

ACTIVITY 2.2.2.1 COMMUNITY LEVEL RISK REDUCTION INTERVENTIONS TRIALS OF IMPROVED PRACTICES:

A Report from STOP Spillover Cambodia
September 2023



Cover Image. Bat guano producer collects bat guano in front of her house in Varint I, Khchau commune, Kang Meas district, Kampong Cham province. Photo Credit: STOP Spillover Cambodia.

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STOP Spillover

Strategies to Prevent Spillover (or “STOP Spillover”) enhances global understanding of the complex causes of the spread of a selected group of zoonotic viruses from animals to humans. The project builds government and stakeholder capacity in priority Asian and African countries to identify, assess, and monitor risks associated with these viruses and develop and introduce proven and novel risk reduction measures. In the context of this work “spillover” refers to an event in which an emerging zoonotic virus is transferred from a non-human animal host species (livestock or wildlife) to another or humans.

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LIST OF ACRONYMS

BGP	Bat guano producer
BGPH	Bat guano producing household
CCWC	Commune committee for women and children
DCWC	District committee for women and children
HC	Health center
HH	Household
HW	Handwashing
NBGP	Non-bat guano producer
NBGPH	Non-bat guano producing household
OD	Operational district
PDA	Provincial department of agriculture
PDRD	Provincial department of rural development
PHD	Provincial Health Department
PPE	Personal protective equipment
SBC	Social and behavior change
TIPs	Trials of Improved Practices

EXECUTIVE SUMMARY

Underlying the emergence of diseases and the spread of epidemics is the behavior of individuals, the social structures in which they operate, and the political and economic environment that shapes a population's outcomes. To prevent and break transmission, individuals must do something different than their current practices. Behavior change across all levels is fundamental to reducing spillover of zoonotic disease from wildlife like bats. Social and behavior change (SBC) interventions informed by research can promote the uptake of positive, risk reduction behaviors. Recognizing this, STOP Spillover in Cambodia conducted formative research to gather insights from bat guano producers and their neighbors—living and working in a high-risk bat-human interface—regarding their practice of priority risk reduction behaviors.

Over three weeks, 13 bat guano producing families and 10 non-bat guano producing neighboring families tried to implement or improve the practice of seven risk reduction behaviors. The methodology used was Trials of Improved Practices (TIPs), a technique in which program planners pretest the actual practices that a program will promote before rolling them out. This ensures that program strategies target the real motivations for adopting practices and promote feasible changes. The trials involved three household visits by an interviewer. The first visit assessed the family's current practices and introduced up to three new or modified practices for them to try. The interviewer then returned midway through the trial period to assess progress and answer questions. At the end of the trial period, the interviewer returned to talk with the family about their experience, assess the extent of change, and discuss the family's reactions and intention to continue the practice.

The results summarized below offer a guide to expectations for behavior change within the life of STOP Spillover and the level of effort and project resources that may be needed to facilitate that change. The behaviors in **red** will require significant attention from STOP Spillover; those in **yellow** may require specific inputs and attention for some sub-behaviors, but overall expectations for change are good; and **green** indicates the expectations for change are excellent and within the parameters that through good community engagement and communication, the families should be able to effect change from their resources.

Table 1: Highlights of trial outcomes and expectations for STOP Spillover inputs to facilitate change of prioritized behaviors.

Priority Practice	Trial Outcomes
Use full PPE every time there will be contact with bats or guano	<ul style="list-style-type: none"> • Full PPE use improved: especially use of a mask more consistently (surgical single-use mask; eye covering, and boots remain largest gap.). • Discomfort wearing PPE: especially feeling that can't breathe; some supply issues (time needed and distance to markets). • Poor practice removing PPE—gloves often were removed first. <p>Feasibility and acceptability of full, consistent (optimal) PPE use is low.</p>
Clean and Store PPE properly	<ul style="list-style-type: none"> • Separation of PPE from regular clothing improved as did single-use mask refresh. • Washing frequency might have improved in most cases, but was not always done properly, never with disinfectant, and unclear if PPE was dried away from roosts. <p>Feasibility and acceptability are good, although it may be difficult to get to optimal practice.</p>
Wash hands after contact with bats or guano	<ul style="list-style-type: none"> • Handwashing with soap at a location outside the house improved, the main gap is drying hands. • Handwashing location(s) could be upgraded, one placed near roost. <p>Acceptability and feasibility are high.</p>
Store harvested guano properly	<ul style="list-style-type: none"> • Not relevant for everyone. Those needing to improve did improve although not fully. Issues: lack of space and support of others for labor. <p>Acceptability and feasibility are good, especially with one time supporting effort of others.</p>
Cover food exposed to bats	<ul style="list-style-type: none"> • Storing/covering food with baskets or in “cupboards” improved. • Care taken on the timing of putting food out for drying was reported to improve. <p>Acceptability and feasibility are good. Especially important for people with open kitchens; appropriate, affordable options appreciated.</p>
Wet wipe surfaces, especially where food is prepared or eaten	<ul style="list-style-type: none"> • Change made on sub-behaviors: use of wet cloth, use of soap, almost everyone did it daily (or more) and often in the morning. <p>Highly acceptable (liked clean space and peace of mind) and feasible.</p>
Proper disposal of dead bats	<p>Assessment indicates that dead bats are often not removed quickly and are thrown out of site, not buried. No trial-only one dead bat found.</p>
Control/protect domestic animals from guano	<p>No trial was done, but participants expressed concern about animals tracking guano into homes. Normative practice is that animals wander freely. Ideas advanced around a different, raised guano collection net.</p>

The BGP and NBGP households demonstrated that with their resources they can make important changes in their biosafety and hygiene practices. The major factors influencing improving practices are: desire for less smell and dust; desire for improved family welfare (beyond just health); an attitude of low perceived risk and complacency (“we have been doing this for decades with no ill effects”); physical discomfort (PPE and feeling they can’t breathe), lack of time (we lead busy lives with many competing demands); lack of agency (women, especially elderly women may not make decisions about purchases—when to buy and how much to spend); physical constraints (current poor health); lack of confidence and trust (unsure if improved practices will make difference and don’t talk about changes for fear of being wrong or seen out of step). The recommendations below are offered to directly address these factors.

The BGP and NBGP households demonstrated that with their own resources they can make important changes in their biosafety and hygiene practices.

Enabling Environment

1. Take a community approach to risk reduction that includes NBGP households in determining project support activities particularly related to hygiene promotion. They can add social support for these measures.
2. Given the older age of many BGP heads of family and guano harvesters, engage them through a “live and learn” approach to lessen their resistance to change by recognizing their years in the guano business, but alerting them to be ready for what might come.
3. Support family dialogue about the needed actions at the household level to support "primary" guano harvesters, often elderly women.

Enabling Technologies

1. Work with the community to set up a scheme(s) to make critical products available locally to address the time constraint faced by many to get to markets to look for supplies. For example, find small entrepreneurs in each village (Varint 1, 2 & 3) who would sell basic PPE and hygiene supplies. These would be products with demand beyond just the 16 BGPs.
2. Offer information about where acceptable products like boots and gloves can be found and their cost. See if buying in bulk might reduce costs.
3. Provide technical support for particularly improved infrastructure: a handwashing station that can be appropriately positioned to encourage handwashing immediately after removing PPE; cabinets to store food; improved ways to collect guano.
4. Continue to explore ways to keep guano off the ground under the roosts so that runoff during the rainy season and the amount of guano tracked by animals is reduced.
5. Confirm if soap is suitable or the type of disinfectant that should be used for PPE cleaning and surface wiping.

Communication and Community Engagement

1. Continue to educate the community about the risk that bats pose to disease transmission, but do not rely on it as a sole motivator. Peoples' interest in reducing the smell and dust, and their appreciation of a clean, safe home environment is high. These are stronger motivators.
2. Awareness-raising is not enough. Institute a system of community and family commitments to staying healthy while living with bats instituted and supported by the OH-DReaM working group¹ (i.e., village chief, CCWC, DCWC, Health Center). Use community or neighborhood scorecards to elicit social accountability and community support to achieve goals and to help those families who have real challenges reaching their commitments (Helping Hands).
3. Recognize positive achievements of both BGP and NBGP households to protect themselves and the community. Spread their knowledge and build on their experience through visitation and exchanges.
4. Consider developing a certification / label for communities or households that consistently demonstrate excellent biosafety and hygiene are being followed.
5. Reminders and nudges are important for establishing habits. Consider calendars, a brightly colored visual path from the entrance to the roost to a handwashing station, a secure place for soap as ways to remind people.
6. Create cell phone videos shared over WhatsApp and Viber that demonstrate proper handwashing, offer examples of how to store PPE, wet wipe surfaces, dispose of dead bats and build cabinets to store food, etc.

¹ The One Health Design, Research and Mentorship working group includes representatives from Provincial Department of Agriculture, Operational District, District Committee for Women and Children, Commune Committee for Women and Children, Village Chief, Health Center, and Provincial Dept of Rural Development.

INTRODUCTION

BACKGROUND

The goal of STOP Spillover is to identify and reduce the risk of pandemic zoonotic virus spillover from animals, including bats, into human populations. "Spillover" is a term referring to the spread of pathogens from one species into a new one, as is believed to have occurred with Severe Acute Respiratory Syndrome coronavirus 2 (SARS-CoV-2), the causative agent of coronavirus disease 2019 (COVID-19), from animals into humans. Spillover is a global threat. In many countries, the physical sites where spillovers occur are not known nor completely understood. In addition, the input and knowledge of people and organizations closest to the interface have often been overlooked.

There is an increasing concern over the emerging infectious diseases associated with bats, hosts of high viral diversity, including many zoonotic viruses. As bat-human interaction increases there can be major effects on human health. Previous scientific studies identified that the infection dynamics of bat-associated zoonoses are driven by the complex interactions of ecological, immunological, behavioral, and anthropogenic factors (Chomel et al., 2014).

In Cambodia, the district of Kang Meas has communities that have been living in proximity with bats since at least 1975, when the practice of building bat roosts and collecting guano was documented. Over many decades, both those families "farming guano" and their neighbors may have been at risk of bat-borne zoonoses (Activity 2.2.2.1 Report on Knowledge, Attitudes, and Practices Regarding Zoonotic Spillover Risks in Bat Guano Farms and Communities: Cambodia). Working with these communities to learn any protective practices that they have in place and how to support them in protecting themselves and their livelihoods can provide lessons for others. As part of the global STOP Spillover project, the Cambodia STOP Spillover activities are focused on the biosafety and hygiene interventions to be implemented in the communities where there is an active bat-human interface.

There are several potential zoonotic disease transmission pathways associated with living with bats. These include: 1) direct exposure to bats and guano by people collecting bat guano; 2) contamination of food and water by bats; 3) exposure to bat contaminants in dust; 4) interactions between humans, domestic animals, wildlife, and bats; and 5) direct contact during disposal of dead bats². In 2023 the STOP Spillover team in Cambodia conducted two studies among the 16 bat guano producing households and their nearby neighbors in Kang Meas district to document: 1) their current practices and the risks they face related to known risk pathways, and 2) the

² Knowledge, Attitudes, and Practices Regarding Zoonotic Spillover Risks in Bat Guano Farms and Communities: Cambodia (2023).

presence of infectious agents from the bats along these risk pathways³. The table below highlights findings from these two studies. These results formed the basis for the TIPs research, the subject of this report.

Table 2. Highlights of findings from earlier studies relevant for TIPs study

Risk Pathway	Survey Highlights		Biological Testing Results for Food, Water and Surfaces
	BGP Households (HH)	NBGP HH	10 BGP HH/10 NBGP HH
Direct Exposure (ex. guano collection)	<ul style="list-style-type: none"> ● 100% of HH have at least one person collecting guano; often elder female. ● 25% have reported bats in home in the past year. ● 25% have eaten bats in the past year. ● PPE is seen as important; 80% used a face mask and head covering but only ~30% regularly use it; women use it more regularly than men. 	<ul style="list-style-type: none"> ● 25% have bats in home < 1 year. ● <10% have eaten bats in the past year. ● ~ 30% use some PPE as they see fit. 	
From clothes and clothes worn during harvesting	<ul style="list-style-type: none"> ● No clothes left drying overnight. ● 43% change clothes after working with guano. ● 70% wash and dry PPE (unclear if after every use). ● Do not store PPE properly 	~10% leave clothes drying overnight	
Contaminated Hands	<ul style="list-style-type: none"> ● 80% report washing hands soon after handling guano. ● HW practice is not optimal 		<ul style="list-style-type: none"> ● 20% of all households had a dedicated space for handwashing in the house, ● 20% use running water

³ Food, Water and Surface Contamination Assessment in a Bat Guano Producing Community, Cambodia: A Report from STOP Spillover 2023.

Risk Pathway	Survey Highlights		Biological Testing Results for Food, Water and Surfaces
	BGP Households (HH)	NBGP HH	10 BGP HH/10 NBGP HH
			to wash hands.
Contaminated Water	<ul style="list-style-type: none"> ● 69% access to piped water ● Water stored in jars often left uncovered. ● 25% drink untreated water 	<ul style="list-style-type: none"> ● 89% access to piped water ● Water stored in jars often left uncovered. ● 12% drink untreated water 	<ul style="list-style-type: none"> ● No positive samples ● 90% of the HH do not cover storage containers of drinking water, ● 55% do not cover containers of water used for vegetable production. ● 60% do not treat drinking water in the home.
Contaminated Food	<ul style="list-style-type: none"> ● Many HH dry meat / food outside in the day–1 HH dried meat outside at night ● 50% have closed kitchens; 50% kitchen open (potentially) to bats. ● Animals walk freely in kitchen. ● Washed fruit 50% of the time or less 	<ul style="list-style-type: none"> ● Many HH dry meat or other food outside in the day ● ~ 20 of HH left meat out drying overnight. ● 43% have closed kitchen; 57% have kitchens potentially open to bats. ● Animals walk freely in kitchen. ● Washed fruit 50% of the time or less 	<ul style="list-style-type: none"> ● 1.4% of food samples were positive for Alphacoronaviruses and Infectious Bronchitis Virus (IBV). ● 80% of all surveyed households did not cover food and meat while drying it.
Contact with Dust (surfaces) / improperly stored guano	<ul style="list-style-type: none"> ● Some HH storing guano in open area under house 		<ul style="list-style-type: none"> ● 2.9% of all household surface samples were contaminated with potential bat-associated coronavirus RNA (Alphacoronaviruses) and Infectious Bronchitis Virus (IBV) found on inside and outside surfaces.
Direct/indirect Contact with Domestic Animals	<ul style="list-style-type: none"> ● 94% of HH have animals. ● Animals do not sleep in house. 	<ul style="list-style-type: none"> ● 74% of households have animals. ● 25% have animals sleeping in the 	

Risk Pathway	Survey Highlights		Biological Testing Results for Food, Water and Surfaces
	BGP Households (HH)	NBGP HH	10 BGP HH/10 NBGP HH
exposed to bats	<ul style="list-style-type: none"> Approx. 15% of respondents have experienced cat or dog bites 	house/ 6% chickens	
Contact with Dead Bats	<ul style="list-style-type: none"> Women are more commonly involved in disposal of dead bats 		

Using the results of these studies, the TIPs study chose to look at the determinants of the following prevention behaviors to determine what would be acceptable and feasible to promote and how and where the project should facilitate social and behavior change. The behaviors that are the subject of the research described in this report are:

1. Bat guano producers (BGPs) use a full set of PPE during any contact with bats or guano.
2. BGPs practice proper removal, cleaning, and storage of PPE.
3. BGPs and Non-bat guano producers (NBGPs) wash their hands with soap and running water especially after contact with bats or guano.
4. BGPs properly store their harvested guano.
5. BGPs and NBGPs clean high-touch surfaces, especially where food is prepared and served every day.
6. BGPs and NBGPs ensure that food being preserved through sun drying is removed as far from the roost as possible and not put out at times of bat movement. And, that food stored in the kitchen is covered.
7. BGPs and NBGPs dispose of dead bats properly.

Water storage was not selected for trial because no contamination was found in any water samples. Although domestic animals may transport bat contaminants, no trial was initiated targeting this pathway because the exact practices that would mitigate transmission in this case have not been worked out for the context. Instead, during the interviews participants were asked for their ideas about how to keep their animals safe from the bats and bat contaminants.

RESEARCH PURPOSE AND QUESTIONS

The purpose of this research is to explore ways in which guano producers and their neighbors can disrupt the most high-risk pathways to protect themselves. The study findings will highlight the determinants of actual behavior rather than the determinants of current or hypothetical

behavior. This activity will: a) add to the information base concerning current risk avoidance behaviors at the onset of the activity; b) inform program managers about what behaviors the program should promote, eliminate or modify based on what people will and can do using their own resources; c) inform the SBC program on the most effective motivators and most significant barriers to adopting new behaviors; d) indicate what kind of support may be needed; and what level of change in particular behaviors the program can expect.

The trials aim to answer the research questions below:

1. What are the guano producing families' current specific practices related to the prioritized risk pathways and their perceptions of risk for zoonotic disease? Do these vary by household characteristics?
2. What are the neighboring families' current specific practices related to the prioritized risk pathways for them and their perceptions of risk for zoonotic disease?
3. What are the initial reactions from the guano producers to modifications to their practices and what will they try?
4. What practices are they successful in completing fully and where do they adjust, drop certain aspects, or stop the practice completely, and what is their reason?
5. What do they perceive to be the advantages and disadvantages of the new or modified behaviors, and what support do they believe they need to sustain the practices?
6. What are the initial reactions from the neighbors to modifications to their practices and what are they willing to try?
7. What practices are they successful in completing fully and where do they adjust, drop certain aspects, or stop the practice completely, and what is their reason for doing so?
8. What do they perceive to be the advantages and disadvantages of the new or modified behaviors, and what support do they believe they need to sustain the practices?

METHODS

This study used a participatory, formative research, mixed-methods methodology: TIPs (Trials of Improved Practices) that has been used by development programs since the late 1970's. TIPs combines the marketing practice of product or concept testing prior to product launch with ethnographic inquiry and quantitative assessments to understand the determinants of new or proposed behaviors prior to their introduction.⁴ TIPs has been used to finalize intervention designs to control malaria, HIV/AIDS, infectious diseases, and solid waste, and to improve the uptake of nutrition, family planning and WASH practices and the use of public and private services. TIPs help programs avoid false starts and investments in products that soon prove unpopular or unsustainable. In this case TIPs will offer an in-depth understanding of participants' preferences and capabilities, as well as the obstacles to and motivations for the practice of behaviors. Because TIPs focus on the trial of a new or modified behavior, the determinants of the new behavior are uncovered and often shift program managers' ideas about what people will or can do, thus changing the orientation of the program from providing information only to tackling structural (ex. access) and social issues. TIPs have proven an excellent way to gauge the acceptability of new behaviors and learn how best to promote and support them.

TIPS are often employed as the second phase of the formative research process. In this case, as described in the background section, TIPs build upon the first exploratory phase of formative research for this project that had two prongs:

1. Household survey, key informant interviews, focus group discussions, and observations to assess the situation and highlight high risk pathways for human-bat contact; and
2. A biological testing of points along the risk pathways to determine where there is current evidence of contamination.

Using the results of phase I, TIPs will allow program personnel to work with the high-risk population to try proposed practices that would reduce exposure risk. The TIPs method employed here will allow bat guano farmers and their neighbors to participate in finding the best solutions for their circumstance and in shaping improved practices with the potential to reduce human-bat interactions that are acceptable, feasible, and likely to result in sustainable behavior change.

The standard TIPs methodology was used. The method calls for three visits to the participant households during a three-week trial period.

⁴ Dicken, Kate, Marcia Griffiths and Ellen Piwoz. Designing by Dialogue. <https://www.manoffgroup.com/wp-content/uploads/Designing-by-Dialogue.pdf>.

Table 3: Table of household (HH) visits during trials period

TIPs Visit 1: Assess Current Situation and Negotiate Trial	TIPs Visit 2: Mid-point Check-in	TIPs Visit 3: Assess Change and Reactions to Trials
<ul style="list-style-type: none"> - Assessment with HH about specific practices related to risk pathways; identify gaps. - Discuss issues and solutions with HH and their perceptions. - Discuss details of the behaviors that match the HH's needs. - Agree on what the household will try for three weeks 	<ul style="list-style-type: none"> - Check-in with the HH to see how they are proceeding with the new or modified practices. - Problem solves as needed with the household. - Check on agreement to continue 	<ul style="list-style-type: none"> - Review of what happened, changes tried by the household/group. - Reflection of experiences with household: advantages, disadvantages, their recommendations for others

SAMPLE AND SAMPLE SELECTION

The research site selected was Khchau commune, Kang Meas district, Kampong Cham province where the bat guano farms are located. The sampling plan called for all 16 bat guano farms to be included and 10 neighboring non-bat guano producing (NBGP) households selected for their proximity to the bat roosts of the BGP households with six living extremely close (within 15 meters) and four living slightly further, but within 20 meters.

RESEARCH TEAM

The research team included the research supervisor, a qualitative research consultant, a STOP Spillover team member, plus three notetakers who were members of the provincial or district agriculture or rural development departments and are members of the OH-DReaM Working Group for the project. This team completed the initial interviews. The mid-point check, a short household visit to find out if the family had begun their new practices or had any questions, was done by the research supervisor and the three notetakers from the initial HH visits who served as interviewers and applied the check lists working with additional members of the OH-DReaM working group from the district and community women's committee who supported with note taking. The final household interviews were conducted by the same team that did the mid-point check⁵. The local interviewers who formed part of the research team were selected for their ability to be impartial and to establish a good rapport with all participant families. They received

⁵ The research team for the final household interviews was planned to be the same as the initial interview team but this plan had to be modified due to unforeseen circumstances.




training in methodology and using the tools and were able to practice interviewing prior to talking with the participant families.

The village chiefs also contributed as key advisors for the timing of the research and support for identifying families to participate. They were not present during any interviews.

DATA COLLECTION, MANAGEMENT AND ANALYSIS

Interview guides were developed and pretested during the training and used for the initial, mid-point and final interviews. The guides for the first household interview were different for the BGP and the NBGP households because the assessment of their practices differed. For the other household visits the guides were the same. The team also developed illustrated reminder materials for each of the recommended optimal practices, which were used to discuss the expectations for the specific practices the household would try. These materials were left with the households, along with a calendar to use for tracking their practices during the trial period (Figure 1). To bolster the team’s conclusions and recommendations, the research lead spoke with the OH-DReaM WG members who served as notetakers and interviewers during the TIPs period to obtain their views on important changes and reasons influencing people’s behavior. These are included in the discussion and recommendations of the report.

Figure 1: Example of completed reminder sheet for handwashing practices by one of TIPs participants

REMEMBER! WASH HANDS AFTER EVERY CONTACT WITH BATS OR BAT GUANO			
YOU NEED:	Week 1	Week 2	Week 3
A PLACE 	✓	✓	✓
WATER WASHING 	✓	✓	✓
SOAP 	✓	✓	✓

DO YOU HAVE A PLACE TO WASH HANDS WITH SOAP?

ARE YOU DOING IT?

The interviews were audio recorded. The recordings were used to maintain accuracy of the field notes and to ensure that the ideas expressed by the participants were conveyed in their own words. The audio recordings were securely stored in the researcher's office until the analysis was completed. The forms and tapes are currently stored in a locked cabinet in the STOP Spillover Tetra Tech office.



Figure 2: Interview discussing the new behavior of surface cleaning with a TIPs participant. Photo Credit: STOP Spillover Cambodia.

The analysis of the TIPs was done manually by the research supervisor and the qualitative research consultant. The basic outcomes of the trials from each household were entered into a “master table” for the analysis, and the qualitative information noted and summarized. Verbatim statements were noted to bolster the summaries of the qualitative findings. Following the

conclusion of the field work, the research team completed a master table of each household's trials and their outcomes, analyzed field notes and drafted the findings from each trial.

ETHICAL CONSIDERATIONS AND APPROVAL

This study adhered to ethical standards and was conducted following approval from the Tufts Health Sciences Institutional Review Board (IRB), (IRB ID STUDY00003959). The protocols were also approved by the National Ethics Committee for Health Research (NECHR) of Cambodia (IRB number 185 NECHR). Enumerators received ethics and compliance training prior to data collection. All participants provided informed consent and were informed that participation was voluntary and that they could withdraw at any time.

Efforts were continually made to protect individual autonomy, minimize harm and maximize benefits, by using procedures that are consistent with sound research designs that consider these issues. The study team informed all participants about the study, explained what would be involved with the study, and ensured voluntary agreement prior to participation. Confidentiality was maintained throughout the process to ensure the protection of study participants. All data and other information have been maintained confidentially. Specifically, to ensure adherence to sound ethical standards, there was no identifying information collected on the interview guides or observation forms. Rather, documents only included the interview number. Names are on consent forms, without interview numbers, which will be kept separately from interview guides.

Study participants were informed of all risks and protections in the consent form which was read aloud to participants and consented to with a signature. This consent form informs potential participants of their right to not answer questions they do not feel comfortable answering, and their right to withdraw from the study at any time without negative consequences. Participants were informed that refusal to participate would also not affect any services they would like to receive from the government or any other service provider. Finally, participants were provided with contact information for a local contact of the study team should they have any further questions or concerns.

TIMELINE

Preparation for the trials began in mid-July 2023 with orientations for the research team and meetings with local officials. The TIPs study was conducted in August after receiving full approval from the IRB. The study included: the initial interviews to determine with each household the practices that they would try; the mid-point check-ins with the households on their implementation of the practices and to remind them of specific aspects of the practice if needed; and the final interviews with all the households. Data cleaning and early analysis was an on-going activity during the trial period [See [Annex 1a](#) for a detailed timeline].

RESULTS/FINDINGS

FINAL SAMPLE: TIPS PARTICIPANTS

The final sample included 13 bat guano producing (BGP) households and 10 non-bat guano producing (NBGP) households in the bat guano producing communities. This sample was less than the original target size because three BGP households were, for various reasons, unavailable to participate⁶.

Table 4. Participating Household Characteristics

Household Characteristics	Bat guano producing HH	Neighboring HH
Location among Villages	Varint 1–6 HH Varint 2–1 HH Varint 3–6 HH	Varint 1–3 HH Varint 2–2HH Varint 3– 5 HH
Commercial bat guano producer	12	
Non-commercial bat guano producer	1	
Living close to bat roosts--within 15 meters of roost		6
Living slightly further away from roosts – greater than 15 meters		4

From each of these 23 households, one participant or key actor was selected for the TIPS. These participants were selected because they are either the head-of-household or they have primary contact with and responsibilities for the bat guano production activities and/or daily household chores related to some of the preventive behaviors under trial.

Table 5. Participant Characteristics

Participant Characteristics	
Mean Age	59 years
Gender	71% Female
Head of Household	14 HHs

⁶ One had sick family members, another, with a very elderly, ill head of household had just merged his farm with that of his daughter, and another had dismantled all their bat roosts and was facing a delay in rebuilding due to heavy rains.

Participant Characteristics	
Primarily responsible for guano harvesting (BGPH)	13 persons
Primarily responsible for household chores (10 BGPHs & 8 NBGPHs)	18 persons

PARTICIPANTS' SENSE OF RISK

All participants were asked about their sense of risk related to living with bats. While most participants expressed some sense of risk, the key triggers varied between the BGP and the NBGP.

Bat Guano Producing Households

BGP households were asked to rate their concerns generally and about engaging in the various tasks on the farm on a scale of 1 to 10, with 1 being the least concern and 10 the highest.

The majority of the BGP household participants (11/13) show some level of concern or a feeling of being at risk when engaging with bat guano production, including harvesting, packing, using guano on crops and repairing the bat roosts. Two BGP households had no concerns regarding their engagement with these activities and said they have never had any health issues related to infections from bats.

"I'm not concerned about anything at all...It's what my family members and I have done for a long time and we do not have any problems with our health...I don't know it, so I am not concerned of anything even health risk or disease spillover from bats" (BGP_006)

"I normally don't have any health problem with myself" (BGP_013)

The BGP household participants who expressed concern ranged greatly in their level of concern. When asked about different tasks, most BGP household participants rated their feeling of risk between a 2 and 10 depending on the chore in question; the average score was 5.6. The activities that participants are most concerned about are harvesting, followed by the packing and drying of the guano. They feel less concern about risk when using guano on crops and repairing the bat roost.

Two BGP household participants among the 11 expressed that they felt they are at high risk (rating for 10) while engaging in the bat guano production for health reasons.

"I am concerned about infectious disease [from bats] as I touch the guano everyday when I collect it and dry it". (BGP_003)

Table 6: Average level of concerns rated by BGP HHs by activity.

Task	Level of Concern (n=11) (1 to 10– 1 is least concern, 10 is most concern)
Harvesting	4.5
Drying/cleaning	3.4
Packing/handling	2.7
Using on crop	1.3
Repairing roost	1.6

The participants who expressed a high level of concern about their tasks of harvesting and packing, and drying guano said they have these concerns because the smell and/or dust can cause health problems.

"It has a bad smell and causes the fever, cold and some diseases" (BPG_010)

"I am concerned of the bat dust enters my nose..."(BPG_001)

"I am worried about the disease from bats, but I don't have any other jobs to do besides this work. The bat guano harvesting is for older people as we can't do anything more...I'm also worried about the infectious disease but I don't know what they could be. Sometimes it is like COVID-19 that we don't know it and it just happened" (BPG_003)

"It has a very bad smell and affects my nose, especially when I inhale. It is also dusty and there are many insects" (BPG_010)

Most participants say they feel less risk when they use bat guano on crops and repair the bat roosts because these tasks do not involve close contact with bats and bat waste, especially if the guano applied to the crops is dry. However, many of the participants are not the ones directly involved in these tasks as they generally hire someone to replace the roosts.

"I don't make contact with bats and bat guano while repairing the bat roost as I hire other people to climb to the roost and replace the bundle of the leaves." (BP_009)

"I am not worried about [repairing the roost] as it doesn't have any guano or waste like urine. The old roost doesn't have bats, that is why we change it, so there is nothing there." (BGP_004)

"I am less worried about [using guano for crops] as I don't do it on my own, I hire other people for my farm." (BGP_001)

A participant directly involved in using guano on the crops says that this task is of concern because it is dusty and there are many insects.

"It is extremely dusty pulled out from the guano, especially when I threw the pieces of the guano to the ground. I used other PPEs while doing this, but it is still smelly and smoky."(BPG_009)

Many participants judge the level of risk based on whether their contact is with wet or dry guano. Some participants believe that the virus from bats will not survive when the guano is dry.

"[Harvesting] is the most vulnerable part for the infection. The guano is also not dry enough. I think if the guano is dry enough, the disease (virus) may be already dead...but I am not worried about packing as the guano is already dry...so it is like we already killed the virus or disease from it." (BPG_004)

"Dry guano is less smelly and affects little health problems." (BGP_011)

When ranking their personal feelings about their level of risk, many BGP household participants show dissonance in their determination. They recognize that they have been told that bats can spread disease and therefore they are at risk but continue to say their experience from decades of guano farming and living with bats is that they have not suffered from any illness due to bats.

"I heard people talking about the disease from bats, so sometimes I am just a bit worried about this and I just try to protect myself from what I can do...but I have worked bat roosts for 30 years so far and I have had this roost for years and I still have good health as other people. That's why I don't feel too worried about this" (BGP_005)

"We have worked with the bat roost in this village for a long time and we have never heard about sickness related to bats at all. You see, my husband has never been working or using bat guano for crops like me, but he is sick more often than me...but I also feel a bit worried if there are any infectious diseases from bats..." (BPG_004)

Non-Bat Guano Producing Households

NBGPs are concerned over the smell and dust from the bats, bat waste on the roofs of their homes and the possibility of having health problems caused by the bats. They describe that the strong smell from the bat guano is particularly difficult to tolerate, especially in the rainy season. They also report that it gives them a headache.

"The guano smells bad, even worse than the pigs...I really can't tolerate the smell and I feel headaches." (NBGP_005)

"It affects the neighbors like us, especially the smell is so bad. If other people visit us or those who are not living in this village, they will not tolerate this smell." (NBGP_004)

"It is very bad smell in the rain and sometimes the bat urine falls on my body." (NBGP_001)

"It is a bad smell and bad for environment because my house is close to the bat roost, it is messy around my house and the bats can carry zoonotic disease." (NBGP_010)

Additionally, two NBGPs households raised concerns over spillover risks associated with the interactions between their animals (chickens and dogs) roaming under the bat roosts next to

their houses. Particularly, the NBGP household who has a dog showed strong concern over the interaction of dogs, bat roosts and their child who plays with the dog.

“I also worry that the dog may carry some diseases from the bat and especially as my young girl always hugs and plays with the dog closely. So, I often shower the dog so that I feel it is clean for my girl to play with.” (NBGP_005)

OVERVIEW OF THE TRIALS

All twenty-three households that were recruited completed the full trial period and tried all the improved practices that they agreed to (Table 6). The majority of the BGP households were engaged in trying to improve three different practices, although one household took on just one practice and another tried two. All ten NBGP households tried to improve two practices.

Table 7: Trials completed by TIPs participants.

Practice	No. of trials BGP	No. of trials NBGP
Full Use of PPE	11	
Optimal PPE storage and care	11	
Proper Handwashing	7	1
Proper Storage of Harvested Guano	2	
Proper Cleaning of High-touch Surfaces	1	10
Proper Protection of Exposed Food	0	4
Proper Disposal of Dead Bats	4	5
Total number of trials	36	20

The initial portion of the interview in each participating household was a brief assessment of their current practices related to the possible behaviors they might be asked to improve based on the outcome of the assessment. These assessments across the 23 households showed that none of the behaviors were being practiced optimally, that is with all the critical sub-behaviors being implemented. While some households were closer to the optimal practice than others, over the course of the three-week trial all households were able to improve their practices, however some gaps remain for many to reach optimal practice. Generally, the household participants were pleased with their accomplishments and recognized the benefits, especially the NBGP households. At the end of the trial period, all households were committed to continue the journey to improve and ensure that these behaviors become part of their routine.

SPECIFIC TRIAL OUTCOMES

TRIAL I: USE OF FULL PPE

The assessment prior to introducing the trials in the BGP households confirmed earlier survey findings; in no BGP household was the main person working with the guano using PPE optimally. While all guano harvesters used a head covering and often other PPE, eye coverings and foot protection were the most common missing or poorly implemented pieces of PPE. Table 7 below presents the summary of common PPE practices of HHs before the trial.

Table 8: Common PPE practices before trial

Descriptions	Status of Practices	Types
Head covering	Always	Cap, Krama
Eye shield	Never	One person (uses glasses to correct vision)
Nose/mouth--mask	Sometimes	Surgical mask, Krama, hat with attached scarf
Hand--gloves	Sometimes	Cloth, plastic washable, plastic gloves one time use only
Upper body--garment	Sometimes	Common clothes, dedicated clothes for bat roosts, sometimes short sleeve blouse
Lower body--garment	Sometimes	Common clothes, dedicated clothes for bat roosts, sometimes shorts and skirts
Feet--boots	Sometimes	Common shoes (flip flops), a few rubber boots

Based on the assessment, eleven BGP households were invited and agreed to participate in the trial of full PPE use when working with bats or guano. They agreed primarily for health reasons:

"It helps to prevent disease for my health." (BGP_006)

At the mid-point check-in, none of the BGP household participants were using all the pieces of PPE they had agreed to. The most common items that were not used were glasses, masks, gloves and rubber boots. The most common reasons for the delays in implementing the improvement in their practice were not having time to buy the needed PPE, and difficulty getting used to the PPE.

"I have not bought it yet as I am busy..." (BGP_011)

"It is a bit difficult to work with gloves...for the boots, it is also difficult to work as i don't get used to yet." (BGP_004)

"I sometimes use normal glasses, but not often as i am afraid of dizziness." (BGP_003)

This trial had mixed results. At the end of the three-week trial period, all the participating guano harvesters had improved their PPE practice, although many still were short of optimal practice (see Table 8).

The PPE most often used and used correctly was a head covering, a mask (10/11) and an upper body garment covering the arms. Many more harvesters used, but still often intermittently or not completely, an eye shield, gloves and rubber boots.

The main issues they faced using the proper PPE and adhering to regular practice is:

- Discomfort working with glasses and rubber boots.

“I’m afraid of dizziness when I use them [glasses].” (BGP_011)

“It is a bit challenging to use a mask, gloves, glasses and rubber boots. I feel like it is difficult to breathe, in short, I don’t get used to working with them yet.” (BGP_013)

- Difficulty finding the PPE in the village (glasses, mask, and rubber boots) and competing demands that prevent them from going elsewhere to find PPE.
- Inconsistent practice (sometimes use and sometimes don’t use mask) due to running out of stock and they cannot manage time to buy the new one. In this instance, they use krama instead.

While many BGP participants faced challenges following an optimal PPE practice, they all agreed to continue what they were doing and to try to improve those areas where they were not doing the recommended practice. They said the motivation for continuing to use PPE is:

“I will continue using them (PPE) to take care of my health.” (BGP_009)

“It’s like a reminder for me not to forget to protect myself.” (BGP_011)

“Protect my family from diseases.” (BGP_005)

Table 9: Trial of PPE consistent use among households

Sub-behaviors / Elements (Total trials = 11)	No. of Initial Practices	No. of Agree to Try	No. of Succeed	No. Intend to Continue
Head covering	11	11	11	11 HHs
Eye shielding (glasses)	1	11	7	
Mask--Nose/mouth	8	11	10	
Gloves--Hand	4	11	7	

Sub-behaviors / Elements (Total trials = 11)	No. of Initial Practices	No. of Agree to Try	No. of Succeed	No. Intend to Continue
Garment--Upper body	8	11	11	
Garment--Lower body	8	11	10	
Boots--Feet	1	11	8	

During the trial all participants spoke with their family members about the practice with PPE that they had agreed to try to stay safe and to protect the family. However, none of them spoke to their neighbors about what they were doing because they were busy with their work, and they dared not talk about this with the neighbor before they could practice well on themselves.

"I spoke with my family for the purpose of safety from infectious disease, but I dare not talk with others. I am waiting to see if I can practice well on my own first, before I can tell others." (BPG_006)

"I spoke with my family, but I have not talked with my neighbor yet as we have not met each other yet." (BGP_011)

"I spoke with my daughter and my grandchildren but I dare not encourage my neighbor yet." (BGP_003)

"I told my children, but I don't have enough time to tell my neighbor." (BGP_007)

TRIAL 2: PROPER STORAGE AND CLEANING OF PPE

Eleven of the participating BGP households were invited and agreed to participate in this trial. There was a high overlap with those also asked to try to use a full set of PPE. The assessment of their practices was done following their agreement to participate, but before the exact trial options were negotiated with them.

The majority of the BGP household participants (8/11) at the first visit demonstrated poor practices related to cleaning and storing their PPE after contact with bats or bat guano. That is, the main guano harvester either did not do a critical behavior or did it sub-optimally. Examples of these suboptimal behaviors are:

1. Head covering is kept under the house (without washing) or is washed once every few days or just put in the sun.
2. Single use mask is used a few times before being thrown away.
3. Clothes used for harvesting guano are washed together with other clothes or they are washed in the river.
4. After drying, the clothes used for harvesting guano are kept with regular clothing.

Four of the eleven participating BGP households demonstrated close to optimal care and cleaning of their PPE. That is, there were a few practices that were omitted, and most were done well, however, with some room for improvement, primarily in dedicating a space outside of the home for keeping the PPE.

All eleven BGP households agreed to try to implement optimal practices when it comes to washing and storing the PPE they use when working near the bats or with the guano. The reasons they gave for improving these practices related primarily to safety and health:

“For illness prevention of my grandchildren and especially those who are closely working with bat roosts.” (BPG_003)

“...be safe for myself and my family.” (BGP_011)

“If we are healthy, then our livelihood is also better.”(BGP_012)

At the mid-point check-in, none of the participants were fully practicing the behaviors they had agreed to. The behaviors least practiced were 1) the order of taking off PPE, i.e., removing the gloves last, and 2) using disinfectant for some of the PPE, beyond just soap.

The reasons participants mentioned for not having implemented these behaviors included: forgetting the practice; not buying the PPE yet, especially gloves; and that they don't have or are not familiar with disinfectants.

This trial had mixed results. By the end of the three-week trial period all households had improved their practice although there were still gaps in the cleaning and storing of PPE among many (see table 9).

- The practice that was readily adopted by almost everyone (10/11) was dedicating a place outside the home for their PPE. This includes a place to change clothes and to store the PPE. They placed hooks and hangers to keep it organized.
- A shift was also seen in the proper use of single-use masks. Nine of eleven participants had enough masks and correctly disposed of them after a single use.
- The most problematic practices were:
 - the use of a disinfectant. Eight of the eleven families did not use disinfectant or disinfecting soap to clean their PPE (gloves and boots) because they didn't know about disinfectants, or they had not bought disinfectant soap.
 - the procedure for removing their PPE—most participants (7/11) take off their gloves first instead of leaving them on until all other PPE is removed.

Although not all households were able to achieve optimal practice related to cleaning and storage of PPE, all participants agreed to continue what they were doing and to try again to improve

those areas where they fell short of the optimal practice. They said they would continue primarily because they see these practices as preventing disease and maintaining the health of the family.

Table 10: Trial of PPE storage among households

Sub-behaviors (Total trials = 11)	No. of Initial Practices	No. of Agree	No. of Succeed	No. Intend to Continue
Take off PPE correctly by removing the gloves last	0	11	4	11 HHs
Allocate a space outside the house (near guano harvest area if possible) for changing and storing PPE.	2	11	10	
Dedicated space with hooks/hangers.	0	11	11	
Dedicated space for washing	0	11	8	
Disinfect all reusable PPE after every use (water, soap, water bucket...)	0	11	8	
Use disinfectant liquid	0	11	3	
Place to dry PPE (free of bats)	0	11	11	
Single use of mask / used correctly	0	11	9	

As with the use of full PPE the participants report that they spoke about the new practices with their family, but not with neighbors.

TRIAL 3: HANDWASHING PRACTICE

Overall, seven BGP households and one NGBP household were selected for the handwashing trial. Prior to the trial, of the eight households, three-quarters (six) demonstrated “good” handwashing practice, but none had optimal practice. The gaps in their practice were:

1. Washed hands with soap in the shower room located inside the house.
2. Washed hands with water from the nearby water jar, which water commonly used for the household.

3. Washed hands, but inconsistently used soap.

“I wash my hand with soap, but sometimes I wash [hand] with only water.” (BGP_010)

“After harvesting guano, I went straight for handwashing and took a bath in the shower room inside my house...” (BGP_001)

One-quarter (2/8; both from BGP households) had “poor” handwashing practice because they never used soap or were not washing hands at all.

“I wash my hand after working with bats, but I don’t wash with soap...I wash my hand nearby the water jar which is used as drinking water for cows and shower there” (BPG_003)

All eight households agreed to follow the guidance offered about establishing a hand washing area outside of the home near the bat roost, the use of soap and how to wash and dry hands properly. (See the table below for the steps in optimal handwashing).

In mid-point check-in, the participants were making progress on their trial. The most noticeable improvement was having soap at the hand washing station. The suggestion to have a clean cloth for drying hands has not seen any uptake. A few participants found or created a dedicated space for hand washing outside the house.

Overall, this trial was successful: those households in need of small improvements (soap) and those in need of larger changes such as setting up an area for handwashing outside the house were able to improve their practice at the end of the three-week trial period. Of note however, is that only one BGP made an area for handwashing near the roosts. All households seemed to develop the habit of handwashing with soap at the end of the trial (see table 10).

By the end of the trial period all households were using soap, and all but one established a handwashing area outside the house and near the roost.

The sub-behavior that caused many to not have an optimal practice was the use of a clean cloth for hand drying. Just over half of the participants managed to keep a clean cloth to dry their hands at the handwashing station because they are unaccustomed to doing it and are worried that the cloth will be taken.

“I wash my hands and shake them a bit, then it is ok. If I put more cloth there, some people may take them.” (NBGP_010)

The eight households that participated in the handwashing trial will continue the practice.

“I wash my hands more properly than before and I have more of a habit of doing that.” (BGP_006)

“I know more about hand washing and increase hand washing practice and prepare a place to keep the clothes to dry my hands.” (BGP_009)

The reasons they gave as motivations for adopting the practice were related to health and prevention of infectious disease.

“Good for health as it can protect us from infection of other diseases.” (BGP_003)

“Be hygienic for the protection from disease for the family.” (BGP_006)

Table 11: Trial of optimal handwashing among households

Sub-behaviors / elements (Total trial= 8)	No. Initial Practices	No. Agree	No. Succeed	No. Intend to Continue all steps
Handwashing station near bat roosts ⁷	0	8	1	8 HHs
Handwashing station outside the house	3	5	8	
Presence of water	6	8	8	
Presence of soap	4	8	8	
Presence of clean cloth to dry hands	0	8	5	

Participants in this trial discussed handwashing with their family members but not with their neighbors because they say they do not have time and they are not confident in their practice to be talking about it with a neighbor.

" I talked with my family. But I am happy to have with my neighbor if they want [information], but mostly they don't have time for this." (BGP_009)

" I continue telling my family about this and if there is some neighbor coming over to my house, then i will tell them." (BGP_003)

⁷ Handwashing station near bat roosts in our context is referring to a place where BGPs usually wash hands after contacting with bats or bat guano.

"I told my child and he/she knows how to practice this, but i have no time to talk with my neighbor."(BGP_007)

"I need to make sure that i have good practice first before i can tell my neighbor." (BGP_010)

TRIAL 4: PROPER STORAGE OF HARVESTED GUANO

The two BGP households that were assessed with poor storage practices were asked to participate in this trial. Prior to the trial, one of these households stored their harvested bat guano in various types of bags, only occasionally a plastic bag. The other household put the guano in an open jar (large concrete water storage container). One household stored the guano in the backyard next to the kitchen and the cattle shelter. The other household with the guano in an open jar had it next to the wall of the house, close to the common area where children play. For this household, it is only when a customer comes to purchase guano that the guano is put in the plastic bag.

- Both HHs have domestic animals that wander around (and occasionally get in) the guano stores and the bat roost.

"I store it at the backyard of my house, about 2 meters away from my kitchen and where the cattle stay...in the daytime, cows are staying and being fed just nearby the bat roost and the chickens are walking around for food there." (BGP_008)

- One participant collects only a small amount of guano with each harvest and finds it easier to add to the stationary open jar.

"I don't get much guano, so I mostly just collect and dry it and keep it in the open jar. I will put it in the common plastic bag if anyone buys that guano...sometimes the chickens from other HH jumped into that jar to eat insects, sleep and sometimes also lay eggs there..." (BGP_005)

Both households agreed to try to improve the two components of this practice: 1) storing the harvested guano in a thick plastic bag, and 2) keeping the stored guano away from the house and inaccessible to animals.

During the mid-point check-in, one of the households started to fully adapt to the behavior by using plastic bags for storing the guano and managed to keep them a bit distant from the house.

This trial had mixed results: After the three-week trial period each household implemented only one part of the trial. Neither household had adequately secured safe storage for their guano (see Table II).

- One household fully adopted the use of plastic bags for storing their guano but continued to store it near the kitchen and close to their cattle. This household at mid-point had moved the storage site 3m from the old location but failed to move it further as planned because of lack of support to do so.
 - The reason for using a plastic bag was “Packaging in a plastic bag helps to reduce smell and reduce infection.” (BGP_008)
 - The reason for not moving the storage area was that there was no help for the farmer to move the stores.
- One household did not use a plastic bag, although they covered their storage jar. And they moved the storage jar about 6 meters away from the earlier placement next to the house.
 - They did not use plastic bags because “A small amount of guano is always bought by customers soon, so I have less motivation to store guano in the bag.” (BGP_005)
 - They covered and moved the jar “to be safe and reduce the infection” and because of the “guidance from the project team.” (BGP_005)

Each participant said they would continue the improvements they had made and would try to implement the other recommendations following the end of the trial period.

Table 12: Trial of optimal guano storage behavior

Sub-behaviors (Total trials = 2)	No. of Initial practices	No. of Agree to try	No. of Succeed	No. Intend to Continue
Store the guano in two layer-bag	0	2	1	2
Keep guano storage in safe location outside the house, without accessible by domestic animal	0	2	1	2

TRIAL 5: CLEAN HIGH-TOUCH SURFACES, ESP. IN COOKING AREAS

Eleven households were assessed (ten NBGP households and one BGP household) for their practice of cleaning high-touch surfaces, especially those where food is prepared or served. The assessment showed that no household was using an optimal cleaning regime. Most of the household participants cleaned some high-touch surfaces, some used a dry cloth, rather than wet-wiping and soap was often not used. One household cleaned in the morning, others later in the day.

“I cleaned all tables (meal, sleeping and cooking tables under her house) several times per day, sometimes dry and sometimes with water without soap. It is to keep those tables clean and free of dust because I sleep and stay there all day. I feel stressed and unhappy with the bad smell from the bats. I cleaned those surfaces just related to the smell, but not to prevent any disease or droppings from bats.” (NBGP_003)

“My house is about 4 meters away from bat roosts. I cleaned the bed and meal table several times a day, and I did it with only dried clothes. It is for household cleaning, not related to any disease or virus spillover from bats.” (NBGP_010)

All eleven households were asked to participate in a trial to improve their cleaning practice with a focus on high-touch areas, especially those in areas of food preparation. All the households agreed to participate in the trial that included i) cleaning with soap and water all surfaces in the kitchen or where food is eaten or stored, ii) wiping these surfaces once every morning iii) washing the cloth used to wipe the surfaces after cleaning.

By the mid-point check-in, everyone had started to implement some part of the behavior: seven households started to fully adopt the new behavior; four participants started to clean surfaces every few days but with soap and water. Those who skipped days said they had a large workload at home, had to take care of a small baby and elderly parents, and they did not perceive a risk coming from surface contamination.

This trial was successful: At the end of the three-week trial period, there were significant changes in the practices related to cleaning high-touch surfaces among the eleven households. Seven out of eleven households (~70%) implemented all the sub-behaviors (see table 12).

The participants who completed the cleaning regularly expressed happiness and peace-of-mind to see the clean and “hygienic” surfaces in their house and kitchens.

“I cannot see if there is any virus and bat dropping on the tables and kitchen because I raise chickens and they are going around under bat roosts and my houses. So, cleaning my meal tables and kitchen spaces is necessary work and this is what I am wishing for.” (NBGP_009)

“I feel tired after working hard at my cabbage farms. Seeing a clean bed, tables, kitchen space and environment, however, I feel fresher and joyful. I feel more comfortable and less concerned about less risk of viral spillover from bats.” (NBGP_003)

- The four households (~30%) where cleaning greatly improved, but was not optimal, expressed concern about the time and effort that it takes to do the cleaning each day.

“I can only clean my meal and kitchen tables once every two to three days because my wife and I have a serious illness (weak heart disease and other health problems) that has caused us not to be able to do many tasks. We are old now and our single daughter is selling some food and groceries and is responsible for all the tasks at home.” (NBGP_002)

“I have a small baby and many tasks at home, so I am not able to clean the surface with soap every morning. However, I can do it once every few days. The sunshine is coming across my house, so I also supposed that the virus cannot live long.” (NBGP_009)

Table 13: Trial of Cleaning high-touch surfaces daily

Sub-behaviors (Total trials = 11)	No. of Initial Practices	No. of Agree to try	No. of Succeed	No. Intend to Continue
1. All surfaces in the kitchen or where food is eaten or stored are cleaned with soap and water	5	9	9	11 HHs
2. Wipe daily in the morning	1	9	7	
3. Wash the cloth used to wipe the surfaces clothes after cleaning	0	9	7	

All eleven participants were optimistic about the new practices and committed to sharing this practice with household members and others including parents, husband, and children, and grandchildren for better hygiene practices. However, three are hesitant to share with neighbors because they feel too busy, have personal health issues and are afraid that other people may not be happy with what they share; it might not be right.

“We are living proximity to the bat roost so we have to be careful and keep good hygiene because I learned that bat can carry zoonotic viruses.” (NBGP_003)

“I will tell my daughters grandchildren to keep good hygiene by cleaning surfaces every morning with soap. We have to live in good hygiene because we are living close to the bat roosts.” (NBGP_011)

TRIAL 6: PROTECT EXPOSED FOOD FROM BAT DROPPINGS

Four of ten NBGP households and none of BGP households were asked to join this trial because other trials were judged by the implementing team to be more important for them. Four households agreed to implement this trial to keep food safe and free of bat contamination. The initial assessment indicated that they partially implemented these behaviors. All households were drying their foods as far from the roosts as possible (although some were still close to the roosts),

and they were aware of the importance of taking food in and out of the house to avoid the times when the bats leave and return to the roosts. However, protecting the food inside (open kitchens) was not done well. Only one participant covered all stored food in a bag, box, jar, or basic cupboard to be inaccessible for bats and other animals such as chickens, dogs, and cats.

“Yes, the bats fly around and across my house and kitchen about several times a month because I am living approximately 15 meters away from the bat roosts. I do not have a proper kitchen (open). I wanted to install it, but it costs a lot. The kitchen materials such as plates, pans, pots, spoons... are outside, but the foods are covered with the basket and clothes on the table next to the kitchen.” (NBGP_009)

“My kitchen was burned several months ago. Therefore, I cook and keep kitchen materials and food outside. I will renovate my kitchen as soon as possible and keep all the materials and food inside the closed kitchen.” (NBGP_010)

By the mid-point check-in, all the participants had fully adopted the new practices.

This trial was a success: After the three-week trial all four participants were practicing the sub-behaviors that would keep food safe from bat contamination to the extent possible in the environment, close to the bat roosts. One of the participants who was cooking outside, completely in the open, cleaned and kept all the food and some kitchen materials in the cabinet.

Figure 3: NBGP_003 keeps the food and other kitchen materials in cupboard.



Table 13 shows the results of the trial and change among the four households, particularly in protecting food in the kitchen or house by covering it or placing it in a bag, jar, box, or basket.

“It is a good practice to keep food safe and healthy for my household members free from any disease and other illness. It is the household work I have to do.” (NBGP_009)

“I am not concerned anymore about the contact of chickens, dogs and cats to my food and other cooking materials. It is safe now. I am happy with the safe and hygiene food.” (BNGP_010)

“It looks tidy and clean. No stress and concern about poor hygiene and disease. I am happy about this practice.” (NBGP_003)

Participants felt enthusiastic about the new practices in terms of having hygienic food, preventing contact with domestic animals (dog, cat, and chicken), and reducing the risk of virus and disease spillover from bats. All of them committed to continuing the practices. sharing with their household members and with other people in their communities.

Table 14: Trial of protecting exposed food from bat droppings.

Sub-behaviors (Total trials = 4)	No. of Initial Practices	No. of Agree to try	No. of Succeed	No. Intend to Continue
1. Food put out to dry is placed as far as possible from the roost.	4	4	4	4 HHs
2. Food is carefully put out to dry to be sure it is after bats are in roost and food is taken in before the bats leave the roost.	4	4	4	
3. Food stored in the kitchen or house covered, placed in a bag, jar, box or similar.	1	4	4	

All participants shared this practice with household members, including their partner and children. However, three participants hesitate to share this practice with other people because they are busy at home, have personal health issues, and are concerned over the negative reactions.

TRIAL 7: DISPOSAL OF DEAD BATS

Using the assessment information, nine households were included in this trial related to proper disposal of dead bats: five NBGP households and four BGP households. Before the trial period all households reported seeing dead bats under their bat roosts and/or around their houses in early 2023. One household recently reported seeing a dead bat next to the table under the house.

Prior to the implementation of the trial, no household practiced optimal disposal of dead bats. The recommended practices were done by only a few. Three (30%) of the households disposed

of the dead bat immediately, two (22%) picked the bat up with a plastic bag or stick tools, two (22%) burned the dead bat, and one (9%) used a mask and gloves while disposing of the dead bat.

“I used the sticks or sometimes my hands to catch the dead bats, then burn them. Sometimes, I just throw them away at any place. It is for the dead bats I can see around my house. However, for others that are away, I might miss them and do nothing.” (BGP_010)

“I saw a dead bat about five days ago. It is a thin female bat that died of hunger (lack of food). Sometimes the dead bats are attacked and eaten by snakes or an owl. The bats fall on the ground. I used a stick tool to throw away or put in the dust pit or burn.” (BGP_012)

“I saw a few dead bats last month (during May or June) in the backyard of my house. I think perhaps the cat eats them. Sometimes the cat carries those bats into my space, so I just use the stick to get the dead bat and throw them away from home as I don’t want the smell of dead bat.” (NBGP_006)

All nine households agreed to practice safe dead bat disposal during the trial period. The steps that they were asked to follow are found in Table 14: i) dispose of the dead bat immediately, ii) wear mask and rubber gloves, iii) pick dead bat up with plastic bag on hand that is pulled down to double cover the bat and put in another plastic bag, iv) burn or deeply bury the bat away from home, v) remove and clean PPE, and vi) wash hands with soap and water.

This trial does not have useful results because eight of the nine participant households did not see a dead bat during the trial period (it was not the season when more dead bats are found, which is reportedly in the months of April and May).

- The one NBGP household that reported a dead bat used the recommended practices to dispose of the dead bat. Of note, she used cloth, not rubber gloves. And she burned the dead bat. (See table 14).

“I can see many dead bats during April, May and June because it is the delivery and lactation period. One bat delivers two babies. While flying out the roosts, the baby bats are holding their mother. Sometimes, the baby bats fall down on the ground and die. Sometimes, the baby bat also falls into the water jar next to my house. However, I have not found it during July.” (NBGP_010)

Despite not being able to practice safe dead bat disposal during the three-week trial period, people in the participating households agreed that they would try the practices after the trial period when they find a dead bat. They discussed dead bat disposal with family members.

Table 15: Trial of proper disposal of dead bats

Sub-behaviors (Total trials = 9)	No. of Initial Practices	No. Agree to try	No. Succeed	No. Intend to Continue
1. Dead bat is immediately disposed of to keep from animals and children.	3	9	1	9 HHs
2. Put on mask and gloves.	1	9	1	
3. Pick up the bat with a plastic bag on hand that is pulled down to double cover the bat. Put in another plastic bag.	2	9	1	
4. Burn or deeply bury the bat away from home.	2	9	1	
5. Remove and clean PPE.	0	9	1	
6. Wash hands.	0	9	1	

Suggestions about how to keep domestic animals safe from guano

Although there was no trial on how to prevent domestic animals from getting into the guano collecting below the nets and tracking it around the village and into homes, each participant was asked their thoughts on this risk pathway and their ideas for mitigating the risk. Below is a summary of the discussions.

BGP Households

- Participants acknowledge that exposure of their domestic animals such as chickens, dogs, cats and even cows to the bat roosts and guano next to their house could create a risk for the spread of disease from bats to animals, and the animals to them.
- More than half of BGPs households said they don't have any information, knowledge or experience about how to keep domestic animals away from bats.
- They say it is not their tradition to keep animals confined and they do not have the resources or commitment to adopt this new behavior.

NBGP Households

- The NBGP household acknowledged that domestic animals, especially chickens, wander through the bat guano looking for food and then they walk into cooking spaces and under the houses and could be an exposure risk.
- NBGP households less than 15 meters from a roost are concerned about the domestic animals that roam the bat roosts. They believe they can be a risk for having viruses/disease that can be transmitted from bat to human.
- Participants say they do not have any ideas about how to mitigate the risk from these animals. Instead, they will improve surface cleaning, food and household hygiene.

DISCUSSIONS AND CONCLUSIONS

THE RESEARCH PROCESS

The Trials of Improved Practices (TIPs) research activity adds an important dimension to the previous research done with three bat guano producing communities in Cambodia. It offers insights into what is acceptable to and feasible for both BGPs and NBGPs to improve their biosafety and hygiene behaviors and the likelihood that they prevent zoonotic disease in their community. Although the sample for this participatory study was small, it was in-depth and engaged directly with families to learn what they could do with their resources (the project provided no inputs other than instruction on optimal behaviors) to improve their home environments. The sample also included a large fraction of all extant BGPs in the district. While not all behaviors could be observed directly by the interviewers, numerous proxy indicators were available to the interviewers to use to corroborate participants' reported behavior.

The interviewers visited homes three times, which undoubtedly offered additional encouragement to families to implement the new or modified behaviors, but also demonstrates the importance of direct support to help families to find solutions that meet their circumstances. Although the three visit TIPs are standard as they support strong rapport with families to get beyond “standard answers” and, as mentioned, find solutions for local contexts. In this case, however, the interviewers were greeted with mild resistance from BGP because they have already participated in multiple studies and meetings with the project and did not want to offer more of their time answering questions. Their resistance may have compromised interviewers' ability to spend time on question probes. Adding an additional challenge, the last-minute change in the interview team meant a switch to local personnel without interviewing experience. Although trained prior to interviewing families, their field notes were not complete, requiring the research supervisor to hold a special session with the interviewers to complete interview notes.

CONSTRAINTS IN EXTRAPOLATING FINDINGS

The outcomes of this study should be reviewed knowing that it represents behaviors and circumstances during the dry season. The torrential rains that come other times of year change the conditions for guano collection and drying, lead to guano runoff from the roosts and possibly from the roofs of homes, as well as the presence of dead bats.

INSIGHTS FOR PROGRAM DEVELOPMENT

The population appears to be homogeneous regarding many socio-economic and life-style measures across the three variants (villages) where the bat guano is “farmed”, although there are a few differences between BGP and NBGP households which should be considered in developing activities to facilitate change in prioritized behaviors. The BGP households tend to be better off

financially than their neighbors and, of course, are working directly with the bats and their waste. Within the BGP households there is a difference between those who are large and more commercialized and those who have small harvests and tend to sell locally.

Both BGP and NGBP households have concerns about the risk they face from living with bats. However, their perceived risk is mitigated by decades of living with bats and not experiencing illness outbreaks that they attribute to bats. Also, of note, many families are managing their poor health or that of a family member (not bat-related) and it takes a lot of time and is of immediate concern.

Although BGP have a poor understanding of the potential health risks and the ways in which they could come in contact with bat contaminants besides directly from work with bats or guano, the recent discussions and attention STOP Spillover has shown to the BGP households regarding the potential health risks does not seem to have provided a strong motivator for change. BGPs' knowledge has changed but it has not changed attitudes. There is a certain complacency that could be influenced by the fact that the guano business, although a family affair (over generations) is often in the purview of the elder members of the family, and they are less aligned to the messaging about risk.

BGP and NBGP households mention immediate concerns about living with bats and are motivated to mitigate these conditions: household members are worried about the smell and the dust that comes from guano production. BGPs are also motivated to keep their business thriving and growing and, of course, all households are concerned overall about the welfare of their families, which includes health, but also economic livelihoods and happiness (less stress). Building on these motivations and providing evidence of the presence of disease agents from the bats on common household surfaces, for example, from the sample testing could counter their complacency with the status quo.

The trials made it clear that both BGP and NBGP households can make changes in their practices using their own resources to improve their situation and mitigate risk. Our research points to the importance of straightforward, specific guidance on what to do and where to conveniently find what is needed to make a change. Family members are busy with daily and income-generating tasks and the guano harvesters are often elderly women without easy access to markets.

There are generally good results with changes to basic hygiene practices like handwashing and wet wiping high-touch surfaces. Immediately washing with soap after completing contact with the bats or guano at an outside location with soap improved. The question remains whether some households should establish an additional handwashing area exclusively for use when working in the bat roosts. Improvements in handwashing areas would enhance the likelihood of thorough and consistent handwashing. Introducing wet wiping/mopping on a routine basis appears well-accepted and “doable.” It was the one practice that got excellent reviews in the final interviews with one person reporting feeling “less stress” with a clean, hygienic home.

Following optimal biosafety procedures related to PPE, preventing transmission to domestic animals, and possibly protecting uncovered foods will require inputs from the project to build sustainable schemes for supply management and infrastructure. Optimal PPE use and care is critical for personal protection, yet practices are poor and while they improved during the trial, for many, they remain suboptimal in multiple areas. BGPs who harvest the guano express significant discomfort from many of the required PPE items, especially eye covering, gloves, and the idea of wearing boots. Some complain about wearing masks consistently. Adding another deterrent to discomfort is complacency/low perceived risk. Many of the BG harvesters are older women and they say they have been harvesting guano for many years without PPE with no adverse effects. Some people report that supplies of PPE are not easily available and there could be an issue of lack of family support to obtain the PPE. The older women do not control family expenditures and do not have a means to travel to obtain PPE in distant markets. The harvesters themselves made a few modifications to the recommended PPE to accommodate their comfort levels: they used a hat with a kind of detachable veil that covers the face except the eyes. This type of hat could be adapted for improved protection. They also found covered shoes (similar to Crocs), but not boots, for harvesting rather than sandals.

Protecting food, especially as it dries outside or is left in open kitchens is well accepted although it is difficult to ascertain if the food being dried is indeed protected. Some participants moved their drying location further from the bat roost, but space is extremely limited so that movement may not make much difference. Further, although the participants say that they are careful to put food out after the bats have returned to the roost and pull it inside prior to their departure, those calculations may not prevent all contact. While participants did find places to store food in kitchens, especially those open to the outside, support for households by way of inexpensive, accessible cabinets would make storage easy and routine.

Particularly among the NBGP household, there is concern about their domestic animals having contact with the guano and bringing it into the house. However, no one offered ideas about how to control/protect domestic animals. This concern over domestic animals serving as a risk pathway could provide good motivation for wet mopping where the major constraint is time availability but with the reward of peace of mind.

RECOMMENDATIONS

Many social, structural, cultural, and internal factors influence whether one will adopt a new practice and it is important to identify and address these. The major factors influencing improving practices are desire for less smell and dust; desire for improved family welfare (beyond just health); an attitude of low perceived risk and complacency (we have been doing this for decades with no ill effects); physical discomfort (when using PPE feel they can't breathe), lack of time (we lead busy lives with many competing demands); lack of agency (women, especially elderly women may not make decisions about purchases—when to buy and how much to spend); physical constraints (current poor health); lack of confidence and trust (unsure if improved practices will make difference and don't talk about changes for fear of being wrong or seen out of step). The recommendations below are offered to directly address these factors.

ENABLING ENVIRONMENT

1. Take a community approach to risk reduction. A high percentage of NBGP feel at risk and are disturbed by the smell and dust from the bats (some talk about feeling stressed). Their receptivity to improving basic biosafety and hygiene practices was good. They can add social support for these measures.
2. Given the older age of many BGP heads of family and guano harvesters, engage them through a “live and learn” approach to lessen their resistance to change. Recognize their years of building a guano business and living with the bats, but times can change and change quickly...we learn new things. To be ready for what might come, to protect and create a healthy environment for children, “live and learn.” Small changes add up.
3. Support family dialogue about the needed actions at the household level to support "primary" guano harvesters. Bat guano harvesting is a gendered activity which is sustained by the involvement of older women in the family. These women often are not in a decision-making role to purchase PPE or disinfectant. Protecting them is protecting family prosperity.

ENABLING TECHNOLOGIES

The BGP and NBGP households demonstrated that with their resources they can make important changes to their biosafety and hygiene practices. However, there are a few areas where STOP Spillover can facilitate these households' adoption of and adherence to optimal behaviors:

1. Work with the community to set up a scheme(s) to make critical products available locally to address the time constraint faced by many to get to markets to look for supplies. An example of something to try would be to find small entrepreneurs in each village (Varint 1, 2 & 3) who would sell basic supplies of single-use masks, eye protection, soap,

disinfectant, cloth for drying hands, plastic bags for guano storage, and baskets or netting to cover food. These would be products with demand beyond just the 16 BGPs.

2. Offer information about where acceptable products like boots and gloves can be found and their cost. See if buying in bulk might reduce costs.
3. Provide technical support to every BGP household to construct a handwashing station that can be appropriately positioned to encourage handwashing immediately after removing PPE. If appropriate, find an NGO in Cambodia that may have an acceptable appropriate technology handwashing station.
4. Continue to explore ways to keep guano off the ground under the roosts so that runoff during the rainy season and the amount of guano tracked by animals is reduced.
5. Confirm if soap is suitable or the type of disinfectant that should be used for PPE cleaning and surface wiping.

COMMUNICATION AND COMMUNITY ENGAGEMENT

1. Continue to educate the community about the risk that bats may pose to disease transmission, but do not rely on it as a sole motivator. Interest in reducing the smell and dust is high and appreciation of a clean, safe home environment is high. These are stronger motivators than health.
2. Awareness raising is not enough: Institute a system of community and family commitments to staying healthy while living with bats instituted and supported by the OH-DReaM working group (i.e., village chief, CCWC, DCWC, Health center). The bats are good for the general welfare of the community. The community and families can commit to keeping the bats and themselves healthy and thriving. They do this by committing to basic biosafety and hygiene. Community or neighborhood scorecards can be kept to look at homes where there is consistent handwashing with soap as evidenced by a hand washing station with running water, for example. This elicits social accountability. Families are recognized and communities can take pride in being a guano producing area that protects its citizens. Other practices like food protection and daily wet wiping could also be tracked. The BGP families can commit to using full PPE, PPE care, and keeping their guano stored safely and securely, in addition to the more general hygiene behaviors. Communities develop schemes to help those families who have real challenges in reaching their commitments ('Helping Hands').
3. Recognize positive achievements of both BGP and NBGP households to protect themselves and the community and to keep the guano business thriving. Support those people/families across the community, but especially in the BGP neighborhoods to offer testimonies and to share new practices. Spread their knowledge and build on their experience through visitation and exchanges.
4. Consider developing a certification/label for communities or households that consistently demonstrate excellent biosafety and hygiene are being followed. The label would certify

that guano from a particular community has been harvested following proper biosafety standards.

5. Reminders are important for establishing habits. Consider calendars to remember and check off when something is done. Nudges, like a brightly colored visual path from the entrance to the roost to a handwashing station, could encourage people to wash their hands immediately. Creating a secure, convenient place for soap reminds people to have it.
6. Consider cell phone videos shared over WhatsApp and Viber that demonstrate proper handwashing, offer examples of how to store PPE, wet wipe surfaces, handle dead bats and build cabinets to store food, etc.

REFERENCES

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ANNEXES

Annex 1a: Timeline of TIPs Implementation

Activity	Jun	Jul	Aug	Sep
1. IRB Clearance	X	X		
2. Train Research staff		X		
3. Recruit HH		X		
4. Initial Interviews and agreement on trials			X	
5. Initial trial period			X	
6. Mid-point check-in			X	
7. Final trial period			X	
8. Final Interview			X	
9. Data review and entry				X
10. Analysis				X
11. Reporting and sharing				X

Annex 2a: Consent Information Sheet for Community Participants

Introduction

We read the responses from the first part of our team’s study at bat guano production farms and have identified at least three different practices to increase safety and reduce the risk of diseases spreading from bats to humans. The use of trials of improved practices (TIPs) will help bat guano farmers to find the best solutions for using practices to reduce these risks. The overall goal of this study is to identify practices that reduce this risk, and that work for farmers long term.

Protocol Title: Community-level risk reduction interventions

Local Investigator’s name: Srey Chanthy

Principal Investigator’s name: [Hellen Amuguni](#) (USA)

Organization: Tetra Tech-Branch ARD, and Tufts University (USA)

You are invited to take part in this study being conducted by Dr. [Hellen Amuguni](#), a researcher from Tufts University and Mr. Srey Chanthy, the Cambodia STOP Spillover Country Team Lead. We are hoping that your participation in this study will help solve the main risks and that your expectations of what good practices look like can help you and other people in your community reduce the risk of diseases spreading from bats to humans. The whole TIPs process will take about one month and will involve 3 visits from the study team, and during your participation, you will try some biosafety and hygiene practices. Throughout the process, we will check in with you to see how the trials of these improved practices are going. This activity is part of a larger project, called “STOP Spillover,” funded by USAID. This project aims to reduce the risk of diseases spreading from animals to humans. It also aims to share information on the risks of close contact with animals. We would like to invite you to read (or have read to you) this consents document to understand what participating in this study would mean for you.

If you decide to be in this study, you will be invited to participate in an initial household education and interview by the study team as the first visit and to start trials of not more than three selected interventions. The second household visit will be conducted in the following one or two weeks by the study team to check and consult your implementation progress, and the final visit and interview will be conducted in the next third or fourth week to assess the results and their effectiveness. If you decide to participate in this study, you agree to discuss plans together with us to start the trials.

Why am I invited to participate in the study?

You are being invited to take part in the TIPs because you have participated in the earlier surveys on risk reduction related to bat guano production in your communities. You have been invited to participate in the TIPs pilot because of your valuable roles, expertise, or both.

Privacy and Confidentiality

By signing this consent form, you agree to participate in the trials and agree to allow the project to take photos, videos and audio records. You also agree to provide your personal contact information such as name and location. We may use information collected from you to produce film documentaries and written success stories. We might also use video and audio recordings from the TIPs for these as well.

There is a risk of loss of confidentiality, meaning your private information could be seen by someone outside of the research team. To minimize this risk, your answers will be labeled with a code and kept separate from your personal information. We will keep all information from this study on a special computer that only study staff will be able to get access to. We will not share your identifying information with anyone. In videos and photos produced from our study, we will be sure to blur your faces to protect your identity.

Your mobile telephone number will be temporarily kept while the study is being done. We may keep your contact information and invite you to participate in any future related studies or we can contact you for any questions we have for a maximum of 3 years. This information will be destroyed after the TIPs research has been completed, within 3 years of TIPs completion. Only study staff will have access to this information.

Future use of information

Other researchers might want to use the information collected from the TIPs and if they get approval, we will share information with them without any of your identifying information (no name, phone number, etc.) We will not share your identifying information with anyone and any videos/photos we produce from this study will have your faces blurred to protect your identity.

Right to participate

If you decide not to participate in the study there is no penalty for you, as participating is voluntary. You can stop participating at any time with no penalty to you and skip any questions you do not want to answer.

Benefits and Payment

There are no direct benefits to you from taking part in the study. We cannot promise any benefits to others from your taking part in this study. However, there would be possible benefits to the people living in your communities and country if it helps to reduce the risk of pandemic virus spreading from bats to humans. It is possible that your participation may indirectly improve the biosafety and hygiene practices among your household members and community members to reduce the risk of diseases spreading from bats to humans. You will not be paid for participating in this study, but you may benefit from possible increased protection from PPE (personal protective equipment) and good hygiene practices if you properly apply it.

This study has been reviewed by the Tufts Health Sciences IRB, and the Cambodia National Ethics Committee for Health Research (NECHR). If you have any questions, concerns, complaints, or think the research study has hurt you, you may talk to me now or you may

STOP Spillover Cambodia Activity 2.2.2.1: Community Level Risk Reduction

contact Mr. Srey Chanthy, who is the Cambodia Country Team Lead. He is available at chanthy.srey@tetrattech.com and by phone at +855 12 943 609. You may also contact Dr. Hellen Amuguni, Principal Investigator, at janetrix.amuguni@tufts.edu

If you have questions about your rights as a research study subject, you may contact the Cambodia IRB at nouthsarida@gmail.com and by phone at +855 12 528 789. You may also contact the Tufts Health Sciences Institutional Review Board (IRB) at +1 (617) 636-7512.

The study team will keep contact information for possible future participation.

Thank you for your participation.

Signature of Agreement by Participant

Signature of Project Activity Lead

Written Name of Participant

Written name of Project Activity Lead

Date of signing:/...../.....

Annex 2b: TIPs Menu of Practice Options

TIP #1 PPE Use			
Practice	Motivation	Steps -Optimal	Options
<p>FOR TRIAL: Use a full set of PPE appropriately every time you work in bat or guano related activities.</p> <p>Specifics: Who? When?</p>	<ul style="list-style-type: none"> • Protects you from direct contact with bat waste that can carry disease. • Controls odor and dirt on your body from the guano. 	<ul style="list-style-type: none"> • Have full set: <ul style="list-style-type: none"> - face mask—disposable; N95 optimal - eye covering-- glasses, sunglasses - gloves, rubber - hat/krama - long sleeve shirt and pants - rubber boots • Cover nose and mouth with mask • Gloves cover hand-no holes 	<ul style="list-style-type: none"> • Mask—surgical single use; minimum cloth mask. • Gloves—minimum cloth gloves. • Rubber boot—minimum closed shoes.
<p>FOR TRIAL: Store PPE outside of house and clean reusable PPE each time.</p>	<ul style="list-style-type: none"> • Protects you from contamination left on PPE exposed to bat waste. • Keeps family free from contamination on PPE. • Reduces odor in house. 	<ul style="list-style-type: none"> • Allocate a space outside the house (near guano harvest area if possible) for changing and storing PPE. • Accommodate space with hooks/hangers. • Disinfect all reusable PPE after every use. <ul style="list-style-type: none"> - single use mask - wash rubber gloves in disinfectant - designate clothes only for work with bats/guano and wash after every use - clean and disinfect boots - clean / wash head covering 	<ul style="list-style-type: none"> • Changing storage area—close to roost to prevent tracking guano; may need accommodation • Disinfectants—can use soap and water for washing.

TIP #2 Handwashing			
Practice	Motivation	Steps-optimal	Options
FOR TRIAL: Bat guano harvesters/farmers wash their hands with soap and water immediately following any contact with bats or guano	<ul style="list-style-type: none"> Keeps you from spreading bat waste contamination from hands to other surfaces—especially mouth or food. Reduces smell. 	<ul style="list-style-type: none"> Handwashing facility is available near the bat roost and place for PPE removal. Handwashing facility is located outside the house. Soap, running water and a clean cloth for drying hands are available. Hands are washed after all PPE is removed. 	<ul style="list-style-type: none"> Air drying hands if no clean cloth is available. If there is no running water, then bucket and cup to pour water. <p>Note: Soap, time, and technique are all important.</p>

TIP #3 Keep Store Packed Guano Safely			
Practice	Motivation	Steps-optimal	Options
FOR TRIAL: Bat guano harvesters store accumulated guano away from the house and from animals.	<ul style="list-style-type: none"> Keeps you, family, and animals safe from contamination and disease from bat waste. Reduces odor and dust in the house. 	<ul style="list-style-type: none"> Guano is packed in closed bags. A secure area away from the house and protected from animal disturbance is used for storage. 	<ul style="list-style-type: none"> Install a storeroom or small storage area away from the house. Store the guano in plastic bags. Store the guano in the jar with a cover.

TIP #4 Protect domestic animals from guano			
Practice	Motivation	Steps-optimal	Options
DISCUSSION ONLY: Bat guano producers use fencing or raised nets to protect their domestic animals from contact with the bat guano under the roosts.	<ul style="list-style-type: none"> Keeps your animals safe from contamination and disease from bat waste. Keeps you and your family safe because the animals won't spread the guano as they roam in the community and house. 	<ul style="list-style-type: none"> Installing a low fence to prevent animals from roaming to the bat roost and guano area. 	<ul style="list-style-type: none"> Raise the capture nets off the ground. Keep animals staying away from the bat roost.

TIP #5 Protect / clean surfaces in cooking areas exposed to bat droppings			
Practice	Motivation	Steps-optimal	Options
DISCUSSION ONLY: Clean surfaces in the kitchen or where household implements dishes are stored to keep them from harboring bat contaminants.	Protect the family; live in a clean environment; keep away from other pests.	<ul style="list-style-type: none"> Identify critical surfaces. Keep a disinfectant available (a bleach dilution). Use the bleach spray or solution with a clean cloth that can be rinsed and kept clean between uses. 	<ul style="list-style-type: none"> Clean with soap and water once per day (preferably in the morning).

TIP #6 Protect exposed food from bat droppings			
Practice	Motivation	Steps-optimal	Options
FOR TRIAL: Families cover foods left to dry or that are stored in open containers in open kitchens.	Keep food safe, free of bat contaminants to protect the health of you and your family	<ul style="list-style-type: none"> Protect food during sun drying, especially do not put it out too early or leave it out too late (bats must not be flying) Dry food as far as possible from the bat roosts. If kitchen is open—easily accessible to bats) cover all stored food in a bag, box, jar or basic cupboard. 	<ul style="list-style-type: none"> Change the location of the drying space to somewhere away from the bat roost. Install any supporting materials to keep the kitchen safe from any access to animals. Install the net to cover the kitchen to prevent the accessibility of bats.

TIP #7 Disposal of dead bats			
Practice	Motivation	Steps-optimal	Options
POSSIBLE TRIAL: Household members (adults) dispose of bats properly immediately after they are discovered.	Keep children or animals from playing with or eating the dead bats. The dead bat may carry disease.	<ul style="list-style-type: none"> Let family members know who to notify for bat disposal. Person wears mask and rubber gloves Place bat in a plastic bag. Burns dead bat in place where waste is incinerated. Hands are washed thoroughly with soap and water. 	<ul style="list-style-type: none"> Person uses plastic bags on hands and pulls down the plastic bag over the bat in that hand and then puts the wrapped bat inside the other bag. Use sticks to handle the carcass if the above are not available. Burn or bury the sticks with the carcass. Bury the bat at least 1 meter deep.

Annex 2c: Initial household Interview Guide for BGPs

Respondent's ID:

Respondent's family code...(Note— Try to interview more than one person in the HH. After the problems have been diagnosed, the primary actor for the improved practice can be identified for the trial)

Name of interviewer

Date of visit...../...../..... (dd/mm/yyyy), Time

PART I—ASSESSMENT (Note: this follows the confirmation of consent and the explanation about the study)

Thank you again for agreeing to participate with us in looking for ways to help everyone here live healthy lives while providing a home for bats. Before we talk about the specific practices you might try, I would like to learn more about your current practices.

Let's start with personal protection for all people in your family who are in direct contact with guano. This means for harvesting the guano, packing the guano for sale, or applying the guano to your crops. It also includes the times when someone repairs the roosts.

1. Who typically performs these tasks?

- Harvesting the guano: _____
- Packing/securing guano for sale: _____
- Using guano on crops: _____
- Repairing the roost: _____

NOTE: If the main person involved in these activities is different from the person being interviewed, please invite the person active in these activities to join the discussion.

2. During these activities of harvesting, packing, using guano on crops and managing the roost you or others in the HH are in direct contact with the bats' urine and feces.

- When performing the activity do you have concerns for your own safety? ___Y / N
- If yes, on a scale of 1-10 with 10 being high concern and 1 being little concern where would you place your level of concern? _____
- What are your concerns?
- If not, what makes you feel safe doing the work?
- For interviewer for each person involved in the activity:

STOP Spillover Cambodia Activity 2.2.2.1: Community Level Risk Reduction

Task	Concern Y / N	Level	Why?
Harvesting			
Dry/cleaning			
Packing/handling			
Using on crops			
Repairing roost			

3. Let's talk about your use of protective covering when you perform these tasks. A full set of covering goes from head to toe. For each task I am going to ask you about any covering your current use. If you use something, I am interested in what and if you use it always or only at certain times and why. (Note: different people may answer these questions by task.)

Task	Head	Eyes	Nose/ mouth	Hands	Body	Feet
Collecting guano						
Cover Y / N						
What						
When						
Drying guano						
Cover Y / N						
What						
When						
Packing/handling						
Cover Y / N						
What						
When						
Applying guano						
Cover Y / N						
What						

Task	Head	Eyes	Nose/ mouth	Hands	Body	Feet
When						
Bat roost repair						
Cover Y / N						
What						
When						

4. After you finish your task of guano harvesting or packing and you remove any protective wear, what do you do? Where do you take it off and where do you keep it? (Ask about each piece of protective wear that they use.)

(Person 1) _____

(Person 2) _____

(Person 3) _____

5. Do you wash or disinfect the protective wear after use? __Y / N

If yes, please describe what you do to clean it: _(If people have different, note them) _____

(Person 1) _____

(Person 2) _____

(Person 3) _____

6. Now I would like to know about cleaning yourself after contact with the guano or bats.

- What do you do?
- When you finish your work with guano or with the bat roosts, do you wash your hands? __Y / N
- If yes, where do you wash your hands?
- Is the handwashing facility close by? Do you need to enter the house to wash your hands?
- How do you wash your hands? (If they don't mention soap ask: Do you use soap? Is it always available to you?)

(Person 1) _____

(Person 2) _____

(Person 1) _____

7. Now I would like to ask you about the storage of the guano that you are harvesting for local use and for sale.

- What type of bag do you store the guano in? _____
- Where do you store guano? _____
- Have you had problems with animals getting into the guano? Please describe.

8. Another area that we are interested in talking about is domestic animals and their contact with the guano.

- Generally, do you have domestic animals like chickens, dogs, cats, pigs that wander into the area under the roosts? __Y / N
- Which of these animals do you have around your home?
- Would you say that it is normal (almost every day the animals roam around the roost? or occasionally?
- Do these same animals wander into your home? Y/ N?
- Do you do anything to discourage the animals from walking in the guano area under the roosts? Y / N?
- If yes, what?
- Do you do anything to keep any of these animals from entering your house?
- If yes, What? _____

Now I would like to talk about food.

9. Does anyone in your family dry food such as meat or fish during the day to store for later use? __Y/N

- If yes, what is their drying practice? When do they put it out in the sun and bring it into the house?
- When brought in the house how is the food stored?
- How close is the drying area to the bat roost?

10. Note if they have an open kitchen ____Y/N

- If yes, OBSERVE-- are there open food containers or the presence of raw food left in the open? Describe:

- If yes, do you ever find bats flying in the kitchen or roosting there?
- If yes, how often? Do you take measures to disrupt them? What do you do?
- On a scale of 1-10 with 10 being high concern and 1 being little concern, where would you place your level of concern about bat droppings getting in your food left in your kitchen? _____
- If rating is high (5 or >), Can you describe your concern?
- If the rating is low, (<5), Can you describe why you don't feel worried?

Now I would like to ask you about care inside your house beyond food storage.

11. Let's look around together: For surfaces like this table, or the workspace you have in your kitchen, or the shelves where you have your plates and things arranged...is it possible to clean them?

- If yes, For the different surfaces how often do you clean them? (Note: it might be different for different surfaces. Please record each if different)
- When you clean, how do you do it? (Do they mention with soap or disinfectant?)
- How often might they do it?
- If not, is there any reason you have not? or you just don't think about it?

Now, I would like to know if you find dead bats around your home.

12. When was the last time that you had a dead bat near your home?

- What did you do?
- Again, using a scale of 1 – 10, with 10 being a high concern and 1 being a little concern where would you place your level of concern about dead bats _____
- If rating is high (5 >), can you describe your concern?
- If rating is low, (<5), Can you describe why you don't feel worried?

13. Overall you have [not shown/shown] (Circle one for this participant based on the three questions about person's perception of risk)) concern about the bats that are being kept by you and your neighbors. Is this the case? ___ Y/N

- If not concerned, although you are not concerned about living near bats every day are there things that you would like to or feel should be done to make the people here safer?
- If yes, what are they?

- If concerned, are there actions you would like to take concerning the bats, but believe you can't? ___Y / N
- What are they?
- Can you tell me anything else about living in a community where bats are being kept for productive purposes?

PART 2–PRIORITIZING HOUSEHOLD PRACTICES: TAKE A BREAK TO REVIEW ANSWERS AND THE HH SITUATION. USE TABLE BELOW TO SUMMARIZE YOUR ANSWERS AND PRIORITIZE THE AREAS MOST IN NEED OF IMPROVEMENT–SELECT NO MORE THAN 3 (APPROPRIATE IF MORE THAN ONE PERSON WILL BE INVOLVED) AND USE THE ASSESSMENT TABLE TO DISCUSS THE PRACTICES AND YOUR ASSESSMENT WITH THE FAMILY

PART 3–NEGOTIATION /COUNSELING SESSION WITH THE TRIAL PARTICIPANT:

Let's shift the conversation and talk more about the purpose of our study. Bats have proven to be important members of our ecosystem. As you know, their guano makes good fertilizer, and they are the source of income for bat guano producing households. However, bats can carry diseases that can infect humans and other animals. To avoid illness outbreaks, people need to take basic precautions and learn to live safely with bats.

The practices that should be done to protect the family include:

1. Eliminate all direct exposure to bat guano and guano dust by always wearing full protective gear and clothing every time you work with bats or guano. The clothing, boots, and gloves should not come into the house but stay safely stored outside in a designated area. All protective clothing and gear should be washed or disinfected between uses.
2. To avoid spreading any possible contamination, hands must be washed with soap and water after any work with bats or guano and after all PPE has been removed.
3. All bat guano being stored should not be near the house and should be secured from animals in a plastic bag.
4. Domestic animals should be protected from direct contact with the guano under the roosts.
5. Clean all surfaces, especially in the cooking area or where eating utensils are stored, every morning using a disinfecting solution or soap and water.

STOP Spillover Cambodia Activity 2.2.2.1: Community Level Risk Reduction

6. Covering all food. That includes food left out to dry that might be contaminated by flying bats or by dust from their guano. And it includes food in the kitchen that might be uncovered.
7. Dead bats should be immediately disposed of properly when they are found. It is dangerous for children to find them and handle them or for an animal to try and eat them.

In our discussion earlier we found that: [Interviewer needs to make a judgment about observations and discuss each of these with HH members present.]

Practice	Excellent (behavior is optimal)	Good (most of the behavior is done well, but a few gaps)	Poor (not observing the practice, or doing it poorly or occasionally)
Wearing full PPE for tasks with bats or guano			
Storing PPE outside the home			
Cleaning PPE appropriately			
Washing hands with soap after contact with bats or guano			
Guano is stored securely and away from the house			
Animals are protected from contact with guano collecting area			
Surfaces in the home cleaned daily with soap and water			
Food drying kept at a distance from the roost			
Optimal time for sun drying			

STOP Spillover Cambodia Activity 2.2.2.1: Community Level Risk Reduction

Practice	Excellent (behavior is optimal)	Good (most of the behavior is done well, but a few gaps)	Poor (not observing the practice, or doing it poorly or occasionally)
Food covered in open kitchen			
Bat presence in home			
Handling of dead bats			

Based on this review, you could do more to protect your family by: [Pick three areas –no more than 3—where the family could do better to protect themselves. And explain this to the participant(s)]

1. Practice: _____ Person: _____
2. Practice: _____ Person: _____
3. Practice: _____ Person: _____

ASK

- Do you agree with this assessment of where you and your family’s practices are protective and where they could be better to give you more security? ___ Y/N Why?
- Would you be willing to try some things to improve your security? I will explain them and then ask you about your thoughts.
- Interviewer: Based on the trials that the family member (s) might try, pick the negotiation sheet for TIP that corresponds to the practices the participants should focus on.
- Proceed one by one with each TIP. Talk to the person selected for the TIP, not a proxy.
 - a. share the best / optimal practice with the participant using the guide. Check their understanding.
 - b. For each practice complete the following:

Practice 1: TIP _____

- As I described this practice to you, what is your reaction?
- Is it something you(and/or members of your family) can do?

STOP Spillover Cambodia Activity 2.2.2.1: Community Level Risk Reduction

- Can you do it routinely?
- Can you describe to me how you would do it?
- Will you be able to get, or do you have, what you need for the practice (PPE, plastic bags, soap, covers for food, etc.)

NOTE: IF THERE ARE THINGS THAT THE PARTICIPANT FEELS THEY CANNOT GET SUCH AS RUBBER BOOTS LOOK AT THE OPTIONS OFFERED IN THE GUIDE AND NEGOTIATE ALTERNATIVES WITH THEM. WHAT CAN THEY DO TO GET CLOSE TO THE OPTIMAL BEHAVIOR.

- Are you willing to try to put this recommendation into practice for the next 2-3 weeks?
- Y /N.
- If, yes, do you have any questions or concerns?
- If not, why not? (Try to respond to the person's concerns and see if you can get them to commit to trying).
- Will you talk about this with your family?
- Do you believe doing this will offer some protection from harm that bats might cause? ___ Y/N and Why?

REMIND THEM THAT THIS IS JUST TRYING. THEY DON'T HAVE TO CONTINUE THE PRACTICE AFTER THE TRIAL IS THEY DON'T WANT TO.

Practice 2: TIP _____

- As I described this practice to you, what is your reaction?
- Is it something you (and/or members of your family) can do?
- Can you do it routinely?
- Can you describe to me how you would do it?
- Will you be able to get, or do you have, what you need for the practice (PPE, plastic bags, soap, covers for food, etc.)

NOTE: IF THERE ARE THINGS THAT THE PARTICIPANT FEELS THEY CANNOT GET SUCH AS RUBBER BOOTS LOOK AT THE OPTIONS OFFERED IN THE GUIDE AND NEGOTIATE ALTERNATIVES WITH THEM. WHAT CAN THEY DO TO GET CLOSE TO THE OPTIMAL BEHAVIOR.

STOP Spillover Cambodia Activity 2.2.2.1: Community Level Risk Reduction

- Are you willing to try to put this recommendation into practice for the next 2-3 weeks? Y /N.
- If, yes, do you have any questions or concerns?
- If not, why not? (Try to respond to the person's concerns and see if you can get them to commit to trying.
- Will you talk about this with your family?
- Do you believe doing this will offer some protection from harm that bats might cause? ___Y/N and Why?

REMIND THEM THAT THIS IS JUST TRYING. THEY DON'T HAVE TO CONTINUE THE PRACTICE AFTER THE TRIAL IS THEY DON'T WANT TO.

Practice 3: TIP _____

- As I described this practice to you, what is your reaction?
- Is it something you(and/or members of your family) can do?
- Can you do it routinely?
- Can you describe to me how you would do it?
- Will you be able to get, or do you have, what you need for the practice (PPE, plastic bags, soap, covers for food, etc.)

NOTE: IF THERE ARE THINGS THAT THE PARTICIPANT FEELS THEY CANNOT GET SUCH AS RUBBER BOOTS LOOK AT THE OPTIONS OFFERED IN THE GUIDE AND NEGOTIATE ALTERNATIVES WITH THEM. WHAT CAN THEY DO TO GET CLOSE TO THE OPTIMAL BEHAVIOR.

- Are you willing to try to put this recommendation into practice for the next 2-3 weeks? Y /N.
- If, yes, do you have any questions or concerns?
- If not, why not? (Try to respond to the person's concerns and see if you can get them to commit to trying.
- Will you talk about this with your family?
- Do you believe doing this will offer some protection from harm that bats might cause? ___Y/N and Why?

REMINDE THEM THAT THIS IS JUST TRYING. THEY DON'T HAVE TO CONTINUE THE PRACTICE AFTER THE TRIAL IS THEY DON'T WANT TO.

CLOSURE:

Thank you for spending this time to talk about how to protect your family and for agreeing to try a few simple things that should make a difference for your family.

Either I, or another person from the project, will come back to see how you are doing with the practice. We want to learn what goes well and where there are difficulties. We would like to make this something everyone can do.

Before I leave, can you tell me again what you are going to try over these next weeks?

Note how s/he explains the practices:

Thank the participant.

Annex 2d: Initial Household Interview Guide for NBGPs

Respondent's ID:

Respondent's family code:.....(Note— Try to interview more than one person in the HH. After the problems have been diagnosed, the primary actor for the improved practice can be identified for the trial)

Name of interviewer

Date of visit...../.... /..... (dd/mm/yyyy), Time

PART I—ASSESSMENT (Note: this follows the confirmation of consent and the explanation about the study)

Thank you again for agreeing to participate with us in looking for ways to help everyone here live healthy lives while providing a home for bats. Before we talk about the specific practices, I would like to learn more about your current situation.

1. **INTERVIEWER**—please note the proximity of the house to the bat roost of the neighbor:___
2. Thinking about your everyday life, are you aware of, or think about, the bats and their coming and going from the roost? __Y/N

STOP Spillover Cambodia Activity 2.2.2.1: Community Level Risk Reduction

- If yes, on a scale of 1-10 with 10 being thinking about them constantly (all the time) and 1 being almost never, where are you?
 - What prompts your thinking or awareness?
3. Again, thinking about your family and community living closely with a wild animal like bats, what would you say are the benefits/advantages and the risks/disadvantages?
- Benefits:
 - Disadvantages:
4. You have been living in this community among bats for a long time. Is there anything that you do, consciously, or perhaps unconsciously, in your daily routine or in certain seasons because there are bats close by? What?
5. At any time are you in direct contact with the bats or possibly with the guano dust that might come from the roosts? ___Y/N When is that?

Now I would like to talk about specific practices.

6. Do you ever wear any form of PPE because of the bats? This would include a mask, gloves, etc. ___Y/N
- If yes, What and When?
 - If you have contact with a bat or bat(s) or the guano, do you take any actions right after? ___ Y/N
 - What?
 - If they do not say that they wash their hands, ask them if they wash their hands and if they have soap to use.
7. Do you have domestic animals (dogs, cats, chickens, pigs) that roam free? ___Y/N
- Which animals:
 - Do you see your animals around the bat roost or suspect that they may wander there? ___Y/N
 - What are your thoughts about your animals possibly being in contact with bats and the guano?
 - If the person expresses any concern: Do you do anything to keep them away from the roost? Or do you have any ideas about how to keep them away?

Now I would like to switch to talking about food and your kitchen area.

8. Does anyone in your family dry food such as fruit, meat, or fish during the day to store for later use? ___Y/N

- If yes, how close is the drying area to the bat roost?
- If yes, what is their drying practice?
- If they don't mention, when do they put it out in the sun and bring it into the house?
- Is this a time that you are aware of the bats' movements? ___ Y/N
- If yes, how?
- When the dried or partially dried food is brought in the house how is it stored?

9. May I see where you prepare food?

OBSERVE-- open food containers? Describe: _____

Generally what kind of food storage is available?

- Note if they have an open kitchen ____ Y/N
- Do you ever find bats flying in the kitchen or roosting there?
- If yes, how often?
- Do you take measures to disrupt them? What?
- If the kitchen is closed or can be closed:
- Do you keep the door/curtain to this area closed consistently?
- Do you do this to keep bats from disturbing the kitchen or for other reasons? What are the reasons?

9. **OBSERVE**: the surfaces that are in the kitchen area or where people eat.

- Looking around, I wonder, do you notice dust settling on your table and shelves and other surfaces? ___ Y/N
- Can you describe it--frequency, perception of amount?
- Does it bother you? ___ Y/N
- If yes, do you do anything to control it? Sweep, and wipe the surfaces?
- If they say they wipe the surfaces, how often do you clean the surfaces? How do you do it (dry cloth, wet cloth, with soap and water, with a disinfectant)?
- Do you in any way think it is related to the bats or just something that always happens?

10. Now, I would like to know if you find dead bats around your home.

- When was the last time that you had a dead bat near your home?

- What did you do?
- Do you notice that the dead bat attracts the interest of your animals or children—that is, do they touch the dead bats or do animals eat the dead bats?
- Using the scale of 1 – 10, with 10 being a high concern and 1 being a little concerned, where would you place your level of concern about finding dead bats near your house?
- If rating is high (5>), can you describe your concern?

11. After our quick discussion is there anything else you would like to say about living in a community where bats also stay?

PART 2—PRIORITIZING HOUSEHOLD PRACTICES: TAKE A BREAK TO REVIEW ANSWERS AND THE HH SITUATION. USE TABLE BELOW TO SUMMARIZE YOUR ANSWERS AND PRIORITIZE THE AREAS MOST IN NEED OF IMPROVEMENT—SELECT NO MORE THAN 2 AND USE THE ASSESSMENT TABLE TO DISCUSS THE PRACTICES AND YOUR ASSESSMENT WITH THE FAMILY.]

PART 3—NEGOTIATION /COUNSELING SESSION WITH THE TRIAL PARTICIPANT:

Let's shift the conversation and talk more about the purpose of our study. Bats have proven to be important members of our ecosystem. As you know, their guano makes good fertilizer, and they can also provide other benefits such as controlling insects like mosquitoes and crop pests. However, bats can also carry diseases that can infect humans and other animals. To avoid outbreaks, people need to take a few precautions and learn to live safely with bats.

The practices that should be done to protect the family include:

1. Handwashing with soap with any contact with the bats or guano.
2. Covering or protecting all food. That includes food left out to dry that might be contaminated by flying bats or by dust from their guano. It also includes food in the kitchen that might be uncovered, especially in open kitchens.
3. Cleaning all exposed surfaces daily, especially those where food is prepared or eating utensil are stored.
4. Dead bats should also be disposed of properly immediately when they are found. It is dangerous for children to find them and handle them or for an animal to eat them.

In our discussion earlier we found that: [Interviewer needs to make a judgment about observations] and give your assessments on all accounts based on your discussion to the participant. Both the good and the poor practices.

STOP Spillover Cambodia Activity 2.2.2.1: Community Level Risk Reduction

Practice	Excellent (behavior is optimal)	Good (most of the behavior is done well, but a few gaps)	Poor (not observing the practice, or doing it poorly or occasionally)
Do they wash hands with soap if in contact-Have soap?			
Food drying area is as far as possible from the roost			
Optimal time for sun drying			
Food stored in kitchen-covered			
Bat presence in home			
Surface cleaning			
Handling of dead bats			

Based on this review, you could do more to protect your family by: [Pick two areas –no more than where the family could do better to protect themselves. And explain this to the participant.

1. Practice one: _____
2. Practice one: _____

ASK

1. Do you agree with this assessment of where you and your family's practices are protective and where they could be better to protect your health and safety? ___ Y/N
 - Why?
 - What comments do you have?
 - Would you be willing to try some things to improve your health and safety? I will explain them and see what you think.

Interviewer: Based on the trials that the family member (s) might try, pick the negotiation sheet for TIP that corresponds to the practices the participants should focus on

Proceed one by one with each TIP. Talk to the person selected for the TIP, not a proxy.

- a) share the best / optimal practice with the participant using the guide. Check their understanding.
- b) For each practice complete the following:

Practice 1: TIP _____

2. As I describe this practice to you, what is your reaction?

- Is it something you and members of your family can do?
- Can you do it routinely?
- Can you describe to me how you will do it?
- Will you be able to get, or do you have, what you need for the practice (soap, covers for food, etc.)

NOTE: IF THERE ARE THINGS THAT THE PARTICIPANT FEELS THEY CANNOT GET SUCH LOOK AT THE OPTIONS OFFERED IN THE GUIDE AND NEGOTIATE ALTERNATIVES WITH THEM. WHAT CAN THEY DO TO GET CLOSE TO THE OPTIMAL BEHAVIOR.

- Are you willing to try to put this recommendation into practice for the next 2-3 weeks? Y /N.
 - If, yes, do you have any questions or concerns?
 - If not, why not? (Try to respond to the person's concerns and see if you can get them to commit to trying.)
- Will you talk about this with your family?
- Do you believe doing this will offer some protection from harm that bats might cause? ___ Y/N Why?

REMIND THEM THAT THIS IS JUST TRYING. THEY DON'T HAVE TO CONTINUE THE PRACTICE AFTER THE TRIAL IS THEY DON'T WANT TO.

Practice 2: TIP _____

3. As I describe this practice to you, what is your reaction?

- Is it something you and members of your family can do?
- Can you do it routinely?
- Can you describe to me how you will do it?
- Will you be able to get, or do you have, what you need for the practice (soap, covers for food, etc.)

NOTE: IF THERE ARE THINGS THAT THE PARTICIPANT FEELS THEY CANNOT GET SUCH LOOK AT THE OPTIONS OFFERED IN THE GUIDE AND NEGOTIATE ALTERNATIVES WITH THEM. WHAT CAN THEY DO TO GET CLOSE TO THE OPTIMAL BEHAVIOR.

- Are you willing to try to put this recommendation into practice for the next 2-3 weeks? Y /N.

- o If, yes, do you have any questions or concerns?
- o If not, why not? (Try to respond to the person's concerns; see if you can get them to commit to trying.
- Will you talk about this with your family?
- Do you believe doing this will offer some protection from harm that bats might cause? ___ Y/N Why?

REMINDE THEM THAT THIS IS JUST TRYING. THEY DON'T HAVE TO CONTINUE THE PRACTICE AFTER THE TRIAL IS THEY DON'T WANT TO.

Trials agreed to by Participant:

1. _____
2. _____

CLOSURE:

Thank you for spending this time to talk about how to protect your family and for agreeing to try a few simple things that should make a difference for your family.

Either I, or another person from the project, will come back to see how you are doing with the practice. We want to learn what goes well and where there are difficulties. We would like to make this something everyone can do.

Before I leave can you tell me again what you are going to try over these next weeks?

Note how s/he explains the practices: _____

Annex 2e: Interview Guide - Mid Point Household Visit

General Information: _____

Respondent's ID: _____

Note:

- Please be sure to interview the person who agreed to each trial during the initial interview.
- Mention to them that our main purpose is to learn from them about the suggestions that they agreed to try. We do not want to promote actions essential for the reduction

STOP Spillover Cambodia Activity 2.2.2.1: Community Level Risk Reduction

of bat-borne disease and risk of viral spillover from bats to humans without understanding the benefits and obstacles that people face in trying to follow them.

Name of interviewer: _____

Date of visit: _____ / _____ / _____ (dd/mm/yyyy), Time (start-end) _____

TRIALS Household agreed to and the person who agreed.

Note: Complete before interview and fill in spaces in the guide below

1. _____
2. _____
3. _____

QUESTIONS

Before we talk about the specific practices that you are trying, I have a few questions:

1. Following our first visit and your agreement to try certain new or modified practices, did you discuss your agreements with others in the family?

Yes, which ones?

No

2. Are the people that you talked to about the practice also going to have to follow the practice?

Yes, what were their reactions? _____

No, what were their comments / what were they curious about? _____

Now let's talk about the different practices you are trying:

Use the list of trials that each household agreed to implement since the initial interview, and ask them the key reminder questions and counseling activities as below:

Trial 1: _____

Reminder—are you talking to the right person?

1. Have you tried this practice or done anything to be able to implement it?

Yes, what are your practices?

No_, what was the reason?

What can motivate you to start the trial agreed?

- Is the practice according to the agreement? (Look at your reminder card for this trial and check the reminder sheet that the participant might have filled out. Take a picture of the participant's reminder sheet)

Sub-activities of trials	Responses		Observed		List down their practices
	Yes	No	Yes	No	

- What would you do with your trials in the remaining trial periods (until 28 August)?

- Do you have questions or suggestions related to starting or continuing your trial?

Yes No

If yes, what are they?

Trial 2: _____

Reminder: Are you talking to the right person for this trial?

- Have you tried this practice or done anything to be able to implement it?

Yes, what are your practices?

No_, what was the reason?

What can motivate you to start the trial agreed?

- Is the practice according to the agreement? (Look at your reminder card for this trial and check the reminder sheet that the participant might have filled out. Take a picture of the participant's reminder sheet)

Sub-activities of trials	Responses		Observed		List down their practices
	Yes	No	Yes	No	

- What would you do with your trials in the remaining trial periods (until 28 August) ?

4. Do you have questions or suggestions related to starting or continuing your trial?

- Yes No

If yes, what are they?

Reminder: Are you talking to the right person for this trial?

1. Have you tried this practice or done anything to be able to implement it?

- Yes, what are your practices?
 No, what was the reason?

What can motivate you to start the trial agreed?

2. Is the practice according to the agreement? (Look at your reminder card for this trial also check the reminder sheet that the participant might have filled out. Take a picture of the participant's reminder sheet)

Sub-activities of trials	Responses		Observed		List down their practices
	Yes	No	Yes	No	

3. What will you do with your trials in the remaining trial periods (until 28 August)?

4. Do you have questions or suggestions related to starting or continuing your trial?

- Yes No

If yes, what are they? _____

CLOSURE:

Remind the person of what they have accomplished.

Confirm those parts of the practice or the entire practice that they will do in the coming week or period of the trial.

Tell them that you intend to follow up with them again at the end of August as the final visit.

Thank the person for participating in the trial to improve ways that people can live safely with bats.

Annex 2f: Interview Guide - Final Household Visit

Respondent's ID: _____

Respondent's family code _____

Note: might want to interview more than one person in the HH depending on trials

Name of interviewer: _____

Date of visit ___ / ___ / ____ (dd/mm/yyyy), Time: _____

TRIALS Household agreed to: (complete before interview and fill in spaces in the guide below and note any commitments made at the mid-check)

1. _____ | mid-check: _____
2. _____ | mid-check: _____
3. _____ | mid-check: _____

Greetings and introductions:

Purpose of visit—to discuss the complete experience of the trial and to learn from the person about whether the changes have made a difference in the routine of their guano business or of living safely with bats.

To learn the advantages and disadvantages experienced with the new practice and whether it is something to recommend to others.

It is important to be honest about the experience.

Review the practices that the farmer or key person agreed to try based on the first interview.

QUESTIONS

Before we talk about the specific practices that you agreed try, I have a few questions:

1. Since my first visit have you discussed / consulted with others in the family about the practices?
 - Yes, which ones?
How many times did you talk to them?
What was/were the discussions or consultations about?
 - No
2. Since my first visit have you discussed/consulted with others outside of the family about any practice?
Note: does not include the mid-check
 - Yes, with whom?
What was/were the discussions about?
 - No

Now let's talk about the different practices you are trying:

Based on each practice the HH agreed to try, ask the questions listed. Probe for reasons why and make detailed notes.

Trial 01

1. **Note:** check where the family was during the mid-term check-in
If they had not started, did you start this practice?
 - No, what are the reasons? Probe why?
 - Yes
 - If they started but had more things to do or improve, were you able to make any of the changes we discussed since my last visit? Yes No
What have you done since my last visit?
 - If they were doing the practice well, did you continue the practice since my last visit?
2. Let's review exactly what you have been doing—how you have implemented the practices?
Is the practice according to the agreement?

Sub-activities of trials	Responses		Observation		List down if any of their practices was changes/adjusted
	Yes	No	Yes	No	

3. If the practice changed what did the person do and why?
4. **OBSERVE** as much as possible. For example, the storage place for the guano, the handwashing facility for the presence of soap, where PPE is stored:
Note:
 - a. If there can be a quantitative measure, ask about it, for example how many dead bats did you find and dispose of? Or how many days this week did you harvest guano using full PPE?
 - b. Take a picture or collect the reminder sheets if they will give them to you so that we have any quantitative information that is available.
5. What are your thoughts related to this practice?
Probes to use: Has it been easy? Are the costs incurred manageable? What do others in the HH think?
 - Positive reactions:
 - Negative reactions:
6. Will you continue with the changes / with the practice? And why or why not?
 - Continue, why?
 - No continue, why?

7. If they have not completed the practice: Are you likely to take further steps to do this practice? **Note:** Please note all steps here—for example each piece of PPE that they might be using or using properly
 - Yes, why?
 - No, why?
8. Are you likely to recommend this practice to others? Why/why not?
 - Yes, why? How would you convince them to try it (please specify the exact words)?
 - No, why?

Trial 02

1. **Note:** check where the family was during the mid-term check-in
If they had not started, did you start this practice?
 - No, what are the reasons? Probe why?
 - Yes
 - If they started but had more things to do or improve, were you able to make any of the changes we discussed since my last visit? Yes No
What have you done since my last visit?
 - If they were doing the practice well, did you continue the practice since my last visit?
2. Let's review exactly what you have been doing—how you have implemented the practices?
Is the practice according to the agreement?

Sub-activities of trials	Responses		Observation		List down if any of their practices was changes/adjusted
	Yes	No	Yes	No	

3. If the practice changed what did the person do and why?
4. **OBSERVE** as much as possible. For example, the storage place for the guano, the handwashing facility for the presence of soap, where PPE is stored:
Note:
 - b. If there can be a quantitative measure, ask about it, for example how many dead bats did you find and dispose of? Or how many days this week did you harvest guano using full PPE?
 - c. Take a picture or collect the reminder sheets if they will give them to you so that we have any quantitative that is information available.
5. What are your thoughts related to this practice?
Probes to use: Has it been easy? Are the costs incurred manageable? What do others in the HH think?
 - Positive reactions:

- Negative reactions:
- 6. Will you continue with the changes / with the practice? And why or why not?
 - Continue, why?
 - No continue, why?
- 7. If they have not completed the practice: Are you likely to take further steps to do this practice? **Note:** Please note all steps here—for example each piece of PPE that they might be using or using properly
 - Yes, why?
 - No, why?
- 8. Are you likely to recommend this practice to others? Why/why not?
 - Yes, why? How would you convince them to try it (please specify the exact words)?
 - No, why?

CLOSURE:

- Finally, in our first discussion I asked you about your feeling of risk or danger in the work that you do with bats or even living in proximity with bats. After implementing these practices, please tell me how you feel.
- On a scale of 1-10 with 10 being high risk/danger and 1 being the lowest risk /danger: How do you feel about your personal risk?
Explain:
How do you feel about your family's risk/danger?
Explain:
- Is there any one of these practices that shifted your feeling?
- Remind the person of what they have accomplished.
- Thank the person for participating in the trial to improve ways that people can live safely with bats.