33.296, $p < 0.0001$, Cramer's V = 0.21); project village responses in the baseline versus the final survey with a small effect size (χ^2 (4, n = 317) = 24.024, $p < 0.0001$, Cramer's V = 0.28); and control village responses in the baseline versus the final survey with a small effect size (χ^2 (3, n = 1178) = 53.649, $p < 0.0001$, Cramer's V = 0.21). In project villages the largest change was percentage stating rarely increased in the final versus baseline surveys. In control villages, the greatest change was an increase in the percent saying never.

Table 27: Frequency distribution of how often enforcement officers talk to people about the reasons for the fisheries laws.

Response	Baseline Survey		Final Survey	
	Control Villages n=575	Project Villages n=140	Control Villages n=603	Project Villages n=177
Not at all / Never	52.7	58.6	67.7	50.8
Rarely	26.3	24.3	25.4	39.0
Frequently	9.0	6.4	3.5	8.5
All the time	0.0	0.0	0.0	1.1
Do not know	12.0	10.7	3.5	0.6

3.2.4 Perceptions of Legitimacy of the Legal Process

Respondents were asked about their perceptions of changes in future fish catches if current fishing laws are obeyed by all fishermen (see Table 28). In the final survey, an overwhelming majority of respondents in both control (83%) and project (97%) villages reported they believe catches will increase if all fishermen obey current fishing laws. These proportions increased from the baseline survey when smaller majorities of control (63%) and project (76%) village respondents reported they believe catches would increase if all fishermen obeyed current fishing laws. Overall, there are statistically significant differences in responses of all groups with a medium effect size ($\chi^2 = 142.208$, DF = 6, $p < 0.0001$, Cramer's V = 0.22). Statistically significant differences in responses are found when comparing control versus project villages in baseline survey responses with a small effect size (χ^2 (2, n = 715) = 16.767, $p < 0.0001$, Cramer's V = 0.15); control versus project village responses in the final survey with a small effect size (χ^2 (2, n = 780) = 22.299, $p < 0.0001$, Cramer's V = 0.17); responses from control village respondents in the baseline versus the final survey with a small effect size (χ^2 (2, n = 1178) = 72.976, $p < 0.0001$, Cramer's V = 0.25); and project village responses in the baseline versus the final survey with a medium effect size (χ^2 (2, n = 317) = 38.701, $p < 0.0001$, Cramer's V = 0.35).

Table 28: Frequency distribution of beliefs concerning changes in future fish catches if the current fishing laws are obeyed by all fishermen.

Response	Baseline Survey		Final Survey	
	Control Villages n=575	Project Villages n=140	Control Villages n=603	Project Villages n=177
Will increase catches	62.6	75.7	82.6	96.6
Will not increase catches	15.5	2.9	11.3	2.8
Do not know	21.9	21.4	6.1	0.6

Table 29 illustrates respondents' perceptions about the likelihood of arrest of a fisherman. In the final survey, larger proportions of respondents in control (38%) and project (37%) villages reported there to be no likelihood of arrest of a fishman, an increase from baseline survey responses from control (16%) and project (16%) villages. Comparing responses between baseline and final surveys as well as control and project villages, there were statistically significant differences across all groups with a medium effect size ($\chi^2 = 130.019$, DF = 12, $p < 0.0001$, Cramer's V = 0.17). There were no statistically significant differences in responses between control and project villages in the baseline survey or control and project villages in the final survey. However, there was a statistically significant difference in responses from control villages between the baseline and final surveys with a small effect size (χ^2 (4, n = 1178) = 91.755, $p < 0.0001$, Cramer's V = 0.28) and from project villages between the baseline and final surveys with a medium effect size (χ^2 (4, n = 317) = 35.802, $p < 0.0001$, Cramer's V = 0.34).

Table 29: Likelihood of arrest of a fisherman.

Response	Baseline Survey		Final Survey	
	Control Villages n=575	Project Villages n=140	Control Villages n=603	Project Villages n=177
Not at all / Never	15.5	16.4	37.6	36.7
Rarely	35.8	37.1	35.0	42.9
Frequently	33.6	32.9	19.1	15.8
All the time	1.6	0.7	1.7	2.3
Do not know	13.6	12.9	6.6	2.3

As a follow on to the question of the likelihood of a fisherman being arrested, respondents were asked about the likelihood of punishment – a fine, confiscation of gear, or go to jail - if a fishermen were arrested (see Table 30). In the final survey, the most common response in control villages was that fishermen would never be subject to punishment if arrested (37%) while in project villages respondents most often reported that fishermen would rarely be subject punishment if arrested (44%). Similar to the previous question of likelihood of arrest, in the final survey respondents in project (37%) and control (35%) villages were more likely to report no likelihood at all of fishermen to be fined, have their great confiscated, or go to jail if they were arrested than in the baseline survey (15% and 12%, for control and project villages respectively). Responses to the final survey for the likelihood of punishment if arrested to be frequent decreased in both control (21%) and project (15%) villages compared to responses in the baseline survey for control (36%) and project (40%) villages.

Across the four groups of responses there were statistically significant differences with a medium effect size ($\chi^2 = 153.136$, DF = 12, $p < 0.0001$, Cramer's V = 0.19). In the baseline survey, responses between control and project villages were not statistically significant. However, in the final survey, differences in responses between control and project villages were statistically significant with a small effect size (χ^2 (4, n = 780) = 11.097, p = 0.025, Cramer's V = 0.12). Between baseline and final survey efforts, responses in control villages were statistically significantly different with a small effect size (χ^2 (4, n = 1178) = 98.904, $p < 0.0001$, Cramer's V = 0.29) and responses in project villages were statistically significantly different with a medium effect size (χ^2 (4, n = 317) = 50.074, $p < 0.0001$, Cramer's V = 0.40).

Table 30: Likelihood if arrested the person will get fined, have gear confiscated or go to jail.

Response	Baseline Survey		Final Survey	
	Control Villages n=575	Project Villages n=140	Control Villages n=603	Project Villages n=177
Not at all / Never	14.8	12.1	36.8	34.5
Rarely	32.0	32.9	32.0	43.5
Frequently	36.3	40.0	21.4	15.3
All the time	2.3	1.4	3.5	4.0
Do not know	14.6	13.6	6.3	2.8

Table 31 illustrates responses about the likelihood that someone arrested would not go to jail due to interventions of politicians. In the final survey, both control (52%) and project (46%) village respondents most often chose that an arrested person would never not go to jail due to interventions of politicians. Although responses in the baseline survey were also most commonly never in control (36%) and project (35%) villages, percentages in the final survey were much higher. One set of responses that is contrary to the change from baseline to final survey responses is that in project villages, more respondents in the final survey (18%) reported that this likelihood was frequent than in the baseline survey (11%).

Responses differed statistically significantly between the four groups with a small effect size (χ^2 = 88.679, DF = 12, p <0.0001, Cramer's V = 0.14). In the baseline survey, differences between control and project village responses were not statistically significant. However, group responses were statistically significantly different between control and project villages in the final survey with a small effect size (χ^2 (4, n = 780) = 31.182, p <0.0001, Cramer's V = 0.20); in control village responses between the baseline and final survey with a small effect size (χ^2 (4, n = 1178) = 43.783, p <0.0001, Cramer's V = 0.19); and in project village responses between the baseline and final surveys with a small effect size (χ^2 (4, n = 317) = 27.414, p <0.0001, Cramer's V = 0.29).

Table 31: Likelihood if arrested the person will not go to jail due to interventions of politicians.

Response	Baseline Survey		Final Survey	
	Control Villages n=575	Project Villages n=140	Control Villages n=603	Project Villages n=177
Not at all / Never	36.2	35.0	51.7	45.8
Rarely	20.3	22.9	20.6	18.1
Frequently	18.6	10.7	8.3	18.1
All the time	1.0	0.0	1.0	5.6
Do not know	23.8	31.4	18.4	12.4

Respondents were asked what they would do if they saw someone illegally fishing as a means to understanding legitimacy of the legal process and moral suasion (see Table 32). In the final survey, the most common answer in both control (48%) and project (48%) villages is to report them to the chief fisherman. In project villages there was a notable change in responses between survey efforts. In the baseline survey, very few respondents said they would report the person to the police (1%) while in the final survey this percentage rose to over one-tenth of responses (11%). Additionally, in the baseline survey, 39% of respondents stated that they would do nothing but this percentage decreased by almost half in the final survey (20%). In the baseline survey, there were no responses other than those listed as options, however, respondents did offer up their own responses in the final survey. Some said they would praise light fishing but curse dynamite fishers, others said nothing would happen regardless of what they did, and others said they would argue or fight with a person doing illegal fishing.

Responses across all four groups were statistically significantly different on what respondents would do it they saw someone illegally fishing, with a medium effect size (χ^2 = 134.972, DF = 15 p <0.0001, Cramer's V = 0.17). In the baseline survey, differences in responses between control and project villages were not statistically significant. In the final survey, there were

statistically significant differences with a small effect size (χ^2 (5, n = 780) = 12.871, p = 0.025, Cramer's V = 0.13). There were also statistically significant differences on control village responses between the baseline and final survey efforts with a small effect size (χ^2 (5, n = 1178) = 84.849, p <0.0001, Cramer's V = 0.27), and statistically significant differences on project villages responses between the baseline and final survey efforts with a medium effect size (χ^2 (5, n = 317) = 34.96, p <0.0001, Cramer's V = 0.33).

Table 32: Legitimacy of legal process/moral suasion: what would you do if you see someone illegally fishing?

Response	Baseline Survey		Final Survey	
	Control Villages n=575	Project Villages n=140	Control Villages n=603	Project Villages n=177
Report them to the police	2.6	0.7	6.1	11.3
Report them to the chief fisherman	31.5	37.9	47.9	47.5
Stop socializing with them	0.2	0.0	1.3	2.3
Tell them to stop fishing with those methods	30.6	22.1	13.6	15.8
Nothing, ignore it	35.1	39.3	29.4	19.8
Other	0.0	0.0	1.7	3.4

Responses to the question of who is most respected to advise on good and bad fishing practices is listed below (Table 33). In the final survey, the most common response in both control (84%) and project (70%) villages was to respect the advice of the chief fisherman.

Table 33: Who respondents respect most to advise them on good and bad fishing practices.

Response	Baseline Survey		Final Survey	
	Control Villages n=575	Project Villages n=140	Control Villages n=603	Project Villages n=177
Fisheries Commission Official	5.6	5.7	8.0	10.7
Chief Fisherman	83.7	83.6	83.9	69.5
Local Government Official	3.3	2.1	2.2	6.2
Chief Fishmonger/Kokonhemaa	3.8	2.9	1.3	4.0
Police	1.2	1.4	2.3	7.3
Traditional Leader	2.4	4.3	2.3	2.3

Overall, there were significant differences between responses from all four groups (control and project villages, baseline and final survey efforts) with a small effect size (χ^2 = 49.417, DF = 15, p <0.0001, Cramer's V = 0.11). Importantly, however, in the baseline survey, there was no significant difference in distribution of responses between the project and control villages. In the final survey, the distribution of responses between the project and control villages was

statistically significant with more of the respondents respecting the advice of the Fisheries Commission Officials, local government officials and police with a small effect size (χ^2 (5, n = 780) = 26.972, p <0.0001, Cramer's V = 0.19). There were statistically significant differences between project village responses in the baseline verses the final survey with more respondents reporting they respect Fisheries Commission Officials, Local Government Officials and Police in the final survey, with a small effect size (χ^2 (5, n = 317) = 14.365, p = 0.013, Cramer's V = 0.21). There were also statistically significant differences in responses in control villages in the baseline versus the final survey with a small effect size with higher values for Fisheries Commission Officials and lower values for Local Government Officials and Chief Fishmonger/Kokonhemaa (χ^2 (5, n = 1178) = 13.167, p = 0.022 Cramer's V = .0.11). While the percent changes between time periods in the control villages was small, there was a distinct shift in project villages to less respect for chief fishermen and traditional leaders, with more respect expressed for government officials from the Fishery Commission, Local Government and Police

Table 34 shows responses to how often if ever respondents were asked for input on fisheries laws by Fisheries Commission. Respondents in control and project villages in baseline and final surveys most commonly reported they were never asked for input on fisheries laws by Fisheries Commission. However, more respondents reported they were rarely asked for input in project villages in the final survey (38%) and relatively fewer (53%) reported they were never asked for input. For control villages in the final survey, the change was in the opposite direction from baseline responses with more respondents reporting they were never asked for input (77%) and fewer (18%) reporting they were asked rarely.

Table 34: If ever asked for input on fisheries laws by Fisheries Commission.

Response	Baseline Survey		Final Survey	
	Control Villages n=575	Project Villages n=140	Control Villages n=603	Project Villages n=177
Not at all / Never	56.3	70.0	76.6	53.1
Rarely	23.3	17.9	18.2	37.9
Frequently	10.4	7.9	3.3	8.5
All the time	0.0	0.0	0.2	0.6
Do not know	9.9	4.3	1.7	0.0

The distribution of responses across all four groups – baseline and final survey for control and project villages – was statistically significantly different with a medium effect size (χ^2 = 124.896, DF = 12, p <0.0001, Cramer's V = 0.17). Responses between control and project villages in the baseline survey were statistically significantly different with a small effect size with a higher proportion of project village respondents reporting they were never (70%) asked for input than those for control villages (56%) (χ^2 (3, n = 715) = 9.857, p =0.02, Cramer's V = 0.18). Statistically significantly different responses between control and project villages are also found in the final survey with a small effect size with lower proportions of project village respondents reporting they were never (53%) asked for input than in control villages (77%) (χ^2 (4, n = 780) = 45.699, p <0.0001, Cramer's V = 0.24). Responses in control villages differed statistically significantly between the baseline and final survey efforts with a small effect size (χ^2 (4, n = 1178) = 79.939, p <0.0001, Cramer's V = 0.26) as did responses in project villages

between survey efforts also with a small effect size (χ^2= 22.866 DF= 4, n = 317), p <0.0001, Cramer's V = 0.27). On this question, project villages showed improvements in consultation whereas the control villages saw declines.

Respondents were asked if they were ever asked for input on fisheries laws by local government (see Table 35). As with the previous question, respondents most commonly reported they were never asked for input by local government for project and control villages in both the baseline and final surveys. However, in the final survey, project village respondents reporting they were never asked for input (63%) was relatively lower and those reporting they were rarely (32%) asked. Importantly, the distribution of control village responses moved in the opposite direction between the baseline and final surveys with a greater proportion reporting they were rarely (22%) asked for input in the baseline survey than in the final survey (16%) and a higher proportion of respondents reporting they were never asked in the final survey (81%) than in the baseline survey (59%).

Table 35: If ever asked for input on fisheries laws by local government.

Response	Baseline Survey		Final Survey	
	Control Villages n=575	Project Villages n=140	Control Villages n=603	Project Villages n=177
Not at all / Never	59.1	73.6	80.8	63.3
Rarely	22.4	17.1	15.6	32.2
Frequently	9.0	4.3	1.2	4.0
Do not know	9.4	5.0	2.5	0.6

The distribution of responses across the baseline and final surveys, and control and project villages was statistically significantly different with a small effect size (χ^2 = 116.074, DF = 9, p <0.0001, Cramer's V = 0.16). There were also statistically significant differences between control and project villages in the baseline survey with a small effect size (χ^2 (3, n = 715) = 10.95, p = 0.012, Cramer's V = 0.12) and between control and project villages in the final survey with a small effect size (χ^2 (3, n = 780) = 33.377, p <0.0001, Cramer's V = 0.21). The distribution of responses in control villages is statistically significantly different between baseline and final surveys with a small effect size (χ^2 (3, n = 1178) = 87.372, p <0.0001, Cramer's V = 0.27), and in project villages between baseline and final surveys with a small effect size (χ^2 (3, n = 317) = 14.274, p = 0.003, Cramer's V = 0.21). On this question, project villages showed improvements in consultation whereas the control villages saw declines.

Responses to how often individuals had been asked for input on fisheries laws by Chief Fishermen or Traditional Leaders are described below (Table 36). Respondents most commonly reported they were never asked for input on fisheries laws by Chief Fishermen or Traditional Leaders in control (33%) and project (51%) villages in the baseline survey and control (47%) villages in the final survey. However, more respondents in project villages in the final survey report they were rarely (50%) asked for input than never (40%).

Table 36: If ever asked for input on fisheries laws by Chief Fishermen or Traditional Leaders

Response	Baseline Survey		Final Survey	
	Control Villages n=575	Project Villages n=140	Control Villages n=603	Project Villages n=177
Not at all / Never	33.4	51.4	47.1	33.9
Rarely	27.3	28.6	33.7	50.3
Frequently	31.7	15.7	15.8	15.3
All the time	0.3	0.7	2.2	0.6
Do not know	7.3	3.6	1.3	0.0

The distribution across all four groups – control and project villages in baseline and final surveys – is statistically significantly different with a medium effect size (χ^2 = 129.413, DF = 12, p <0.0001, Cramer's V = 0.17). Responses between control and project villages were statistically significantly different in the baseline survey with a small effect size (χ^2 (4, n = 715) = 22.757, p <0.0001, Cramer's V = 0.18) and responses in the final survey were also statistically significantly different in the final survey with a small effect size (χ^2 (4, n = 780) = 19.799, p = 0.001, Cramer's V = 0.16). Statistically significant differences in control villages were also found between baseline and final survey responses with a small effect size (χ^2 (4, n = 1178) = 81.551, p <0.0001, Cramer's V = 0.26) as well as in project villages between baseline and final survey responses with a small effect size (χ^2 (4, n = 317) = 21.183, p <0.0001, Cramer's V = 0.26). On this question, project villages showed improvements in consultation whereas the control villages saw declines.

Table 37 illustrates responses to which groups should be involved in making fisheries rules. Respondents most commonly chose Chief Fisherman, followed by Fishermen to be involved in making fisheries rules for all groups - control and project villages for baseline and final surveys. Respondents in the final survey from project villages showed increases in the choice of Fisheries Commission (29%) and Local Government (15%) to be involved in making fisheries rules and decreases in the percentage choosing fishermen and chief fishermen. . Chi square test results indicate statistically significantly differences in the distribution of responses across all four groups on all potential answers except for Environmental Groups for which responses were less than 1% for project and control villages in baseline and final surveys.

Table 37: Which groups[1] should be involved in making fishery rules.

Group Type	Baseline Survey		Final Survey		Chi Square Test Results (df=3 n=1490)
	Control Villages n=571	Project Villages n=139	Control Villages n=603	Project Villages n=177	
Chief Fisherman	79.0	83.5	83.9	74.6	χ^2 = 10.056, p=0.018, Cramer's V=0.08 (small effect)
Fishermen	56.6	55.4	53.4	41.8	χ^2 =12.083, p=0.007, Cramer's V=0.09 (small effect)
Traditional Leaders	12.6	10.1	20.7	10.7	χ^2 =22.501, p <0.0001, Cramer's V=0.12 (small effect)
Fisheries Commission	8.6	12.9	16.9	29.4	χ^2 =49.771, p <0.0001, Cramer's V=0.18 (small effect)
Parliament	7.4	13.7	8.6	14.7	χ^2 =12.092, p=0.007, Cramer's V=0.09 (small effect)
Fish Processors	9.8	2.2	8.1	10.7	χ^2 =9.662, p=0.022, Cramer's V=.0.08 (small effect)
Local Government	8.1	5.0	4.3	15.3	χ^2 =26.59, p <0.0001, Cramer's V=0.13 (small effect)
Environmental Groups	0.2	0.0	0.0	0.6	Not significant

[1] The respondents were asked to select two responses

3.3 Child Labor and Trafficking

Respondents were asked a series of questions about their knowledge on the illegality of child labor and trafficking practices, attitudes as to what acceptable practices are, and perceived prevalence of child labor and trafficking practices in their community. Answers on knowledge of illegal practices and acceptable practices were converted to a percent answering yes regardless of whether the practice was legal or illegal. Answers on perceived prevalence were converted to rank scores. A lower score means less perceived prevalence.

3.3.1 Knowledge

Responses to knowledge on illegal child labor and trafficking practices are illustrated in Table 38. Statistical differences between the baseline and final survey periods were examined using chi square tests. All are statistically significantly different except children 15-18 years, working on a fishing vessel which showed no change. However, when examining statistical significance across all four groups (baseline, final, project sites, control site) differences were significant (χ 2 =22.8, p <0.0001 Cramer's V=0.13 (small effect). Responses to the final survey in project villages showed statistically significantly higher levels of knowledge about illegal child labor practices for children 15-18 years working on a fishing vessel but no significant change in control villages.

In all practices asked about where there were statistically significant differences, "*yes*" responses increased in the final survey compared to the baseline. These changes are in the correct and expected direction except for Children 15-18 years selling fish or smoking fish after school , which is legal. For this practice, more people in the final survey thought this was also illegal. Other than this practice, only one other showed low knowledge - Children <15 years selling fish

or smoking fish after school, which is illegal, only 25% of respondents in the final survey knew this was illegal. However, there was a 10% increase in correct responses compared to the baseline. All of the other practice showed high marks, from 77% to 94 % correct responses.

Table 39: Knowledge on illegal child labor and trafficking practices.

Practice (Percentage of respondents with responses as to whether practice is illegal)	Baseline Survey N=689	Final Survey N=780	Chi-square test results (all villages – baseline, final) (df=1, n=1469
Children <15 years working on a fishing vessel (illegal)	76.2	86.5	χ^2 =26.2, p <0.0001 Cramer's V=0.13 (small effect)
Children <15 years selling fish or smoking fish after school (illegal)	14.1	24.6	χ^2 =25.7, p <0.0001 Cramer's V=0.13 (small effect)
Children <15 years selling fish or smoking fish any time of day (illegal)	58.2	82.3	χ^2 =103.3, p <0.0001 Cramer's V=0.27 (small effect)
Children <15 years parent taking payment from a person at a location outside of the community (illegal)	83.9	94.9	χ^2 =47.8, p <0.0001 Cramer's V=0.18 (small effect)
Children 15-18 years working on a fishing vessel (illegal)	70.0	73.2	Not significant
Children 15-18 years selling fish or smoking fish after school (legal)	87.0	83.2	χ^2 =, p <0.02 Cramer's V=0.05 (small effect)
Children 15-18 years selling fish or smoking fish any time of day (illegal)	52.8	77.4	χ^2 =98.4, p <0.0001 Cramer's V=0.26 (small effect)
Children 15-18 years: parent taking payment from a person at a location outside of the community (illegal)	85.6	94.0	χ^2 =28.6, p <0.0001 Cramer's V=0.14 (small effect)

3.3.2 Attitudes

Respondents were asked for their attitudes about acceptable (as opposed to legal) chile labor and trafficking practices. The responses from the baseline and final surveys, respectively, are compared in Table 39. Out of the eight practices asked of respondents, six showed statistically significant declines in responses between the base line and final survey periods. These included: children under 15 years old working in a fishing vessel, selling or smoking fish after school, selling or smoking fish any time of day, and, children 15-18 years old working in a fishing vessel selling or smoking fish after school, selling or smoking fish any time of day. There were no changes in the percentages of respondents on the trafficking question for children under 15 or between the ages of 15-18 years. While there was no change over time on trafficking, the people who saw this practice as acceptable is already extremely low at less than 5% of respondent.

Regarding children under 15 years old, the highest percentages of acceptable child labor practice is selling or smoking fish after school, even though it is illegal, for both baseline (97.3%) and final survey (78.0%) respondents. Similar results are found for children ages 15-18 selling or smoking fish after school (95.7% baseline, 84.0% final). The percentages on the other practices that showed significant change showed low percentages in the final survey ranging from 11 – 27 percent.

Table 40. Perceptions concerning acceptable labor practices acceptable to allow.

Practice (Percentage of respondents saying yes, it is acceptable)	Baseline Survey	Final Survey	Chi Square Test Results
Children <15 years working on a fishing vessel (illegal)	22.7	13.0	χ^2 (1, n=1408) = 23.183, p<0.001, Cramer's V=0.128 (small effect)
Children <15 years selling fish or smoking fish after school (illegal)	97.3	78.0	χ^2 (1, n=1408) = 111.447, p<0.001, Cramer's V=0.281 (small effect)
Children <15 years selling fish or smoking fish any time of day (illegal)	21.3	10.8	χ^2 (1, n=1408) = 29.435, p<0.001, Cramer's V=0.145 (small effect)
Children <15 years parent taking payment from a person at a location outside of the community (illegal trafficking)	2.9	3.3	χ^2 (1, n=1408) = 111.447, p=0.610, Not Significant
Children 15-18 years working on a fishing vessel (illegal)	27.6	27.3	χ^2 (1, n=1413) = 0.012, p=0.913, Not Significant
Children 15-18 years selling fish or smoking fish after school (legal)	95.7	84.0	χ^2 (1, n=1413) = 50.589, p<0.001, Cramer's V=0.189 (small effect)
Children 15-18 years selling fish or smoking fish any time of day (illegal)	22.4	15.8	χ^2 (1, n=1418) = 10.017, p<0.002, Cramer's V=0.084 (small effect)
Children 15-18 years: parent taking payment from a person at a location outside of the community (illegal trafficking)	3.0	4.5	χ^2 (1, n=1413) = 2.128, p=0.145, Not Significant

3.3.3 Perceived Practice/Prevalence

Respondents were asked questions about the perceived prevalence of child labor and trafficking practices children under 15 years old). For each type of labor practice, they were asked to select one of the following responses as to how often this occurred in their community: rarely (1-2 times), sometimes (3-10 times) or often (more than 10 times). Respondents were also asked how widespread the practice of child trafficking was in their community with choice of responses being; many families do it, only a few do it, no one ever does it. Answers were converted to rank scores. An overall child labor and trafficking (CLaT) score was created by summing the scores for three child labor and one trafficking practice. Mean scores were calculated for each indicator and presented in Table 40. The Kruskal-Wallis and Mann-Whitney U tests with Bonferroni correction[1] results were also conducted on the rank scores to examine statistical differences in perceived prevalence of child labor and trafficking between time periods

Table 41 illustrates results about perceived prevalence of child labor and trafficking practices in project and control villages during both the baseline and final surveys. Means scores were lowest in project villages in the final survey on all indicators with four of those statistically significantly lower than the control villages (parents allowing children <15 to go fishing; parents allowing children <15 to work during school hours selling; child trafficking; and the sum of all mean scores). In the baseline survey, mean scores were higher in the project villages compared to the control villages on all indicators. The significant decrease in the Project villages overall CLaT

[1] Bonferroni adjustment involves dividing the alpha level of .05 by the number of tests used, then using the revised alpha level as your criteria for determining significance. In this case, the new alpha level is .05/2 = 0.025

score over time contrasts with no significant change in the control sites. The overall CLaT score and on all other indicators in the final survey was lower than the control sites.

Table 42: Differences between project and control villages over time in the perceived prevalence of child labor and trafficking practices.

Labor practice	Mean Scores			
	Baseline		Final Survey	
	Project villages	Control villages	Project villages	Control villages
Parents allowing children < 15 to go fishing	2.45	2.41	2.18	2.29
Parents allowing children < 15 to work during school hours smoking fish	2.24	2.08	2.06	2.15
Parents allowing children < 15 to work during school hours selling fish	2.26	2.04	2.04	2.14
Practice of parents taking payments from a person to take care of child at location outside your community (Trafficking)	1.70	1.44	1.34	1.52
Mean of Sum of all mean scores (Overall CLaT score)	8.65	7.97	7.62	8.10

Child labor

A statistically significant difference was revealed in the perceived prevalence of parents allowing children <15 to go fishing across the four different groups (project and control villages in the baseline and final survey) ($\chi 2$ (3, n = 1470) = 11.729, p = 0.008). A significant difference was revealed in the perceived prevalence of parents allowing children <15 to go fishing in the project villages from the baseline to the final survey (U = 9748, z = -2.806, p = 0.005). There was a statistically significant difference in the perceived prevalence of parents allowing children <15 to go fishing in the control villages as well from the baseline to the final survey (U = 157139.5, z = -2.026, p = 0.043). However, in this case it was an increase in perceived prevalence as opposed to the decline in perceived prevalence in the project sites.

There was no statistically significant difference found across groups on perceived prevalence of parents allowing children <15 to work during school hours smoking fish (χ^2 (3, n = 1468) = 6.811, p = 0.078).

Statistically significant differences were revealed across all four groups on perceived prevalence of parents allowing children <15 to work during school hours selling fish (χ^2 (3, n = 1471) = 11.706, p = 0.008). Significant differences were found in responses from project villages between the baseline and final surveys (U = 9964.5, z = -2.563, p = 0.010). Responses were not statistically significantly different from control villages between the baseline and final surveys (U = 157215.5, z = -2.026, p = 0.043).

Trafficking

Statistically significant differences on perceived child trafficking were revealed on project village responses between the baseline and final surveys (U = 8589, z = -5.354, p <0.0001).

Control village responses between baseline and final surveys were not statistically significantly different (U = 167792.5, z = -1.106, p = 0.269).

CLAT Score

Differences on mean sum of all scores were statistically significant in project villages between baseline and final surveys (U = 8759.5, z = -3.821, p <0.0001), however, differences were not statistically significant in control villages between baseline and final survey efforts (U = 161236.5, z = -0.703, p = 0.482).

3.4 Women's Empowerment

A Women's Empowerment in Fisheries Index (WEFI) was created and used in this report. It is based on the Women's Empowerment in Agriculture Index (WEAI) (Alkire et al., 2013). For this report we use a subset of questions from the WEAI to construct a Women's Empowerment in Fisheries Index (WEFI) tailored specifically for the fisheries sector in Ghana. The number of dimensions, indicators and questions used for the WEFI has been reduced considerably compared to the WEAI, mainly due to concerns of the overall survey length (WEFI was only one component of the overall SFMP survey) and resources available for the overall survey. We use four dimensions and seven indicators. The questions used for each indicator is also a subset of those used for the similar indicators in the WEAI. Other questions have been tailored for a fisheries context with more specificity on fishing asset ownership use and control, and membership in specific national fisheries associations for example. See Appendix 4 for more information on the procedures and scoring for the WEFI. Each dimension has a possible range of scores from 0 – 6 (equal weighting in the overall score) and the overall WEFI score ranges from 0-24.

Table 43 provides the details of the WEFI scores including the overall mean scores and mean scores on each dimension and indicator. Using the Kruskal-Wallis Test, all indictors between male and female during the baseline period are statistically significant differences at $p<0.05$ except for the group membership indicator. Using the Kruskal-Wallis Test, all indictors between male and female during the final survey period are statistically significant differences at $p<0.05$ except for the access to credit indicator. Women in both time periods have statistically significant lower overall WEFI scores than men but the gap narrowed in the final survey period.

Table 42 shows changes in WEFI scores of men and women between the baseline and final survey periods was made using the Kruskal-Wallis Test. For women, while the overall WEFI score went up slightly over time along with many of the individual indicators, there was no significant overall change between time periods on the total WEFI score. For women, there were significant changes on some of the indicators including increases autonomy in production and access to credit indicators. There was a significant decline in the control of income dimension for women. For men, the overall WEFI score significantly declined. For men, there were significant declines on the production and income dimensions, and ownership of productive assets indicator.

Table 44: Differences in WEFI scores for men and women at baseline and final survey periods.

Dimension / Indicator	Baseline Survey			Final Survey		
	Male (n=304)	**Female (n=411)**	**Diff. in means M-F**	**Male (n=365)**	**Female (n=415)**	**Diff. in means M-F**
1. Production	*3.12*	*1.96*	*1.16*	*2.59*	*2.31*	*0.29*
1.1 Input into productive decisions	1.68	1.96	-0.27	1.45	2.01	-0.56
1.2 Autonomy in production	1.44	0.004	1.44	1.15	0.30	0.847
2. Resources - Access to Productive Capital	*2.74*	*3.21*	*-0.48*	*2.65*	*3.38*	*-0.74*
2.1 Ownership of productive assets	1.78	2.42	-0.64	1.65	2.33	-0.68
2.2 Access to credit	0.96	0.80	0.16	1.00	1.06	(N.S.) -0.06
3. Income - Control of Use	*3.48*	*3.02*	*0.46*	*3.04*	*2.54*	*0.16*
4. Leadership	*2.63*	*1.70*	*0.93*	*2.44*	*1.86*	*0.59*
4.1 Speaking in public/influence	2.31	1.42	0.89	2.21	1.54	0.67
4.2 Group membership	0.32	0.28	(N.S.) 0.04	0.23	0.32	-0.08
Total WEFI score	**11.97**	**9.90**	**2.08**	**10.73**	**10.08**	***0.64***

(N.S. – not a statistically significant difference. Negative differences in means are where Male score is less than Female score. Male – Female statistical comparison of differences in mean scores using the Kruskal-Wallis Test and $p<0.05$ for significance.)

Table 42: Differences in WEFI scores for male and female respondents between baseline and final survey periods.

Dimension / Indicator	Diff. in Means Baseline – Final (P=value)	
	Male (n=304-B, n=365-F)	**Female (n=411-B, n=415-F)**
1. Production	*-0.53(<.000)*	*0.35 (<.000)*
1.1 Input into productive decisions	-0.24 (.008)	0.05 (N.S.)
1.2 Autonomy in production	-0.29 (<.000)	0.30 (<.000)
2. Resources - Access to Productive Capital	*-0.09 (N.S.)*	*-0.17 (N.S.)*
2.1 Ownership of productive assets	-0.13 (.029)	-0.09 (N.S.)
2.2 Access to credit	0.04 (N.S.)	0.26 (<.000)
3. Income - Control of Use	*-0.44 (.001)*	-0.49 (*<.000)*
4. Leadership	*-0.18 (N.S.)*	*0.16 (N.S.)*
4.1 Speaking in public / influence	-0.10 (N.S.)	0.12 (N.S.)
4.2 Group membership	-0.08 (N.S.)	0.04(N.S.)
Total WEFI score	-1.24 (.001)	0.19 (N.S.)

(N.S. – not a statistically significant difference. Negative differences in means are where there was a lower score in the final survey compared to baseline. Baseline – Final statistical comparison of differences in mean scores using the Kruskal-Wallis Test and $p<0.05$ for significance.)

4. DISCUSSION AND CONCLUSIONS

4.1 Livelihoods and Perceptions of Quality of Life

More than four-fifths (87%) of respondents in the final survey in 2019 reported that their quality of life has decreased in the past five years and the proportion has increased from 72% in the baseline survey. This is a disturbing trend indicating that socio-economic conditions are deteriorating in fishing communities along the coast. This trend is corroborated by other survey data that showed moderate to severe household hunger increasing and women's dietary diversity decreasing (increase in the percentage with low dietary diversity).

There were no apparent trends between survey periods in the patterns of change in percent of households with various types of household structure, durable goods and other wealth indicators (e.g., electricity, sanitation, water supply). Some showed not change and other went up or down. Principle component analysis was conducted on the 44 material wealth indicators as well and showed no changes in scores of household contents or structure or other wealth indicators (e.g., electricity, sanitation, water supply).

However, for the MSL component consisting of fishing assets (boats, nets generator) showed a significant decline. In looking at the indicators that make up this component. Ownership of a motorized canoe declined by 14 % to 35%in the final survey. Ownership of fishing gears declined by 16%, gears down by 6% and generators down by 6 percent. This is a clear indication of economic decline in the fishing sector.

The mean number of livelihoods among fishing households surveyed increased in the final survey compared to the baseline. This increase was seen in the number of fishing as well as non-fishing households but the change was greater among non-fishing livelihoods. This suggests some degree of adaptive capacity to maintain food and income sources among fishing households as the fishery collapses. The project did not focus on livelihood diversification, rather it focused on improving existing livelihoods among women processors and traders. Therefore, these changes cannot be attributed to project interventions and likely represent development of autonomous coping strategies of fisherfolks themselves.

4.2 Perceptions of Fish Catch and Abundance

The survey results showed that in the 2019 survey there are increasing percentages of fishermen that perceive fish abundance and fish catch is declining and ease of catching fish is becoming more difficult compared to the baseline in 2015. These perceptions are corroborated with stock assessment reports (Lazar et al., 2020) of the Scientific and Technical Working Group of SFMP that showed declining catch per unit of effort, declining biomass of small pelagics in the ocean and increasing fishing mortality (increased fishing effort). Illegal fishing is the highest reported reason for perceived changes in fish catch, abundance and ease of catching with three-quarters of respondents naming this reason followed by an increasing number of canoes (31%), and China-china and trawlers taking fish (35%) of an increasing number of trawlers and China-China boats. Changes compared to the baseline show increasing numbers blaming illegal fishing and trawlers and China-China. These results suggest that little progress has been made on stopping illegal fishing or in controlling the behaviors of the trawler fleet.

4.3 Perceptions on Illegal Fishing Practices

The greatest percentage of respondents consider that light fishing has increased a lot with a substantial increase in this perception in project villages compared to non-project villages in the 2019 survey. In the final survey, three-quarters of the sample in project villages reported fine mesh net use to have increased somewhat or increased a lot, a significant increase from the baseline survey. Respondents' perceptions of the types of vessels conducting illegal fishing changed from inshore vessels being the most-commonly reported response in the baseline survey to canoes and foreign trawlers in the final survey. Ranking of types of vessels are consistent across control and project villages. However, when asked to identify the most frequent illegal actor, most respondents from control and project villages identified inshore vessels in the baseline survey while the most common answer in the final survey for control and project villages was canoes and trawlers, with the percentage identifying trawlers showing a substantial increase.

These findings further detail fisherfolk perceptions about the type of illegal fishing and who is responsible for the cause of the fishery decline The survey results further suggest that little progress has been made on curbing illegal fishing, and that it may in fact be increasing. These findings suggest that the USAID SFMP activities on illegal fishing as well as those of other donors (World Bank supported WARFP and EU supported fisheries Projects) have made little or no impact on the illegal fishing problem.

4.4 Knowledge of Fishing Laws

The percentage of respondents that said they are somewhat or very aware of fishing regulations increased substantially in the final survey compared to the baseline survey. This increase was similar in the project and control villages. Mean scores on correct responses concerning legal and illegal fishing practices increased in both the control and project villages in the final survey. The findings suggest that while fisherfolk knowledge of fishing regulations increased, it has had no impact on reducing the level of illegal fishing as noted previously.

4.5 Perceptions on Deterrence

4.5.1 Enforcement and Patrols

The greatest change from the baseline and final survey was a significant increase in the percentage of respondents that said they never or rarely saw law enforcement on the beaches or on at-sea patrols and a significant decrease in the percentage that responded they frequently saw them. Respondents reported they rarely or never saw enforcement officers discussing reasons for fisheries laws as the most frequent response in the baseline and final surveys, The responses in these categories increased slightly between the baseline and final surveys to over 90% of the respondents.

These finding suggests that law enforcement officers are making less patrols and are less frequently interacting with fisherfolks, reducing deterrence factors to prevent illegal activities. It should be noted that the WARFP supported at-sea patrols between 2015-2018 but once the WARFP funds ended, at-sea patrols probably declined again given the costly nature of this type of patrolling. The perceived decline in patrols, if a true reflection of actual patrolling, and the decline in law enforcement discussing laws with respondents could be the result of fisheries law enforcement personnel becoming disheartened with conducting patrols due to frequent reports of

political interference to pressure officials to allow those arrested to be released and confiscated gears given back to fishermen.

4.5.2 Arrests, Prosecution and Political Interference

Responses to likelihood of arrest of fisherman changed between baseline and final survey. The most common response during the baseline was rarely, followed by frequently in both control and project villages. In the final survey, the most common response was never, followed by rarely for both control and project villages. Proportions of respondents in project and control villages reporting the likelihood of punishment – fine, confiscation of gear, or having to go to jail – decreased between the baseline and final surveys in both control and project villages with many more respondents reporting the likelihood to be "not at all" or "rarely" in the final survey. The majority of respondents agreed there is little likelihood that politicians will intervene and prevent someone from going to jail with an increase from the baseline in the final survey. However, more respondents in the final survey in project villages reported that the likelihood was frequent, compared to the baseline survey. There were fewer responses in the "do not know category" in the final survey that accounts for the increases noted in the

These findings are a bit mixed, with more people having an opinion on these questions (less saying don't know) and with more indicating decreased political interference, but in project villages, some indicating increased interference. If perceptions of political interference are declining overall, this is a good development. However, it is then difficult to rationalize that declines in law enforcement patrolling is due to political interference.

4.6 Perceptions of Legitimacy of the Legal Process

4.6.1 Moral Suasion and Peer Pressure

Overwhelming majorities in control (83%) and project (97%) villages believe that if all fishermen obey current fishing regulations, fish catches will increase. These percentages increased from the baseline survey. Responses to what would respondents do if they saw someone fishing illegally showed an increase in respondents who would report them to the chief fisherman (the most common response) and the police, in both control and project villages. There was also a decrease in the number of people who said they would do nothing or ignore it in the final survey in both control and project villages. However, differences in responses between the baseline and final surveys were more pronounced in project villages.

These findings suggest fisherfolk increasingly believe that obeying laws is beneficial to the fishery and are more willing to take actions to against fellow fisherfolk who disobey the laws. This is a good sign that implementation of co-management, whereby fisherfolk have more responsibility over resource management, could be effective in curtailing illegal fishing in the future as moral suasion and peer pressure factors influencing deterrence are improving.

4.6.2 Respect for Authorities and Consultation

Project village responses in the final survey indicate increased respect in Fisheries Commission Officials, Local Government Officials, Police, and Kokonhemaas and a slight decline mentioning chief fishermen and Traditional Leaders as compared to responses in the baseline survey. There were no significant differences in the control sites comparing baseline and final survey results.

Many people in the sector have indicated the need for chief fishermen and traditional authorities to play a larger role in fisheries management, and their perceived decline in those mentioning

them as respectful could be taken as a negative trend. However, the overwhelming majority (84% control villages, 70% project villages) still most frequently state chief fishermen. The increase in the mention of government officials (at the expense of chief fishermen) may be a sign that more individuals are now recognizing the efforts of local authorities, Fisheries Commission and Police as more credible and sincere.

Regarding consultations, in the final survey compared to the baseline, in project sites there were fewer respondents reporting they were never asked for input, and more responding they were asked rarely for input on fisheries the laws by Fisheries Commission and local government. Responses to frequency of being asked for input on fisheries laws by Chief Fishermen or Traditional Leaders followed a similar pattern as that for the Fisheries Commission and local government. While so many respondents still said never or rarely is not good, and where the ideal would be most answering frequently or all the time, the increase in rarely and decrease in never responses does represent some incremental change in a positive direction. These findings suggest that consultations between fisherfolks, government authorities and chief fishermen and traditional authorities have improved over time in project sites but not necessarily in control sites. This suggests the project improved consultations in project sites where project activities supporting consultations were most intensive, and even though broader non-site specific regional consultations through the Fisher – to – Fisher dialogues occurred, control site respondents still did not perceive improvement. This may have implications in the future for sustainability of improved consultations and continued post project improvements coastwide as it suggests potential dependence on project staffing and funding, and that stakeholder consultations may not yet have been fully institutionalized within government agencies. The passage of the fisheries co-management policy in 2020 however may change this as it now mandates the Fisheries Commission to institutionalize these processes through co-management committees, and to support their operations.

Respondents were asked which groups should be involved in making fisheries rules. Chief Fisherman followed by Fishermen were the most common responses across both time periods and in both control and project villages. When comparing differences over time, greater proportions of project village responses in the final survey chose Fisheries Commission and Local Government when asked which groups should be involved in making fisheries rules. These findings are similar to the findings on who do you respect regarding advice on fisheries rules. While chief fishermen and fishermen were still most frequently mentioned, and as more than one response was allowed on this question, a more balanced proportion, with government authorities having higher percentages and chief fishermen and fishermen slightly lower percentages in project sites suggests attitudes shifting to more power sharing among stakeholders. This could be building an improved foundation for more inclusive collaborative management in the future rather than sole dependence on either fisherfolks and traditional leaders or government authorities.

4.7 Child Labor and Trafficking

4.7.1 Knowledge

There were significant improvements in the final survey in seven out of eight questions asked concerning knowledge of illegal child labor and trafficking questions asked compared to the baseline responses. Only the question on children aged 15-18 years selling fish or smoking fish after school, which is legal, showed no significant improvement. Although these data for

children 15-18 years to sell or smoke fish after school suggest a gap in knowledge, since it is the only measure asked about that is not illegal, there may be some methodological complications with the way the survey was designed and administered with regard to this measure.

The percent of correct responses was high on seven questions ranging from 78% to 99% of respondents having correct knowledge except for children <15 years selling fish or smoking fish after school which is illegal and ranged from 14% to 27 % of respondents. Major improvements were seen over time in both control and project sites. This suggests the project made considerable progress in educating individuals about the differences in legal and illegal practices, including child trafficking. There seems to be confusion among respondents regarding ages at which children can sell or smoke fish after school. While SFMP conducted awareness campaigns in project villages including supporting CLaT advocates and community drama, SFMP also conducted broader-reaching mass media campaigns and worked to strengthen child protection committees which could explain the improvements in bother project and control villages. In addition, SFMP was not the only project supporting anti child labor and trafficking activities. For instance, the US Department of State had funded two local NGOs to strengthen Protection, Prevention and Prosecution activities. Therefore, the changes cannot be solely attributed to SFMP activities.

4.7.2 Attitudes

While SFMP communications programs were geared to educate people about illegal child labor and trafficking practices and consequences for those children, the Theory of Change also hoped to not only increase knowledge but change attitudes about many illegal child labor and trafficking practices being viewed as acceptable behavior. There were significant improvements in attitudes concerning what is not an acceptable practice where out of the eight practices asked of respondents, six showed statistically significant declines in responses between the baseline and final survey periods. This suggests the project (and contributions of other donors) made considerable progress in changing attitudes about child trafficking in a positive way. While there were no changes in the percentages of respondents on the child trafficking questions, people who saw this practice as acceptable is already extremely low at less than 5% of respondents. Regarding children under 15 years old, high percentage of respondents (96% baseline, 85% final survey) felt it is acceptable for children to sell or smoke fish after school, even though it is illegal. This seems to be another area of confusion with similar findings concerning knowledge.

4.7.3 Perceived Practice /Prevalence

While knowledge of illegal practices increased and attitudes improved concern acceptable and unacceptable practices, the question arises whether this would translate into reduce prevalence of these practices. Along with the SFMP communications programs and other activities such as community child advocate volunteers and strengthening district child protection committees were intended to reduce prevalence.

The perceived prevalence of child labor and trafficking practices significantly decreased in project sites on all measures between baseline and final survey periods. There were no significant changes in the control sites although scores tended to increase. Scores were lowest in project villages in the final survey on all measures with four of those measures statistically significantly lower than the comparison groups (parents allowing children <15 to go fishing; parents allowing children <15 to work during school hours selling; child trafficking; and the sum of all mean scores).

These results suggest the project made progress on reducing the prevalence of child labor and trafficking in the project sites. In addition, SFMP was not the only project supporting anti-child labor and trafficking activities along the coast. For instance, the US Department of State had funded two local NGOs to strengthen Protection, Prevention and Prosecution activities. Therefore, the changes cannot be solely attributed to SFMP activities.

4.8 Women's Empowerment

Using a Women's Empowerment in Fisheries Index (WEFI), roughly modeled off of the Women's Empowerment in Agriculture Index (WEAI), increases in the overall index were expected from the SFMP interventions. We also assumed that women would have lower scores than men, meaning overall a gender disparity for women. The was no change between the baseline and final overall WEFI scores for women but the scores for men declined. In looking at the individual attributes that make up the score, the decline in the men's score is attributed mostly to a decline in the Production and Income dimensions. On the women's score, there was a similar decline on the income dimension. AS households showed a decline in the ownership of fishing assets in the final survey – likely a result of the collapsing fishery – this could potentially explain the decline in these empowerment dimensions for both men and women and a decline in the overall WEFI score for men.

For women, looking at the individual indicators of the WEFI score, there was an increase in access to credit and autonomy in production indicators. The autonomy in production indicator measures how much input women have in decisions about fisheries related activities. This may be attributable in part to SFMP gender activities such as the "*honam*" training that was intended to build peer support networks about issues that affect women. SFMP also supported women to get better access to credit through establishment of Village Savings and Loan Associations and facilitated loans from the government's Micro-finance and Small Loans Center. This may have contributed to the women's increased score on access to credit.

While we expected to see increases in the WEFI score for women, and the score for women trended higher in the final survey even though it was not statistically significant, the gap between the WEFI scores of men and women did narrow significantly. This can be viewed therefore as some modest gains over time.

4.9 Summary of Findings

The Table below summarizes the hypothesized or predicted trends and actual trends over life-of-project on the various indicators measured in this report. Green Arrows represent positive changes which could be reasonably attributed to project interventions in whole or in part. Red downward arrows indicate negative trends that the project was unable to influence. Yellow circles represent indicators where there were no changes measured in the surveys.

Table 43: Trends in key indicators assessed.

Indicator	Predicted Trend	Actual Trend
Livelihoods		
Diversified livelihoods		
MSL Low house structure		
MSL Fishing assets		
MSL High amenities		
Food Security		
Household hunger		
Women's dietary diversity		
Quality of Life		
Fish Catch and Abundance		
Illegal Fishing		
Knowledge of Fishing Laws		
Deterrence Factors		
Law enforcement		
Arrests and Prosecution		
Legitimacy of the Legal Process		
Moral Suasion		
Respect for Authorities & Consultation		
Child Labor and Trafficking		
Knowledge		
Attitudes		
Practice / Prevalence		
Women's Empowerment		
1. Production		
2. Resources - Access to productive capital		
3. Income - control of use		
4. Leadership		
Total WEFI score		

Summary of the actual changes relative to expected change are shown in the Table 43 below. For more information on the hypothesis developed regarding expected changes, see Appendix 2. Predicted changes are relative to expected project goal and impacts as noted in Table 1 in the

introduction. Green arrows represent a positive change and red arrows represent a negative change or trend. Yellow arrows indicate no significant change. The direction of the arrows indicate the change in the indicator. For instance, illegal fishing was expected to go down (green arrow pointing down) but perceptions of stakeholders was that it has increased (red arrow going up).

Out of the 22 indicators shown in the table, we expected 7 to show no change (yellow) and 15 to show positive trends (green). The survey results were that 5 showed no change, 9 showed negative trends (red) and 8 showed positive trends. Our expectations were met or exceeded on 10 of the indicators, and 12 trended opposite our expectation. The actual negative trends (red) cluster around indicators concerning food security and quality of life as well as health of the fishery, illegal fishing and enforcement. The food security and quality of life declines are likely due to the declining health of the fishery and declining catches and may have contributed to no improvements on the empowerment indictors. The decline in perceptions of deterrence factors and increased perceptions of illegal fishing contribute to the decline in the fisheries resource and catches.

While the survey results show some modest gains on some of the indicators , the overall picture for the fishery sector is poor. Clearly much more effort is needed to achieve a healthy fishery and improve the socio-economic conditions of people that depend on the fishery for their survival.

5. RECOMMENDATIONS

Fish catch and abundance: Results in this survey are similar to scientific stock assessments and show a continuing decline in the health of the fishery. The Fisheries Commission should continue to conduct peer reviewed stock assessments annually. Tracking fisherfolk perceptions should also continue in subsequent socio-economic surveys. More urgent action is needed in terms of effective implementation of regulations to curb excessive fishing effort and the overcapacity in all fleets.

Quality of life, household wealth and food security in fishing communities: Declining trends on these indicators are linked to declining catches, and further regulatory measures to rebuild the fishery are likely to have additional negative short-term impacts on fisherfolks as documented during the 2019 closed fishing season (see Ofori-Danson et al., 2019). Future initiatives should implement measures to mitigate these impacts. Promotion of diversified livelihoods should be supported. While the local and global track record on creating successful livelihoods in the past has been lackluster, future activities should start with a review and accumulation of lessons of past failures and look at changes to improve success. The fact that livelihood diversification is already occurring independently within fishing households, engaging fisherfolks in development of such strategies should be part of the design considerations. This report did not examine whether diversified livelihoods increases proclivity towards supporting regulations as posited in the project's theory of change but should be investigated further.

Illegal Fishing: As indicators suggest a lack of progress on reducing illegal fishing and decreased deterrence by law enforcement, future donor efforts need to focus on these elements as IUU will be a continuing drag on the possibility of full fisheries recovery. However, as the issues here are complex, it is suggested that a deeper political analysis and review of reasons behind the reduced deterrence be discussed with stakeholders prior to design and implementation of further interventions. This should include a more in-depth look at the "saiko" transshipment problem and the role of political interference in enforcement.

Child Labor and Trafficking: Given the evident success of the anti-child labor and trafficking campaigns by SFMP and contributions of other donor efforts, it is recommended that USAID continue to support grants to local NGOs in the coastal regions supporting anti-child labor and trafficking practices. As there seems to be some confusion among respondents regarding ages at which children can sell or smoke fish after school, or whether children between the ages of 15-18 years can go fishing, these should be emphasized more in future communications campaigns. This is difficult as it has been a long cultural practice among fish processors and traders for children to work alongside their mothers as a way of learning the vocation, and for boys to go fishing with their fathers to learn the fishing trade. This is still legal if done at the right age, and such communications campaigns should emphasize keeping kids in school first, prior to apprenticeship.

Women's Empowerment: While the gap between men and women narrowed in this survey, the fact that women's empowerment did not improve much and there was a decline in men's empowerment should be of concern and more effort made to empower both men and women. Successful programs of promoting VSLAs among women fish processors and traders should be continued as this shows direct improvements on access to finance indicators.

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APPENDIX 1. Final Survey Questionnaire

See the baseline report (Crawford et al. 2016) for the baseline questionnaire. The following is the survey instrument (Excel version) used in Kobotoolbox for the 2019 follow-up survey.

Survey worksheet

name	type	required	label	relevant	constraint	appearance	choice_ filter
start	start						
end	end						
today	today						
deviceid	deviceid						
simserial	simserial						
phonenumber	phonenumber						
Section_A	**begin group**		**A. Community Data**			w5	
note_a	note		**NOTE TO ENUMERATOR:** Your team will interview fishing households located closest to your given list of coordinates. Answer the following questions and attempt to locate the house structure nearest to the current set of coordinates. If multiple households exist within that structure, pick one using the appropriate random number list. If no household structure is near to the current set of coordinates, or if the nearest household structure has already been surveyed, proceed to the next set of coordinates. Confirm with household residents that there are individuals within the household engaged in fishing activities of either fishing, processing and/or trading. If there are no individuals within the household engaged in fishing, processing or trading, please go to the next nearest household until you find the nearest fishing household for that set of coordinates.				

name	type	required	label	relevant	constraint	appearance	choice_ filter
enum_id	select_one enum_id	yes	A 1.01 Enumerator Identifier			w1	
region	select_one regions	yes	A 1.02 Region:			w1	
district	select_one districts	yes	A 1.03 District:			w1	region= ${regio n}
community	select_one community	yes	A 1.04 Community/Village Name:			w1	region= ${regio n} and district =${distr ict}
coord_pos	text	yes	A 1.05 Choose coordinate number:			w1	
	end group						
Section_B	**begin group**		**B. Household Data**			w4	
note_ic	note		**Informed Consent**			w1	
note_b	note		**NOTE TO ENUMERATOR:** You need to obtain verbal consent from each respondent before you can administer the survey. Carefully read aloud the consent form and clarify any ambiguities. Answer the following question based on the response from the respondent. Start with the household head, which may be a male or female adult. If the household head is not available, interview the next senior most person in the household, then the food preparer and then the significant other of the househead or the oppoitite sex of the person interviewed as the most senior household member present.			w3	
consent	select_one yes_no	yes	Do you, the enumerator, affirm that you have read aloud the consent statement to the participant and that they have consented to the interview?				

name	type	required	label	relevant	constraint	appearance	choice_ filter
personal_name	text	yes	What is the name of the respondent? (household head or senior most adult in household)	${consent}='1'		w2	
personal_mobile	text	yes	What is the number (mobile) where the respondent may be reached?	${consent}='1'		w2	
num_households	text	yes	B 0.01 Number of Households within Structure:	${consent}='1'		w1	
type_household	select_one household_type	yes	B 0.02 Type of Household:	${consent}='1'		w1	
gps_household	geopoint		B 0.03 GPS Coordinates of Household:	${consent}='1'			
	end group						
Section_B1	**begin group**		**B1. Fishing Livelihood**			w5	
livelihood_activities	select_multiple brian_livelihood	yes	B 1.01 Are members of your household engaged in any of the following livelihood activities? (check all that apply)	${consent}='1'		w1	
livelihood_first_important	select_one brian_livelihood	yes	B1.02 Which livelihood activity is the most important to your household?	${consent}='1'		w1	
livelihood_second_important	select_one brian_livelihood	yes	B 1.03 Which livelihood activity is the second most important to your household?	${consent}='1'		w1	
livelihood_fish_types	select_multiple brian_fish	yes	B 1.04 What are the main types of fish you catch? (check all that apply)	${consent}='1' and selected(${livelihood_activities}, 'fishing')		w1	
livelihood_fish_types_important	select_one brian_fish	yes	B 1.05 Which group of fish is the most important for your livelihood?	${consent}='1'		w1	
livelihood_fish_other	text		B 1.05a What other fish are important to your livelihood?	${consent}='1' and selected(${livelihood_activities}, 'other')			
	end group						
Section_B2	**begin group**		**B2. Material Style of Life/Household Wealth Indicator (household head)**			w4	
note_B2	note		Enumerator: Observe dwelling characteristics and record. If you are not in the house and			w4	

name	type	required	label	relevant	constraint	appearance	choice_ filter
			cannot observe then ask the head of household. (This section is only asked once per household).				
dwelling_roof	select_one roof_material	yes	B 2.01 Enumerator: OBSERVE (DO NOT ASK) Roof top material (outer covering):	${consent}='1'		w1	
dwelling_floor	select_one floor_material	yes	B 2.02 Enumerator: OBSERVE (DO NOT ASK) Floor material:	${consent}='1'		w1	
dwelling_walls	select_one wall_material	yes	B 2.03 Enumerator: OBSERVE (DO NOT ASK) Exterior Walls:	${consent}='1'		w1	
dwelling_state	select_one condition	yes	B 2.04 Enumerator: OBSERVE (DO NOT ASK) State of the dwelling:	${consent}='1'		w1	
dwelling_toilet	select_one toilet	yes	B 2.05 What is the main type of toilet your household uses?	${consent}='1'		w1	
dwelling_water	select_one yes_no	yes	B 2.06 Is there a water source inside the dwelling?	${consent}='1'		w1	
dwelling_electricity	select_one yes_no	yes	B 2.07 Does this dwelling have access to electricity?	${consent}='1'		w1	
dwelling_cooking_fuel	select_one cooking_source	yes	B 2.08 What is the main source of cooking fuel for your household?	${consent}='1'		w1	
	end group						
Section_B2a	**begin group**		**B2a Durable Goods**	${consent}='1'		w4	
durable_goods	select_multiple durable_goods		B 2.09 Does your household own any of the following list of goods?				
	end group						
Section_B3	**begin group**		**B3. Household Hunger Scale (food preparer)**			w4	
note_b3	note		Enumerator: Ask to speak to the person responsible for household food preparation (this section is only asked once per household and the food preparer may be head of household, significant other of the opposite sex, or a different person in the household)				

name	type	required	label	relevant	constraint	appearance	choice_ filter
consent_food	select_one yes_no	yes	Do you, the enumerator, affirm that you have read aloud the consent statement to the participant and that they have consented to the interview?	${consent}='1'		w2	
name_food	text	yes	What is the name of the respondent?	${consent_food}='1'		w2	
hunger_food	select_one yes_no	yes	B 3.01 In the last 4 weeks, was there ever no food to eat of any kind in your dwelling because of lack of resources to get food?	${consent_food}='1'		w1	
hunger_food_often	select_one likert_often3	yes	B 3.01a How often did this happen in the last 4 weeks?	${consent_food}='1' and ${hunger_food}='1'		w1	
hunger_sleep	select_one yes_no	yes	B 3.02 In the last 4 weeks, did you or any household member go to sleep at night hungry because there was not enough food?	${consent_food}='1'		w1	
hunger_sleep_often	select_one likert_often3	yes	B 3.02a How often did this happen in the last 4 weeks?	${consent_food}='1' and ${hunger_sleep}='1'		w1	
hunger_days	select_one yes_no	yes	B 3.03 In the last 4 weeks, did you or any household member go a whole day and night without eating anything at all because there was not enough food?	${consent_food}='1'		w1	
hunger_days_often	select_one likert_often3	yes	B 3.03a How often did this happen in the last 4 weeks?	${consent_food}='1' and ${hunger_days}='1'		w1	
	end group						
repeat_individuals	**begin_repeat**		Start of repeat section for multiple respondents in the household			w4	
Section_C	note		**C. Individual Data**				
note_c	note		**NOTE TO ENUMERATOR:** All applicable questionnaire sections below are asked of the head of household and senior most gender-				

name	type	required	label	relevant	constraint	appearance	choice_ filter
			opposite household member as separate survey entries.				
consent_ind	select_one yes_no	yes	Do you, the enumerator, affirm that you have read aloud the consent statement to the participant and that they have consented to the interview?	${consent}='1'		w2	
Section_C1	**begin group**		**C1. Demographics and Individual Characteristics**			w4	
member_name	text		C 1.0 What is the respondents name?	${consent_ind}='1'		w2	
member_type	select_one member_type	yes	C 1.01 Is the respondent the head of household, or the gender-opposite senior most household member?	${consent_ind}='1'			
member_gender	select_one gender	yes	C 1.02 What is the respondent's gender?	${consent_ind}='1'		w1	
member_age_input	text	yes	C 1.03 What is your age in years?	${consent_ind}='1'	.>17 and .<90	w1	
member_marital_status	select_one marital_status	yes	C 1.04 What is your civil or marital status?	${consent_ind}='1'		w1	
member_literacy	select_one yes_no_dk	yes	C 1.05 Can you read and write in either English, the local language, or both?	${consent_ind}='1'		w1	
member_attended_school	select_one yes_no_dk	yes	C 1.06 Have you ever attended school?	${consent_ind}='1'		w1	
member_highest_school	select_one schooling	yes	C 1.06a What is the highest educational qualification completed?	${consent_ind}='1'		w2 horizontal	
	end group						
Section_C2	**begin group**		**C2. Perceptions of Quality of life**			w4	
perception_quality_life	select_one likert_amount	yes	C 2.02 Compared to 5 years ago, is your quality of life or standard of living now:	${consent_ind}='1'		w1	
Section_C3	note		**C3. Perceptions on Fishing**				
perception_abundance_pelagic	select_one likert_amount4	yes	C 3.01 Compared to 5 years ago, would you say the number of "small pelagic" fish in the sea is now:	${consent_ind}='1'		w1	

name	type	required	label	relevant	constraint	appearance	choice_ filter
perception_yield_pelagics	select_one likert_amount4	yes	C 3.02 Compared to 5 years ago, is the amount of "small pelagic" fish you catch:	${consent_ind}='1'		w1	
perception_cpue_ease	select_one cpue_ease	yes	C 3.03 Compared to 5 years ago, which statement describes the situation today?	${consent_ind}='1'		w1	
perception_causes	select_multiple fishing_causes		C 3.04 What are the main reasons for the changes you mentioned, if any? (check all that apply)	${consent_ind}='1'		w2 horizonal	
perception_causes_other	text	yes	C 3.05 Please specify the "other" reason:	${consent_ind}='1' and selected(${perception_causes},'other')		w2	
	end group						
Section_C4	**begin group**		**C4. Women's Dietary Diversity (Women of reproductive age only >17 and <46 yrs old)**			w4	
note_C4a	note		Enumerator Instruction: As the respondent recalls foods, select "yes" for the corresponding food below. If any food is not listed in the food groups below, enter it in the "other foods" text box. If foods are used in small amounts for seasoning or as a condiment, they should be included in the option "Condiments"			w2	
note_C4b	note		Once the respondent finishes recalling the foods eaten, read each food group which was not marked "yes", ask the following question, and mark either "yes", "no" or "don't know" for the group: Yesterday during the day or night, did you drink/eat any [FOOD GROUP ITEMS]?			w2	
WDD_foods	select_multiple WDD_foods	yes	C 4.01 What foods have you eaten in the last 24 hours? (select all that apply)	${consent_ind}='1' and ${member_gender}='2' and (${member_age_inp		w3 horizontal	

name	type	required	label	relevant	constraint	appearance	choice_ filter
				ut}>'17' and ${member_age_input}<'46')			
WDD_foods_other	text		C4.01a. Enter what other foods eaten, separated by commas, not in the list above.	${consent_ind}='1' and ${member_gender}='2' and (${member_age_input}>'17' and ${member_age_input}<'46') and selected(${WDD_foods},'21')		w2	
WDD_foods_fish	select_multiple fish_type		C 4.02 What kind of fish? (select all that apply)	${consent_ind}='1' and ${member_gender}='2' and (${member_age_input}>'17' and ${member_age_input}<'46') and selected(${WDD_foods},'13')		w2	
	end group						
Section_C5	**begin group**		**C5. Law Enforcement and Regulatory Compliance**			w6	
perception_light_fishing	select_one likert_increase_decrease	yes	C 5.1 Compared to 5 years ago, has the level of light fishing among fishermen in your community:	${consent_ind}='1'		w1	
perception_fine_mesh	select_one likert_increase_decrease	yes	C 5.2 Compared to 5 years ago, has the use of fine mesh nets among fishermen in your community:	${consent_ind}='1'		w1	

name	type	required	label	relevant	constraint	appearance	choice_ filter
perception_illegal_actors	select_multiple illegal_actors	yes	C 5.5 Are any of the following conducting illegal fishing activities near your community, such as light fishing, dynamite fishing, carbide fishing, using fine mesh nets,or trawlers operating near shore? (check all that apply)	${consent_ind}='1'		w1	
perception_most_illegal_actor	select_one illegal_actors		C 5.5a Of those, who is the most frequent violator?	${consent_ind}='1'		w1	
perception_enforcement_beach	select_one likert_often	yes	C 5.6 How often do you see the marine police or fisheries commission enforcement officers PATROLLING THE BEACHES in your community?	${consent_ind}='1'		w1	
perception_enforcement_sea	select_one likert_often	yes	C 5.7 How often do you see the navy or marine police patrolling OUT IN THE SEA?	${consent_ind}='1'		w1	
	end group						
section_C5a	**begin group**		**Law and Regulation 2**			w4	
perception_enforcement_discussion	select_one likert_often	yes	C 5.8 How often do enforcement officers talk to you about the reasons for the fisheries laws?	${consent_ind}='1'		w1	
perception_illegal_knowledge	select_one likert_knowledge	yes	C 5.9A How aware are you of Ghanaian fishing regulations?	${consent_ind}='1'		w1	
note_C59	note		**Enumerator,** please read "I will read you a list of fishing practices. For each, please tell me if it is illegal under Ghana fishing law". (Enumerator: check all that the respondent says are illegal)				
perception_illegal_practices	select_multiple illegal_fishing		C 5.9B Which of the following fishing practices are illegal under Ghana fishing laws? Check all that apply	${consent_ind}='1'		w2 horizontal	
perception_regulations	select_one regulation_outlook	yes	C 5.20 Which statement do you feel reflects your opinion about the fishery:	${consent_ind}='1'		w2	
	end group			${consent_ind}='1'			
section_C5b	**begin group**		**Law and Regulation 3**	${consent_ind}='1'		w4	

name	type	required	label	relevant	constraint	appearance	choice_ filter
perception_punishment _arrest	select_one likert_often	yes	C 5.21 What is the likelihood that a fisherman will be arrested for illegal fishing such as light fishing or dynamite fishing?	${consent_ind}='1'		w1	
perception_punishment _confiscated	select_one likert_often	yes	C 5.22 What is the likelihood that a fisherman, if arrested, will have gear confiscated, pay a fine, or go to jail?	${consent_ind}='1'		w1	
perception_punishment _intervention	select_one likert_often	yes	C 5.23 To what extent do people high up (such as politicians) intervene on behalf of fishermen if they are arrested to get them off with no jail, no fine, or release of confiscated gear?	${consent_ind}='1'		w1	
perception_fishing_cons cience	select_one fishing_conscienc e	yes	C 5.24 If you see a fisherman who lives in your community using illegal fishing methods (such as light fishing or dynamite fishing), which of the following actions would you most likely do?	${consent_ind}='1'		w1	
perception_fishing_cons cience_other	text		C 5.24a What other action would you most likely do?	${consent_ind}='1' and selected(${perceptio n_fishing_conscience }, 'other')			
perception_fishing_resp ect	select_one fishing_respect	yes	C 5.25 From the following list of people, who do you respect the most in advising you about good and bad fishing practices?	${consent_ind}='1'		w2 horizontal	
	end group			${consent_ind}='1'			
section_C5c	**begin group**		**Law and Regulation 4**	${consent_ind}='1'		w4	
perception_empowerme nt_commission	select_one likert_often	yes	C 5.28 How often are you asked for your opinion about development of fishing laws and regulations by the fisheries commission?	${consent_ind}='1'		w1	
perception_empowerme nt_local_government	select_one likert_often	yes	C 5.29 How often are you asked for your opinion about development of fishing laws and regulations by local government officials?	${consent_ind}='1'		w1	
perception_empowerme nt_chief_fisherman	select_one likert_often	yes	C 5.30 How often are you asked for your opinion about development of fishing laws and regulations by chief fishermen or traditional leaders?	${consent_ind}='1'		w1	

name	type	required	label	relevant	constraint	appearance	choice_ filter
perception_empowerment_groups	select_multiple fisheries_rulemakers		C 5.31 Who should be the primary groups involved in deciding the rules about fishing in order to have sustained and improved catches in the future? (Choose no more than 2)	${consent_ind}='1'	count-selected(.) <=2	w2 horizontal	
empowerment_group	**end group**						
Section_C6	**begin group**		**C6. Perceptions of CLaT**			w4	
perception_trafficking_note	note		Which of the following practices in your community do you believe are acceptable for parents to allow? Please check all that apply.				
perception_trafficking_under15	select_multiple fishing_activities		C 6.32 Children under the age of 15 years:	${consent_ind}='1'		w2 horizontal	
perception_trafficking_15_18	select_multiple fishing_activities		C 6.33 Children between the ages of at least 15 but below 18 years:	${consent_ind}='1'		w2 horizontal	
perception_child_fishing	select_one likert_often	yes	C 6.34 In your opinion, how widespread is the practice of parents allowing children under the age of 15 years to go fishing?	${consent_ind}='1'		w2 horizontal	
perception_child_fish_smoking	select_one likert_often	yes	C 6.35 In your opinion, how widespread is the practice of parents allowing children under the age of 15 years to work during school hours smoking fish?	${consent_ind}='1'		w2 horizontal	
perception_child_fish_selling	select_one likert_often	yes	C 6.36 In your opinion, how widespread is the practice of parents allowing children under the age of 15 years to work during school hours selling fish?	${consent_ind}='1'		w2 horizontal	
perception_trafficking_community	select_one fishing_trafficking_payment	yes	C 6.37 Sometimes parents in fishing communities take payments from a person who promises to take care of a child at a location outside your community. In your opinion, how widespread is this practice?	${consent_ind}='1'		w2 horizontal	
perception_trafficking_legality_note	note		Which of the following practices do you believe are illegal under Ghana's labor laws? Check all that apply				

name	type	required	label	relevant	constraint	appearance	choice_ filter
perception_trafficking_legality_15	select_multiple fishing_activities		C 6.38 Children below the age of 15 years:	${consent_ind}='1'		w2 horizontal	
perception_trafficking_legality_15_18	select_multiple fishing_activities		C 6.39 Children between the ages of at least 15 but below 18 years:	${consent_ind}='1'		w2 horizontal	
trafficking_legality	**end group**						
Section_C7	**begin group**		**C7. Empowerment Index**			w4	
note_g	note		Enumerators note: Ask to conduct the interview for this section in private or where other members of the household cannot overhear or contribute answers. Do not attempt to make responses between the primary and secondary respondent the same -- it is okay for them to be different.				
ftf_g2	note		**Role in Household Decision-making around production and income generation**				
participation_fishing	select_one yes_no	yes	C 7.01 Did you (singular) participate in fishing or fishpond culture in the past 12 months?	${consent_ind}='1'		w2	
input_decision_fishing	select_one input_types_na	yes	C 7.01a How much input did you have in making decisions about fishing or fishpond culture?	${consent_ind}='1' and ${participation_fishing}='1'		w2	
	end group						
ftf_g3	**begin group**		**Access to Productive Capital**			w5	
note_g3	note		"Now I'd like to ask you about your household's ownership of a number of items that could be used to generate income."				
capital_land	select_one yes_no_dk		C 7.02 Does anyone in your household currently have any agricultural land (pieces/plots)?	${consent_ind}='1'		w1	
capital_land_ownership	select_one decision_types		C 7.02a Who would you say owns most of this item?	${consent_ind}='1' and ${capital_land}='1'		w2	

name	type	required	label	relevant	constraint	appearance	choice_filter
capital_land_sell	select_one decision_types		C 7.02b Who would you say can decide whether to sell this item most of the time?	${consent}='1' and ${capital_land}='1'		w2	
capital_animals	select_one yes_no_dk		C 7.03 Does anyone in your household currently have any livestock or poultry (oxen, cattle, goats, pigs, sheep, chickens, ducks, turkeys, pigeons, etc)?	${consent_ind}='1'		w1	
capital_animals_ownership	select_one decision_types		C 7.03a Who would you say owns most of this item?	${consent_ind}='1' and ${capital_animals}='1'		w2	
capital_animals_sell	select_one decision_types		C 7.03b Who would you say can decide whether to sell this item most of the time?	${consent_ind}='1' and ${capital_animals}='1'		w2	
	end group						
Section_C7a-fish	**begin group**		**Capital 2 fishing**			w3	
capital_fishing	select_one yes_no_dk	yes	C 7.04 Does anyone in your household currently have any fishing boats or gear?	${consent_ind}='1'		w1	
capital_fishing_canoe_motorized	integer	yes	C 7.05 How many motorized canoes?	${consent_ind}='1' and ${capital_fishing}='1'		w1	
capital_fishing_canoe_nonmotorized	integer	yes	C 7.06 How many nonmotorized canoes?	${consent_ind}='1' and ${capital_fishing}='1'		w1	
capital_fishing_semi-industrial	integer	yes	C 7.07 How many semi-industrial boats?	${consent_ind}='1' and ${capital_fishing}='1'		w1	
capital_fishing_trawler	integer	yes	C 7.08 How many trawlers?	${consent_ind}='1' and ${capital_fishing}='1'		w1	
capital_fishing_ownership	select_one decision_types	yes	C 7.04a Who would you say owns most of this item?	${consent_ind}='1' and ${capital_fishing}='1'		w1	

name	type	required	label	relevant	constraint	appearance	choice_ filter
capital_fishing_sell	select_one decision_types	yes	C 7.04b Who would you say can decide whether to sell this item most of the time?	${consent_ind}='1' and ${capital_fishing}='1'		w1	
	end group						
Section_C7a-acq	**begin group**		**Capital 2 aquaculture**			w3	
capital_fishing_aquaculture_pond	select_one yes_no_dk		C 7.08a Does anyone in your household have any aquaculture ponds (fishponds)?	${consent_ind}='1'			
capital_fishing_aquaculture_pond_number	integer	yes	C 7.09 How many aquaculture ponds?	${consent_ind}='1' and ${capital_fishing_aquaculture_pond}='1'		w1	
capital_aquaculture_ownership	select_one decision_types	yes	C 7.09a Who would you say owns most of these aquaculture ponds?	${consent_ind}='1' and ${capital_fishing_aquaculture_pond_number}>'0'			
capital_aquaculture_sell	select_one decision_types	yes	C 7.09b Who would you say can decide whether to sell this item most of the time?	${consent_ind}='1' and ${capital_fishing_aquaculture_pond_number}>'0'			
	end group						
Section_C7a-smoker	**begin group**		**Capital 2 smokers**			w3	
capital_fishing_smoker	select_one yes_no_dk		C 7.09c Does anyone in your household currently own any smokers?	${consent_ind}='1'			
capital_fishing_smoker_number	integer	yes	C 7.10 How many fish smokers?	${consent_ind}='1' and ${capital_fishing_smoker}='1'		w1	
capital_fishing_smoker_ownership	select_one decision_types	yes	C 7.11 Who would you say owns most of this item?	${consent_ind}='1' and ${capital_fishing_smoker_number}>'0'		w1	

name	type	required	label	relevant	constraint	appearance	choice_ filter
capital_smoker_sell	select_one decision_types	yes	C 7.12 Who would you say can decide whether to sell this item most of the time?	${consent_ind}='1' and ${capital_fishing_smoker_number}>'0'		w1	
	end group						
Section_C7a-house	**begin group**		**Capital 2 house**			w3	
capital_house	select_one yes_no_dk	yes	C 7.13 Does anyone in your household currently have any houses or other structures?	${consent_ind}='1'		w1	
capital_house_ownership	select_one decision_types	yes	C 7.14 Who would you say owns most of this item?	${consent_ind}='1' and ${capital_house}='1'		w1	
capital_house_sell	select_one decision_types	yes	C 7.15 Who would you say can decide whether to sell this item most of the time?	${consent_ind}='1' and ${capital_house}='1'		w1	
	end group						
Section_C7b	**begin group**		**Capital 3**			w5	
capital_cellphone	select_one yes_no_dk	yes	C 7.16 Does anyone in your household currently have any cellphones?	${consent_ind}='1'		w1	
capital_cellphone_ownership	select_one decision_types	yes	C 7.16a Who would you say owns most of this item?	${consent_ind}='1' and ${capital_cellphone}='1'		w2	
capital_cellphone_type	select_multiple cell_type		C 7.16b What type(s) of phone (i.e., iPhone, Android, basic SMS/voice, etc.)?	${consent_ind}='1' and ${capital_cellphone}='1'		w2	
capital_nonfarm_land	select_one yes_no_dk	yes	C 7.17 Does anyone in your household currently have other land not used for agricultural purposes (pieces/plots, residential or commercial land, etc.)?	${consent_ind}='1'		w2	
capital_nonfarm_land_ownership	select_one decision_types	yes	C 7.17a Who would you say owns most of this item?	${consent_ind}='1' and ${capital_nonfarm_land}='1'		w2	

name	type	required	label	relevant	constraint	appearance	choice_ filter
captital_nonfarm_sell	select_one decision_types	yes	C 7.17b Who would you say can decide whether to sell this item most of the time?	${consent_ind}='1' and ${capital_nonfarm_land}='1'			
capital_transportation	select_one yes_no_dk	yes	C 7.18 Does anyone in your household currently have means of transportation (bicycle, motorcycle, car, etc.)?	${consent_ind}='1'		w2	
capital_transportation_ownership	select_one decision_types	yes	C 7.18a Who would you say owns most of this item?	${consent_ind}='1' and ${capital_transportation}='1'		w2	
capital_transportation_sell	select_one decision_types	yes	C 7.18b Who would you say can decide whether to sell this item most of the time?	${consent_ind}='1' and ${capital_transportation}='1'			
	end group						
Section_C7c	**begin group**		**Access to Credit**			w5	
note_3b	note		NOTE TO ENUMERATOR: read the following statement to the respondent: "Next I'd like to ask about your household's experience with borrowing money or other items in the past 12 months."				
bank_account	select_one yes_no_dk	yes	C 7.19 Does anyone in your household have a bank account?	${consent_ind}='1'		w1	
bank_account_owner	select_one decision_types	yes	C 7.20 Who is the owner of the account?	${consent_ind}='1' and ${bank_account}='1'		w2	
bank_account_withdrawals	select_one decision_types	yes	C 7.21 Who makes decisions regarding withdrawals from the account?	${consent_ind}='1' and ${bank_account}='1'		w2	
bank_account_saving	select_one yes_no_dk	yes	C 7.22 Do you regularly deposit some of your income in your account(s)?	${consent_ind}='1' and ${bank_account}='1'			

name	type	required	label	relevant	constraint	appearance	choice_ filter
lending_ngo	select_one yes_no_dk	yes	C 7.23 Has anyone in your household taken any loans or borrowed cash/in-kind from a non-government organization (NGO) in the past 12 months?	${consent_ind}='1'		w1	
lending_ngo_type	select_one lending_types	yes	C 7.24 What type of loan / borrowing?	${consent_ind}='1' and ${lending_ngo}='1'		w2	
lending_ngo_borrow_decision	select_one decision_types	yes	C 7.25 Who made the decision to borrow from this source?	${consent_ind}='1' and ${lending_ngo}='1'		w2	
lending_informal	select_one yes_no_dk	yes	C 7.26 Has anyone in your household taken any loans or borrowed cash/in-kind from an informal lender in the past 12 months?	${consent_ind}='1'		w1	
lending_informal_type	select_one lending_types	yes	C 7.27 What type of loan / borrowing?	${consent_ind}='1' and ${lending_informal}='1'		w2	
lending_informal_borrow_decision	select_one decision_types	yes	C 7.28 Who made the decision to borrow from this source?	${consent_ind}='1' and ${lending_informal}='1'		w2	
lending_formal	select_one yes_no_dk	yes	C 7.29 Has anyone in your household taken any loans or borrowed cash/in-kind from a formal lender (bank/financial institution) in the past 12 months?	${consent_ind}='1'		w1	
lending_formal_type	select_one lending_types	yes	C 7.30 What type of loan / borrowing?	${consent_ind}='1' and ${lending_formal}='1'		w2	
lending_formal_borrow_decision	select_one decision_types	yes	C 7.31 Who made the decision to borrow from this source?	${consent_ind}='1' and ${lending_formal}='1'		w2	

name	type	required	label	relevant	constraint	appearance	choice_ filter
lending_personal	select_one yes_no_dk	yes	C 7.32 Has anyone in your household taken any loans or borrowed cash/in-kind from a friend or relative in the past 12 months?	${consent_ind}='1'		w1	
lending_personal_type	select_one lending_types	yes	C 7.33 What type of loan / borrowing?	${consent_ind}='1' and${lending_personal}='1'		w2	
lending_personal_borrow_decision	select_one decision_types	yes	C 7.34 Who made the decision to borrow from this source?	${consent_ind}='1' and${lending_personal}='1'		w2	
lending_micro	select_one yes_no_dk	yes	C 7.35 Has anyone in your household taken any loans or borrowed cash/in-kind from a group based micro-finance or lending (including Village Savings and Loan Associations -VSLA- or susu or merry-go-rounds, etc.) in the past 12 months?	${consent_ind}='1'		w1	
lending_micro_type	select_one lending_types	yes	C 7.36 What type of loan / borrowing?	${consent_ind}='1' and ${lending_micro}='1'		w2	
lending_micro_borrow_decision	select_one decision_types	yes	C 7.38 Who made the decision to borrow from this source?	${consent_ind}='1' and ${lending_micro}='1'		w2	
	end group						
Section_C7c2	**begin group**		**Individual Leadership and Influence in the Community**			w3	
comfort_misbehavior	select_one comfort_types	yes	C 7.39 Do you feel comfortable speaking up in public to protest the misbehavior of authorities or elected officials?	${consent_ind}='1'		w1	
comfort_fishing_illegal	select_one comfort_types	yes	C 7.40 Do you feel comfortable speaking up in public to protest illegal fishing activities?	${consent_ind}='1'		w1	
comfort_fishing_rules	select_one comfort_types	yes	C 7.41 Do you feel comfortable speaking up in public to propose new fishing rules needed to rebuild the fishery?	${consent_ind}='1'		w1	

name	type	required	label	relevant	constraint	appearance	choice_ filter
	end group						
Section_C7d	**begin group**		**Group Membership**			w4	
note_g4b	note		"Now I'm going to ask you about groups in the community. These can be either formal or informal and customary groups."				
groups_inshore_fisherm en	select_one yes_no_dk	yes	C 7.42 Is there a National In-Shore Fishermen's Association (GIFA) group?	${consent_ind}='1'		w1	
groups_inshore_fisherm en_active	select_one yes_no	yes	C 7.43 Are you an active member of this group?	${consent_ind}='1' and ${groups_inshore_fis hermen}='1'		w1	
groups_inshore_fisherm en_input	select_one input_types	yes	C 7.44 How much input do you have in making decisions in this group?	${consent_ind}='1' and ${groups_inshore_fis hermen}='1'		w2	
groups_canoe_fisherme n	select_one yes_no_dk	yes	C 7.45 Is there a National Canoe Fishermen's Council (GNCFC) group?	${consent_ind}='1'		w1	
groups_canoe_fisherme n_active	select_one yes_no	yes	C 7.46 Are you an active member of this group?	${consent_ind}='1' and ${groups_canoe_fish ermen}='1'		w1	
groups_canoe_fisherme n_input	select_one input_types	yes	C 7.47 How much input do you have in making decisions in this group?	${consent_ind}='1' and ${groups_canoe_fish ermen}='1'		w2	
	end group						
Section_C7e	**begin group**		**Group Membership 2**			w4	
groups_fishmonger_cew efia	select_one yes_no_dk	yes	C 7.48 Is there a CEWEFIA (Central and Western Region Fishmongers Improvement Association) group?	${consent_ind}='1'		w1	
groups_fishmonger_cew efia_active	select_one yes_no	yes	C 7.49 Are you an active member of this group?	${consent_ind}='1' and ${groups_fishmonger _cewefia}='1'		w1	

name	type	required	label	relevant	constraint	appearance	choice_ filter
groups_fishmonger_cewefia_input	select_one input_types	yes	C 7.50 How much input do you have in making decisions in this group?	${consent_ind}='1' and ${groups_fishmonger_cewefia}='1'		w2	
groups_fishmonger_daa	select_one yes_no_dk	yes	C 7.51 Is there a DAA (Development Action Association) group?	${consent_ind}='1'		w1	
groups_fishmonger_daa_active	select_one yes_no	yes	C 7.52 Are you an active member of this group?	${consent_ind}='1' and ${groups_fishmonger_daa}='1'		w1	
groups_fishmonger_daa_input	select_one input_types	yes	C 7.53 How much input do you have in making decisions in this group?	${consent_ind}='1' and ${groups_fishmonger_daa}='1'		w2	
	end group						
Section_C7f	**begin group**		**Group Membership 3**			w4	
groups_fishmonger_nafpta	select_one yes_no_dk	yes	C 7.54 Is there a NAFPTA (National Fish Processors and Traders Association) group?	${consent_ind}='1'		w1	
groups_fishmonger_nafpta_active	select_one yes_no	yes	C 7.55 Are you an active member of this group?	${consent_ind}='1' and ${groups_fishmonger_nafpta}='1'		w1	
groups_fishmonger_nafpta_input	select_one input_types	yes	C 7.56 How much input do you have in making decisions in this group?	${consent_ind}='1' and ${groups_fishmonger_nafpta}='1'		w2	
groups_fishmonger_other	select_one yes_no_dk	yes	C 7.57 Is there another fishmonger or processor group?	${consent_ind}='1'		w1	
groups_fishmonger_other_active	select_one yes_no	yes	C 7.58 Are you an active member of this group?	${consent_ind}='1' and ${groups_fishmonger_other}='1'		w1	
groups_fishmonger_other_input	select_one input_types	yes	C 7.59 How much input do you have in making decisions in this group?	${consent_ind}='1' and		w2	

name	type	required	label	relevant	constraint	appearance	choice_ filter
				${groups_fishmonger _other}='1'			
	end group						
Section_C7g	**begin group**		**Group Membership 4**				
groups_credit	select_one yes_no_dk	yes	C 7.60 Is there a credit or microfinance (including Susu/Village Savings and Loan Associations - VSLA) group?	${consent_ind}='1'		w1	
groups_credit_active	select_one yes_no	yes	C 7.61 Are you an active member of this group?	${consent_ind}='1' and ${groups_credit}='1'		w1	
groups_credit_input	select_one input_types	yes	C 7.62 How much input do you have in making decisions in this group?	${consent_ind}='1' and ${groups_credit}='1'		w2	
groups_trade	select_one yes_no_dk	yes	C 7.63 Is there a trade and business association?	${consent_ind}='1'		w1	
groups_trade_active	select_one yes_no	yes	C 7.64 Are you an active member of this group?	${consent_ind}='1' and ${groups_trade}='1'		w1	
groups_trade_input	select_one input_types	yes	C 7.65 How much input do you have in making decisions in this group?	${consent_ind}='1' and ${groups_trade}='1'		w2	
ftf_g4b	**end group**						
ftf_g5	**begin group**		**Decision Making**			w4	
note_g5	note		"Now I have some questions about making decisions about various aspects of household life."				
decision_fishing_input	select_one decision_types_2	yes	C 7.66 When decisions are made regarding getting inputs for fishing, who is it that normally takes the decision?	${consent_ind}='1'		w2	
decision_fishing_types	select_one decision_types_2	yes	C 7.67 When decisions are made regarding the type of fishing, who is it that normally takes the decision?	${consent_ind}='1'		w2	

name	type	required	label	relevant	constraint	appearance	choice_ filter
decision_smoking	select_one decision_types_2		C 7.67a When decisions are made regarding fish smoking or processing, who is it that normally takes the decision?	${consent_ind}='1'		w2	
decision_fishing_market	select_one decision_types_2	yes	C 7.68 When decisions are made regarding taking fish to the market (or not), who is it that normally takes the decision?	${consent_ind}='1'		w2	
decision_wage	select_one decision_types_2	yes	C 7.69 When decisions are made regarding your own (singular) wage or salary employment, who is it that normally takes the decision?	${consent_ind}='1'		w2	
decision_major_expenditure	select_one decision_types_2	yes	C 7.70 When decisions are made regarding major household expenditures (such as a large appliance for the house like a refrigerator), who is it that normally takes the decision?	${consent_ind}='1'		w2	
decision_minor_expenditure	select_one decision_types_2	yes	C 7.71 When decisions are made regarding minor household expenditures (such as food for daily consumption or other household needs), who is it that normally takes the decision?	${consent_ind}='1'		w2	
	end group						
Section_C8	**begin group**		**C8. Project Involvement**			w5	
note_C8	note		With these questions we want to determine if the respondent has been involved in any SFMP sponsored activities as well as activities sponsored by other organizations.				
participate_sfmp	select_one yes_no		C 8.01 Have you participated in any SFMP activities?	${consent_ind}='1'		w1	
participate_sfmp_kind	select_multiple sfmp_activities		C 8.01a If yes, what kind? (check all that apply)	${consent_ind}='1' and ${participate_sfmp}='1'		w2	
particpate_other_what	text		What other SFMP activities have you participated in?	${consent_ind}='1' and selected(${participat		w2	

name	type	required	label	relevant	constraint	appearance	choice_ filter
				e_sfmp_kind}, 'other')			
newfish_act	text		C 8.02 If another fisheries project starts, what types of activities would you like to see in your community? (open text)	${consent_ind}='1'		w3	
participate_otherprojects	select_one yes_no_dk		C 8.04 Have you participated in other fisheries management projects?	${consent_ind}='1'			
participate_otherprojects_which	select_multiple other_projects		C 8.04a What other projects have you participated in? (please check all that apply)	${consent_ind}='1' and ${participate_otherprojects}='1'			
	end group						
Section_C9	**begin group**		**C9. Miscellaneous**			w4	
top_issues_today1	text		C 9.01 What do you see as the top two issues or problems in the fisheries sector today? (open ended)	${consent_ind}='1'		w2	
top_issues_today2	text		C 9.01a Another top issue.	${consent_ind}='1'		w2	
top_changes_3years1	text		C 9.02 What are the top two most significant changes you have seen in the fisheries sector in the past 3 years? (open ended)	${consent_ind}='1'		w2	
top_changes_3years2	text		C 9.02a Another significant change.	${consent_ind}='1'		w2	
top_changes_future1	text		C 9.03 What are the top two changes you would like to see implemented in the future? (open text)	${consent_ind}='1'		w2	
top_changes_future2	text		C 9.03a Another change to implement.	${consent_ind}='1'		w2	
	end group						
	end_repeat						
section_end	**note**		**Note to enumerator:** thank people in the household for conducting the survey. Remind them you will return during the closure for a short follow-up and then again after the closure Submit completed survey and move to next household.				

name	type	required	label	relevant	constraint	appearance	choice_ filter

Choices worksheet

list name	name	label	region	district
regions	volta	Volta		
regions	greateraccra	Greater Accra		
regions	central	Central		
regions	western	Western		
districts	ketusouth	Ketu South	volta	
districts	ledzokuku	Ledzokuku-Krowor Municipal Assembly	greateraccra	
districts	adawest	Ada West	greateraccra	
districts	komenda	Komenda-Edina Eguafo-Abrem Municipal	central	
districts	awutusenya	Awutu Senya	central	
districts	effutu	Effutu Municipal	central	
districts	shama	Shama	western	
districts	ahantawest	Ahanta West	western	
enum_id	10	Issahaka Mac Billa		
enum_id	11	Saeed Benjamine Wedjong		
enum_id	12	Damiana Etsey		
enum_id	13	Judith Quaye		
enum_id	14	Abdallah Sulley		
enum_id	15	Faisal Abdalai		
enum_id	16	Perfectual Labik		
enum_id	17	Abeiku Tekyie		

list name	name	label	region	district
community	adina	ADINA	volta	ketusouth
community	agavedzi	AGAVEDZI	volta	ketusouth
community	teshie	TESHIE	greateraccra	ledzokuku
community	akplabanya	AKPLABANYA	greateraccra	adawest
community	britishkomenda	BRITISH KOMENDA	central	komenda
community	senyaberaku	SENYA BERAKU	central	awutusenya
community	winneba	WINNEBA	central	effutu
community	aboadze	ABOADZE	western	shama
community	akitakyi	AKITAKYI	western	ahantawest
community	shamabensir	SHAMA (BENSIR)	western	shama
house_status	single	Single Household		
house_status	multiple	Multiple Households		
house_status	empty	No Households Present		
house_status	missing	No House Structure Nearby		
house_status	other	Other		
household_type	1	Male and Female Adult		
household_type	2	Female Adult Only		
household_type	3	Male Adult Only		
household_religion	1	No Religion		
household_religion	2	Christian		
household_religion	3	Islam		
household_religion	4	Traditionalist		
household_religion	5	Other		
household_ethnic	1	Akan		
household_ethnic	2	Ga		
household_ethnic	3	Ewe		

list name	name	label	region	district
household_ethnic	4	Fanti		
household_ethnic	5	Ahanta		
household_ethnic	6	Nzema		
household_ethnic	7	Other		
yes_no	1	Yes		
yes_no	2	No		
yes_no_dk	1	Yes		
yes_no_dk	2	No		
yes_no_dk	98	Don't Know		
yes_no_dk	99	No Answer		
respondent_type	1	Head of Household		
respondent_type	2	Gender-Opposite Seniormost Member		
gender	1	Male		
gender	2	Female		
likert_often	98	Don't Know		
likert_often	1	Not at all / Never		
likert_often	2	Rarely		
likert_often	3	Frequently		
likert_often	4	All the time		
likert_often3	1	Rarely (1-2 times)		
likert_often3	2	Sometimes (3-10 times)		
likert_often3	3	Often (more than 10 times)		
likert_often4	1	Rarely (1-2 times)		

list name	name	label	region	district
likert_often4	2	Sometimes (3-10 times)		
likert_often4	3	Often (more than 10 times)		
likert_often4	98	Don't Know/No Response		
likert_often5	1	Rarely (1-2 times)		
likert_often5	2	Sometimes (3-10 times)		
likert_often5	3	Often (more than 10 times)		
likert_often5	98	Don't know		
likert_often5	99	No response		
member_type	1	Head of household		
member_type	2	Gender opposite senior most household member		
relationship	1	Primary Respondent		
relationship	2	Spouse (Wife/Husband)		
relationship	3	Child (Son/Daughter)		
relationship	4	Parent/Parent in-law		
relationship	5	Son/Daughter in-law		
relationship	6	Grandchild		
relationship	7	Brother/Sister		
relationship	8	Step child		
relationship	9	Foster child		
relationship	10	Other relative		
relationship	11	Non-relative		
age_units	1	Months		
age_units	2	Years		
marital_status	1	Never married / Single		
marital_status	2	Informal / Consensual union / living together		

list name	name	label	region	district
marital_status	3	Married		
marital_status	4	Separated		
marital_status	5	Divorced		
marital_status	6	Widowed		
marital_status	99	No Answer		
schooling	1	None		
schooling	2	MSLC		
schooling	3	BECE		
schooling	4	Voc/Comm		
schooling	5	Teacher Tra. A		
schooling	6	Teacher Post Sec		
schooling	7	GCE O Level		
schooling	8	SSCE/WASSCE		
schooling	9	GCE A Level		
schooling	10	Tech/Prof Cert		
schooling	11	Tech/Prof Dipl		
schooling	12	HND		
schooling	13	Bachelors		
schooling	14	Masters		
schooling	15	Doctorate		
schooling	16	Other		
brian_livelihood	fishing	Fishing		
brian_livelihood	processing	Fish Processing / Smoking		
brian_livelihood	trading	Fish Trading		
brian_livelihood	farming_food	Farming food crops (cassava, vegetables, etc)		
brian_livelihood	farming_cash	Farming plantation crops (cocoa, rubber, palm, etc)		
brian_livelihood	livestock	Livestock Rearing		
brian_livelihood	other	Other		

list name	name	label	region	district
likert_amount4	1	More		
likert_amount4	2	About the same		
likert_amount4	3	Less		
likert_amount4	98	Don't know/No Answer		
likert_amount2	98	Don't Know		
likert_amount2	3	Worse		
likert_amount2	2	About the same		
likert_amount2	1	Better		
likert_amount	1	More		
likert_amount	2	About the same		
likert_amount	3	Less		
likert_amount	98	Don't know		
likert_amount	99	No answer		
brian_fish	small_pelagic	Small Pelagics (sardinella, anchovies and herring, mackeral)		
brian_fish	large_pelagic	Large Pelagics (tuna, marlin)		
brian_fish	bottom_demersal	Bottom Demersals (red fish, grouper, cassava fish)		
brian_fish	shell_fish	Shell Fish (Shrimps, Prawns)		
brian_fish	other	Other		
brian_life	3	Worse		
brian_life	2	About the same		
brian_life	1	Better		
more_less_same	3	Less		
more_less_same	2	About the same		
more_less_same	1	More		

list name	name	label	region	district
cpue_ease	1	It is easier to catch fish today		
cpue_ease	2	There is no change in the ease of catching fish		
cpue_ease	3	It is harder to catch fish today		
cpue_time	1	I spend less time to catch the same amount of fish		
cpue_time	2	I spend about the same time to catch the same amount of fish		
cpue_time	3	I have to spend more time to catch the same amount of fish		
cpue_gear	1	I can catch more fish today with the same size net I used 5 years ago		
cpue_gear	2	I can catch the same amount of fish today with the same size net I used 5 years ago		
cpue_gear	3	I need to use bigger or longer nets to catch the same amount of fish today that I did 5 years ago		
fishing_causes	illegal_fishing	Illegal fishing activities		
fishing_causes	oil_development	Oil and Gas development offshore chasing the fish away		
fishing_causes	trawlers_in_zone	China-china and trawler vessels fishing taking the fish		
fishing_causes	more_canoes	Increasing number of canoes and fishermen		
fishing_causes	more_trawlers	Increasing number of china-china boats and trawlers		
fishing_causes	sea_change	The sea conditions have changed compared to many years ago		
fishing_causes	algal_blooms	Algal Blooms (like green-green)		
fishing_causes	god_will	It is God's will (Nyame)		
fishing_causes	fishermen	It is primarily due to the actions of fishermen		
fishing_causes	sea_god	The sea spirits are causing it (Busom, Nai, etc)		
fishing_causes	other	Other		
WDD_foods	1	Milk such as tinned milk, powdered, or fresh animal milk		
WDD_foods	2	Tea or coffee		

list name	name	label	region	district
WDD_foods	3	Any other liquids such as juice or cocoa		
WDD_foods	4	Bread, rice, noodles, or other foods made from grains (Kenkey, Banku, Koko, Tuo Zaafi, Akple, Weanimix)		
WDD_foods	5	Pumpkin, Red of Yellow Yams, Carrots, Sweet Potatoes that are yellow or orange inside		
WDD_foods	6	White Potatoes, White Yams, Manioc, Cassava, Cocoyam, Fufu, or any other foods made from roots, tubers, or Plantain.		
WDD_foods	7	Any dark green, leafy vegetables (Kontomire, Aleefu, Ayoko, Kale, Cassava leaves)		
WDD_foods	8	Ripe Mangoes or Pawpaw		
WDD_foods	9	Any other fruits or vegetables (e.g., Bananas, Avocados, Tomatoes, Oranges, or Apples)		
WDD_foods	10	Liver, Kidney, Heart, or other organ meats		
WDD_foods	11	Any meat, such as Beef, Pork, Lamb, Goat, Chicken, or Duck		
WDD_foods	12	Eggs		
WDD_foods	13	Fresh or dried fish or shellfish (e.g., Prawn, Lobster)		
WDD_foods	14	Any foods made from beans, peas, lentils, nuts or seeds?		
WDD_foods	15	Yogurt, Cheese or other milk products?		
WDD_foods	16	Any oils, fats, or butter or foods made with any of these?		
WDD_foods	17	Any sugary foods such as chocolates, sweets, candies, pastries, cakes, or biscuits?		
WDD_foods	18	Condiments for flavor, such as chillies, spices, herbs, or fish powder?		
WDD_foods	19	Grubs, snails, or insects?		
WDD_foods	20	Foods made with red palm oil, red palm nut, or red palm nut pulp sauce?		
WDD_foods	21	Other foods?		
fish_type	1	Demersal - cuttlefish, grouper, snapper, cassava fish, etc.		
fish_type	2	Small pelagics, fresh - anchovy, herring, sardine, and/or mackerals, etc.		

list name	name	label	region	district
fish_type	3	Small Pelagics - smoked/dried, anchovy, herring, sardine, and/or mackerals, etc.		
fish_type	6	Large pelagics - tuna, marlin, sharks, etc.		
fish_type	4	Tilapia		
fish_type	5	Other		
fish_type	98	Don't know		
fish_type	99	No answer		
likert_increase_decrease	1	Decreased a lot		
likert_increase_decrease	2	Decreased somewhat		
likert_increase_decrease	3	Stayed about the same		
likert_increase_decrease	4	Increased somewhat		
likert_increase_decrease	5	Increased a lot		
likert_increase_decrease	98	Don't Know/No Answer		
illegal_actors	foreign_trawler	Large Industrial fishing trawlers (china-china boats)		
illegal_actors	inshore_vessels	Inshore vessels		
illegal_actors	canoe	Canoes		
likert_knowledge	3	Barely/Not At All		
likert_knowledge	2	Somewhat		
likert_knowledge	1	Very		
illegal_fishing	gill_nets	Set gill nets		
illegal_fishing	monofilament_nets	Monofilament nets, i.e., rubber nets, Sika Ye Abrantie		
illegal_fishing	small_mesh_nets	Nets with mesh sizes smaller than 2.5cm		
illegal_fishing	beach_seines	Beach seines		
illegal_fishing	light_fishing	Fishing with lights		
illegal_fishing	large_mesh_nets	Nets with mesh sizes greater than 10cm		
illegal_fishing	marlin_fishing	Catching of Marlin fish or Swordfish		

list name	name	label	region	district
illegal_fishing	saiko_fishing	Saiko fishing, (catch transferred from trawlers to canoes at sea then brought to shore)		
illegal_fishing	sea_turtle_fishing	Catching of sea turtles		
illegal_fishing	apw_nets	"Ali Poli Watcha" nets		
illegal_fishing	dynamite_fishing	Use of dynamite		
illegal_fishing	drift_gill_nets	Drift gill nets		
regulation_outlook	1	If the fishing laws are followed by all fishermen, it will increase fish catches in the future		
regulation_outlook	2	The current fishing laws, if followed by all fishermen, will not increase the fish catches in the future		
regulation_outlook	98	Don't know		
punishment_penalty	2	The penalties are so small, it does not stop anyone from illegal fishing		
punishment_penalty	1	The penalties are very severe and prevent fishermen from illegal fishing		
fishing_conscience	5	Nothing and ignore it		
fishing_conscience	4	Tell them to stop using those fishing methods		
fishing_conscience	3	Stop socializing with them if they were my friend		
fishing_conscience	2	Report them to the chief fisherman		
fishing_conscience	1	Report them to the police		
fishing_conscience	other	Other, please specify		
fishing_respect	1	Fisheries Commission Official		
fishing_respect	2	Chief Fisherman		
fishing_respect	3	Local Government Official		
fishing_respect	4	Chief Fishmonger (Kokohemaa)		
fishing_respect	5	Police		
fishing_respect	6	Traditional Leader (other than Chief Fisherman or Kokohene, i.e., Chief of community / Ohene)		

list name	name	label	region	district
fisheries_rulemakers	fishermen	Fishermen		
fisheries_rulemakers	fish_processors	Fish Processors / Traders		
fisheries_rulemakers	chief_fisherman	Chief Fishermen		
fisheries_rulemakers	traditional_leader	Traditional Leaders		
fisheries_rulemakers	local_government	Local Government / District Assembly		
fisheries_rulemakers	fisheries_commission	National Fisheries Commission		
fisheries_rulemakers	environmental_groups	Environmental Groups		
fisheries_rulemakers	parliament	Members of Parliament		
fishing_activities	crew	Working on a fishing vessel		
fishing_activities	selling_afterschool	Selling fish or smoking fish after school		
fishing_activities	selling_anytime	Selling or smoking fish during any time of the day		
fishing_activities	trafficking	Parent taking payment from a person who promises to take care of the child at a location outside of the community		
fishing_activities	none	None of the activities listed above.		
fishing_trafficking_payment	3	Many families in the community do this		
fishing_trafficking_payment	2	Only a very few families in the community do this		
fishing_trafficking_payment	1	No one in the community ever does this		
how_often	1	Rarely (1-2 times)		
how_often	2	Sometimes (3-10 times)		
how_often	3	Often (more than 10 times)		
land_unit	1	Poles		
land_unit	2	Acres		
land_unit	4	Hectares		
land_unit	5	Meters Squared		

list name	name	label	region	district
crop_unit	1	Maxibag		
crop_unit	2	Minibag		
crop_unit	3	Tonnes		
roof_material	1	Palm leaves / raffia / thatch		
roof_material	2	Wood		
roof_material	3	Corrugated metal sheets		
roof_material	4	Asbestos / slate		
roof_material	5	Roofing tiles		
roof_material	6	Mud bricks / earth		
roof_material	7	Bamboo		
roof_material	8	Other		
floor_material	1	Earth / Mud / Mud Bricks		
floor_material	2	Wood		
floor_material	3	Stone		
floor_material	4	Cement / Concrete		
floor_material	5	Burnt Bricks		
floor_material	6	Vinyl Tiles		
floor_material	7	Ceramic / Marbile Tiles		
floor_material	8	Terrazzo		
floor_material	9	Other		
wall_material	1	Mud / Mud Bricks		
wall_material	2	Wood / Bamboo		
wall_material	3	Metal Sheets / Slate / Asbestos		
wall_material	4	Stones		
wall_material	5	Burnt Bricks		
wall_material	6	Cement / Sandcrete Blocks		
wall_material	7	Thatch		

list name	name	label	region	district
wall_material	8	Cardboard		
wall_material	9	Other		
condition	1	In excellent repair, no sign of wear		
condition	2	In good shape, some minor wear-and-tear or damage		
condition	3	In moderate condition, some damage and moderate wear-and-tear		
condition	4	In poor shape, much damage		
condition	5	In very bad shape		
rent_status	1	Rented		
rent_status	2	Owned		
rent_status	3	Borrowed (no payment)		
rent_status	4	Other		
toilet	1	Flush Toilet (WC)		
toilet	2	Pit Latrine		
toilet	3	KVIP		
toilet	4	Pan/Bucket		
toilet	5	Public toilet (flush/bucket/KVIP)		
toilet	6	Toilet in another house		
toilet	7	No toilet facility (bush, beach)		
toilet	8	Other		
water_source	1	Piped into dwelling		
water_source	2	Piped into plot/yard		
water_source	3	Public tap (someone else's private tap)		
water_source	4	Tube well / borehole		
water_source	5	Protected dug well		
water_source	6	Protected spring		

list name	name	label	region	district
water_source	7	Rain water collection		
water_source	8	Unprotected dug well/springs		
water_source	9	River/ponds/streams/Dam		
water_source	10	Tanker-truck/vendor		
water_source	11	Sachet Water		
water_source	12	Bottled Water		
water_source	13	Other (specify)		
water_treatment	1	Filtered		
water_treatment	2	Boiled		
water_treatment	3	Filtered and Boiled		
water_treatment	4	Iodine or other mineral / natural treatments		
water_treatment	5	UV treated		
water_treatment	6	Other		
light_source	1	Electricity via national grid		
light_source	2	Solar panel		
light_source	3	Piped or liquid propane gas (biogas)		
light_source	4	Private generator		
light_source	5	Public or shared generator		
light_source	6	Lanterns/candles/paraffin		
light_source	7	Fire lit sticks, grass, or pit		
light_source	8	Other		
cooking_source	1	Electricity		
cooking_source	2	Piped or liquid propane gas (biogas)		
cooking_source	3	Kerosene		
cooking_source	4	Charcoal		
cooking_source	5	Firewood		
cooking_source	6	Animal dung		

list name	name	label	region	district
cooking_source	7	Agricultural crop residue		
cooking_source	8	Other		
kitchen_type	1	External		
kitchen_type	2	Internal		
waste_system	1	Collected by local authority		
waste_system	2	Collected by private firm		
waste_system	3	Own garbage pit or heap		
waste_system	4	Own burned or buried		
waste_system	5	Public garbage		
waste_system	6	Dumped in vacant land/property		
waste_system	7	Dumped in river, lake, or sea		
waste_system	8	Other		
durable_goods	1	Motorized canoes		
durable_goods	2	Nonmotorized canoes		
durable_goods	3	Trawlers or inshore boats (China—China)		
durable_goods	4	Aquaculture fish ponds		
durable_goods	5	Aquaculture fish cages		
durable_goods	6	Fishing nets or gear		
durable_goods	7	Fish smokers		
durable_goods	8	Radio		
durable_goods	9	Tape or CD/DVD Player/VCR		
durable_goods	10	Television		
durable_goods	11	Sewing Machine		
durable_goods	12	Kerosene Stove		
durable_goods	13	Electric stove; Hot plate		
durable_goods	14	Gas stove		
durable_goods	15	Refrigerator		

list name	name	label	region	district
durable_goods	16	Bicycle		
durable_goods	17	Motorbike		
durable_goods	18	Car		
durable_goods	19	Computer Equipment		
durable_goods	20	Generator		
interview_type	1	No input		
interview_type	2	Input into very few decisions		
interview_type	3	Input into some decisions		
interview_type	4	Input into most decisions		
interview_type	5	Input into all decisions		
interview_type	6	No decision made		
input_types_na	1	No input		
input_types_na	2	Input into very few decisions		
input_types_na	3	Input into some decisions		
input_types_na	4	Input into most decisions		
input_types_na	5	Input into all decisions		
input_types_na	6	No decision made		
fishing_jobs	fisherman	Fisherman		
fishing_jobs	aquaculture	Aquaculture		
fishing_jobs	processor	Processor		
fishing_jobs	marketer	Marketer		
decision_types	1	Self		
decision_types	2	Partner / Spouse		
decision_types	3	Self and Partner/Spouse jointly		
decision_types	4	Other household member(s)		
decision_types	5	Self and other household member(s)		

list name	name	label	region	district
decision_types	6	Partner/Spouse and other household member(s)		
decision_types	7	Someone (or group of people) outside the household		
decision_types	8	Self and other outside people		
decision_types	9	Partner/Spouse and other outside people		
decision_types	10	Self, partner/spouse, and other outside people		
lending_types	1	Cash		
lending_types	2	In-kind		
lending_types	3	Cash and in-kind		
account_types	1	Current		
account_types	2	Savings		
account_types	3	Both current and savings		
comfort_types	1	No, not at all comfortable		
comfort_types	2	Yes, but with a great deal of difficulty		
comfort_types	3	Yes, but with a little difficulty		
comfort_types	4	Yes, fairly comfortable		
comfort_types	5	Yes, very comfortable		
input_types	1	No input		
input_types	2	Input into very few decisions		
input_types	3	Input into some decisions		
input_types	4	Input into most decisions		
input_types	5	Input into all decisions		
decision_types_2	1	Main male or husband		
decision_types_2	2	Main female or wife		
decision_types_2	3	Husband and wife jointly		
decision_types_2	4	Someone else in the household		

list name	name	label	region	district
decision_types_2	5	Jointly with someone else inside the household		
decision_types_2	6	Jointly with someone else outside the household		
decision_types_2	7	Someone outside the household / other		
decision_types_2	98	Household does not engage in activity / Decision not made		
decision_extents	1	Not at all		
decision_extents	2	Small extent		
decision_extents	3	Medium extent		
decision_extents	4	Large extent		
cell_type	smart	Smart phone (iPhone, Android, phone with internet connectivity and keyboard, etc)		
cell_type	basic	Basic phone (SMS/voice only)		
cell_provider	mtn	MTN		
cell_provider	tigo	Tigo (Millicom)		
cell_provider	glo	Glo		
cell_provider	expresso	Expresso		
cell_provider	airtel	Airtel		
cell_provider	vodafone	Vodafone		
cell_provider	other	Other		
sfmp_activities	mgmt_leader	Meetings or training of fisheries management or leadership		
sfmp_activities	iuu	Meetings or trainings on illegal fishing		
sfmp_activities	closure_regis	Meetings or trainings on the closed seasons or canoe registration		
sfmp_activities	post_harvest	Meetings or trainings on post-harvest improvements such as business development, literacy, ahotor stove use, or improved processing and handling		
sfmp_activities	fisher_future	Meetings or trainings on the fisher future plans		
sfmp_activities	fisher_micro	Meetings or trainings on the microinsurance plan		

list name	name	label	region	district
sfmp_activities	clat	Meetings or trainings on child labor and trafficking		
sfmp_activities	loans	Meetings or trainings on loans with MASLOC, rural banks or VSLAs?		
sfmp_activities	gender	Meetings or trainings on gender mainstreaming.		
sfmp_activities	other	Other types of activities or events ? Please specify.		
comm_hear	1	TV specify channel		
comm_hear	2	National Radio: specific channel		
comm_hear	3	Community/Local radio specify		
comm_hear	4	Newspaper: specify name		
comm_hear	5	Community meeting or loud speaker announcements		
comm_hear	6	Theatre presentations		
comm_hear	7	Durabar		
comm_hear	8	Chief fishermen		
comm_hear	9	Traditional leader		
comm_hear	10	Friend or family member		
comm_hear	11	Religious authority		
comm_hear	12	Fisheries Commission		
comm_hear	13	District official		
comm_hear	14	Kokohene		
comm_hear	15	Other specify		
comm_hear	98	Dont know		
comm_hear	99	No response		
other_projects	1	Far Bon Bo		
other_projects	2	WARFP		
other_projects	3	Far Dwuma Nkodo		

Settings worksheet

id_string	style	version
2019_repeat_survey_final	theme-grid	13

APPENDIX 2. Hypothesis and statistical design for Time 1-Time 2 and project non-project comparisons

Household Data

1. Fishing Household Livelihood Data and Productive Activities (head of household) – tracks the level of livelihood diversity at the household level, i.e., the total number of productive activities and fishing versus non-fishing productive activities as measures of household economic resilience. Fish related activities include fishing, processing, trading. # of fish related activities/total # of livelihood activities. These are trends data and over time the project may contribute to their improvements, but the project is not expected to directly influence or change these over the life of the project. We also hypothesize that the household level indicators may influence the individual's responses on the project outcome indicators. Calculate the mean number of overall livelihood activities, mean number of fishing livelihood activities, mean number of non-fishing livelihood activities for Prj and Ctrl villages at T1 and T2. and follow-up t-tests. In the interpretation of the results, if not seeing an increase in other livelihoods as the fisheries collapse then this signals a lack of adaptive capacity.
2. Material Style of Life/Household Wealth Indicators (head of household) – set of indicators that looks at household structure and contents/possessions of durable goods as a measure of household wealth in lieu of household income or per capita consumption as a measure of poverty. It provides the ability to track changes over time of a wealth parameter (e.g., are people becoming wealthier or less wealthy over time). This measure will also allow a household wealth measure to be used for testing the hypothesis of to what extent household wealth may influence individual responses on other parameters of concern. Principle Component Analysis conducted on the combined data sets for T1 and T2 with 2-3 principle components used in the analysis (usually a household structure and a household contents meta variable). The main question to be answered is whether fishing households are becoming poorer or less poor over the life of project using this measure. While the project did not expect to influence this measure directly, understanding trends in relative change in wealth is important. Because the project was not expected to influence this measure directly, we can compare all data for T1 with all data from T2. While most of Ghana is showing reduced poverty rates, we hypothesize that fishing households are losing economic ground due to the collapse of the small pelagic and demersal stocks. Comparison of MSL component scores (t-tests). Frequency distribution tables and Chi-Sq tests on selected measures in addition to the PCA.
3. Food Security - Household Hunger Scale (food preparer) – standard FtF parameter that creates an index or score of hunger or the household that is aggregated into a severe, moderate, and no hunger ordinal scale. 0-1 = Little to no hunger in hh, 2-3 = Moderate hunger in hh, 4-6 = Severe hunger in hh. Analysis of differences over time will use a test of means of the score, but we will also show the raw data for the ordinal scale for these time parameters. Trend data overall between T1 and T2. Also, might look at women who have been involved in any business-related activities (e.g., post processing activities, stoves, literacy, VSLAs in the project villages) versus

others. (Kruskal-Wallis test and Bonferroni-corrected Mann-Whitney U tests to test for significant differences in the median).

4. Food Security Indicators Women's Dietary Diversity Score (women of reproductive age 18-45 in the case of our survey, not 15-45) – standard FtF parameter. We hypothesize that WDD will be declining due to stock collapse (Kruskal-Wallis test and Bonferroni-corrected Mann-Whitney U tests to test for significant differences in the median). Consider a table showing the percentage of respondents from each time period and village type (i.e., T1 Prj. Village, T1 Ctrl Village, T2 Prj Village T2 Ctrl Village) in each of the three hunger categories (little/no, moderate, severe). Perform a Kruskal-Wallis test.

Individual Data

1. Demographics/Individual Characteristics – Characteristics of the individual (e.g., gender, age, household wealth) can be used to test whether those parameters influence individual responses on other parameters. We hypothesize that the baseline and final samples are drawn from the same population and have similar individual characteristics (Chi-Square tests, expecting no statistically significant differences to demonstrate no differences in our samples), and that gender, age, and household wealth influence responses on the outcome measures (Chi-Square for Independence and/or Spearman's Rank Order Correlations)

2. Perceptions of Quality of Life – ordinal scale that measures whether people perceive their quality of life as improving or not. We hypothesize that it will be declining based on the fisheries stock collapses (Table showing percentage of responses in each category, Kruskal-Wallis test and Bonferroni-corrected Mann-Whitney U tests to test for significant differences in the median).

C3. Perceptions of Fishing Abundance, Catch, and Effort – ordinal scale that measures whether people perceive it as improving or not. Currently coded as 1=more, 2=about the same, 3=less. Trend in T1 vs. T2 for all sites combined because we do not expect our activities in the project villages to affect these measures. We hypothesize that all of these perception measures will be moving opposite the desired direction (i.e., abundance and catch declining, effort increasing) (Table showing percentage of responses in each category, Chi Square or Kruskal-Wallis test and Bonferroni-corrected Mann-Whitney U tests to test for significant differences in the median).

C5. Law Enforcement and Regulatory Compliance –nominal and ordinal scale data and we hypothesize that project activities have improved compliance (Table, Chi-Square tests, Kruskal-Wallis test). Knowledge of Fishing Laws – ordinal scale data and data on whether 12 specific fishing practices are legal/illegal. The number of correct responses were summed for a total score on fishing knowledge ranging from 0 to 12, with 12 representing a perfect score and 0 representing no correct responses at all. Compare the mean b/w PT1, CT1, PT2, CT2 with Anova (Lk at Tbl 57 on p. 48 in the Baseline report). Perceptions on Illegal Fishing Practices questions are coded in the Final Survey as follows: 1 = decreased a lot, 2 = decreased somewhat, 3 = stayed about the same, 4 = increased somewhat, 5 = increased a lot. Perceptions on Knowledge of Fishing Laws are coded as 1=very, 2=somewhat, 3=barely/not at all.

Measures pertaining to perceptions of who is conducting illegal fishing practices, most frequent illegal actor, perceptions on deterrence, perceptions of legitimacy of the legal process and perceptions of opinion leaders in fisheries should all be compared between the project and control villages at T1 and T2. IUU should be declining if BCC has been effective and the leading determinant of compliance.

C6. Perceptions of CLaT –data measuring knowledge, attitudes, and perceptions of the prevalence of individuals regarding child labor and trafficking practices. We hypothesize that the project activities have improved people's knowledge of the laws, increased negative attitudes towards child labor and trafficking, and decreased perceived prevalence of this practice. An overall child labor and trafficking score was created by summing the mean scores for 3 child labor and 1 trafficking practice. ANOVA used to look for statistically significant differences in the regions. Set up the mean sum of the scores for prj and ctrl at T1 and T2. Separate out the trafficking from three child labor questions b/c the former is the most severe . Put means in the table but use the Kruskal-Wallis test b/c it's more conservative and the score is ordinal not interval data.

C7. Empowerment Index – subset of standard parameters used by FtF on comparing empowerment on several dimensions between men and women. We hypothesize that project activities have improved the empowerment scores of women in areas of advocacy, access to credit, and assets, but no influence on access to assets.

C8. Project Involvement – measures the level of involvement of survey respondents in SFMP activities. We hypothesize that those individuals that have participated in SFMP activities will have improved scores on law enforcement, regulatory compliance, CLaT perceptions, and empowerment indices.

APPENDIX 3. Training Agenda

SUSTAINABLE FISHERIES MANAGEMENT PROJECT

REPEAT OF BASELINE SURVEY

AGENDA FOR 11th TO 14TH JUNE 2019

Training Methodology and Approach: As can be inferred from the training content, multiple approaches will be used in the course of the enumerator training. Among other approaches, the training will make use of the following:

1. Interactive plenary discussion/teaching
2. Role play
3. Group discussion
4. Site visit and practice sessions
5. Questions and answers

The essence of using multiple approaches is to ensure that the participants fully understand their roles and responsibilities in the field.

Outline of Training Content

Introductions

1. Overview of the SFMP
2. Purpose of the Household Survey
3. Target Communities

Roles and Responsibilities

1. Expectations / Contract Terms and Conditions
2. Logistics and Travel
3. Reporting

Communication and Traditional / Cultural Dynamics

1. Community Entry / Communicating the SFMP
2. Role Play Exercises
3. Distribution of Project Information

Fishing Techniques

1. Gear Types
2. Types of Fish
3. Fishing Terminology related to the survey

Survey methodology

1. Sample
2. Sample size

Schedule of Training

Day 1 (11th June)

Time	Activity	Person Responsible
8:30am	Introductions	Bakari & Cathy
9:30am	Roles and Responsibilities	Bakari and Fant
10:00am	Logistical Arrangements and Contract Issues	Bakari and Fant
10:30am	**Snack Break**	
11:00am	Overview of the SFMP	Bakari
11:20 am	Purpose of the Repeat Baseline Survey	Bakari & Cathy
11:45am	Issues with 2015 Data	Bakari & Cathy
12:00am	Communicating the SFMP	Fant/Nii
1:00pm	**Lunch**	
2:00pm	Fishing Techniques	Socrates
3:00pm	Gear Technology	Socrates
4:00pm	**Snack Break**	
4:15pm	Survey Methodology	Bakari & Cathy
5:00pm	Closing	Fant

Day 2 (12th June)

Time	Activity	Person Responsible
8:30am	Debrief of Day 1 Training	Fant
9:30am	Interview Techniques	Bakari
10:15am	**Snack Break**	
10:30am	Survey Overview	Cathy
11:00am	Role Play (in local languages-without tablets)	Fant
12:30pm	Discussion	Bakari
1:00pm	**Lunch**	
2:00pm	Tablet Overview	Bakari & Fant
3:00pm	Mapping Overview	Bakari & Fant
4:00pm	**Snack Break**	
4:15pm	Survey Technology Overview	Bakari & Fant
5:00pm	Closing	Fant

Survey Overview (Tool familiarization)

1. Distribution of Paper Survey
2. Read through of Survey Questions

Interview Techniques

1. Survey Practice

Tablet Overview

1. Android System

2. Applications Used
3. Power Usage

Mapping Overview
1. GPS Technology
2. Google Maps
3. SFMP Baseline Survey App

Survey Technology Overview
1. Enketo
2. Submission / Queuing
3. Saving Drafts

Day 3 (13th June)

Time	Activity	Person Responsible
8:30am	Debrief of Day 2 Enumerator Training	Fant
9:30am	Role Play with Tablet (English)	Bakari & Fant
10:15am	**Snack Break**	
10:45am	Role Play with Tablet (Fante/Ga)	Bakari & Fant
1:00pm	**Lunch**	
2:00pm	Role Play with Tablet (Ewe)	Bakari & Fant
3:00pm	Discussion	Bakari
4:00pm	**Snack Break**	
4:30pm	Distribution of Materials for the Pre-test	Fant
5:00pm	Closing	Fant

Day 4 Field Test (14th June)

Time	Activity	Person Responsible
8:30am	Travel to Teshie	All
9:30am	Morning Surveys	Bakari & Fant
1:00pm	Lunch	
2:00pm	Debrief of Field Test	Bakari & Fant
3:00pm	Discuss Actual Data Collection Itinerary	Bakari & Fant
4:30pm	Departure	Bakari & Fant

Debrief of Field Test

1. Issues Encountered by Enumerators
2. Potential Issues Predicted by Enumerators
3. Potential Mitigation Measures

APPENDIX 4: Women's Empowerment in Fisheries Index (WEFI)

The women's empowerment index used in this report is based on the Women's Empowerment in Agriculture Index (WEAI) (Alkire et al., 2013). The WEAI index has 5 dimensions and 10 indicators as noted below.

Domain	Indicator	Weight
Production	Input in productive decisions	1/10
	Autonomy in production	1/10
Resources	Ownership of assets	1/15
	Purchase, sale, or transfer of assets	1/15
	Access to and decisions about credit	1/15
Income	Control over use of income	1/5
Leadership	Group member	1/10
	Speaking in public	1/10
Time	Workload	1/10
	Leisure	1/10

(Source: Alkire, S., R. Meinzen-Dick, A. Peterman, A. Quisumbing, G. Seymour and A. Vaz. 2013. The Women's Empowerment in Agriculture Index. *World Development* 52: 71–91. http://dx.doi.org/10.1016/j.worlddev.2013.06.007)

For this report we use a subset of questions from this WEAI to construct a Women's Empowerment in Fisheries Index (WEFI) tailored specifically for the fisheries sector in Ghana. The number of dimensions, indicators and questions used here has been reduced considerably compared to the WEAI, mainly due to concerns of the overall survey length (WEFI was only one component) and resources available for the overall survey. We use four dimensions and seven indicators. The questions used for each indicator is also a subset of those used for the similar indicators in the WEAI. Other questions have been tailored for a fisheries context with more specificity on fishing asset ownership use and control, and membership in specific national fisheries associations for example.

Sum scores for

Women's Empowerment Dimensions	**Indicators**	**Possible Score Range**	**Actual range from data**
Production	Input into productive decisions Autonomy in production	0-6	
Access & Control Resources	Ownership of assets Access to credit	0-6	
Control and Use of Income	Decisions on household expenditures	0-6	
Leadership	Group member Speaking in public	0-6	
	Total	0-24	

The specific questions and response types and scoring methods are provided below.

1 Production Score Range 0-6

1.1 Input in productive decisions (Range 0-4)

This indicator assess at whether the individual had sole or joint input into making decisions about (a) fishing inputs, (b) type of fishing, (c) fish processing and smoking, and (d) fish marketing.

Person in the household who makes decisions on various productive economic activities

Kobo code		scoring	scoring	scoring	scoring
	Response/ Type	Fishing Inputs	Type of Fishing	Fish Processing and Smoking	Fish to Market
1	Main male or husband	1	1	1	1
2	Main female or wife	1	1	1	1
3	Husband and wife jointly	1	1	1	1
4	Someone else in the household	0	0	0	0
5	Jointly with someone else inside the household	1	1	1	1
6	Jointly with someone else outside the household	1	1	1	1
7	Someone outside the household / other	0	0	0	0
98	Household does not engage in activity / Decision not made	0	0	0	0

For Kobo code 1, if response male and gender male, score 2, if response male and gender female, score 0. For Kobo code 2 If response female and gender female, score 2, if response female and gender male, score 0. SUM for All 4 types: Range 0-4

1.2 Production- Role in Household Decision making autonomy in production (Range 0-2)

This indicator assesses the extent to which the individual feels he or she can make his or her own personal decisions about the following aspects of fishing activities if he or she wanted to.

Individual participation in any fishing activity or aquaculture in the last 12 months by gender

Kobo code		score
1	Yes	1
2	No	0
98 / 99 (or blank)	Don't know / no response	0

Range 0-1

Who makes decisions on fishing in the last 12 months

Kobo code	response	score
1	No input	0
2	Input into very few decisions	0
3	Input into some decisions	1
4	Input into most decisions	1
5	Input into all decisions	1
6	No decision made	0

For kobo code 98/99 or blank, score 0

Range 0-1

2 Access to and Control of Productive Resources (Range 0-6)

The questions for this indicator include two of the three categories provided in the WEAI: (1) ownership of assets; (2) decisions regarding the purchase, sale, or transfer of land and assets; and (3) access to and decisions about credit.

1. The first indicator examines whether an individual reports having sole or joint ownership of land and assets (including fishing inputs, agricultural land, large and small livestock, fishponds, farm equipment, house, cell phone, nonagricultural land, and means of transportation**).** A person is considered to have adequate achievements if he or she reports having sole or joint ownership of at least one major asset in fishing and one other major asset.
2. The second indicator, defined with similar assets, asks who the person is who can make decisions regarding the purchase, sale, or transfer of land and assets
3. The third indicator examines decision making about whether to obtain credit and how to use the proceeds from credit from various sources (nongovernmental organizations, formal and informal lenders, friends or relatives, rotating savings and credit associations). To have adequacy on this indicator, a person must belong to a household that has access to credit (even if they did not use credit), and if the household used a source of credit, the person participated in at least one decision about it.

2.1 Ownership of productive assets (Range 0- 4)

2.1.1 Who owns the asset

		scoring	scoring
Kobo code	**response**	**Fishing Canoe (MOTORIZED OR NON MOTORIZED)**	**Fish smokers**
1	Self	1	1
2	Partner / Spouse	0	0
3	Self and Partner/Spouse jointly	1	1
4	Other household member(s)	0	0
5	Self and other household member(s)	1	1
6	Partner/Spouse and other household member(s)	0	0
7	Someone (or group of people) outside the household	0	0
8	Self and other outside people	1	1
9	Partner/Spouse and other outside people	0	0
10	Self, partner/spouse, and other outside people	1	1

For kobo code 98/99 or blank, score 0

Sum scores on fishing assets. RANGE 0-2

2.1.2 Household ownership of assets

Kobo code	Response	cellphone	house	Agricul Land	Livestock	Other Non-Agricul Land	Transport (bicycle, motorbike, car)
1	Self	1	1	1	1	1	1
2	Partner / Spouse	0	0	0	0	0	0
3	Self and Partner/Spouse jointly	1	1	1	1	1	1
4	Other household member(s)	0	0	0	0	0	0
5	Self and other household member(s)	1	1	1	1	1	1
6	Partner/Spouse and other house member(s)	0	0	0	0	0	0
7	Someone outside the household	0	0	0	0	0	0
8	Self and other outside people	1	1	1	1	1	1
9	Partner/Spouse and other outside people	0	0	0	0	0	0
10	Self, partner/spouse, and other outside people	1	1	1	1	1	1

For kobo code 98/99 or blank, score 0

Sum SCORES on other assets. If person has a sum of 0 score 0, sum of 1 score 1, sum of greater than 1 score 2 on any of the above questions – score 2 Range 0-2

2.3 Access to Credit total possible score (Range – 0-2)

The third indicator examines decision making about whether to obtain credit and how to use credit from various sources (non-governmental organizations, formal and informal lenders, friends or relatives, rotating savings, and credit associations). To have adequacy on this indicator, a person must belong to a household that has access to credit (even if they did not use credit),and/ or if the household used a source of credit, the person participated in at least one decision about it.

2.3.1 Borrowing money and banking practices of household respondents

Kobo code	Response/ Type	Bank account	Non-govt Org	Informal lender	Formal lender	Relative	Micro-finance/ Susu
	Taken loan from or Ownership of an account						
1	Yes	1	1	1	1	1	1
2	No	0	0	0	0	0	0
98 / 99	Don't know/ no answer	0	0	0	0	0	0

Score 1 if person has taken a loan or ownership of an account on any of the above categories, otherwise 0.

2.3.2 Ownership, borrowing and decision making patterns on loans and bank account

Kobo code	Response/ Type	Bank account	Non-govt Org	Informal lender	Formal lender	Relative	Micro-finance/ Susu
	Borrow decision or owner of account						
1	Self	1	1	1	1	1	1
2	Partner / Spouse	0	0	0	0	0	0
3	Self and Partner/Spouse jointly	1	1	1	1	1	1
4	Other household member(s)	0	0	0	0	0	0
5	Self and other household member(s)	1	1	1	1	1	1
6	Partner/Spouse and other house member(s)	0	0	0	0	0	0
7	Someone outside the household	0	0	0	0	0	0
8	Self and other outside people	1	1	1	1	1	1
9	Partner/Spouse and other outside people	0	0	0	0	0	0
10	Self, partner/spouse, and other outside people	1	1	1	1	1	1

For kobo code 98/99 or blank, score 0

Score 1 if person has as self or jointly borrowed / owned on any of the above categories, otherwise 0.

3. Control over Use of Income Range 0-6

This domain concerns sole or joint control over the use of income and expenditures. The single indicator for this dimension measures the degree of input into decisions about the use of income generated from the productive/income-generating activities mentioned above as well as the extent to which the individual feels he or she can make his or her own personal decisions regarding wage or salary employment. A person is considered adequate if he or she has input into decisions about income generated, conditional on participation in the activity

Person in the household who makes decisions on various economic activities and expenditures

		scoring	scoring	scoring
Kobo code	Response/ Type	Wages and Salaries	Major Household Expend	Minor Household Expend
1	Main male or husband	2	2	2
2	Main female or wife	2	2	2
3	Husband and wife jointly	1	1	1
4	Someone else in the household	0	0	0
5	Jointly with someone else inside the household	1	1	1
6	Jointly with someone else outside the household	1	1	1
7	Someone outside the household / other	0	0	0
98	Household does not engage in activity / Decision not made	0	0	0

For Kobo code 1, if response male and gender male, score 2, if response male and gender female, score 0. For Kobo code 2 If response female and gender female, score 2, if response female and gender male, score 0. SUM for all 3 topics. Range 0-6

4. Leadership (Range = 0-6)

The fourth domain concerns leadership in the community, here measured by membership in economic or social groups and comfort speaking in public. Recognizing the value of social capital as a resource, membership shows whether the person is a member of at least one social or economic group. Whether the person is comfortable speaking up in public consists of responses to questions about the person's ease in speaking up in public.

4.1 Influence in the Community (Range 0-3)

Comfort level about speaking in public on topics of community concern

Kobo code		scoring	scoring	scoring
	Response/ Type	**Misbehavior of Authorities or Elected Officials**	**Protest Illegal Fishing**	**Propose New Fishing Rules**
1	No, not at all comfortable	0	0	0
2	Yes, but with a great deal of difficulty	0	0	0
3	Yes, but with a little difficulty	1	1	1
4	Yes, fairly comfortable	1	1	1
5	Yes, very comfortable	1	1	1

For kobo code 98/99 or blank, score 0

SUM scores for the three questions. Range 0-3

4.2 Group Membership (Range 0-3)

4.2.1 Knowledge, membership and participation in fish producer or processor organizations

		scoring	scoring
Kobo code	**Response/Type**	**Canoe Fishermen's Council**	**NFPTA**
	Active Member		
1	Yes	0.5	0.5
2	No	0	0
98/ 99 / blank	Don't know or no answer/ blank	0	0
	Input into group decisions		
1	No input	0	0
2	Input into very few decisions	0	0
3	Input into some decisions	0.5	0.5
4	Input into most decisions	0.5	0.5
5	Input into all decisions	0.5	0.5
98/ 99 / blank	Don't know or no answer/ blank	0	0

Sum scores NGCFC and NFPTA. (Range 0-2)

4.2.2 Knowledge, membership and participation in other community associations

		scoring	scoring
Kokbo code	**Response**	**Credit Microfinance Assn**	**Trade or Business Assn**
	Active Member		
1	Yes	1	1
2	No	0	0
98/ 99 / blank	Don't know or no answer/ blank	0	0
	Input into group decisions		
1	No input	0	0
2	Input into very few decisions	0	0
3	Input into some decisions	1	1
4	Input into most decisions	1	1
5	Input into all decisions	1	1
98/ 99 / blank	Don't know or no answer/ blank	0	0

Score 1 if active member, AND some, most, all decisions on any of the above Range 0-1

4.3 Sum of scores for a Total WEFI Score

Women's Empowerment Dimension	**Possible Score Range**	**Actual range from data**
Production	0-6	
Access and Control Resources	0-6	
Control and Use of Income	0-6	
Leadership	0-6	
Total	0-24	