ESTIMATING THE PREVALENCE OF FORCED LABOR IN THE FISHING INDUSTRY IN COSTA RICA

NYU and UMASS Lowell

University of Alaska, Anchorage

COMHESWA

Meredith Dank, PhD
Sheldon Zhang, PhD
Kyle Vincent, PhD
Mackenzie Stoeltje, MPH
Mengfei Wang, MS

Amana Mbise, PhD

Furaha Caloupis

ACKNOWLEDGEMENTS

Estimating the Prevalence of Forced Labor in the Fishing Industry in Costa Rica

Abstract

As part of the Prevalence Reduction Innovation Forum (PRIF), a prevalence study was conducted on forced labor in Costa Rica's fishing industry. Two estimation methods were used: (1) Multi-Stage Probability Proportional to Size (PPS) or Household Enrollment Sampling with a final N= 1,017, and (2) Multi-Wave Snowball or Link Tracing (LTS) Sampling with a final N= 1,009. Both sampling strategies produced similar findings in terms of target population size estimations and the prevalence of forced labor abuses among fishermen in Costa Rica. Both methodologies found forced labor, as defined by the PRIF common indicators, to affect roughly 1 out of every 5 fishermen in Costa Rica.

Both strategies were found to work well but provided largely discrepant estimates for the population size. It was found that a multistage sampling design is not best suited for estimating the size of a hidden domain of a population, such as the one in the context of this study. Both sampling strategies required a high level of planning and care to obtain efficient estimates, although one method was reported by field staff as far more cumbersome in field procedure and laborious in survey taking than the other. It is clear that the two strategies, PPS and LTS, reached into separate parts of the population and gave discrepant estimates on population size as well as some parts of the composition of the population. For this reason, we advocate the use of hybrid methodologies whenever feasible.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

AME	Average Marginal Effect
APRIES	African Programming & Research Initiative to End Slavery
CI	Confidence Interval
CLT	Central Limit Theorem
CONATT	National Coalition against Illicit Smuggling and Trafficking of Migrants
CRC	Costa Rican Colon
DE	Design Effect
DTM	Displacement Tracking Matrix
EPSEM	Equal Probability of Selection Method
ERI	Rapid Response Team
FAO	Food and Agriculture Organization
FL	Forced Labor
GBV	Gender-Based Violence
GIS	Geographic Information System
G-NSUM	Generalized Network Scale-Up Method
HCG	Homily Configuration Graph
HT	Human Trafficking
ICC	Intracluster Correlation Coefficient
IMAS	Mixed Institute of Social Assistance
INCOPESCA	Costa Rican Institute of Fish and Agriculture
IOM	International Organization for Migration
IRB	Institutional Review Board
JTIP	U.S. Department of State's Office to Monitor and Combat Trafficking in Persons
LTS	Link Tracing Sampling
M(C)AR	Missing (Completely) at Random

MCMC	Markov chain Monte Carlo
MSE	Multiple Systems Estimation
NE4NS	New Estimates for Network Sampling
NSUM	Network Scale-Up Method
OR	Odds Ratio
PFA	Psychological First Aid
PNS-PSE	Privatized Network Sampling Population Size Estimation
PPS	Probability Proportional to Size
PRIF	Prevalence Reduction Innovation Forum
PSU	Primary Sampling Unit
RDS	Respondent Driven Sampling
SE	Standard Error
SS-PSE	Successive Sampling Population Size Estimation
TIP	Trafficking in Persons
TVPA	Trafficking Victims Protection Act
VF	Visibility Factor
VH	Volz-Heckathorn

EXECUTIVE SUMMARY

This study was implemented by one of the six teams funded under the Prevalence Reduction Innovation Forum (PRIF) Program at the University of Georgia to advance the knowledge and understanding of prevalence estimation strategies in human trafficking research. This team evaluated two sampling strategies and their corresponding estimation procedures commonly used to study hard-to-reach populations — (1) multistage probability proportional to size (PPS) and (2) link-tracing sampling (LTS), within well-defined geographical locations in the state of Puntarenas along the Pacific coast of Costa Rica where forced labor in the fishing industry is suspected to be highly prevalent. Findings from this study will also serve as a baseline, against which the impact of an intervention program will be measured.

RESEARCH DESIGN

To ensure measurement consistency across all teams, PRIF in collaboration with the U.S. Department of State, developed a set of common measures and counting rules to operationalize the legal definition of human trafficking (HT) on three key elements — acts, means, and purpose. Of the total 39 common indicators established, PRIF further selected 12 core indicators for all teams to include in their survey questionnaires.

Two operational thresholds were used to define a potential victim of forced labor. For prevalence estimation, respondents who met either threshold are considered potential victims of human trafficking.

Threshold 1 consists of two key indicators: a) Having to perform sex acts to pay off debt or receive wages; or b) Losing freedom of movement due to surveillance, experiencing isolation within the workplace, or losing the freedom to communicate with friends or family.

Threshold 2 is made up of 10 indicators that fall in several categories of abuses pertaining to recruitment, employment practices and penalties, personal life and properties, degrading work conditions, debt bondage, and violence. Respondents who reported experiencing at least two or more indicators from two measurement categories were considered potential victims.

Method 1*: Multi-Stage Probability Proportional to Size (PPS) Sampling*
The study research team developed a multistage sampling design based on a sampling frame constructed from geographically-based auxiliary information and general population counts, thanks to our collaboration with the International Organization for Migration (IOM) in Costa Rica, and consequently their connections with the various government agencies. Our choice of a multi-stage PPS sampling method was to establish a comparison reference that is based on the fact that it is the most conventional method for a large-scale social survey. By accessing registration and existing government demographic data, we constructed a list of all townships and communities where fishermen reside on the Pacific coast of Costa Rica as our primary sampling units (PSU). Following a PPS random sample of the PSUs, we proceeded to sample clusters of villages (our secondary sampling units) before we proceeded to conduct a systematic recruitment approach based on the number of interviews allocated for that location. Although multi-stage PPS sampling is the most widely applied method and the gold standard for most large-scale social surveys, we remain unclear about its ability to accurately assess the magnitude and prevalence of forced labor among hard-to-reach or unevenly distributed populations.

Method 2*: Multi-Wave Snowball/Link Tracing (LTS) Sampling*
Probability-based sampling often does not provide full/adequate coverage of hard-to-reach populations, especially when they are concentrated in hidden pockets of the target population that are typically inaccessible to interviewers or consist of those who are reluctant to give an interview without first

establishing a level of trust with the interview team. Network-based survey strategies have been popularized in recent decades because of increased efforts to understand how diseases spread or how to enumerate unique populations that are unevenly distributed, e.g., substance misusers, sex workers, and victims of human trafficking. Because of the nature of their highly skewed (or hidden) distributions, estimation of population values from conventional strategies has been problematic. However, network-based (also known as link-tracing) sampling strategies may face challenges when deriving estimates of population quantities because link-traced individuals are recruited into the sample with (unobservable) unequal probabilities due to their network size or recruitment preferences. By imposing a network-based recruitment strategy using our time-tested field methods, we achieved multiple "entry points" to recruit people of diverse characteristics into our sample. This served well for approximating sample inclusion probabilities with a newly developed design-based approach (Thompson, 2020), also known as 'NE4NS'[1] and applications of novel population size estimation procedures, both of which were expected to aid with obtaining statistically efficient estimates of population quantities.

For many hard-to-reach populations, such as people with HIV or substance misusers, there are no known sampling frames on which a probability-based sampling design can be based. Further, researchers will not necessarily have complete control over the sample selection procedure. Therefore, one approach is to model the initial sample selection procedure as if it arises from a Bernoulli sampling design (such a design is similar to a simple random sampling design but allows for a variable sample size); see Frank and Snijders (1994) for further details and Vincent (2018) for extensions of the method which permit for a stratified setup for sampling and inference purposes. Hence, we began data collection for the study with the selection of a well-dispersed and spaced-out initial sample whose composition matches what we expected a Bernoulli/simple random sampling design would give in terms of key demographics, based on auxiliary information and local partner's insights. In the context of this study, we selected a relatively large number of "seeds" (or entry points) over a well-dispersed geographical area from which link-tracing sampling follows from each "seed", and to facilitate population size estimation we model the selection of the initial sample as if it arises from a random sampling design. All additional waves of respondents were based on tracing links out to the corresponding nominations of those individuals recently selected for the sample. The initial sample were the "seeds" and their referrals comprised the first wave, etc. Sampling continued in this pattern until three waves were reached.

Add-On: Network Scale-Up Method (NSUM)

All PRIF teams were instructed to include an NSUM component in their study, and we included this method in the PPS survey. NSUM assumes that people's social networks are on average representative of the general population in which one lives. For example, suppose a sample of respondents know an average of 300 people each (i.e., the size of their personal network) and they reported that on average two from their personal network died from a specific earthquake. Then, under general conditions, we can estimate that approximately 2/300 of the general population have died from this earthquake. A full design and typical application of NSUM was outside the scope of this proposed study because the long list of network measures makes it impractical to implement in our household-based survey protocol. Instead, we included a minimal set of questions to elicit the number of acquaintances of the respondent according to several personal characteristics.

---

[1] The name 'NE4NS' is taken to reflect the title of the Thompson (2020) paper, "New Estimates for Network Sampling".

ANALYSIS AND FINDINGS

PPS vs. LTS in Estimating Populations

Our PPS data collection reached a final sample of 1,017 unique individuals, while LTS resulted in a final sample size of 1,009. Based on the PPS sampling strategy, there was a crude estimate for the overall Population size based on extrapolating the mean of the survey weights, taken to be the inverse of the selection probabilities, of 26,295 individuals with a 95% confidence interval (CI) of (9251; 43,339) in Puntarenas' fishing sector. As the sampling weights were highly skewed, we note that a more robust alternative may be to extrapolate the median of the weights which would give a population size estimate of 19,432. Based on LTS, there was an estimated population size of 8,140 fishermen in Puntarenas, with a 95% CI of (7730; 8572). Population size estimates based on a spectrum of procedures applied to the LTS data set gave point estimates ranging from 5000 – 11,500.

Estimating Trafficking Victims: PPS, LTS, and NSUM

We applied the two thresholds established by PRIF in estimating the number of potential victims in Costa Rica, and applied the estimated rate of victimization to the estimated population size obtained by either PPS or LTS. Although either of the thresholds qualifies respondents as potential victims of human trafficking, we opted to add estimates for Threshold 1 and Threshold 2 separately for greater precision and analytical clarity in our comparison. The findings from each approach are described below.

Both estimation strategies produced similar rates of trafficking violations when both thresholds were combined. The PPS sample had an overall rate of forced labor at 21.1% (weighted population estimate of 21.8%). The LTS sample had an overall rate of 22.4% (adjusted population estimation of 24.4%). In other words, approximately one out of every five fishermen (and one out of every four when using the NE4NS estimate) in Puntarenas' fishing sector were victims of forced labor. Further, no substantively significant differences were found between the two estimation strategies on any of the 12 key indicators that made up the two thresholds.

While both PPS and LTS yielded similar threshold estimates, the NSUM estimates were typically smaller than those based on the individual-level PPS observation while the NSUM with visibility factor (VF) adjustments were typically much larger and with a level of uncertainty that reflected the magnitude of the estimates. We further disaggregated the trafficking thresholds to their composite items and again found the NSUM estimates largely discrepant from the corresponding PPS and LTS estimates, with a similar degree of uncertainty.

Comparing PPS and LTS in Estimating the Prevalence of Forced Labor in the Fishing Industry

Our detailed comparative analysis revealed that both PPS and LTS yielded relatively similar estimates on most demographic profiles and all composite items of the trafficking definition thresholds. No substantively significant differences were found between the two estimation strategies on any of the 12 key constituent items that make up the thresholds of forced labor in this study.

As anticipated, both estimation strategies produced a much lower prevalence rate on Threshold 1, the more stringent criteria, than that of Threshold 2. On the PPS sample, 9.8% met this threshold with a population-adjusted rate of 10.6%. The LTS sample found a lower proportion of individuals working in the fishing industry meeting this threshold at 7.1% with a Thompson (2020) resampling method for weight approximation (also known as "NE4NS") population-adjusted rate of 9%.

We found larger proportions of the respondents from both samples meeting Threshold 2. In the PPS sample, 19.0% (20.2% population adjusted) of individuals working in the fishing industry may be potential victims of forced labor. In the LTS sample, 20.8% (23.3% NE4NS population adjusted) met this threshold for trafficking victimization. Upon a closer examination of the composite items, we found that over 30% in both samples said yes to their employer, subcontractor or buyer of their catch "Reduced the value of goods you produced or services you provided? (EP02)", which significantly raised the overall proportion of people who met criteria for HT Threshold 2.

Overall, both estimation strategies produced similar rates of trafficking violations when both thresholds were combined. The PPS sample had an overall rate of forced labor in the fishing industry at 21.1% (21.8% population adjusted). The LTS sample had an overall rate of 22.4% (24.4% NE4NS population adjusted). In other words, about one out of every five individuals working in the fishing industry in Puntarenas, Costa Rica were potential victims of forced labor at their present job.

Help-Seeking

We asked survey respondents if they ever sought help for any of the abuses and exploitation they experienced while working in the fishing industry, who they sought help from and what kind of help they received. Only 19% of individuals from the PPS survey ever sought help while 27.8% of the LTS sample sought help. Respondents typically sought help from co-workers, friends or family members after encountering forced labor. Only 19% of individuals from the PPS survey ever sought help while 27.8% of the LTS sample sought help.

Risk/Protective Factors Associated with the Fishing Industry

We conducted a systematic analysis to identify factors (respondent demographics, employment characteristics, and social support) associated with the likelihood of being victimized. When both trafficking violation thresholds were combined, several interesting patterns emerged. Family finance appeared to be a strong predictor of one's odds of being victimized, suggesting financial desperation as a possible cause of being victimized, such as having children or not being able to pay household bills. With a few exceptions, such as one age group and being male, most demographic variables did not seem to have any influence on the risk of HT victimization. Another consistent predictor of victimization risk is working for a subcontractor or intermediary. By and large, findings from our multivariate analyses appear to suggest that the vulnerability of being victimized could not be associated with any demographic profiles or necessarily attributed to the type of work one chose to engage in. More likely than not, one's situational factors, such as financial desperation and unscrupulous employers as well as personal psychological resiliency and preparedness may be more influential in mediating HT victimization risks.

Comparison of Estimation Strategies

The estimation strategies provided somewhat different estimates for the population size, although the CI for that based on PPS captures several of the point estimates based on the LTS setup. The lower-bound estimate from the PPS sample (9,251) is either near the upper-bound or falls within the CIs corresponding to the LTS population size estimates. However, we note here that finding/accessing individuals in a hidden/stigmatized population through conventional strategies is typically inefficient and can create coverage issues. Hence, a PPS household-based sampling design may not be regarded as an efficient method for estimating the size of a hidden population. Such designs are typically based on multi-stage sampling procedures, with PPS selection based on auxiliary information related to the general population, which are prone to non-response that cannot be modeled as missing at random (MAR) (Rubin, 1976) and which give rise to sampling weights with a

high degree of heterogeneity along with weights of zero for those who cannot be captured through the design. From the perspective of applied social science, both estimation strategies appeared to have worked relatively well for implementation and prevalence-estimation purposes. The PPS approach was much easier to implement because of the significantly reduced complexity relative to the tracking and tracing exercise which is required for LTS. LTS requires an elaborate tracking scheme in order to be able to trace the respondents' referrals and any overlaps across sampled networks. This not only introduced erroneous data code entries both in Qualtrics and the tracking sheets but increased the overall cost of the survey due to the various incentive structures and required data cleaning. That said, the LTS method did successfully identify harder to reach sub-populations, such as non-Costa Rican nationals and long-haul fishermen, which the PPS survey was not able to do. Our NSUM was not a full-fledged design because it was added as a third method after the funding was awarded for PPS and LTS, and we were not able to ask the full breadth of NSUM questions due to time constraints. Thus, the data were not conducive to measuring a respondent's social network with high levels of precision.

Of particular note, it is clear that the two strategies, PPS and LTS, reached into separate parts of the population and gave discrepant estimates on population size as well as some parts of the composition of the population. For this reason, we advocate the use of hybrid methodologies (i.e., the use of two or more strategies in a single study) whenever feasible to 1) increase coverage of the study population, 2) cross validate and possibly combine estimates to give less biased and/or more efficient estimates (for example, through using a weighted average based on the estimated variance of the estimators), and 3) to contribute to the accumulation of knowledge relating to which strategies are best suited for specific studies on hidden populations.

Study Limitations

This study has several limitations which shed light on possible avenues for future research. The most salient ones include:

- Data collection activities were limited to daylight hours, thus systematically missing those who were working during these hours and were either not home during the time of household sampling/selection or were unable to leave their jobs for an LTS-based interview.
- Data collection was limited to communities on the Pacific Coast of Costa Rica, thus limiting its generalizability for State of Guanacaste and the Caribbean Sea side of the country.
- Few non-Costa Rican fishermen were captured in either sampling method, particularly the PPS method, suggesting a different recruitment method is required to reach the non-Costa Rican population.
- Because our primary goal was to compare PPS and LTS estimation methodologies, we were unable to implement a full-fledged NSUM design, thus making any NSUM-related conclusions open to alternative interpretations.
- Due to institutional mistrust and/or safety concerns, certain groups (e.g., non-Costa Ricans, those involved in criminal activities) were not able to be reached, thus limiting our understanding of prevalence of trafficking among these populations, even though they may be the most vulnerable.

RECOMMENDATIONS

GENERAL RESEARCH RECOMMENDATIONS

- Hiring field supervisors and enumerators that are residents of the target communities with prior knowledge of the target sector builds trust, improves data collection efforts, and facilitates decision-making that is sensitive to local realities during the data collection process.
- Conducting household surveys, especially when a monetary incentive is involved, in communities where general violence such as robbery, gun fire, and risk of street violence is common needs to be well thought out in order to reduce risk of injury to any parties involved.
- Enforcing close supervision and a comprehensive tracking system ensures clarity among team members and more accurate monitoring of the surveys conducted in the field, preventing enumerators from mistyping or repeating survey codes.
- Having standardized criteria[2] for the seed selection of the LTS design favors the participation of diverse population groups within the target sector in the sampling.
- Strategic rotation of enumerators and supervisors among community-based teams, based on their specific technical strengths or knowledge of the local context, ensures rigorous application of surveys.
- During the PPS methodology, the use of geographic information systems (GIS) to create survey sections according to the size of the community ensures rigor of the methodology and contributes to the efficient use of field teams' time. This also allows for the geo-reference of safe spaces and police stations that may be useful in the future.
- During the PPS methodology, having enumerators work in pairs or groups, carrying only sufficient money for incentives, and maintaining constant communication with other teams contributes to mitigating security concerns.
- Training supervisors and enumerators on Psychological First Aid (PFA), vicarious trauma, and how to handle disclosures of gender-based violence (GBV), human trafficking and other forms of violence such as extortion ensures minimal harm is done to the participant.
- Providing field teams with pamphlets or materials containing information about referral pathways for GBV, human trafficking and other forms of violence could be handed out to possible victims and individuals at risk during the data collection process.

POLICY RECOMMENDATIONS

- Awareness campaigns are needed to boost the knowledge of laborers' legal protections and referral pathways.
- Legal and policy reforms are necessary to regularize this highly unprotected sector to ensure basic human and labor rights to those working in the fishing industry, and to ensure a meaningful response for the government to rights-violations.
- Biweekly or monthly district visits by governmental and private sector agents will allow for a better understanding of the fishing sector's reality and the dynamics within the communities, promote local

---

[2] In an ideal case the seeds would be random, but in the empirical case they should either "look" random or be scattered out in terms of location and demographic profiles.

understanding, buy-in, and support for anti-trafficking efforts, and establish of strong work relationships between governmental and local stakeholders, and local associations within the fishing industry.

- Secure alliances with key counterparts from all political sides and sectors (which are part of IOM's neutrality and partiality principles), ensures engagement from different relevant actors, such as local associations and governmental institutions.
- Future studies should emphasize the collection of community-led, evidence-based information for decision-making, which encourages interest in knowing the results of the study and participating in future collaborative actions.

BACKGROUND AND PROBLEM STATEMENT

In response to continued challenges in prevalence estimations of human trafficking (HT) or forced labor (FL) around the world, the Office to Monitor and Combat Trafficking in Persons (JTIP) at the U.S. Department of State, through the African Programming & Research Initiative to End Slavery (APRIES) at the University of Georgia, funded six teams to assess different prevalence estimation strategies in different labor sectors. This study seeks to estimate the prevalence of FL in Costa Rica using two sampling strategies commonly associated with research on hard-to-reach populations — (1) multi-stage probability proportional to size (PPS) sampling and (2) link tracing sampling (LTS). By conducting a head-to-head comparison within a well-defined geographical area on a specific target population — individuals engaged in the fishing industry in Puntarenas, Costa Rica — we hope to assess the relative adequacies and consequences in generating population estimations on forced labor in Costa Rica. A second goal of this study is to build the capacity of the local research community in Costa Rica to become familiar with these proposed sampling strategies and field procedures.

CHALLENGES IN ESTIMATING HUMAN TRAFFICKING PREVALENCE IN COSTA RICA

Research on modern slavery faces many challenges in producing reliable estimations on the prevalence of the problem (Zhang, 2012). The hidden and complex nature of forced labor and exploitation, as well as the proliferation of inconsistent definitions and indicators, has resulted in varied prevalence estimations and a range of interpretations. In recent years, researchers have applied different strategies in prevalence estimations that all claim to be superior to other methodologies to measure hard-to-reach populations in certain contexts (Zhang & Vincent, 2017). These include variant versions of probability-based sampling, multiple systems estimation (or mark-and-recapture) methods, variant versions of network scale-up methods, respondent-driven sampling, and other link-tracing strategies. As a result, vastly different figures have appeared in agency reports and journal articles about the scale of the problem either locally or globally.

Research on human trafficking or modern slavery often defies conventional probability-based sampling. The "invisibility" of human trafficking is in part a product of the demographics of the population most at risk. According to estimates by the Walk Free Foundation, International Labor Organization, and the IOM, migrants are disproportionately victims of human trafficking (ILO, IOM, Walk Free Foundation). From 2010 to 2022, the Rapid Response Team (ERI) of the National Coalition against Illicit Smuggling and Trafficking of Migrants (CONATT) in Costa Rica has accredited a total of 366 victims of human trafficking, including dependents of trafficking survivors. 53% of accredited victims are foreign-born, mostly Nicaraguans, followed by individuals from Vietnam, Indonesia, the Dominican Republic, Colombia, and El Salvador, among others (internal data from ERI, 2022). It is worth mentioning that one in five Venezuelans interviewed by IOM during the 2019 Displacement Tracking Matrix (DTM) study on Venezuelans in human mobility in Central America and the Caribbean, said that they had either worked against their will, or without payment or were held against their will since they left Venezuela for Central America or the Caribbean (DTM, 2019).

Experiences of poverty and political instability, which feed migration from a number of countries in the region to Costa Rica, render migrants vulnerable to trafficking. Migrants that moved to Costa Rica out of desperation, looking for a job, and whose migratory status is irregular, are typically more willing to accept poor working conditions as they lack alternatives in their countries of origin. Moreover, employment opportunities for migrants, especially in the formal labor market, are not so easy to find, as this type of work requires a work permit, paying taxes and complying with social security, among other criteria (IOM Costa Rica, 2020). Consequently, migrants rely on risky survival mechanisms, which often leads them to find work

through less formal, and frequently unregulated channels. Irregular migrants seldom report labor abuses out of fear of deportation or legal repercussions (IOM, OIT, 2011).

Human trafficking is difficult to study because it operates through subtle mechanisms of control and deception instead of blatant coercion. For example, laborers may have willingly entered into a contract, but the terms they agreed to were misleading or duplicitous resulting in them being trafficked. Further, victims of human trafficking are not typically held in this condition for life (Ramirez, C.H. & Mendoza, S.L., 2018). More commonly, they are enslaved for a few years or months, making human trafficking an ever-shifting crime, too elusive to measure. Despite recent efforts to combat human trafficking, including specifying it as a crime in its national criminal code and by establishing CONATT, Costa Rica lacks quality and effective strategies for collecting and analyzing trafficking prevalence data. Moreover, trafficking in the fishing sector has never been a focus of anti-trafficking initiatives, despite the economic importance and risk factors in the industry.

In Costa Rica, the fishing sector is comprised of predominately artisanal fishing on the Pacific Coast (Chacon et al., 2007). The artisanal fleet is diverse, and ranges from small motor-less boats, to ships with advanced navigation systems that can sail 40 miles off the Coast (Herrera-Ulloa, A, et al., 2011). Most artisanal fishers live off the Gulf of Nicoya, one of the largest and most exploited estuaries in Central America (Palacios, J.A., 2007). Although geographically concentrated, fishing in Costa Rica is highly decentralized. Fifty fishing cooperatives are estimated to be operating along the Central Pacific coast, however only 37 of these are registered with the government (Arraya, I., 2006). This presents a challenge to collecting demographic statistics on the population employed in fisheries-- though surveys carried out by The Program for the Development of Fishing in Central America (Programa para el Desarrollo Pesquera en Centroamérica) recorded 8,395 fishers along the Pacific Coast. Overall, 14,000 people are directly employed in fishing, while 3,200 people are indirectly employed by the industry (INCOPESCA, 2018). The fishing sector has an outsized economic impact through its intersections with tourism and bolstering of local economies. Tourism is the largest industry in Costa Rica, and as of 2011, 33% of profits from tourism came from recreational fishing, additionally tourists to the coasts have created a higher demand for seafood products (Joaquin, J. & Windevoxhel, N., 2011).

Costa Rican fisheries are also an essential source of labor in coastal areas which typically experience high rates of unemployment. While men typically work as fishermen, processing activities, such as cleaning and canning employ many local women (Herrera-Ulloa, A, et al., 2011). A study by the Food and Agriculture Organization (FAO), which will be published in the next few months, estimates that approximately 10% of those employed in the fishing sector are women. Additionally, small-scale fisheries provide most of the seafood sold for domestic consumption. Conditions in the fishing industry are strenuous, and there are many risks of exploitation for both the local community and migrant workers. As a result of the sector's decentralization, there is lack of oversight to ensure appropriate labor standards, and few avenues for recourse in the case of abuse. As a compounding factor, most coastal communities have very limited political or economic power, and limited access to educational opportunities stunts local economic development. Consequently, there are few employment alternatives to escape the poor working conditions in fishing.

Criminal organizations often take advantage of the lack of regulation in Costa Rican fishing and the desperation of fishing communities to mask their illicit activities, including the smuggling of drugs or humans. While fishing is not as concentrated on the Caribbean coast, the industry in this region can become a vehicle for trafficking and a threat to the local community. In several cases, young men along the Caribbean have been fraudulently recruited onto fishing ships only to be brought to Jamaica and exploited as field hands. Bringing transparency to the fishing sector will support interventions for a range of issues facing coastal communities, including law enforcements' efforts to tackle drug-related crimes. Despite CONATT's varied and extensive efforts to combat trafficking in Costa Rica, they have yet to undertake trafficking prevention in the

fishing sector. Therefore, this joint project will be the first of its kind, opening doors for the IOM and other interested partners to work with a previously unreached population.

Although geographically concentrated in Limón (Caribbean) and Puntarenas (Pacific), especially in the Gulf of Nicoya, fishing in Costa Rica is characterized by decentralized artisanal fisheries that are not consistently registered with the government. Additionally, since Costa Rica does not have a fishing census, it is not possible to specify the number of people employed in the fishing sector, their geographical location, economic condition, and access to services. This made it challenging in the context of this analysis to accurately estimate the entire population of individuals encompassing all activities involved in Costa Rica's fishing industry. There is also a huge information gap with regards to the analysis and recognition of the role and importance of the presence of women in the small-scale artisanal fishing sector. This hindered the ability to explicitly detail all the roles women play among the various activities involved in this industry (Informe Estado de la Nación, 2022).

RESEARCH DESIGN

PROJECT GOALS AND OBJECTIVES

This study had two main goals:

1. Compare the robustness of two methodological approaches in human trafficking prevalence research: Multi-Stage Probability Proportional to Size (PPS) Sampling and Link Tracing Sampling (LTS).
2. Identify and build the capacity of human trafficking research teams in the design, testing and dissemination of human trafficking prevalence data in Costa Rica.

Subsumed under these two main project aims are a list of specific objectives, separated into two categories:

METHODOLOGICAL OBJECTIVES FOR INVESTIGATION

1. How does one research method compare to the other in terms of producing prevalence estimates of forced labor in the fishing industry in Costa Rica, in terms of precision and robustness in error reduction?
2. What are the differences in the amount of time and costs associated with each type of data collection?
3. Which data collection method seems better suited for the fishing industry in Costa Rica?
4. Will either data collection method tested in this study be able to generalize in other labor sectors?
5. What errors and/or unreasonable assumptions are practitioners likely to make when applying the corresponding inference procedures (made through publicly available statistical software) to data sets collected through sophisticated/innovative and novel network-based sampling strategies on hidden populations? How can such errors or unreasonable assumptions be remedied/addressed?

CAPACITY BUILDING OBJECTIVES FOR INVESTIGATION

1. What lessons can be learned in implementing two separate research designs across the same population, in terms of project management, staff training, staff supervision, and fluency in transition from one method to another in the field?
2. What are the cost-benefits (or cost differentials) in staffing arrangement, training, and field activities between the two field methods?
3. How may the research project improve the local team's capacity for future projects of similar or larger scale?
4. What experiences and lessons may this project produce to share with other Latin American countries on field surveys on human trafficking related topics?

SURVEY INSTRUMENT DEVELOPMENT

Our survey instrument included the following major domains of measures: (1) demographic characteristics (e.g., age, gender, ethnicity, family composition, and living situations); (2) migration decisions and debt situations (e.g., debt amount, borrowing sources); (3) work conditions and earning experience (e.g., type of jobs, weekly earnings); (4) multiple measures of experiences at workplace (e.g., types of jobs, overtime, payment terms); (5) forms of workplace abuse, including violence, restriction of physical/communicative freedom, and other abusive labor practices. The instrument is included in **Appendix C**. Further, the

instrument also includes items required by the sampling method for which it is designed, such as those based on nominations as required by the link tracing methodology, as well as items needed to accommodate the NSUM data collection.

DEFINITION OF FORCED LABOR

For this study, terminologies such as DS, HT, or FL are interchangeable. All PRIF teams were asked to apply the same measures when defining HT violations. Through extensive deliberations among 19 lead Investigators based on the principles established by the Trafficking Victims Protection Act (TVPA)/Palermo Protocol along the three key elements of human trafficking (acts, means, and purpose), PRIF developed an instrument of 39 common indicators covering seven domains of measures: (1) recruitment (R), (2) employment practices and penalties (EP), (3) personal life and properties (PL), (4) degrading conditions (DC), (5) freedom of movement (FM), (6) debt or dependency (DD), and (7) violence and threats of violence (V) (Okech et al., 2021). Of these 39 common indicators, PRIF selected 12 core indicators for all teams to include in their individual instruments to achieve consistency, thus enabling a meta-analysis across the data collected from all project sites. More specifically, these 12 key indicators are as follows:

A. RECRUITMENT (R)
   a. R1S — Coercive recruitment (abduction, confinement during the recruitment process)/feeling obliged during recruitment to work; and
   b. R2S — Deceptive recruitment (nature of services or responsibilities required)
B. EMPLOYMENT PENALTIES AND PRACTICES (EP)
   a. EP1S - Had your pay, other promised compensation and/or benefits withheld and if you leave you will not get them; and
   b. P2S - High or increasing debt related to an employer or other person who controls earnings (by falsification of accounts, inflated prices for goods/services purchased, reduced value of goods/services produced, excessive interest rate on loans, etc.)
C. PERSONAL LIFE AND PROPERTIES (PL)
   a. PL1S — Another individual has control over any meaningful part of your personal life (i.e., blackmail, religious retribution, or exclusion from future employment, community, personal or social life, etc.); and
   b. PL3S — Made to work or engage in commercial sex to repay outstanding debt or wage advance.
D. DEGRADING CONDITIONS (DC)
   a. DC1S — Made to be available day and night without adequate compensation outside the scope of the contract.
E. FREEDOM OF MOVEMENT (FM)
   a. FM1S — Confiscation of or loss of access to identity papers or travel documents
   b. FM3S — No freedom of movement or communication
F. DEBT OR DEPENDENCY (DD)
   a. DD1S — Had a debt imposed on you without your consent
G. VIOLENCE AND THREATS OF VIOLENCE (V)
   a. V3S — Physical violence against you or someone you care deeply about
   b. V4S — Sexual violence against you or someone you care deeply about

To qualify as a potential victim of forced labor in the context of this study, thresholds were established as stipulated by the PRIF Human Trafficking Core Indicators. Of all the indicators listed above, two were

considered more severe in violations of human rights and dignity than others, and therefore a positive response to either would qualify one as a potential victim of HT. We labeled this group as Threshold 1:

- Having to perform sex acts to pay off debt or receive wages (PL3S); or
- Losing their freedom of movement through surveillance, isolation, or being locked in the workplace, or losing freedom to communicate with friends or family (FM3S)

For the remaining 10 indicators, respondents needed to report two or more of the indicators to qualify as a potential victim, and thus we labeled this group Threshold 2. For prevalence estimation, respondents who reported having experienced violations that met either threshold will be considered potential victims of HT. Furthermore, findings for each of the 12 key constituent indicators are also presented. We presented the analysis at such a granulated level solely for the purpose of instrument diagnosis and methods assessment. Readers should be reminded to consider the combined category (i.e., either Threshold 1 or Threshold 2 as presented in Table 16) as the overall prevalence rate of trafficking victimization. Aside from these specific indicators, prevalence estimation must also consider the timeframe of when such violations occurred - e.g., at the present (or point prevalence), within the past 12 months, or the respondent's lifetime (as in "Have you ever used illicit substances?"). In this study, our measurement focused on fishermen's HT experiences (1) at their present job; and (2) their lifetime exposure to trafficking violations.

SAMPLING AND POPULATION ESTIMATION

Our study population included individuals 18 years or older who were engaged in some facet of the fishing industry in the state of Puntarenas in Costa Rica. Work in the fishing industry included: small-scale artisanal fishing (panga), medium artisanal fishing (boat, longline)-more than 40 miles, advanced artisanal fishing (transnational, longline)-more than 90 miles, semi-industrial fishing (shrimp, bolillo), industrial fishing (tuna, from other countries), and other. Roles in the fishing sector included: boat owner, armador (provides ready and spare parts), captain, crew (includes sailors, cooks, engineers), fish receiver, fish transportation, pawn, dock helpers, sale of supplies (ice, buns, lines), repair service (workshop, mechanic, welding, radio, GPS, sonar), gasoline (oil, hydraulic fluid), fish processing (cleaning, skinning), shrimp peeler, fishing nets (arrangement, lujadoras, sale), marketing of fishery products (intermediary), shellfish extraction, tourism linked to fishing, and other.

For our data collection strategies, we held a few assumptions to specify the boundaries (or limitations) of our study design. First, for the household survey, a "house" was defined as a structure with four walls and a main entrance. This excluded boats, on which some fishermen live or sleep, tents, and make-shift dwellings which were erected behind churches, other residences, businesses or abandoned property. Additionally, measures had to be taken to address safety concerns that were raised in Puntarenas. According to Costa Rica's Ministry of Justice and Peace (*Ministerio de Justicia y Paz*), Puntarenas showed a marked increase in number of homicides from 2020 to 2021 and is the province with the third-highest percentage of sexual assaults. To prevent situations that might place enumerators in unsafe conditions, surveys were only administered during daylight hours, and excluded communities where the crime rate was particularly high. As a result, this excluded those working in the fishing industry who worked during daylight hours who were not able to leave their job to participate in the survey, those who spent an extended amount of time at sea working on a boat, and individuals who lived in high crime rate areas.

Our study design and field procedures were reviewed and approved by the New York University Institutional Review Board (IRB) and our local partner's, International Office of Migration (IOM), global legal department to ensure that they complied with the legal regulations and cultural norms of the country. Data collection was

carried out by IOM who are experienced in administering large scale social surveys and with native familiarity in the socio-cultural practices of Costa Rica. No North American-based researchers were involved in any direct contact with research subjects. Further, no data collection took place prior to the formal approval of these field procedures.

Multistage Probability Proportional to Size (PPS)

The study research team first developed a multistage sampling design. A list of districts with corresponding fishing villages and communities was developed and the districts were assigned to strata by geographical area. Sampling activities were drawn with PPS at the first stage based on the principle of proportional allocation via known size of the general population as provided by the Costa Rican 2011 census. To begin, we worked with our IOM partner to develop a geographical boundary around the Gulf of Nicoya with its many fishing communities. IOM then carried out district visits and established strong working relationships with the main governmental and local stakeholders, as well as local associations within the fishing industry. Meetings with key counter-trafficking actors and local stakeholders were conducted to introduce and explain the objective of the project and the dynamics of the work of the field team in the communities. These activities allowed a better understanding of the fishing sector's reality and the dynamics within the communities. It also allowed the field teams to ensure the buy-in of local communities. These meetings and visits also allowed the identification and recruitment methods of the initial seeds needed to commence the multi-wave link-tracing sampling design.

To ensure the administration of the surveys with the multistage PPS sampling, IOM hired 10 enumerators and 2 field supervisors. It is worth noting that all of them were residents of the coastal communities of Puntarenas during the project period and had intimate knowledge of the fishing sector, which favored decision making during the data collection process. From October 11th to 14th, IOM and NYU conducted training for enumerators and supervisors in Puntarenas to build and strengthen their capacities and understand their responsibilities to administer the proposed social surveys.

Sample Size Calculations PPS

A sample size sufficient for obtaining a prevalence measure with a high-level of precision and which corresponds to the study region is critical for testing and comparing the two methods. Below are the sample size calculations as originally used for the study. We note that 1) calculations are based on a stratified-type of sampling strategy, as little was known about the networked population, and the strategies were to be based on the same sample size, and 2) adaptations to the allocation of effort at each stage were made in the field to account for logistical challenges that only became apparent at the time of the formative assessment and data collection.

Preliminary sample size calculations are based on the formulas detailed in Levy and Lemeshow (2011). The expression of interest is that which is based on a predetermined stratified setup over the respective strata (districts) that partition the study region, given as follows. For a fixed sample size n, the optimal sample size for stratum h under what is known as the principle of Neyman allocation is $n_h = \left(n \times (N_h \sigma_h) \right) / \Sigma N_i \sigma_i$ where N_h is the size of stratum h and σ_h is the standard deviation of the responses of interest within stratum h. The level of confidence is set to the conventionally accepted value of 95%, and the margin-of-error is set to 2% as the study team aimed to obtain a precise estimate within the study budget. The CI corresponding to an estimate $\hat{p}$ of the true prevalence p is typically taken to be $\left(\hat{p} - 1.96 \times SE(\hat{p}); \hat{p} + 1.96 \times SE(\hat{p}) \right)$ where the value -/+1.96 respectively corresponds to the 2.5th and 97.5th percentile of the normal distribution to give rise to a CI based on 95% nominal levels and with the aid of the central limit theorem (CLT). Hence, for this setup the sample sizes will give a CI of expected length of four percentage points, since the margin-of-error is set to 2%,

and will capture the true value of the population prevalence on 95% of cases. Sample size calculations show that, over varying levels of prevalence, even with extreme heterogeneity in prevalence measures across the strata, a sample size of 1000 within a focused study region should result in the desired level of precision for prevalence measures.

Upon receiving the full sample frame and based on district level map, we originally opted to commence sampling with selecting districts via PPS, which will serve as the primary sampling units (PSUs), and then implement a second stage design to select villages/communities within selected districts. Upon entry into a selected village, our field team will begin with a random entry point and approach every k^{th} household to inquire if a fisherman lives there for subject recruitment. This systematic random sampling strategy was to be continued until the allotted number of surveys for that village/community is reached. To guide our choice of sample size within districts, we will consider the intracluster correlation coefficient (ICC), defined as $\rho = (s_b^2)/((s_b^2 + s_w^2))$ where the terms refer to the variance between districts and variance within districts.

Ideally, the districts should be chosen to be as representative of the population as possible, so the variance within districts is high and between districts is low, to give small values of the ICC. The design effect (DE) is taken to be $DE = 1 + \rho(m - 1)$ where m refers to the (average) number of subjects in a cluster/census tract and ρ was taken as a simulation input (see below). This value serves as the denominator in the effective sample size (ESS), $ESS = mk/DE$ where k is the number of districts in the study region. The effective sample size provides an estimate of the quantity of effort under this design that is required to achieve the same level of precision as if a simple random sampling design were used.

For a range of plausible values for the aforementioned sample size formula parameters/inputs, we found that a sample of size 1000 was likely to suffice in meeting the desired margin-of-error. We confirmed this with the use of a comprehensive set of simulation studies conducted for this proposal, and which explore a range of heterogeneity and clustering effects as summarized in the sample size calculations. We have found that first-stage samples of size 10 (i.e., number of districts), second stage samples of size 5 (i.e., number of villages/communities within selected districts), and final-stage samples of size 20 (i.e., number of respondents in selected villages/communities) (or a total sample N=1000) result in estimates with levels of precision that are close to the desired margin-of-error level of 2%.

Recruitment Strategies PPS

To guide the first stage of sampling, we acquired a roster of all districts from government population data for the selected regions. A mapping exercise took place where our local partner screened the entirety of Puntarenas to identify all communities where fishing commerce was present. The sampling design was revised to reflect the sample size calculations and anticipated logistical challenges in the field.

Our first stage of sampling was further revised to instead be coastal communities and not districts, and entailed selecting 13 coastal communities from a list of 29 coastal communities with probability proportional to size. Table 1 provides the number of respondents from each selected coastal community along with the approximated number of dwellings in the coastal community.

Table 1: Sample distribution of number of respondents and approximate counts for number of dwellings for each of the thirteen selected coastal communities as provided by IOM.

Coastal Community	Number of Sample Respondents	Approximate Number of Dwellings
Isla Venado	80	235
Costa de Pájaros	85	356
Manzanillo	70	115
Chomes	71	308
Morales	70	664
Nancite and Bocana	144	387
Puntarenas	78	2904
Chacarita	105	5142
El Roble	72	6070
Tárcoles	81	477
Quepos	69	751
Cocal	92	237

Sampford's PPS sampling procedure (Sampford, 1967) was used to select a sample without replacement. Coastal community population size measures were taken to be the approximated corresponding total district size divided by the number of coastal communities within the district; note that such approximations were used instead of household counts as these were not observed until coastal communities were visited, hence only seven unique values are presented in histogram below. Figure 1 provides a histogram of the resulting first-stage selection probabilities for the sample respondents.

Figure 1: First-stage selection probabilities, based on approximated coastal community size and Sampford's sampling design, for the sample respondents.
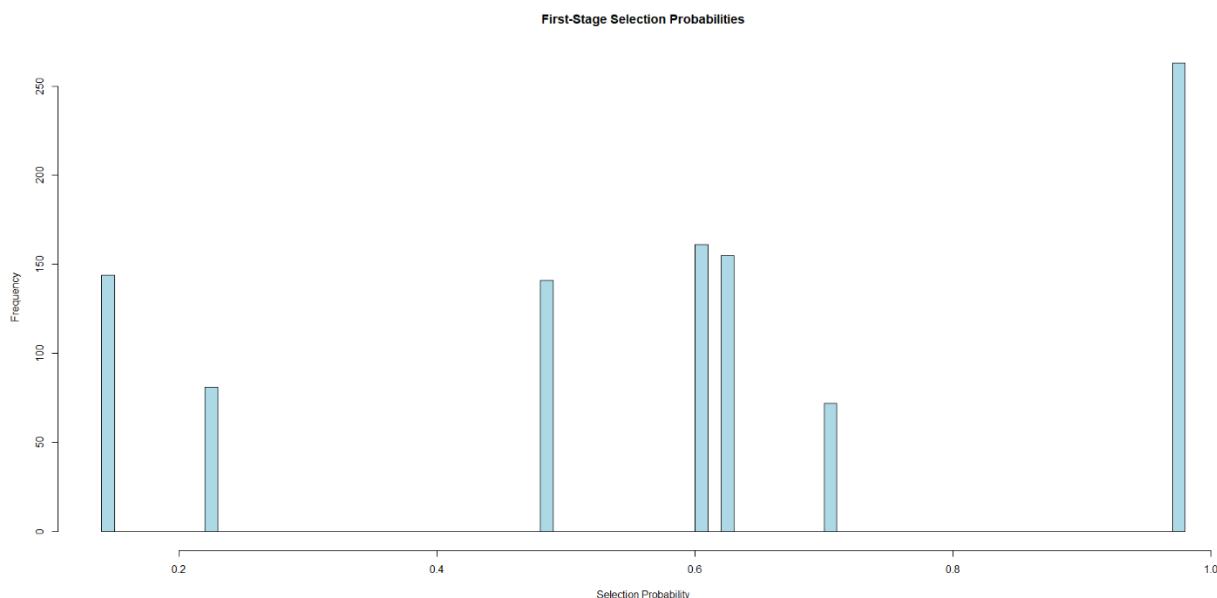
The choice of selecting 13 coastal communities was based on the sample size calculations, which turned out to be a face-value representation of small, medium, and large communities, and a logistical balance for allocating a realistic number of surveys to each coastal community. Because all communities have variant water frontages and fishing populations that may or may not be proportional to their census population sizes (i.e., large districts or communities may have a smaller fishing commerce due to their smaller waterfront), we decided to apply a variant of the equal probability of selection method (EPSEM) and asked our enumerators to complete 75-80 surveys per community we note that Chacarita resulted in a larger number of surveys as it was comprised of two separate townships.

The second stage of sampling was based on sampling households within each of the 13 selected coastal community. Upon entering the coastal community, IOM researchers scoped the entire community to count all possible residences, defined as all dwellings sharing one main entrance. They then considered the allotted number of interviews and total number of possible residences so that the number sampled took into consideration the corresponding number of residences. The second stage of sampling was based on visiting coastal communities and selecting a systematic sample until a successful number of interviews within range of a predetermined number were made (due to logistical constraints and several field teams simultaneously conducting interviews, exact numbers were not always reached). Households that refused or were unavailable for an interview were treated as MCAR (i.e., missing completely at random) since demographic information for such households could not be observed.

Sampling at the second stage was modeled as if data were obtained through a simple random sampling design, as this facilitates the estimation procedure (Levy and Lemeshow, 2011). Figure 2 provides a histogram of the second-stage selection probabilities.

Figure 2: Second-stage selection probabilities for the sample respondents.
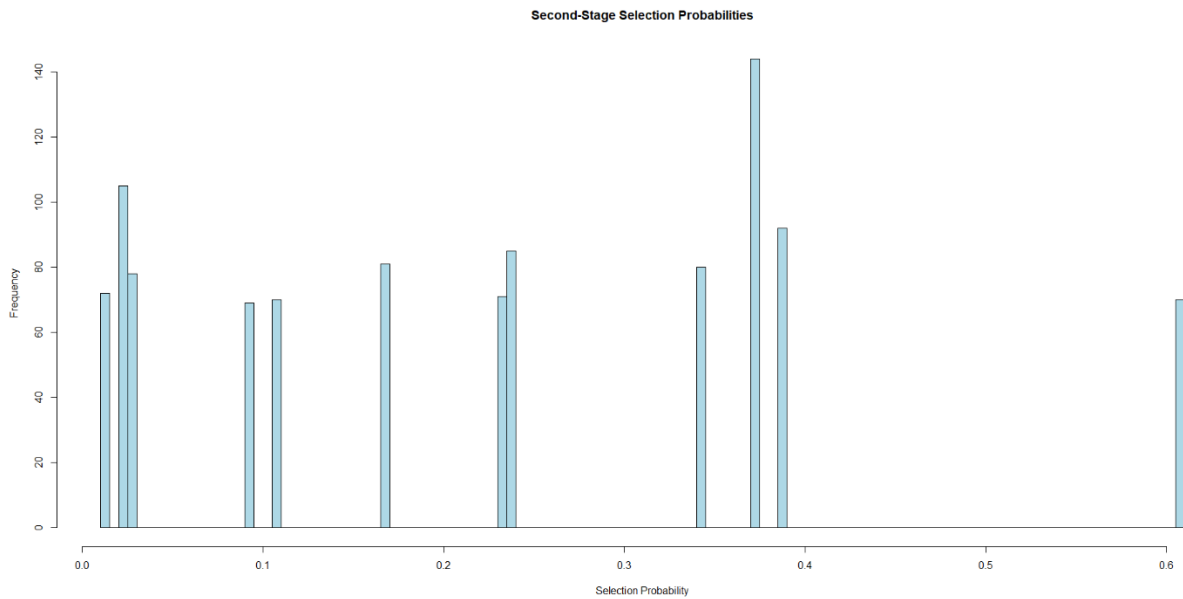
Finally, field supervisors would divide up the observed dwellings by the number of surveys to be completed and followed a pre-determined procedure to start knocking on doors at a fixed frequency. Upon entering a household, the enumerators would engage in rapport building activities and followed the IRB approved field procedures to explain the purpose of the study. Only one member of the household was selected at random, based on the birthday proximity scheme to decide which eligible candidates to take part in the survey.

The final stage of sampling was based on selecting an eligible respondent from households visited through the systematic sampling procedure. In almost all cases, there was only one eligible respondent. Hence, the third-stage selection probabilities were taken to be uniform and set to the value of one. Figure 3 presents a histogram of the final selection probabilities.

Figure 3: Final selection probabilities for the sample respondents.
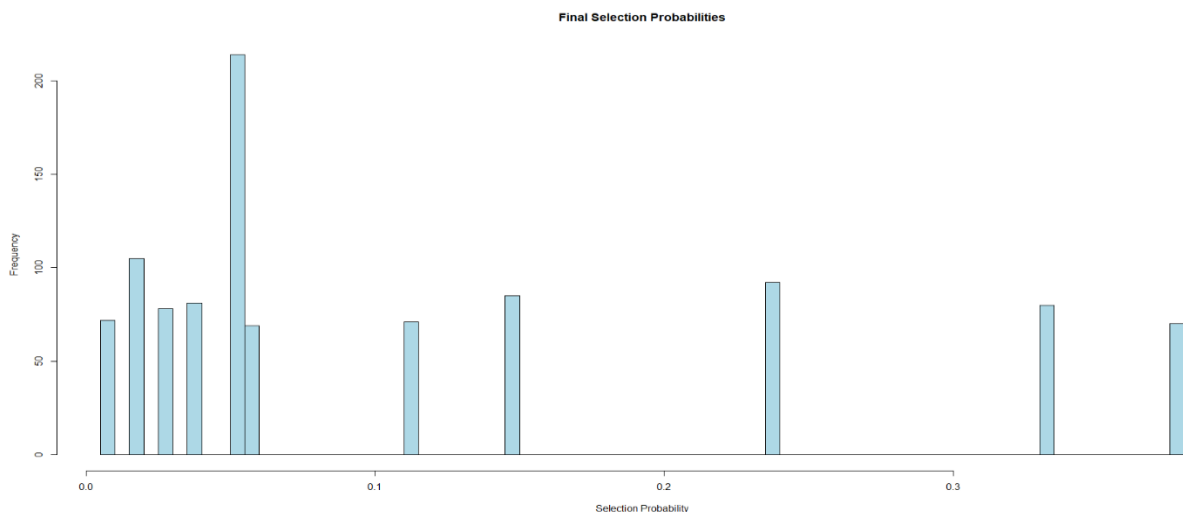
Figure 4 presents a geographical image of where the PPS surveys took place and the number of completed interviews in each community.

Figure 4: Number of surveys conducted with PPS per community.

Population Estimation

The sampling design weights are taken to be the inverse of the final selection probabilities of the sample respondents. Figure 5 presents a histogram of the sampling weights, which sum to 26,295.

Figure 5: Design-Based Sampling Weights for Household Respondents

Design-Based Sampling Weights for Household Respondents
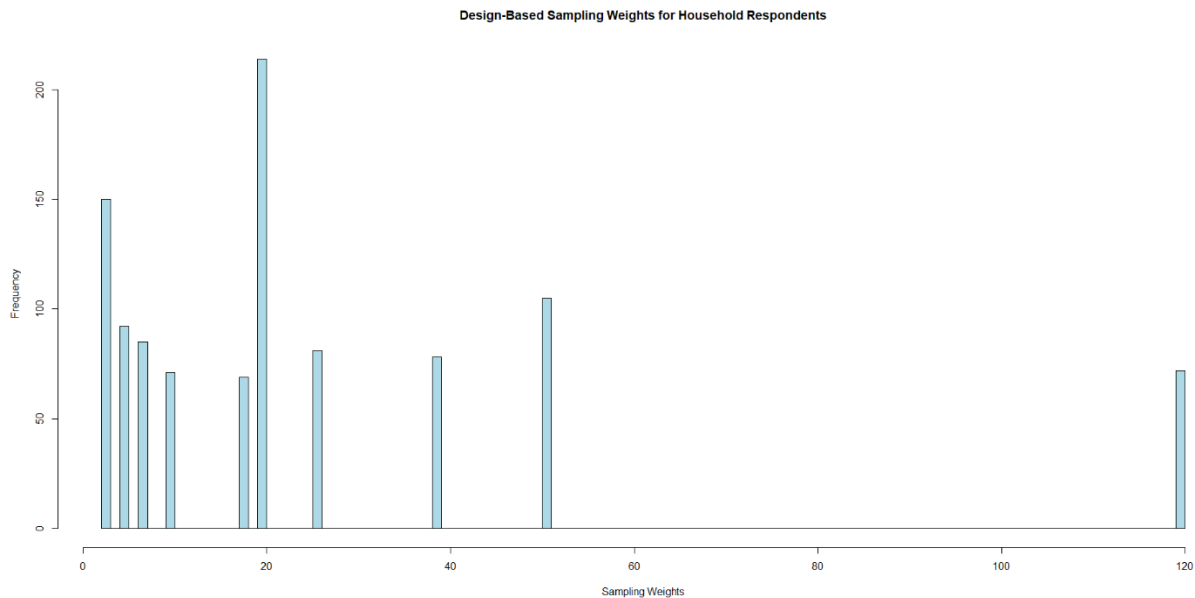
Battaglia et al. (2004) offer suggestions on how to appropriately weight sample observations. Two Suggestions refer to collapsing cell counts that are less than 5% of the sample size and trimming extreme weights to five times the mean of the weights. In this case, no cell counts were less than 6% of the sample size and five times the mean of the weights was approximately 130. Therefore, collapsing of cell observations and sample trimming was not required.

A bootstrap resampling procedure (Efron and Tibshirani, 1994), namely that developed by Canty and Davison (1999) for multistage sampling designs, based on 1000 replications was used for the calculation of standard errors and CIs. The bootstrap resampling procedure has much appeal and utility for applications to data sets arising from conventional/multistage sampling designs, for reasons given as follows. First, it can account to some degree for observational errors that a linear/parametrical method cannot through recreating observational error via resampling observations and therefore naturally builds them into the variance estimation procedure. Second, the joint inclusion/selection probabilities do not have to be calculated for a variance expression, as would typically be needed for a linear method. Third, it can preserve confidentiality agreements since micro data will not have to be shared with users, i.e., only statistics corresponding to the external user's analyses (such as medians/percentiles) based on the bootstrap samples and not the micro data, will be needed to perform their own analyses. Fourth, it makes use of the sample weighting/calibration procedure within each bootstrap resample, and hence accounts for the full point estimation procedure. Finally, the user can obtain approximations for the sampling distribution (in particular, percentiles) of statistics.

A population size estimate can be calculated based on the sum of the sampling weights. The estimate is evaluated to be 26,295 with a 95% CI of (9251; 43,339). It is noted here that multistage sampling designs are not typically and directly used for hidden population size estimation where only the hidden population is interviewed, for reasons explained above, but may rather be used for domain size estimation when the general population size is known since counts can be post-stratified to appropriate values. Further, nonresponse rates were not fully accounted for (i.e., since they were treated as MCAR), the first-stage selection probability was based on the total general population size per community, and very small selection

probabilities were approximated which in turn gave rise to extreme weights and therefore inflated the estimate of the study population size. An alternative method based on extrapolating the median of the sample weights, as opposed to the mean, gives a point estimate of 19,432.

Link-Tracing Sampling (LTS)

Because many TIP populations are highly skewed in terms of clustering, hidden, or difficult to survey, estimation of population values from sample data collected through conventional/traditional designs has been problematic. Network-based (also known as link-tracing) sampling strategies, such as the traditional snowball sampling design, may also be difficult to use to derive population estimates because link-traced individuals are recruited in the sample with (unobservable) unequal selection probabilities due to their network size or recruitment preferences (Thompson, 2020). Much progress has been made since respondent driven sampling (RDS) was seminally introduced by Heckathorn (1997) more than two decades ago. In this study, we extended on the current methods as we applied a novel link-tracing-based sampling strategy based on selecting a generously sized initial sample from a sampling frame, however imperfect, that can be argued to be somewhat representative of the hidden population in terms of key demographics. The primary motivations for using this approach were to avoid any inherent biases that would result from over-sampling from the core/well-connected areas of the networked population, and to permit for implementing a wide range of procedures for study population size estimation.

These initial respondents, also known as "seeds" (or entry points), were instructed to recruit additional respondents through chain referrals making it akin to the RDS recruitment procedure. However, our design allowed for only three waves of recruitment in addition to selection of the "seed" wave, unlike the conventional RDS procedure which would typically proceed over at least five waves. In contrast to typical RDS approaches, since the majority of the study population was immediately accessible, this approach aims to sample wide rather than deep in order to quickly achieve a representative sample of the network of the hidden population.

Furthermore, we also sought repeat coupon redemptions among respondents in the sense that one person may receive referral coupons more than once because she belongs to two overlapping social networks. This approach would permit additional observations of the sampled network, over and above what a conventional RDS approach would give and allow for a wider class of estimation procedures to be applied. In addition, our approach asks for covariate information of the respondents' personal network members so that any untraced links can be appended within the final networked sample. This method is akin to what is known as "RDS+" (Thompson, 2020).

The identification of overlaps essentially creates a mark-recapture type of data set, permitting for estimation of population quantities (in particular, prevalence and size) to be made with a high level of efficiency. The estimation strategy then relies less on direct RDS-type connections between waves of recruitments, but on links within personal networks of all respondents in the sample. This design-based focused population estimation strategy is well-argued to increase the accuracy of estimates of population quantities over those typically observed with traditional RDS estimation procedures (Thompson, 2020).

To evaluate and compare these two estimation strategies, LTS data collection was conducted in tandem with PPS sampling in the same communities. Figure 6 shows the number of surveys conducted with LTS per community.

Figure 6: Number of surveys conducted with LTS per community.
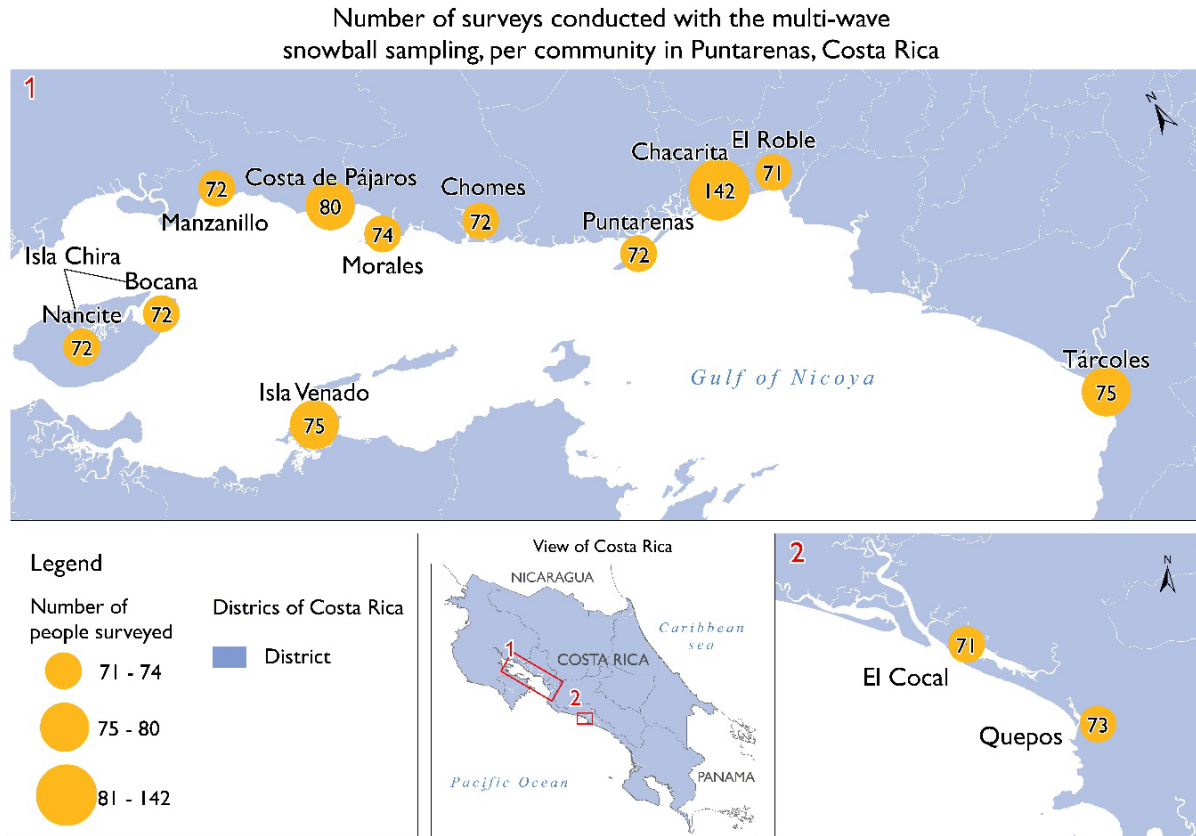
Number of surveys conducted with the multi-wave snowball sampling, per community in Puntarenas, Costa Rica

This process was closely supervised through district visits and an exhaustive tracking system that ensured clarity among team members and an exact monitoring of the surveys conducted in the field:

1. Each enumerator tracked all surveys conducted and codes assigned in a paper sheet and wrote out this information in an excel sheet named Enumerator Registry daily.
2. Each supervisor tracked all surveys conducted and monetary incentives that were given and wrote out this information in an excel sheet named Supervisors Registry daily.
3. The IOM team developed a tracking sheet of all surveys conducted, per community, which was updated daily during the implementation of this project.

After completing the survey, each participant (person A) received an economic incentive of 4,000 CRC (Costa Rica Colons) and could refer up to seven people within the fishing industry. Three were then chosen by the enumerators through a pre-determined random procedure; this recruitment mechanism allowed for modeling selection of peers from a respondent's personal network through a completely random sampling design, which greatly aids in estimation of population quantities (note that this is an assumption for RDS estimation). For each referee (person B) that showed up and completed the survey, the initial surveyed individual (person A) would receive 2,000 CRC per referee, with a maximum of three references. Those individuals that were referred more than once, aka "repeats," received an incentive of 1,000 CRC for showing up the second time. Referrals were terminated at the second wave.

To promote the participation of various population groups within the fishing sector, four main criteria were applied for the selection of the seeds which aided with finding a suitable set of seeds with which to commence the study:

- Presence of one or more social vulnerability factors associated with gender identity, age, nationality, migratory status, and/or socioeconomic condition.
- Direct association with some form of community or local organization that works to promote and protect the rights of those individuals that work in the fishing industry, or has extensive social networks linked to the fishing sector, which ensures that s/he can refer up to 7 people or more.
- People who meet a territorial diversity criterion, that is, not all of them come from the same neighborhood, household, or association.
- Availability to travel to sites where the surveys were conducted in defined periods.

The design commenced with the selection of 111 seeds, and 203 were recruited for the first wave, 296 for the second wave, and 399 for the third wave. The final sample size was 1009. Figure 7 below provides a visual illustration of the observed sample network based solely on first-time coupon redemptions (multiple redemptions accounted for less than 2% of the total sample size, and such observations are incorporated in the RDS+ type of analysis), based on 898 observed links through coupon redemptions. Individuals were allowed to recruit up to three of their peers. This data set was later incorporated into the RDS+ analysis.

Figure 7: Network Sample Graph with Seeds in Green and Referrals in Yellow based on coupon redemptions.
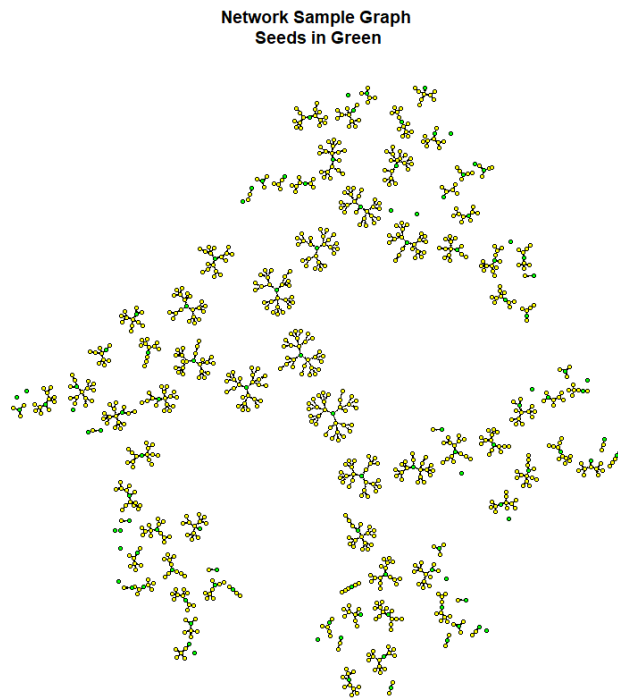
The first analysis is based on first-time coupon redemptions, so that RDS-based weighting schemes could be explored. Several sets of sample weights were explored for this study. The first was based on the Volz-

Heckathorn (VH) weighting procedure (Volz and Heckathorn, 2008), which assigns the weights based on the self-reported network size. The self-reported network size is initially taken to be the response to the question "Q113 About how many individuals 18 years and older do you personally know by name/alias who have worked in the fishing industry in Costa Rica, are not family members, and currently live in Puntarenas?" The self-reported network size for each respondent was then updated to be the maximum of their response to this question and the number of coupons they passed out and which were redeemed. As some respondents reported counts in the thousands, a Winsorization procedure was used to truncate the responses to their 95th percentile (i.e., 1000). Winsorization was also used to truncate the lowest responses to the sample distribution's 1st percentile (i.e., 4). Figure 8 below presents a histogram of the updated self-reported network sizes.

Figure 8: Self-Reported Network Size of Sampled Respondents
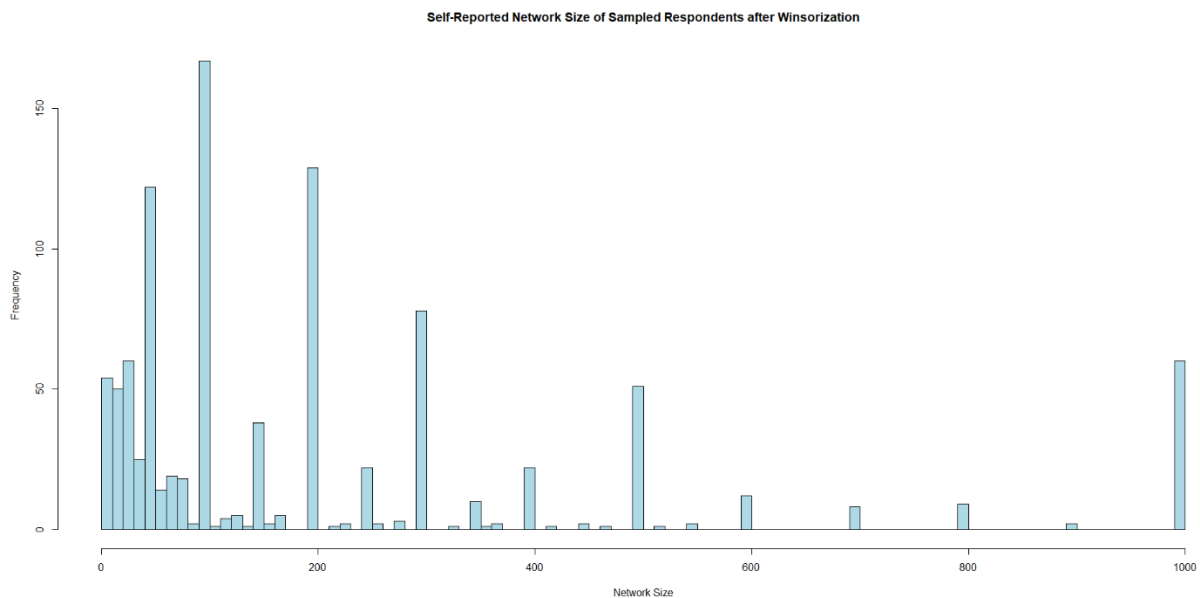
Before RDS weighting procedures can be applied, a population size estimate is required as an input for the weighting procedure for standard error calculations as the Salganik uncertainty estimator is used with the Volz-Heckathorn weighting scheme (Salganik, 2006); note that the sample weights are scaled to sum to the population size estimate. The successive sampling population size estimation (SS-PSE) procedure delineated in Handcock et al. (2015), and which is based on a Bayesian framework, was applied to the RDS data set. Results based on a Poisson weighted measurement error model gave rise to unstable estimates. Therefore, no measurement error model was applied. As there was little to no prior information on the population size, a flat prior distribution was used. A total of 30,000 Markov chain Monte Carlo (MCMC) iterations, of which the first 5000 were discarded as burn in, were used for approximating the posterior distribution of the population size. Every tenth MCMC observation was retained for calculation of the posterior statistics. Based on a consultation with the research experts, a cap on the network size was taken to be 50 for the estimation procedure. The date of the interview was taken to be the recruitment time.

The posterior mean was found to be 1765, with a 95% probability interval of (1292; 2545). Figure 9 presents a histogram of the posterior distribution while Figure 10 presents trace plots corresponding to the model parameters. The trace plots confirm that the choices of the length of the MCMC chain and interval for

observation retention reached convergence and was sufficient in length. Note that the μ and σ parameters respectively refer to the mean and standard deviation of the unit size (which is analogous to the degree) distribution.

Figure 9: Posterior Distribution of Population Size

Posterior Distribution of Population Size, SSPSE Method, Flat Prior,
No Measurement Error Model
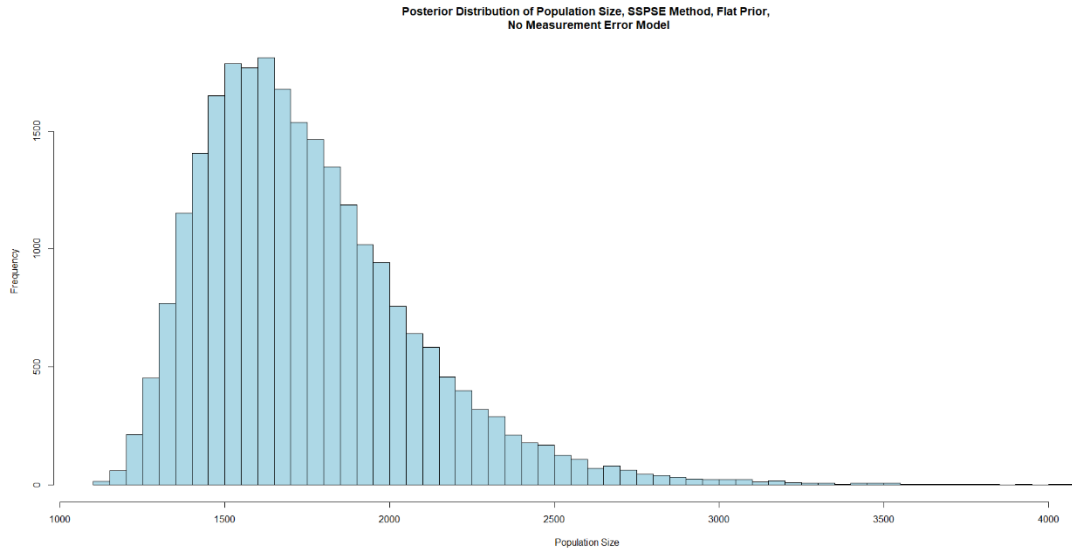
Figure 10: Model Parameter Trace Plots
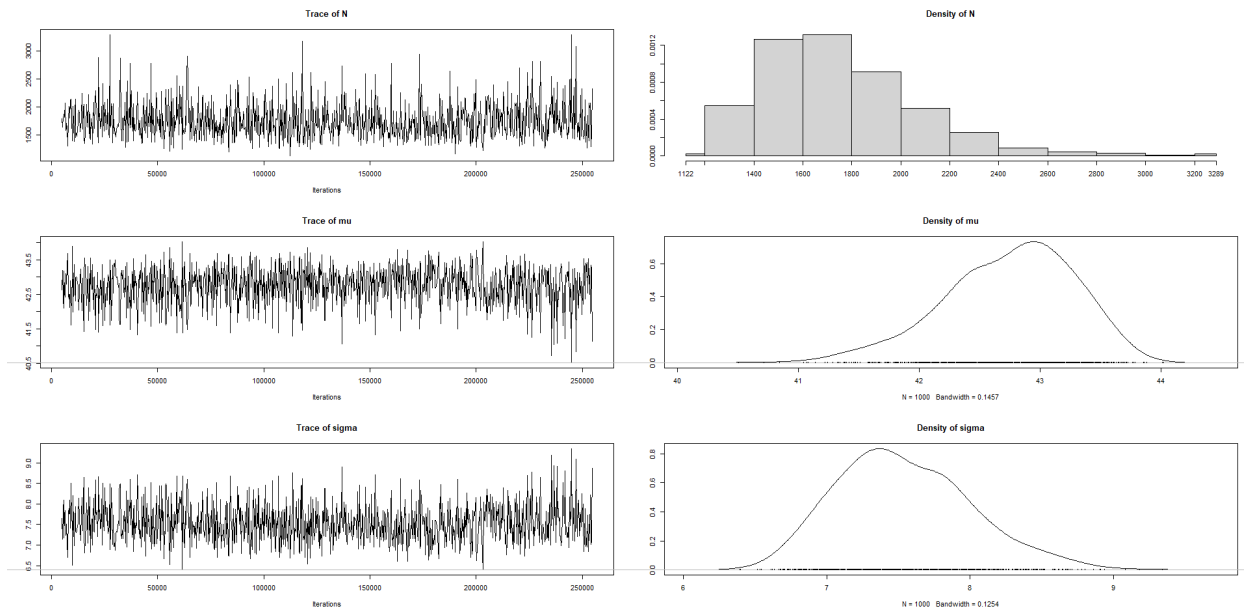
For the RDS weighting procedures, the posterior mean of the SS-PSE was taken to be the estimated population size (i.e., 1765) although the posterior median may also serve well for highly-skewed distributions. As the SS-PSE method relies on the degree sequence of the sampled individuals, and since only three waves of observation were obtained, it is likely that the SS-PSE method would not give a reliable

estimate and should therefore be treated as exploratory for this study's analysis; see Figure 11 showing the plot of network size by wave, which reveals a large degree of homogeneity in the distribution of network size across waves and which therefore gives little information to base the SS-PSE estimation procedure upon. However, RDS weighting procedures are oftentimes robust to misspecification of the population size and honest standard errors of estimates of population quantities may still be obtained for such cases.

Figure 11: Plot of Network Size by Wave
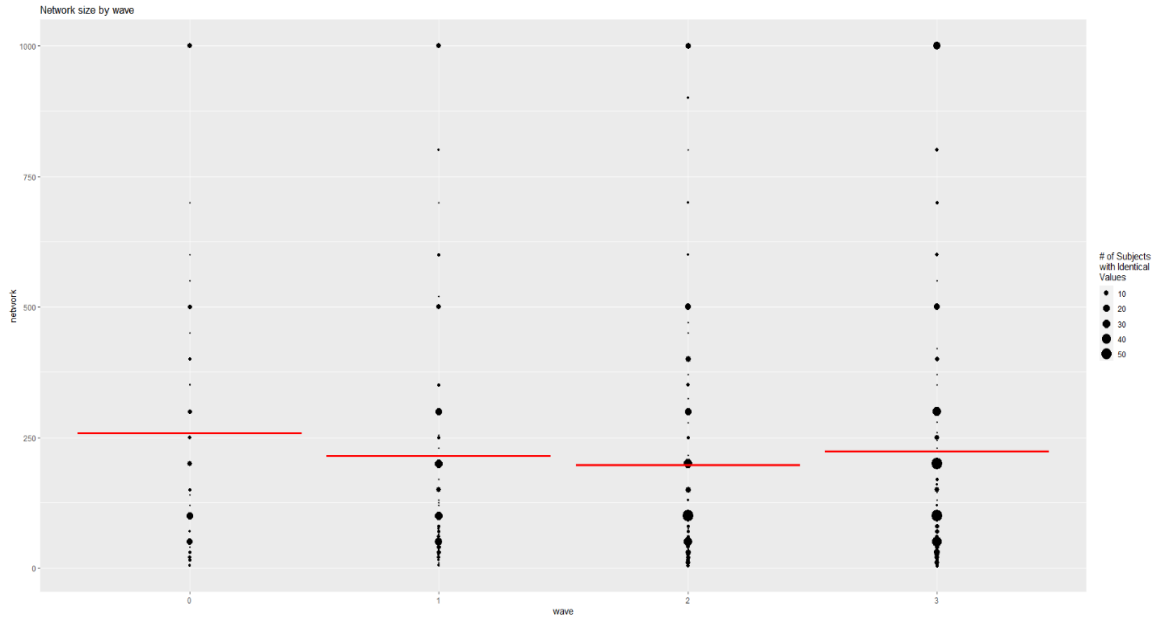
Figure 12 presents a histogram of the Volz-Heckathorn weights, which sum to 1765.

Figure 12: Volz-Heckathorn Weights
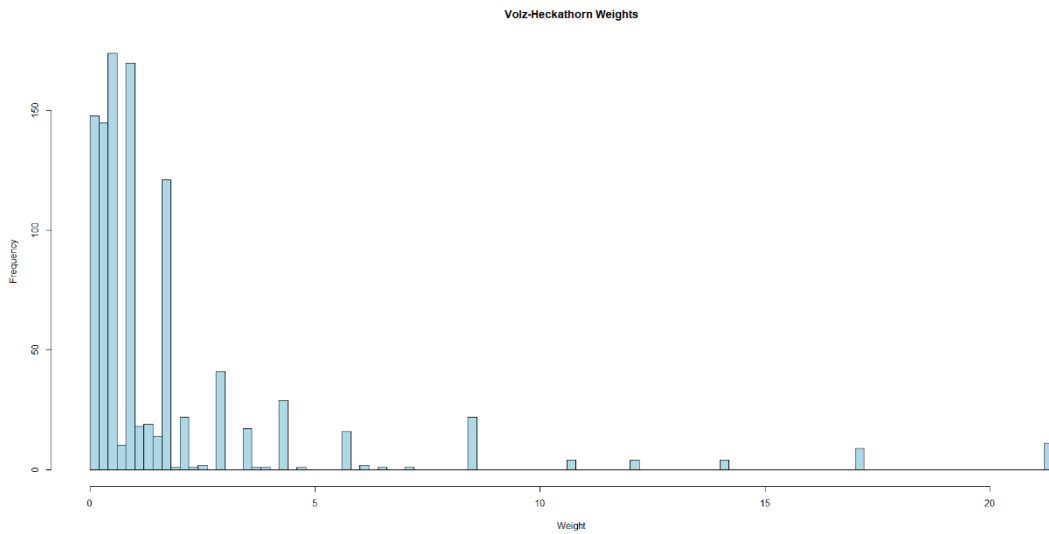
As expected, diagnostic plots showed rapid convergence and no issues relating to bottlenecks with the estimates based on the VH weights were observed.

The second weighting procedure was based on the homophily configuration graph weighting scheme (Fellows, 2019), which is tailored for proportional/categorical variables and which bases estimation on the assumption that either classic RDS assumptions hold true or that the population network is well approximated by a homophily configuration graph. This weighting scheme is well-suited for this study since 1) it does not rely on Markov assumptions, and 2) it is robust to limitations commonly encountered with RDS estimation when sampling is based on short RDS chains (Fellows, 2019). The weights are a function of the survey variable, and as an example Figure 13 presents a histogram of the homily configuration graph (HCG) weights for the gender variable.

Figure 13: HCG Weights for the Gender Variable
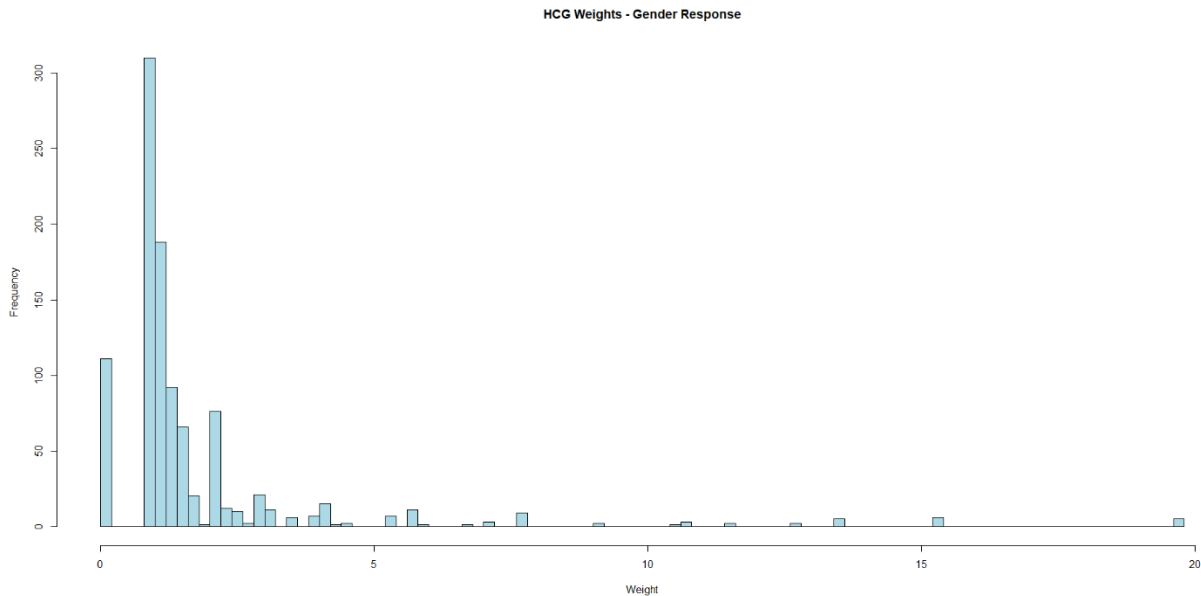
Finally, the resampling procedure outlined in Thompson (2020) is applied to the network observations and is based on an exhaustive number of iterations (100,000) where the approximate proportion of the reseeded initial sample size is set to 10% of the targeted final subsample size of 400. The reseeded initial sample size is chosen to reflect the initial sample size of the full sample, and the targeted final subsample size is taken to align with the choices made for the simulation studies presented in Thompson (2020).

Figure 14 presents a histogram of the resulting weights, which have been scaled to sum to unity; note that an estimate of the population size is not required since the corresponding estimation procedure is akin to the generalized unequal probability estimator. The mass of relatively large weights corresponds to the isolated individuals as these individuals were less likely to be selected for the sample.

Figure 14: Sample Weights Based on Resampling Procedure

Sample Weights Based on Resampling Procedure
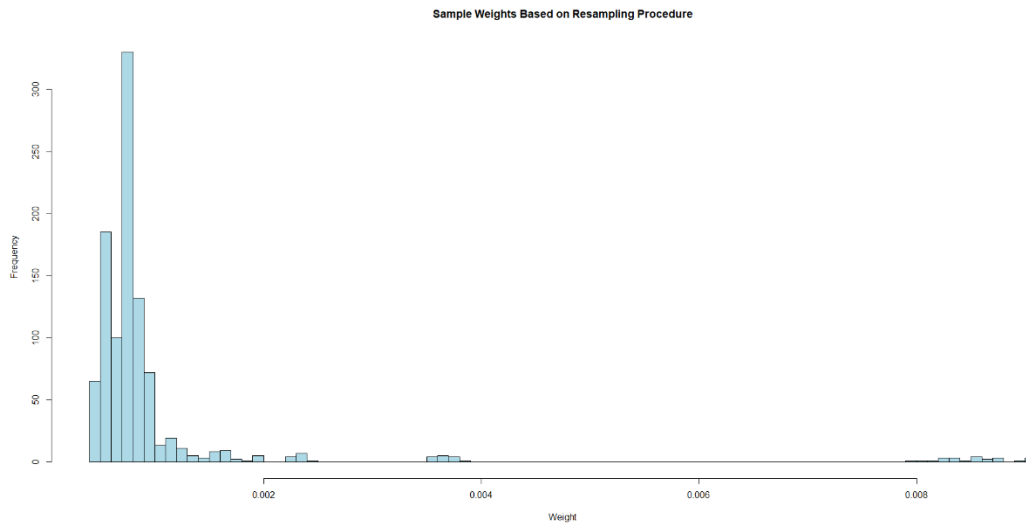
Figure 15 presents a scatterplot of the resampling-based and VH weights. The correlation measure is approximately 0.04. In many cases, individuals self-report as having a relatively small network size and hence receive a large VH weight. In contrast, as they were recruited by a well-connected individual there are many sample paths leading to this individual. Hence the reason for a small weight approximated by the resampling procedure. The cloud of points in the bottom right corner, which corresponds to the mass of points at the extremum in Figure 14, corresponds to those individuals in the sample that were relatively isolated from the rest of the sample, most of which self-reported a moderate to large network size.

Figure 15: Scatterplot of the Resampling and VH Weights
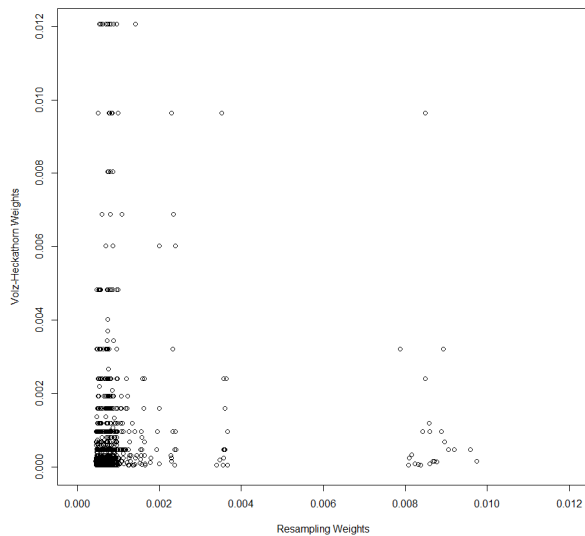
Additional mapping for RDS+ type of estimation was based primarily on multiple redemption of coupons and mapping mobile numbers as provided by the respondent for their own mobile number and those in their personal network. This resulted in an additional 734 links observed within the final sample. Figure 16 gives a plot of the network sample based on the links observed through coupon redemption as well as additional

mapping. The prevalence of disconnected components highlights the need for a moderate number of access points to the study population, as was strategically used in this study.

Figure 16: Full Network Sample Graph with Seeds in Green and Referrals in Yellow

Full Network Sample Graph
Seeds in Green
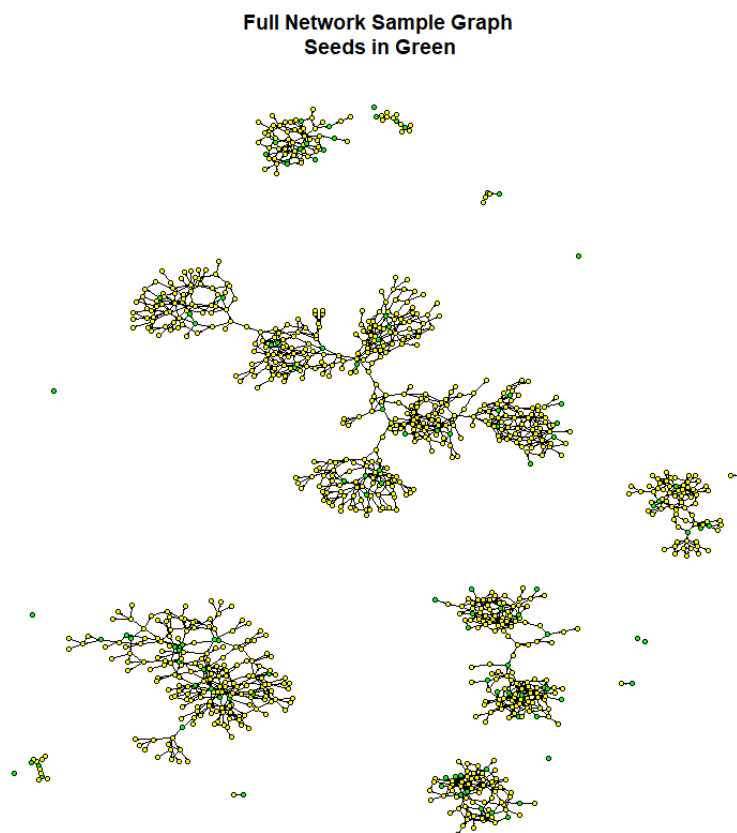
The Thompson (2020) resampling procedure was applied to this data set based on the same sampling parameters used for the RDS data set. Figure 17 presents a histogram of the resampling weights. The correlation between these weights and those based on the same procedure applied to the RDS data set is approximately 62%; less isolated individuals were observed in the RDS+ data set, which resulted in approximations for their weights to be smaller than those based on the RDS setup.

Figure 17: Sample Weights Based on Resampling Procedure with the Full Network
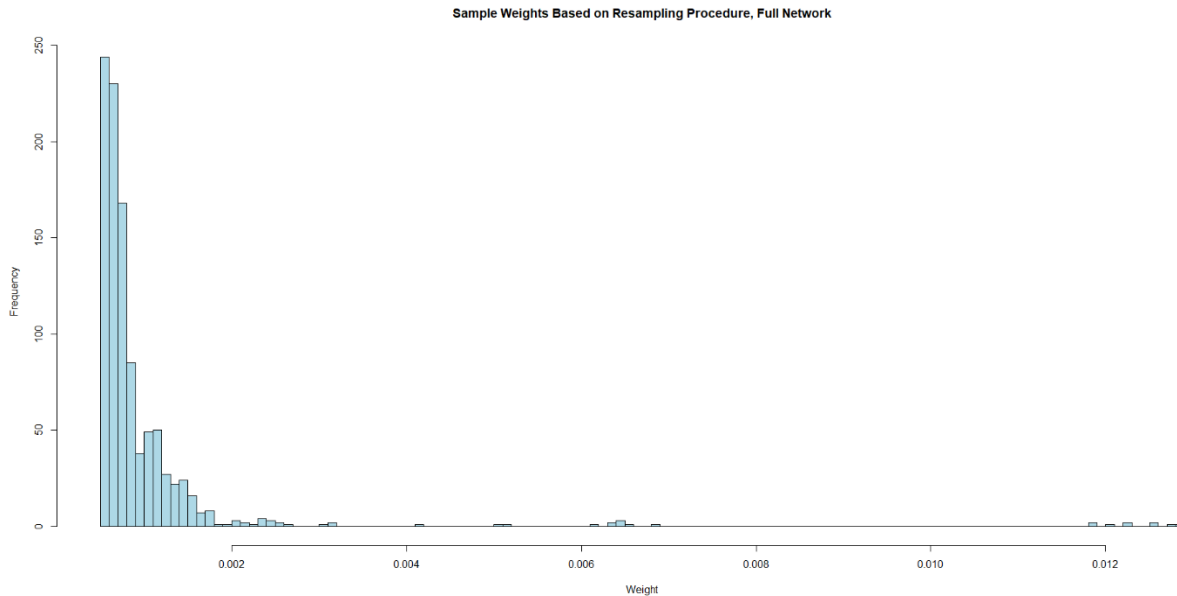
Privatized Network Sampling Population Size Estimation (PNS-PSE) leverages the reported non-recruitment connections (alters) in order to estimate population size. The intuition is that if many of the reported alters are in the RDS sample, or are reported as alters by other subjects, then the population size is likely to be relatively small. Conversely, if none of the alters are seen in the sample or are reported as alters by other individuals, the population size is likely to be large.

Khan et al. (2018) developed a mathematical estimator based on this intuition, which was further improved by Fellows (2022). These estimators explicitly deal with the complexity of estimating population size off of a link tracing design, such as heterogeneity of capture due to differing network degrees and network clustering. Fellows (2022) describes three estimators. The Cross-Sample estimator leverages the rate that alters appear in the RDS sample, the Cross-Alter estimator leverages the rate at which an individual's alters appear in other subjects' alter lists, and the Cross-Network estimator leverages both of these pieces of information.

The PNS-PSE method was applied to the data set based solely on the mobile phone number mappings; a total of 1404 "links" were used for the estimation procedure. Based on a consultation with the research experts, the network degree was capped at 40. A total of 4937 unique individuals were observed through observation and mobile number mappings. The estimation procedure gives the three estimates for the population size as presented below in Table 2. The 95% CIs are based on 1000 bootstrap resamples.

Table 2: Estimates for Population Size

Method	Point Estimate	Confidence Interval
Network	8140	(7730; 8572)
Alter	8735	(8277; 9219)
Sample	5616	(5209; 6055)

The Frank and Snijders (1994) estimate, which is a mark-recapture type of estimate and is based on the ratio of the number of links observed within the initial sample to the number of links to individuals outside the initial sample, is applied to this data set. Figure 18 gives a plot of the information used for this estimator.

Figure 18: Network Sample Graph with Seeds in Green and First Wave Respondents in Yellow

Network Sample Graph
Seeds in Green, First Wave in Yellow
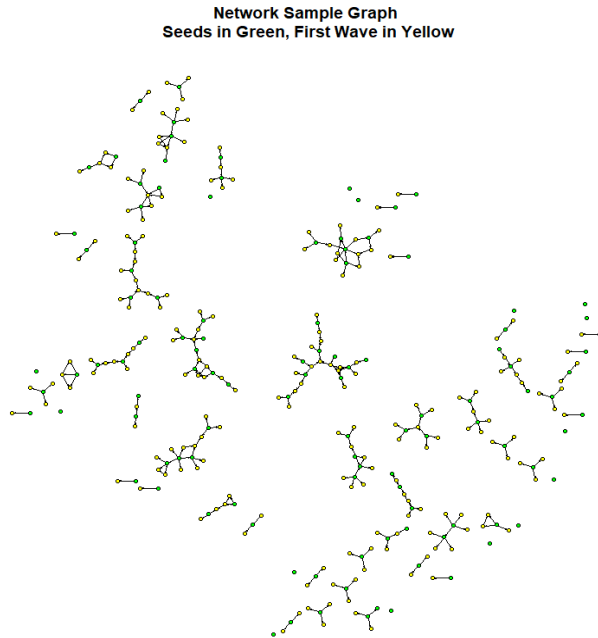
Two estimates were calculated, where one is based on the assumption that all links are reciprocated and the other is based directly on the observed directional links; we note here that the survey questionnaire did not ask for confirmation of the existence of reciprocated links, and so the estimates should be taken as exploratory as some reciprocated links may exist over and above what was observed. For the former, the point estimate was evaluated to be 4261 with a 95% CI of (947; 7575). For the latter, the point estimate is evaluated to be 8029 with a 95% CI of (2154; 13,905).

A Rao-Blackwellization scheme analogous to that presented in Vincent and Thompson (2017) was applied to the data set; the estimation procedure is a computationally intensive one that searches for sample reorderings, so that some units in the first wave are treated as hypothetically belonging to the initial sample and vice-versa, and bases improved estimation on a weighted average of the set of Frank and Snijders (1994) estimates corresponding to the sample reorderings. For the data set that assumes all links are reciprocated, this resulted in an improved point estimate of 3950 with a 95% CI of (1413; 5074). For that based on the data without assuming reciprocity, the improved estimate is 11,470 with a 95% CI of (1716; 21,225).

Mark-recapture types of estimates were also obtained based on constructing sampling occasions corresponding to mappings based on mobile numbers. The 111 seeds were randomly assigned to different sets and nominations/mapping from each set comprised a sampling/capture occasion. This approach was repeated several times to give either three or four sampling occasions.

Estimates based on closed population loglinear models, as can be obtained with the Rcapture package (Baillargeon and Rivest, 2007), were within the range of 5000-6000. However, most

estimates were returned with warnings. The sparse overlap in the lists encouraged a sparse multiple systems estimation (MSE) procedure (Chan et al., 2021), which was found to be within the range of 5000 – 6000. Here is an example of one outcome: The number of captures for the four sampling occasions was 197, 192, 153, and 155. A total of 631 individuals were captured once and 33 were captured twice. The sparse MSE point estimate was 5159 and with a 95% CI of (3594; 7560). Population estimates using various methods are presented below in Table 3 with standard errors (SE) in parentheses.

Table 3. Study Population Size Estimates

Study Methodology	Estimator	Population Estimate (SE)
PPS	Horvitz-Thompson	26,295 (8,696)
Link Tracing	SS-PSE	1765 (397)
	PNS-PSE (Network)	8140 (225)
	PNS-PSE (Alter)	8735 (247)
	PNS-PSE (Sample)	5616 (224)
	Frank and Snijders - reciprocated links	4261 (1691)
	Frank and Snijders - directional links	8029 (2998)
	Improved - Frank and Snijders - reciprocated links	3950 (573)
	Improved - Frank and Snijders - directional links	11,470 (4977)
	Sparse MSE	5159 (1225)

Network Scale-Up Method (NSUM)

All PRIF teams were instructed to include an NSUM component as a third estimation method. As detailed in Salganik et al. (2011a), the NSUM has gained much attention in recent years as it serves as a cost-friendly way to estimate the size/prevalence of hard-to-reach populations. An early and well-known application of this method for estimating an unknown population size was made by a team of anthropologists, mathematicians, and social network analysts who were attempting to estimate the number of deaths from the large earthquake in Mexico in the fall of 1985. The method rests on the assumption that people's social networks (i.e., the set of people that one knows) are on average representative of the general population in which one

lives (Bernard et al., 1991; Killworth et al., 1990). Estimation is explained by example: suppose a sample of respondents know 300 people each on average as the size of their personal network and on average they reported two from their personal network died from the earthquake. We can then estimate that approximately 2/300 of the general population may have died from the earthquake. Because census-level information or known subpopulation counts exist, we can apply this method to estimate the size of a target population.

NSUM is an approach that is generally based on sampling from the more general population, possibly based on a frame composed of listed households in a geographic region, and which uses an indirect method to estimating population size/prevalence of a subpopulation of interest (McCarty et al., 2001). With the NSUM, oftentimes a sample is selected from the general population and respondents are asked about the composition of their personal network along with the number of individuals they know that identify as part of the hidden population. The sample networks are mathematically combined, and with the aid of population counts based on census information are then scaled up to obtain an estimate of the size of the hidden population. This study made use of an ad hoc and experimental variant of the NSUM. We conducted the NSUM analysis to provide an estimate of the prevalence rate.

A full-fledged design and implementation of the NSUM methodology was outside the scope of this proposed study, as this study was primarily concerned with evaluating PPS and multi-wave link-tracing sampling estimation strategies to identify their relative benefits and drawbacks. Because a proper setup for a true NSUM design would require multiple items be added to measure respondents' social networks as well as known populations, it would be impractical for this study to accommodate a much longer questionnaire.

The NSUM can be attached to any probability-based sampling method because it requires only a set of uniquely designed questions to elicit responses on respondents' knowledge of (1) people within their own personal network of particular characteristics (i.e., victims of FL), and (2) estimations of some known subpopulations as frames of reference. There are several approaches to estimating personal network sizes, including the summation- and reference-based NSUM (Maltiel et al., 2015), and those based on more generalized NSUM (G-NSUM) models (Feehan & Salganik, 2016).

Essentially, respondents were asked a list of "how many X do you know" questions where X corresponds to several subpopulations of known and unknown size. Known groups correspond to reference groups where the size and scope has been measured, such as people in the United States who have diabetes; unknown groups correspond to the target population of interest (e.g., sex workers). Because NSUM does not ask respondents to identify any individuals with particular characteristics (including themselves), it is presumed to be able to improve honesty in the response.

In this study, we included a minimal set of questions to elicit the number of acquaintances (appropriately defined) of the respondent according to several (less than 10) personal-characteristic categories. These items were included in the questionnaire for the PPS component. It should be noted that we were asked to include NSUM measures in only one of the two sampling methods. We opted to include the NSUM items in the PPS instrument because NSUM works best when administered alongside a probability-based methodology.

For the NSUM population estimation strategy, the assumption is that people's social networks (i.e., the set of people that one knows based on a predefined relationship) are on average representative of the general population (Bernard et al., 1991; Killworth et al., 1990). Once a respondent's social network size is estimated, the enumerator will then ask if the respondent knows the number of people in his/her own social network who possess some particular profiles (e.g., How many children do you know who are involved in the sex

trade?), and also the number of people they know in a subpopulation (e.g., How many registered nurses do you know?) of the general population for frames of reference.

NSUM requires only a single random/probability sample and has gained much popularity in efforts to estimate the size/prevalence of hard-to-reach populations (Josephs et al., 2022). However, population size estimation relying on the classic NSUM requires validations that the NSUM assumptions related to homogeneity of the underlying network are met. Feehan and Salganik (2016) introduced the generalized NSUM (or G-NSUM) that incorporates unequal sampling weights and relaxes some of the assumptions.

However, a properly designed NSUM to estimate the prevalence of HT or other stigmatized activities would require an elaborate and cumbersome list of measures to gauge the size of the respondent's social network, which in the context of this study would induce survey fatigue after the long list of other critical items in the survey instrument are asked. NSUM assumes one's social network represents the total number of individuals that the respondent recognizes by sight or name, preferably contacted in the last several years and can still contact (Laga et al., 2021). To ask the respondent to recall all the people they know will involve questions that systematically comb through one's family and social activities nearby as well as correspondence with contacts with which they have not recently been in touch. As one can imagine, the number of items would significantly lengthen the already long questionnaire.

After consultation with an expert from the funding agency, we agreed with several other research teams under this round of funding to collectively use seven items to provide an NSUM-like measurement. Also, per agreement with the funding agency, the NSUM items were only used in the PPS questionnaire and not in the LTS questionnaire.

Because the survey for the PPS method was already long and detailed, we were conscientious of the limited time prospective respondents were able to afford when participating in our survey. We were only able to ask a limited number of questions to approximate an NSUM-like measurement of one's social network, including a total count of distinct contacts listed within their mobile phones. As shown in Table 3, there was a wide range of the sizes of these respondents' social networks based on the varying characteristics, ranging from a few hundred to several in the thousands.

Table 4. Individual-level- and NSUM-based estimates with 95% confidence intervals.

Variable	Individual-Level Point Estimate	Individual-Level Confidence Interval	NSUM Point Estimate	NSUM Confidence Interval	NSUM with VF Point Estimate	NSUM with VF Confidence Interval
Deceptive Recruitment	1,914	(363; 3,465)	651	(239; 1,063)	5,130	(1,887; 8,374)
Made Avail. Day and Night	1,821	(713; 2,930)	600	(221; 980)	4,691	(1,726; 7,656)
Lacked Freedom	5,365	(1,764; 8,966)	325	(119; 530)	8,347	(3,069; 13,624)
Physical Violence	2,098	(513; 3,684)	151	(55; 246)	1,808	(655; 2,950)

Estimation

NSUM estimation in the context of this study requires an estimate of the size of the fishermen population. Based on summing the sampling weights, a Horvitz-Thompson estimate for this value is 26,295 with 95% nominal CI based on the CLT of (9,673; 42,916).

The size of each individual's personal network, defined to be the number of fishermen in their list of contacts on their smart phone, is used in the usual NSUM estimation formula. Point estimates for the NSUM variables are based on the ratio of the sum of the weighted observations of the corresponding variable and the sum of the weighted personal network size in terms of fishermen, multiplied against the estimate of the number of fishermen. Define the former to be $\hat{X}$ and the latter to be $\hat{Y}$, and $\hat{Z} = \hat{X}\hat{Y}$. In order to obtain a variance estimator for $\hat{Z}$, an approximation to the covariance of $\hat{X}$ and $\hat{Y}$ is required. A reliable estimate for this value can be challenging to analytically derive. For this reason, the variables are treated as independent, and their covariance is set to zero. The corresponding variance expression is therefore taken to be $\widehat{Var}(\hat{Z}) = \widehat{Var}(\hat{X})\widehat{Var}(\hat{Y}) + \widehat{Var}(\hat{X})\hat{Y}^2 + \widehat{Var}(\hat{Y})\hat{X}^2$. Hence, the CIs should be treated as conservative.

To mitigate transmission bias, a VF can be used to inflate the NSUM estimates (Haghdost et al., 2018). Essentially, questions are asked about the number or percentage of those in a respondent's personal network that know if they truly do or do not possess the characteristic of interest. A VF is then based on a weighted average of such responses, in the form of a percentage, and the NSUM estimate is inflated by this factor. In our study, we made use of the Q107 and Q111 responses to calculate VFs for each of the trafficking indicators. In short, the VF was taken to be the arithmetic mean, across those that possess the trafficking indicator, of the percentage of individuals in their personal network that they spoke with in the last week, and which are truly aware that they possess the indicator. At this time, variance estimates are conditional on this value and do not account for any inherent variability in the estimation of the VF.

ANALYSIS AND FINDINGS

In this section, we present the unweighted and weighted estimates for the survey variables. We chose to present both sets of statistics side by side for easy comparison. The raw (or unweighted) sample statistics are presented first followed by the population-adjusted statistics from both prevalence estimation strategies. These descriptive tables represent the most straightforward findings on the key measures. These tables are also compiled in **Appendix B** to report the CIs on all survey items, as well as significance tests to highlight any major differences between the two samples. Statistical analysis comprises three major components: (1) a comparison of the different population estimation strategies applied in this study; (2) descriptive and weighted estimation of population characteristics of specific trafficking measures; and (3) inferential statistics to explore risk/protective factors associated with HT victimization using the two primary estimation strategies.

The design we used was not a typical RDS one and so the VH and HCG procedures should be considered as exploratory ones. However, we present estimates based on the core LTS data set that does not include link observations for multiple coupon redemptions and which therefore conforms with an RDS setup. Several sample weighting procedures were explored for this study, namely the VH (Volz and Heckathorn, 2008), HCG (Fellows, 2019), and Thompson (2020) resampling weighting procedures; the Thompson (2020) procedure was applied to both the RDS and RDS+ data sets. In this report, we present the estimates based on the Thompson (2020) resampling procedure applied to the RDS data set as 1) the VH and HCG procedures are typically applied to standard RDS data sets, and 2) the RDS+ data set may have some inherent error in the post-data linking. However, we note here that we typically found only a small to moderate amount of disagreement in the weighted estimates for most survey variables across all weighting procedures. We present estimates for weighted estimates based on all procedures for a select subset of survey variables of high interest to the research team, namely the PRIF trafficking indicators. Since NE4NS appeared to generate the most conservative and somewhat consistent outcomes, we opted to present population estimates based on the NE4NS-weighting scheme.

DEMOGRAPHIC PROFILES

As shown in Table 5, over 70% of respondents in both samples were between the ages of 26 and 60, suggesting work in the fishing industry is pursued by most age groups in the adult population. For PPS, about 2/3 of our sample consisted of men, while the difference in gender ratios was less pronounced in our LTS sample, with men making up 53%. Almost 60% of individuals in the PPS samples reported they were currently married; with 32% reporting they had never been married. However, we estimate a smaller proportion, about 46%, of the population for LTS respondents were married while almost 45% of the LTS population had never been married. Most respondents in both samples reported having at least one child, with a plurality of respondents reporting three or more children. In both samples, about 58% of respondents reported that their highest level of education was primary school, with 20% of the PPS sample and 16% of the LTS sample reporting that they had received no formal education. Additionally, for both samples the majority of respondents began working in the fishing industry as minors, with only between 33-37% of both samples entering the fishing industry after the age of 18. This finding is an important one and illustrates the need for a study to focus specifically on child labor in the fishing industry in Puntarenas which was not within the scope of this project. As expected, because data collection activities for both prevalence estimation strategies took place in the same geographical regions and were based on the same sampling design, few remarkable differences existed between the two samples.

Table 5. Demographic Profiles				
	Household Survey		LTS	
	Sample* (N=1017) %	Population Adjusted** %	Sample* (N=1009) %	NE4NS - Population Adjusted** %
Gender				
Female	32.1	34.3	46.3	42.5
Male	67.1	65	53.0	56.9
Non-binary	0.5(5)	0.3	0.5(5)	0.4
Prefer not to say	0.4(4)	0.4	0.2(2)	0.2
Age Group				
18-25	10.3(105)	9.1	16.2(163)	15.0
26-40	35.3(359)	32.8	36.6(369)	38.6
41-60	40.2(409)	43	37.2(375)	36.8
61 and older	14.2(144)	15.1	10.0(101)	9.6
Marital status				
Currently married	58.4(594)	55.2	45.9(463)	47.9
Divorced	5.0(51)	7.4	3.0(30)	3.2
Never married	32.0(325)	32.7	44.5(449)	42.1
Separated	2.8(28)	2	5.4(54)	5.9
Widowed	1.9(19)	2.6	1.2(12)	0.9
Number of Children				
0	16.1(164)	14.4	16.3(164)	17.3
1	15.7(160)	15.9	19.9(201)	19.6
2	20.5(208)	21.3	22.3(225)	23.6
3	19.9(202)	16	18.5(186)	18.3
4	12.7(129)	15.5	10.0(101)	8.4
5 or more	15.1(154)	16.8	13.0(131)	12.7
Education				

Bachelor's Degree	1.4(14)	2.1	0.7(7)	0.4
Cannot read or write/Illiterate	3.9(40)	3.1	4.3(43)	4.2
High School Degree	9.6(98)	8.1	12.4(125)	11.6
No Formal Education/Literate	20.0(203)	18.4	16.0(161)	14.7
Primary School	57.8(588)	60.3	57.5(580)	0.5
Secondary School	6.4(65)	6.7	8.4(85)	61.4
Vocational School/Some College	0.9(9)	1.2	0.7(7)	6.8
District				
Chacarita	8.5(86)	16.4	14.2(143)	13.3
Chira	14.8(151)	11.6	14.3(144)	14.8
Chomes	15.7(160)	8.2	14.4(145)	11.6
El Roble	6.3(64)	27.5	7.0(71)	7.2
Lepanto	8.2(83)	1.2	7.4(75)	6.4
Manzanillo	11.7(119)	2	14.9(150)	12.3
Puntarenas	NA	NA	0.1(1)	0.1
Quepos	13.2(134)	19.2	8.0(81)	6.4
Tarcoles	13.8(140)	6.3	13.3(134)	16.2
When did you start working in the fishing industry? (in age ranges)				
0-5	0.7(7)	0.6	0.6(6)	1.2
6-8	10.6(108)	7.7	8.1(82)	7.6
9-11	12.6(128)	10.2	11.8(119)	9.3
12-15	31.5(320)	33.1	28.5(287)	30.6
16-18	11.9(121)	12.6	13.9(140)	13.7
18+	32.7(333)	35.8	37.0(373)	37.6
I don't know	NA	NA	0.1(1)	0.1

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

Financial Strains

As shown in Table 6, the majority of respondents in both samples reported they received a monthly income of less than 100,000 CRC. Their children's education made up a big part of their annual spending with 44% of individuals in the PPS sample and 35% of individuals in the LTS sample reporting that their child's education costs more than 300,000 CRC per year. Around 47-48% of respondents in both samples indicated they were not able to cover their household expenses in the past 6 months. Again, few significant differences existed between the two samples.

Table 6. Financial Strains				
	Household Survey		LTS	
	Sample* (N=1017) %	Population Adjusted** %	Sample* (N=1009) %	NE4NS - Population Adjusted** %
Cost for Children's Education				
100,000 CRC or less	7.0(48)	6.1	7.3(48)	6.7
100,001 - 200,000 CRC	11.3(77)	11.5	17.3(113)	16.5
200,001 - 300,000 CRC	9.2(63)	9.4	13.0(85)	10.0
I do not have children	24.0(164)	21.6	25.0(164)	25.7
I do not know	2.6(18)	2.1	2.0(13)	1.7
More than 300,000 CRC	44.4(303)	48	35.3(231)	39.1
Prefer not to say	1.5(10)	1.2	0.2(1)	0.2
Monthly Average Household Expenses				
Between 100,001 - 300,000	8.8(89)	10.2	5.8(59)	7.2
Between 300,001 -500,000	0.6(6)	1.4	0.3(3)	0.2
Between 500,001 - 700,000	0.8(8)	0.4	NA	NA
I don't know	0.5(5)	0.4	0.3(3)	0.4
Less than 100,000	88.9(904)	87	93.6(944)	92.2
More than 700,001	0.3(3)	0.4	NA	NA
Prefer not to say	0.2(2)	0.3	NA	NA
Were you able to cover your household bills over the last 6 months?				
I don't know	0.3(3)	0.1	0.1(1)	0.2
No	46.8(476)	47.8	61.7(621)	57.9

Yes	52.9(538)	52.1	38.2(385)	41.8
Did you borrow money to finance the journey to Costa Rica?				
I do not know	NA	NA	6.7(8)	5.0
No	76.0(38)	87	73.9(88)	80.3
Yes	24.0(12)	13	19.3(23)	14.7
How much in total did you pay in order to secure the job (in CRC)?				
Mean	300.7	289.4	85.6	157.5
Std. Dev.	1331.1	1309.6	715.7	67.4
Range	0-6600	0-6600	0-15000	-
95% CI	-	-	-	(25.34, 289.58)

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

Migration

Table 7 shows the proportion of fishermen that were foreign migrants. In the PPS sample, 5.1% of respondents indicated they were not Costa Rican. Of the 52 respondents that reported being a citizen of another country, the majority (45 respondents) said their country of origin was Nicaragua. In the LTS sample, 12.4% reported they were not native Costa Ricans. Of the 125 respondents in the LTS sample that reported they were foreign nationals, 106 people indicated they were from Nicaragua. Six individuals each stated they originated from some either Colombia or Venezuela. Both estimation methods confirmed that the overwhelming majority of fishermen were native Costa Ricans. However, the LTS methodology captured over twice as many foreign nationals as the PPS methodology. The significant difference was possibly due to the fact that LTS might be better at reaching more hidden sub-populations since it relies on referrals through individuals' social networks.

Table 7. Migration				
	Household Survey		LTS	
	Sample* (N=1017) %	Population Adjusted** %	Sample* (N=1009) %	NE4NS - Population Adjusted** %
Is the respondent Costa Rican?				
No	5.1(52)	4.3	12.4(125)	12.2
Yes	94.9(965)	95.7	87.6(884)	87.8
What country are you a citizen of?				
Colombia	NA	NA	0.6(6)	1.0

Costa Rica	94.6(962)	95.1	87.7(885)	87.8
El Salvador	0.2(2)	0.2	0.1(1)	0.1
Honduras	0.1(1)	0.2	NA	NA
Mexico	0.1(1)	0	NA	NA
Nicaragua	4.4(45)	4.2	10.5(106)	8.9
Other	0.3(3)	0.2	0.4(4)	1.3
Panama	0.1(1)	0.1	0.1(1)	0.4
Venezuela	0.2(2)	0	0.6(6)	0.4

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

Employer Information

The Costa Rican Mixed Institute of Social Assistance (IMAS) has established a package of benefits, including financial, that respond to the needs of people in situations of economic vulnerability. However, as shown in Table 8, over 75% of respondents in both samples stated that they did not receive the IMAS benefit, although we don't know how many were actually eligible for it from the sampled population. Additionally, almost 70% of respondents from the PPS sample and almost 80% of respondents from the LTS sample reported that they do not have the Costa Rican Institute of Fish and Agriculture (INCOPESCA) license, which is a required to legally fish from a vessel in the ocean or lake in Costa Rica. On average, between 41-43% of respondents in both samples reported they worked for the owner of a fishing boat in their current job, whereas 11.5% of the PPS sample and almost double that of the LTS sample (22.8%) worked for a sub-contractor. Again, when comparing the two methodologies, LTS appears to be better at uncovering a potentially more vulnerable group since past research has shown that individuals who are paid by a sub-contractor are more likely to experience wage theft and other types of exploitation and theft (LeBaron 2014; Issa 2017).

Table 8. Employer Information				
	Household Survey		LTS	
	Sample* (N=1017) %	Population Adjusted** %	Sample* (N=1009) %	NE4NS - Population Adjusted** %
Do you receive the IMAS benefit?				
I do not know	0.1(1)	0	NA	NA
No	77.0(783)	73.8	75.7(762)	80.5
Prefer not to say	0.4(4)	0.4	NA	NA
Yes	22.5(229)	25.8	24.3(244)	19.5
Do you have the INCOPESCA license?				

I do not know	0.1(1)	0.2	0.2(2)	0.2
No	68.2(694)	73.8	78.9(724)	79.6
Prefer not to say	0.3(3)	0.1	0.2(2)	0.1
Yes	31.4(319)	25.9	20.7(190)	20.1
In your most current job, who is your employer (this is the person who pays you)?				
I do not have an employer (artisanal fishing, owner of their own boats, etc.)	29.3(231)	26.4	13.9(140)	12.4
I do not know	0.6(5)	0.4	0.3(3)	0.2
Other	15.3(121)	14.8	21.9(221)	20.9
Owner of the fishing boat	42.7(337)	44.6	41.0(414)	43.5
Prefer not to say	0.5(4)	0.8	0.1(1)	0.1
Sub-contractor	11.5(91)	13	22.8(230)	22.9
Did the employer/intermediary pay the recruitment fee?				
I do not know	0.5(5)	0.2	0.4(4)	0.3
No	50.3(512)	43.8	38.4(387)	37.1
Prefer not to say	0.4(4)	0.5	NA	NA
There was no fee	45.6(464)	52.9	59.9(604)	61.0
Yes	3.1(32)	2.6	1.4(14)	1.5
Did employer remove the fee from your salary?				
I do not know	0.3(3)	0.1	16.7(3)	13.4
No	1.9(19)	1.7	16.7(3)	10.6
Prefer not to say	0.2(2)	0.3	5.6(1)	4.2
There was no fee	96.0(976)	96.7	NA	NA
Yes	1.7(17)	1.3	61.1(11)	71.8

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

PRIF INDICATORS

Abuses During Recruitment Phase

Table 9 depicts the proportion of those working in the fishing industry who reportedly experienced abuse during recruitment either for their current job or ever. Although the overall sample sizes for both methods

were small (less than 100 respondents that ever experienced exploitation during recruitment), feeling obligated during recruitment to work for a job was the most reported, with ~62% of PPS respondents and ~48% of LTS respondents expressing feeling obligated while being recruited for their current job. Between 41% and 49% of workers in both samples reported ever feeling obligated during recruitment to work for a job. For PPS respondents, the next most reported abuse was feeling cheated or lied to about the nature of the job or specific responsibilities, with 45% of the sample reporting such situations in their current situation. For LTS respondents, 45.8% of the population reported both feeling cheated or lied to about the nature of the job or specific responsibilities and that they were required to do things that were completely different from what they were led to believe.

Of the 24 PPS respondents and 43 LTS respondents who reported some lies/misrepresentation during recruitment, about half of the PPS sample and around 72% of the LTS sample reported that their responsibilities in the current job were different from what they were told. 50% of the PPS sample and about 37% of the LTS sample stated their hours in their current job were different from what was presented to them.

Although the two estimation strategies had a few slight differences, both revealed similar and consistent patterns of abuses that occurred to the respondents during the recruitment phase of their employment. In short, it was not difficult to find fishermen, regardless of which sampling method was used, who were either pressured into taking a job, felt cheated afterwards, and experienced gross misrepresentations of the responsibilities of their anticipated jobs or differences in promised pay. It should be noted that being abducted, confined, kidnapped, or held against one's will during the recruitment phase did occur to some of these individuals, albeit in very small numbers.

Table 9. Abuses During Recruitment				
	In Current Job %	Population Adjusted Current %	Ever Happened %	Population Adjusted Ever %
(1) Household Survey				
Q40: Sometimes people are obliged to work at a job against their will. During the recruitment process, did any of the following happen to you? (Select all that apply) (R1S/R2S)				
Sample size (N)	42		76	
Felt obliged during recruitment to work for a job (R1S)	61.9(26)	59.1	48.7(37)	63.3
Were abducted, confined, kidnapped, or held against your will by your employer or people who worked for your employer (R1S)	14.3(6)	9.2	11.8(9)	8.7

	In Current Job %	NE4NS - Population Adjusted Current %	Ever Happened %	NE4NS - Population Adjusted Ever %
Felt cheated or lied to about the nature of your job or specific responsibilities of the work you were supposed to do (R2S)	45.2(19)	62.7	51.3(39)	58.3
Were required to do things that were completely different from what you were led to believe (R2S)	33.3(14)	44.6	35.5(27)	48.9

Q41 Thinking about the most recent time this happened, can you tell me what lies/misrepresentations were used regarding the nature of the services to deceive you into accepting the job? (Select all that apply) (R2S)

Sample size (N)	24		56	
Responsibilities were different from what was told	50.0(12)	76.2	46.4(26)	58.5
Nature of work was different	37.5(9)	34.7	26.8(15)	28.3
Hours of work were different	50.0(12)	90.1	32.1(18)	45.8
Vacation/time off was different	25.0(6)	35.5	14.3(8)	26.1
Other	29.2(7)	19.8	26.8(15)	24.9
Prefer not to say	0.0(0)	0	3.6(2)	5.2
Not Applicable	0.0(0)	0	0.0(0)	0
	In Current Job %	NE4NS - Population Adjusted Current %	Ever Happened %	NE4NS - Population Adjusted Ever %

(2) Link Tracing

Q40: Sometimes people are obliged to work at a job against their will. During the recruitment process, did any of the following happen to you? (Select all that apply) (R1S/R2S)

Sample size (N)	59		97	
Felt obliged during recruitment to work for a job (R1S)	47.5(28)	40.6	41.2(40)	37.1
Were abducted, confined, kidnapped, or held against your will by your employer or people who worked for your employer (R1S)	10.2(6)	6.2	9.3(9)	7.8

Felt cheated or lied to about the nature of your job or specific responsibilities of the work you were supposed to do (R2S)	45.8(27)	33.3	51.5(50)	41.8
Were required to do things that were completely different from what you were led to believe (R2S)	45.8(27)	54.0	43.3(42)	47.2
Q41 Thinking about the most recent time this happened, can you tell me what lies/misrepresentations were used regarding the nature of the services to deceive you into accepting the job? (Select all that apply) (R2S)				
Sample size (N)	43		73	
Responsibilities were different from what was told	72.1(31)	60.2	65.8(48)	51.7
Nature of work was different	39.5(17)	34.5	37.0(27)	31.4
Hours of work were different	37.2(16)	20.6	34.2(25)	19.9
Vacation/time off was different	9.3(4)	6.2	6.8(5)	4.4
Other	9.3(4)	4.5	15.1(11)	9.1
Prefer not to say	2.3(1)	1.2	1.4(1)	0.7
Not Applicable	0.0(0)	0	0.0(0)	0

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

Abusive Employment Practices and Penalties

Table 10 shows that 5.9% of the PPS sample and 6.4% of the LTS sample reported their employer had ever withheld compensation and/or benefits to prevent them from leaving their job. The amount of compensation withheld averaged 133,085 CRC in the PPS sample and was lower, at 90,987.5 CRC, in the LTS sample. In their current job, 27% of PPS workers and 34.3% of LTS workers reported their employer had reduced the value of goods or services they provided, with 30.9% of PPS workers and 36.1% of LTS workers reporting that this had ever happened in an employment situation. In most cases, the devalued good or service was the price of fish and other seafood. Between 16-17% of both samples reported their employer had in any job charged them fees or inflated prices for goods/services purchased. The goods and services that a lot of the fishermen were overcharged for included gas for the boats, boat rentals, and fishing equipment.

Table 10. Abusive Employment Practices and Penalties				
	In Current Job %	Population Adjusted Current %	Ever Happened %	Population Adjusted Ever %
(1) Household Survey				

	In Current Job %	NE4NS - Population Adjusted Current %	Ever Happened %	NE4NS - Population Adjusted Ever %
Sometimes people work for employers who do not let them leave their jobs. Has your employer or people who work for your employer				
1. Withheld your compensation and/or benefits to prevent you from leaving? (EP01)	2.5(25)	2.7	5.9(48)	5.1
2. Told you that you would lose your compensation already earned if you decided to quit?	3.2(33)	3.8	6.5(53)	6.5
How much was withheld? (In CR)				
Mean	134161.2	110360.4	133085.1	112987.4
(Std. Dev.)	153397.3	128497.3	162706.2	156227.2
[Range]	0-500000	0-500000	0-600000	0-600000
Have you ever felt that an employer/broker or whoever economically benefits from your labor				
Charged you fees or inflated the prices for goods/services you purchased from your employer (EP02) (1)	18.2(116)	17.7	17.4(152)	15.1
Reduced the value of goods you produced or services you provided (EP02) (2)	27.0(200)	29.6	30.9(282)	30.1
Tried to reduce your compensation by charging you excessive fees for things such as rent, food, or other items you consumed at the workplace (EP02) (3)	11.4(71)	14.2	12.1(101)	14.2
	In Current Job %	NE4NS - Population Adjusted Current %	Ever Happened %	NE4NS - Population Adjusted Ever %
(2) Link Tracing				
Sometimes people work for employers who do not let them leave their jobs. Has your employer or people who work for your employer				
1. Withheld your compensation and/or benefits to prevent you from leaving? (EP01)	2.4(24)	2.4	6.4(49)	6.4

2. Told you that you would lose your compensation already earned if you decided to quit?	2.1(21)	2.1	5.4(41)	5.4
How much was withheld? (In CRC)				
Mean	72761.9	63739	90987.5	142790
(Std. Dev.)	102481.2	23599	137838.7	62811
[Range]	0-400000	-	0-600000	-
95% CI	-	(17486.28, 109992.5)	-	(19682.43, 265897.1)
Have you ever felt that an employer/broker or whoever economically benefits from your labor				
Charged you fees or inflated the prices for goods/services you purchased from your employer (EP02) (1)	16.2(97)	21.7	16.0(129)	20.3
Reduced the value of goods you produced or services you provided (EP02) (2)	34.3(233)	37.9	36.1(297)	39.1
Tried to reduce your compensation by charging you excessive fees for things such as rent, food, or other items you consumed at the workplace (EP02) (3)	10.1(59)	8.0	9.7(77)	9.1

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

Violations of Personal Life and Property

As shown in Table 11, the use of threats to workers' personal lives and property was generally uncommon in both PPS and LTS samples. Between 1.3-1.4% of both samples reported their current employer threatened to isolate or did isolate them from their family.

In both samples, threats to exclude them from future employment constituted the most commonly reported abuse that had ever happened. Within the PPS sample, 4.4% reported experiencing threats to be excluded from future employment in their current job, while 5.5% reported such threats had ever happened to them. Exclusion from future employment opportunities was also the most frequently reported threat in the LTS sample, with 7.2% experiencing such threats in their current job and 7% having ever experienced such threats.

Table 11. Personal Life and Property				
	In Current Job %	Population Adjusted Current %	Ever Happened %	Population Adjusted Ever %
(1) Household Survey				
Sometimes, employers want to have control over people's lives outside their job. Has your employer or people who work for your employer ever attempted to control your personal life outside work in any of these ways?				
Controlled through blackmail, that is threatened to reveal something personal/embarrassing about you (PL1S/PL02/PL04)	1.9(14)	1.1	2.0(19)	1.9
Controlled through religious retribution (any punishment because of your religious beliefs or practices) (PL1S/PL02/PL04)	1.3(10)	1.3	0.9(8)	0.5
Controlled by threatening to exclude you from future employment opportunities (PL1S/PL02/PL04)	4.4(33)	5.1	5.5(51)	6
Controlled you by threatening to, or actually isolating you from your family	1.3(10)	1.6	1.1(10)	1
Controlled you by threatening to, or actually isolating you from your friends (being ostracized) (PL1S/PL02/PL04)	1.7(13)	1.6	1.4(13)	1.4
Controlled you by making you perform sex acts to pay off your outstanding debt or wage advance (PL1S/PL02/PL04)	0.5(4)	0.2	0.5(5)	0.2
	In Current Job %	NE4NS - Population Adjusted Current %	Ever Happened %	NE4NS - Population Adjusted Ever %
(2) Link tracing				
Sometimes, employers want to have control over people's lives outside their job. Has your employer or people who work for your employer ever attempted to control your personal life outside work in any of these ways?				

Controlled through blackmail, that is threatened to reveal something personal/embarrassing about you (PL1S/PL02/PL04)	2.3(13)	2.4	1.8(15)	2.7
Controlled through religious retribution (any punishment because of your religious beliefs or practices) (PL1S/PL02/PL04)	0.5(3)	0.5	0.2(2)	0.2
Controlled by threatening to exclude you from future employment opportunities (PL1S/PL02/PL04)	7.2(42)	8.2	7.0(57)	7.2
Controlled you by threatening to, or actually isolating you from your family	1.4(8)	2.9	1.5(12)	3.4
Controlled you by threatening to, or actually isolating you from your friends (being ostracized) (PL1S/PL02/PL04)	1.4(8)	1.2	1.7(14)	2.3
Controlled you by making you perform sex acts to pay off your outstanding debt or wage advance (PL1S/PL02/PL04)	1.2(7)	1.2	0.4(3)	0.5

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

Degrading Working Conditions

Table 12 reports the percentage of fishermen who were required to be available to their employer day and night, or to work extra hours without adequate pay. In the PPS sample, 4.3% of workers said they experienced such situations in their current job, while about 10.7% reported this type of situation had ever happened to them. Within the LTS sample, 4.5% report this situation in their current job and 9.3% report that it has ever happened.

Table 12. Degrading Conditions				
	In Current Job %	Population Adjusted Current %	Ever Happened %	Population Adjusted Ever %
(1) Household Survey				
Has your employer ever required you to be available day and night or to work extra hours without adequate pay outside the scope of your contract (these are not compensated overtime hours)? (DC1S)				
Yes	4.3(44)	4.3	10.7(70)	10.3
(2) Link Tracing				

Has your employer ever required you to be available day and night or to work extra hours without adequate pay outside the scope of your contract (these are not compensated overtime hours)? (DC1S)				
Yes	4.5(45)	4.1	9.3(67)	10.3

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

Restriction of Freedom of Movement

Table 13 shows frequencies of workers who report having their freedom of movement or communication restricted. Within the PPS sample, only 0.9% reported their current employer had taken their identity papers, while 1.7% reported that this had ever happened said their current employer made it so they were unable to access their identity papers. Of the few respondents that had experienced an employer confiscating their identity papers or making workers unable to access those papers ever, the majority (68.8%) reported the document confiscated was an identity card. Within the LTS sample, 0.4% reported their current employer confiscated their identity papers and 1.1% reported that this had ever happened. Compared to the PPS sample, a similar proportion of LTS respondents reported their employer had confiscated identity papers (66.7%).

In terms of limiting freedom of movement, one of the most common tactics by current employers in both samples was being kept under surveillance, with just over 5% reporting such restrictions occurring in their current job for PPS and 5% for LTS. Regarding limitations on ability to communicate, a little over 5% of the PPS sample also reported they were prevented or restricted from communicating with friends or family members in their current job; in the LTS sample, only 1.6% reported experiencing this in their current job. In this sample, almost 5% of both samples report they were restricted on where they could go during non-work hours in their current job. In sum, findings from both estimation strategies were similar in that restriction of freedom of movement was relatively low in occurrences.

Table 13. Freedom of Movement				
	In Current Job %	Population Adjusted Current %	Ever Happened %	Population Adjusted Ever %
(1) Household Survey				
Has your employer/people who work for your employer ever taken/confiscated your identity papers or made it so you were unable to access your identity papers (e.g. passport, work permit)? (FM1S)				
Yes	0.9(9)	1.6	1.7(16)	2.5
If yes, which documents (check all that apply)? (FM1S)				
Sample Size (N)	9		16	
Passport	22.2(2)	3.7	31.2(5)	20.6
Identify Card	77.8(7)	180.1	68.8(11)	130.9

Visa	11.1(1)	1.8	6.2(1)	1
Work Permit	22.2(2)	53.2	18.8(3)	31.5
Birth Certificate	0.0(0)	0	0.0(0)	0
Other	0.0(0)	0	6.2(1)	6.2
Sometimes, employers want to have control over people's lives outside their job. Has your employer or people who work for your employer ever attempted to control your personal life outside work in any of these ways? (PL1S)				
You were forbidden from leaving the work site (FM3S)	3.9(29)	6.4	5.4(50)	6.9
You were kept under surveillance (FM3S)	5.3(40)	5.6	7.0(66)	7
You were kept in an isolated place with nowhere to go (FM3S)	1.6(12)	2.5	2.3(21)	2.8
You were locked in the workplace or living quarters (FM3S)	1.2(9)	2.1	1.5(14)	1.6
You were restricted on where you could go during non-work hours	4.9(37)	6.5	5.4(50)	6.3
Your phone was confiscated (FM3S) (25)	3.9(29)	6.4	2.3(21)	1.8
You were prevented or restricted from communicating freely with your family, including making or receiving phone calls to/from them (FM3S) (7)	5.3(40)	5.6	2.7(25)	3.2
You were prevented or restricted from communicating freely with other workers (8)	1.6(12)	2.5	3.1(29)	2.8
You were prevented or restricted from communicating freely with others outside the workplace (9)	1.2(9)	2.1	3.1(29)	2.8
You were not permitted to seek or receive medical services when you fell ill (10)	4.6(35)	4.6	5.2(48)	5.2
You were not allowed to have visitors (11)	1.5(11)	1.6	2.2(20)	2.6

	In Current Job %	NE4NS - Population Adjusted Current %	Ever Happened %	NE4NS - Population Adjusted Ever %
You were forced to work when you refused to (12)	2.5(19)	2.2	3.8(36)	3.7

(2) Link Tracing

Has your employer/people who work for your employer ever taken/confiscated your identity papers or made it so you were unable to access your identity papers (e.g. passport, work permit)? (FM1S)

Yes	0.4(4)	0.5	1.1(9)	2

If yes, which documents (check all that apply)? (FM1S)

Sample Size (N)	4		9	
Passport	0.0(0)	0	22.2(2)	8.1
Identify Card	100.0(4)	100	66.7(6)	37.9
Visa	0.0(0)	0	0.0(0)	0
Work Permit	25.0(1)	16.9	22.2(2)	58.8
Birth Certificate	0.0(0)	0	0.0(0)	0
Other	0.0(0)	0	0.0(0)	0

Sometimes, employers want to have control over people's lives outside their job. Has your employer or people who work for your employer ever attempted to control your personal life outside work in any of these ways? (PL1S)

You were forbidden from leaving the work site (FM3S)	4.0(23)	3.7	4.4(36)	4.0
You were kept under surveillance (FM3S)	5.0(29)	6.8	5.9(48)	7.7
You were kept in an isolated place with nowhere to go (FM3S)	0.4(2)	0.4	0.5(4)	0.4
You were locked in the workplace or living quarters (FM3S)	1.6(9)	1.2	1.0(8)	0.6
You were restricted on where you could go during non-work hours	4.7(27)	3.9	5.8(47)	5.4
Your phone was confiscated (FM3S) (25)	1.1(6)	1.3	1.0(8)	1.0

You were prevented or restricted from communicating freely with your family, including making or receiving phone calls to/from them (FM3S) (7)	1.6(9)	1.6	2.0(16)	2.9
You were prevented or restricted from communicating freely with other workers (8)	1.2(7)	1.0	1.8(15)	2.0
You were prevented or restricted from communicating freely with others outside the workplace (9)	2.5(14)	3.2	2.2(18)	2.6
You were not permitted to seek or receive medical services when you fell ill (10)	4.3(25)	3.6	5.4(44)	4.2
You were not allowed to have visitors (11)	2.5(14)	2.7	2.5(20)	2.8
You were forced to work when you refused to (12)	3.7(21)	3.6	4.3(35)	4.2

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

Debt or Dependency

As shown in Table 14, 8.9% of the PPS sample reported having a debt imposed on them by their current employer; of those that had experienced an employer-imposed debt, the average value of that debt was 1,297,060 CRC. However, the population estimate for the average amount of debt imposed by an employer is 1,576,578 CRC.

For LTS workers, 10.4% reported having a debt they did not agree with imposed on them by their current employer; of the fishermen in this sample that had a debt imposed by their employer, the average amount of debt was 95,646 CRC. For the population, the average amount of debt was estimated to be around 137,029 CRC.

Table 14. Debt or Dependency				
	Household Survey		Link Tracing	
	Sample* (N=1017) %	Population Adjusted** %	Sample* (N=1009) %	NE4NS - Population Adjusted** %
Have you ever had a debt imposed on you without your consent by your employer? For instance, has your employer / person who derived economic benefit from your labor decided that you owed them money for reasons you didn't agree with (this may include taking on someone else's debt, including a family member; this does not include a debt imposed during recruitment)? (DD01)				

I do not know	NA	NA	0.1(1)	0.1
No	91.1(820)	93	89.5(698)	90.3
Yes	8.9(80)	7	10.4(81)	9.5
If yes, how much did the debt cost? (in CRC)				
Mean	1297060.3	1576578.4	95646.4	137029.38
Std. Dev.	5313051.2	5830330.4	138770.4	40801
Range	1-24000000	1-24000000	1-450000	-
95% CI	-	-	-	(57061.31, 216997.4)

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

Violence or Threats of Violence in their Workplace

Table 15 shows the proportion of workers who reported experiencing violence or threats of violence from their employer. By and large, violence or threats of violence in their workplace were relatively rare (although not zero) in both samples. Within the PPS sample, 3.1% of workers reported experiencing physical violence used against them and 1.2% reported experiencing sexual violence. Additionally, 2% reported experiencing physical violence used against someone they care about and 0.4% reported having experienced sexual violence used against someone they care about. However, a higher number (7.3%) of workers in the PPS sample reported an employer had ever used physical violence against them, while 10% of those in the LTS sample reported experiencing physical violence ever in a job. Of those in the PPS survey who reported experiencing physical violence ever by an employer, over 43% reported an employer pushing, shaking, or throwing something at them. The LTS sample reported similar experiences, with 6.2% stating an employer had ever used physical violence against them and 3.7% reporting an employer had used sexual violence against them. However, there was much lower reporting of physical or sexual violence used against someone the respondent cared about in this sample. In this sample the top physical abuses were pushing, shaking, or throwing something (~70%) and punching (40%).

Table 15. Violence and Threats of Violence				
	In Current Job %	Population Adjusted Current %	Ever Happened %	Population Adjusted Ever %
(1) Household Survey				
Has your employer or people who work for your employer ever				
Used physical violence against you (V3S)	3.1(32)	2.6	7.3(74)	6.7

Used physical violence against someone you care deeply about (V3S)	2.0(20)	2	2.9(30)	3.7
Used sexual violence against you (V4S)	1.2(12)	0.9	1.7(17)	1.8
Used sexual violence against someone you care deeply about (V4S)	0.4(4)	0	1.0(10)	0.7
If your employer ever used physical violence against you, which of the following did they do? (Select all that apply)				
Pushed you, shook you or throw something at you (V3S)	4.2(6)	4.6	43.2(19)	45
Slapped you about or twisted your arm (V3S)	1.4(2)	0.6	18.2(8)	11.7
Punched you with their fist or with something that could hurt you (V3S)	2.1(3)	0.9	25.0(11)	15.5
Kicked you or dragged you (V3S)	2.1(3)	1.3	13.6(6)	8.5
Tried to strangle or burn you (VS3)	2.1(3)	1.3	6.8(3)	4.3
Attacked you with a knife, gun, or other type of weapon (VS3)	2.8(4)	4	20.5(9)	31.2
If your employer ever used physical violence against someone you care deeply about, which of the following did they do? (Select all that apply)				
Pushed you, shook you or throw something at you (V3S)	2.1(3)	2	17.4(8)	22.3
Slapped you about or twisted your arm (V3S)	1.4(2)	0.6	8.7(4)	5.8
Punched you with their fist or with something that could hurt you (V3S)	1.4(2)	0.6	10.9(5)	6.4
Kicked you or dragged you (V3S)	1.4(2)	0.6	6.5(3)	4.1
Tried to strangle or burn you (VS3)	2.1(3)	1.3	6.5(3)	4.1

Attacked you with a knife, gun, or other type of weapon (VS3)	2.1(3)	3.9	15.2(7)	26.6

If someone you care about was subjected to physical or sexual violence, can you tell me your relationship with the person or persons who was/were subjected to violence? (Select all that apply)

Sample size (N)	1		5	
Child	0.0(0)	0	0.0(0)	0
Spouse	0.0(0)	0	20.0(1)	3.2
Parent	0.0(0)	0	0.0(0)	0
Sibling	0.0(0)	0	0.0(0)	0
Other Relative	0.0(0)	0	20.0(1)	14.8
Friend	100.0(1)	16.2	60.0(3)	38.4
Other	0.0(0)	0	20.0(1)	14.8

	In Current Job %	NE4NS - Population Adjusted Current %	Ever Happened %	NE4NS - Population Adjusted Ever %
(1) Link Tracing				
Has your employer or people who work for your employer ever				
Used physical violence against you (V3S)	6.2(63)	7.3	10.0(101)	9.9
Used physical violence against someone you care deeply about (V3S)	3.7(37)	6	6.0(61)	7.5
Used sexual violence against you (V4S)	0.2(2)	0.1	1.1(11)	0.7
Used sexual violence against someone you care deeply about (V4S)	0.5(5)	1.1	1.3(13)	1.7

If your employer ever used physical violence against you, which of the following did they do? (Select all that apply)

Pushed you, shook you or throw something at you (V3S)	62.9(22)	77.1	74.1(43)	78.1
Slapped you about or twisted your arm (V3S)	22.9(8)	18.6	32.8(19)	30.9

Punched you with their fist or with something that could hurt you (V3S)	40.0(14)	60.7	48.3(28)	60.6
Kicked you or dragged you (V3S)	17.1(6)	13	20.7(12)	16.3
Tried to strangle or burn you (VS3)	8.6(3)	6.4	10.3(6)	8.3
Attacked you with a knife, gun, or other type of weapon (VS3)	25.7(9)	65.3	43.1(25)	54.2
If your employer ever used physical violence against someone you care deeply about, which of the following did they do? (Select all that apply)				
Pushed you, shook you or throw something at you (V3S)	40.9(9)	70.7	57.1(20)	66.7
Slapped you about or twisted your arm (V3S)	18.2(4)	14.1	28.6(10)	26.5
Punched you with their fist or with something that could hurt you (V3S)	31.8(7)	66.7	42.9(15)	61.5
Kicked you or dragged you (V3S)	9.1(2)	6.2	11.4(4)	8.1
Tried to strangle or burn you (VS3)	13.6(3)	10.3	11.4(4)	7.1
Attacked you with a knife, gun, or other type of weapon (VS3)	40.9(9)	74.9	57.1(20)	72.1
If someone you care about was subjected to physical or sexual violence, can you tell me your relationship with the person or persons who was/were subjected to violence? (Select all that apply)				
Sample size (N)	3		6	
Child	0.0(0)	0	16.7(1)	5.1
Spouse	0.0(0)	0	0.0(0)	0
Parent	0.0(0)	0	0.0(0)	0
Sibling	0.0(0)	0	16.7(1)	3.8
Other Relative	0.0(0)	0	0.0(0)	0
Friend	0.0(0)	0	0.0(0)	0
Other	100.0(3)	100	66.7(4)	91.1

SUMMARY OF KEY OUTCOMES ON FORCED LABOR VICTIMIZATION AT PRESENT JOB

Table 16 shows the proportion of workers from each sample whose experience met the definition of forced labor, according to the two thresholds established by the PRIF HT Core Indicators. The *first threshold*, the more stringent one, was defined as fishermen reporting either of the following: having to perform sex acts to pay off debt or receive wages, or losing their freedom of movement through surveillance, isolation, or being locked in the workplace, or losing freedom to communicate with friends or family. Of fishermen in the PPS sample, 9.8% met this threshold, and may be potential victims of HT. The population estimate for this sample was 10.6%. The proportion of workers meeting this threshold was similar in the LTS sample, with 7.1% reporting one of the requisite workplace abuses. The NE4NS population adjusted estimate for this sample was 9%.

The *second* HT threshold was defined as experiencing two or more of the following: being forced to work against their will; employer preventing them from leaving their job through withholding compensation, or coercive debt agreements; employer preventing them from leaving through threats/blackmail; working in degrading conditions; having debt imposed on them by their employer; and employer preventing them from leaving through threats of violence. We found larger proportions of the respondents from both samples met this indicator of forced labor. In the PPS sample, 19% of workers experienced at least two of the previously mentioned workplace abuses, with a population estimate of 20.2%. Of workers in the LTS sample, 20.8% met this threshold for trafficking, with a NE4NS population estimate of 23.3%. Upon a closer examination of the positive responses to this threshold, we found that while some of the constituent items, like violence, had only a few positive responses, the proportion of "Yes" responses in wage theft and exploitation was much higher, comparatively. Over 30% in both samples said yes to "Reduced the value of goods you produced or services you provided? (EP02)", which significantly raised the overall proportion of people who met criteria for HT Threshold 2.

In sum, when both thresholds are combined to form the overall prevalence of potential trafficking victims, as defined by the common measures under the PRIF program, both estimation methods produced roughly about the same ratios (i.e., 1 out of every 5 fishermen in Costa Rica had experienced workplace abuses that could qualify as victims of human trafficking).

Table 16. Prevalence of Trafficking Victimization at Present Job							
Household Survey			Link Tracing				
	Sample* (N=1017) %	Population Adjusted** %	Sample* (N=1009) %	VH- Population Adjusted** %	HCG - Population Adjusted ** %	NE4NS - Population Adjusted ** %	NE4NS+ - Population Adjusted ** %
Threshold 1			Threshold 1				
Yes	9.8(100)	10.6	7.1(72)	5.9	6.1	9.0	6.9
No	90.2(917)	89.4	92.9(937)	94.1	93.9	91.0	93.1
Threshold 2			Threshold 2				
Yes	19.0(193)	20.2	20.8(210)	17.4	17.3	23.3	20.5
No	81.0(824)	79.8	79.2(799)	82.6	82.7	76.7	79.5
Either Threshold 1 or Threshold 2			Either Threshold 1 or Threshold 2				
Yes	21.1(215)	21.8	22.4(226)	19.3	19.4	24.4	21.8
No	78.9(802)	78.2	77.6(783)	80.7	80.6	75.6	78.2

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights;

*** Corresponding p-value for HCG weight estimates is 0.05

HCG weighting is only applicable to survey variables which are proportional or categorical, not continuous

Help-Seeking/Services Received

Table 17 shows the help seeking behaviors of the individuals in the fishing industry in both samples. It is important to note that due to a glitch in the survey software during the PPS survey, not everyone who reported experiencing workplace abuse was asked if they ever sought help. Thus, the total number of those individuals who answered the help-seeking questions, whether it be that they did or did not seek help, does not equal the number of individuals who experienced forced labor. The issue with the software was fixed in time for the LTS survey. That said, we will still report findings from both surveys; however, the LTS data is more reliable than the PPS data.

For those that reported experiencing exploitation while working in the fishing industry, respondents were asked why they stayed at the job despite experiencing workplace abuses. The vast majority in both samples (79%-89%) stated that they did not have any better job options, and approximately one-third worried about loss of wages. The PPS sample did report higher rates of physical and emotional abuse as reasons why they stayed at the job than the LTS sample.

Of those who reported experiencing any of the workplace abuses in the survey, 19% of workers in the PPS sample (20.2% adjusted population) and 27.8% of workers (36.4% in the NE4NS adjusted population) in the LTS sample reported seeking help. For both samples, the most common services received were mental health (PPS- 23.8%; LTS – 17.8%), medical services (23.8%-PPS; 6.8%-LTS), or for the PPS sample they reported they were not ultimately helped (42.9%) whereas in the LTS sample 58.9% reported they received other services. In PPS sample, workers most reported getting help from a friend (26.1%) or co-worker (21.7%). For fishermen from the LTS sample who sought help, workers most reported seeking help from a co-worker (20.5%), local law enforcement (23.3%) and an immediate family member (16.4%).

Table 17. Help-seeking Behavior				
	Household Survey		Link Tracing	
	Sample* (N=1017) %	Population Adjusted** %	Sample* (N=1009) %	NE4NS - Population Adjusted** %
Why did you choose to stay? (choose all that apply)				
Sample size (N)	63		146	
Physical Violence	6.3(4)	10.7	0.7(1)	0.3
Physically Restrained	1.6(1)	1.6	0.0(0)	0
Deprived of food, water and/or sleep	0.0(0)	0	2.7(4)	1.7
Sexual Violence	1.6(1)	0.3	0.0(0)	0
Emotional Violence	14.3(9)	12.8	2.1(3)	1.1
Harm to a family member(s) or someone you care about	3.2(2)	8.5	0.0(0)	0

Legal action (including being arrested)	1.6(1)	0.3	0.7(1)	0.3
Withholding of ID cards/citizenship (e.g passport)	6.3(4)	13.8	0.7(1)	0.3
Loss of wages	33.3(21)	50.3	34.2(50)	31.3
Confiscation of savings or other valuables	6.3(4)	12.2	0.0(0)	0
Too far from home and nowhere to go	11.1(7)	31.5	2.1(3)	1.4
Kept drunk/drugged	3.2(2)	0.4	0.0(0)	0
No better job options	79.4(50)	96.9	89.0(130)	89.0
Restrictions in communication	3.2(2)	5.4	1.4(2)	0.8
Have you ever sought help for any of the situations you disclosed above?				
No	70.6(89)	74.2	70.3(185)	61.5
Prefer not to say	10.3(13)	5.7	1.9(5)	2.1
Yes	19.0(24)	20.2	27.8(73)	36.4
If yes, who did you seek help from? (check all that apply)				
Sample size (N)	23		73	
Home country embassy/consulate	0.0(0)	0	0.0(0)	0
Overseas organization in foreign country	0.0(0)	0	0.0(0)	0
Spouse	0.0(0)	0	0.0(0)	0
Immediate family (mother, father, grandparents, siblings)	8.7(2)	6.3	16.4(12)	11.5
Extended family (aunt, uncle, cousin, niece, nephew, in-laws)	8.7(2)	9.7	1.4(1)	0.8
Friend	26.1(6)	27.2	11.0(8)	14.0
Co-worker	21.7(5)	28.9	20.5(15)	12.7
Local service provider/counselor	0.0(0)	0	2.7(2)	1.2
Lawyer	8.7(2)	6.2	2.7(2)	8.6
Local law enforcement	17.4(4)	13.5	23.3(17)	26.4

Neighbor/Community member	8.7(2)	11.7	5.5(4)	2.6
Faith or religious community	4.3(1)	3	2.7(2)	1.5
Stranger	0.0(0)	0	0.0(0)	0
Other	34.8(8)	37.5	63.0(46)	47.6
If yes, what kind of help did they provide? (check all that apply)				
Sample size (N)	21		73	
Shelter, food, clothing	14.3(3)	19.8	6.8(5)	11.2
Mental health support	23.8(5)	22.9	17.8(13)	8.8
They contacted law enforcement	4.8(1)	3.3	9.6(7)	4.8
They contacted my home country embassy/consulate	0.0(0)	0	0.0(0)	0
They contacted a service provider	0.0(0)	0	1.4(1)	0.6
They bought me to a medical doctor	23.8(5)	26.4	6.8(5)	4.5
They didn't end up helping me	42.9(9)	50.6	17.8(13)	18.8
Other	19.0(4)	33.6	58.9(43)	69.5

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

EXPLORING RISK/PROTECTIVE FACTORS IN VICTIMIZATION OF FORCED LABOR

Finally, we conducted data mining that involved multivariate statistical analysis to explore risk factors (or conversely, protective factors) associated with the likelihood experiencing forced labor victimization, as many factors are associated with a person's susceptibility to trafficking abuses in the fishing industry in Costa Rica. We grouped these covariates into several broad categories, including: (1) demographic profile, such as gender, age, and immigration status; (2) nature of work (i.e., the type of work); and (3) other factors. Chances of encountering forced labor situations are presented as odds ratios, with 95% nominal CIs calculated based on an exponential transformation and the CLT.

For ease of interpretation, we used a main effects model with all predictors as a basic logistic regression model. Further, to better understand the substantive meanings of the significant odds rations (OR) as listed in the following tables, we also present the average marginal effects (AME) and the CIs, as well as the frequency and counts of the categories in all covariates. We applied a stepwise algorithm to arrive at a parsimonious model. Two groups of covariates were of particular interest to our exploration of risk/protective factors: (1) the size of fishing vessels and range; and (2) specific type of jobs in the fishing industry. To gain clarity, we conducted two separate analyses to differentiate these two sets of covariates. We found several interesting patterns.

As shown in Table 18, in our PPS household survey sample, we found that, relative to married people, those had never married or belong the other marital category (e.g., divorced, separated, and widowed) were more likely to become victimized. For instance, those fishermen who had never married were about 85% more (OR=1.85) likely to be victimized than their married counterparts; those divorced/separated/widowed (coded as "other") were 2.3 times as likely as the married fishermen to be victimized. Further, having children at home was clearly associated with increased risks of being victimized. Those with 1-2 children at home were about 3.8 times as likely to be victimized as those without children; and those with 3 or more children were about 5.3 times as likely. These demographic risk factors clearly suggest certain levels of financial desperation that exposed these fishermen to heightened vulnerability. This finding was reinforced by the fact that fishermen unable to pay household bills in the past 6 months were about 1.9 times as likely to be victimized as those who could pay their bills.

Those who engaged in medium range artisanal fishing (i.e., longline fishing more than 40 miles but less than 90 miles offshore) were found to be far more likely (OR=3.25) to be victimized than any other forms of fishing, e.g., close to shore or long-haul fishing. We are intrigued by this finding and would need further research to understand this phenomenon. Working for an intermediary or subcontractor would also increase the odds of encountering trafficking victimizations, OR=3.56.

Table 18. Survey-Weighted Logit Regression of Human Trafficking Indicators on Demographic, Financial, and Employment variables Household Survey with Ship size and Range type (N = 983)					
	AME	Std. Error	Odds Ratio	95% CI	Frequency %(N)
Demographic Factors					
Gender					
Male	0.0294	0.347	1.227	(0.622, 2.422)	67.4(663)
Age Range					
26 to 40	-0.0012	0.411	0.992	(0.443, 2.221)	35.5(349)
41 to 60	-0.0267	0.451	0.837	(0.346, 2.028)	40.2(395)
61 and older	-0.0799	0.536	0.559	(0.196, 1.598)	14.3(141)
Marital Status					
Never Married	0.0908	0.3	1.852*	(1.028, 3.336)	31.5(310)
Other	0.1309	0.352	2.334*	(1.171, 4.656)	9.7(95)
Number of Children					
1 to 2	0.1427	0.367	3.809**	(1.854, 7.827)	35.8(352)

3 or more	0.1945	0.398	5.277**	(2.421, 11.502)	48.3(475)
Currently Attending School					
No	0.0184	0.419	1.137	(0.501, 2.585)	88.4(869)
Educational Level					
Primary School	0.0086	0.304	1.063	(0.586, 1.928)	58.1(571)
Secondary and above	0.0601	0.385	1.487	(0.699, 3.164)	18.0(177)
Country of Citizenship					
Foreigners	0.0667	0.71	1.527	(0.379, 6.146)	5.1(50)
Financial Strains					
Were you able to cover your household bills over the last 6 months					
No	0.0913	0.241	1.867**	(1.163, 2.995)	47.3(465)
Monthly Average Household Expenses					
Between 100,001 - 300,000	0.0261	0.433	1.19	(0.51, 2.78)	9.0(88)
Between 300,001 -500,000	-0.1364	1.371	0.268	(0.018, 3.934)	0.5(5)
Between 500,001 - 700,000	0.3941	0.83	7.945*	(1.561, 40.434)	0.7(7)
More than 700,001	-0.0156	1.605	0.895	(0.038, 20.817)	0.3(3)
Employment Characteristics					
What do you do in your job?					
Small-scale artisanal fishing	0.0228	0.392	1.171	(0.543, 2.526)	60.2(592)
Medium artisanal fishing	0.2095	0.552	3.248*	(1.101, 9.578)	5.8(57)
Advanced artisanal fishing	0.111	0.84	1.956	(0.377, 10.156)	1.5(15)
Semi-industrial fishing	-0.1238	1.606	0.329	(0.014, 7.65)	0.9(9)
Industrial fishing	0.0269	0.961	1.195	(0.181, 7.865)	1.6(16)
Other	0.0062	0.364	1.043	(0.511, 2.128)	44.2(434)
Do you receive the IMAS benefit?					
No	0.0687	0.329	1.648	(0.866, 3.138)	77.5(762)

Do you have the INCOPESCA license?					
Yes	0.0521	0.293	1.414	(0.796, 2.512)	31.1(306)
Age first started working in fishing industry					
0 to 5	-0.191	1.342	0.057*	(0.004, 0.784)	0.7(7)
6 to 8	0.0068	0.431	1.049	(0.45, 2.441)	10.6(104)
9 to 11	0.0612	0.391	1.49	(0.693, 3.203)	12.6(124)
12 to 15	0.0143	0.314	1.104	(0.597, 2.044)	31.8(313)
16 to 18	-0.0077	0.38	0.946	(0.449, 1.992)	11.5(113)
Work for a subcontractor/intermediary					
Not Applicable	-0.0329	0.476	0.749	(0.295, 1.902)	7.7(76)
Yes	0.2146	0.254	3.562**	(2.167, 5.855)	28.8(283)
Intercept		0.899	0.009**	(0.002, 0.053)	

Note: *p<.05; *p<.01

Table 19 presents findings from the LTS, which revealed a few risk/protective factors that were different from those found in the household survey. Being male significantly increased one's likelihood of being victimized than their female counterparts (OR=2.41). Relative to those young people aged 18-25, those in their 26-40 were more than twice (OR=2.11) as likely to be victimized. In comparison, no other age groups were more or less likely than the 18-25 group to experience trafficking violations.

Family finance was again found to predict one's likelihood to be victimized. Those who reported having difficulties in paying household bills were about 60% (OR=1.58) more likely to have experienced HT trafficking violations.

What was interesting was that, for the LTS, the type of board/range of fishing appeared to reveal more risk factors. Those engaging near shore small-scale artisanal fishing (i.e., on panga boats) were 87% more likely (OR=1.87) to be victimized as those in other types of fishing. Similar to the household PPS sample, those engaged in mid-range fishing (i.e., longline fishing more than 40 miles but less than 90 miles offshore) were also more likely to be victimized than those who were not, but by as much as four times (OR=4.04). Whether one had a license to fish was also found to be associated with trafficking violations. Relative to those who did not have a fishing license (i.e., INCOPESCA), those who either didn't know or didn't want to tell were about 3.6 times as likely to be victimized. We also found fishermen (N=12) whose employer paid their recruitment fee were 5.5 times as likely to be victimized, although the small number of cases made the estimation somewhat unstable. Same as the household PPS sample, working for an intermediary or subcontractor would also increase the odds of encountering trafficking victimizations, OR=2.923.

Table 19. Survey-Weighted Logit Regression of Human Trafficking Indicators on Demographic, Financial, and Employment variables
Link Tracing with Ship size and Range type (N = 985)

	AME	Std. Error	Odds Ratio	95% CI	Frequency %(N)
Demographic Factors					
Gender					
Male	0.1192	0.251	2.411**	(1.475, 3.943)	53.1(523)
Non-binary	0.0368	1.138	1.366	(0.147, 12.702)	0.5(5)
Age Range					
26 to 40	0.0977	0.329	2.112*	(1.109, 4.022)	36.5(360)
41 to 60	0.0535	0.36	1.553	(0.767, 3.143)	37.5(369)
61 and older	0.0449	0.424	1.456	(0.634, 3.344)	9.9(98)
Marital Status					
Never Married	0.0426	0.206	1.356	(0.905, 2.03)	44.6(439)
Other	-0.0331	0.335	0.764	(0.396, 1.474)	9.3(92)
Number of Children					
1 to 2	0.0261	0.29	1.215	(0.689, 2.143)	42.0(414)
3 or more	0.0212	0.309	1.173	(0.64, 2.149)	41.5(409)
Currently Attending School					
Yes	0.0743	0.268	1.659	(0.981, 2.807)	14.6(144)
Educational Level					
Less than primary	0.0124	0.234	1.096	(0.692, 1.735)	19.9(196)
Secondary and above	0.0309	0.242	1.248	(0.778, 2.004)	22.2(219)
Country of Citizenship					
Foreigners	0.0516	0.275	1.428	(0.833, 2.446)	12.3(121)
Financial Strains					
Were you able to cover your household bills over the last 6 months					

No	0.0614	0.192	1.583*	(1.086, 2.308)	61.9(610)
Monthly Average Household Expenses					
Between 100,001 - 300,000 (including 2 above 300,000)	0.086	0.379	1.764	(0.839, 3.711)	6.2(61)
Employment Characteristics					
What do you do in your job?					
Small-scale artisanal fishing	0.0837	0.265	1.871*	(1.114, 3.143)	55.9(551)
Medium artisanal fishing	0.2384	0.39	4.044**	(1.884, 8.678)	5.4(53)
Advanced artisanal fishing	0.2126	0.82	3.531	(0.708, 17.615)	0.9(9)
Other^	0.08	0.258	1.798*	(1.084, 2.984)	52.8(520)
Do you receive the IMAS benefit?					
No	0.041	0.233	1.364	(0.864, 2.152)	75.5(744)
Do you have the INCOPESCA license?					
Yes	0.0025	0.24	1.02	(0.637, 1.633)	19.1(188)
Don't know/Prefer not to say	0.211	0.339	3.622**	(1.864, 7.038)	9.0(89)
Did the employer pay the recruitment fee?					
No	0.012	0.212	1.091	(0.72, 1.654)	38.4(378)
Yes	0.2991	0.842	5.516*	(1.06, 28.713)	1.2(12)
Age first started working in fishing industry					
0 to 5	0.3795	1.345	8.654	(0.62, 120.793)	0.6(6)
6 to 8	0.025	0.349	1.206	(0.609, 2.389)	8.2(81)
9 to 11	0.059	0.309	1.524	(0.831, 2.792)	11.8(116)
12 to 15	0.0417	0.24	1.357	(0.848, 2.17)	28.7(283)
16 to 18	-0.011	0.315	0.916	(0.494, 1.698)	13.8(136)
Work for a subcontractor/intermediary					
Not Applicable	-0.0947	0.41	0.332**	(0.149, 0.742)	14.6(144)
Yes	0.1706	0.189	2.931**	(2.026, 4.242)	35.8(353)

Intercept		0.657	0.008**	(0.002, 0.027)	

Note: *p<.05; *p<.01.

^Other ship size and Range type includes: Semi-industrial fishing (shrimp, bolillo), Industrial fishing (tuna, from other countries), and other (extraction of shellfish, artisanal fishing by hand, resale of gasoline, ice, workshops)

Next, we ran analyses to explore if any specific sectors inside the fishing industry would increase the odds of encountering trafficking violations. In this set of analyses, we found a set of similar risk/protective factors. As shown in Table 20, in our household PPS sample, we found that those who were divorced, separated, or widowed were 2.9 times as likely to be victimized as those currently married. Again, those with children were significantly more likely to be victimized than those without. Relative to those without children, those with 1-2 children were about 3.9 times as likely and those with 3 or more children were 4.9 times as likely, clearly suggesting financial burden was perhaps a strong predictor of vulnerability towards HT victimization. Similarly, those who could not pay household bills were 93% (OR=1.93) more likely to experience HT victimization than those who could.

When we closely examined the relationship between specific task or sector within the fishing industry and HT victimization, we found little predictive power in most covariates. The only sector, shrimp peelers, was a significant predictor of HT violation (OR= 2.50. No other roles or jobs within the fishing industry appeared to be more prone to HT victimization than others. Those who received no social benefits and welfare assistance (i.e., IMAS) were 97% (OR=1.97) more likely to experience HT victimization than those who did. Again, as we found earlier in the above-presented analyses, working for an intermediary or subcontractor would increase the odds of encountering trafficking victimizations, OR=3.69.

Table 20. Survey-Weighted Logit Regression of Human Trafficking Indicators on Demographic, Financial, and Employment variables **Household Survey with Fishing Sectors (N = 983)**					
	AME	Std. Error	Odds Ratio	95% CI	Frequency %(N)
Demographic Factors					
Gender					
Male	0.0638	0.373	1.593	(0.766, 3.311)	67.4(663)
Age Range					
26 to 40	0.0035	0.43	1.023	(0.441, 2.376)	35.5(349)
41 to 60	-0.0297	0.473	0.818	(0.323, 2.068)	40.2(395)
61 and older	-0.102	0.528	0.456	(0.162, 1.283)	14.3(141)
Marital Status					
Never Married	0.0827	0.299	1.788	(0.994, 3.214)	31.5(310)
Other	0.1658	0.355	2.903**	(1.448, 5.818)	9.7(95)

Number of Children					
1 to 2	0.1396	0.378	3.688**	(1.757, 7.743)	35.8(352)
3 or more	0.1838	0.43	4.903**	(2.109, 11.396)	48.3(475)
Currently Attending School					
No	0.0181	0.414	1.139	(0.506, 2.566)	88.4(869)
Educational Level					
Primary School	-0.0086	0.295	0.94	(0.527, 1.677)	58.1(571)
Secondary and above	0.0464	0.378	1.362	(0.649, 2.857)	18.0(177)
Country of Citizenship					
Foreigners	0.0379	0.618	1.29	(0.384, 4.329)	5.1(50)
Financial Strains					
Were you able to cover your household bills over the last 6 months					
No	0.0938	0.24	1.927**	(1.204, 3.085)	47.3(465)
Monthly Average Household Expenses					
Between 100,001 - 300,000	0.0164	0.412	1.12	(0.5, 2.51)	9.0(88)
Between 300,001 -500,000	-0.1351	1.351	0.266	(0.019, 3.761)	0.5(5)
Between 500,001 - 700,000	0.4319	0.806	10.253**	(2.111, 49.811)	0.7(7)
More than 700,001	-0.058	1.708	0.635	(0.022, 18.051)	0.3(3)
Employment Characteristics					
What is your role in the fishing sector					
Boat owner	0.0388	0.378	1.304	(0.622, 2.735)	23.2(228)
Combined^	0.0528	0.404	1.419	(0.643, 3.133)	7.8(77)
Captain	0.0683	0.333	1.577	(0.82, 3.032)	20.9(205)
Crew	0.0792	0.357	1.676	(0.833, 3.372)	12.5(123)
Pawn	0.0515	0.294	1.424	(0.8, 2.536)	32.0(315)
Repair Service	0.092	0.446	1.794	(0.749, 4.299)	4.5(44)
Fish Processing	-0.0567	0.346	0.653	(0.332, 1.287)	16.3(160)

Shrimp Peeler	0.1474	0.419	2.497*	(1.098, 5.678)	11.8(116)
Fishing Nets	-0.0191	0.401	0.872	(0.397, 1.913)	9.3(91)
Marketing of Fishery Products	0.0825	0.344	1.716	(0.875, 3.368)	15.8(155)
Shellfish Extraction	0.0887	0.44	1.779	(0.75, 4.216)	15.0(147)
Other	-0.0078	0.445	0.946	(0.395, 2.264)	6.6(65)
Do you receive the IMAS benefit?					
No	0.0884	0.333	1.966*	(1.023, 3.779)	77.5(762)
Do you have the INCOPESCA license?					
Yes	0.0847	0.296	1.764	(0.988, 3.15)	31.1(306)
Age first started working in fishing industry					
0 to 5	-0.198	1.403	0.049*	(0.003, 0.767)	0.7(7)
6 to 8	-0.003	0.438	0.979	(0.415, 2.311)	10.6(104)
9 to 11	0.0173	0.414	1.127	(0.5, 2.537)	12.6(124)
12 to 15	0.0088	0.31	1.063	(0.579, 1.952)	31.8(313)
16 to 18	-0.0089	0.393	0.938	(0.434, 2.025)	11.5(113)
Work for a subcontractor/intermediary					
Not Applicable	-0.0469	0.533	0.643	(0.226, 1.828)	7.7(76)
Yes	0.2153	0.252	3.685**	(2.249, 6.037)	28.8(283)
Intercept		0.867	0.005**	(0.001, 0.027)	

Note: *p<.05; *p<.01.

^ Combined fishing sector includes: Armador, Fish Receiver, Fish Transportation, Dock Helpers, Sales of Supplies, Gasoline, Tourism linked to fishing

In our LTS, we found similar patterns as presented earlier in our analysis on the type of boat or range of fishing activities. As shown in Table 21, we found that being male was 2.27 times as likely to be victimized as women. Compared to young fishermen 18-25, those in their 26-40 were twice as likely (OR=2.10) to be victimized. Having children was not predictive of any risk; however, not being able to pay household bills would increase the odds of being victimized by about 63% (OR=1.63). Similar to findings from the household PPS sample, we did not find any specific roles or sectors within the fishing industry to be associated with increased/decreased risks of encountering HT violations.

Having no idea if one had a fishing license or prefer not to say was associated with increased odds of victimization (OR=3.18). Working for an employer who paid recruitment fees was also associated with increased risk of being victimized. Again, working for an intermediary or subcontractor was 2.86 times as likely to be victimized.

Table 21. Survey-Weighted Logit Regression of Human Trafficking Indicators on Demographic, Financial, and Employment variables
Link Tracing with Fishing Sectors (N = 985)

	AME	Std. Error	Odds Ratio	95% CI	Frequency %(N)
Demographic Factors					
Gender					
Male	0.1123	0.27	2.271**	(1.339, 3.852)	53.1(523)
Non-binary	0.0266	1.079	1.252	(0.151, 10.38)	0.5(5)
Age Range					
26 to 40	0.0958	0.326	2.102*	(1.108, 3.985)	36.5(360)
41 to 60	0.0641	0.363	1.688	(0.829, 3.441)	37.5(369)
61 and older	0.0589	0.438	1.625	(0.689, 3.833)	9.9(98)
Marital Status					
Never Married	0.0362	0.207	1.292	(0.861, 1.939)	44.6(439)
Other	-0.041	0.344	0.717	(0.365, 1.407)	9.3(92)
Number of Children					
1 to 2	0.0282	0.293	1.232	(0.694, 2.186)	42.0(414)
3 or more	0.0189	0.316	1.152	(0.62, 2.141)	41.5(409)
Currently Attending School					
Yes	0.0745	0.265	1.655	(0.985, 2.78)	14.6(144)
Educational Level					
Less than primary	0.016	0.239	1.124	(0.703, 1.795)	19.9(196)
Secondary and above	0.0265	0.241	1.208	(0.754, 1.937)	22.2(219)
Country of Citizenship					
Foreigners	0.0367	0.277	1.29	(0.75, 2.22)	12.3(121)
Financial Strains					
Were you able to cover your household bills over the last 6 months					
No	0.0654	0.196	1.626*	(1.108, 2.388)	61.9(610)

Monthly Average Household Expenses					
Between 100,001 - 300,000 (including 2 above 300,000)	0.0769	0.37	1.663	(0.805, 3.434)	6.2(61)
		Employment Characteristics			
What is your role in the fishing sector					
Boat owner	-0.0352	0.345	0.767	(0.39, 1.507)	15.3(151)
Combined^	0.0762	0.311	1.656	(0.901, 3.045)	7.7(76)
Captain	0.0411	0.31	1.329	(0.723, 2.441)	11.8(116)
Crew	0.0953	0.323	1.855	(0.986, 3.492)	8.9(88)
Pawn	0.0008	0.235	1.006	(0.635, 1.594)	36.5(360)
Fish Processing	0.0368	0.296	1.291	(0.723, 2.305)	10.4(102)
Shrimp Peeler	-0.0007	0.31	0.995	(0.542, 1.827)	22.0(217)
Fishing Nets	-0.0022	0.452	0.984	(0.406, 2.388)	4.0(39)
Shellfish Extraction	-0.0218	0.289	0.851	(0.483, 1.498)	19.5(192)
Other	0.0017	0.406	1.012	(0.457, 2.245)	8.0(79)
Do you receive the IMAS benefit?					
No	0.0357	0.227	1.305	(0.836, 2.038)	75.5(744)
Do you have the INCOPESCA license?					
Yes	0.0103	0.244	1.081	(0.67, 1.742)	19.1(188)
Not Applicable	0.1884	0.353	3.182**	(1.593, 6.353)	9.0(89)
Did the employer pay the recruitment fee?					
No	0.0119	0.21	1.09	(0.722, 1.645)	38.4(378)
Yes	0.3206	0.818	6.048*	(1.217, 30.048)	1.2(12)
Age first started working in fishing industry					
0 to 5	0.354	1.324	7.552	(0.564, 101.078)	0.6(6)
6 to 8	0.0403	0.347	1.345	(0.681, 2.655)	8.2(81)
9 to 11	0.0497	0.316	1.435	(0.773, 2.664)	11.8(116)
12 to 15	0.0495	0.241	1.433	(0.894, 2.297)	28.7(283)

16 to 18	0.0048	0.309	1.038	(0.566, 1.904)	13.8(136)
Work for a subcontractor/intermediary					
Not Applicable	-0.091	0.439	0.357*	(0.151, 0.844)	14.6(144)
Yes	<u>0.1675</u>	0.188	2.864**	(1.982, 4.14)	35.8(353)
Intercept		0.602	0.015**	(0.005, 0.049)	

Note: *p<.05; *p<.01.

^ Combined fishing sector includes: Armador, Fish Receiver, Fish Transportation, Dock Helpers, Sales of Supplies, Repair Service, Gasoline, Marketing of Fishery Products, Tourism linked to fishing

In conclusion, several interesting patterns emerged in our analyses of risk/protective factors associated with likelihood of encountering trafficking abuses. Family finance appeared to be a strong predictor of one's odds of being victimized, suggesting financial desperation as a possible cause of being victimized, such as having children or not being able to pay household bills. With a few exceptions, such as one age group and being male, most demographic variables did not seem to have any influence on the risk of HT victimization. Another consistent predictor of victimization risk is working for a subcontractor or intermediary. By and large, findings from our multivariate analyses appear to suggest that the vulnerability of being victimized could not be associated with any demographic profiles or necessarily attributed to the type of work one chose to engage in. More likely than not, one's situational factors, such as financial desperation and unscrupulous employers as well as personal psychological resiliency and preparedness may be more influential in mediating HT victimization risks.

DISCUSSION AND RECOMMENDATIONS

This study is of significance to the research community for two compelling reasons. First, forced labor in the fishing industry is a form of human trafficking that has received much media attention but little empirical and systematic research. Because of this hidden nature, the topic has not lent itself to much research scrutiny. Second, despite the paucity in empirical knowledge of the problem, the HT research community does not have a clear sense on how best to approach prevalence estimation in the field, particularly when the target populations are hard to reach. Human trafficking research routinely deals with populations that are not only hard to reach but also highly skewed in distribution, thus presenting a constant challenge in our efforts to provide robust prevalence estimation either for advocacy or baseline purposes. We were afforded this rare opportunity to conduct a head-to-head comparison of two well-known sampling methodologies. Through this comparative empirical test, we attempted to answer some of the fundamental questions about what approaches can perform better when it comes to measuring modern slavery, specifically forced labor in the fishing industry. We do not believe there has been any study of this nature and design in the field of HT research. It is difficult to overestimate the potential impact and significance of the study from a methodological perspective. Aside from its methodological significance, we also had a rare opportunity to interact and train local researchers on how to interpret and implement the field procedures as designed. We believe our local partner, IOM Costa Rica, has gained much experience in implementing the study as designed. Their technical know-how and the field experience will place them in a much better position for future studies of a similar nature. In the following sections, we reflect on the knowledge gained from analyzing the two primary estimation strategies and lessons learned.

COMPARISON OF ESTIMATION STRATEGIES

After reviewing the estimation outcomes as presented above, we found that both strategies worked well but provided largely discrepant estimates for the population size; we reiterate that a multistage sampling design is not best suited for estimating the size of a hidden domain of a population, such as in the context of this study. Both sampling strategies required a high level of planning and care to obtain efficient estimates. More detailed reflections on the field procedures employed in these two data collection activities are provided in a report by our field partner in Costa Rica (**Appendix A**). From an analytical point of view, there are several advantages and disadvantages to using one strategy over the other. Below, we summarize our lessons learned and limitations of this study.

As stated earlier, it is clear that the two strategies, PPS and LTS, reached into different parts of the population and gave discrepant estimates on population size as well as some parts of the composition of the population. For this reason, we advocate the use of hybrid methodologies (i.e., the use of two or more strategies in a single study) whenever feasible to 1) increase coverage of the study population, 2) cross validate and possibly combine estimates to give less biased and/or more efficient estimates (for example, through using a weighted average based on the estimated variance of the estimators), and 3) to contribute to the accumulation of knowledge relating to which strategies are best suited for specific studies on hidden populations.

ASSESSMENT OF THE TWO PREVALENCE ESTIMATION METHODS

Overall, both sampling methods were effective in producing population estimates on the scope of forced labor in the fishing industry in Costa Rica. These two estimation strategies provided somewhat different estimates for the population size, and even within the LTS study the population size estimates were fairly discrepant. From the perspective of applied social sciences, both estimation strategies appeared to have worked relatively well. However, the PPS approach was much easier to implement because of the significantly

reduced complexity in tracking and tracing links which is required for LTS. Such designs require an elaborate tracking scheme in order to be able to trace the respondents' referrals and any re-captures. This not only introduced a lot of erroneous data code entries both in Qualtrics and the tracking sheets but increased the overall cost of the survey due to the various incentive structures and required substantial data cleaning, which included NYU and IOM quadruple checking referral coupon numbers in both the survey and tracking sheets. That said, the LTS method did successfully identify harder to reach sub-populations, such as non-Costa Rican nationals and long-haul fishermen, which the PPS-survey was not able to do. Our NSUM application was not a full-fledged one because it was added as a third method after the funding was awarded for PPS and LTS, and we were not able to ask the full breadth of NSUM questions due to time constraints. Thus, the data was not conducive to measuring a respondent's social network with high levels of precision.

On the prevalence rate of HT victimization, both sampling strategies appear capable of detecting violations among the target population. In fact, both sampling strategies yielded somewhat similar findings, as shown in Table 16. Both TIP qualification thresholds performed about the same, with the more stringent criteria (Threshold 1) registering lower occurrence rates than the less stringent ones (Threshold 2). On Threshold 1, PPS uncovered a slightly higher rate of violations than that of the LTS, while on Threshold 2 both estimation strategies were almost identical. In short, both sampling strategies were about the same in detecting HT violations in the fishing population in Costa Rica.

Household PPS Surveys

Advantages:

1. Efficient in establishing a spatial sampling frame when communities have clear boundaries, even when official registry is not available.
2. Can estimate and map hotspots where characteristics of high interest to the study team are most prevalent.
3. Conventional, easy to understand and implement in the field, with established field procedures.
4. Can produce estimates that are conceivably more representative of the general population in the target area.
5. Cost-efficient because enumerator training and supervision were well established and easy to follow; and data are easier to clean and prepare for analysis.
6. Anonymous survey with no follow-ups, thus fewer data safety concerns.
7. True probability sampling design allows for defendable, unbiased estimates of population quantities. However, this only applies to that part of the population which is accessible through an in-person, household-based invitation.
8. Well suited for appending an NSUM module as PPS is a proper, probability-based sampling method for studying populations.
9. Statistical software is readily available to aid with applications of traditional approaches like PPS; this includes sampling from a frame and analyzing data sets.
10. Avoids gaming issues, i.e., when respondents attempt to redeem multiple coupons purely for the purposes of obtaining the incentives.
11. Missing data occurrences are easily handled through imputation procedures based on regression formulas that can be applied to the probability sample.
12. Can be used in combination with adaptive spatial sampling designs, which are designed to sample areas/neighborhoods adjacent to those with a high yield of interesting individuals to increase the total yield of such individuals and produce efficient estimates.

Disadvantages.

1. May be regarded as inefficient for tapping into pockets of the target population where potential victims tend to gather and may reside away from typical residential dwellings, thus producing fewer potential victims in the sample.
2. May be challenging to calculate the selection probabilities when non-response is a function of hidden population membership and covariates cannot be observed with non-response experiences.
3. May not be well suited for efficiently estimating the size of the hidden population, especially when the hidden population is small in relation to the general population.
4. May not offer full coverage of the study population, including transgender women who work in the fishing industry, anyone under the age of 18 (which was not within the scope of this project), those who were currently at sea during the data collection period, and individuals working other jobs outside of Puntarenas during the fishing off-season.

Link Tracing Sampling

Advantages:

1. The most promising feature of LTS is its ability to reach potential victims that would be missed by the conventional household PPS survey, i.e., can offer full or nearly full coverage of the study population. For instance, as shown in the demographic tables of the study samples' statistics, LTS could reach a more non-Costa Rican nationals. This also results in a sample with a higher yield of individuals with characteristics of high interest to the survey team.
2. Easier for estimating the size of the hidden population, as newly developed procedures can be applied to obtain reliable estimates based on the fully observed sample network.
3. Permits analysts to make inferences abut network structures of the study population, which may correlate well with prevalence and assist with strategically implementing intervention strategies.
4. There is a growing body of literature and statistical analysis software, rapidly becoming publicly/freely available, to assist research teams with the planning, administration, and analysis of surveys.
5. LTS permits variants of link-tracing designs that can be adapted once in the field to target individuals/areas of high interest to the survey team.

Disadvantages:

1. Significantly more complicated in planning and execution, thus more costly in field operations.
    a. Significant increase in staff training, and field procedures and supervision—our enumerator training lasted three times as long to prepare and familiarize field procedures.
    b. During the field activities, a separate tracking system must be established to parallel the tablet-based data capturing to keep track of all respondents because of their links, thus creating significantly more burden on supervision and enumerator time in the field to track referrals and record incentive payments.
    c. Increased postscript data cleaning because all respondents interviewed are supposed to be linked to others and there can be multiple links between social networks since our survey was conducted within communities.
2. Significant challenges to keep links verified in a timely manner while in the field, thus challenging postscript data cleaning and quality vetting.
3. Increased incentive costs associated with incentivized recruitment procedures.

4. Collection of potentially identifiable information, thus forcing additional layers of data concerns upon the research team.
5. Sample network weighting schemes still require further research and refinement to provide robust estimates across the wide range of scenarios commonly encountered when studying hidden populations.
6. It is not always clear which LTS designs will serve best for studying a specific hidden population.

Assessment of NSUM

We were unable to implement a full-fledged design of NSUM because of our field condition and survey setup. A proper NSUM study would require carefully measuring the size of a respondent's social network with enough precision to enable dedicated NSUM analyses. These network size measures would have significantly increased the length of our survey and inevitably induce survey fatigue. For instance, a recent study estimating the prevalence of HIV populations in Singapore used questions pertaining to dozens of known populations (Teo et al., 2019), which would have been infeasible in the current study. The length of time required to administer a proper NSUM study would also increase the time enumerators must spend in the field, thus slowing down the data collection pace while increasing costs associated with field logistics and security arrangement. Given the limited design and imperfect measures on the size of one's social network, our NSUM without and with VF estimates are respectively smaller and larger than estimates generated using the other two strategies. Our suggestion is similar to what Salganik et al. (2011b) stated in their study that if further studies confirm what we have found here in Costa Rica, then NSUM is perhaps not appropriate for estimating the size of populations such as that studied here because the NSUM module may be too difficult to design and administer when an already comprehensive survey is to be asked.

Study Limitations

This study has several limitations which shed light on possible avenues for future research. The most salient ones include:

- Data collection activities were limited to daylight hours, thus systematically missing those who were working during these hours and were either not home during the household sampling or were unable to leave their jobs for the LTS sampling.
- Data collection was limited to communities on the Pacific Coast of Costa Rica, thus limiting its generalizability for the Caribbean Sea side of the country.
- Few non-Costa Rican fishermen were captured in either sampling method, particularly the PPS method, suggesting a different recruitment method is required to reach the non-Costa Rican population.
- Because our primary goal was to compare PPS and LTS estimation methodologies, we were unable to implement a full-fledged NSUM design, thus making any NSUM related conclusions open to alternative interpretations.
- Due to institutional mistrust and/or safety concerns, certain groups (e.g., non-Costa Ricans, those involved in criminal activities) were not able to be reached, thus limiting our understanding of prevalence of trafficking among this population, even though they may be most vulnerable.

RECOMMENDATIONS

GENERAL RESEARCH RECOMMENDATIONS

- Hiring field supervisors and enumerators that are residents of the target communities with prior knowledge of the target sector, builds trust, improves data collection efforts, and facilitates decision-making that is sensitive to local realities during the data collection process.
- Conducting household surveys, especially when a monetary incentive is involved, in communities where general violence such as robbery, gun fire, and risk of street violence is common needs to be well thought out in order to reduce risk of injury to any parties involved.
- Enforcing close supervision and a comprehensive tracking system ensures clarity among team members and more accurate monitoring of the surveys conducted in the field.
- Having standardized criteria for the seed selection during the multi-wave LTS methodology favors the participation of diverse population groups within the target sector in the sampling.
- Strategic rotation of enumerators and supervisors among community-based teams, based on their specific technical strengths or knowledge of the local context, ensures rigorous application of surveys.
- During the PPS methodology, the use of geographic information systems (GIS) to create survey sections according to the size of the community ensures rigor of the methodology and contributes to the efficient use of field teams' time. This also allows for the geo-reference of safe spaces and police stations that may be useful in the future.
- During the PPS methodology, having enumerators work in pairs or groups, carrying only sufficient money for incentives, and maintaining constant communication with other teams contributes to mitigating security concerns.
- Training supervisors and enumerators on Psychological First Aid (PFA), vicarious trauma, and how to handle disclosures of gender-based violence (GBV), human trafficking and other forms of violence such as extortion ensures minimal harm is done to the participant.
- Providing field teams with pamphlets or materials containing information about referral pathways for GBV, human trafficking and other forms of violence could be handed out to possible victims and individuals at risk during the data collection process.

POLICY RECOMMENDATIONS

- Awareness campaigns are needed to boost the knowledge of laborers' legal protections and referral pathways.
- Legal and policy reforms are necessary to regularize this highly unprotected sector to ensure basic human and labor rights to those working in the fishing industry, and to ensure a meaningful response for the government to rights-violations
- Biweekly or monthly district visits by governmental and private sector agents will allow for a better understanding of the fishing sector's reality and the dynamics within the communities, promote local understanding, buy-in, and support for anti-trafficking efforts, and establish of strong work relationships between governmental and local stakeholders, and local associations within the fishing industry.
- Secure alliances with key counterparts from all political sides and sectors (which are part of IOM's neutrality and partiality principles), ensures engagement from different relevant actors, such as local associations and governmental institutions.

- Future studies should emphasize the collection of community-led, evidence-based information for decision-making, which encourages interest in knowing the results of the study and participating in future collaborative actions.

REFERENCES

Baillargeon, S. and Rivest, L.-P. (2007). Rcapture: loglinear models for capture-recapture in R. *Journal of Statistical Software, American Statistical Association, 19*, 1-31.

Battaglia, M. P., Izrael, D., Hoaglin, D. C., and Frankel, M. R. (2004). Tips and tricks for raking survey data (aka sample balancing). *Abt Associates, Technical Report.*

Canty, A. J. and Davison, A. C. (1999) Resampling-based variance estimation for labour force surveys. *The Statistician, 48, p.379-391.*

Chan, L., Silverman, B. W., and Vincent, K. (2021). Multiple Systems Estimation for Sparse Capture Data: Inferential Challenges When There Are Nonoverlapping Lists. *Journal of the American Statistical Association, Taylor & Francis, 116*, 1297-1306.

Efron, B. and Tibshirani, R. J. (1994). An Introduction to the Bootstrap. *Chapman and Hall/CRC.*

Fellows, I. E. (2022). Estimating Population Size from a Privatized Network Sample. *Journal of Survey Statistics and Methodology, 10, 1346-1369.*

Fellows, I. E. (2019). Respondent-driven sampling and the homophily configuration graph. *Statistics in Medicine, 38*, 131-150.

Frank, O. & Snijders, T. (1994). Estimating the Size of Hidden Populations Using Snowball Sampling. *Journal of Official Statistics*, *10*, 53-67.

Haghdoost, A., Gohari, M. A., Mirzazadeh, A., Zolala, F., & Baneshi, M. R. (2018). A review of methods to estimate the visibility factor for bias correction in network scale-up studies. *Epidemiology and Health*, **40.**

Handcock, M. S., Gile, K. J., and Mar, C. M. (2015). Estimating the size of populations at high risk for HIV using respondent-driven sampling data. *Biometrics, 71*, 258-266.

Khan, B., Lee, H. W., Fellows, I., and Dombrowski, K. (2018). One-step estimation of networked population size: Respondent-driven capture-recapture with anonymity. *Plos one*, 13(4):e0195959.

Levy, P. and Lemeshow, S. (2011). *Sampling of Populations: Methods and Applications. John Wiley & Sons, New York.*

Rubin, D. B. (1976). Inference and Missing Data. *Biometrika, 63*, 581-592.

Sampford, M. R. (1967). On sampling without replacement with unequal probabilities of selection. *Biometrika, 54,* p. 499-513.

Salganik M. J. (2006). Variance estimation, design effects, and sample size calculations for respondent-driven sampling. *Journal of urban health : bulletin of the New York Academy of Medicine*, *83*(6 Suppl), i98–i112. https://doi.org/10.1007/s11524-006-9106-x

Thompson, S. (2020). New estimates for network sampling. *arXiv preprint 2002.01350.*

Vincent, K. and Thompson, S. (2017). Estimating Population Size With Link-Tracing Sampling. *Journal of the American Statistical Association, 112*, 1286-1295.

Volz, E. and Heckathorn, D. (2008). Probability Based Estimation Theory for Respondent Driven Sampling. Journal of Official Statistics, *24*, 79-97.

APPENDICES

APPENDIX A: IOM FIELD IMPLEMENTATION REPORT

To ensure the 2000 surveys could be conducted, IOM carried out district visits and established strong working relationships with the main governmental and local stakeholders, as well as local associations within the fishing industry. Meetings with key counter-trafficking actors and local stakeholders were conducted to introduce and explain the objective of the project and the dynamics of the work of the field team in the communities. These activities allowed a better understanding of the fishing sector's reality and the dynamics within the communities. It also allowed the field teams to ensure the buy-in of local communities. These meetings and visits also allowed the identification of the initial seeds needed to conduct the link-tracing sampling.

Household Methodology

A list of coastal communities, organized by canton and district, with the estimated size of its population, was developed according to inputs and information given by counterparts during the meetings, and based on literature review. The list also includes security considerations for those areas that are identified as dangerous for surveyors to access.

A map of coastal communities (below) was developed. This map was developed to inform the household survey methodology, according to inputs and information given by counterparts during the meetings. The map was based on the 2011 Census data (National Institute of Statistics and Census of Costa Rica, INEC), which has data on the number of people living in coastal areas, and the 2022 data received from the Joint Institute of Social Assistance (IMAS), which focuses on those persons who receive the social benefit for fishermen/women from the government, was developed using Power Bi to allow the map to be interactive and disaggregate variables. It is worth mentioning that in Costa Rica, there is no demographic study of the fishing sector. According to INCOPESCA, in 2023 the institution will be conducting their own census of the fishing sector.

Estimating the Prevalence of Forced Labor in the Fishing Industry in Costa Rica

Coastal communities on the central and south Pacific coast of Costa Rica

IOM — UN MIGRATION

Manzanillo, Costa de Pájaros, Isla Chira, Morales, Isla Venado, Chomes, Puntarenas, Isla Bejuco, Isla Venado, Isla Jesucita, Paquera, Tárcoles, Cóbano, Quepos, Sierpe, Palma, Golfito, Puerto Jiménez, Zancudo, Pilón, Pavones

Caribbean Sea
Costa Rica
Panamá
Pacific Ocean

Simbology

- Coastal communities

Communities with counterparts
- South pacific
- Central pacific

Angélica Madrigal Brenes
amadrigal@iom.int
Information Management and GIS Specialist
IOM Costa Rica

A map of districts and cantons (below) was developed to inform the household survey methodology, according to inputs and information given by counterparts during the meetings.

IOM — UN MIGRATION

Estimating the prevalence of forced labor in the fishing industry in Costa Rica

Coastal cantons and districts on the Puntarenas province, Costa Rica

Cantón: Puntarenas
1. Cóbano
2. Paquera
3. Lepanto
4. Mazanillo
5. Chomes
6. Chira
7. Pitahaya
8. Puntarenas
10. Chacarita
11. El Roble
9. Barranca

Cantón: Esparza
1. Espíritu Santo
2. San Juan Grande
3. Caldera

Cantón: Garabito
1. Tárcoles
2. Jacó

Cantón: Parrita
1. Parrita

Cantón: Aguirre
1. Quepos
2. Savegre

Cantón: Osa
1. Bahía Ballena
2. Puerto Cortés
3. Sierpe
4. Drake

Cantón: Puerto Jiménez
1. Puerto Jiménez

Cantón: Golfito
1. Golfito
2. Pavón

Caribbean Sea
Pacific Ocean
Panamá
Cantón: Puntarenas
Cantón: Esparza
Cantón: Garabito
Cantón: Parrita
Cantón: Aguirre
Cantón: Osa
Cantón: Golfito
Cantón: Puerto Jiménez

Angélica Madrigal Brenes
amadrigal@iom.int
Information Management and GIS Specialist
IOM Costa Rica

The map below shows communities visited under this project and their security concern (red for high attention or concern, orange for medium attention or concern and green for low).
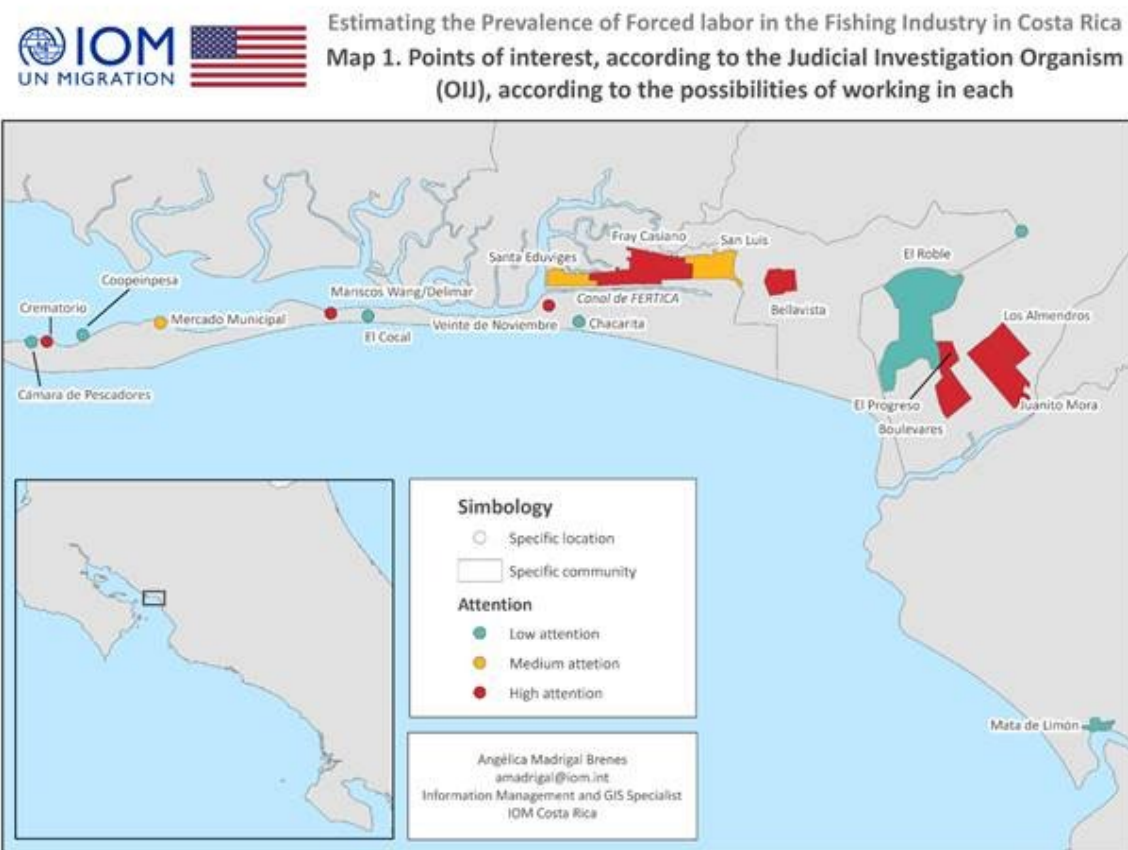
The maps developed during the community cartography exercise were subsequently analyzed by the IOM team to inform the household survey strategy. Districts were divided according to their population size and coastal communities that met high security concerns were discarded so that from the resulting list, 13 of the resulting 29 communities were sampled, and there was an attempt to get 70 interviews per community. Some communities (for example Chacarita), while they have the same name, account for more than 1 community because of their size population-wise.

IOM and NYU conducted a pilot of the survey in Puntarenas Center. The pilot allowed enumerators to clarify their concerns, test the instrument, become familiar with the questions, and understand how to interact with the people working in the fishing industry of Puntarenas. Enumerators learned which techniques work best to engage with local communities while conducting the multistage probability proportionate to size sampling survey (including how to introduce themselves, how to screen those who work in the fishing industry, how to make the surveyed person feel safe to share sensitive stories, etc.) and how to explain what the survey entails to the target population.

Supervisors assigned the communities to be covered to their teams. We select a starting point of the "cuadra" (neighborhood). On Monday, they started knocking on house 1. On Tuesday, they started knocking on house 2. On Wednesday, on house 3, etc. Depending on the size of the block (we counted an estimated number of houses using QGIS and local knowledge), we divided it by the number of surveys we had to complete, and we used the result to decide how many houses we had to "skip" in between surveys.

The below graphic shows the number of surveys conducted with the multistage probability proportionate to size sampling per community in Puntarenas.

Number of surveys conducted with the multistage probability proportionate to size sampling, per community in Puntarenas, Costa Rica
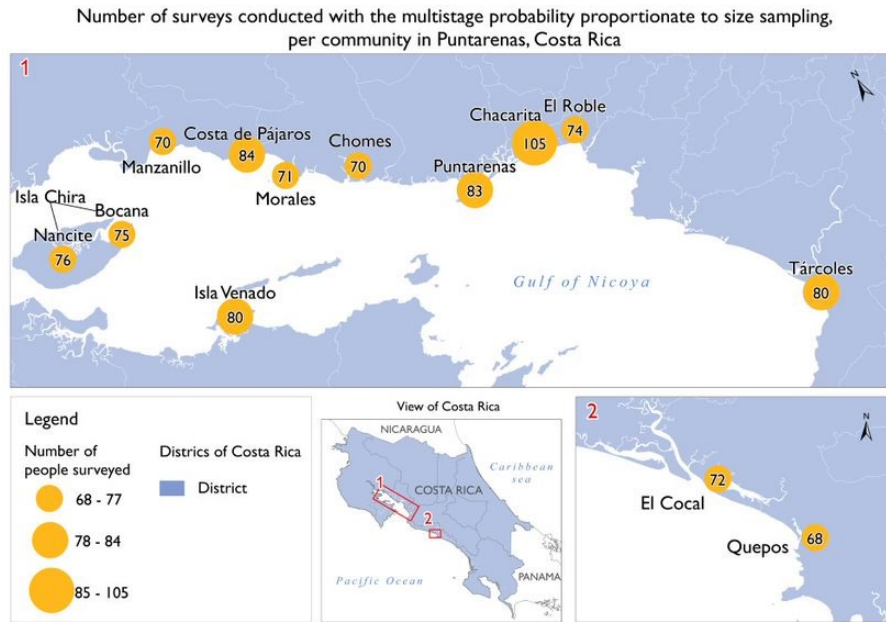
LTS Methodology

The data collection process was finished in mid-February, 2023, with 1021 people working in the fishing industry surveyed with the link-tracing sampling. The graph below shows the number of surveys conducted with the link-tracing sampling per community in Puntarenas.
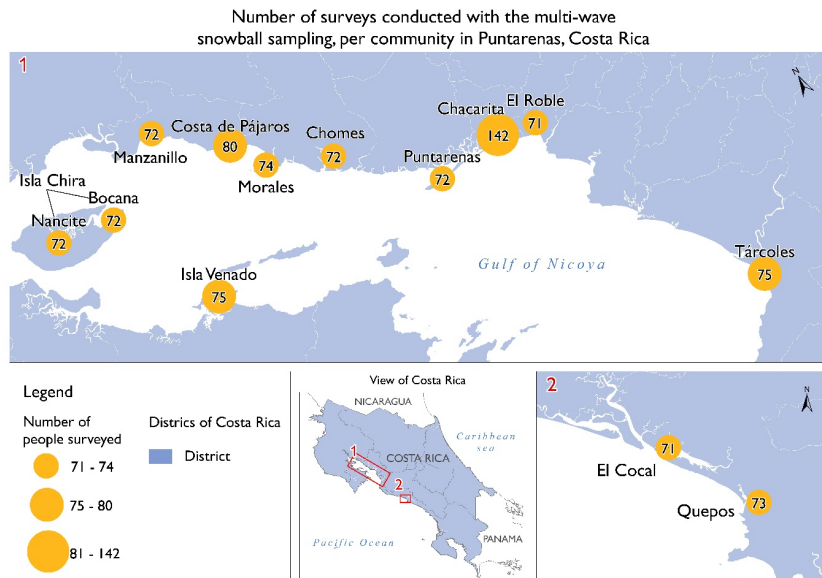
Number of surveys conducted with the multi-wave snowball sampling, per community in Puntarenas, Costa Rica

This process was closely supervised through district visits and an exhaustive tracking system that ensured clarity among team members and an exact monitoring of the surveys conducted in the field.

(I)   Each enumerator tracked all surveys conducted and codes assigned in a paper sheet, and wrote out this information in an excel sheet named <u>Enumerator Registry</u> daily.

(II)   Each supervisor tracked all surveys conducted and monetary incentive that were given, and wrote out this information in an excel sheet named <u>Supervisors Registry</u> daily.

(III) The IOM team developed a tracking sheet of all surveys conducted, per community, which was updated daily during the implementation of this project.

After completing the survey, each participant (person A) received an economic incentive of 4.000,00 Costa Rica colones and could reference up to seven people within the fishing industry; from which only three were chosen randomly by the enumerators by using a specific strategy. For each referee (person B) that showed up and completed the survey, the initial surveyed individual (person A) could receive 2.000,00 Costa Rica colones per reference, with a top of three references. Those individuals that were referenced (person B) more than once, named "returnees," did receive an economic incentive of 1.000,00 Costa Rica colones for showing up the second time.

To ensure the administration of the surveys with the Multistage probability proportionate to size (PPS) sampling, IOM hired 10 enumerators and 2 field supervisors. It is worth noting that all of them are residents of the coastal communities of Puntarenas and had prior knowledge of the fishing sector, which favored decision making during the data collection process. From October 11th to 14th, IOM and NYU conducted a training for enumerators and supervisors in Puntarenas to build and strengthen their capacities and understand their responsibilities to administer the surveys under the multistage probability proportionate to size (PPS) sampling method. To ensure the administration of the surveys with the link-tracing sampling in time before the closing of the project, IOM hired a total of 17 enumerators and 5 field supervisors total, hiring additional resources to the team that had previously conducted the multistage probability proportionate to size (PPS) sampling. A second training was held from December 14th and 15th, to ensure a solid understanding of the LTS sampling method in its theory and practice.

To promote the participation of various population groups within the fishing sector in the sampling, four main criteria were applied for the selection of the seeds:

● Presence of one or more social vulnerability factors associated with gender identity, age, nationality, migratory status, and/or socioeconomic condition.

● Direct association with some form of community or local organization that work to promote and protect the rights of those individuals that work in the fishing industry, or has extensive social networks linked to the fishing sector, which ensure that s/he can refer up to 7 people or more.

● People who meet a territorial diversity criterion, that is, not all of them come from the same neighborhood, household, or association.

● Availability to travel to sites where the surveys were conducted in defined periods.

To ensure the quality of the data gathering process, the strategic rotation of some enumerators and supervisors among teams assigned by communities, based on their technical strengths and knowledge of the local context, allowed the exchange of good practices and greater rigor in terms of the registration and application of the surveys.

As an estimation, in general, 20 daily surveys were applied per community, in an average of 4 survey days per community, with a minimum of 2 days and a maximum of 11 days (Quepos). Work teams per community were made up of 5 enumerators each (it is necessary to consider that the number of tablets available was not equal to the number of enumerators) plus 1 or 2 supervisors who centralized the administration of economic incentives.

Below is a detailed description of the steps to follow to apply the survey and incentive tracking strategy in the link-tracing methodology:

Scenario 1: Registration of a **seed**

Step 1. Designate "seeds" identified by the field supervisors to conduct the survey. There will be about 10 seeds per community for a total of 100 seeds.

Step 2. The enumerators apply the survey to the designated seed. At the end they give the seed a coupon with the IOM seal, check the "completed survey" box, and record the survey number in the 'Survey #' section of the Enumerators Registry document. The survey number is designated with the enumerator initials, an S for seed, and a unique survey number. The enumerator will then fill out the 'Survey coupon' (yellow side of the below coupon example) with the seed's survey number. This coupon will serve as proof of payment for the supervisor who delivers the incentive.

Step 3. Once the survey is completed, the enumerator randomly selects three of the seven references indicated by the seed, starting with the number of the day of the week in which the registration is made. For the purpose of standardizing the reference selection, the following order will be taken: 1. Monday, 2. Tuesday, 3. Wednesday, 4. Thursday, 5. Friday, 6. Saturday, 7. Sunday.

Step 4. Three new survey numbers are selected to give to the seed for their three references. The enumerator then registers them in the 'Reference' section of the Enumerators Registry document, in the same row in which it registered the seed who referred them.

Step 5. The enumerator will then fill in the three reference coupons to give to the seed. The new codes corresponding to the people who have just been referred will be placed in the 'Survey #' space of the below coupon example and the survey number of the seed who made the references will be placed in the 'Coupon #' space. The coupon number will be the same for the three tickets.

Step 6. The enumerator gives the seed the three coupons, explaining that the green part must be given to their three references and that they will keep the yellow part to receive ₡ 2,000 for every referred person who completes the survey.

Step 7. The seed then contacts the field supervisor to receive their incentive.

Remember: for this methodology, enumerators and field supervisors will always work together.

Step 8. The seed delivers the stamped coupon to the field supervisor and the supervisor registers it in the Field Supervisors Registry document. The seed who completed the survey signs the registration document and receives ₡ 4,000 colones for the survey they just completed.

Step 9. At the end of each day of surveying, both enumerators and supervisors digitize their physical survey records.

Scenario 2: Registration of a **referenced person who does not complete the survey.**

Step 1. A person who was referred by another individual and who has a green coupon approaches to take the survey.

Step 2. The enumerator determines if the person has already approached to take a survey before, first by visual identification of the person and then by means of the telephone number/identifier. If they have not previously approached, they are allowed to take the survey, if they have already presented a coupon, follow the steps of scenario 5 (repeating person or "returnee").

Step 3. The enumerator conducts the survey. If the survey is not completed, the enumerator withdraws the green coupon and informs the field supervisor.

Step 4. The field supervisor records the coupon in the Supervisors Registry document as an incomplete survey.

Scenario 3: Registration of a **referenced person who does complete the survey**

Step 1. A person who was referred by another individual and who has a green coupon approaches to take the survey.

Step 2. The enumerator determines if the person has already taken the survey before, first by visual identification of the person and then by means of the telephone number/identifier. If they have not previously taken it, they are allowed to continue. If they have already taken the survey and presented a coupon, follow the steps of scenario 5 (repeating person or "returnee").

Step 3. The enumerator applies the survey. If it is completed, they give the referenced person a coupon with the IOM seal, check the "completed survey" box, and record the survey number in the 'Survey #' section of the Enumerators Registry document. For referenced individuals (not seeds) the enumerator will only fill in the 'Survey coupon' (yellow side of the below coupon example) with the data of the "Reference Coupon" (green side of the below coupon example) that the referenced person will bring with them as proof that they were referenced. The yellow side will serve as proof of payment for the supervisor who delivers the incentive.

Step 4. Once the survey is finished, the enumerator randomly selects three of the seven references indicated by the respondent for delivery of coupons. The enumerator registers these survey numbers in the 'Reference' space of the Enumerators Registry document, in the same row in which the newly surveyed person was registered.

Step 5. The enumerator will then fill in the three reference coupons to give to the respondent. The new codes corresponding to the people who have just been referred will be placed in the 'Survey #' space of the below coupon example and the survey number of the individual who made the references will be placed in the 'Coupon #' space. The coupon number will be the same for the three tickets.

Step 6. The enumerator gives the respondent the three coupons, explaining that the green part must be given to their three references and that they will keep the yellow part to receive ₡ 2,000 for every referred person who completes the survey.

Step 7. The respondent then contacts the field supervisor to receive their incentive.

Step 8. The respondent delivers the stamped coupon to the field supervisor and the supervisor registers it in the Field Supervisors Registry document. The respondent who completed the survey signs the registration document and receives ₡ 4,000 colones for the survey they just completed.

Step 9. At the end of each day of surveying, both enumerators and supervisors digitize their physical survey records.

Scenario 4: When **a person who made a referral returns to claim their incentive.**

Step 1. The person who made a referral contacts the supervisor to verify if the referred person completed the survey. The supervisor will ask for the survey and coupon number and corroborates it with the Supervisors Registry. If the survey and coupon numbers are not registered, indicating the references have not completed the survey, or if the survey was registered as incomplete, the incentive is not delivered.

Step 2. If the referrals completed the survey, the person who made the referrals will give the yellow coupons for each referral who completed the survey to the supervisor.

Step 3. The supervisor fills out the Supervisors Registry and the respondent signs it and receives an

incentive of ₡2,000 for each referral that completed the survey.

Step 4. At the end of each day of surveying, both enumerators and supervisors digitize their physical survey records.

Scenario 5: When **a referenced person arrives a second time (repeater or "returnee")**

Step 1. A referenced person with a green coupon approaches to take the survey.

Step 2. The enumerator determines if the person has already participated in the survey before, first by visual identification of the person and then by means of the telephone number/identifier.

Step 3. If the person has already completed the survey and this is the second time that they have presented a coupon, they will not take the survey again and the enumerator sends them to the field supervisor to withdraw the payment.

Step 4. The coordinator verifies with the telephone number/identifier in the Supervisor Registry that it is a repeat case. They register it as a recapture and record the survey number that the repeating person completed in the previous wave. The recaptured individual signs and receives an incentive of ₡ 1,000.

Front of coupon:

Back of coupon:

Challenges	Actions Taken
High level of criminality in Puntarenas was reported, especially armed robbery and confrontations with firearms. Security concerns were often in the community of Chacarita during the administration of both surveying methodologies.	Having enumerators working in pairs and groups and carrying only sufficient money for incentives during the first methodology; and changing physical location during the second methodology. Also, local police forces were informed about the areas that the enumerators would be covering, and constant communication was maintained with them which ensured constant patrolling close to the survey sites.
The fishing sector is highly politicized and all counterparts that are involved in this project have diverse interests at stake, mostly political and economic, also linked to environmental concerns.	IOM works with all relevant counterparts according to its neutrality and impartiality principles. Alliances with key counterparts from all political sides and sectors are secured, to ensure all key actors are engaged in the conversations. This allows IOM to ensure engagement from fishers' associations, governmental institutions, and other relevant actors.
Changing weather conditions created roadblocks and high waves at sea that created difficulties in accessing targeted communities. Some visits even had to be cancelled because of heavy rains (especially during the last quarter of 2022).	Alternative routes were taken when possible and activities that could be virtualized were done. One-day field missions were not scheduled to avoid traveling during the night, and United Nations Department of Safety and Security (UNDSS) reporting mechanisms and recommendations were always applied. Furthermore, the work teams were reorganized when needed, based on reaching the survey quotas per community, without compromising their safety or that of the people surveyed.
During the holiday seasons in Costa Rica (December to January) the response of the targeted communities was conditioned by the cultural celebrations that take place at that time of the year: many people either travel to visit relatives or they are dedicated to gathering events. Also, local authorities register a higher level of criminality and insecurity during the holiday seasons.	The starting date for the multi-wave snowball sampling was rescheduled to start on January, seeking safer conditions for entering the communities, as well as to ensure the participation of the targeted communities.

Because of the changing schedules of the fishers (depending on the winds, tides, gas prices, and crew availability), many seeds that had confirmed their participation could not attend. Also, because not all of them have cell phones or telephone signal reception, immediate communication was not possible.	Field supervisors personally met with the seeds weeks/days before the survey took place to identify challenges, and made adequations on the data collection strategy, such as varying survey schedules, changing physical space, and implementing different communication mechanisms when needed.
Given the peaks of influx of people and the complexity of the link-tracing methodology, some survey codes were mistyped or repeated.	Continuous monitoring of the tracking sheets by field supervisors allowed an early identification of these type of mistakes and with it, reinforcement training was done for the weakest aspects. Also, enumerators with IM/GIS skills were strategically assigned to work in pairs with those enumerators that mistyped or repeated a code to ensure no more errors were made.
Not enough community infrastructure met the criteria to function as physical space for applying the link-tracing methodology. Access to essential services such as water, electricity, geographical proximity in terms of the fishing sector, capacity, among others, were limited.	Exhaustive research through district visits and meetings with key stakeholders allowed the identification and coordination for the use of the more strategic physical spaces in each community. Local knowledge and networking of IOM´s local consultants (enumerators and supervisors) was key on making decisions sensitive to local realities.
Some people to be surveyed appeared drunk or under the influence of some psychoactive substance.	As soon as the situation was perceived either by the enumerator or the supervisor, a coded sentence was used to alert the whole team about the dangerous situation, which could also alter the quality of the data collected. The person was then informed that s/he could not take the survey and kindly asked to leave or referred to service providers in case of indicators of violence. If the survey had already started, this was gently stopped and the person was asked to leave, or they referred to relevant service providers.
Fishing groups associated with drifting longline (whose authorization is limited in accordance with national regulations) manifested lack of trust with any external actor, since they associate it with environmental protection projects that have represented a threat to their fishing activities in the past.	When the project was presented to the communities, it was made clear that the objective is to guarantee the rights of individuals that work in the fishing industry; and that all the information shared would be treated according to the IOM Data Protection Principle on confidentiality. Regular meetings are held with all stakeholders to build trust and ensure buy-in. Often, the bottom-up approach is used, while other times working relationships are built by using key connection in the field, who will refer to other key actors they know and ensure they trust the IOM team.

Due to economic needs and the difficult socio-economic situation in this sector, some informants compromised the methodology by providing the coupon to the references that did not correspond according to the aleatory system.	The coding system designed by IOM, in which a telephone number was used as the identity of the coupons, allowed enumerators to identify these situations before starting the survey. Centralizing incentives on the field supervisors also guaranteed the rigor of the methodology by double checking if the person surveyed owned the phone number registered under the coupon, before paying them.

In compliance with IOM Data Protection Principles, all data was obtained by lawful and fair means with the knowledge and consent of the data subjects at the time of the collection. Considering the vulnerabilities faced by those individuals that work in the fishing industry, no personal data, such as name, location, or ID number, was collected, and a coding system was developed to guaranteeing the confidentiality and quality of the information provided. Furthermore, data was kept secure, both technically and organizationally, through adequate technological equipment and programmatic tools provided by the University of New York (NYU).

Table 5. Demographic Profiles				
	Household Survey		Link Tracing	
	Sample* (N=1017) %	Population Adjusted** %	Sample* (N=1009) %	NE4NS - Population Adjusted** %
Gender				
Female	32.1(326)	34.3	46.3(467)	42.5
Male	67.1(682)	65	53.0(534)	56.9
Non-binary	0.5(5)	0.3	0.5(5)	0.4
Prefer not to say	0.4(4)	0.4	0.2(2)	0.2
Age Group				
18-25	10.3(105)	9.1	16.2(163)	15.0
26-40	35.3(359)	32.8	36.6(369)	38.6
41-60	40.2(409)	43	37.2(375)	36.8
61 and older	14.2(144)	15.1	10.0(101)	9.6
Marital status				
Currently married	58.4(594)	55.2	45.9(463)	47.9
Divorced	5.0(51)	7.4	3.0(30)	3.2
Never married	32.0(325)	32.7	44.5(449)	42.1
Separated	2.8(28)	2	5.4(54)	5.9
Widowed	1.9(19)	2.6	1.2(12)	0.9
Number of Children				
0	16.1(164)	14.4	16.3(164)	17.3
1	15.7(160)	15.9	19.9(201)	19.6
2	20.5(208)	21.3	22.3(225)	23.6
3	19.9(202)	16	18.5(186)	18.3
4	12.7(129)	15.5	10.0(101)	8.4

5 or more	15.1(154)	16.8	13.0(131)	12.7
Education				
Bachelor's Degree	1.4(14)	2.1	0.7(7)	0.4
Cannot read or write/Illiterate	3.9(40)	3.1	4.3(43)	4.2
High School Degree	9.6(98)	8.1	12.4(125)	11.6
No Formal Education/Literate	20.0(203)	18.4	16.0(161)	14.7
Primary School	57.8(588)	60.3	57.5(580)	0.5
Secondary School	6.4(65)	6.7	8.4(85)	61.4
Vocational School/Some College	0.9(9)	1.2	0.7(7)	6.8
District				
Chacarita	8.5(86)	16.4	14.2(143)	13.3
Chira	14.8(151)	11.6	14.3(144)	14.8
Chomes	15.7(160)	8.2	14.4(145)	11.6
El Roble	6.3(64)	27.5	7.0(71)	7.2
Lepanto	8.2(83)	1.2	7.4(75)	6.4
Manzanillo	11.7(119)	2	14.9(150)	12.3
Puntarenas	NA	NA	0.1(1)	0.1
Quepos	13.2(134)	19.2	8.0(81)	6.4
Tarcoles	13.8(140)	6.3	13.3(134)	16.2
When did you start working in the fishing industry?				
0-5	0.7(7)	0.6	0.6(6)	1.2
6-8	10.6(108)	7.7	8.1(82)	7.6
9-11	12.6(128)	10.2	11.8(119)	9.3
12-15	31.5(320)	33.1	28.5(287)	30.6
16-18	11.9(121)	12.6	13.9(140)	13.7
18+	32.7(333)	35.8	37.0(373)	37.6
I don't know	NA	NA	0.1(1)	0.1

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

Table 6. Financial Strains				
	Household Survey		Link Tracing	
	Sample* (N=1017) %	Population Adjusted** %	Sample* (N=1009) %	NE4NS - Population Adjusted** %
Cost for Children's Education				
100,000 CRC or less	7.0(48)	6.1	7.3(48)	6.7
100,001 - 200,000 CRC	11.3(77)	11.5	17.3(113)	16.5
200,001 - 300,000 CRC	9.2(63)	9.4	13.0(85)	10.0
I do not have children	24.0(164)	21.6	25.0(164)	25.7
I do not know	2.6(18)	2.1	2.0(13)	1.7
More than 300,000 CRC	44.4(303)	48	35.3(231)	39.1
Prefer not to say	1.5(10)	1.2	0.2(1)	0.2
Monthly Average Household Expenses				
Between 100,001 - 300,000	8.8(89)	10.2	5.8(59)	7.2
Between 300,001 -500,000	0.6(6)	1.4	0.3(3)	0.2
Between 500,001 - 700,000	0.8(8)	0.4	NA	NA
I don't know	0.5(5)	0.4	0.3(3)	0.4
Less than 100,000	88.9(904)	87	93.6(944)	92.2
More than 700,001	0.3(3)	0.4	NA	NA
Prefer not to say	0.2(2)	0.3	NA	NA
Were you able to cover your household bills over the last 6 months				
I don't know	0.3(3)	0.1	0.1(1)	0.2
No	46.8(476)	47.8	61.7(621)	57.9
Yes	52.9(538)	52.1	38.2(385)	41.8
Did you borrow money to finance the journey to Costa Rica				
I do not know	NA	NA	6.7(8)	5.0
No	76.0(38)	87	73.9(88)	80.3
Yes	24.0(12)	13	19.3(23)	14.7
How much in total did you pay in order to secure the job (in CRC)				

Mean	300.7	289.4	85.6	157.5
Std. Dev.	1331.1	1309.6	715.7	67.4
Range	0-6600	0-6600	0-15000	-
95% CI	-	-	-	(25.34, 289.58)

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

Table 7. *Migration*				
	Household Survey		Link Tracing	
	Sample* (N=1017) %	Population Adjusted** %	Sample* (N=1009) %	NE4NS - Population Adjusted** %
Is the respondent Costa Rican?				
No	5.1(52)	4.3	12.4(125)	12.2
Yes	94.9(965)	95.7	87.6(884)	87.8
What country are you a citizen of?				
Colombia	NA	NA	0.6(6)	1.0
Costa Rica	94.6(962)	95.1	87.7(885)	87.8
El Salvador	0.2(2)	0.2	0.1(1)	0.1
Honduras	0.1(1)	0.2	NA	NA
Mexico	0.1(1)	0	NA	NA
Nicaragua	4.4(45)	4.2	10.5(106)	8.9
Other	0.3(3)	0.2	0.4(4)	1.3
Panama	0.1(1)	0.1	0.1(1)	0.4
Venezuela	0.2(2)	0	0.6(6)	0.4

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

Table 8. Employer Information				
	Household Survey		Link Tracing	
	Sample* (N=1017) %	Population Adjusted** %	Sample* (N=1009) %	NE4NS - Population Adjusted** %
Do you receive the IMAS benefit?				
I do not know	0.1(1)	0	NA	NA
No	77.0(783)	73.8	75.7(762)	80.5
Prefer not to say	0.4(4)	0.4	NA	NA
Yes	22.5(229)	25.8	24.3(244)	19.5
Do you have the INCOPESCA license?				
I do not know	0.1(1)	0.2	0.2(2)	0.2
No	68.2(694)	73.8	78.9(724)	79.6
Prefer not to say	0.3(3)	0.1	0.2(2)	0.1
Yes	31.4(319)	25.9	20.7(190)	20.1
In your most current job, who is your employer (this is the person who pays you)?				
I do not have an employer (artisanal fishing, owner of their own boats, etc.)	29.3(231)	26.4	13.9(140)	12.4
I do not know	0.6(5)	0.4	0.3(3)	0.2
Other	15.3(121)	14.8	21.9(221)	20.9
Owner of the fishing boat	42.7(337)	44.6	41.0(414)	43.5
Prefer not to say	0.5(4)	0.8	0.1(1)	0.1
Sub-contractor	11.5(91)	13	22.8(230)	22.9
Did the employer/intermediary pay the recruitment fee?				
I do not know	0.5(5)	0.2	0.4(4)	0.3
No	50.3(512)	43.8	38.4(387)	37.1
Prefer not to say	0.4(4)	0.5	NA	NA
There was no fee	45.6(464)	52.9	59.9(604)	61.0
Yes	3.1(32)	2.6	1.4(14)	1.5

Did employer remove the fee from your salary?				
I do not know	0.3(3)	0.1	16.7(3)	13.4
No	1.9(19)	1.7	16.7(3)	10.6
Prefer not to say	0.2(2)	0.3	5.6(1)	4.2
There was no fee	96.0(976)	96.7	NA	NA
Yes	1.7(17)	1.3	61.1(11)	71.8

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

Table 9. Abuses During Recruitment				
	In Current Job %	Population Adjusted Current %	Ever Happened %	Population Adjusted Ever %
(1) Household Survey				
Q40: Sometimes people are obliged to work at a job against their will. During the recruitment process, did any of the following happen to you? (Select all that apply) (R1S/R2S)				
Sample size (N)	42		76	
Felt obliged during recruitment to work for a job (R1S)	61.9(26)	59.1	48.7(37)	63.3
Were abducted, confined, kidnapped, or held against your will by your employer or people who worked for your employer (R1S)	14.3(6)	9.2	11.8(9)	8.7
Felt cheated or lied to about the nature of your job or specific responsibilities of the work you were supposed to do (R2S)	45.2(19)	62.7	51.3(39)	58.3
Were required to do things that were completely different from what you were led to believe (R2S)	33.3(14)	44.6	35.5(27)	48.9
Q41 Thinking about the most recent time this happened, can you tell me what lies/misrepresentations were used regarding the nature of the services to deceive you into accepting the job? (Select all that apply) (R2S)				
Sample size (N)	24		56	

	In Current Job %	NE4NS - Population Adjusted Current %	Ever Happened %	NE4NS - Population Adjusted Ever %
Responsibilities were different from what was told	50.0(12)	76.2	46.4(26)	58.5
Nature of work was different	37.5(9)	34.7	26.8(15)	28.3
Hours of work were different	50.0(12)	90.1	32.1(18)	45.8
Vacation/time off was different	25.0(6)	35.5	14.3(8)	26.1
Other	29.2(7)	19.8	26.8(15)	24.9
Prefer not to say	0.0(0)	0	3.6(2)	5.2
Not Applicable	0.0(0)	0	0.0(0)	0

(2) Link Tracing

Q40: Sometimes people are obliged to work at a job against their will. During the recruitment process, did any of the following happen to you? (Select all that apply) (R1S/R2S)

Sample size (N)	59		97	
Felt obliged during recruitment to work for a job (R1S)	47.5(28)	40.6	41.2(40)	37.1
Were abducted, confined, kidnapped, or held against your will by your employer or people who worked for your employer (R1S)	10.2(6)	6.2	9.3(9)	7.8
Felt cheated or lied to about the nature of your job or specific responsibilities of the work you were supposed to do (R2S)	45.8(27)	33.3	51.5(50)	41.8
Were required to do things that were completely different from what you were led to believe (R2S)	45.8(27)	54.0	43.3(42)	47.2

Q41 Thinking about the most recent time this happened, can you tell me what lies/misrepresentations were used regarding the nature of the services to deceive you into accepting the job? (Select all that apply) (R2S)

Sample size (N)	43		73	
Responsibilities were different from what was told	72.1(31)	60.2	65.8(48)	51.7

Nature of work was different	39.5(17)	34.5	37.0(27)	31.4
Hours of work were different	37.2(16)	20.6	34.2(25)	19.9
Vacation/time off was different	9.3(4)	6.2	6.8(5)	4.4
Other	9.3(4)	4.5	15.1(11)	9.1
Prefer not to say	2.3(1)	1.2	1.4(1)	0.7
Not Applicable	0.0(0)	0	0.0(0)	0

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

Table 10. Abusive Employment Practices and Penalties				
	In Current Job %	Population Adjusted Current %	Ever Happened %	Population Adjusted Ever %
(1) Household Survey				
Sometimes people work for employers who do not let them leave their jobs. Has your employer or people who work for your employer				
1. Withheld your compensation and/or benefits to prevent you from leaving? (EP01)	2.5(25)	2.7	5.9(48)	5.1
2. Told you that you would lose your compensation already earned if you decided to quit?	3.2(33)	3.8	6.5(53)	6.5
How much was withheld? (In CR colones)				
Mean	134161.2	110360.4	133085.1	112987.4
(Std. Dev.)	153397.3	128497.3	162706.2	156227.2
[Range]	0-500000	0-500000	0-600000	0-600000
Have you ever felt that an employer/broker or whoever economically benefits from your labor				
Charged you fees or inflated the prices for goods/services you purchased from your employer (EP02) (1)	18.2(116)	17.7	17.4(152)	15.1

	In Current Job %	NE4NS - Population Adjusted Current %	Ever Happened %	NE4NS - Population Adjusted Ever %
Reduced the value of goods you produced or services you provided (EP02) (2)	27.0(200)	29.6	30.9(282)	30.1
Tried to reduce your compensation by charging you excessive fees for things such as rent, food, or other items you consumed at the workplace (EP02) (3)	11.4(71)	14.2	12.1(101)	14.2

(2) Link Tracing

Sometimes people work for employers who do not let them leave their jobs. Has your employer or people who work for your employer

	In Current Job %	NE4NS - Population Adjusted Current %	Ever Happened %	NE4NS - Population Adjusted Ever %
1. Withheld your compensation and/or benefits to prevent you from leaving? (EP01)	2.4(24)	2.4	6.4(49)	6.4
2. Told you that you would lose your compensation already earned if you decided to quit?	2.1(21)	2.1	5.4(41)	5.4

How much was withheld? (In CR colones)

Mean	72761.9	63739	90987.5	142790
(Std. Dev.)	102481.2	23599	137838.7	62811
[Range]	0-400000	-	0-600000	-
95% CI	-	(17486.28, 109992.5)	-	(19682.43, 265897.1)

Have you ever felt that an employer/broker or whoever economically benefits from your labor

Charged you fees or inflated the prices for goods/services you purchased from your employer (EP02) (1)	16.2(97)	21.7	16.0(129)	20.3
Reduced the value of goods you produced or services you provided (EP02) (2)	34.3(233)	37.9	36.1(297)	39.1

	In Current Job %	Population Adjusted Current %	Ever Happened %	Population Adjusted Ever %
Tried to reduce your compensation by charging you excessive fees for things such as rent, food, or other items you consumed at the workplace (EP02) (3)	10.1(59)	8.0	9.7(77)	9.1

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

Table 11. Personal Life and Property				
	In Current Job %	Population Adjusted Current %	Ever Happened %	Population Adjusted Ever %
(1) Household Survey				
Sometimes, employers want to have control over people's lives outside their job. Has your employer or people who work for your employer ever attempted to control your personal life outside work in any of these ways?				
Controlled through blackmail, that is threatened to reveal something personal/embarrassing about you (PL1S/PL02/PL04)	1.9(14)	1.1	2.0(19)	1.9
Controlled through religious retribution (any punishment because of your religious beliefs or practices) (PL1S/PL02/PL04)	1.3(10)	1.3	0.9(8)	0.5
Controlled by threatening to exclude you from future employment opportunities (PL1S/PL02/PL04)	4.4(33)	5.1	5.5(51)	6
Controlled you by threatening to, or actually isolating you from your family	1.3(10)	1.6	1.1(10)	1
Controlled you by threatening to, or actually isolating you from your friends (being ostracized) (PL1S/PL02/PL04)	1.7(13)	1.6	1.4(13)	1.4
Controlled you by making you perform sex acts to pay off your outstanding debt or wage advance (PL1S/PL02/PL04)	0.5(4)	0.2	0.5(5)	0.2

	In Current Job %	NE4NS - Population Adjusted Current %	Ever Happened %	NE4NS - Population Adjusted Ever %
(2) Link tracing				
Sometimes, employers want to have control over people's lives outside their job. Has your employer or people who work for your employer ever attempted to control your personal life outside work in any of these ways?				
Controlled through blackmail, that is threatened to reveal something personal/embarrassing about you (PL1S/PL02/PL04)	2.3(13)	2.4	1.8(15)	2.7
Controlled through religious retribution (any punishment because of your religious beliefs or practices) (PL1S/PL02/PL04)	0.5(3)	0.5	0.2(2)	0.2
Controlled by threatening to exclude you from future employment opportunities (PL1S/PL02/PL04)	7.2(42)	8.2	7.0(57)	7.2
Controlled you by threatening to, or actually isolating you from your family	1.4(8)	2.9	1.5(12)	3.4
Controlled you by threatening to, or actually isolating you from your friends (being ostracized) (PL1S/PL02/PL04)	1.4(8)	1.2	1.7(14)	2.3
Controlled you by making you perform sex acts to pay off your outstanding debt or wage advance (PL1S/PL02/PL04)	1.2(7)	1.2	0.4(3)	0.5

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

Table 12. Degrading Conditions				
	In Current Job %	Population Adjusted Current %	Ever Happened %	Population Adjusted Ever %
(1) Household Survey				

Has your employer ever required you to be available day and night or to work extra hours without adequate pay outside the scope of your contract (these are not compensated overtime hours)? (DC1S)				
Yes	4.3(44)	4.3	10.7(70)	10.3
(2) Link Tracing				
Has your employer ever required you to be available day and night or to work extra hours without adequate pay outside the scope of your contract (these are not compensated overtime hours)? (DC1S)				
Yes	4.5(45)	4.1	9.3(67)	10.3

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

Table 13. Freedom of Movement				
	In Current Job %	Population Adjusted Current %	Ever Happened %	Population Adjusted Ever %
(1) Household Survey				
Has your employer/people who work for your employer ever taken/confiscated your identity papers or made it so you were unable to access your identity papers (e.g. passport, work permit)? (FM1S)				
Yes	0.9(9)	1.6	1.7(16)	2.5
If yes, which documents (check all that apply)? (FM1S)				
Sample Size (N)	9		16	
Passport	22.2(2)	3.7	31.2(5)	20.6
Identify Card	77.8(7)	180.1	68.8(11)	130.9
Visa	11.1(1)	1.8	6.2(1)	1
Work Permit	22.2(2)	53.2	18.8(3)	31.5
Birth Certificate	0.0(0)	0	0.0(0)	0
Other	0.0(0)	0	6.2(1)	6.2
Sometimes, employers want to have control over people's lives outside their job. Has your employer or people who work for your employer ever attempted to control your personal life outside work in any of these ways? (PL1S)				

	In Current Job %	NE4NS - Population Adjusted Current %	Ever Happened %	NE4NS - Population Adjusted Ever %
You were forbidden from leaving the work site (FM3S)	3.9(29)	6.4	5.4(50)	6.9
You were kept under surveillance (FM3S)	5.3(40)	5.6	7.0(66)	7
You were kept in an isolated place with nowhere to go (FM3S)	1.6(12)	2.5	2.3(21)	2.8
You were locked in the workplace or living quarters (FM3S)	1.2(9)	2.1	1.5(14)	1.6
You were restricted on where you could go during non-work hours	4.9(37)	6.5	5.4(50)	6.3
Your phone was confiscated (FM3S) (25)	3.9(29)	6.4	2.3(21)	1.8
You were prevented or restricted from communicating freely with your family, including making or receiving phone calls to/from them (FM3S) (7)	5.3(40)	5.6	2.7(25)	3.2
You were prevented or restricted from communicating freely with other workers (8)	1.6(12)	2.5	3.1(29)	2.8
You were prevented or restricted from communicating freely with others outside the workplace (9)	1.2(9)	2.1	3.1(29)	2.8
You were not permitted to seek or receive medical services when you fell ill (10)	4.6(35)	4.6	5.2(48)	5.2
You were not allowed to have visitors (11)	1.5(11)	1.6	2.2(20)	2.6
You were forced to work when you refused to (12)	2.5(19)	2.2	3.8(36)	3.7
	In Current Job %	NE4NS - Population Adjusted Current %	Ever Happened %	NE4NS - Population Adjusted Ever %
(2) Link Tracing				

Has your employer/people who work for your employer ever taken/confiscated your identity papers or made it so you were unable to access your identity papers (e.g. passport, work permit)? (FM1S)				
Yes	0.4(4)	0.5	1.1(9)	2
If yes, which documents (check all that apply)? (FM1S)				
Sample Size (N)	4		9	
Passport	0.0(0)	0	22.2(2)	8.1
Identify Card	100.0(4)	100	66.7(6)	37.9
Visa	0.0(0)	0	0.0(0)	0
Work Permit	25.0(1)	16.9	22.2(2)	58.8
Birth Certificate	0.0(0)	0	0.0(0)	0
Other	0.0(0)	0	0.0(0)	0
Sometimes, employers want to have control over people's lives outside their job. Has your employer or people who work for your employer ever attempted to control your personal life outside work in any of these ways? (PL1S)				
You were forbidden from leaving the work site (FM3S)	4.0(23)	3.7	4.4(36)	4.0
You were kept under surveillance (FM3S)	5.0(29)	6.8	5.9(48)	7.7
You were kept in an isolated place with nowhere to go (FM3S)	0.4(2)	0.4	0.5(4)	0.4
You were locked in the workplace or living quarters (FM3S)	1.6(9)	1.2	1.0(8)	0.6
You were restricted on where you could go during non-work hours	4.7(27)	3.9	5.8(47)	5.4
Your phone was confiscated (FM3S) (25)	1.1(6)	1.3	1.0(8)	1.0
You were prevented or restricted from communicating freely with your family, including making or receiving phone calls to/from them (FM3S) (7)	1.6(9)	1.6	2.0(16)	2.9

You were prevented or restricted from communicating freely with other workers (8)	1.2(7)	1.0	1.8(15)	2.0
You were prevented or restricted from communicating freely with others outside the workplace (9)	2.5(14)	3.2	2.2(18)	2.6
You were not permitted to seek or receive medical services when you fell ill (10)	4.3(25)	3.6	5.4(44)	4.2
You were not allowed to have visitors (11)	2.5(14)	2.7	2.5(20)	2.8
You were forced to work when you refused to (12)	3.7(21)	3.6	4.3(35)	4.2

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

Table 14. Debt or Dependency				
	Household Survey		Link Tracing	
	Sample* (N=1017) %	Population Adjusted** %	Sample* (N=1009) %	NE4NS - Population Adjusted** %
Have you ever had a debt imposed on you without your consent by your employer? For instance, has your employer / person who derived economic benefit from your labor decided that you owed them money for reasons you didn't agree with (this may include taking on someone else's debt, including a family member; this does not include a debt imposed during recruitment)? (DD01)				
I do not know	NA	NA	0.1(1)	0.1
No	91.1(820)	93	89.5(698)	90.3
Yes	8.9(80)	7	10.4(81)	9.5
If yes, how much did the debt cost? (in CR colones)				
Mean	1297060.3	1576578.4	95646.4	137029.38
Std. Dev.	5313051.2	5830330.4	138770.4	40801
Range	1-24000000	1-24000000	1-450000	-
95% CI	-	-	-	(57061.31, 216997.4)

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

Table 15. Violence and Threats of Violence				
	In Current Job %	Population Adjusted Current %	Ever Happened %	Population Adjusted Ever %
(1) Household Survey				
Has your employer or people who work for your employer ever				
Used physical violence against you (V3S)	3.1(32)	2.6	7.3(74)	6.7
Used physical violence against someone you care deeply about (V3S)	2.0(20)	2	2.9(30)	3.7
Used sexual violence against you (V4S)	1.2(12)	0.9	1.7(17)	1.8
Used sexual violence against someone you care deeply about (V4S)	0.4(4)	0	1.0(10)	0.7
If your employer ever used physical violence against you, which of the following did they do? (Select all that apply)				
Pushed you, shook you or throw something at you (V3S)	4.2(6)	4.6	43.2(19)	45
Slapped you about or twisted your arm (V3S)	1.4(2)	0.6	18.2(8)	11.7
Punched you with their fist or with something that could hurt you (V3S)	2.1(3)	0.9	25.0(11)	15.5
Kicked you or dragged you (V3S)	2.1(3)	1.3	13.6(6)	8.5
Tried to strangle or burn you (VS3)	2.1(3)	1.3	6.8(3)	4.3

	In Current Job %	NE4NS - Population Adjusted Current %	Ever Happened %	NE4NS - Population Adjusted Ever %
Attacked you with a knife, gun, or other type of weapon (VS3)	2.8(4)	4	20.5(9)	31.2
If your employer ever used physical violence against someone you care deeply about, which of the following did they do? (Select all that apply)				
Pushed you, shook you or throw something at you (V3S)	2.1(3)	2	17.4(8)	22.3
Slapped you about or twisted your arm (V3S)	1.4(2)	0.6	8.7(4)	5.8
Punched you with their fist or with something that could hurt you (V3S)	1.4(2)	0.6	10.9(5)	6.4
Kicked you or dragged you (V3S)	1.4(2)	0.6	6.5(3)	4.1
Tried to strangle or burn you (VS3)	2.1(3)	1.3	6.5(3)	4.1
Attacked you with a knife, gun, or other type of weapon (VS3)	2.1(3)	3.9	15.2(7)	26.6
If someone you care about was subjected to physical or sexual violence, can you tell me your relationship with the person or persons who was/were subjected to violence? (Select all that apply)				
Sample size (N)	1		5	
Child	0.0(0)	0	0.0(0)	0
Spouse	0.0(0)	0	20.0(1)	3.2
Parent	0.0(0)	0	0.0(0)	0
Sibling	0.0(0)	0	0.0(0)	0
Other Relative	0.0(0)	0	20.0(1)	14.8
Friend	100.0(1)	16.2	60.0(3)	38.4
Other	0.0(0)	0	20.0(1)	14.8
	In Current Job %	NE4NS - Population Adjusted Current %	Ever Happened %	NE4NS - Population Adjusted Ever %
(1) Link Tracing				

Has your employer or people who work for your employer ever				
Used physical violence against you (V3S)	6.2(63)	7.3	10.0(101)	9.9
Used physical violence against someone you care deeply about (V3S)	3.7(37)	6	6.0(61)	7.5
Used sexual violence against you (V4S)	0.2(2)	0.1	1.1(11)	0.7
Used sexual violence against someone you care deeply about (V4S)	0.5(5)	1.1	1.3(13)	1.7
If your employer ever used physical violence against you, which of the following did they do? (Select all that apply)				
Pushed you, shook you or throw something at you (V3S)	62.9(22)	77.1	74.1(43)	78.1
Slapped you about or twisted your arm (V3S)	22.9(8)	18.6	32.8(19)	30.9
Punched you with their fist or with something that could hurt you (V3S)	40.0(14)	60.7	48.3(28)	60.6
Kicked you or dragged you (V3S)	17.1(6)	13	20.7(12)	16.3
Tried to strangle or burn you (VS3)	8.6(3)	6.4	10.3(6)	8.3
Attacked you with a knife, gun, or other type of weapon (VS3)	25.7(9)	65.3	43.1(25)	54.2
If your employer ever used physical violence against someone you care deeply about, which of the following did they do? (Select all that apply)				
Pushed you, shook you or throw something at you (V3S)	40.9(9)	70.7	57.1(20)	66.7
Slapped you about or twisted your arm (V3S)	18.2(4)	14.1	28.6(10)	26.5
Punched you with their fist or with something that could hurt you (V3S)	31.8(7)	66.7	42.9(15)	61.5
Kicked you or dragged you (V3S)	9.1(2)	6.2	11.4(4)	8.1

Tried to strangle or burn you (VS3)	13.6(3)	10.3	11.4(4)	7.1
Attacked you with a knife, gun, or other type of weapon (VS3)	40.9(9)	74.9	57.1(20)	72.1
If someone you care about was subjected to physical or sexual violence, can you tell me your relationship with the person or persons who was/were subjected to violence? (Select all that apply)				
Sample size (N)	3		6	
Child	0.0(0)	0	16.7(1)	5.1
Spouse	0.0(0)	0	0.0(0)	0
Parent	0.0(0)	0	0.0(0)	0
Sibling	0.0(0)	0	16.7(1)	3.8
Other Relative	0.0(0)	0	0.0(0)	0
Friend	0.0(0)	0	0.0(0)	0
Other	100.0(3)	100	66.7(4)	91.1

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

Table 16. Prevalence of Trafficking Victimization at Present Job							
Household Survey			Link Tracing				
	Sample* (N=1017) %	Population Adjusted** %	Sample* (N=1009) %	VH-Population Adjusted** %	HCG - Population Adjusted ** %	NE4NS - Population Adjusted ** %	NE4NS+ - Population Adjusted ** %
Threshold 1			Threshold 1				
Yes	9.8(100)	10.6	7.1(72)	5.9	6.1	9.0	6.9
No	90.2(917)	89.4	92.9(937)	94.1	93.9	91.0	93.1
Threshold 2			Threshold 2				
Yes	19.0(193)	20.2	20.8(210)	17.4	17.3	23.3	20.5
No	81.0(824)	79.8	79.2(799)	82.6	82.7	76.7	79.5
Either Threshold 1 or Threshold 2			Either Threshold 1 or Threshold 2				
Yes	21.1(215)	21.8	22.4(226)	19.3	19.4	24.4	21.8
No	78.9(802)	78.2	77.6(783)	80.7	80.6	75.6	78.2

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights;

*** Corresponding p-value for HCG weight estimates is 0.05
HCG weighting is only applicable to survey variables which are proportional or categorical, not continuous

Table 17. Help-seeking Behavior

	Household Survey		Link Tracing	
	Sample* (N=1017) %	Population Adjusted** %	Sample* (N=1009) %	NE4NS - Population Adjusted** %
Why did you choose to stay? (choose all that apply)				
Sample size (N)	63		146	
Physical Violence	6.3(4)	10.7	0.7(1)	0.3
Physically Restrained	1.6(1)	1.6	0.0(0)	0
Deprived of food, water and/or sleep	0.0(0)	0	2.7(4)	1.7
Sexual Violence	1.6(1)	0.3	0.0(0)	0
Emotional Violence	14.3(9)	12.8	2.1(3)	1.1
Harm to a family member(s) or someone you care about	3.2(2)	8.5	0.0(0)	0
Legal action (including being arrested)	1.6(1)	0.3	0.7(1)	0.3
Withholding of ID cards/citizenship (e.g passport)	6.3(4)	13.8	0.7(1)	0.3
Loss of wages	33.3(21)	50.3	34.2(50)	31.3
Confiscation of savings or other valuables	6.3(4)	12.2	0.0(0)	0
Too far from home and nowhere to go	11.1(7)	31.5	2.1(3)	1.4
Kept drunk/drugged	3.2(2)	0.4	0.0(0)	0
No better job options	79.4(50)	96.9	89.0(130)	89.0
Restrictions in communication	3.2(2)	5.4	1.4(2)	0.8
Have you ever sought help for any of the situations you disclosed above?				
No	70.6(89)	74.2	70.3(185)	61.5
Prefer not to say	10.3(13)	5.7	1.9(5)	2.1
Yes	19.0(24)	20.2	27.8(73)	36.4
If yes, who did you seek help from? (check all that apply)				
Sample size (N)	23		73	

Home country embassy/consulate	0.0(0)	0	0.0(0)	0
Overseas organization in foreign country	0.0(0)	0	0.0(0)	0
Spouse	0.0(0)	0	0.0(0)	0
Immediate family (mother, father, grandparents, siblings)	8.7(2)	6.3	16.4(12)	11.5
Extended family (aunt, uncle, cousin, niece, nephew, in-laws)	8.7(2)	9.7	1.4(1)	0.8
Friend	26.1(6)	27.2	11.0(8)	14.0
Co-worker	21.7(5)	28.9	20.5(15)	12.7
Local service provider/counselor	0.0(0)	0	2.7(2)	1.2
Lawyer	8.7(2)	6.2	2.7(2)	8.6
Local law enforcement	17.4(4)	13.5	23.3(17)	26.4
Neighbor/Community member	8.7(2)	11.7	5.5(4)	2.6
Faith or religious community	4.3(1)	3	2.7(2)	1.5
Stranger	0.0(0)	0	0.0(0)	0
Other	34.8(8)	37.5	63.0(46)	47.6
If yes, what kind of help did they provide? (check all that apply)				
Sample size (N)	21		73	
Shelter, food, clothing	14.3(3)	19.8	6.8(5)	11.2
Mental health support	23.8(5)	22.9	17.8(13)	8.8
They contacted law enforcement	4.8(1)	3.3	9.6(7)	4.8
They contacted my home country embassy/consulate	0.0(0)	0	0.0(0)	0
They contacted a service provider	0.0(0)	0	1.4(1)	0.6
They bought me to a medical doctor	23.8(5)	26.4	6.8(5)	4.5
They didn't end up helping me	42.9(9)	50.6	17.8(13)	18.8

Other	19.0(4)	33.6	58.9(43)	69.5

Notes: *Sample statistics; ** Adjusted based on sampling-specific weights

Estimating the Prevalence of Forced Labor in the Fishing Industry in Costa Rica

Table of Contents

Q1 Consent to Participate in a Research Study/Consent Form for Electronic Survey

Estimating the Prevalence of Forced Labor in the Fishing Industry in Costa Rica

Grant number: SSJTIP19CA0032
Protocol number: IRB-FY2022-5926

NOTE TO INTERVIEWERS: Please read this form to potential respondents and offer the respondents the opportunity to review it themselves prior to beginning the survey.

Purpose of the Study: The purpose of the study is to learn more about trafficking among individuals who work in the fishing industry in Costa Rica. We hope that the information we learn from people like you will help people understand some of the problems that you and others in your situation face, and can make better decisions about how to help you deal with these problems. We are conducting surveys with people who are at least 18 years old and may have experienced work abuses working in the fishing industry in Costa Rica. Up to 2000 people will participate in this research in Costa Rica. This study is being done by researchers from New York University and International Office for Migration (IOM), and the study is funded by the US Department of State.

What Will Happen: If you agree to participate in the survey, we will ask you to answer some questions about your experiences working in the fishing industry in Costa Rica. You can decide not to answer any question at any time for any reason. If you don't want to answer a question, you can move on to the next one. If you decide at any time that you want to stop answering questions, that's fine too. It might take about 30 or 40 minutes to complete this survey. Deciding not to answer a question or to stop answering any questions won't have any impact on our relationship, on getting referrals, or getting services anywhere.

Risks or Discomforts: Some of the questions we will ask are personal. For example, we will ask you if somebody forced you to work or do things you didn't want to, or someone you worked for took the money or food you earned, or forced you to work late and/or long hours. You may find it unpleasant to answer some of our questions. You don't have to answer any questions if you don't want to, and you can stop our conversation at any time. If you feel that you need to talk to a professional counselor, we can refer you somewhere that is safe and confidential.

There might be some risk that someone could find out that you are participating in this research, and this might cause trouble for you. Everything you tell us will be kept private and confidential. You can skip any questions or stop the survey at anytime. Your responses will not be linked directly back to you. We will connect you with organizations and agencies that might be able to help you if you feel unsafe.

Benefits of the Study: This study will not improve your life or work in any way. But, we think it will help us understand the work and life situations of people like you in Costa Rica.

Incentives to Participate: For your time, you will receive 4,000 Costa Rican colones.

Confidentiality: Every precaution will be taken to protect your privacy. We will not use your name and your name will not be associated with the responses that you give or disclose to the organization sponsoring the study. All of the data we collect will be stored on password-protected computers and shared via the cloud using a file sharing program called Dropbox.   Your Rights: Your participation in this study is voluntary. Some of the topic areas that will be discussed may be considered personal. It is possible that some of the survey questions may make you uncomfortable or upset. You can refuse to answer any question, or you may take a break at any time during the survey. Every effort will be made to protect your information, but this cannot be guaranteed. You can decide not to participate, or you can decide to stop participating, and this will not affect your relationship with us or the services you receive. Questions: This study is run by Francesca

Tabellini. Her phone number is 7295 4984. You can call him with any questions about what you tell us today, the study, or about the research results. If you have any questions about your rights as a research participant or if you want to talk to someone other than the researchers, you can contact the New York University Research Compliance Administrator at 212-998-4808 or ask.humansubjects@nyu.edu.

Do you have any questions?

Q2. Do you agree to participate?	1	Yes
	2	No

SURVEY ADMINISTRATIVE RECORDS QUESTIONS

If YES to Q2 Q3. Survey Number	Text	
Q4. Type of Survey Conducted	1	Link Tracing
	2	Household enrollment
If 'Link Tracing' in Q4 Q5. Name	Text	
Q6. Mobile Number	Text	
Q7. Village where survey took place in Puntarenas:	Text	
Q8. What region do you live in?	1	Puntarenas
	2	Esparza
	3	Osa
	4	Quepos
	5	Golfito
	6	Parrita
	7	Corredores

	8	Garabito
	9	Monteverde
	10	Puerto Jiménez
Q9. What district do you live in?	1	Acapulco
	2	Arancibia
	3	Barranca
	4	Chacarita
	5	Chira
	6	Chomes
	7	Cóbano
	8	El Roble
	9	Guacimal
	10	Lepanto
	11	Manzanillo
	12	Paquera

	13	Pitahaya
	14	Puntarenas
	15	Caldera
	16	Espíritu Santo
	17	Macacona
	18	San Jerónimo
	19	San Juan Grande
	20	San Rafael
	21	Bahía Ballena,
	22	Bahía Drake
	23	Puerto Cortés
	24	Palmar
	25	Piedras Blancas
	26	Sierpe
	27	Naranjito

	28	Quepos
	29	Savegre
	30	Golfito
	31	Guaycará
	32	Pavón
	33	Parrita
	34	Corredor
	35	La Cuesta
	36	Laurel
	37	Canoas
	38	Jacó
	39	Tárcoles
	40	Lagunillas
	41	Monteverde
	42	Puerto Jiménez

If 'Link Tracing' in Q4 Q10. Who referred them to the survey (enter referral survey ID)? The intake person will provide you with the referral number. If coupon does not know, put N/A.	Text
Q11. Initials of Interviewer	Text
Q12. Date of interview	Automatic Entry

DEMOGRAPHICS QUESTIONS

Q13. What is your gender?	1	Male
	2	Female
	3	Non-binary
	4	Prefer not to say
Q14. What is your (approximate) age?	1	18-25
	2	26-40
	3	41-60
	4	61 and older
	5	Prefer not to say
	6	I do not know
Q15. What country are you a citizen of?	1	Costa Rica
	2	Salvador
	3	Guatemala
	4	Honduras

	5	Mexico
	6	Nicaragua
	7	Panama
	8	Venezuela
	9	Other (text box)
	10	Prefer not to say
Q16. What is your marital status	1	Never married
	2	Currently married
	3	Separated
	4	Divorced
	5	Widowed
	6	Other (text box)
	7	Prefer not to say
	8	I do not know
Q17. Do you have any children?	1	Yes

	2	No
	3	Prefer not to say
	4	I do not know
If YES to Q17 Q18. How many children do you have?	1	1
	2	2
	3	3
	4	4
	5	5 or more
	6	Prefer not to say
	7	I do not know
Q19. Do your children attend school?	1	Yes, all of them
	2	Some but not all of them
	3	No
	4	Prefer not to say
	5	I do not know

If YES to Q19 Q20. How much money do you pay per year, in total, for your children's education?	1	100,000 CRC or less
	2	100,001 - 200,000 CRC
	3	200,001 - 300,000 CRC
	4	More than 300,000 CRC
	5	Prefer not to say
	6	I do not know
Q21. Are YOU currently attending school or training?	1	Yes
	2	No
	3	Prefer not to say
Q22. What is the highest grade you completed in school?	1	Primary School
	2	Secondary School
	3	High School Degree
	4	Vocational School/Some College
	5	Bachelor's Degree
	6	Postgraduate Degree

	7	Cannot read or write/Illiterate
	8	No Formal Education/Literate
	9	Other (text box)
	10	Prefer not to say
	11	I do not know
Q23. How much are your household expenses each month (on average)?	1	Less than 100,000
	2	Between 100,001 - 300,000
	3	Between 300,001 -500,000
	4	Between 500,001 - 700,000
	5	More than 700,001
	6	Prefer not to say
	7	I don't know
Q24. Were you able to cover your household bills over the last 6 months?	1	Yes
	2	No
	3	Prefer not to say

	4	I don't know

FISHING QUESTIONS

Q25. What do you do in your job (ship size X range type)?	1	Small-scale artisanal fishing (panga)
	2	Medium artisanal fishing (boat, longline) – more than 40 miles
	3	Advanced artisanal fishing (transnational, longline) – more than 90 miles
	4	Semi-industrial fishing (shrimp, bolillo)
	5	Industrial fishing (tuna, from other countries)
	6	Other (text box)
	7	Prefer not to say
	8	I do not know
	9	Not Applicable
Q26. What is your role in the fishing sector (check all that apply)?	1	Boat owner
	2	Armador (provides ready and spare parts)
	3	Captain

	4	Crew (includes sailors, cooks, engineers)
	5	Fish receiver (collection)
	6	Fish transportation
	7	Pawn
	8	Dock Helpers
	9	Sale of supplies (ice, buns, lines)
	10	Repair service (workshop, mechanic, welding, radio, GPS, sonar)
	11	Gasoline (oil, hydraulic fluid)
	12	Fish processing (cleaning, skinning)
	13	Shrimp peeler
	14	Fishing nets (arrangement, lujadoras, sale)
	15	Marketing of fishery products (intermediary)
	16	Shellfish extraction

	17	Tourism linked to fishing (spare time while veda)
	18	Other (text box)
	19	Prefer not to say
	20	I do not know
	21	Not Applicable
Q27.Do you receive the IMAS benefit?	1	Yes
	2	No
	3	Prefer not to say
	4	I do not know
	5	Not Applicable
Q28.Do you have the INCOPESCA license?	1	Yes
	2	No
	3	Prefer not to say
	4	I do not know

	5	Not Applicable

MIGRATION PROCESS QUESTIONS

Q29. For the Enumerators: Is the respondent Costa Rican?	1	Yes
	2	No
Q30.1. When did you arrive in Costa Rica? [month]	Range: January-December	
Q30.2. When did you arrive in Costa Rica? [day]	N/A	
Q30.3. When did you arrive in Costa Rica? [year]	Range: 1950-2025	
Q31. Who helped you identify the job in Costa Rica? (check all that apply)	1	A family member already in Costa Rica
	2	A friend already in Costa Rica
	3	A friend or family member in Costa Rica who heard about the job through an ad or agency
	4	A government registered official job recruitment agency
	5	A private recruitment agency (not registered with the government)
	6	An individual with connections of job placement in Costa Rica
	7	I found it myself

	8	Other (text box)
	9	Prefer not to say
	10	I do not know
	11	Not Applicable
Q32. Did you borrow money to finance the journey to Costa Rica?	1	Yes
	2	No
	3	Prefer not to say
	4	I do not know
	5	Not Applicable
If YES to Q32 Q33. How much did you borrow? (in CR colones)	Text	
Q34. Which of the following conditions apply to your job offer? (EP8M)	1	An official contract was signed that detailed the job offer, including work conditions, pay and employment benefits
	2	A contract was produced with some details about the job nature and payment terms

	3	A contract was produced but not in a language I read or understood
	4	There was no written contract, but detailed verbal communication was made regarding work conditions, payment terms, and employment benefits
	5	There was no written contract, only verbal agreement with some details about the job nature and payment terms
	6	There was neither a written nor verbal agreement
	7	Other (text box)
	8	Prefer not to say
	9	Not Applicable
Q35. Would you say that your job in the fishing industry in Costa Rica is:	1	The job conditions/payment terms turned out to be better than what was told to me prior to starting work
	2	The job conditions/payment terms matched what I had learned prior to starting work
	3	The job conditions/payment terms turned out to be worse than what I had learned prior to starting work. (R3M)

	4	The job conditions/payment terms turned out to be completely false from what was told to me prior to starting work (R2S)
	5	Other (text box)
	6	Prefer not to say
	7	Not Applicable
Q36. How much in total did you pay in order to secure the job? (in CR colones - enter 0 for none)	Text	
Q37. Did the employer/intermediary pay the recruitment fee?	1	Yes
	2	No
	3	There was no fee
	4	Prefer not to say
	5	I do not know
If YES or 'I do not know' to Q37 Q38. Did they remove the fee from your salary?	1	Yes
	2	No
	3	Prefer not to say
	4	I do not know

Q39. How much money did they remove?	Text	
Q40. Sometimes people are obliged to work at a job against their will. During the recruitment process, did any of the following happen to you? (Select all that apply) (R1S/R2S)	1	Felt obliged during recruitment to work for a job (R1S)
	2	Were abducted, confined, kidnapped, or held against your will by your employer or people who worked for your employer. (R1S)
	3	Felt cheated or lied to about the nature of your job or specific responsibilities of the work you were supposed to do
	4	Were required to do things that were completely different from what you were led to believe (R2S)
	5	No, none of these things happened to me
	6	Prefer not to say
	7	Not Applicable
If (3) or (4) in Q40 Q41. Thinking about the most recent time this happened, can you tell me what lies/misrepresentations were used regarding the nature of the services to deceive you into accepting the job? (Select all that apply) (R2S)	1	Responsibilities were different from what was told
	2	Nature of work was different
	3	Hours of work were different

	4	Vacation/time off was different
	5	Other (text box)
	6	Prefer not to say
	7	Not Applicable
If (1) or (2) in Q40 Q42. Did this happen in your most current job?	1	Yes
	2	No
	3	Prefer not to say
Q43. When was the last time in your employment history that this happened?	1	Within the last three-six months
	2	Within the last six months
	3	Within the last nine months
	4	Within the last twelve months
	5	Between twelve and twenty-four months
	6	More than twenty-four months ago
	7	Prefer not to say

	8	I do not know

WORK HISTORY QUESTIONS

Q44. Enumerators Read: Now I am going to ask you some questions about your work in the fishing industry in Costa Rica.		
Q45. How old were you when you started working in the fishing industry?	1	0-5
	2	6-8
	3	9-11
	4	12-15
	5	16-18
	6	18+
	7	Prefer not to say
	8	I do not know
Q46. How many people work in your most current job?	1	0
	2	1
	3	2
	4	3
	5	4

	6	5 or more	
	7	Prefer not to say	
	8	I do not know	
Q47. Has your employer ever required you to be available day and night or to work extra hours without adequate pay outside the scope of your contract (these are not compensated overtime hours)? (DC1S)	1	Yes	
	2	No	
	3	Prefer not to say	
	4	I do not know	
	5	Not Applicable	
If YES to Q47 Q48. Has this happened to you in your most current job?	1	Yes	
	2	No	
	3	Prefer not to say	
Q49. When was the last time in your employment history that this happened?	1	Within the last three-six months	
	2	Within the last six months	

	3	Within the last nine months
	4	Within the last twelve months
	5	Between twelve and twenty-four months
	6	More than twenty-four months ago
	7	Prefer not to say
	8	I do not know
Q50. In your most current job, who is your employer (this is the person who pays you)?	1	Owner of the fishing boat
	2	Sub-contractor
	3	I do not have an employer (artisanal fishing, owner of their own boats, etc.)
	4	Other (text box)
	5	Prefer not to say
	6	I do not know
Q51. Do you work for a subcontractor/intermediary in your most current job (e.g. someone who gave you work tasks that wasn't your direct employer)?	1	Yes
	2	No

	3	Prefer not to say
	4	I do not know
	5	Not Applicable
Q52. What are the payment terms of the job?	1	Daily
	2	Weekly
	3	Monthly
	4	Annual
	5	Other (text box)
	6	Prefer not to say
	7	I do not know
	8	Not Applicable
Q53. Are you ever not paid for the work you do?	1	Yes
	2	No
	3	Prefer not to say

		4	I do not know
		5	Not Applicable
If YES to Q53 Q54. How many times in total has this happened?	Text		
Q55. How much money (approximately) have you not been paid in total? (in CR colones)	Text		
Q56. Did you or do you still pay a monthly fee to your broker or sub-contractor/intermediary?	1	Yes	
	2	No	
	3	Prefer not to say	
	4	I do not know	
	5	Not Applicable	
If YES to Q56 Q57. How much did you or do you still pay per month? (in CR colones)	Text		
Q58. Are you able to bargain/negotiate your wage/salary?	1	Yes	
	2	No	
	3	Prefer not to say	

	4	I do not know
	5	Not Applicable
Q59. Is your wage ever delayed from what you agreed upon without a good reason?	1	Yes
	2	No
	3	Prefer not to say
	4	I do not know
	5	Not Applicable
Q60. Is any part of your wage withheld on payday without good reason?	1	Yes
	2	No
	3	Prefer not to say
	4	I do not know
	5	Not Applicable
Q61. Is wage withholding a common practice?	1	Yes
	2	No
	3	Prefer not to say

	4	I do not know
	5	Not Applicable
Q62. Are you provided vacation time?	1	Yes
	2	No
	3	Sometimes
	4	Prefer not to say
	5	I do not know
	6	Not Applicable
Q63. If you have work-related disputes, do you settle them directly with the employer?	1	Yes
	2	No
	3	Prefer not to say
	4	Not Applicable
Q64. Sometimes people work for employers who do not let them leave their jobs. Has your employer or people who work for your employer ever withheld your compensation and/or benefits to prevent you from leaving? (EP01)	1	Yes
	2	No

	3	Prefer not to say
	4	I do not know
	5	Not Applicable
If YES to Q64 Q65. Has this happened in your most current job/situation?	1	Yes
	2	No
	3	Prefer not to say
Q66. When was the last time in your employment history that this happened?	1	Within the last three months
	2	Within the last six months
	3	Within the last nine months
	4	Within the last twelve months
	5	Between 12-24 months
	6	More than 24 months ago
	7	Prefer not to say

	8	I do not know
Q67. How much was withheld? (In CR colones)	Text	
Q68. Has your employer or people who work for your employer ever told you that you would lose your compensation already earned if you decided to quit?	1	Yes
	2	No
	3	Prefer not to say
	4	Not Applicable
If YES to Q68 Q69. Has this happened in your most current job/situation?	1	Yes
	2	No
	3	Prefer not to say
Q70. When was the last time in your employment history that this happened?	1	Within the last three months
	2	Within the last six months
	3	Within the last nine months
	4	Within the last twelve months
	5	Between 12-24 months

	6	More than 24 months ago
	7	Prefer not to say
	8	I do not know

Q71. Enumerators read: Sometimes, people enter into debt agreements with their employers to pay for the cost of their housing/living conditions, or the costs of securing their employment including transportation, documentation, and work permits.

Q72. Have you ever felt that an employer/broker or whoever economically benefits from your labor (EP02):

Q72.A. Charged you fees or inflated the prices for goods/services you purchased from your employer (EP02)

Q72.A.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q72.A.2. Did this happen in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A

Q72.A.3. When did this last happen to you?	Text	
Q72.B. Reduced the value of goods you produced or services you provided (EP02)		
Q72.B.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q72.B.2. Did this happen in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q72.B.3. When did this last happen to you?	Text	
Q72.C. Tried to reduce your compensation by charging you excessive fees for things such as rent, food, or other items you consumed at the workplace (EP02)		
In any job?	1	Yes
	2	No

	3	Prefer not to say
	4	N/A
Did this happen in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
When did this last happen to you?	Text	
Q73. Has this happened in your most current job?	1	Yes
	2	No
	3	Prefer not to say
	4	Not applicable
Q74. When was the last time in your employment history that this happened?	1	Within the last three months
	2	Within the last six months
	3	Within the last nine months

	4	Within the last twelve months
	5	Between 12-24 months
	6	More than 24 months ago
	7	Prefer not to say
	8	I do not know
Q75. Have you ever had a debt imposed on you without your consent by your employer? For instance, has your employer / person who derived economic benefit from your labor decided that you owed them money for reasons you didn't agree with (this may include taking on someone else's debt, including a family member; this does not include a debt imposed during recruitment)? (DD01)	1	Yes
	2	No
	3	Prefer not to say
	4	I do not know
	5	Not Applicable
If YES to Q75 Q76. How much did the debt cost? (in CR colones)	Text	

RESTRICTION OF FREEDOM QUESTIONS

Q77. Enumerators read: Now I would like to ask you some questions about how you are treated at work. I would like to assure you that your answers will be kept secret, and that you do not have to answer any questions that you do not want to. May I continue?	1	Yes
	2	No

If YES to Q77
Q78. Sometimes, employers want to have control over people's lives outside their job. Has your employer or people who work for your employer ever attempted to control your personal
life outside work in any of these ways? (PL1S)

Q78.A. You were forbidden from leaving the work site (FM3S)

Q78.A.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q78.A.2. Has this happened in your most recent job?	1	Yes

	2	No
	3	Prefer not to say
	4	N/A
Q78.A.3. When was the last time this happened to you?	Text	

Q78.B. You were kept under surveillance (FM3S)

Q78.B.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q78.B.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q78.B.3. When was the last time this happened to you?	Text	

Q78.C. You were kept in an isolated place with nowhere to go (FM3S)

Q78.C.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q78.C.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q78.C.3. When was the last time this happened to you?	Text	

Q78.D. You were locked in the workplace or living quarters (FM3S)

Q78.D.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q78.D.2. Has this happened in your most recent job?	1	Yes

	2	No
	3	Prefer not to say
	4	N/A
Q78.D.3. When was the last time this happened to you?	Text	

Q78.E. You were restricted on where you could go during non-work hours

Q78.E.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q78.E.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q78.E.3. When was the last time this happened to you?	Text	

Q79. Sometimes, employers want to have control over people's lives outside their job. Has your employer or people who work for your employer ever attempted to control your personal

life outside work in any of these ways? (PL1S)		
Q79.A. Your phone was confiscated (FM3S)		
Q79.A.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q79.A.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q79.A.3. When was the last time this happened to you?	Text	
Q79.B. You were prevented or restricted from communicating freely with your family, including making or receiving phone calls to/from them (FM3S)		
Q79.B.1. In any job?	1	Yes
	2	No
	3	Prefer not to say

	4	N/A
Q79.B.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q79.B.3. When was the last time this happened to you?	Text	
Q79.C. You were prevented or restricted from communicating freely with other workers		
Q79.C.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q79.C.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A

Q79.C.3. When was the last time this happened to you?	Text	

Q79.D. You were prevented or restricted from communicating freely with others outside the workplace		

Q79.D.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q79.D.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q79.D.3. When was the last time this happened to you?	Text	

Q80. Sometimes, employers want to have control over people's lives outside their job. Has your employer or people who work for your employer ever attempted to control your personal life outside work in any of these ways? (PL1S)		

Q80.A. You were not permitted to seek or receive medical services when you fell ill		

Q80.A.1. In any job?	1	Yes

	2	No
	3	Prefer not to say
	4	N/A
Q80.A.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q80.A.3. When was the last time this happened to you?	Text	
Q80.B. You were not allowed to have visitors		
Q80.B.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q80.B.2. Has this happened in your most recent job?	1	Yes
	2	No

	3	Prefer not to say
	4	N/A
Q80.B.3. When was the last time this happened to you?	Text	
Q80.C. You were forced to work when you refused to		
Q80.C.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q80.C.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q80.C.3. When was the last time this happened to you?	Text	
Q81. Sometimes, employers want to have control over people's lives outside their job. Has your employer or people who work for your employer ever attempted to control your personal life outside work in any of these ways? (PL1S)		

Q81.A. Controlled through blackmail, that is threatened to reveal something personal/embarrassing about you (PL1S/PL02/PL04)		
Q81.A.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q81.A.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q81.A.3. When was the last time this happened to you?	Text	
Q81.B. Controlled through religious retribution (any punishment because of your religious beliefs or practices) (PL1S/PL02/PL04)		
Q81.B.1. In any job?	1	Yes
	2	No
	3	Prefer not to say

	4	N/A
Q81.B.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q81.B.3. When was the last time this happened to you?	Text	

Q81.C. Controlled by threatening to exclude you from future employment opportunities (PL1S/PL02/PL04)		
Q81.C.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q81.C.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say

	4	N/A
Q81.C.3. When was the last time this happened to you?	Text	

Q82. Sometimes, employers want to have control over people's lives outside their job. Has your employer or people who work for your employer ever attempted to control your personal life outside work in any of these ways? (PL1S)		
Q82.A. Controlled you by threatening to, or actually isolating you from your family (PL1S/PL02/PL04)		
Q82.A.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q82.A.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q82.A.3. When was the last time this happened to you?	Text	
Q82.B. Controlled you by threatening to, or actually isolating you from your friends (being ostracized)(PL1S/PL02/PL04)		

Q82.B.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q82.B.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q82.B.3. When was the last time this happened to you?	Text	

Q82.C. Controlled you by making you perform sex acts to pay off your outstanding debt or wage advance (PL1S/PL02/PL04)

Q82.C.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A

Q82.C.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q82.C.3. When was the last time this happened to you?	Text	

Q83. Enumerators Read: Sometimes people are not allowed to keep their own identification or travel documents. [Note: sometimes passports and travel documents for fishermen are held by the employer to prevent the employee from leaving or working for another employer]

Q84. Has your employer/people who work for your employer ever taken/confiscated your identity papers or made it so you were unable to access your identity papers (e.g. passport, work permit)? (FM1S)	1	Yes
	2	No
	3	Prefer not to say
	4	Not Applicable
If YES to Q84 Q85. Which documents (check all that apply)? (FM1S)	1	Passport
	2	Identity Card

	3	Visa
	4	Work Permit
	5	Birth Certificate
	6	Other
	7	Prefer not to say
	8	I do not know
Q86. Has this happened in your most current job?	1	Yes
	2	No
	3	Prefer not to say
Q87. When was the last time in your employment history that this happened?	1	Within the last three months
	2	Within the last six months
	3	Within the last nine months
	4	Within the last twelve months
	5	Between 12 to 24 months
	6	More than 24 months ago

	7	Prefer not to say
	8	I do not know

EXPERIENCE OF EMOTIONAL/PHYSICAL/SEXUAL VIOLENCE QUESTIONS

Q88. Enumerators Read: Sometimes, people stay at a job or in other dangerous situations because someone threatens to hurt them or hurt someone they care deeply about.

Q89. Have the following incidents happened to you at work?

Q89.A. Confiscated your savings or other valuables (e.g. jewelry)

Q89.A.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q89.A.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q89.A.3. When was the last time this happened to you?	Text	

Q89.B. Belittled you in front of your peers

| Q89.B.1. In any job? | 1 | Yes |

	2	No
	3	Prefer not to say
	4	N/A
Q89.B.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q89.B.3. When was the last time this happened to you?	Text	
Q89.C. Ostracized you from your peers		
Q89.C.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q89.C.2. Has this happened in your most recent job?	1	Yes
	2	No

	3	Prefer not to say
	4	N/A
Q89.C.3. When was the last time this happened to you?	Text	

| Q90. Have the following incidents happened to you at work? | | |

| Q90.A. Smashed things to intimidate you on purpose (V8M) | | |

Q90.A.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q90.A.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q90.A.3. When was the last time this happened to you?	Text	

| Q90.B. Threatened physical violence against you (V8M) | | |

Q90.B.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q90.B.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q90.B.3. When was the last time this happened to you?	Text	

Q90.C. Threatened physical violence against someone you care deeply about (V8M)

Q90.C.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q90.C.2. Has this happened in your most recent job?	1	Yes

	2	No
	3	Prefer not to say
	4	N/A
Q90.C.3. When was the last time this happened to you?	Text	

Q90.D. Used physical violence against someone you care deeply about (V8M)		
Q90.D.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q90.D.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q90.D.3. When was the last time this happened to you?	Text	

Q91. Have the following incidents happened to you at work?

Q91.A. Pushed you, shook you or throw something at you (V3S)		
Q91.A.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q92.A.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q92.A.3. When was the last time this happened to you?	Text	
Q91.B. Slapped you about or twisted your arm (V3S)		
Q91.B.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A

Q91.B.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q91.B.3. When was the last time this happened to you?	Text	

Q91.C. Punched you with their fist or with something that could hurt you (V3S)		
Q91.C.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q91.C.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q91.C.3. When was the last time this happened to you?	Text	

Q91.D. Kicked you or dragged you (V3S)		
Q91.D.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q91.D.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q91.D.3. When was the last time this happened to you?	Text	
Q91.E. Tried to strangle or burn you (VS3)		
Q91.E.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A

Q91.E.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q91.E.3. When was the last time this happened to you?	Text	

Q91.F. Attacked you with a knife, gun, or other type of weapon (VS3)		
Q91.F.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q91.F.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q91.F.3. When was the last time this happened to you?	Text	

Q92. Have the following incidents happened to you at work?		
Q92.A. Forced you to do something sexual that you did not want to do (V4S)		
Q92.A.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q92.A.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q92.A.3. When was the last time this happened to you?	Text	
Q92.B. Forced you to be photographed or watch other sexual acts that you found degrading (V4S)		
Q92.B.1. In any job?	1	Yes
	2	No
	3	Prefer not to say

	4	N/A
Q92.B.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q92.B.3. When was the last time this happened to you?	Text	
Q92.C. Used sexual violence against someone you care deeply about (V4S)		
Q92.C.1. In any job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A
Q92.C.2. Has this happened in your most recent job?	1	Yes
	2	No
	3	Prefer not to say
	4	N/A

Q92.C.3. When was the last time this happened to you?	Text	
Q93. If someone you care about was threatened or subjected to physical or sexual violence, can you tell me your relationship with the person who was threatened with or subjected to physical violence? (choose all that apply)	1	Child
	2	Spouse/romantic partner
	3	Parent
	4	Sibling
	5	Other relative
	6	Friend
	7	Other
	8	Prefer not to say
	9	Not Applicable

HELP-SEEKING ACTIVITIES QUESTIONS

Q94. To the interviewer: Did the respondent answer yes to any of the abuses listed above?	1	Yes
	2	No
If YES to Q94 Q95. You mentioned some of these bad things happened to you, did you stay at the job?	1	Yes
	2	No
	3	Prefer not to say
	4	Not Applicable
If YES to Q95 Q96. Why did you choose to stay? (choose all that apply)	1	Physical violence (including being punched, kicked, dragged, beaten up, threatened with a gun, knife or other weapons)
	2	Physically restrained (including being tied up or locked in a room)
	3	Deprived of food, water and/or sleep
	4	Sexual violence (an act that is sexual in nature, including physical contact, being photographed or forced to watch other sexual acts)
	5	Emotional violence (including belittling or ostracizing a person

		in front of their peers/verbal abuse)
	6	Harm to a family member(s) or someone you care about
	7	Legal action (including being arrested)
	8	Withholding of ID cards/citizenship (e.g passport)
	9	Loss of wages
	10	Confiscation of savings or other valuables
	11	Too far from home and nowhere to go
	12	Kept drunk/drugged
	13	No better job options
	14	Restrictions in communication
	15	Nothing would have happened to me
	16	Other (text box)
	17	Prefer not to say

	18	I do not know
Q97. Have you ever sought help for any of the situations you disclosed above?	1	Yes
	2	No
	3	Prefer not to say
	4	Not Applicable
If YES to Q97 Q98. Who did you seek help from? (check all that apply)	1	Home country embassy/consulate
	2	Overseas organization in foreign country
	3	Spouse
	4	Immediate family (mother, father, grandparents, siblings)
	5	Extended family (aunt, uncle, cousin, niece, nephew, in-laws)
	6	Friend
	7	Co-worker
	8	Local service provider/counselor
	9	Lawyer

	10	Local law enforcement	
	11	Neighbor/community member	
	12	Faith or religious community	
	13	Stranger	
	14	Other (text box)	
	15	Prefer not to say	
Q99. What kind of help did they provide? (check all that apply)	1	Shelter, food, clothing	
	2	Mental health support	
	3	They contacted law enforcement	
	4	They contacted my home country embassy/consulate	
	5	They contacted a service provider	
	6	They bought me to a medical doctor	
	7	They didn't end up helping me	
	8	Other (text box)	

	9	Prefer not to say
Q100. Did you get the help you needed?	1	Yes
	2	No
	3	Somewhat yes (they provided some help but not all I needed)
	4	Prefer not to say
If (2), (3), or (4) in Q100 Q101. If no or only some help, what and/or from who were you hoping to receive help? (check all that apply)	1	Shelter, food, clothing
	2	Mental health support
	3	Law enforcement assistance
	4	Home country embassy/consulate assistance
	5	Service provider assistance
	6	Medical assistance
	7	Other (text box)
	8	Prefer not to say
	9	Not Applicable

If (2) or (4) in Q100 Q102. If you didn't seek help, why not? (check all that apply)	1	I was scared
	2	I didn't think anyone could help
	3	I didn't know who to go for help
	4	I thought I could handle it on my own
	5	Other (text box)
	6	Prefer not to say

Q103. Enumerators Read: Finally, we would like to know how active you are in using different channels to communicate with your friends, family members, relatives, store owners, or anyone you interact with.	
If 'Household enrollment' in Q4 Q104. If you can add up all different contacts in your mobile phone numbers or WhatsApp, can you tell me the total number of contacts? Please take your time to browse through your mobile phone.	Text
Q105. Can you tell me how many of these contacts are also fishermen?	Text
Q106. Can you tell me of all your contacts, with how many did you communicate with in the last week via phone or social media?	Text
Q107. Of those you communicated with in the last week via phone and social media, how many are fishermen?	Text
Q108. How many people did you communicate with in person in the last 7 days, that you didn't communicate with via phone or social media?	Text
Q109. Of those that you only communicated in person with, how many were fishermen?	Text
Q110.A. Are from Nicaragua	Text
Q110.B. Are from Isla Chira	Text
Q110.C. Experienced deceptive recruitment (nature of services or responsibilities required)	Text

Q110.D. Were made to be available day and night without adequate compensation outside the scope of the contract	Text
Q110.E. Lacked freedom of movement or communication	Text
Q110.F. Experienced physical violence against them or someone they care deeply about	Text
If (3) or (4) in Q35 OR (1), (2), (3), or (4) in Q40 Q111.A. Experienced deceptive recruitment (nature of services or responsibilities required)	Text
If YES to Q47 Q111.B. Were made to be available day and night without adequate compensation outside the scope of the contract	Text
If YES to any components of Q78 Q111.C. Had no freedom of movement or communication	Text
If YES to any components of Q92 Q111.D. Experienced physical violence against them or someone you care deeply about	Text

LINK TRACING QUESTIONS

Now we are coming to the end of this interview. Before we finish, we would like you to help us identify others like you who are: not family members, who currently live in Puntarenas, who have worked in the fishing industry in Costa Rica, and who are at least 18 years old [If seed = 0,] and who did not provide you with a coupon to participate in this study. Can you help us? We will pay for you to bring your friends to us, and your friends will also get paid for participating in this survey. Here is how we do this. We would like you to tell us up to 7 people who are not family who you know well who fit these characteristics. Then I will choose three of them for you to give the coupon. This coupon has important information on it, such as the location of the interview, contact information for the study, and what the study is about. We can schedule a time for you to bring these friends of yours to us, and we will pay you 2,000 Costa Rican Colones for each of these three people.

Now let me explain how this form works. This form helps us keep track of the referrals (or nominations), who include up to 7 members that you know who are not family members and who fit these characteristics: currently live in Puntarenas, have worked in the fishing industry in Costa Rica, and who are at least 18 years old. We are only using this form to keep track of these nominations, in case some of them have been interviewed before. We also need to keep track of our payment to our respondents, such as yourself. We do this using the unique coupon codes that are on each coupon.

If 'Link tracing' in Q4 Q113. About how many individuals 18 years and older do you personally know by name/alias who have worked in the fishing industry in Costa Rica, are not family members, and currently live in Puntarenas?	Text

Q114. Please tell me up to 7 people that you know well so that we can ask you to bring three of them in to join our survey. If do not know, please add 999. If refuse to answer, please add 777.

Q114.A. Person 1

Q114.A.1. Area they currently live in	Text
Q114.A.2. Can we have his/her mobile number for verification purposes? [Enumerator, try and get at least the last 3-4 digits of their phone number. If respondent does not know this, that is OK]	Text
Q114.A.3. Sex	Text

Q114.A.4. Approximately how old were they on their last birthday?	Text
Q114.A.5. What is their marital status?	Text
Q114.A.6. What work do they do in the fishing industry?	Text
Q114.B. Person 2	
Q114.B.1. Area they currently live in	Text
Q114.B.2. Can we have his/her mobile number for verification purposes? [Enumerator, try and get at least the last 3-4 digits of their phone number. If respondent does not know this, that is OK]	Text
Q114.B.3. Sex	Text
Q114.B.4. Approximately how old were they on their last birthday?	Text
Q114.B.5. What is their marital status?	Text
Q114.B.6. What work do they do in the fishing industry?	Text
Q114.C. Person 3	
Q114.C.1. Area they currently live in	Text
Q114.C.2. Can we have his/her mobile number for verification purposes? [Enumerator, try and get at least the last 3-4 digits of their phone number. If respondent does not	Text

know this, that is OK]	
Q114.C.3. Sex	Text
Q114.C.4. Approximately how old were they on their last birthday?	Text
Q114.C.5. What is their marital status?	Text
Q114.C.6. What work do they do in the fishing industry?	Text
Q114.D. Person 4	
Q114.D.1. Area they currently live in	Text
Q114.D.2. Can we have his/her mobile number for verification purposes? [Enumerator, try and get at least the last 3-4 digits of their phone number. If respondent does not know this, that is OK]	Text
Q114.D.3. Sex	Text
Q114.D.4. Approximately how old were they on their last birthday?	Text
Q114.D.5. What is their marital status?	Text
Q114.D.6. What work do they do in the fishing industry?	Text
Q114.E. Person 5	
Q114.E.1. Area they currently live in	Text

Q114.E.2. Can we have his/her mobile number for verification purposes? [Enumerator, try and get at least the last 3-4 digits of their phone number. If respondent does not know this, that is OK]	Text
Q114.E.3. Sex	Text
Q114.E.4. Approximately how old were they on their last birthday?	Text
Q114.E.5. What is their marital status?	Text
Q114.E.6. What work do they do in the fishing industry?	Text
Q114.F. Person 6	
Q114.F.1. Area they currently live in	Text
Q114.F.2. Can we have his/her mobile number for verification purposes? [Enumerator, try and get at least the last 3-4 digits of their phone number. If respondent does not know this, that is OK]	Text
Q114.F.3. Sex	Text
Q114.F.4. Approximately how old were they on their last birthday?	Text
Q114.F.5. What is their marital status?	Text
Q114.F.6. What work do they do in the fishing industry?	Text

Q114.G. Person 7	
Q114.G.1. Area they currently live in	Text
Q114.G.2. Can we have his/her mobile number for verification purposes? [Enumerator, try and get at least the last 3-4 digits of their phone number. If respondent does not know this, that is OK]	Text
Q114.G.3. Sex	Text
Q114.G.4. Approximately how old were they on their last birthday?	Text
Q114.G.5. What is their marital status?	Text
Q114.G.6. What work do they do in the fishing industry?	Text