# SCAPES - Data Management Plan

SCAPES study team

today

## Contents

# 1 Project data

The SCAPES project requires data from multiple sources. The types of data are listed below.

## 1.1 Anthropogenic landscape data

1. Landcover/land use
    1. Satellite (raw/previously processed)
    2. Drone
2. Crop stages
    1. Satellite
    2. Drone
    3. Crop calendars/Qualitative data
3. Settlement patterns
    1. Satellite (raw/Google structures)
    2. Drone
    3. Transect walks
4. Housing material and structure
    1. Satellite
    2. Drone
    3. Questionnaires (Household)

### 1.1.1 Products

1. Exposure surfaces

## 1.2 Human

1. Rodent contact
    1. Questionnaires (Household/Individual/Movement)
    2. ProxLogs
    3. Trapping
2. Movement
    1. GPS trackers
    2. Daily diaries
    3. Mini-interview
    4. Observation
3. Space use
    1. GPS trackers
    2. Daily diaries
    3. Mini-interview
    4. Observation
4. Livelihood
    1. Questionnaires (Individual)
    2. Qualitative
5. Sociodemographic
    1. Questionnaires (Individual)
        1. Age
        2. Sex
        3. Education
6. Food security
    1. Questionnaires (Household)
    2. Qualitative
7. Rodent impact on stored food
    1. Questionnaires (Household)
    2. Mini-interview
8. LASV serology
    1. Questionnaires (Individual)

### 1.2.1 Products

1. Exposure footprints
2. Risk factors for LASV exposure and seroconversion
3. Social, spatial and environmental correlates of movement pattern and risk behaviour

## 1.3 Rodent

1. Rodent detections
    1. Species richness
    2. Individual abundance/density
    3. Occupancy
2. LASV serology
3. LASV prevalence
4. Rodent contact rates
    1. Proxloggers
5. Rodent movement

### 1.3.1 Products

1. Spatiotemporal host data layers. Spatially explicit predictions of rodent occupancy, density and infection by land use zone

2. Human-rodent overlap in space and time

# 2 Planned project outputs

This section contains the discrete planned outputs and associated questions/aims of each output.

## 2.1 Initial

These are outputs mentioned at the Brighton 2022 meeting. **To add research questions and data needs and output lead**

1. Human Ecology and Infectious Disease - COMPLETED
    - Sagan Friant
    - Aim 1
2. SES application to infectious disease in human-driven landscape. System dynamics map of Lassa Fever
    - Aim 1
3. Human construction of Mastomys niche
    - Aim 1
4. Participatory mapping of human-rodent interfaces and dynamics
    - Aim 1
5. Data free rodent model
    - Aim 1
6. Value of information
    - Aim 1
7. Descriptive rodent ecology and infection across landscapes
    - Aim 1
8. Mixed-method geo-ethnography of human-rodent-environment
    - Aim 1
9. Serosurveys and seroconversion
    - Aim 1
10. Epidemiological risk factors
    - Aim 1
11. Reservoir and disease dynamics in West vs. East Africa
    - Aim 1
12. Human movement and activity space mapping in relation to rodent abundance
    - Aim 1
13. Rodent movement ecology, density and landuse
    - Aim 1
14. Mini-hotspots - Spatially explicit metapopulation models - Humans, reservoir and disease dynamics
    - Aim 2
15. Local/participatory scenarios and interventions
    - Aim 2
16. GOATs
    - Aim 3
17. Regional/National hotspots 2.0
    - Aim 3
18. Human construction of Lassa niche and interventions - broad scale overview (commentary)
19. SCAPES study protocols - In Progress
    - David Simons (outline produced by Dave Redding)

## 2.2 Additional

These are potential additional outputs.

1. Differences in human movement and activities by sub-groups.

- Extension of 8 and 12 above.
- Do individuals in Lassa fever endemic regions have different movement patterns and space-use based on age, sex and socio-economic position?
- Is between village heterogeneity greater than that of different sub-groups within a village?
- What are the implications for LASV risk by age, sex and socio-economic position based on this?
- Data needs:
  - Human movement and space use stratified by sub-group characteristics
  - Land use rasters
  - Activity diaries
  - Mini-interviews
  - Qualitative data
- Project leads: Kate Thompson with David Simons

2. Occupation as an irrelevant risk factor for Lassa fever in endemic settings.
   - Interaction with 10 above.
   - Occupational risk factors are generally accepted for infectious disease risk, doctors ask about them, researchers publish them in table 1. However, in West Africa supplemental sources of income may convey risk that would otherwise not be recorded.
   - What proportion of individuals with a different occupation access farming and forested land for supplementary food or income?
   - How do we suggest that this should change assessment of risk of individuals?
   - What would the implications be for epidemiological and clinical suspicion of acute LASV infection be?
   - Data needs:
     - Human movement and space use stratified by occupation
     - Activity diaries
     - Mini-interviews
     - Individual questionnaires
     - Human serology
     - Case data from published sources
   - Project leads: David Simons
3. Rodent activity and it's association with food insecurity.
   - How prevalent is food insecurity in our study region?
   - Is there any association between the perceived impact of rodent activity on stored food or crops in the field and food insecurity?
   - Is a households food insecurity associated with activity to control rodent populations?
   - Do more food insecure household consume more rodents?
   - What is the evidence and magnitude of rodent-human competition for stored food?
   - Data needs:
     - Questionnaires (measure of food insecurity, rodent presence and rodent consumption)
     - Rodent trapping (in both food secure and insecure households)
   - Project leads: David Simons
4. Rattiness index and perceived rattiness.
   - The rattiness index has been developed to allow indirect estimation of rodent population density/activity in a setting
   - How does this match to the perception of rodent activity?

# 3 Qualitative data

## 3.1 Participatory Rural Assessment

How will data be collected?
What form will this data take?
How/where will it be stored?
What will the data include?

What are the variables/parameters of the data?
How will data be cleaned/processed?
How will the data be anonymised/participants protected? Will data be shared? If so, how?

# 4 Quantitative data

## 4.1 Community questionnaires

Questionnaires have been designed as XLSForms and are implemented using the Kobo platform. Data is collected on local devices and sent to the KoboToolbox server (https://kf.kobotoolbox.org/) for the SCAPES project. Access can be provided for data entry, modification and download. An unprocessed data set can be downloaded directly from the KoboToolbox server.

Alternatively, a project has been created to pull the data and format it using R.

### 4.1.1 R Repository for data processing

The `robotoolbox` R package is used to download the data locally through the Kobo API. This approach uses the `dm` R package to handle the grouped repeats in the questionnaire and the `haven` R package to handle variable structure (e.g., labelled factors).

Within the `dm` structure repeats within the questionnaire form unique rows in a linked dataframe.

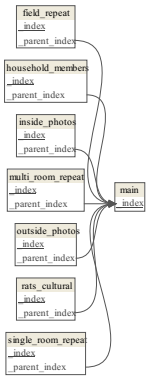
```
library(here)
library(dm)
library(dplyr)
library(readr)

dm <- read_rds(here("household_questionnaire", "data", "h_data", "h_data_dm_2024-04-30.rds"))

knitr::kable(tibble(`Table names` = names(dm),
                    `Number of records` = sapply(dm, function(x) nrow(x)),
                    `Links to households` = sapply(dm, function(x)
                      length(unique(x$`_parent_index`)))))
```

| Table names | Number of records | Links to households |
|---|---|---|
| main | 330 | 0 |
| household_members | 2107 | 329 |
| single_room_repeat | 842 | 283 |
| field_repeat | 866 | 330 |
| rats_cultural | 35 | 34 |
| inside_photos | 563 | 324 |
| outside_photos | 492 | 326 |
| multi_room_repeat | 279 | 217 |

```
dm_draw(dm)
```




Within questionnaires these repeats may be conditional and so each main questionnaire may be associated with none or many indexed repeats.

### 4.1.2 Household questionnaire:

**4.1.2.1 Metadata and household size.** The first section of the household questionnaire records the date, time and location of the completed questionnaire. The number of individuals within the household is recorded here.

**Variable Name:** `start`
**Description:** Formatted datetime when the questionnaire entry was created.
**Type of Data:** Datetime

---

**Variable Name:** `end`
**Description:** Formatted datetime when the questionnaire date entry was completed. This may not equate to the length of data collection as data may be added later (e.g., images).
**Type of Data:** Datetime

---

**Variable Name:** `date`
**Description:** Likely not needed but was used for internal questionnaire logic. Similar to end in that it records the date of the most recent data entry in the form.
**Type of Data:** Date
**Format:** %Y_%m_%d

---

**Variable Name:** `interviewer_id`
**Description:** Name of the interviewer who conducted the interview.
**Type of Data:** Factor with labels associated with values.
**Options for Responses:**
- Option 1: Diana (Code: 1)
- Option 2: Helen (Code: 2)
- Option 3: Nzube (Code: 3)
- Option 4: Sunday (Code: 4)
- Option 5: Other (Code: 5)

**Relationships with other variables:** `interviewer_id_other` contains the free-text entry if other is selected.

---

**Variable Name:** `community`
**Description:** Community questionnaire was conducted in.
**Type of Data:** Factor with labels associated with values.
**Options for Responses:**
- Option 1: Dyegh (Akwa Kwasi) (Code: dyegh)
- Option 2: Ikyogbakpev (Akwa Kwasi) (Code: ikyogbakpev)
- Option 3: Zugu (Code: zugu)
- Option 4: Okimbongha (Code: okimbongha)
- Option 5: Ogamanna (Code: ogamanna)
- Option 6: Ofonekom (Code: ofonekom)
- Option 7: Ezeakataka (Code: ezeakataka)
- Option 8: Enyandulogu (Code: enyandulogu)
- Option 9: Offianka (Code: offianka)

---

**Variable Name:** `consent_household`
**Description:** Whether consent for data collection has been provided.
**Type of Data:** Binary
**Options for Responses:**
- Yes (Code: 1)
- No (Code: 0)

---

**Variable Name:** `household_number`
**Description:** Identification number of the household this questionnaire pertains to.
**Type of Data:** Integer
**Validation Rules:** Combined with community to produce a unique identifier for a household. Data validation during processing to ensure each household is uniquely identified.

---

**Variable Name:** `multiple_family_household`
**Description:** Are members from this household all from the same family? See protocol for definitions used for household and family.
**Type of Data:** Integer

---

**Variable Name:** `n_people`
**Description:** The number of individuals currently living within the household. Includes those who come and go on a regular basis or are current students away for school.
**Type of Data:** Integer

**4.1.2.2 Demographics of household members.** This repeat group of questions collects demographic data of all members of the sampled household.

## Repeat Section: Household members demographic will be repeated for each member of the household

**Variable Name:** `sex_person`
**Description:** The sex of the individual.
**Type of Data:** Binary
**Options for Responses:**
- Female (Code: 1)
- Male (Code: 0)

**Variable Name:** `baby`
**Description:** Are they less than 1 year old?
**Type of Data:** Binary (Yes or No)
**Options for Responses:**
- Yes (Code: 1)
- No (Code: 0)

**Variable Name:** `age`
**Description:** The age of the individual, in years. Only asked for those >1 year old.
**Type of Data:** Integer

**Variable Name:** `age_baby`
**Description:** The age of the individual in months. Only asked for those <1 year old.
**Type of Data:** Integer

**Variable Name:** `permanent_transient`
**Question:** In the last year, was this individual regularly resident within this household?
**Type of Data:** Binary (Yes or No)
**Options for Responses:**
- Yes (Code: 1)
- No (Code: 0)

**End of household member repeat**

#### 4.1.2.3 Household structure and associated buildings.

These questions collect information on the structure of the household, whether other households share buildings and the type of buildings used by the sampled.

**Variable Name:** `compound`
**Question:** Is this household within a compound?
**Description:** A compound can be an enclosed area. A compound can also be a clear but defined area.
**Type of Data:** Binary (Yes or No)
**Options for Responses:**
- Yes (Code: 1)
- No (Code: 0)

---

**Variable Name:** `multiple_households`
**Question:** Do any other households live in the same compound?
**Description:** Only asked if the answer to the `compound` question is Yes.
**Type of Data:** Binary (Yes or No)
**Options for Responses:**
- Yes (Code: 1)
- No (Code: 0)

---

**Variable Name:** `n_in_other_households`
**Question:** How many people live in this compound?
**Description:** Not including those that are in the focal household. Only asked if the answer to the `multiple_households` question is Yes.
**Type of Data:** Integer

---

**Variable Name:** `other_household_activities`
**Question:** Which of the following activities occur regularly with these other households?
**Description:** Only asked if the answer to the `multiple_households` question is Yes.
**Type of Data:** Factor with labels associated with values.
**Options for Responses:**
- Option 1: Sleeping (Code: sleeping)
- Option 2: Eating (Code: eating)
- Option 3: Cooking (Code: cooking)
- Option 4: Hunting (Code: hunting)
- Option 5: Farming (Code: farming)
- Option 6: None (Code: none)
- Option 7: Other (Code: other)

---

**Variable Name:** `other_household_activities_specify`
**Description:** Captures other activities which may be conducted with the focal household only if other is selected in `other_household_activities`
**Type of Data:** Free text

---

**Variable Name:** `household_ethnicity_same`
**Question:** Do all members of this household identify as the same ethnicity?
**Type of Data:** Binary (Yes or No)
**Options for Responses:**
- Yes (Code: 1)
- No (Code: 0)

---

**Variable Name:** `household_ethnicity`
**Question:** What ethnicity is the household?
**Description:** Only asked if the answer to the `household_ethnicity_same` question is Yes.
**Type of Data:** Factor with labels associated with values.
**Options for Responses:**
- Option 1: Igbo (Izzi) (Code: igbo_izzi)
- Option 2: Igbo (Other) (Code: igbo_other)
- Option 3: Membe (Code: membe)
- Option 4: Tiv (Code: tiv)
- Option 5: Other (Code: other)

---

**Variable Name:** `other_ethnicity_household`
**Description:** Only asked if the answer to `household_ethnicity` is other
**Type of Data:** Free-text

---

**Variable Name:** `household_religion_same`
**Question:** Do all members of this household share the same religion?
**Type of Data:** Binary (Yes or No)
**Options for Responses:**
- Yes (Code: 1)
- No (Code: 0)

---

**Variable Name:** `household_religion`
**Question:** What religion is the household?
**Description:** Factor with labels associated with values.
**Options for Responses:**
- Option 1: Christian (Code: christian)
- Option 2: Muslim (Code: muslim)
- Option 3: Traditionalist (Code: traditionalist)
- Option 4: Other (Code: other)

---

**Variable Name:** `household_religion_other`
**Description:** Only asked if the answer to `household_religion` is other
**Type of Data:** Free-text

---

**Variable Name:** `n_compound`
**Question:** How many buildings or other structures are there in the compound?
**Description:** This variable represents the count of buildings or other structures within the compound.
**Type of Data:** Integer

---

**Variable Name:** `n_individual_buildings`
**Question:** How many individual buildings does the household use regularly?
**Description:** This variable represents the count of individual buildings regularly used by the household.
**Type of Data:** Integer

---

**Variable Name:** `building_owned`
**Question:** Are these buildings owned by your household?
**Description:** This variable indicates whether the buildings are owned by the household.
**Type of Data:** Factor with labels associated with values.
**Options for Responses:**
- Option 1: Own themselves (Code: own_themselves)
- Option 2: Owned by other members of the family (Code: own_family)
- Option 3: Rented from a non-family member (Code: rented)
- Option 4: Other (Code: other)

---

**Variable Name:** `building_owned_other`
**Description:** This question appears if other is selected in `building_owned`
**Type of Data:** Free-text

---

**Variable Name:** `n_multi_room`
**Question:** How many multi-room buildings does this household regularly use?
**Description:** This variable represents the count of multi-room buildings regularly used by the household.
**Type of Data:** Integer

---

**Variable Name:** `n_single_room`
**Question:** How many single-room buildings does this household regularly use?
**Type of Data:** Integer

**4.1.2.4 Multi-room building repeat.** The following section is repeated for each of the multi-room buildings used by the sampled household. To capture information on each of the rooms within a building this is separated from data collection for single room buildings.

## Repeat Section: Multi-room buildings will be added, one per repeat

**Variable Name:** `building_purpose`
**Question:** What does the household use this building for?
**Description:** For each building used by a household this variable captures information on what purpose it is used for.
**Type of Data:** Character with each option in a string separated by a space
**Options for Responses:**
- Option 1: Sleeping (Code: sleeping)
- Option 2: Food preparation (Code: food_preparation)
- Option 3: Cooking (Code: cooking)
- Option 4: Eating (Code: eating)
- Option 5: Socialising/Parlour (Code: socialising_parlour)
- Option 6: Cooked food storage (Code: food_storage)
- Option 7: Packaged food storage (Noodle, Indomie etc.) (Code: packaged_food_storage)
- Option 8: Crop storage (Garri, Rice, Yam etc.) (Code: crop_storage)
- Option 9: Seed storage (Code: seed_storage)
- Option 10: Animal storage (Chicken, Goat etc.) (Code: animal_storage)
- Option 11: Other storage (Code: other_storage)
- Option 12: Other (Code: other)

---

**Variable Name:** `specify_building_purpose`
**Description:** Only asked if other is selected as one of the options in `building_purpose`
**Type of Data:** Free-text

---

**Variable Name:** `building_location`
**Question:** Where is the building located?
**Type of Data:** Factor with labels associated with values
**Options for Responses:**
- Option 1: Within the compound (Code: compound)
- Option 2: No compound, within the village (Code: no_compound)
- Option 3: Elsewhere in the village, outside of the compound (Code: village)
- Option 4: In the field, outside of the compound (Code: fields)
- Option 5: In a different village (Code: other_village)
- Option 6: In a different town/city (Code: in_town)
- Option 7: Other (Code: other)

---

**Variable Name:** `specify_building_location`
**Description:** Only asked if other is selected as the option in `building_location`
**Type of Data:** Free-text

---

**Variable Name:** `roof_material`
**Question:** What is the roof made of?
**Type of Data:** Character with each option in a string separated by a space
**Options for Responses:**
- Option 1: Mat/thatch (Code: mat_thatch)
- Option 2: Zinc/metal (Code: zinc_metal)
- Option 3: Deck (Code: deck)
- Option 4: None (Code: none)
- Option 5: Other (Code: other)

**Definitions:**

- Roof - refers to external material of the roof
- Deck - . . .

---

**Variable Name:** `roof_other`

**Description:** Only asked if other is selected as the option in `roof_material`
**Type of Data:** Free-text

---

**Variable Name:** `wall_material`
**Question:** What are the walls made of?
**Type of Data:** Character with each option in a string separated by a space
**Options for Responses:**
- Option 1: Mud block (Code: mud_block)
- Option 2: Brick (Code: brick)
- Option 3: Cement blocks (Code: cement_block)
- Option 4: Plaster (Code: plaster)
- Option 5: Wood (Slats, Lumber etc.) (Code: wood)
- Option 6: Trees/Sticks (Code: wood_other)
- Option 7: Other (Code: other)

**Definitions:**

- Mud block - an unfired mud block
- Brick - a fired block
- Plaster - . . .

---

**Variable Name:** `walls_other`
**Description:** Only asked if other is selected as the option in `wall_material`
**Type of Data:** Free-text

---

**Variable Name:** `door_material`
**Question:** What is the door of the main entrance made of?
**Type of Data:** Select one
**Options for Responses:**
- Option 1: Wood (Code: wood)
- Option 2: Metal (Code: metal)
- Option 3: None (Code: none)
- Option 4: Other (Code: other)

---

**Variable Name:** `door_other`
**Description:** Only asked if other is selected as the option in `door_material`
**Type of Data:** Free-text

---

**Variable Name:** `window_material`
**Question:** What are the windows made of?
**Type of Data:** Character with each option in a string separated by a space
**Options for Responses:**
- Option 1: Permanently open (Code: permanently_open)
- Option 2: Permanently closed (Code: permanently_closed)
- Option 3: Wooden shutters (Code: wooden_shutters)
- Option 4: Glass panes (Code: glass)
- Option 5: Mosquito net (Code: screen)
- Option 6: Metal grill/sheet (Code: metal)
- Option 7: No windows (Code: none)
- Option 8: Other (Code: other)

---

**Variable Name:** `specify_window`
**Description:** Only asked if other is selected as the option in `window_material`
**Type of Data:** Free-text

---

**Variable Name:** `ceiling_material`
**Question:** What material is used for the ceiling?
**Type of Data:** Character with each option in a string separated by a space
**Options for Responses:**
- Option 1: Mat/thatch (Code: mat_thatch)
- Option 2: Wood (Code: wood)
- Option 3: Cement (Code: cement)
- Option 4: Synthetic (Code: synthetic)
- Option 5: Sack bag/Carpet/Lino (Code: lining)
- Option 6: No ceiling (Code: no_ceiling)
- Option 7: Other (Code: other)

**Definitions:**

- Sack bag/Carpet/Lino - . . .

---

**Variable Name:** `specify_ceiling`
**Description:** Only asked if other is selected as the option in `ceiling_material`
**Type of Data:** Free-text

---

**Variable Name:** `ceiling_storage`
**Question:** Is there anything stored between the ceiling and the roof?
**Type of Data:** Binary (yes/no)
**Options for Responses:**
- Yes (Code: 1)
- No (Code: 0)

---

**Variable Name:** `storage_items_ceiling`
**Question:** What is stored in this space?
**Type of Data:** Character with each option in a string separated by a space
**Options for Responses:**
- Option 1: Cooked food (Code: cooked_food)
- Option 2: Uncooked food (Code: uncooked_food)
- Option 3: Packaged food (Code: packaged_food)
- Option 4: Crops for sale (Code: crops_for_sale)
- Option 5: Crops for household use (Code: crops_for_household_use)
- Option 6: Seeds for sale (Code: seeds_for_sale)
- Option 7: Seeds for household use (Code: seeds_for_household_use)
- Option 8: Clothing (Code: clothing)
- Option 9: Other (Code: other)

---

**Variable Name:** `ceiling_storage_other`
**Description:** Only asked if other is selected as the option in `storage_items_ceiling`
**Type of Data:** Free-text

---

**Variable Name:** `floor`
**Question:** What is the floor made of?
**Type of Data:** Character with each option in a string separated by a space
**Options for Responses:**
- Option 1: Mud (Code: mud)
- Option 2: Cement (Code: cement)
- Option 3: Tile (Code: tile)
- Option 4: Other (Code: other)

---

**Variable Name:** `internal_door`
**Question:** Are there doors between the rooms in the building?
**Description:** This variable indicates whether there are doors between the rooms in the building.
**Type of Data:** Single-select with binary responses.
**Options for Responses:**
- Yes (Code: 1)
- No (Code: 0)

---

**Variable Name:** `internal_door_fit`
**Question:** Do the doors fit well within the building?
**Description:** This variable indicates whether the doors fit well within the building. i.e., If your finger can fit through any space in the door, or between the door and the frame, it does not fit well.
**Type of Data:** Single-select with binary responses.
**Options for Responses:**
- Yes (Code: 1)
- No (Code: 0)

---

**Variable Name:** `rooms_in_building`
**Question:** How many rooms are there in this building?
**Description:** This variable captures the number of rooms within the same building, including kitchens, bedrooms, storerooms, parlors, etc.
**Type of Data:** Integer

---

**Variable Name:** `n_household_sleep`
**Question:** How many people from this household sleep in this building?
**Description:** This variable indicates the number of people from this household who sleep in this building.

**Type of Data:** Integer

---

**Variable Name:** `sleep_same_room`
**Question:** Does everyone from this household that sleeps in this building sleep in the same room?
**Description:** This variable indicates whether everyone from this household who sleeps in this building sleeps in the same room.
**Type of Data:** Single-select with binary responses.
**Options for Responses:**
- Yes (Code: 1)
- No (Code: 0)

---

**Variable Name:** `n_rooms_household_sleep`
**Question:** How many different rooms do people from this household sleep in?
**Description:** This variable captures the number of different rooms in which people from this household sleep.
**Type of Data:** Integer

---

**Variable Name:** `other_household_sleep`
**Question:** Do members of a different household sleep in this building?
**Description:** This variable indicates whether members of a different household sleep in this building.
**Type of Data:** Single-select with binary responses.
**Options for Responses:**
- Yes (Code: 1)
- No (Code: 0)

---

**Variable Name:** `other_household_sleep_shared`
**Question:** Do members of a different household sleep in the same space/place as members of this household?
**Description:** This variable indicates whether members of a different household sleep in the same space/place as members of this household.
**Type of Data:** Single-select with binary responses.
**Options for Responses:**
- Yes (Code: 1)
- No (Code: 0)

---

**Variable Name:** `n_other_household_sleep_multi`
**Question:** How many members of a different household sleep in this building?
**Description:** This variable captures the number of members of a different household who sleep in this building.
**Type of Data:** Integer

---

**Variable Name:** `rodents_enter_building`
**Question:** Do any rats enter this building?
**Description:** This variable indicates whether any rats are known to enter this building.
**Type of Data:** Single-select with three responses
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Unknown (Code: unknown)

---

**Variable Name:** `rodents_in_building`
**Question:** Do any rats live in this building?
**Description:** This variable indicates whether any rats are known to live in this building.
**Type of Data:** Single-select with three responses
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Unknown (Code: unknown)

---

**Variable Name:** `rodents_in_building_evidence`
**Question:** How do you know rats live here?
**Description:** This variable captures the evidence of rats living in the building.
**Type of Data:** Multi-select
**Options for Responses:**
- Option 1: See live rats (Code: see_live_rats)
- Option 2: See dead rats (Code: see_dead_rats)
- Option 3: See rat urine (Code: see_rat_urine)
- Option 4: See rat faeces (Code: see_rat_faeces)
- Option 5: See rat burrows (Code: see_rat_burrows)

- Option 6: Hear them (Code: hear_them)
- Option 7: Smell them (Code: smell_them)
- Option 8: Direct contact with rats (Code: direct_contact)
- Option 9: Seen the damage they have done to items (Code: item_damage)
- Option 10: Other (Code: other)

---

**Variable Name:** `rodents_in_building_specify`
**Question:** Please specify.
**Description:** This variable allows for specifying other evidence of rats living in the building. Only asked if other is selected in `rodents_in_building_evidence`.
**Type of Data:** Free text

---

**Variable Name:** `rodent_faeces_multi_sleep`
**Question:** Do you ever see the excreta/shit of rats in the places where people sleep?
**Description:** This variable indicates whether rat excreta are observed in sleeping areas.
**Type of Data:** Single-select with three responses (Yes, No, Unknown)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Unknown (Code: unknown)

---

**Variable Name:** `rodent_sleeping_contact_multi`
**Question:** Has anyone been bitten or scratched by a rat while sleeping in this building?
**Description:** This variable indicates whether there has been any contact that could potentially result in direct pathogen transmission with rats while sleeping. Sleeping areas may not be the same thing as bedrooms as individuals may sleep in additional rooms of the building.
**Type of Data:** Single-select with three responses (Yes, No, Unknown)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Unknown (Code: unknown)

---

**Variable Name:** `mastomys_multi`
**Question:** Do you notice a rat called *Mastomys natalensis* (the multimammate rat, or the rat with many offspring) in this building?
**Description:** This variable captures awareness of the presence of *Mastomys natalensis* in the building.
**Type of Data:** Single-select with three responses (Yes, No, Unknown)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Unknown (Code: unknown)

---

**Variable Name:** `mastomys_timing_multi`
**Question:** What time of the day do you see this rat?
**Description:** This variable captures the timing of *Mastomys natalensis* sightings.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Daytime (Code: daytime)
- Option 2: Nighttime (Code: nighttime)
- Option 3: Anytime (Code: anytime)

---

**Variable Name:** `mastomys_season_multi`
**Question:** Which season do you see them in?
**Description:** This variable captures the seasonality of *Mastomys natalensis* sightings.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Dry (Code: dry)
- Option 2: Rainy (Code: rainy)
- Option 3: All seasons (Code: all_seasons)

---

**Variable Name:** `designated_kitchen`
**Question:** Is there a room that is designated as the kitchen in this building?
**Description:** This variable indicates whether there is a room designated as the kitchen in the building. Most kitchen activities occur outside but some preparation may occur within buildings or the kitchen may be attached to the building.
**Type of Data:** Single-select with three responses (Yes, No, Unknown)
**Options for Responses:**

- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Unknown (Code: unknown)

---

**Variable Name:** `sleep_in_kitchen`
**Question:** Do people from this household regularly sleep in the room that is designated as the kitchen?
**Description:** This variable captures whether individuals from the household regularly sleep in the room designated as the kitchen. Only asked if the answer to `designated_kitchen` is Yes.
**Type of Data:** Single-select with three responses (Yes, No, Sometimes)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Sometimes (Code: sometimes)

---

**Variable Name:** `n_sleep_in_kitchen`
**Question:** How many individuals from this household sleep in the kitchen?
**Description:** This variable indicates the number of individuals from the household who regularly sleep in the kitchen. Only asked if the answer to `sleep_in_kitchen` is Yes.
**Type of Data:** Integer

---

**Variable Name:** `rodent_damage_kitchen`
**Question:** Do rats eat or destroy food or ingredients in the kitchen?
**Description:** This variable captures whether rats cause damage to food or ingredients in the kitchen. It considers the damage they do to household items stored within kitchens.
**Type of Data:** Single-select with three responses (Yes, No, Unknown)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Unknown (Code: unknown)

---

**Variable Name:** `rodent_damage_kitchen_items`
**Question:** What do rats eat or destroy in the kitchen?
**Description:** This variable captures the items that rats eat or destroy in the kitchen.
**Type of Data:** Multi-select
**Options for Responses:**
- Option 1: Prepared but uncooked food (Garri, Pounded Yam etc.) (Code: uncooked_food)
- Option 2: Other ingredients for cooking (Spices, Dried Fish etc.) (Code: ingredients)
- Option 3: Cooked food (Code: cooked_food)
- Option 4: Rice for cooking (Code: rice)
- Option 5: Yams for cooking (Code: yam)
- Option 6: Groundnut for cooking (Code: groundnut)
- Option 7: Other crops for cooking (Code: other_crops)

---

**Variable Name:** `specify_other_kitchen_items`
**Question:** Please specify other items that rats eat or destroy in the kitchen.
**Description:** This variable allows for specifying other items that rats may eat or destroy in the kitchen. This question is only asked if other_crops is selected in the `rodent_damage_kitchen_items`.
**Type of Data:** Free-text

---

**Variable Name:** `prepared_food_damage`
**Question:** How much of the prepared food kept in this kitchen is damaged?
**Description:** This variable attempts to quantify the extent of damage to prepared but uncooked food kept in the kitchen by rats. This question is only asked if uncooked_food is selected in the `rodent_damage_kitchen_items`.
**Type of Data:** Single-select with three responses.
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `cooked_food_damage`
**Question:** How much of the cooked food kept in this kitchen is damaged?
**Description:** This variable attempts to quantify the extent of damage to cooked food kept in the kitchen by rats. This question is only asked if cooked_food is selected in the `rodent_damage_kitchen_items`.
**Type of Data:** Single-select with three responses.
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)

- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `rice_damage`
**Question:** How much of the rice kept in this kitchen is damaged?
**Description:** This variable attempts to quantify the extent of damage to rice stored in the kitchen by rats. This question is only asked if rice is selected in the `rodent_damage_kitchen_items`.
**Type of Data:** Single-select with three responses.
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `yam_damage`
**Question:** How much of the yam kept in this kitchen is damaged?
**Description:** This variable attempts to quantify the extent of damage to yams stored in the kitchen by rats. This question is only asked if yam is selected in the `rodent_damage_kitchen_items`.
**Type of Data:** Single-select with three responses.
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `groundnut_damage`
**Question:** How much of the groundnut kept in this kitchen is damaged?
**Description:** This variable attempts to quantify the extent of damage to groundnut stored in the kitchen by rats. This question is only asked if groundnut is selected in the `rodent_damage_kitchen_items`.
**Type of Data:** Single-select with three responses.
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `ingredients_damage`
**Question:** How much of the other ingredients kept in this kitchen is damaged?
**Description:** This variable attempts to quantify the extent of damage to other crops stored in the kitchen by rats. This question is only asked if other_crops is selected in the `rodent_damage_kitchen_items`.
**Type of Data:** Single-select with three responses.
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

We do not collect information on the quantity of other ingredients that may be stored being damaged by rodents.

---

**Variable Name:** `designated_store`
**Question:** Is there a room that is designated to store food, crops, or seed in this building?
**Description:** This variable indicates whether there is a room designated to store food, crops, or seed in the building.
**Type of Data:** Single-select with three responses (Yes, No, Sometimes)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Sometimes (Code: sometimes)

---

**Variable Name:** `cooked_food_in_store`
**Question:** Do you ever store cooked food in this same store room?
**Description:** This variable captures whether cooked food is stored in the same store room designated for food, crops, or seeds. Only asked if 'Yes' is selected in `designated_store`.
**Type of Data:** Single-select with three responses (Yes, No, Sometimes)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Sometimes (Code: sometimes)

---

**Variable Name:** `sleep_in_store`
**Question:** Do people sleep in the room that is designated as storage for food, crops, or seeds?

**Description:** This variable indicates whether people sleep in the room designated as storage for food, crops, or seeds. Only asked if 'Yes' is selected in `designated_store`.
**Type of Data:** Single-select with three responses (Yes, No, Sometimes)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Sometimes (Code: sometimes)

---

**Variable Name:** `n_sleep_in_store`
**Question:** How many individuals from this household sleep in the storeroom(s)?
**Description:** This variable indicates the number of individuals from this household who sleep in the storeroom(s). Only asked if 'Yes' is selected in `designated_store` and 'Yes' is selected in `sleep_in_store`.
**Type of Data:** Integer

---

**Variable Name:** `rodent_damage_store`
**Question:** Do rats eat or destroy food or harvested crops in the storeroom?
**Description:** This variable captures whether rats eat or destroy food or harvested crops in the storeroom. Harvested crops include everything that you grow yourself.
**Type of Data:** Single-select with three responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `rodent_damage_store_items`
**Question:** What do rats eat or destroy in this storeroom?
**Description:** This variable captures what rats eat or destroy in the storeroom. Only asked if 'Yes' is selected in `rodent_damage_store`.
**Type of Data:** Multi-select
**Options for Responses:**
- Option 1: Cooked food (Code: cooked_food)
- Option 2: Ingredients for cooking (Code: ingredients)
- Option 3: Packaged food (Code: packaged_food)
- Option 4: Harvested crops for household use (Code: harvested_crops_use)
- Option 5: Harvested crops for sale (Code: harvested_crops_sale)
- Option 6: Seed stock for household use (Code: seed_use)
- Option 7: Seed stock for sale (Code: seed_sale)
- Option 8: Other items (Code: other)

---

**Variable Name:** `specify_other_store`
**Question:** Specify other items
**Description:** This variable allows specifying other items that rats eat or destroy in the storeroom. Only asked if 'Other items' is selected in `rodent_damage_store_items`.
**Type of Data:** Free text

---

**Variable Name:** `cooked_food_damage_store`
**Question:** How much of the cooked food kept in this storeroom is damaged?
**Description:** This variable indicates the extent of damage to the cooked food kept in the storeroom. Only asked if 'Cooked food' is selected in `rodent_damage_store_items`.
**Type of Data:** Single-select with three responses (A bit (<25%), A lot (25-75%), Most (>75%))
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `ingredients_damage_store`
**Question:** How much of the ingredients for cooking are damaged?
**Description:** This variable indicates the extent of damage to the ingredients for cooking kept in the storeroom. Only asked if 'Ingredients for cooking' is selected in `rodent_damage_store_items`.
**Type of Data:** Single-select with three responses (A bit (<25%), A lot (25-75%), Most (>75%))
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `uncooked_food_damage_store`
**Question:** How much of the uncooked food kept in this storeroom is damaged?

**Description:** This variable indicates the extent of damage to the uncooked food kept in the storeroom. Only asked if 'Prepared but uncooked food' is selected in `rodent_damage_store_items`.
**Type of Data:** Single-select with three responses (A bit (<25%), A lot (25-75%), Most (>75%))
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `packaged_food_damage_store`
**Question:** How much of the packaged food kept in this storeroom is damaged?
**Description:** This variable indicates the extent of damage to the packaged food kept in the storeroom. Only asked if 'Packaged food' is selected in `rodent_damage_store_items`.
**Type of Data:** Single-select with three responses (A bit (<25%), A lot (25-75%), Most (>75%))
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `crops_use_damage_store`
**Question:** How much of the crops for household use is damaged?
**Description:** This variable indicates the extent of damage to the crops for household use kept in the storeroom. Only asked if 'Harvested crops for household use' is selected in `rodent_damage_store_items`.
**Type of Data:** Single-select with three responses (A bit (<25%), A lot (25-75%), Most (>75%))
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `crops_sale_damage_store`
**Question:** How much of the crops for sale is damaged?
**Description:** This variable indicates the extent of damage to the crops for sale kept in the storeroom. Only asked if 'Harvested crops for sale' is selected in `rodent_damage_store_items`.
**Type of Data:** Single-select with three responses (A bit (<25%), A lot (25-75%), Most (>75%))
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `seed_use_damage_store`
**Question:** How much of the seed for household use is damaged?
**Description:** This variable indicates the extent of damage to the seed for household use kept in the storeroom. Only asked if 'Seed stock for household use' is selected in `rodent_damage_store_items`.
**Type of Data:** Single-select with three responses (A bit (<25%), A lot (25-75%), Most (>75%))
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `seed_sale_damage_store`
**Question:** How much of the seed for sale is damaged?
**Description:** This variable indicates the extent of damage to the seed for sale kept in the storeroom. Only asked if 'Seed stock for sale' is selected in `rodent_damage_store_items`.
**Type of Data:** Single-select with three responses (A bit (<25%), A lot (25-75%), Most (>75%))
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `other_items_damage_store`
**Question:** How much of the other items is damaged?
**Description:** This variable indicates the extent of damage to other items kept in the storeroom. Only asked if 'Other items' is selected in `rodent_damage_store_items`.
**Type of Data:** Single-select with three responses (A bit (<25%), A lot (25-75%), Most (>75%))
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)

- Option 3: Most (>75%) (Code: most_75)

**End of multiple room building repeat**

#### 4.1.2.5 Single room building information.

The following section collects information on the number and type of single room buildings this household uses.

**Variable Name:** `building_name`
**Question:** What buildings does this household have?
**Description:** This variable captures the single room buildings present in the household.
**Type of Data:** Multi-select
**Options for Responses:**
- Option 1: Room or bedroom (Code: bedroom)
- Option 2: Parlour (Code: parlour)
- Option 3: Kitchen (Code: kitchen)
- Option 4: Store (Code: store)
- Option 5: Farm shed (Code: farm_shed)
- Option 6: Hunting shed (Code: hunting_shed)
- Option 7: Animal shed (Code: animal_shed)
- Option 8: Other (Code: other)

---

**Variable Name:** `building_name_other`
**Question:** Specify other building name
**Description:** This variable allows specifying other building names if 'Other' is selected in `building_name`.
**Type of Data:** Free text

---

**Variable Name:** `n_room`
**Question:** How many buildings are used as rooms/bedrooms?
**Description:** This variable indicates the number of buildings used as rooms or bedrooms. Only asked if 'Room or bedroom' is selected in `building_name`.
**Type of Data:** Integer

---

**Variable Name:** `same_construction_room`
**Question:** Is the construction the same for each of these?
**Description:** This variable captures whether the construction is the same for each building used as a room or bedroom. Only asked if there are multiple buildings used as rooms or bedrooms.
**Type of Data:** Single-select with two responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `n_parlour`
**Question:** How many buildings are used as a parlour?
**Description:** This variable indicates the number of buildings used as a parlour. Only asked if 'Parlour' is selected in `building_name`.
**Type of Data:** Integer

---

**Variable Name:** `same_construction_parlour`
**Question:** Is the construction the same for each of these?
**Description:** This variable captures whether the construction is the same for each building used as a parlour. Only asked if there are multiple buildings used as parlours.
**Type of Data:** Single-select with two responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `n_kitchen`
**Question:** How many buildings are used as kitchens?
**Description:** This variable indicates the number of buildings used as kitchens. Only asked if 'Kitchen' is selected in `building_name`.
**Type of Data:** Integer

---

**Variable Name:** `same_construction_kitchen`
**Question:** Is the construction the same for each of these?
**Description:** This variable captures whether the construction is the same for each building used as a kitchen. Only asked if there are multiple buildings used as kitchens.
**Type of Data:** Single-select with two responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `n_store`
**Question:** How many buildings are used only as store rooms?
**Description:** This variable indicates the number of buildings used only as store rooms. Only asked if 'Store' is selected in `building_name`.
**Type of Data:** Integer

---

**Variable Name:** `same_construction_store`
**Question:** Is the construction the same for each of these?
**Description:** This variable captures whether the construction is the same for each building used only as a store room. Only asked if there are multiple buildings used only as store rooms.
**Type of Data:** Single-select with two responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `building_ownership`
**Question:** Ownership status of the building
**Description:** This variable indicates the ownership status of the building.
**Type of Data:** Single-select with four responses
**Options for Responses:**
- Option 1: Own themselves (Code: own_themselves)
- Option 2: Another family member owns it (Code: own_family)
- Option 3: Rented from a different household and different family (Code: rented)
- Option 4: Other (Code: other)

---

**Variable Name:** `n_farm_shed`
**Question:** How many farm sheds are there?
**Description:** This variable indicates the number of farm sheds. Only asked if 'Farm shed' is selected in `building_name`.
**Type of Data:** Integer

---

**Variable Name:** `same_construction_farm`
**Question:** Is the construction the same for each of these?
**Description:** This variable captures whether the construction is the same for each farm shed. Only asked if there are multiple farm sheds.
**Type of Data:** Single-select with two responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `n_hunting_shed`
**Question:** How many hunting sheds are there?
**Description:** This variable indicates the number of hunting sheds. Only asked if 'Hunting shed' is selected in `building_name`.
**Type of Data:** Integer

---

**Variable Name:** `same_construction_hunting`
**Question:** Is the construction the same for each of these?
**Description:** This variable captures whether the construction is the same for each hunting shed. Only asked if there are multiple hunting sheds.
**Type of Data:** Single-select with two responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `n_animal_shed`
**Question:** How many animal sheds are there?
**Description:** This variable indicates the number of animal sheds. Only asked if 'Animal shed' is selected in `building_name`.
**Type of Data:** Integer

---

**Variable Name:** `same_construction_animal`
**Question:** Is the construction the same for each of these?
**Description:** This variable captures whether the construction is the same for each animal shed. Only asked if there are multiple animal sheds.
**Type of Data:** Single-select with two responses (Yes, No)
**Options for Responses:**

- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

#### 4.1.2.6 Single room building repeat.

This repeating group collects information on the structure and use of single room buildings.

---

---

## Repeat Section: Single room buildings will be added, one per repeat

---

**Variable Name:** `building_purpose_single`
**Question:** Building purpose
**Description:** This variable captures the purpose of the single room building. Select all appropriate activities.
**Type of Data:** Multi-select
**Options for Responses:**
- Option 1: Sleeping (Code: sleeping)
- Option 2: Food preparation (Code: food_preparation)
- Option 3: Cooking (Code: cooking)
- Option 4: Eating (Code: eating)
- Option 5: Socialising/Parlour (Code: socialising_parlour)
- Option 6: Cooked food storage (Code: cooked_food_storage)
- Option 7: Packaged food storage (Noodle, Indomie etc.) (Code: packaged_food_storage)
- Option 8: Crop storage (Garri, Rice, Yam etc.) (Code: crop_storage)
- Option 9: Seed storage (Code: seed_storage)
- Option 10: Animal storage (Chicken, Goat etc.) (Code: animal_storage)
- Option 11: Other storage (Code: other_storage)
- Option 12: Other (Code: other)

---

**Variable Name:** `specify_building_purpose_single`
**Question:** Specify other
**Description:** This variable allows for specifying other purposes of the single room building. Only asked if Other is selected in `building_purpose_single`.
**Type of Data:** Free text

---

**Variable Name:** `building_location_single`
**Question:** Where is this building located?
**Description:** This variable indicates the location of the single room building.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Within the compound (Code: compound)
- Option 2: No compound, within the village (Code: no_compound)
- Option 3: Elsewhere in the village, outside of the compound (Code: village)
- Option 4: In the fields, outside of the compound (Code: fields)
- Option 5: In a different village (Code: other_village)
- Option 6: In a different town/city (Code: in_town)
- Option 7: Other (Code: other)

---

**Variable Name:** `specify_building_location_single`
**Question:** Specify other
**Description:** This variable allows for specifying other locations of the single room building. Only asked if Other is selected in `building_location_single`.
**Type of Data:** Free text

---

**Variable Name:** `building_type_single`
**Question:** What type of building is this?
**Description:** This variable indicates the type of the single room building.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Multi room building (Code: multi_room_building)
- Option 2: Single room building (square) (Code: single_room_building_square)
- Option 3: Single room building (circular) (Code: single_room_building_circular)
- Option 4: Single room building (rounded corners) (Code: single_room_building_rounded)
- Option 5: Other (Code: other)

---

**Variable Name:** `specify_other_building`

**Question:** Specify other type of building
**Description:** This variable allows for specifying other types of the single room building. Only asked if Other is selected in `building_type_single`.
**Type of Data:** Free text

---

**Variable Name:** `animal_structure`
**Question:** Is there a structure to house animals attached to this building?
**Description:** This variable indicates whether there is a structure to house animals attached to the single room building.
**Type of Data:** Single-select with three responses (Yes, No, Unknown)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Unknown (Code: unknown)

---

**Variable Name:** `animals_in_structure`
**Question:** What animals are kept in this structure?
**Description:** This variable captures the animals kept in the structure attached to the single room building. Only asked if 'Yes' is selected in `animal_structure`.
**Type of Data:** Multi-select
**Options for Responses:**
- Option 1: Chicken (Code: chicken)
- Option 2: Goat/Sheep (Code: goat)
- Option 3: Cow (Code: cow)
- Option 4: Pig (Code: pig)
- Option 5: Duck/Fowl (Code: duck)
- Option 6: Other (Code: other)

---

**Variable Name:** `roof_material`
**Question:** What is the roof made of?
**Description:** This variable indicates the material used for the roof of the single room building.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Mat/thatch (Code: mat_thatch)
- Option 2: Zinc/metal (Code: zinc_metal)
- Option 3: Deck (Code: deck)
- Option 4: None (Code: none)
- Option 5: Other (Code: other)

---

**Variable Name:** `roof_other_single`
**Question:** Specify roof type
**Description:** This variable allows for specifying other roof types if 'Other' is selected in `roof_material`.
**Type of Data:** Free text

---

**Variable Name:** `wall_material`
**Question:** What are the walls made of?
**Description:** This variable captures the materials used for the walls of the single room building.
**Type of Data:** Multi-select
**Options for Responses:**
- Option 1: Mud block (Code: mud_block)
- Option 2: Brick (Code: brick)
- Option 3: Cement blocks (Code: cement_block)
- Option 4: Plaster (Code: plaster)
- Option 5: Wood (Slats, Lumber etc.) (Code: wood)
- Option 6: Trees/Sticks (Code: wood_other)
- Option 7: Other (Code: other)

---

**Variable Name:** `walls_other_single`
**Question:** Specify walls type
**Description:** This variable allows for specifying other wall types if 'Other' is selected in `wall_material`.
**Type of Data:** Free text

---

**Variable Name:** `door_material`
**Question:** What is the door of the main entrance made of?
**Description:** This variable indicates the material used for the door of the main entrance of the single room building.
**Type of Data:** Single-select
**Options for Responses:**

- Option 1: Wood (Code: wood)
- Option 2: Metal (Code: metal)
- Option 3: None (Code: none)
- Option 4: Other (Code: other)

---

**Variable Name:** `door_other_single`
**Question:** Specify door material
**Description:** This variable allows for specifying other door materials if 'Other' is selected in `door_material`.
**Type of Data:** Free text

---

**Variable Name:** `window_material`
**Question:** What are the windows made of?
**Description:** This variable captures the materials used for the windows of the single room building.
**Type of Data:** Multi-select
**Options for Responses:**
- Option 1: Permanently open (Code: permanently_open)
- Option 2: Permanently closed (Code: permanently_closed)
- Option 3: Wooden shutters (Code: wooden_shutters)
- Option 4: Glass panes (Code: glass)
- Option 5: Mosquito net (Code: screen)
- Option 6: Metal grill/sheet (Code: metal)
- Option 7: No windows (Code: none)
- Option 8: Other (Code: other)

---

**Variable Name:** `specify_window_single`
**Question:** Specify other
**Description:** This variable allows for specifying other window materials if 'Other' is selected in `window_material`.
**Type of Data:** Free text

---

**Variable Name:** `ceiling_material`
**Question:** What material is used for the ceiling?
**Description:** This variable indicates the material used for the ceiling of the single room building.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Mat/thatch (Code: mat_thatch)
- Option 2: Wood (Code: wood)
- Option 3: Cement (Code: cement)
- Option 4: Synthetic (Code: synthetic)
- Option 5: Sack bag/Carpet/Lino (Code: lining)
- Option 6: No ceiling (Code: no_ceiling)
- Option 7: Other (Code: other)

---

**Variable Name:** `specify_ceiling_single`
**Question:** Specify other
**Description:** This variable allows for specifying other ceiling materials if 'Other' is selected in `ceiling_material`.
**Type of Data:** Free text

---

**Variable Name:** `ceiling_storage_single`
**Question:** Is there anything stored between the ceiling and the roof?
**Description:** This variable indicates whether there is anything stored between the ceiling and the roof of the single room building.
**Type of Data:** Single-select with three responses (Yes, No, Unknown)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Unknown (Code: unknown)

---

**Variable Name:** `storage_items_ceiling_single`
**Question:** What is stored in this space?
**Description:** This variable captures the items stored between the ceiling and the roof of the single room building. Multiple options can be selected, and it is only asked if 'Yes' is selected in `ceiling_storage_single`.
**Type of Data:** Multi-select
**Options for Responses:**
- Option 1: Cooked food (Code: cooked_food)
- Option 2: Uncooked food (Code: uncooked_food)
- Option 3: Packaged food (Code: packaged_food)

- Option 4: Crops for sale (Code: crops_for_sale)
- Option 5: Crops for household use (Code: crops_for_household_use)
- Option 6: Seeds for sale (Code: seeds_for_sale)
- Option 7: Seeds for household use (Code: seeds_for_household_use)
- Option 8: Clothing (Code: clothing)
- Option 9: Other (Code: other)

---

**Variable Name:** `ceiling_storage_other_single`
**Question:** What other items are stored in the roof storage space?
**Description:** Enter items, using a comma (,) to separate items. This question is asked only if 'Other' is selected in `ceiling_storage_single`.
**Type of Data:** Free-text

---

**Variable Name:** `floor_material`
**Question:** What is the floor made of?
**Description:** This variable captures the material of the floor. It is asked as a multiple-choice question.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Mud (Code: mud)
- Option 2: Cement (Code: cement)
- Option 3: Tile (Code: tile)
- Option 4: Other (Code: other)

---

**Variable Name:** `specify_floor_other_single`
**Question:** Specify the floor material
**Description:** This variable captures additional details about the floor material. It is asked only if 'Other' is selected in `floor_material`.
**Type of Data:** Free-text

---

**Variable Name:** `n_household_sleep_single`
**Question:** How many people from this household sleep in this building?
**Description:** This variable captures the number of people from this household who sleep in this building.
**Type of Data:** Integer

---

**Variable Name:** `other_household_sleep_single`
**Question:** Do members of a different household sleep in this building?
**Description:** This variable captures whether members of a different household sleep in this building. It is asked only if 'Sleeping' is selected in `building_purpose_single`.
**Type of Data:** Single-select with three responses (Yes, No, Sometimes)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Sometimes (Code: sometimes)

---

**Variable Name:** `other_household_sleep_shared_single`
**Question:** Do members of a different household sleep in the same space/place as members of this household?
**Description:** This variable captures whether members of a different household sleep in the same space/place as members of this household. It is asked only if 'Yes' is selected in `other_household_sleep_single`.
**Type of Data:** Single-select with two responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `n_other_household_sleep_single`
**Question:** How many members of a different household sleep in this building?
**Description:** This variable captures the number of members of a different household who sleep in this building. It is asked only if 'Yes' is selected in `other_household_sleep_single`.
**Type of Data:** Integer

---

**Variable Name:** `rodents_enter_building_single`
**Question:** Do any rats enter this building?
**Description:** This variable captures whether rats are known to enter the building.
**Type of Data:** Single-select with three responses (Yes, No, Unknown)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

- Option 3: Don't know (Code: unknown)

---

**Variable Name:** `rodents_in_building_single`
**Question:** Do any rats live in this building?
**Description:** This variable captures whether rats are known to live in the building.
**Type of Data:** Single-select with three responses (Yes, No, Unknown)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Don't know (Code: unknown)

---

**Variable Name:** `rodents_in_building_evidence_single`
**Question:** How do you know rats live here?
**Description:** This variable captures the evidence of rats living in the building. It is asked only if 'Yes' is selected in `rodents_in_building_single`.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: See live rats (Code: see_live_rats)
- Option 2: See dead rats (Code: see_dead_rats)
- Option 3: See rat urine (Code: see_rat_urine)
- Option 4: See rat faeces (Code: see_rat_faeces)
- Option 5: See rat burrows (Code: see_rat_burrows)
- Option 6: Hear them (Code: hear_them)
- Option 7: Smell them (Code: smell_them)
- Option 8: Direct contact with rats (Code: direct_contact)
- Option 9: Seen the damage they have done to items (Code: item_damage)
- Option 10: Other (Code: other)

---

**Variable Name:** `mastomys_single`
**Question:** Do you notice a rat called Mastomys natalensis (the multimammate rat, or the rat with many offspring) in this building?
**Description:** This variable captures whether you notice a specific type of rat in the building. It is asked if rats enter or live in the building.
**Type of Data:** Single-select with three responses (Yes, No, Unknown)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Don't know (Code: unknown)

---

**Variable Name:** `mastomys_timing_single`
**Question:** What time of the day do you see this rat?
**Description:** This variable captures the time of the day when you see the specific type of rat. It is asked only if 'Yes' is selected in `mastomys_single`.
**Type of Data:** Single-select with three responses (Daytime, Nighttime, Anytime)
**Options for Responses:**
- Option 1: Daytime (Code: daytime)
- Option 2: Nighttime (Code: nighttime)
- Option 3: Anytime (Code: anytime)

---

**Variable Name:** `mastomys_season_single`
**Question:** Which season do you see them in?
**Description:** This variable captures the season when you see the specific type of rat. It is asked only if 'Yes' is selected in `mastomys_single`.
**Type of Data:** Single-select with three responses (Dry, Rainy, All seasons)
**Options for Responses:**
- Option 1: Dry (Code: dry)
- Option 2: Rainy (Code: rainy)
- Option 3: All seasons (Code: all_seasons)

---

**Variable Name:** `sleep_in_kitchen_single`
**Question:** How many members of this household sleep in the kitchen?
**Description:** This variable captures the number of household members sleeping in the kitchen.
**Type of Data:** Single-select with two responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `food_inside_single`
**Question:** Are ingredients or crops stored in this kitchen?
**Description:** This variable indicates whether ingredients or crops are stored in the kitchen.
**Type of Data:** Single-select with two responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `cooked_inside_single`
**Question:** Is cooked food stored in this building?
**Description:** This variable indicates whether cooked food is stored in the building.
**Type of Data:** Single-select with two responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `rodent_damage_kitchen_single`
**Question:** Do rats eat or destroy food or crops in the kitchen?
**Description:** This variable indicates whether rats eat or destroy food or crops in the kitchen.
**Type of Data:** Single-select with three responses (Yes, No, Unknown)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Unknown (Code: unknown)

---

**Variable Name:** `rodent_damage_kitchen_items_single`
**Question:** What do rats eat or destroy in the kitchen?
**Description:** This variable captures what rats eat or destroy in the kitchen. It is asked only if 'Yes' is selected in `rodent_damage_kitchen_single`.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Prepared but uncooked food (Garri, Pounded Yam etc.) (Code: uncooked_food)
- Option 2: Other ingredients for cooking (Spices, Dried Fish etc.) (Code: ingredients)
- Option 3: Cooked food (Code: cooked_food)
- Option 4: Rice for cooking (Code: rice)
- Option 5: Yams for cooking (Code: yam)
- Option 6: Groundnut for cooking (Code: groundnut)
- Option 7: Other crops for cooking (Code: other_crops)

---

**Variable Name:** `specify_other_kitchen_items_single`
**Question:** Specify other
**Description:** This variable allows specifying other items if selected in `rodent_damage_kitchen_items_single`.
**Type of Data:** Free-text

---

**Variable Name:** `ingredients_food_damage_single`
**Question:** How much of the ingredients for food is damaged?
**Description:** This variable captures the extent of damage to the ingredients for food, if any.
**Type of Data:** Single-select with three responses (A bit (<25%), A lot (25-75%), Most (>75%))
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `cooked_food_damage_single`
**Question:** How much of the cooked food is damaged?
**Description:** This variable captures the extent of damage to the cooked food, if any.
**Type of Data:** Single-select with three responses (A bit (<25%), A lot (25-75%), Most (>75%))
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `rice_damage_single`
**Question:** How much of the rice is damaged?
**Description:** This variable captures the extent of damage to the rice, if any.
**Type of Data:** Single-select with three responses (A bit (<25%), A lot (25-75%), Most (>75%))

**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `yam_damage_single`
**Question:** How much of the yam is damaged?
**Description:** This variable captures the extent of damage to the yam, if any.
**Type of Data:** Single-select with three responses (A bit (<25%), A lot (25-75%), Most (>75%))
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `sleep_in_store_single`
**Question:** Do any members of this household sleep in the storeroom?
**Description:** This variable indicates whether any members of the household sleep in the storeroom.
**Type of Data:** Single-select with three responses (Yes, No, Sometimes)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Sometimes (Code: sometimes)

---

**Variable Name:** `n_sleep_in_store_single`
**Question:** How many individuals from this household sleep in the storeroom(s)?
**Description:** This variable captures the number of individuals from the household who sleep in the storeroom(s). It is asked only if 'Yes' is selected in `sleep_in_store_single`.
**Type of Data:** Integer

---

**Variable Name:** `cooked_food_in_store_single`
**Question:** Do you ever store cooked food in this same store room?
**Description:** This variable indicates whether cooked food is stored in the same storeroom.
**Type of Data:** Single-select with two responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `stored_inside_single`
**Question:** Are any of the following stored in this building?
**Description:** This variable captures items stored in the building.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Cooked food (Code: cooked_food)
- Option 2: Ingredients for cooking (Code: ingredients)
- Option 3: Packaged food (Code: packaged_food)
- Option 4: Harvested crops for household use (Code: harvested_crops_use)
- Option 5: Harvested crops for sale (Code: harvested_crops_sale)
- Option 6: Seed stock for household use (Code: seed_use)
- Option 7: Seed stock for sale (Code: seed_sale)
- Option 8: Other items (Code: other)

---

**Variable Name:** `other_stored_single`
**Question:** Specify other items
**Description:** This variable allows respondents to specify other items stored in the building. Only asked if Other items is selected in `stored_inside_single`.
**Type of Data:** Free-text

---

**Variable Name:** `crops_stored_single`
**Question:** What types of crops?
**Description:** This variable captures the types of crops stored in the building.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Rice (Code: rice)
- Option 2: Maize/Corn (Code: maize_corn)
- Option 3: Cassava (Code: cassava)
- Option 4: Yams (Code: yam)

- Option 5: Fruit (Code: fruit)
- Option 6: Other (Code: other)

---

**Variable Name:** `crops_stored_single_other`
**Question:** Specify other crops
**Description:** This variable allows respondents to specify other types of crops stored in the building. Only asked if Other is selected in `crops_stored_single`.
**Type of Data:** Free-text

---

**Variable Name:** `seed_stored_inside_single`
**Question:** What types of seeds?
**Description:** This variable captures the types of seeds stored in the building.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Rice (Code: rice)
- Option 2: Maize/Corn (Code: maize_corn)
- Option 3: Cassava (Code: cassava)
- Option 4: Other (Code: other)

---

**Variable Name:** `seed_stored_inside_other`
**Question:** Specify other seeds
**Description:** This variable allows respondents to specify other types of seeds stored in the building. Only asked if Other is selected in `seed_stored_inside_single`.
**Type of Data:** Free-text

---

**Variable Name:** `rodent_damage_store_single`
**Question:** Do rats eat or destroy food or crops in the store?
**Description:** This variable indicates whether rats cause damage to food or crops stored in the building.
**Type of Data:** Single-select with three responses (Yes, No, Unknown)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Unknown (Code: unknown)

---

**Variable Name:** `rodent_damage_store_items_single`
**Question:** What do rats eat or destroy in this storeroom?
**Description:** This variable captures the items that rats eat or destroy in the storeroom.
**Options for Responses:**
- Option 1: Cooked food (Code: cooked_food)
- Option 2: Ingredients for cooking (Code: ingredients)
- Option 3: Packaged food (Code: packaged_food)
- Option 4: Harvested crops for household use (Code: harvested_crops_use)
- Option 5: Harvested crops for sale (Code: harvested_crops_sale)
- Option 6: Seed stock for household use (Code: seed_use)
- Option 7: Seed stock for sale (Code: seed_sale)
- Option 8: Other items (Code: other)

---

**Variable Name:** `cooked_food_damage_store_single`
**Question:** How much of the cooked food is damaged?
**Description:** This variable captures the extent of damage to cooked food caused by rats in the storeroom. This question is only asked if 'Cooked food' is selected in the response to `rodent_damage_store_items_single`.
**Type of Data:** Single-select with three responses (A bit (<25%), A lot (25-75%), Most (>75%))
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `ingredients_damage_store_single`
**Question:** How much of the ingredients for cooking are damaged?
**Description:** This variable captures the extent of damage to ingredients for cooking caused by rats in the storeroom. This question is only asked if 'Ingredients for cooking' is selected in the response to `rodent_damage_store_items_single`.
**Type of Data:** Single-select with three responses (A bit (<25%), A lot (25-75%), Most (>75%))
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)

- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `packaged_food_damage_store_single`
**Question:** How much of the packaged food is damaged?
**Description:** This variable captures the extent of damage to packaged food caused by rats in the storeroom. This question is only asked if 'Packaged food' is selected in the response to `rodent_damage_store_items_single`.
**Type of Data:** Single-select with three responses (A bit (<25%), A lot (25-75%), Most (>75%))
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `crops_use_damage_store_single`
**Question:** How much of the crops for household use is damaged?
**Description:** This variable captures the extent of damage to crops for household use caused by rats in the storeroom. This question is only asked if 'Harvested crops for household use' is selected in the response to `rodent_damage_store_items_single`.
**Type of Data:** Single-select with three responses (A bit (<25%), A lot (25-75%), Most (>75%))
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `crops_sale_damage_store_single`
**Question:** How much of the crops for sale is damaged?
**Description:** This variable captures the extent of damage to crops for sale caused by rats in the storeroom. This question is only asked if 'Harvested crops for sale' is selected in the response to `rodent_damage_store_items_single`.
**Type of Data:** Single-select with three responses (A bit (<25%), A lot (25-75%), Most (>75%))
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `seed_use_damage_store_single`
**Question:** How much of the seed for household use is damaged?
**Description:** This variable captures the extent of damage to seed for household use caused by rats in the storeroom. This question is only asked if 'Seed stock for household use' is selected in the response to `rodent_damage_store_items_single`.
**Type of Data:** Single-select with three responses (A bit (<25%), A lot (25-75%), Most (>75%))
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `seed_sale_damage_store_single`
**Question:** How much of the seed for sale is damaged?
**Description:** This variable captures the extent of damage to seed for sale caused by rats in the storeroom. This question is only asked if 'Seed stock for sale' is selected in the response to `rodent_damage_store_items_single`.
**Type of Data:** Single-select with three responses (A bit (<25%), A lot (25-75%), Most (>75%))
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

---

**Variable Name:** `other_items_damage_store_single`
**Question:** How much of the other items is damaged?
**Description:** This variable captures the extent of damage to other items caused by rats in the storeroom. This question is only asked if 'Other items' is selected in the response to `rodent_damage_store_items_single`.
**Type of Data:** Single-select with three responses (A bit (<25%), A lot (25-75%), Most (>75%))
**Options for Responses:**
- Option 1: A bit (<25%) (Code: a_bit_25)
- Option 2: A lot (25-75%) (Code: a_lot_25_75)
- Option 3: Most (>75%) (Code: most_75)

**End of single room building repeat**

---

#### 4.1.2.7 Rodent control.

This section captures household level rodent control and prevention.

**Variable Name:** `rodent_removal_questions`
**Question:** Did the participant mention any awareness of rodents in their building in the above questions?
**Description:** This variable captures whether the participant mentioned any awareness of rodents in their building in the preceding questions.
**Type of Data:** Single-select with three responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `rodent_removal_home`
**Question:** Is there anything you do to remove rats that live in your home?
**Description:** This variable captures whether the participant takes any action to remove rats that live in their home. This question is only asked if the participant mentioned awareness of rodents in their building in the preceding questions.
**Type of Data:** Single-select with three responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `rodent_removal_home_method`
**Question:** How do you do this removal?
**Description:** This variable captures the methods used by the participant to remove rats from their home. This question is only asked if the participant takes action to remove rats that live in their home.
**Type of Data:** Multi-select
**Options for Responses:**
- Option 1: Traps (Code: traps)
- Option 2: Poison (Code: poison)
- Option 3: Gumtrap (Rat bible) (Code: gumtrap)
- Option 4: Sticks (Code: sticks)
- Option 5: Cats (Code: cat)
- Option 6: Dogs (Code: dog)
- Option 7: Other (Code: other)

---

**Variable Name:** `rodent_removal_method_other`
**Question:** Specify other
**Description:** This variable captures other methods used by the participant to remove rats from their home. This question is only asked if 'Other' is selected in the response to `rodent_removal_home_method`.
**Type of Data:** Free-text

---

**Variable Name:** `rodent_remove_use`
**Question:** What do you do with the rats you remove from your home?
**Description:** This variable captures what the participant does with the rats they remove from their home. This question is only asked if the participant takes action to remove rats that live in their home.
**Type of Data:** Multi-select
**Options for Responses:**
- Option 1: Eat them (Code: eat_them)
- Option 2: Sell them (Code: sell_them)
- Option 3: Dispose of them (Code: dispose_them)
- Option 4: Feed them to animals (Code: feed_them_to_animals)
- Option 5: I do not contact the bodies of the rat (Code: no_contact)

---

**Variable Name:** `rodent_remove_other`
**Question:** Specify other
**Description:** This variable captures other methods used by the participant to remove rats from their home. This question is only asked if 'Other' is selected in the response to `rodent_remove_use`.
**Type of Data:** Free-text

---

**Variable Name:** `rodent_mitigation`
**Question:** Is there anything you do to stop rats damaging your items, food, crops, or seeds in this building? Is there anything you do to prevent rats accessing your home?
**Description:** This variable captures whether the participant takes any action to prevent rats from damaging items, food, crops, or seeds in their building, or from accessing their home. This question is only asked if the participant mentioned any awareness of rodents in their building in the preceding questions.
**Type of Data:** Single-select with three responses (Yes, No)
**Options for Responses:**

- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `rodent_mitigation_method`
**Question:** How do you do this?
**Description:** This variable captures the methods used by the participant to mitigate the risk of rats damaging items, food, crops, or seeds in their building, or from accessing their home. This question is only asked if the participant takes action to prevent rats from damaging items, food, crops, or seeds in their building, or from accessing their home.
**Type of Data:** Multi-select
**Options for Responses:**
- Option 1: Store items that rats eat in containers (Code: containers)
- Option 2: Seal holes/burrows (Code: seal_burrows)
- Option 3: Replace wooden doors with metal doors (Code: convert_door)
- Option 4: Make a concrete home (Code: upgrade_structure)
- Option 5: Use cats (Code: cats)
- Option 6: Use dogs (Code: dogs)
- Option 7: None (Code: none)
- Option 8: Other (Code: other)

---

**Variable Name:** `rodent_mitigation_other`
**Question:** Specify other
**Description:** This variable captures other methods used by the participant to mitigate the risk of rats damaging items, food, crops, or seeds in their building, or from accessing their home. This question is only asked if 'Other' is selected in the response to `rodent_mitigation_method`.
**Type of Data:** Free-text

---

**Variable Name:** `rodent_control_buildings`
**Question:** Do you use these approaches in all of the buildings you access?
**Description:** This variable captures whether the participant uses the approaches mentioned above in all of the buildings they access. This question is only asked if the participant takes action to remove rats that live in their home or takes measures to prevent rats from accessing their home.
**Type of Data:** Single-select with three responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `rodent_control_specific`
**Question:** Which buildings do you use these approaches in?
**Description:** This variable captures the specific buildings in which the participant uses the approaches mentioned above. This question is only asked if the participant does not use these approaches in all of the buildings they access.
**Type of Data:** Multi-select
**Options for Responses:**
- Option 1: Sleeping (Code: sleeping)
- Option 2: Food preparation (Code: food_preparation)
- Option 3: Cooking (Code: cooking)
- Option 4: Eating (Code: eating)
- Option 5: Socialising/Parlour (Code: socialising_parlour)
- Option 6: Cooked food storage (Code: food_storage)
- Option 7: Packaged food storage (Noodle, Indomie etc.) (Code: packaged_food_storage)
- Option 8: Crop storage (Garri, Rice, Yam etc.) (Code: crop_storage)
- Option 9: Seed storage (Code: seed_storage)
- Option 10: Animal storage (Chicken, Goat etc.) (Code: animal_storage)
- Option 11: Other storage (Code: other_storage)
- Option 12: Other (Code: other)

---

**Variable Name:** `cats`
**Question:** Do you keep cats in this household?
**Description:** This variable captures whether the participant keeps cats in their household.
**Type of Data:** Single-select with three responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `cats_inside`
**Question:** Do cats ever go into your buildings?
**Description:** This variable captures whether cats ever go into the participant's buildings.

**Type of Data:** Single-select with three responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

#### 4.1.2.8 Other buildings.

This question group captures information on other buildings, such as toilets and hygiene practices within the household.

**Variable Name:** `non_buildings`
**Question:** Do you have any other spaces in your compound which you use to store food and/or crops which are not enclosed buildings? For example yam barns or any other buildings without roofs that have not been described above.
**Description:** This variable captures whether the participant has any other spaces in their compound used for storing food and/or crops that are not enclosed buildings, such as yam barns or other structures without roofs that have not been described above.
**Type of Data:** Single-select with three responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `toilet`
**Question:** What type of toilet do members of this household normally use?
**Description:** This variable captures the type of toilet used by members of the household.
**Type of Data:** Multi-select
**Options for Responses:**
- Option 1: Go to the toilet in the bush/Open defecation (Code: field_defecation)
- Option 2: In a trench or other open system (Code: open_system)
- Option 3: In a pit latrine (Code: pit_latrine)
- Option 4: In a toilet with plumbing (Code: toilet_plumbing)
- Option 5: Other (Code: other)

---

**Variable Name:** `specify_other_toilet`
**Question:** Specify other
**Description:** This variable captures other types of toilets used by members of the household. This question is only asked if 'Other' is selected in the response to `toilet`.
**Type of Data:** Free-text

---

**Variable Name:** `toilet_structure`
**Question:** Is the toilet or bathroom a separate structure?
**Description:** This variable captures whether the toilet or bathroom is a separate structure. This question is only asked if the toilet type includes an enclosed system, a pit latrine, or a toilet with plumbing.
**Type of Data:** Single-select with three responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

**4.1.2.9 Fields used repeat.** The following question and subsequent repeating group captures information on the ownership of fields and current use by the sampled household.

**Variable Name:** `household_fields`
**Question:** Does this household own or manage any fields? Include garden areas as a single field if they are near to each other.
**Description:** This variable captures whether the household owns or manages any fields. This includes garden areas considered as a single field if they are near to each other.
**Type of Data:** Single-select with three responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

## Repeat Section: Data on fields owned or managed by this household

---

**Variable Name:** `field_ownership`
**Question:** Is this a rented field?
**Description:** This variable captures whether the field is rented by the household.
**Type of Data:** Single-select with two responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `field_years`
**Question:** How long, in years, have you rented this field for?
**Description:** This variable captures the duration, in years, for which the field has been rented by the household. This question is only asked if the field is rented.
**Type of Data:** Integer

---

**Variable Name:** `field_shared`
**Question:** At any point in the last 12 months did you hire other people from outside of the household to work in this field?
**Description:** This variable captures whether the household hired people from outside of the household to work in the field during the last 12 months.
**Type of Data:** Single-select with two responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `field_type`
**Question:** What type of field is this?
**Description:** This variable captures the type of field.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Flat field (Code: flat)
- Option 2: Mounded/Heaped/Ridges field (Code: mounded)
- Option 3: Garden (Code: garden)
- Option 4: Wet/Paddy field (swamp field) (Code: wet)
- Option 5: Plantation (Code: plantation)
- Option 6: Orchard (Code: orchard)
- Option 7: Other (Code: other)

---

**Variable Name:** `field_type_specify`
**Question:** Please specify.
**Description:** This variable captures additional details about the type of field. This question is only asked if 'Other' is selected in the response to `field_type`.
**Type of Data:** Free-text

---

**Variable Name:** `field_crop`
**Question:** What do you grow in this field? If multiple crops are grown in the same field select all of the appropriate options.

**Description:** This variable captures the crops grown in the field.
**Type of Data:** Multi-select
**Options for Responses:**
- Option 1: Maize/Corn (Code: maize_corn)
- Option 2: Rice (Code: rice)
- Option 3: Cassava (Code: cassava)
- Option 4: Yam (Code: yam)
- Option 5: Fruit (Code: fruit)
- Option 6: Vegetables (Code: vegetables)
- Option 7: Cacao (Code: cacao)
- Option 8: Peppers (Code: peppers)
- Option 9: Groundnut (Code: groundnut)
- Option 10: Okra (Code: okra)
- Option 11: Bene seeds (Code: bene_seeds)
- Option 12: Beans (Code: beans)
- Option 13: Leafy greens (Code: leafy_greens)
- Option 14: Sweet potato (Code: sweet_potato)
- Option 15: Other (Code: other)

---

**Variable Name:** `field_crop_other`
**Question:** Specify other.
**Description:** This variable captures other crops grown in the field. This question is only asked if 'Other' is selected in the response to `field_crop`.
**Type of Data:** Free-text

---

**Variable Name:** `rat_field`
**Question:** Do you notice rats in this field?
**Description:** This variable captures whether the respondent notices rats in the field.
**Type of Data:** Single-select with two responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `rat_field_evidence`
**Question:** How do you know rats live here?
**Description:** This variable captures the evidence of rats living in the field. Only asked if `rat_field` is answered Yes
**Type of Data:** Multi-select
**Options for Responses:**
- Option 1: See live rats (Code: see_live_rats)
- Option 2: See dead rats (Code: see_dead_rats)
- Option 3: See rat urine (Code: see_rat_urine)
- Option 4: See rat faeces (Code: see_rat_faeces)
- Option 5: See rat burrows (Code: see_rat_burrows)
- Option 6: See the damage they do (Code: see_damage)
- Option 7: Other (Code: other)

---

**Variable Name:** `rat_field_evidence_other`
**Question:** Specify other.
**Description:** This variable captures other evidence of rats living in the field. This question is only asked if 'Other' is selected in the response to `rat_field_evidence`.
**Type of Data:** Free-text

---

**Variable Name:** `mastomys_field`
**Question:** Do you notice a rat called Mastomys natalensis (the multimammate rat, or the rat with many young) in this field?
**Description:** This variable captures whether the respondent notices Mastomys natalensis in the field.
**Type of Data:** Single-select with two responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `mastomys_timing_field`
**Question:** What time of the day do you see this rat?
**Description:** This variable captures the time of day when the respondent sees Mastomys natalensis in the field. This question is only asked if 'Yes' is selected in the response to `mastomys_field`.
**Type of Data:** Single-select

**Options for Responses:**
- Option 1: Daytime (Code: daytime)
- Option 2: Nighttime (Code: nighttime)
- Option 3: Anytime (Code: anytime)

---

**Variable Name:** `mastomys_season_field`
**Question:** Which season do you see them in?
**Description:** This variable captures the season in which the respondent sees Mastomys natalensis in the field. This question is only asked if 'Yes' is selected in the response to `mastomys_field`.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Dry (Code: dry)
- Option 2: Rainy (Code: rainy)
- Option 3: All seasons (Code: all_seasons)

---

**Variable Name:** `predators`
**Question:** What predators do you notice in this field?
**Description:** This variable captures the predators noticed in the field.
**Type of Data:** Multi-select
**Options for Responses:**
- Option 1: Bird of prey/Hawk/Raptor (Code: bop)
- Option 2: Monkeys (Code: monkey)
- Option 3: Feral dog/Wild dog (Code: feral_dog)
- Option 4: Other (Code: other)

---

**Variable Name:** `predation_other`
**Question:** Specify other.
**Description:** This variable captures other predators noticed in the field. This question is only asked if 'Other' is selected in the response to `predators`.
**Type of Data:** Free-text

---

**Variable Name:** `maize_field_damage`
**Question:** How much of the Maize/Corn crop in the field is damaged by rats?
**Description:** This variable captures the extent of damage to the Maize/Corn crop caused by rats. This question is asked if the respondent selects 'Maize/Corn' in the `field_crop` variable.
**Type of Data:** Range (Integer)
**Options for Responses:**
- Range: 1 to 5
- 1: No damage by rodents
- 5: There is nothing left after the rodents have damaged it

---

**Variable Name:** `rice_field_damage`
**Question:** How much of the rice harvest is damaged by rats?
**Description:** This variable captures the extent of damage to the rice harvest caused by rats. This question is asked if the respondent selects 'Rice' in the `field_crop` variable.
**Type of Data:** Range (Integer)
**Options for Responses:**
- Range: 1 to 5
- 1: No damage by rodents
- 5: There is nothing left after the rodents have damaged it

---

**Variable Name:** `cassava_field_damage`
**Question:** How much of the cassava harvest is damaged by rats?
**Description:** This variable captures the extent of damage to the cassava harvest caused by rats. This question is asked if the respondent selects 'Cassava' in the `field_crop` variable.
**Type of Data:** Range (Integer)
**Options for Responses:**
- Range: 1 to 5
- 1: No damage by rodents
- 5: There is nothing left after the rodents have damaged it

---

**Variable Name:** `yam_field_damage`
**Question:** How much of the yam harvest is damaged by rats?
**Description:** This variable captures the extent of damage to the yam harvest caused by rats. This question is asked if the respondent selects 'Yam' in the `field_crop` variable.
**Type of Data:** Range (Integer)

**Options for Responses:**
- Range: 1 to 5
- 1: No damage by rodents
- 5: There is nothing left after the rodents have damaged it

---

**Variable Name:** `fruit_field_damage`
**Question:** How much of the fruit harvest is damaged by rats?
**Description:** This variable captures the extent of damage to the fruit harvest caused by rats. This question is asked if the respondent selects 'Fruit' in the `field_crop` variable.
**Type of Data:** Range (Integer)
**Options for Responses:**
- Range: 1 to 5
- 1: No damage by rodents
- 5: There is nothing left after the rodents have damaged it

---

**Variable Name:** `vegetable_field_damage`
**Question:** How much of the vegetable harvest is damaged by rats?
**Description:** This variable captures the extent of damage to the vegetable harvest caused by rats. This question is asked if the respondent selects 'Vegetables' in the `field_crop` variable.
**Type of Data:** Range (Integer)
**Options for Responses:**
- Range: 1 to 5
- 1: No damage by rodents
- 5: There is nothing left after the rodents have damaged it

---

**Variable Name:** `cacao_field_damage`
**Question:** How much of the cacao harvest is damaged by rats?
**Description:** This variable captures the extent of damage to the cacao harvest caused by rats. This question is asked if the respondent selects 'Cacao' in the `field_crop` variable.
**Type of Data:** Range (Integer)
**Options for Responses:**
- Range: 1 to 5
- 1: No damage by rodents
- 5: There is nothing left after the rodents have damaged it

---

**Variable Name:** `peppers_field_damage`
**Question:** How much of the pepper harvest is damaged by rats?
**Description:** This variable captures the extent of damage to the pepper harvest caused by rats. This question is asked if the respondent selects 'Peppers' in the `field_crop` variable.
**Type of Data:** Range (Integer)
**Options for Responses:**
- Range: 1 to 5
- 1: No damage by rodents
- 5: There is nothing left after the rodents have damaged it

---

**Variable Name:** `groundnut_field_damage`
**Question:** How much of the groundnut harvest is damaged by rats?
**Description:** This variable captures the extent of damage to the groundnut harvest caused by rats. This question is asked if the respondent selects 'Groundnut' in the `field_crop` variable.
**Type of Data:** Range (Integer)
**Options for Responses:**
- Range: 1 to 5
- 1: No damage by rodents
- 5: There is nothing left after the rodents have damaged it

---

**Variable Name:** `okra_field_damage`
**Question:** How much of the okra harvest is damaged by rats?
**Description:** This variable captures the extent of damage to the okra harvest caused by rats. This question is asked if the respondent selects 'Okra' in the `field_crop` variable.
**Type of Data:** Range (Integer)
**Options for Responses:**
- Range: 1 to 5
- 1: No damage by rodents
- 5: There is nothing left after the rodents have damaged it

---

**Variable Name:** `bene_field_damage`

**Question:** How much of the bene seed harvest is damaged by rats?
**Description:** This variable captures the extent of damage to the bene seed harvest caused by rats. This question is asked if the respondent selects 'Bene Seeds' in the `field_crop` variable.
**Type of Data:** Range (Integer)
**Options for Responses:**
- Range: 1 to 5
- 1: No damage by rodents
- 5: There is nothing left after the rodents have damaged it

---

**Variable Name:** `beans_field_damage`
**Question:** How much of the bean harvest is damaged by rats?
**Description:** This variable captures the extent of damage to the bean harvest caused by rats. This question is asked if the respondent selects 'Beans' in the `field_crop` variable.
**Type of Data:** Range (Integer)
**Options for Responses:**
- Range: 1 to 5
- 1: No damage by rodents
- 5: There is nothing left after the rodents have damaged it

---

**Variable Name:** `greens_field_damage`
**Question:** How much of the leafy greens harvest is damaged by rats?
**Description:** This variable captures the extent of damage to the leafy greens harvest caused by rats. This question is asked if the respondent selects 'Leafy Greens' in the `field_crop` variable.
**Type of Data:** Range (Integer)
**Options for Responses:**
- Range: 1 to 5
- 1: No damage by rodents
- 5: There is nothing left after the rodents have damaged it

---

**Variable Name:** `potato_field_damage`
**Question:** How much of the sweet potato harvest is damaged by rats?
**Description:** This variable captures the extent of damage to the sweet potato harvest caused by rats. This question is asked if the respondent selects 'Sweet Potato' in the `field_crop` variable.
**Type of Data:** Range (Integer)
**Options for Responses:**
- Range: 1 to 5
- 1: No damage by rodents
- 5: There is nothing left after the rodents have damaged it

---

**Variable Name:** `pesticide_use`
**Question:** Do you use any of the following on this field?
**Description:** This variable captures whether the respondent uses any pesticides on the field.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Rodenticide (Code: rodenticide)
- Option 2: Pesticide (Code: pesticide)
- Option 3: Herbicide (Code: herbicide)
- Option 4: Insecticide (Code: insecticide)
- Option 5: Other (Code: other)

---

**Variable Name:** `pesticide_other`
**Question:** Specify other.
**Description:** This variable captures other pesticides used on the field. This question is only asked if 'Other' is selected in the response to `pesticide_use`.
**Type of Data:** Free-text

---

**Variable Name:** `rodent_removal_field`
**Question:** Is there anything you do to remove rats that live in this field?
**Description:** This variable captures whether the respondent takes any actions to remove rats from the field.
**Type of Data:** Single-select with two responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
**Condition:** This question is asked if the respondent notices rats in the field (`rat_field` equals 'yes').

---

**Variable Name:** `rodent_removal_field_method`

**Question:** How do you do this?
**Description:** This variable captures the method used to remove rats from the field. This question is only asked if the respondent selects 'Yes' in the response to `rodent_removal_field`.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Traps (Code: traps)
- Option 2: Poison (Code: poison)
- Option 3: Gumtrap (Rat bible) (Code: gumtrap)
- Option 4: Sticks (Code: sticks)
- Option 5: Cats (Code: cat)
- Option 6: Dogs (Code: dog)
- Option 7: Other (Code: other)

---

**Variable Name:** `rodent_removal_field_other`
**Question:** Specify other.
**Description:** This variable captures other methods used to remove rats from the field. This question is only asked if 'Other' is selected in the response to `rodent_removal_field_method`.
**Type of Data:** Free-text

---

**Variable Name:** `rodent_remove_use_field`
**Question:** What do you do with the rats you remove from your field?
**Description:** This variable captures what the respondent does with the rats removed from the field. This question is asked if the respondent selects 'Yes' in the response to `rodent_removal_field`.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Eat them (Code: eat_them)
- Option 2: Sell them (Code: sell_them)
- Option 3: Dispose of them (Code: dispose_them)
- Option 4: Feed them to animals (Code: feed_them_to_animals)
- Option 5: I do not contact the bodies of the rat (Code: no_contact)
- Option 6: Other (Code: other)

---

**Variable Name:** `rodent_mitigation_field`
**Question:** Is there anything you do to stop rats damaging your crops in this field?
**Description:** This variable captures whether the respondent takes any actions to prevent rats from damaging crops in the field.
**Type of Data:** Single-select with two responses (Yes, No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
**Condition:** This question is asked if the respondent notices rats in the field (`rat_field` equals 'yes').

---

**Variable Name:** `rodent_mitigation_method_field`
**Question:** How do you do this?
**Description:** This variable captures the method used to prevent rats from damaging crops in the field. This question is only asked if the respondent selects 'Yes' in the response to `rodent_mitigation_field`.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Store items that rats eat in containers (Code: containers)
- Option 2: Seal holes/burrows (Code: seal_burrows)
- Option 3: Replace wooden doors with metal doors (Code: convert_door)
- Option 4: Make a concrete home (Code: upgrade_structure)
- Option 5: Use cats (Code: cats)
- Option 6: Use dogs (Code: dogs)
- Option 7: None (Code: none)
- Option 8: Other (Code: other)

---

**Variable Name:** `rodent_mitigation_field_other`
**Question:** Specify other.
**Description:** This variable captures other methods used to prevent rats from damaging crops in the field. This question is only asked if 'Other' is selected in the response to `rodent_mitigation_method_field`.
**Type of Data:** Free-text

---

**Variable Name:** `field_location`
**Question:** How long does it take you to walk to the field?
**Description:** This variable captures the time taken by the respondent to walk to the field, reported in minutes.

Alternatively, it can be phrased as "If you were to leave for the field at 7 am, what time would you arrive there?" and the number of minutes then calculated.
**Type of Data:** Integer

---

**Variable Name:** `field_position`
**Question:** Do you need to do any of the following to get to the field?
**Description:** This variable captures the actions the respondent needs to take to reach the field.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Cross a river or stream (Code: river)
- Option 2: Cross a tarred road (Code: road)
- Option 3: Walk through a forest (Code: forest)
- Option 4: Walk through other households' fields (Code: other_fields)

**Condition:** This question is asked if the respondent's location to the field is not a compound (`field_location` is not 'compound').

**End of field repeat**

---

---

#### 4.1.2.10 Livestock, storage methods and food security.

The following group of questions includes questions on livestock ownership, how food is eaten and stored and food security within the household.

**Variable Name:** `livestock`
**Question:** Do you own any livestock animals?
**Description:** This variable captures whether the respondent owns any livestock animals.
**Type of Data:** Single-select with two responses
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `livestock_animals`
**Question:** Which animals do you own?
**Description:** This variable captures the types of animals owned by the respondent. This question is asked if the respondent answers 'Yes' to owning livestock (`livestock` equals 'yes').
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Chicken (Code: chicken)
- Option 2: Goat/Sheep (Code: goat)
- Option 3: Cow (Code: cow)
- Option 4: Pig (Code: pig)
- Option 5: Duck/Fowl (Code: duck)
- Option 6: Other (Code: other)

---

**Variable Name:** `livestock_other`
**Question:** Specify other.
**Description:** This variable captures other types of livestock owned by the respondent. This question is only asked if 'Other' is selected in the response to `livestock_animals`.
**Type of Data:** Free-text

---

**Variable Name:** `livestock_sleep`
**Question:** Where do your livestock normally sleep at night?
**Description:** This variable captures the sleeping locations of the respondent's livestock. This question is asked if the respondent answers 'Yes' to owning livestock (`livestock` equals 'yes').
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: In a room where people sleep (Code: house)
- Option 2: In a shed for chickens (Code: chicken_shed)
- Option 3: In a shed for goats/sheep (Code: goat_shed)
- Option 4: In a structure for pigs (Code: pig_sty)
- Option 5: Outside (Code: outside)
- Option 6: Other (Code: other)

---

**Variable Name:** `livestock_sleep_other`
**Question:** Specify other.
**Description:** This variable captures other sleeping locations of the respondent's livestock. This question is only asked if 'Other' is selected in the response to `livestock_sleep`.
**Type of Data:** Free-text

---

**Variable Name:** `livestock_sleep_species`
**Question:** Do animals of different species ever sleep in the same building/structure?
**Description:** This variable captures whether animals of different species ever sleep in the same building/structure. This question is asked if the respondent answers 'Yes' to owning livestock (`livestock` equals 'yes') and the livestock do not sleep outside (`livestock_sleep` does not equal 'outside').
**Type of Data:** Single-select with three responses
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Sometimes (Code: sometimes)

---

**Variable Name:** `meal_location`
**Question:** Does this household eat their meals inside or outside?
**Description:** This variable captures whether the household eats their meals inside, outside, or both.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Inside (Code: inside)

- Option 2: Outside (Code: outside)
- Option 3: Both inside and outside (Code: inside_outside)

---

**Variable Name:** `storage_cooked_containers`
**Question:** What containers is cooked food stored in?
**Description:** This variable captures the containers used to store cooked food.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Pot (Code: pot)
- Option 2: Pot with lid (Code: pot_lid)
- Option 3: Jerry can (Code: fuel_can)
- Option 4: Jerry can with lid (Code: fuel_can_lid)
- Option 5: Flask (Code: flask)
- Option 6: Flask with lid (Code: flask_lid)
- Option 7: Cooler (Code: cooler)
- Option 8: None (Code: none)
- Option 9: Not applicable (Code: not_applicable)
- Option 10: Other (Code: other)

---

**Variable Name:** `storage_cooked_other`
**Question:** Specify other.
**Description:** This variable captures other types of containers used to store cooked food. This question is only asked if 'Other' is selected in the response to `storage_cooked_containers`.
**Type of Data:** Free-text

---

**Variable Name:** `storage_packaged_containers`
**Question:** What containers are packaged food stored in?
**Description:** This variable captures the containers used to store packaged food.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Packaging or wrapper it came in (Code: wrapper)
- Option 2: Nylon/Plastic bag (Code: nylon)
- Option 3: Container (Code: container)
- Option 4: Container with lid (Code: container_lid)
- Option 5: Plastic container without lid (Code: plastic_container)
- Option 6: Plastic container with lid (Code: plastic_container_lid)
- Option 7: Cupboard (Code: cupboard)
- Option 8: None (Code: none)
- Option 9: Not applicable (Code: not_applicable)
- Option 10: Other (Code: other)

---

**Variable Name:** `storage_packaged_other`
**Question:** Specify other.
**Description:** This variable captures other types of containers used to store packaged food. This question is only asked if 'Other' is selected in the response to `storage_packaged_containers`.
**Type of Data:** Free-text

---

**Variable Name:** `storage_seed_crop_containers_c`
**Question:** What containers are crops or seeds that are used for cooking stored in?
**Description:** This variable captures the containers used to store crops or seeds that are used for cooking.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Sack bag (Code: sack)
- Option 2: Bucket (Code: bucket)
- Option 3: Bucket with a lid (Code: bucket_lid)
- Option 4: Clay pot (Code: clay_pot)
- Option 5: Clay pot with a lid (Code: clay_pot_lid)
- Option 6: None (Code: none)
- Option 7: Not applicable (Code: not_applicable)
- Option 8: Other (Code: other)

---

**Variable Name:** `storage_c_other`
**Question:** Specify other.
**Description:** This variable captures other types of containers used to store crops or seeds that are used for cooking. This question is only asked if 'Other' is selected in the response to `storage_seed_crop_containers_c`.
**Type of Data:** Free-text

---

**Variable Name:** `storage_seed_crop_containers_g`
**Question:** What containers are crops or seeds that are used for growing stored in?
**Description:** This variable captures the containers used to store crops or seeds that are used for growing.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Sack bag (Code: sack)
- Option 2: Bucket (Code: bucket)
- Option 3: Bucket with a lid (Code: bucket_lid)
- Option 4: Clay pot (Code: clay_pot)
- Option 5: Clay pot with a lid (Code: clay_pot_lid)
- Option 6: None (Code: none)
- Option 7: Not applicable (Code: not_applicable)
- Option 8: Other (Code: other)

---

**Variable Name:** `storage_g_other`
**Question:** Specify other.
**Description:** This variable captures other types of containers used to store crops or seeds that are used for growing. This question is only asked if 'Other' is selected in the response to `storage_seed_crop_containers_g`.
**Type of Data:** Free-text

---

**Variable Name:** `food_resources`
**Question:** In the past 30 days, was there ever no food to eat of any kind in your house because of lack of resources to get food?
**Description:** This variable captures whether there was ever a situation in the past 30 days where there was no food to eat in the household due to lack of resources.
**Type of Data:** Single-select with two responses
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `food_resources_frequency`
**Question:** How often did this happen in the past 30 days?
**Description:** This variable captures the frequency of situations where there was no food to eat in the household due to lack of resources. This question is asked if the respondent answers 'Yes' to `food_resources`.
**Type of Data:** Single-select with three responses
**Options for Responses:**
- Option 1: Rarely (1-2 times) (Code: rarely)
- Option 2: Sometimes (3-10 times) (Code: sometimes)
- Option 3: Often (more than 10 times) (Code: often)

---

**Variable Name:** `food_sleep`
**Question:** In the past 30 days, did you or any household member go to sleep at night hungry because there was not enough food?
**Description:** This variable captures whether any household member went to sleep at night hungry due to insufficient food in the past 30 days.
**Type of Data:** Single-select with two responses
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `food_sleep_frequency`
**Question:** How often did this happen in the past 30 days?
**Description:** This variable captures the frequency of situations where any household member went to sleep at night hungry due to insufficient food in the past 30 days. This question is asked if the respondent answers 'Yes' to `food_sleep`.
**Type of Data:** Single-select with three responses
**Options for Responses:**
- Option 1: Rarely (1-2 times) (Code: rarely)
- Option 2: Sometimes (3-10 times) (Code: sometimes)
- Option 3: Often (more than 10 times) (Code: often)

---

**Variable Name:** `food_day`
**Question:** In the past 30 days, did you or any household member go a whole day and night without eating anything at all because there was not enough food?
**Description:** This variable captures whether any household member went a whole day and night without eating anything at all due to insufficient food in the past 30 days.
**Type of Data:** Single-select with two responses

**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `food_day_frequency`
**Question:** How often did this happen in the past 30 days?
**Description:** This variable captures the frequency of situations where any household member went a whole day and night without eating anything at all due to insufficient food in the past 30 days. This question is asked if the respondent answers 'Yes' to `food_day`.
**Type of Data:** Single-select with three responses
**Options for Responses:**
- Option 1: Rarely (1-2 times) (Code: rarely)
- Option 2: Sometimes (3-10 times) (Code: sometimes)
- Option 3: Often (more than 10 times) (Code: often)

---

**Variable Name:** `household_items`
**Question:** Select each of the following items that your household owns.
**Description:** This variable captures the household items owned by the respondent's household.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Radio (Code: radio)
- Option 2: Casette player/recorder (Code: casette_player)
- Option 3: TV (Code: tv)
- Option 4: Wooden chairs (Code: wooden_chairs)
- Option 5: Upholstered chairs (Code: upholstered_chairs)
- Option 6: Cane chairs (Code: cane_chairs)
- Option 7: Wooden cupboard (Code: wooden_cupboard)
- Option 8: Cane cupboard (Code: cane_cupboard)
- Option 9: Wooden bed (Code: wooden_bed)
- Option 10: Metal bed (Code: metal_bed)

**4.1.2.11 Cultural and health practices involving rodents.** The following repeating group collects information on the involvement of the household with any cultural or health practices involving rodents. These may be practices the housheold has been directly involved in, or those it is aware of.

## Repeat Section: Cultural and Health practices involving rodents

**Variable Name:** `rodent_culture_health`
**Question:** Do you people have any cultural practices (festivals, charms, sacrifices) or health practices that use rats or animals that resemble rats?
**Description:** This variable captures whether there are cultural or health practices in the community that involve the use of rats or animals resembling rats.
**Type of Data:** Single-select with two responses
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

**Variable Name:** `rodent_culture_health_name`
**Question:** What is the name of this practice?
**Description:** This variable captures the name of the cultural or health practice involving rats or animals resembling rats. This question is asked if the respondent answers 'Yes' to `rodent_culture_health`.
**Type of Data:** Free-text

**Variable Name:** `rodent_name_detail`
**Question:** What rat species is this information about?
**Description:** This variable captures the rat species relevant to the cultural or health practice. This question is asked if the respondent answers 'Yes' to `rodent_culture_health`.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Ntaali (Code: ntaali)
- Option 2: Ektupo (Code: ektupo)
- Option 3: Nkapfu (Code: nkapfu)
- Option 4: Oginyi (Code: oginyi)
- Option 5: Ikpo (Code: ikpo)
- Option 6: Okoror (Code: okoror)
- Option 7: Oriku (Code: oriku)
- Option 8: Odupfu (Code: odupfu)
- Option 9: Ekwata (Code: ekwata)
- Option 10: Kpev (Code: kpev)
- Option 11: Agundu (Code: agundu)
- Option 12: Julie (Code: julie)
- Option 13: Akpezinga/Abrazinga (Code: akpezinga)
- Option 14: Mbam/Ngbam (Code: mbam)
- Option 15: Nyongu (Code: nyongu)
- Option 16: Sam (Code: sam)
- Option 17: Agbacha (Code: agbacha)
- Option 18: Torhe (Code: torhe)
- Option 19: Fashon (Code: fashion)
- Option 20: Ubina (Code: ubina)
- Option 21: Irom (Code: irom)
- Option 22: Imanava (Code: imanava)

**Variable Name:** `part_of_rodent`
**Question:** What parts of the rat are used for this practice?
**Description:** This variable captures the parts of the rat used in the cultural or health practice. This question is asked if the respondent answers 'Yes' to `rodent_culture_health`.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Meat of rat (Code: meat)
- Option 2: Skin of rat (Code: skin)
- Option 3: Bones/teeth/claws of rat (Code: hard_part)

- Option 4: Whole rat (Code: whole_animal)
- Option 5: Organs of the rat (Code: internal_organs)
- Option 6: Faeces of the rat (Code: faeces)
- Option 7: Fat of the rat (Code: fat)
- Option 8: Fur of the rat (Code: fur)
- Option 9: Don't know (Code: unknown)
- Option 10: Rat blood (Code: blood)
- Option 11: Other (Code: other)

---

**Variable Name:** `part_of_rodent_other`
**Question:** Specify other.
**Description:** This variable captures other parts of the rat used in the cultural or health practice. This question is asked if 'Other' is selected in the response to `part_of_rodent`.
**Type of Data:** Free-text

---

**Variable Name:** `purpose_of_rodent`
**Question:** What is the purpose of using this part?
**Description:** This variable captures the purpose of using the specified part of the rat in the cultural or health practice.
**Type of Data:** Free-text

---

**Variable Name:** `prepare_rodent`
**Question:** How is the rat prepared?
**Description:** This variable captures the method of preparation for the rat used in the cultural or health practice.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Live (Code: live)
- Option 2: Raw (Code: raw)
- Option 3: Passive heat (under sun) (Code: passive_heat)
- Option 4: Direct heat (above fire) (Code: direct_heat)
- Option 5: Liquor (Code: liquor)
- Option 6: Other (Code: other)
- Option 7: Don't know (Code: unknown)

---

**Variable Name:** `prepare_rodent_other`
**Question:** Specify other.
**Description:** This variable captures other methods of preparing the rat used in the cultural or health practice. This question is asked if 'Other' is selected in the response to `prepare_rodent`.
**Type of Data:** Free-text

---

**Variable Name:** `administering_rodent`
**Question:** How is the rat prescribed/administered?
**Description:** This variable captures the method of administration for the rat used in the cultural or health practice.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Oral (Code: oral)
- Option 2: Topical (skin) (Code: topical_skin)
- Option 3: Topical (eye) (Code: topical_eye)
- Option 4: Topical (inhaled) (Code: topical_inhaled)
- Option 5: Enema (Code: enema)
- Option 6: Subcutaneous (Code: subcutaneous)
- Option 7: Intravenous (Code: intravenous)
- Option 8: Other (Code: other)
- Option 9: Don't know (Code: unknown)

---

**Variable Name:** `administering_rodent_other`
**Question:** Specify other.
**Description:** This variable captures other methods of administering the rat used in the cultural or health practice. This question is asked if 'Other' is selected in the response to `administering_rodent`.
**Type of Data:** Free-text

**End of Health and Cultural practices repeat**

---

---

#### 4.1.2.12 GPS coordinates.

These questions capture the location of the sampled household.

**Variable Name:** `latitude`
**Question:** Latitude (first row on the GPS next to N)
**Description:** This variable captures the latitude coordinate of the household, taken while standing in front of the main doorway into the household. The latitude value typically begins with '06'.
**Type of Data:** Decimal

---

**Variable Name:** `longitude`
**Question:** Longitude (second row on the GPS next to E)
**Description:** This variable captures the longitude coordinate of the household, taken while standing in front of the main doorway into the household. The longitude value typically begins with '08'.
**Type of Data:** Decimal

**4.1.2.13 Household photographs.** Annotated photographs of the external and internal componenents of household structures can be added within this repeating group.

## Repeat Section: Household photographs

**Variable Name:** `photos_acceptable`
**Question:** Are you able to take photos of the area surrounding the household and inside the house?
**Description:** This variable captures whether the respondent is able to take photos of the area surrounding the household and inside the house. If 'Yes' is selected, the respondent is prompted to take photos. If 'No' is selected, no further action is required.
**Type of Data:** Single-select with two responses (Yes, No)
**Options for Responses:**
- Option 1: Yes
- Option 2: No

**Notes:** Make sure that when taking photos, faces of any individuals are not included. For inside photos, particularly focus on the kitchen, sleeping area, and area where food, crops, or seeds are stored. Also, take photos of any known rat burrows.

---

**Variable Name:** `photo_inside`
**Question:** Photo (inside)
**Description:** This variable captures a photo taken inside the household. (Associated Logic: This variable is associated with the group `inside_photos`, initiated when the respondent indicates they are able to take photos (`photos_acceptable` = 'yes').)
**Type of Data:** Image

---

**Variable Name:** `photo_inside_name`
**Question:** What is this a photo of?
**Description:** This variable captures the description of the photo taken inside the household. (Associated Logic: This variable is associated with the group `inside_photos`, initiated when the respondent indicates they are able to take photos (`photos_acceptable` = 'yes').)
**Type of Data:** Text

---

**Variable Name:** `photo_outside`
**Question:** Photo (outside)
**Description:** This variable captures a photo taken outside the household. (Associated Logic: This variable is associated with the group `outside_photos`, initiated when the respondent indicates they are able to take photos (`photos_acceptable` = 'yes').)
**Type of Data:** Image

---

**Variable Name:** `photo_outside_name`
**Question:** What is this a photo of?
**Description:** This variable captures the description of the photo taken outside the household. (Associated Logic: This variable is associated with the group `outside_photos`, initiated when the respondent indicates they are able to take photos (`photos_acceptable` = 'yes').)
**Type of Data:** Text
**Notes:** For outside photos, pictures of the different buildings that are part of the household, nearby gardens, farmland, or bush are desired.

### End of Household photographs

#### 4.1.2.14 Household surroundings.

Descriptions of the immediate surroundings of the household are captured here.

**Variable Name:** `surroundings_household`
**Question:** What is in the nearby surrounding of this household?
**Description:** This variable captures the elements present in the nearby surroundings of the household. Respondents can select multiple options.
**Type of Data:** Multi-select
**Options for Responses:**
- Option 1: Another compound (Code: another_compound)
- Option 2: Other buildings not part of this household (Code: other_buildings)
- Option 3: Gardens (Code: gardens)
- Option 4: Farms (Code: farms)
- Option 5: Bush (Code: bush)
- Option 6: Forest (Code: forest)
- Option 7: Yam barn (Code: yam_barn)
- Option 8: Other (Code: other)

**Notes:** This completes the survey for this household. Offer to answer any questions they may have. Thank the participants and move on to the next household.

---

**Variable Name:** `surroundings_outside_other`
**Question:** Specify other
**Description:** This variable captures other elements present in the nearby surroundings of the household, if 'Other' is selected in the response to `surroundings_household`.
**Type of Data:** Free-text

---

**Variable Name:** `notes`
**Question:** Feel free to add any notes you want the team to know about this household.
**Description:** This variable allows the respondent to add any additional notes about the household.
**Type of Data:** Free-text

Variable names and response codes are available from the XLSForm of the questionnaire. The variable name is stored in the `name` column of the `survey` sheet. For the responses (`choices` sheet), the `list_name` is associated with the `type` column in the `survey` sheet. The response values and labels are in the `choices` sheet columns named `name` and `label` respectively.

### 4.1.3 Household questionnaire data checks:

As data checks are added the functions and their purposes will be recorded here.

Data checks are performed on the `hh_df_list` object which is read in `.rds` format after being produced in `main\01_rename_variables_hh.R`. All data checks and associated cleaning steps are performed in `main\02_clean_data_hh.R`

#### 4.1.3.1 Check 1: Unique numbering of households

**Description:** This check ensures that each household in the dataset has a unique identifier.

**Arguments:**

- `df`: The dataframe containing household data. Default is `hh_df_list$household_main`.

**Returns:**

- `NULL` if all household IDs are unique.
- Dataframe containing duplicate records if duplicates are found.

**Code:**

```
check_unique_id <- function(df = hh_df_list$household_main) {
    duplicate_indices <- duplicated(df$household_id) | duplicated(df$household_id,
        fromLast = TRUE)
    if (any(duplicate_indices)) {
        duplicate_records <- df$`_index`[duplicate_indices, ]
        message(crayon::red("FAIL: Duplicate household IDs found. Check duplicate_records for details."))
        return(duplicate_records)
    } else {
        message(crayon::green("PASS: All household IDs are unique"))
        return(NULL)
    }
}

# Execute the function to check for unique household IDs
duplicate_records <- check_unique_id(df = hh_df_list$household_main)
```

**Outcomes:**

- If the message "All household IDs are unique" is returned, this indicates that each household has a unique identifier in the data pulled down from the server.
- The returned object is `NULL` if the check is passed.
- If the message "Duplicate household IDs found. Check `duplicate_records` for details" is returned, the study team should be contacted to correct the underlying data. If it is not possible for them to do this directly in the form the necessary correction can be made on the data stored in the server. Finally, if that is not possible the correction can be made directly in these scripts directly into the `hh_df_list$household_main` object.
- The returned object (`duplicate_records`) is a vector of values from the `hh_df_list$household_main$_index` column of the data. This can be used for further investigation of the duplication.

#### 4.1.3.2 Check 2: Household coordinates

**Description:** The `clean_coordinates` function is designed to clean and validate geographic coordinates extracted from the questionnaire records. It checks for coordinates

falling within specified boundaries (Nigeria and relevant Local Government Authorities), corrects errors such as misplaced decimal points, and logs any potential issues encountered during the process.

**Arguments:**

- `df`: The dataframe containing coordinates to be cleaned. The default is `hh_df_list$household_main`.

**Returns:**

- An updated dataframe with corrected coordinates.

**Source code:**

```
clean_coordinates <- function(df = hh_df_list$household_main) {
    # Extract coordinates from the dataframe
    coords <- extract_coordinates(df)
    # Define administrative boundaries
    Nigeria <- gadm(country = "NGA", level = 0, path = here("data", "spatial"))
    lga <- gadm(country = "NGA", level = 2, path = here("data", "spatial"))
    # Check coordinates against country boundary and administrative boundaries
    checked_coords <- check_coordinates(coords, Nigeria, lga)
    # Correct errors in the coordinates Factors to correct
    factors <- 10^(0:12)
    corrected_coords <- correct_errors(checked_coords, factors, Nigeria)
    # Log messages about the coordinates
    log_messages(coords, checked_coords, corrected_coords)
    # Update the original dataframe with the corrected coordinates
    updated_df <- update_coordinates(corrected_coords$coords_spat, df)
    # Return the updated dataframe
    return(updated_df)
}
```

#### 4.1.3.2.1 Extract coordinates sub-function

**Description:** The `extract_coordinates` sub-function extracts latitude and longitude coordinates from a dataframe.

**Arguments:**

- `df`: A dataframe containing coordinates to be extracted.

**Returns:**

- A SpatVector object containing extracted coordinates.

**Source code:**

```
# Sub-function 1: Extract Coordinates
extract_coordinates <- function(df) {
    # Extract coordinates from the dataframe
    coords <- df %>%
        dplyr::select(`_index`, id = household_id, latitude, longitude) %>%
        # Remove rows with missing latitude or longitude values
    dplyr::filter(!is.na(latitude) & !is.na(longitude)) %>%
        # Create a SpatVector
    vect(geom = c("longitude", "latitude"), crs = project_CRS)
    return(coords)
}
```

#### 4.1.3.2.2 Check coordinates sub-function

**Description:** The `check_coordinates` sub-function checks whether coordinates fall within specified boundaries.

**Arguments:**

- `coords`: A SpatVector object containing coordinates to be checked
- `Nigeria`: A spatial object representing the boundaries of Nigeria. Obtained using the `gadm` function of the `geodata` R package.

- `lga`: A spatial object representing the boundaries of Local Government Authorities within Nigeria (Level-2). Obtained using the `gadm` function of the `geodata` R package.

**Returns:**

- A list containing checked coordinates.

**Source code:**

```
# Sub-function 2: Check Coordinates
check_coordinates <- function(coords, Nigeria, lga) {
    coords_spat <- coords
    in_nigeria <- coords_spat[Nigeria]
    out_nigeria <- coords_spat[!is.related(coords_spat, Nigeria, "intersects"), ]

    # Add LGA information to the coordinates
    coords_spat$lga <- coords_spat %>%
        mutate(abbreviation = str_split(coords_spat$id, "-", simplify = TRUE)[, 1]) %>%
        left_join(village_state %>%
            select(abbreviation, lga)) %>%
        pull(lga)
    # Check if coordinates fall within the correct LGA
    in_lga <- coords_spat[coords_spat$lga == terra::extract(lga, coords_spat)$NAME_2]
    out_lga <- coords_spat[coords_spat$lga != terra::extract(lga, coords_spat)$NAME_2 |
        is.na(terra::extract(lga, coords_spat)$NAME_2)]

    list(coords_spat = coords_spat, in_nigeria = in_nigeria, out_nigeria = out_nigeria,
        in_lga = in_lga, out_lga = out_lga)
}
```

#### 4.1.3.2.3 Correct errors sub-function

**Description:** The `correct_errors` sub-function corrects errors in coordinates, such as misplaced decimal points.

**Arguments:**

- `coords`: A list containing checked coordinates.
- `factors`: A vector of factors used for correcting coordinates.
- `Nigeria`: A spatial object representing the boundary of Nigeria.

**Returns:**

- A list containing corrected coordinates.

**Source code:**

```
# Sub-function 3: Correct Errors
correct_errors <- function(coords, factors, Nigeria) {
    potential_errors <- data.frame()
    updated_coords <- coords$coords_spat  # Store the updated coordinates in a new object
    for (index in coords$out_nigeria$`_index`) {
        record <- coords$coords[coords$coords$`_index` == index]
        # Initialize a flag to track if any correction is made for this record
        correction_made <- FALSE
        # Check latitude value range and correct if high or low
        if (crds(record)[, 2] >= 14 || crds(record)[, 2] <= 4) {
            for (factor in factors) {
                corrected_latitude <- crds(record)[, 2]/factor
                # Check if corrected latitude falls within the desired range
                if (corrected_latitude >= 4 && corrected_latitude <= 14) {
                  # Create a new SpatVector with the updated latitude
                  updated_coords <- crds(coords$coords_spat)
                  updated_coords[coords$coords_spat$`_index` == index] <- c(crds(record)[,
                    1], corrected_latitude)
                  updated_spatvector <- vect(updated_coords, crs = project_CRS) %>%
                    bind_spat_cols(coords$coords_spat)
                  # Replace the SpatVector in coords with the updated one
```

```
                coords$coords_spat <- updated_spatvector
                potential_errors <- bind_rows(potential_errors, tibble(`_index` = index,
                  reason = ifelse(crds(record)[, 2] >= 14), "corrected decimal point mistake (latitude high)",
                  "corrected decimal point mistake (latitude low)"))
                correction_made <- TRUE
                break
              }
            }
        }
        # Check longitude value range and correct if high or low
        if (crds(record)[, 1] >= 15 || crds(record)[, 1] <= 2) {
            for (factor in factors) {
                corrected_longitude <- crds(record)[, 1]/factor
                # Check if corrected longitude falls within the desired range
                if (corrected_longitude >= 2 && corrected_longitude <= 15) {
                  # Create a new SpatVector with the updated longitude
                  updated_coords <- crds(coords$coords_spat)
                  updated_coords[coords$coords_spat$`_index` == index] <- c(corrected_longitude,
                    crds(record)[, 2])
                  updated_spatvector <- vect(updated_coords, crs = project_CRS) %>%
                    bind_spat_cols(coords$coords_spat)
                  # Replace the SpatVector in coords with the updated one
                  coords$coords_spat <- updated_spatvector
                  potential_errors <- bind_rows(potential_errors, tibble(`_index` = index,
                    reason = ifelse(crds(record)[, 1] >= 15), "corrected decimal point mistake (longitude high)",
                    "corrected decimal point mistake (longitude low)"))
                  correction_made <- TRUE
                  break
                }
            }
        }
        # Check for swapped lat and long
        if (!is.na(crds(record)[, 2]) && !is.na(crds(record)[, 1]) && crds(record)[,
            2] >= 4 && crds(record)[, 2] <= 14 && crds(record)[, 1] >= 2 && crds(record)[,
            1] <= 15) {
            # Create a new SpatVector with swapped latitude and longitude
            updated_coords <- tibble(x = crds(record)[, c("y")], y = crds(record)[,
                c("x")])
            updated_spatvector <- vect(updated_coords, geom = c("x", "y"), crs = project_CRS) %>%
                bind_spat_cols(record)
            # Check if the swapped coordinates are within country bounds
            if (is.related(updated_spatvector, Nigeria, "intersects")) {
                coords$coords_spat <- bind_spat_rows(coords$coords[coords$coords$`_index` !=
                  index], updated_spatvector)
                potential_errors <- bind_rows(potential_errors, tibble(`_index` = index,
                  reason = "corrected latitude and longitude swap"))
                correction_made <- TRUE
            } else {
                coords$coords_spat <- coords$coords_spat  # If not within bounds, revert to original coordinates
            }
        }
        # If no correction is made for this record, consider it as an 'other
        # error'
        if (!correction_made) {
            potential_errors <- bind_rows(potential_errors, tibble(`_index` = index,
                reason = "other potential error"))
        }
    }
    # Extract the corrected coordinates and potential errors
    corrected_coords <- list(coords_spat = coords$coords_spat, in_nigeria = coords$in_nigeria,
        out_nigeria = coords$out_nigeria, potential_errors = potential_errors)
    return(corrected_coords)
}
```

#### 4.1.3.2.4 Update coordinates sub-function

**Description:** The `update_coordinates` sub-function updates the original dataframe with corrected coordinates.

**Arguments:**

- `coords`: A SpatVector object containing corrected coordinates.
- `df`: A dataframe containing original coordinates.

**Returns:**

- An updated dataframe with corrected coordinates.

**Source code:**

```
# Sub-function 4: Update Coordinates
update_coordinates <- function(coords = coords_spat, df) {
    # Match the row indices between the original dataframe and the corrected
    # coordinates
    rows_to_update <- match(coords$`_index`, df$`_index`)
    # Extract the corrected latitude and longitude from the coords object
    updated_latitude <- crds(coords)[, 2]  # Column number 2 corresponds to latitude
    updated_longitude <- crds(coords)[, 1]  # Column number 1 corresponds to longitude
    # Update the relevant rows in the original dataframe with the corrected
    # coordinates
    df[rows_to_update, c("latitude", "longitude")] <- list(updated_latitude, updated_longitude)
    # Return the updated dataframe
    return(df)
}
```

#### 4.1.3.2.5 Log messages sub-function

**Description:** The `log_messages` sub-function logs messages about the coordinate cleaning processes.

**Arguments:**

- `coords`: A SpatVector object containing coordinates.
- `checked_coords`: A list containing checked coordinates.
- `corrected_coords`: A list containing corrected coordinates.

**Source code:**

```
# Sub-function 5: Log Messages
log_messages <- function(coords, checked_coords, corrected_coords) {
    # Coordinate Check 1
    cat("Coordinate Check 1:\n", crayon::green(paste(bold(nrow(checked_coords$in_nigeria),
        "records have coordinates within Nigeria.\n"))), crayon::yellow(paste(bold(nrow(coords) -
        nrow(checked_coords$in_nigeria)), "records have coordinates falling outside of Nigeria.\n")),
        crayon::red(paste(bold(nrow(df) - nrow(coords)), "records have missing coordinates.\n")))
    # Summary
    unique_errors <- nrow(corrected_coords$potential_errors)
    cat(paste(unique_errors, "unique record(s) had incorrect coordinates.\n"))
    # Coordinate Check 2
    cat("\nCoordinate Check 2:\n", crayon::red(paste(bold(nrow(checked_coords$out_lga)),
        "records have coordinates outside of the correct LGAs.\n")))
    # Coordinate Check 3
    cat("\nCoordinate Check 3:\n")
    if (unique_errors == 0) {
        cat(crayon::green("No latitude and longitude swapping detected.\n"))
    } else {
        cat(crayon::yellow("No latitude and longitude swapping detected after correction.\n"))
    }
    # Coordinate Check 4
    cat("\nCoordinate Check 4:\n", crayon::yellow(paste(bold(nrow(corrected_coords$potential_errors)),
        "misplaced decimal points were detected and corrected.\n")))
}
```

### 4.1.4 Individual questionnaire:

**4.1.4.1 Metadata and associated household.** The first section of the household questionnaire records the date, time and location of the completed questionnaire. The linkage to the household questionnaire is through this section.

**Variable Name:** `start`
**Question:** Start
**Description:** This variable records the data and time the questionnaire was initialised.
**Type of Data:** Datetime

---

**Variable Name:** `calculate_date`
**Question:** Date
**Description:** This variable captures the date when the questionnaire is initiated.
**Type of Data:** Date %Y_%m_%d

---

**Variable Name:** `deviceid`
**Question:** Device ID
**Description:** This variable captures the unique identifier of the device used to complete the questionnaire.

---

**Variable Name:** `interviewer_id`
**Question:** Enter your interviewer ID
**Description:** This variable captures the ID of the interviewer conducting the survey.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Diana (Code: 1)
- Option 2: Helen (Code: 2)
- Option 3: Nzube (Code: 3)
- Option 4: Sunday (Code: 4)
- Option 5: Other (Code: other)

---

**Variable Name:** `interviewer_id_other`
**Question:** Specify other
**Description:** This variable captures additional details if 'Other' is selected in `interviewer_id`.
**Type of Data:** Free-text

---

**Variable Name:** `community`
**Question:** Which community is the household located in?
**Description:** This variable captures the community where the surveyed household is located.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Dyegh (Akwa Kwasi) (Code: dyegh)
- Option 2: Ikyogbakpev (Akwa kwasi) (Code: ikyogbakpev)
- Option 3: Zugu (Code: zugu)
- Option 4: Okimbongha (Code: okimbongha)
- Option 5: Ogamanna (Code: ogamanna)
- Option 6: Ofonekom (Code: ofonekom)
- Option 7: Ezeakataka (Code: ezeakataka)
- Option 8: Enyandulogu (Code: enyandulogu)
- Option 9: Offianka (Code: offianka)

---

**Variable Name:** `household_number`
**Question:** What household number is this?
**Description:** This variable captures the household number. This is allocated by the team using the household enumaration from the village.
**Type of Data:** Integer

---

**Variable Name:** `household_id`
**Question:** Household ID
**Description:** This variable concatenates the first three letters of the community name with the household number to generate a unique household ID. This is then presented to the interviewer for confirmation.
**Type of Data:** Calculated

**4.1.4.2 Consent process** Consent is captured after initialising the questionnaire. We do this to aid understanding of sampling (i.e., how many selected households consented to enrollment).

**Variable Name:** `over_18`
**Question:** Is this participant over 18 years old?
**Description:** This variable captures whether the participant is over 18 years old.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `informed_consent_adult`
**Question:** The participant has had the study processes explained to them and has provided written informed consent to take part in the study. They are made aware that they can remove themselves from the study at any point by contacting the study team.
**Description:** This variable captures whether the adult participant has provided informed consent to participate in the study after understanding the study processes.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

**Note:** Thank the participant for their time, complete and save this form and move on to the next participant if the response is No. This question is asked if the participant is over 18 years old (`over_18` equals 'yes').

---

**Variable Name:** `blood_sample_consent_adult`
**Question:** The participant has had the processes for obtaining a Dried Blood Spot explained to them and has provided written informed consent for this.
**Description:** This variable captures whether the adult participant has provided informed consent for obtaining a Dried Blood Spot (DBS) sample.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

**Note:** Thank them for enrolling in the study and providing a blood sample, we will move onto the questions after recording the consent form. This question is asked if the participant is over 18 years old (`over_18` equals 'yes') and has provided informed consent to participate in the study (`informed_consent_adult` equals 'yes').

---

**Variable Name:** `under_12`
**Question:** Is the child under 12?
**Description:** This variable captures whether the participant is under 12 years old.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

**Note:** This question is asked if the participant is not over 18 years old (`over_18` equals 'no').

---

**Variable Name:** `assent_under_18`
**Question:** The participant has had the study processes explained to them and have provided assent for enrollment in the study. Signed consent has been provided by their parent or guardian.
**Description:** This variable captures whether the participant, who is under 18 years old, has provided assent for enrollment in the study, with signed consent provided by their parent or guardian.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `blood_sample_assent_child`
**Question:** The participant has had the processes for obtaining a Dried Blood Spot explained to them and has provided written informed consent for this.
**Description:** This variable captures whether the participant, who is under 18 years old, has provided written informed consent for obtaining a Dried Blood Spot (DBS) sample.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

#### 4.1.4.3 Individual demographics.

**Variable Name:** `first_name`
**Question:** First name
**Description:** This variable captures the first name that the individual uses. This information is important for contact purposes if needed.
**Type of Data:** Free-text

---

**Variable Name:** `surname`
**Question:** Surname
**Description:** This variable captures the surname of the individual.
**Type of Data:** Free-text

---

**Variable Name:** `age_individual`
**Question:** Age in years
**Description:** This variable captures the age of the individual in years.
**Type of Data:** Integer

---

**Variable Name:** `yob_individual`
**Question:** Year of birth
**Description:** This variable calculates the year of birth based on the current year and the individual's age.
**Type of Data:** Calculated

---

**Variable Name:** `sex_individual`
**Question:** Sex
**Description:** This variable captures the sex of the individual.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Female (Code: female)
- Option 2: Male (Code: male)

---

**Variable Name:** `ethnicity_individual`
**Question:** Ethnicity
**Description:** This variable captures the ethnicity of the individual.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Igbo (Izzi) (Code: igbo_izzi)
- Option 2: Igbo (Other) (Code: igbo_other)
- Option 3: Membe (Code: membe)
- Option 4: Tiv (Code: tiv)
- Option 5: Other (Code: other)

---

**Variable Name:** `ethnicity_individual_other`
**Question:** Specify ethnicity
**Description:** This variable captures the ethnicity of the individual if 'Other' is selected in the response to `ethnicity_individual`.
**Type of Data:** Free-text

---

**Variable Name:** `religion_individual`
**Question:** Religion
**Description:** This variable captures the religion of the individual.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Christian (Code: christian)
- Option 2: Muslim (Code: muslim)
- Option 3: Traditionalist (Code: traditionalist)
- Option 4: Other (Code: other)

---

**Variable Name:** `religion_individual_other`
**Question:** Specify religion
**Description:** This variable captures the religion of the individual if 'Other' is selected in the response to `religion_individual`.
**Type of Data:** Free-text

---

**Variable Name:** `education`
**Question:** Level of education
**Description:** This variable captures the level of education of the individual.

**Type of Data:** Single-select
**Options for Responses:**
- Option 1: None/No formal schooling (Code: none)
- Option 2: Primary education (up until age 12) (Code: primary)
- Option 3: Junior secondary education (up until age 16) (Code: junior_secondary)
- Option 4: Senior secondary education (up until age 19) (Code: senior_secondary)
- Option 5: University level education (Code: undergraduate)
- Option 6: Master's, Doctoral level degree (Code: postgraduate)
- Option 7: Other (Code: other)

---

**Variable Name:** `education_other`
**Question:** Specify other
**Description:** This variable captures other levels of education if 'Other' is selected in the response to `education`.
**Type of Data:** Free-text

---

**Variable Name:** `education_subject`
**Question:** What subject was studied in higher education?
**Description:** This variable captures the subject studied in higher education if the individual selected 'University level education' or 'Master's, Doctoral level degree' in the response to `education`.
**Type of Data:** Free-text

#### 4.1.4.4 Place of birth and length of residence.

**Variable Name:** `community_pob`
**Question:** Is the community we are currently in your place of birth?
**Description:** This variable captures whether the community where the survey is being conducted is the participant's place of birth.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `country_of_birth`
**Question:** What country were you born in?
**Description:** This variable captures the country where the participant was born. This question is asked if the participant's current community is not their place of birth.
**Type of Data:** Free-text

---

**Variable Name:** `state_of_birth`
**Question:** What state were you born in?
**Description:** This variable captures the state where the participant was born. This question is asked if the participant's current community is not their place of birth.
**Type of Data:** Free-text

---

**Variable Name:** `region_of_birth`
**Question:** What LGA were you born in?
**Description:** This variable captures the Local Government Area (LGA) where the participant was born. This question is asked if the participant's current community is not their place of birth.
**Type of Data:** Free-text

---

**Variable Name:** `village_of_birth`
**Question:** What is the name of the village you were born in?
**Description:** This variable captures the name of the village where the participant was born. This question is asked if the participant's current community is not their place of birth.
**Type of Data:** Free-text

---

**Variable Name:** `year_arrived`
**Question:** What year did you move to this community?
**Description:** This variable captures the year when the participant moved to the current community. This question is asked if the participant's current community is not their place of birth.
**Type of Data:** Integer

---

**Variable Name:** `resident_months`
**Question:** How much of the year are you resident in this community (in months)?
**Description:** This variable captures the number of months the participant resides in the current community.
**Type of Data:** Integer
**Range:** 1 - 12 (Step of 1)

---

**Variable Name:** `resident_elsewhere`
**Question:** In the last 12 months what are the names of the places where you have spent more than two weeks sleeping?
**Description:** This variable captures the names of the places where the participant has spent more than two weeks sleeping in the last 12 months.
**Type of Data:** Free-text

---

**Variable Name:** `non_resident_reason`
**Question:** Why are they resident in these places?
**Description:** This variable captures the reasons why the participant resides in the places mentioned in `resident_elsewhere`.
**Type of Data:** Free-text

---

**Variable Name:** `return_reason`
**Question:** Why do they return to this community?
**Description:** This variable captures the reasons why the participant returns to the current community.
**Type of Data:** Free-text

---

**Variable Name:** `sleep_elsewhere`
**Question:** Do you regularly sleep in a different location?
**Description:** This variable captures whether the participant regularly sleeps in a different location.

**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `sleep_elsewhere_location`
**Question:** Where are these locations you regularly sleep?
**Description:** This variable captures the locations where the participant regularly sleeps if they answered 'Yes' to `sleep_elsewhere`.
**Type of Data:** Free-text

#### 4.1.4.5 Marital status and children.

**Variable Name:** `relationship`
**Question:** What is your marital status?
**Description:** This variable captures the marital status of the participant.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Single (Code: single)
- Option 2: Married (Code: married)
- Option 3: Divorced (Code: divorced)
- Option 4: Widowed (Code: widowed)
- Option 5: Cohabiting (Code: cohabiting)
- Option 6: Separated (Code: separated)

---

**Variable Name:** `children_ever`
**Question:** Do you have or have you ever had children?
**Description:** This variable captures whether the participant has or has ever had children.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `n_children`
**Question:** How many children have you had?
**Description:** This variable captures the total number of children the participant has had.
**Type of Data:** Integer
**Note:** This question is asked if the participant has or has ever had children.

---

**Variable Name:** `children_alive`
**Question:** How many children are alive?
**Description:** This variable captures the number of children who are currently alive.
**Type of Data:** Integer
**Note:** This question is asked if the participant has or has ever had children.

---

**Variable Name:** `children_in_household`
**Question:** How many children live at home currently? (more than 6 months a year)
**Description:** This variable captures the number of children who live at home currently, residing for more than 6 months a year.
**Type of Data:** Integer
**Note:** This question is asked if there is at least one child alive (`children_alive` $>= 1$).

#### 4.1.4.6 Occupation and individual income.

**Variable Name:** `work`
**Question:** What kind of work do you do to make money and to get food?
**Description:** This variable captures the type of work the participant engages in to earn money and obtain food.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Farming (Code: farming)
- Option 2: Assist with agricultural work (in household fields) (Code: ag_worker)
- Option 3: Assist with agricultural work (in other households' fields) (Code: ag_worker_elsewhere)
- Option 4: Hunter/Trapper (Code: hunter_trapper)
- Option 5: Fishing (Code: fishing)
- Option 6: Timber (Code: timber)
- Option 7: Collect forest goods (NTFPs) (Code: ntfps)
- Option 8: Animal husbandry (Code: animal)
- Option 9: Trader (Code: trader)
- Option 10: Artisan/Handiwork/Carpenter (Code: artisan)
- Option 11: Driver (Code: driver)
- Option 12: Teacher (Code: teacher)
- Option 13: Clergy (minister, pastor) (Code: clergy)
- Option 14: Student (Code: student)
- Option 15: Government worker (Code: government_worker)
- Option 16: Pensioner (Code: pensioner)
- Option 17: Other (Code: other)

---

**Variable Name:** `income_other`
**Question:** Specify other
**Description:** This variable captures additional types of work if 'Other' is selected in `work`.
**Type of Data:** Free-text

---

**Variable Name:** `income_individual`
**Question:** In a normal month, how much money do you personally bring into the household?
**Description:** This variable captures the estimated monthly income brought into the household by the participant.
**Type of Data:** Integer

---

**Variable Name:** `field_entry`
**Question:** Do you ever go into the agricultural fields or farms?
**Description:** This variable captures whether the participant ever goes into agricultural fields or farms.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `field_work_freq`
**Question:** In the last 12 months, how many months did you spend working in fields/farm?
**Description:** This variable captures the frequency of the participant's work in fields or farms over the past 12 months.
**Type of Data:** Integer
**Range:** 1 - 12 (Step of 1)
**Note:** This question is asked if the participant answers 'Yes' to `field_entry`.

---

**Variable Name:** `field_work_seasonality`
**Question:** Which seasons do you work in the fields/farm?
**Description:** This variable captures the seasons in which the participant works in fields or farms.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Dry (Code: dry)
- Option 2: Rainy (Code: rainy)
- Option 3: All seasons (Code: all_seasons)

**Note:** This question is asked if the participant does not work in fields or farms for all 12 months (`field_work_freq` != '12').

---

**Variable Name:** `forest_entry`
**Question:** Do you ever go into forested areas?
**Description:** This variable captures whether the participant ever goes into forested areas.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Yes (Code: yes)

- Option 2: No (Code: no)

---

**Variable Name:** `forest_entry_purpose`
**Question:** Why do you go into the forest?
**Description:** This variable captures the purposes for which the participant goes into the forest.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Hunting/Trapping (Code: hunting_trapping)
- Option 2: Collecting food (Code: collecting_food)
- Option 3: NTFPs (Code: ntfps)
- Option 4: Gathering firewood (Code: firewood)
- Option 5: Transiting through on my way elsewhere (Code: transit)
- Option 6: For cultural or religious activity (Code: cultural)
- Option 7: For leisure purposes (Code: leisure)
- Option 8: Other (Code: other)

**Note:** This question is asked if the participant answers 'Yes' to `forest_entry`.

---

**Variable Name:** `forest_entry_purpose_other`
**Question:** Specify other
**Description:** This variable captures additional purposes for going into the forest if 'Other' is selected in `forest_entry_purpose`.
**Type of Data:** Free-text
**Note:** This question is asked if 'Other' is selected in `forest_entry_purpose`.

---

**Variable Name:** `forest_entry_freq`
**Question:** In the last 12 months, how many months did you spend accessing the forest?
**Description:** This variable captures the frequency of the participant's access to the forest over the past 12 months.
**Type of Data:** Integer
**Range:** 1 - 12 (Step of 1)
**Note:** This question is asked if the participant answers 'Yes' to `forest_entry`.

---

**Variable Name:** `forest_work_seasonality`
**Question:** Which seasons do you access the forest?
**Description:** This variable captures the seasons in which the participant accesses the forest.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Dry (Code: dry)
- Option 2: Rainy (Code: rainy)
- Option 3: All seasons (Code: all_seasons)

**Note:** This question is asked if the participant does not access the forest for all 12 months (`forest_entry_freq` != '12') and answers 'Yes' to `forest_entry`.

#### 4.1.4.7 Meat consumption, type and frequency

**Variable Name:** `meat_consumption`
**Question:** Do you eat meat from domestic animals?
**Description:** This variable captures whether the participant consumes meat from domestic animals.
**Type of Data:** Single-select (Yes/No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `meat_consumption_type`
**Question:** What types of domestic meat do you eat?
**Description:** This variable captures the types of domestic meat consumed by the participant. This question is asked if the participant responds 'Yes' to `meat_consumption`.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Chicken (Code: chicken)
- Option 2: Goat/Sheep (Code: goat)
- Option 3: Cow (Code: cow)
- Option 4: Pig (Code: pig)
- Option 5: Turkey (Code: turkey)
- Option 6: Other (Code: other)

---

**Variable Name:** `meat_consumption_freq`
**Question:** How often do you eat domestic meat?
**Description:** This variable captures the frequency of consuming domestic meat. This question is asked if the participant responds 'Yes' to `meat_consumption`.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: A few times in my life (Code: few_life)
- Option 2: A few times in a year (Code: few_year)
- Option 3: A few times in a month (Code: few_month)
- Option 4: A few times in a week (Code: few_week)
- Option 5: Every day (Code: daily)

---

**Variable Name:** `bushmeat_consumption`
**Question:** Do you eat meat from bush animals?
**Description:** This variable captures whether the participant consumes meat from bush animals.
**Type of Data:** Single-select (Yes/No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `bushmeat_animals`
**Question:** Which bushmeat have you eaten in the last 12 months?
**Description:** This variable captures the types of bushmeat consumed by the participant. This question is asked if the participant responds 'Yes' to `bushmeat_animals`.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Rabbit (Code: rabbit)
- Option 2: Giant pouched rat (Code: giant_rat)
- Option 3: Grasscutter (Code: grasscutter)
- Option 4: Monkey (Code: monkey)
- Option 5: Porcupine (Chuku chuku) (Code: porcupine)
- Option 6: Squirrel (Code: squirrel)
- Option 7: Other rats (Code: rat_other)
- Option 8: Deer (Duiker/Antelope/Bush goat) (Code: deer)
- Option 9: Snake (Code: snake)
- Option 10: Birds (Code: birds)
- Option 11: Shrew (Code: shrew)
- Option 12: None (Code: none)
- Option 13: Other (Code: other)

---

**Variable Name:** `bushmeat_freq`
**Question:** How often do you eat meat from animals in the bush?
**Description:** This variable captures the frequency of consuming bushmeat. This question is asked if the participant responds 'Yes' to `bushmeat_animals`.

**Type of Data:** Single-select
**Options for Responses:**
- Option 1: A few times in my life (Code: few_life)
- Option 2: A few times in a year (Code: few_year)
- Option 3: A few times in a month (Code: few_month)
- Option 4: A few times in a week (Code: few_week)
- Option 5: Every day (Code: daily)

---

**Variable Name:** `meat_avoided`
**Question:** Are there any animals you do not eat?
**Description:** This variable captures whether the participant avoids eating certain animals.
**Type of Data:** Single-select (Yes/No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `meat_avoided_animals`
**Question:** What animals will you not eat?
**Description:** This variable captures the specific animals that the participant avoids eating. This question is asked if the participant responds 'Yes' to avoiding certain animals.
**Type of Data:** Free-text

#### 4.1.4.8 Rodent consumption and handling.

**Variable Name:** `current_rodent_consumption`
**Question:** Do they currently eat rat?
**Description:** This variable captures whether the participant currently consumes rat as part of their diet.
**Type of Data:** Single-select (Yes/No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `past_rodent_consumption`
**Question:** Have they ever eaten rat?
**Description:** This variable captures whether the participant has ever consumed rat in the past.
**Type of Data:** Single-select (Yes/No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `rodent_consumption`
**Question:** Why do you eat rats?
**Description:** This variable captures the reasons why the participant eats rats. This question is asked if the participant currently eats rats or has eaten rats in the past.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: They taste good (Code: taste)
- Option 2: They are important for my nutrition (Code: nutrition)
- Option 3: I am hungry (Code: hunger)
- Option 4: They are available (Code: availability)
- Option 5: They are cheap compared to other meat (Code: cheap)
- Option 6: It is part of my culture (Code: cultural)
- Option 7: Other reason (Code: other)

---

**Variable Name:** `rodent_eat_other`
**Question:** Specify other
**Description:** This variable captures additional reasons for eating rats if 'Other' is selected in `rodent_consumption`.
**Type of Data:** Free-text

---

**Variable Name:** `rodent_consumption_hunger`
**Question:** If you didn't eat rats would you go hungry?
**Description:** This variable captures whether the participant would go hungry if they didn't eat rats. This question is asked if "Yes" is selected in `rodent_consumption`.
**Type of Data:** Single-select (Yes/No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `sell_rodent`
**Question:** Have you ever sold rats?
**Description:** This variable captures whether the participant has ever sold rats.
**Type of Data:** Single-select (Yes/No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `sell_rodent_location`
**Question:** Where do you sell rats?
**Description:** This variable captures the locations where the participant sells rats. This question is asked if "Yes" is selected in `sell_rodent`.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Within the community (Code: community)
- Option 2: In markets outside of the community (Code: outside_community)
- Option 3: In cities (Code: cities)
- Option 4: Other locations (Code: other)

---

**Variable Name:** `sell_rodent_importance`
**Question:** What contribution to your income is the money you make from selling rats?

**Description:** This variable captures the importance of the income derived from selling rats to the participant's overall income.
**Type of Data:** Single-select (Small/Medium/Large)
**Options for Responses:**
- Option 1: Small (Code: small)
- Option 2: Medium (Code: medium)
- Option 3: Large (Code: large)

---

**Variable Name:** `sell_rodent_condition`
**Question:** What is the condition of rats you sell?
**Description:** This variable captures the condition of the rats sold by the participant. This question is asked if "Yes" is selected in `sell_rodent`.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Alive (Code: alive)
- Option 2: Raw (whole animal) (Code: raw_whole_animal)
- Option 3: Raw (butchered animal) (Code: raw_butchered_animal)
- Option 4: Dried (Code: dried)
- Option 5: Cooked (whole animal) (Code: cooked_whole)
- Option 6: Cooked (butchered animal) (Code: cooked_butchered)
- Option 7: Other (Code: other)

---

**Variable Name:** `sell_mastomys`
**Question:** Do you ever sell *Mastomys natalensis* (the multimammate rat)?
**Description:** This variable captures whether the participant ever sells *Mastomys natalensis*.
**Type of Data:** Single-select (Yes/No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `sell_mastomys_condition`
**Question:** What is the condition of *Mastomys natalensis* you sell?
**Description:** This variable captures the condition of the *Mastomys natalensis* sold by the participant. This question is asked if "Yes" is selected in `sell_mastomys`.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Alive (Code: alive)
- Option 2: Raw (whole animal) (Code: raw_whole_animal)
- Option 3: Raw (butchered animal) (Code: raw_butchered_animal)
- Option 4: Dried (Code: dried)
- Option 5: Cooked (whole animal) (Code: cooked_whole)
- Option 6: Cooked (butchered animal) (Code: cooked_butchered)
- Option 7: Other (Code: other)

**4.1.4.9 Administered rodent products for health or cultural practices.** Repeat question group, this is only completed if the individual has been involved in administering rodent products for healthcare or cultural practices.

## Repeat Section: Administering rodent products for health or cultural practices

**Variable Name:** `name_health_cultural`
**Question:** What is the name of the practice?
**Description:** This variable captures the name of the cultural health practice involving the use of rats.
**Type of Data:** Free-text

**Variable Name:** `rodent_species`
**Question:** What rat species is this information about?
**Description:** This variable captures the specific rat species relevant to the cultural health practice.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Ntaali (Code: ntaali)
- Option 2: Ektupo (Code: ektupo)
- Option 3: Nkapfu (Code: nkapfu)
- Option 4: Oginyi (Code: oginyi)
- Option 5: Ikpo (Code: ikpo)
- Option 6: Okoror (Code: okoror)
- Option 7: Oriku (Code: oriku)
- Option 8: Odupfu (Code: odupfu)
- Option 9: Ekwata (Code: ekwata)
- Option 10: Kpev (Code: kpev)
- Option 11: Agundu (Code: agundu)
- Option 12: Julie (Code: julie)
- Option 13: Akpezinga/Abrazinga (Code: akpezinga)
- Option 14: Mbam/Ngbam (Code: mbam)
- Option 15: Nyongu (Code: nyongu)
- Option 16: Sam (Code: sam)
- Option 17: Agbacha (Code: agbacha)
- Option 18: Torhe (Code: torhe)
- Option 19: Fashion (Code: fashion)
- Option 20: Ubina (Code: ubina)
- Option 21: Irom (Code: irom)
- Option 22: Imanava (Code: imanava)

**Variable Name:** `part_of_rodent`
**Question:** What parts of the rat were used for this practice?
**Description:** This variable captures the parts of the rat utilized in the cultural health practice.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Meat of rat (Code: meat)
- Option 2: Skin of rat (Code: skin)
- Option 3: Bones/teeth/claws of rat (Code: hard_part)
- Option 4: Whole rat (Code: whole_animal)
- Option 5: Organs of the rat (Code: internal_organs)
- Option 6: Faeces of the rat (Code: faeces)
- Option 7: Fat of the rat (Code: fat)
- Option 8: Fur of the rat (Code: fur)
- Option 9: Rat blood (Code: blood)
- Option 10: Other (Code: other)

**Variable Name:** `purpose_of_rodent`
**Question:** What was the purpose of using this part?
**Description:** This variable captures the purpose behind using the specified part of the rat in the cultural health practice.
**Type of Data:** Free-text

**Variable Name:** `prepare_rodent`
**Question:** How was the rat prepared?
**Description:** This variable captures the method used to prepare the rat for the cultural health practice.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Live (Code: live)
- Option 2: Raw (Code: raw)
- Option 3: Passive heat (under sun) (Code: passive_heat)
- Option 4: Direct heat (above fire) (Code: direct_heat)
- Option 5: Liquor (Code: liquor)
- Option 6: Other (Code: other)
- Option 7: Don't know (Code: unknown)

---

**Variable Name:** `administering_rodent`
**Question:** How was the rat prescribed/administered?
**Description:** This variable captures how the rat was prescribed or administered in the cultural health practice.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Oral (Code: oral)
- Option 2: Topical (skin) (Code: topical_skin)
- Option 3: Topical (eye) (Code: topical_eye)
- Option 4: Topical (inhaled) (Code: topical_inhaled)
- Option 5: Enema (Code: enema)
- Option 6: Subcutaneous (Code: subcutaneous)
- Option 7: Intravenous (Code: intravenous)
- Option 8: Other (Code: other)
- Option 9: Don't know (Code: unknown)

**End of administering rodent products repeat**

**4.1.4.10 Prepared rodent products for health or cultural practices.** Repeat question group. Only completed if the individual has reported being involved in the preparation of rodent products for healthcare or cultural practices.

## Repeat Section: Preparing rodent products for health or cultural practices

**Variable Name:** `prepared_health_cultural`
**Question:** Have you ever prepared a rat for use in a cultural or health practice?
**Description:** This variable captures whether the respondent has ever prepared a rat for use in a cultural or health practice.
**Type of Data:** Single-select (Yes/No)
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `name_health_cultural_prep`
**Question:** What is the name of the practice?
**Description:** This variable captures the name of the cultural or health practice involving the prepared rat.
**Type of Data:** Free-text

---

**Variable Name:** `rodent_species_prep`
**Question:** What rat species is this information about?
**Description:** This variable captures the specific rat species relevant to the cultural or health practice.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Ntaali (Code: ntaali)
- Option 2: Ektupo (Code: ektupo)
- Option 3: Nkapfu (Code: nkapfu)
- Option 4: Oginyi (Code: oginyi)
- Option 5: Ikpo (Code: ikpo)
- Option 6: Okoror (Code: okoror)
- Option 7: Oriku (Code: oriku)
- Option 8: Odupfu (Code: odupfu)
- Option 9: Ekwata (Code: ekwata)
- Option 10: Kpev (Code: kpev)
- Option 11: Agundu (Code: agundu)
- Option 12: Julie (Code: julie)
- Option 13: Akpezinga/Abrazinga (Code: akpezinga)
- Option 14: Mbam/Ngbam (Code: mbam)
- Option 15: Nyongu (Code: nyongu)
- Option 16: Sam (Code: sam)
- Option 17: Agbacha (Code: agbacha)
- Option 18: Torhe (Code: torhe)
- Option 19: Fashion (Code: fashion)
- Option 20: Ubina (Code: ubina)
- Option 21: Irom (Code: irom)
- Option 22: Imanava (Code: imanava)

---

**Variable Name:** `part_of_rodent_prep`
**Question:** What parts of the rat were used for this practice?
**Description:** This variable captures the parts of the rat utilized in the cultural or health practice.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Meat of rat (Code: meat)
- Option 2: Skin of rat (Code: skin)
- Option 3: Bones/teeth/claws of rat (Code: hard_part)
- Option 4: Whole rat (Code: whole_animal)
- Option 5: Organs of the rat (Code: internal_organs)
- Option 6: Faeces of the rat (Code: faeces)
- Option 7: Fat of the rat (Code: fat)
- Option 8: Fur of the rat (Code: fur)

- Option 9: Don't know (Code: unknown)
- Option 10: Other (Code: other)

---

**Variable Name:** `purpose_of_rodent_prep`
**Question:** What was the purpose of using this part?
**Description:** This variable captures the purpose behind using the specified part of the rat in the cultural or health practice.
**Type of Data:** Free-text

---

**Variable Name:** `prepare_rodent_prep`
**Question:** How was the rat prepared?
**Description:** This variable captures the method used to prepare the rat for the cultural or health practice.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Live (Code: live)
- Option 2: Raw (Code: raw)
- Option 3: Passive heat (under sun) (Code: passive_heat)
- Option 4: Direct heat (above fire) (Code: direct_heat)
- Option 5: Liquor (Code: liquor)
- Option 6: Other (Code: other)

---

**Variable Name:** `administering_rodent_prep`
**Question:** How was the rat prescribed/administered?
**Description:** This variable captures how the rat was prescribed or administered in the cultural or health practice.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Oral (Code: oral)
- Option 2: Topical (skin) (Code: topical_skin)
- Option 3: Topical (eye) (Code: topical_eye)
- Option 4: Topical (inhaled) (Code: topical_inhaled)
- Option 5: Enema (Code: enema)
- Option 6: Subcutaneous (Code: subcutaneous)
- Option 7: Intravenous (Code: intravenous)
- Option 8: Other (Code: other)

**End of preparing rodent products repeat**

---

---

**4.1.4.11 Rodent Contact Sheet.** The rodent contact sheet is a paper administered survey where interviewees report their known and recalled contacts with rodents in the last year. Data is transcribed into a separate google sheets document but for record retention photographs are uploaded alongside the individuals questionnaire.

**Image:** `rc_year_p1`
**Description:** Take a photo of the first page of the participant's last year rodent contact sheet.
**Additional Instructions:** Ensure the image is clear and readable. Maximum image size: 1024 pixels.

---

**Image:** `rc_year_p2`
**Description:** Take a photo of the second page of the participant's last year rodent contact sheet.
**Additional Instructions:** Ensure the image is clear and readable. Maximum image size: 1024 pixels.

---

**Image:** `rc_year_p3`
**Description:** Take a photo of the third page of the participant's last year rodent contact sheet.
**Additional Instructions:** Ensure the image is clear and readable. Maximum image size: 1024 pixels.

---

**Image:** `rc_year_p4`
**Description:** Take a photo of the fourth page of the participant's last year rodent contact sheet.
**Additional Instructions:** Ensure the image is clear and readable. Maximum image size: 1024 pixels.

---

**Variable Name:** `excreta_year`
**Question:** In the last year have you come into contact with the urine or faeces of a rat?
**Description:** This variable captures whether the respondent has come into contact with the urine or faeces of a rat in the last year.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Don't know (Code: unknown)

---

**Variable Name:** `excreta_location`
**Question:** Was this contact in the agricultural areas, somewhere you sleep, or somewhere else?
**Description:** This variable captures the locations where the contact with rat urine or faeces occurred.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Agricultural area (Code: fields)
- Option 2: Household (Code: house)
- Option 3: Yam barn (Code: barn)
- Option 4: Other (Code: other)

---

**Variable Name:** `excreta_location_other`
**Question:** Specify other
**Description:** This variable allows the respondent to specify other locations where the contact with rat urine or faeces occurred.
**Type of Data:** Free-text

---

**Variable Name:** `excreta_cleaning`
**Question:** Do you ever clean up or remove the rat faeces when you see it?
**Description:** This variable captures whether the respondent cleans up or removes rat faeces when they see it.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)
- Option 3: Don't know (Code: unknown)

---

**Variable Name:** `excreta_cleaning_method`
**Question:** How do you do this?
**Description:** This variable captures the methods used by the respondent to clean up or remove rat faeces.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Brush it out of the house (Code: brush)
- Option 2: Remove it with my hands (Code: hand)
- Option 3: Use water to wash it away (Code: water)
- Option 4: Other (Code: other)

**Variable Name:** `excreta_cleaning_other`
**Question:** Specify other
**Description:** This variable allows the respondent to specify other methods used to clean up or remove rat faeces.
**Type of Data:** Free-text

#### 4.1.4.12 Awareness of rodent associated diseases.

**Variable Name:** `rodent_diseases`
**Question:** Are you aware that people can get diseases or sicknesses spread to people by rats?
**Description:** This variable captures whether the respondent is aware that people can get diseases or sicknesses spread to people by rats. If the respondent answers "Yes" to this question, they will be prompted to specify the names of these diseases.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `rodent_diseases_name`
**Question:** What are the names of these diseases?
**Description:** This variable captures the names of diseases spread to people by rats, if the respondent is aware of any. If the respondent selects "Lassa fever" as one of the diseases, they will be prompted to provide more information about their knowledge of Lassa fever.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Malaria (Code: malaria)
- Option 2: Typhoid (Code: typhoid)
- Option 3: Ebola (Code: ebola)
- Option 4: Lassa fever (Code: lassa)
- Option 5: Mpox/Monkeypox (Code: mpox)
- Option 6: Leptospirosis (Code: leptospirosis)
- Option 7: Leishmaniasis (Code: leishmaniasis)
- Option 8: Scrub typhus/Spotted fever/Rickettsial disease (Code: rickettsial)
- Option 9: Stomach problems (Code: stomach_symptoms)
- Option 10: Don't know (Code: unknown)
- Option 11: Other (Code: other)

---

**Variable Name:** `rodent_diseases_other`
**Question:** Specify other
**Description:** This variable allows the respondent to specify other diseases spread to people by rats.
**Type of Data:** Free-text

---

**Variable Name:** `lassa_disease_aware`
**Question:** Have you heard about a disease called Lassa fever?
**Description:** This variable captures whether the respondent has heard about a disease called Lassa fever. If the respondent answers "Yes" to this question or selects "Lassa fever" in the previous question, they will be prompted to provide more information about their knowledge of Lassa fever.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `lassa_source`
**Question:** Where have you heard about Lassa fever?
**Description:** This variable captures the sources from which the respondent has heard about Lassa fever.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Television (Code: television)
- Option 2: Radio (Code: radio)
- Option 3: Social media (Code: social_media)
- Option 4: Pamphlets/Posters (Code: pamphlets_posters)
- Option 5: Newspapers (Code: newspapers)
- Option 6: Hospital or health centre (Code: hospital_or_health_centre)
- Option 7: Place of worship (Code: place_of_worship)
- Option 8: Government sources (Code: government_sources)
- Option 9: School/University (Code: school_university)
- Option 10: Word of mouth (Code: word_of_mouth)
- Option 11: Other (Code: other)

---

**Variable Name:** `lassa_source_other`
**Question:** Specify other
**Description:** This variable allows the respondent to specify other sources from which they have heard about Lassa fever.

**Type of Data:** Free-text

---

**Variable Name:** `lassa_infection_source`
**Question:** How can humans get infected with Lassa fever?
**Description:** This variable captures how humans can get infected with Lassa fever.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Don't know (Code: dont_know)
- Option 2: Contact with rats (Code: contact_rats)
- Option 3: Contact with people (Code: contact_people)
- Option 4: Dirty environments (Code: dirty_environments)
- Option 5: Witchcraft (Code: witchcraft)
- Option 6: Weather (Code: weather)
- Option 7: Other (Code: other)

---

**Variable Name:** `human_lassa_infection_other`
**Question:** Specify other
**Description:** This variable allows the respondent to specify other ways humans can get infected with Lassa fever.
**Type of Data:** Free-text

---

**Variable Name:** `rodent_contact_lassa`
**Question:** What type of contact with rats can spread Lassa fever?
**Description:** This variable captures the types of contact with rats that can spread Lassa fever.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Eating rats (Code: consumption_rat)
- Option 2: Being scratched/bitten by rats (Code: rat_wound)
- Option 3: Touching rats (direct contact) (Code: touch_rat)
- Option 4: Contact with their faeces or urine (indirect contact) (Code: contact_excreta)
- Option 5: Other (Code: other)

---

**Variable Name:** `rodent_contact_lassa_other`
**Question:** Specify other
**Description:** This variable allows the respondent to specify other types of contact with rats that can spread Lassa fever.
**Type of Data:** Free-text

---

**Variable Name:** `rodent_species_lassa`
**Question:** Which type of rats can spread Lassa fever?
**Description:** This variable captures which type of rats can spread Lassa fever.
**Type of Data:** Free-text

---

**Variable Name:** `rodent_species_lassa_explicit`
**Question:** Do any of these rats spread Lassa fever?
**Description:** This variable captures whether any of the specified rat species spread Lassa fever.
**Type of Data:** Multiple-select
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `lassa_diseases_other`
**Question:** Specify other
**Description:** This variable allows the respondent to specify other diseases spread to people by rats.
**Type of Data:** Free-text

**4.1.4.13 Under-12 demographics.** These questions are only asked of individuals under the age of 12 who will only be providing a DBS.

**Variable Name:** `child_first_name`
**Question:** What is the first name of this child?
**Type of Data:** Free-text

---

**Variable Name:** `child_surname`
**Question:** What is the surname of this child?
**Type of Data:** Free-text

---

**Variable Name:** `child_under_1`
**Question:** Is this child younger than 1 year old?
**Description:** This variable captures whether the child is younger than 1 year old. If `child_under_1` is 'yes', the age of the child will be captured in months using the variable `age_in_months`. If `child_under_1` is 'no', the age will be captured in years using the variable `age_under_12`.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: no)

---

**Variable Name:** `age_under_12`
**Question:** Age in years
**Description:** This variable captures the age of the child in years if they are older than 1 year old. Only asked when `child_under_1` is 'no'.
**Type of Data:** Integer

---

**Variable Name:** `age_in_months`
**Question:** How old is this child in months?
**Description:** This variable captures the age of the child in months if they are younger than 1 year old. Only asked when `child_under_1` is 'yes'.
**Type of Data:** Integer

---

**Variable Name:** `sex_under_12`
**Question:** Sex
**Description:** This variable captures the sex of the child.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Female (Code: female)
- Option 2: Male (Code: male)

---

**Variable Name:** `community_pob_under_12`
**Question:** Is the community we are currently in your place of birth?
**Description:** This variable captures whether the community the child is currently in is their place of birth.
**Type of Data:** Single-select
**Options for Responses:**
- Option 1: Yes (Code: yes)
- Option 2: No (Code: np)

---

**Variable Name:** `country_of_birth_under_12`
**Question:** What country were you born in?
**Description:** This variable captures the country of birth of the child if the current community is not their place of birth. Asked when `community_pob_under_12` is 'no'.
**Type of Data:** Free-text

---

**Variable Name:** `state_of_birth_under_12`
**Question:** What state were you born in?
**Description:** This variable captures the state of birth of the child if the current community is not their place of birth. Asked when `community_pob_under_12` is 'no'.
**Type of Data:** Free-text

---

**Variable Name:** `region_of_birth_under_12`
**Question:** What LGA were you born in?
**Description:** This variable captures the LGA of birth of the child if the current community is not their place of birth. Asked when `community_pob_under_12` is 'no'.
**Type of Data:** Free-text

**Variable Name:** `village_of_birth_under_12`
**Question:** What is the name of the village you were born in?
**Description:** This variable captures the village of birth of the child if the current community is not their place of birth. Asked when `community_pob_under_12` is 'no'.
**Type of Data:** Free-text

---

**Variable Name:** `year_arrived`
**Question:** What year did you move to this community?
**Description:** This variable captures the year the child moved to the current community if it's different from their place of birth.
**Type of Data:** Integer

#### 4.1.4.14 Consent and DBS photographs.

**Variable Name:** `consent_p1`
**Question:** Take a photo of the signature page of the consent form.
**Description:** This image is a photograph of the signature page of the consent form signed by the participant or their legal guardian, indicating their consent to participate in the study.
**Conditions:** This image is required for all participants as part of the consent process.
**Maximum Image Size:** 640 pixels

---

**Variable Name:** `blood_spot`
**Question:** Take a photo of the blood spot card, with its label attached that will be used for this participant.
**Description:** This image is a photograph of the blood spot card with its label attached. The blood spot card will be used for collecting blood samples from the participant. This image is required if the participant has consented to provide a blood sample.
**Conditions:** This image is required if the participant has consented to provide a blood sample. It is triggered when the participant indicates their consent for blood sample collection.
**Maximum Image Size:** 640 pixels

---

**Variable Name:** `confirm_blood_spot`
**Question:** Type the label of the blood spot card here.
**Description:** This text field is used to input the label of the blood spot card attached to the blood sample collected from the participant. This is used for confirmation and matching individuals to their sample. It is required when the participant consents to provide a blood sample.
**Conditions:** This field is required if the participant has consented to provide a blood sample. It is triggered when the participant indicates their consent for blood sample collection.

### 4.1.5 Individual questionnaire data checks:

As data checks are added the functions and their purposes will be recorded here.

Data checks are performed on the `i_df_list` object which is read in `.rds` format after being produced in `main\01_rename_variables_i.R`. All data checks and associated cleaning steps are performed in `main\02_clean_data_i.R`

#### 4.1.5.1 Check 1: Unique numbering of individuals

**Description:** This check ensures that each individual in the dataset has a unique identifier, which is a combination of the household ID and the participant ID. If any duplicate individual IDs are found, they are returned for further correction.

**Arguments:**

- `df`: The dataframe containing household data. Default is `i_df_list$individual_main`.

**Returns:**

- If all individual IDs are unique, the function will overwrite the participant ID (`i_df_list$household_main$participant_`) column with the combined household and participant IDs, and a green message confirming this action will be displayed.
- If duplicate individual IDs are found, a red message will indicate that correction is needed prior to overwriting participant IDs, and a dataframe (`duplicated_ids`) containing the duplicated individual IDs will be returned for further correction.

**Code:**

```
# Check unique numbering of individuals
check_unique_id_i <- function(df = i_df_list$individual_main) {

    # Combine household ID and participant ID to create individual ID
    individual_id <- paste(df$household_id, df$participant_id, sep = "-")

    if (nrow(df) == length(unique(individual_id))) {
        # If all individual IDs are unique, overwrite participant ID with
        # individual ID
        message(crayon::green("All individual IDs are unique"))
        df$participant_id <- individual_id
        message(crayon::green("Individual IDs (combined household and participant ID) have overwritten participant IDs"))
    } else {
        # If duplicate individual IDs are found, return duplicated IDs for
        # correction
        message(crayon::red("Individual IDs are not unique, needs correction prior to overwriting the participant ID. Duplicated

        duplicated_ids <- df %>%
            select(household_id, participant_id, `_index`) %>%
            # Create individual ID by combining household ID and participant ID
        mutate(individual_id = paste(household_id, participant_id, sep = "-")) %>%
            # Filter duplicated individual IDs
        filter(individual_id %in% individual_id[duplicated(individual_id)])

        return(duplicated_ids)
    }
}
```

#### 4.1.5.2 Check 2: Individual questionnaire household IDs match to household questionnaire IDs

**Description:** This check verifies whether the household IDs in the individual questionnaire data match those in the household questionnaire data (`hh_df_list$household_main`). It identifies households with missing individual or household questionnaires and provides details on the mismatches.

**Arguments:**

- `df`: The dataframe containing individual questionnaire data. Default is `i_df_list$individual_main`.

**Returns:**

- A list containing two vectors:
  - `no_h_questionnaires`: Household IDs from the individual questionnaire data that are missing in the household questionnaire data.
  - `no_i_questionnaires`: Household IDs from the household questionnaire data that are missing in the individual questionnaire data.

**Code:**

```
# Check individual questionnaire household IDs match household questionnaire
# IDs
check_match <- function(df = i_df_list$individual_main) {

    no_h_questionnaires <- vector()  # Initialize vector to store missing household IDs in individual questionnaire data
    no_i_questionnaires <- vector()  # Initialize vector to store missing household IDs in household questionnaire data

    # Check if individual questionnaire household IDs match household
    # questionnaire IDs
    matched_hh <- tibble(in_i = as.character(df$household_id), matched_hh = as.character(df$household_id) %in%
        as.character(hh_df_list$household_main$household_id))
    matched_i <- tibble(in_hh = as.character(hh_df_list$household_main$household_id),
        matched_i = as.character(hh_df_list$household_main$household_id) %in% as.character(df$household_id)) %>%
        # Left join to count the number of individuals per household
    left_join(df %>%
        group_by(household_id) %>%
        summarise(n = n()), by = c(in_hh = "household_id"))

    # Check if all individual questionnaires come from sampled households
    if (all(matched_hh$matched_hh) == TRUE) {
        message(crayon::green("Check 1: PASS Individual questionnaires come from sampled households\n\n"),
            crayon::green("All completed individual questionnaires have completed household level questionnaires based on their
    } else {
        # Display message for individual questionnaires from unsampled
        # households
        message(crayon::red("Check 1: FAIL Individual questionnaires come from unsampled households\n\n"),
            crayon::red("There is a mismatch between completed individual questionnaires and household level questionnaires base
            crayon::red(paste("Household questionnaires from", matched_hh %>%
                filter(matched_hh == FALSE) %>%
                distinct(in_i) %>%
                nrow(), "household IDs (in the individual data) are missing\n")),
            crayon::red(paste("This has resulted in", matched_hh %>%
                filter(matched_hh == FALSE) %>%
                nrow(), "individual questionnaires being unable to be linked to household level data\n")),
            crayon::red("The household IDs of those without household questionnaires are stored in `match_questionnaires$no_h_qu
    }

    # Store missing household IDs in individual questionnaire data
    no_h_questionnaires <- matched_hh %>%
        filter(matched_hh == FALSE) %>%
        distinct(in_i) %>%
        pull(in_i)

    # Check if all households have at least one associated individual
    # questionnaire
    if (all(matched_i$matched_i) == TRUE) {
        message(crayon::green("Check 2: PASS Households have at least one associated individual questionnaire\n\n"),
            crayon::green("The following table shows the number of individuals who have completed questionnaires within a househ
                          The aim is for 3 individuals per household\n"),
            crayon::green(paste0(capture.output(data.frame(matched_i %>%
                rename(n_individuals = n) %>%
                group_by(n_individuals) %>%
                summarise(n_questionnaires = n()))), collapse = "\n")))
    } else {
        # Display message for households with no associated individual
        # questionnaires
```

```
        message(crayon::red("Check 2: FAIL Some households have no associated individual questionnaires\n\n"),
            crayon::red(paste0("Households come from the following villages: ", combine_words(unique(str_split(matched_i$in_hh,
                "-", simplify = TRUE)[, 1]))), "\n"), crayon::red(paste0("Households with no individual questionnaires are shown
            crayon::red(paste0(capture.output(data.frame(matched_i %>%
                filter(is.na(n)) %>%
                mutate(village = str_sub(in_hh, end = 3)) %>%
                group_by(village) %>%
                summarise(n_households = n()))), collapse = "\n")), crayon::red("\nThe household IDs of those without individual

        # Store missing household IDs in household questionnaire data
        no_i_questionnaires <- matched_i %>%
            filter(is.na(n)) %>%
            arrange(in_hh) %>%
            pull(in_hh)

    }

    return(list(no_h_questionnaires = no_h_questionnaires, no_i_questionnaires = no_i_questionnaires))

}

# Execute the function and store the results
match_questionnaires <- check_match(df = i_df_list$individual_main)
```

#### 4.1.5.3 Check 3: Assessing demographic missingness Description:

This check assesses the completeness of demographic data by identifying missing values in `age`, `first_name`, `surname`, and `sex` fields.

**Arguments:**
None

**Returns:**

- `missing_age`: IDs of individuals with missing age information.
- `missing_names`: IDs of individuals with missing first name or surname information.
- `missing_sex`: IDs of individuals with missing sex information.

**Code:**

```
# Assessing missing age
missing_age <- i_df_list$individual_main %>%
    filter(is.na(age)) %>%
    pull(id)

# Assessing missing names
missing_names <- i_df_list$individual_main %>%
    filter(is.na(first_name) | is.na(surname)) %>%
    pull(id)

# Assessing missing sex
missing_sex <- i_df_list$individual_main %>%
    filter(is.na(sex)) %>%
    pull(id)
```

#### 4.1.5.4 Check 4: Assessing DBS association Description:

This check assesses whether the dried blood spot (DBS) sample has been accurately recorded in the questionnaire. It identifies missing DBS IDs and missing DBS images for participants who consented to DBS sampling. Additionally, it verifies whether the DBS IDs match the expected IDs based on participant information. These checks are only performed on individuals who provided consent for the DBS (`b_consent` == "yes").

**Arguments:**
- `df`: The dataframe containing individual questionnaire data. Default is `i_df_list$individual_main`

**Returns:**
- `missing_dbs_id`: IDs of individuals with missing DBS IDs. - `missing_dbs_img`: IDs of individuals with missing DBS images. - `dbs_mismatch`: IDs of individuals with mismatches between DBS IDs and expected participant IDs.

```
# Assessing missing DBS ID
missing_dbs_id <- i_df_list$individual_main %>%
  filter(b_consent == "yes" & is.na(confirm_blood_spot)) %>%
  pull(id)

# Assessing missing DBS image
missing_dbs_img <- i_df_list$individual_main %>%
  filter(b_consent == "yes" & is.na(blood_spot)) %>%
  pull(id)

# Function to check DBS ID association
dbs_id_check <- function(df = i_df_list$individual_main) {
  # Filter participants who consented to DBS sampling
  df <- df %>%
    filter(b_consent == "yes")

  participant_id <- df$id
  dbs_id <- df$confirm_blood_spot

  # Compare DBS ID with expected participant ID
  comparable <- (
    # Compare village section of the DBS ID
    str_to_lower(str_sub(participant_id, 1, 3)) == str_to_lower(str_sub(dbs_id, 1, 3)) &
    # Compare household number section of the DBS ID
    str_extract(participant_id, "(?<=\\D|^)\\d{1,3}") == str_extract(dbs_id, "(?<=\\D|^)\\d{1,3}") &
    # Compare participant number section of the DBS ID after removing any additional letters
    str_extract(participant_id, "\\d{1,3}(?=$)") == str_extract(str_replace(dbs_id, "\\D*$", ""), "\\d{1,3}(?=$)")
  )

  dbs_mismatch <- participant_id[!comparable | is.na(comparable)]

  if(length(dbs_mismatch) < 1) {
    message(crayon::green("No mismatches between expected DBS names and participant IDs have been detected"))
  } else {
    message(crayon::red(paste0(length(dbs_mismatch), " mismatches between DBS names and participant IDs have been detected.\n",
                               "These mismatches have been stored in `dbs_mismatch`.")))
  }

  return(dbs_mismatch)
}

# Check DBS ID association
dbs_mismatch <- dbs_id_check(df = i_df_list$individual_main)
```

These records should be compared to the sample inventory document and physical inventory.

#### 4.1.5.5 Assessing place of birth and length of residence. Description:

This section involves cleaning and standardizing the place of birth and residence data in the individual questionnaire dataset. It ensures consistency and accuracy in recording demographic information, including village, region, state, and country of birth and residence. Additionally, it calculates variables related to time since arrival, length of residence, and permanent residency status.

**Arguments:**
- `i_df_list$individual_main`: The dataframe containing individual questionnaire data. - `village_state`: A project wide file stored in `scapes/project_wide_data/village_state.rds` and read in to this section in the `00_libraries.R` file. - `nigeria_states`: A vector of accepted state names. Specified in `00_libraries.R`.

**Code:**

```
# Function to clean and standardize state names
clean_state_names <- function(states, valid_states = nigeria_states) {
```

```r
  # Function to find the closest match for a given string in a list
  find_closest_match <- function(str, valid_list) {
    distances <- sapply(valid_list, stringdist::stringdistmatrix, str)
    closest_index <- which.min(distances)
    return(valid_list[closest_index])
  }
  # Clean and standardize each state name
  cleaned_states <- sapply(states, function(state) {
    if (is.na(state)) {
      return(state)
    } else {
      # Extract the first word as the state name
      state_name <- strsplit(state, " ")[[1]][1]

      # Check if the state name is in the valid list
      if (state_name %in% valid_states) {
        # State name is valid, add "State" if missing
        return(paste(state_name, "State"))
      } else {
        # State name is not valid, find the closest match in the valid list
        closest_match <- find_closest_match(state_name, valid_states)
        # Exclude appending "State" if the closest match is "Federal Capital Territory"
        if (closest_match == "Federal Capital Territory") {
          return(state)
        } else {
          # Return the closest match with "State"
          return(paste(closest_match, "State"))
        }
      }
    }
  })
  return(cleaned_states)
}

# Clean and standardize place of birth and residence data
pob <- i_df_list$individual_main %>%
  select(id, age, date, community_pob, country_of_birth, state_of_birth,
         region_of_birth, village_of_birth, year_arrived, resident_months,
         resident_elsewhere) %>%
  mutate(abbreviation = str_sub(id, end = 3)) %>%
  left_join(village_state %>%
              select(abbreviation, village, lga, state)) %>%
  mutate(state = clean_state_names(state)) %>%
  mutate(village_of_birth = case_when(community_pob == "yes" ~ village,
                                      community_pob == "no" ~ str_to_title(village_of_birth),
                                      is.na(community_pob) ~ as.character(NA)),
         region_of_birth = case_when(community_pob == "yes" ~ lga,
                                     community_pob == "no" ~ str_to_title(region_of_birth),
                                     is.na(community_pob) ~ as.character(NA)),
         state_of_birth =  case_when(community_pob == "yes" ~ clean_state_names(state),
                                     community_pob == "no" & !is.na(state_of_birth) ~
                                       clean_state_names(str_to_title(state_of_birth)),
                                     is.na(community_pob) ~ as.character(NA)),
         country_of_birth = case_when(community_pob == "yes" ~ "Nigeria",
                                      community_pob == "no" ~ str_to_title(country_of_birth),
                                      is.na(community_pob) ~ as.character(NA)),
         time_since_arrival = case_when(is.na(community_pob) ~ as.numeric(NA),
                                        community_pob == "yes" ~ as.numeric(NA),
                                        # If year_arrived is a valid year, calculate time of residency
                                        community_pob == "no" & year_arrived >= 1900 &
                                          year_arrived <= year(Sys.Date()) ~ year(as.Date(date, "%Y_%m_%d")) - year_arrived,
                                        # If year_arrived is less or equal to 120, assume it's years since arrival
                                        community_pob == "no" & year_arrived <= 120 ~ year_arrived,
                                        community_pob == "no" & str_sub(year_arrived, end = 4) >= 1900 &
                                          str_sub(year_arrived, end = 4) <= year(Sys.Date())
                                        ~  year(as.Date(date, "%Y_%m_%d")) - as.numeric(str_sub(year_arrived, end = 4)),
                                        # Handle any other cases with NA
```

```
                                    TRUE ~ as.numeric(NA)),
        tsa_compatible = case_when(is.na(time_since_arrival)|is.na(age) ~ NA,
                                   time_since_arrival <= age ~ TRUE,
                                   time_since_arrival > age ~ FALSE,
                                   TRUE ~ FALSE),
        length_of_residence = case_when(is.na(time_since_arrival)|is.na(tsa_compatible) ~ as.numeric(age),
                                        tsa_compatible == TRUE ~ as.numeric(time_since_arrival),
                                        TRUE ~ as.numeric(NA)),
        # defining permanent resident as <= 6 months away from the village
        permanent_resident = case_when(resident_months >= 6 ~ TRUE,
                                       resident_months < 6 ~ FALSE,
                                       is.na(resident_months) ~ NA)) %>%
  select(id, age, community_pob,
        village_birth = village_of_birth, region_birth = region_of_birth, state_birth = state_of_birth,
        country_birth = country_of_birth, village_residence = village, region_residence = lga,
        state_residence = state, period_residence = length_of_residence, permanent_residence = permanent_resident,
        months_residence_in_year = resident_months, other_residence = resident_elsewhere)
```

**Comments:**

- The `clean_state_names` function standardizes state names in the dataset.
- Various `case_when` statements handle different scenarios related to residency status and duration, ensuring consistency and accuracy in recording demographic information.
- The resulting dataset `pob` contains cleaned and standardized demographic information for analysis.

#### 4.1.5.6 Check 5: Assessing RCS inclusion Description:

This check assesses whether individuals aged 12 and older have an associated Rodent Contact Sheet (RCS). The RCS is a paper form completed by interviewers with participants to report contact with rodents over the last year. Each row of the RCS pertains to a single rodent species as defined by the respondent. There can be up to four sheets of this paper form, denoted by `rc_year_p1` to `rc_year_p4`. The interviewer takes a photo of each sheet.

**Arguments:**
- `df`: The dataframe containing individual questionnaire data. Default is `i_df_list$individual_main`.

**Returns:**
- `missing_rcs`: A vector containing the IDs of individuals who are missing an associated rodent contact sheet.

**Code:**

```
check_rcs <- function(df = i_df_list$individual_main) {
    # Filter individuals aged 12 and older
    rcs <- df %>%
        filter(is.na(age) | age >= 12) %>%
        select(id, rc_year_p1, rc_year_p2, rc_year_p3, rc_year_p4) %>%
        mutate(rcs_present = case_when(!is.na(rc_year_p1) | !is.na(rc_year_p2) |
            !is.na(rc_year_p3) | !is.na(rc_year_p4) ~ TRUE, TRUE ~ FALSE))

    # Identify missing RCS
    missing_rcs <- rcs %>%
        filter(rcs_present == FALSE) %>%
        pull(id)

    if (sum(rcs$rcs_present) == nrow(rcs)) {
        message(crayon::green("All individuals aged 12 and older have an associated Rodent Contact Sheet."))
    } else {
        message(crayon::red(paste0(nrow(rcs %>%
            filter(rcs_present == FALSE)), " individuals are missing an associated Rodent Contact Sheet.\n")),
            crayon::red("The IDs for these individuals are stored in `missing_rcs`."))
    }
```

```
    return(missing_rcs)
}

missing_rcs <- check_rcs(df = i_df_list$individual_main)
```

**Comments:**
- The function checks if individuals aged 12 and older have an associated Rodent Contact Sheet (RCS) by examining the presence of RCS photograph filenames (`rc_year_p1` to `rc_year_p4`) in the dataset.
- If an individual is missing an RCS, their ID is stored in the `missing_rcs` vector for further action.

#### 4.1.5.7 Correcting missingness Description:

This section identifies and compiles information about missing data across this components of the study. It collects various types of missing data, including missing questionnaire IDs, demographic information, consent-related data, and images associated with certain study procedures. The collected data is organized into a dataframe for further analysis and reporting. This is exported as a `.csv` file and shared with the study team to rectify these issues.

**Code:**

```
# Identify missing data ------------------------------------------------

missing_data <- list(
  # Missing household questionnaires IDs from the individual questionnaire data
  missing_h_questionnaire = match_questionnaires$no_h_questionnaires,
  # Missing individual questionnaire IDs from the household questionnaire data
  missing_i_questionnaire = match_questionnaires$no_i_questionnaires,
  # Missing participant IDs from the household data
  participant_id_missing = missing_data$household_id,
  # Missing age data from the individual questionnaire data
  missing_age = missing_age,
  # Missing name data (first name or surname) from the individual questionnaire data
  missing_names = missing_names,
  # Missing sex data from the individual questionnaire data
  missing_sex = missing_sex,
  # Missing DBS IDs from individuals who consented to DBS sampling
  missing_dbs_id = missing_dbs_id,
  # Mismatched DBS IDs between expected and actual IDs
  duplicated_dbs_id = dbs_mismatch,
  # Missing DBS images from individuals who consented to DBS sampling
  missing_dbs_image = missing_dbs_img,
  # Missing RCS images from individuals aged 12 and older
  missing_rcs_image = missing_rcs
) %>%
  enframe(name = "missing") %>%
  unnest(cols = value) %>%
  rename(id = value) %>%
  # Joining with additional data for context
  left_join(
    i_df_list$individual_main %>%
      select(id, interviewer_id, date) %>%
      # Converting interviewer_id to a factor for categorical representation
      mutate(interviewer_id = as_factor(interviewer_id))
  ) %>%
  # Arranging the data for clarity
  arrange(id, interviewer_id, date, missing)

# Write the missing data to a CSV file
write_csv(
  missing_data,
  here("household_questionnaire", "data", "missing", paste0("missing_", Sys.Date(), ".csv"))
)
```

#### 4.1.5.8 Save clean dataframe Description:

This step combines the cleaned individual questionnaire data with the place of birth information and subsets the relevant variables for analysis and reporting purposes. The resulting dataframe includes demographic information, residence details, behavioral factors, health-related data, and other relevant variables. The cleaned dataframe is then saved as an `.RDS` file for further use `scapes\household_questionnaire\data\i_data\i_df_list_cleaned.rds`.

**Code:**

```
clean_i <- i_df_list$individual_main %>%
    left_join(pob %>%
        select(-any_of(c("community_pob", "age"))), by = "id") %>%
    select(`_index`, household_id, participant_id, id, id_confirmed, date, interviewer_id,
        q_consent, b_consent, age, sex, ethnicity, religion, education, village_residence,
        region_residence, state_residence, permanent_residence, months_residence_in_year,
        other_residence, community_pob, village_birth, region_birth, state_birth,
        country_birth, period_residence, non_resident_reason, return_reason, sleep_elsewhere,
        sleep_elsewhere_location, relationship, children_ever, n_children, children_alive,
        children_in_household, income, income_other, income_individual, field_entry,
        field_work_freq, field_work_seasonality, forest_entry, forest_entry_purpose,
        forest_entry_purpose_other, forest_entry_freq, forest_work_seasonality, any_of(starts_with("meat_")),
        any_of(starts_with("bushmeat_")), current_rodent_consumption, past_rodent_consumption,
        rodent_eat_reason, rodent_eat_other, rodent_consumption_hunger, any_of(starts_with("sell_")),
        any_of(starts_with("excreta_")), administered_health_cultural, prepared_health_cultural,
        any_of(contains("disease")), any_of(contains("lassa")), blood_spot, any_of(starts_with("rc"))) %>%
    # Ensure proper data type conversion and remove variable labels
mutate_all(~if (is.labelled(.)) as_factor(.) else .) %>%
    zap_label()

clean_i_list <- list(individual_main = clean_i, individual_hc_use = i_df_list$individual_hc_use,
    individual_hc_prep = i_df_list$individual_hc_prep)

# Save the cleaned dataframe as an RDS file
write_rds(clean_i_list, here("household_questionnaire", "data", "i_data", "i_df_list_cleaned.rds"))
```

Linking IDs to samples?

### 4.1.6 Human serology

### 4.1.7 Rodent trapping

### 4.1.8 Rodent serology/PCR

### 4.1.9 Other

Boundaries of villages - area containing village households and area containing village farms.