POPULATION , SAMPLING

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A population is <u>an entire group about which some information is required to be ascertained.</u> We can have population of heights, weights, haemoglobin levels, events, outcomes, so long as the population is well defined with explicit inclusion and exclusion criteria.
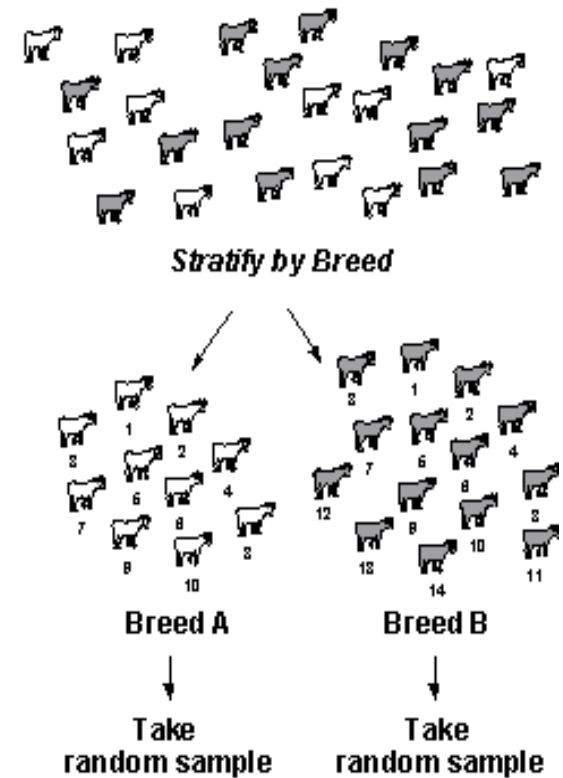
In selecting a population for study, the research question or purpose of the study will suggest a suitable definition of the population to be studied, in terms of location and restriction to a particular age group or occupation.
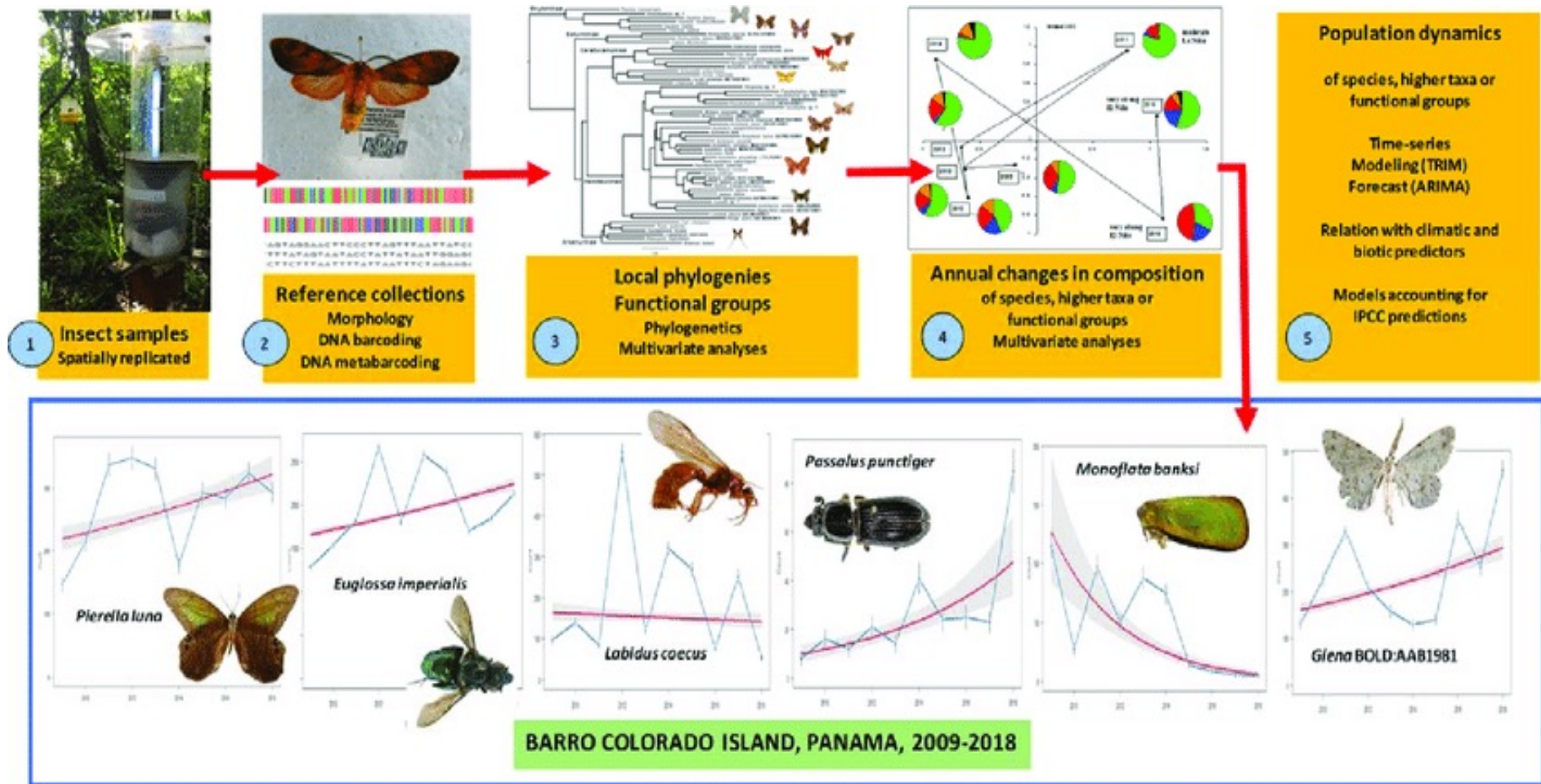

Population

Sampling

Inference
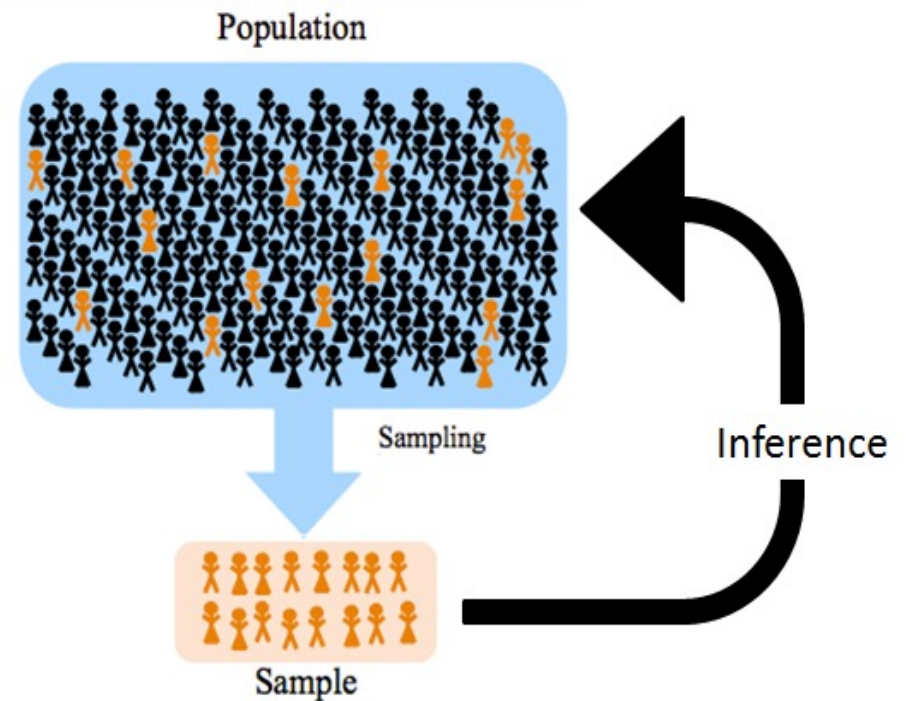
Sample

Populations and samples

In statistics the term *population* is broaden used not only means the people or human residents who live in a certain region, but also refers to other group of living such as animals, insects, and plants. To embark more on this concept, the population can be used for subset specific group for instance, doctor, nurse, patients, children, elderly, and homeless people, pre-weaning and post-weaning calves etc….

However, the population mean is donated by μ (mu) given by probability distribution and the standard deviation is denoted by ς (low case sigma).

Stratify by Breed

Breed A   Breed B

Take random sample   Take random sample

Population dynamics

of species, higher taxa or functional groups

Time-series
Modeling (TRIM)
Forecast (ARIMA)

Relation with climatic and biotic predictors

Models accounting for IPCC predictions

1 Insect samples
Spatially replicated

2 Reference collections
Morphology
DNA barcoding
DNA metabarcoding

3 Local phylogenies
Functional groups
Phylogenetics
Multivariate analyses

4 Annual changes in composition
of species, higher taxa or functional groups
Multivariate analyses

5

Pierella luna

Euglossa imperialis

Labidus coecus

Passalus punctiger

Monoflata banksi

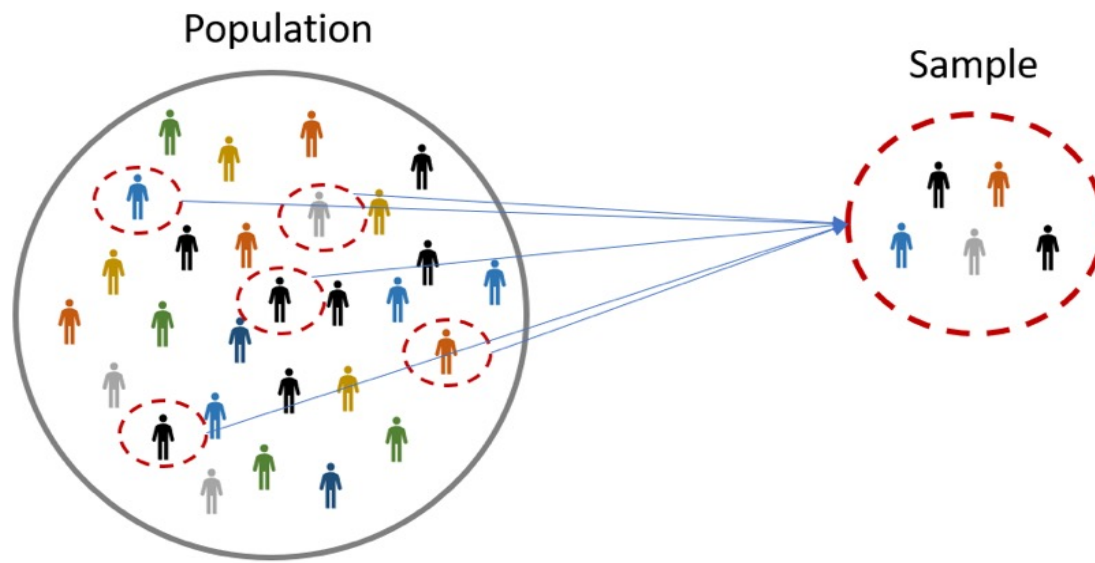Glena BOLD:AAB1981

BARRO COLORADO ISLAND, PANAMA, 2009-2018

Illustration (1): Sample and Population

- Sample and Sampling

- Sample: is the unite or individual that may be chosen for participation in a study (people, families, household, institutions. People are referred to as subjects or participants.

- Sampling: the process of selecting a group of people, events, behaviours, or other elements can be involved for the study.

- In samples design process the questions it ask are what and who is the focus of the study, where, and when it is being done, and why.

-To clarify this by an example: focus on the cigarette-smoking behaviour (what) of the high school seniors (who) in a large metropolitan high school (where). So, this is very important to address our question in the study wants to conduct, as an essential part of the study design or plan it.

Target population

It can be referred to the group or groups derived from a population that a researcher has a desire to select the samples from it. Selecting the sample population is depended on type of study (ie: comparison group of animals with a disease and other group without disease).

Adults, elderlies, or young people
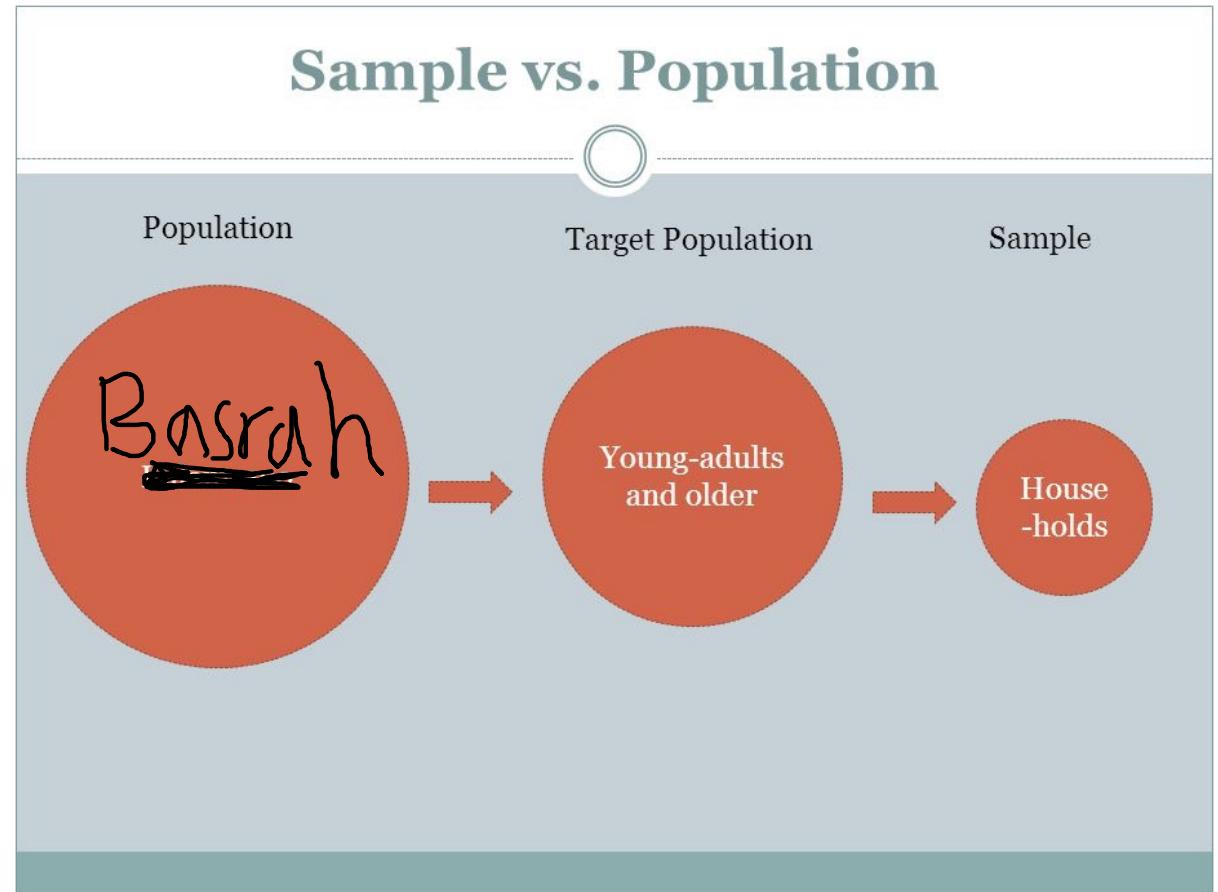
What is the target population?

1. We want to know how many commercial flocks of poultry have birds that are H5N1 positive.

2. We want to conduct a national survey for FMD.

3. We want to know the economic impact of mastitis in goats.

➢ Inclusive criteria- participants in a questionnaire survey would be involved in a study aged 18 and over.
➢ Exclusive criteria- group or persons would be not included in a study,
Example: people who speak neither Spanish and English in USA.

Sampling frame

The sampling frame is the list of the target population from which the sample will be drawn. For example, it would be the list of students from high schools (**who**), the study will be conducted in the school (**where**), the study will be done at the beginning or end of the school year (**when**).

<u>Resemble</u>, the list of the cattle owners who have been registered in the veterinary hospital may be selected for a study survey
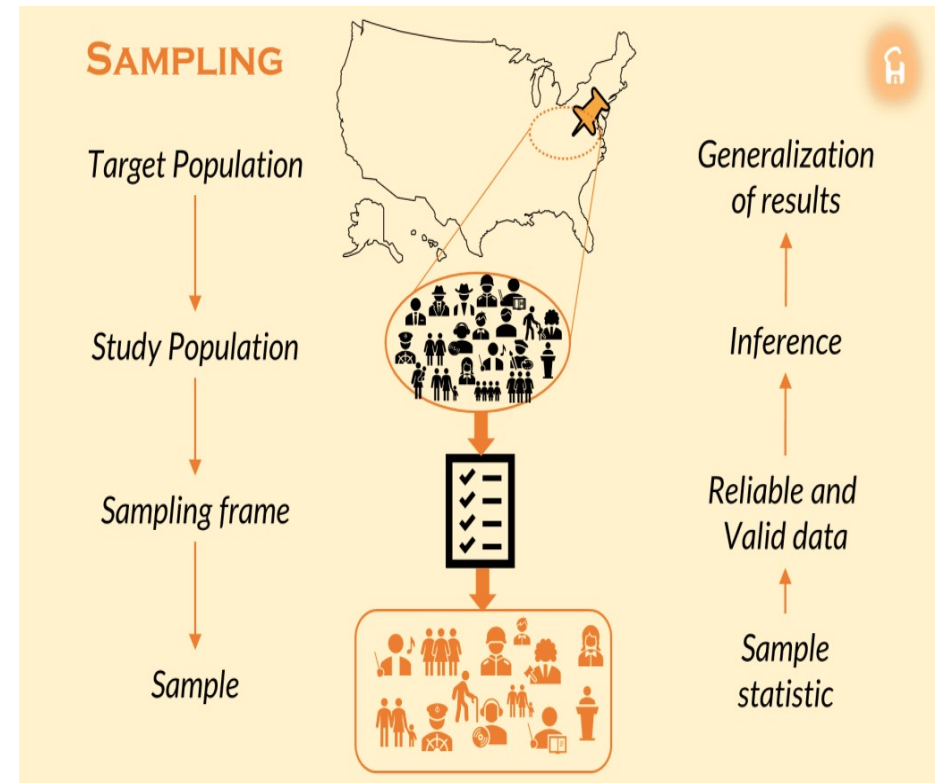
Sampling frame

❑ Complete list of all sampling units in the target population.

❑ Using the sampling frame individual units are then chosen for sampling. By other word who will be included in a study design

There is a problem in Iraq and in Basrah as sampling frames is not available but if yes how accurate is?

Added to that-avoiding repeated the same name of the person or animal that will not fill in sample error

Sampling frame (list of all members)

List of provinces/districts/villages   List of shires/towns

Telephone directories

Street directory

Dog registrations

Horse registrations

Brands register

Cattle tail tag master file

Veterinary Clients

Electronic tag register

Electoral roles

How could a census be used in your region?

Sample – subgroup of total population

- Advantages
  Decreases time, effort and cost
  More thorough investigation than census
- Disadvantages
  Potential representativeness of sample
    Potential representativeness of data
    Effort versus results

Why sample?

★ Gather information on a unite of study but not for every one as is beyond resources of most researcher

★ Disease prevalence/incidence survey

★Questionnaire

• Risk factors for disease

• Knowledge of disease

• Disease control methods

★ Animal populations

Sampling issues

1. When do we sample? ➡️ TIMING

2. What do we sample? ➡️ POPULATION

3. How do we take the samples? ➡️ LOGISTICS

4. How many samples do we take? ➡️ STATISTICS

Ex: Cigarette-smoking behaviour of high school students;

Diarrhoea outbreak affected children under age of five years old
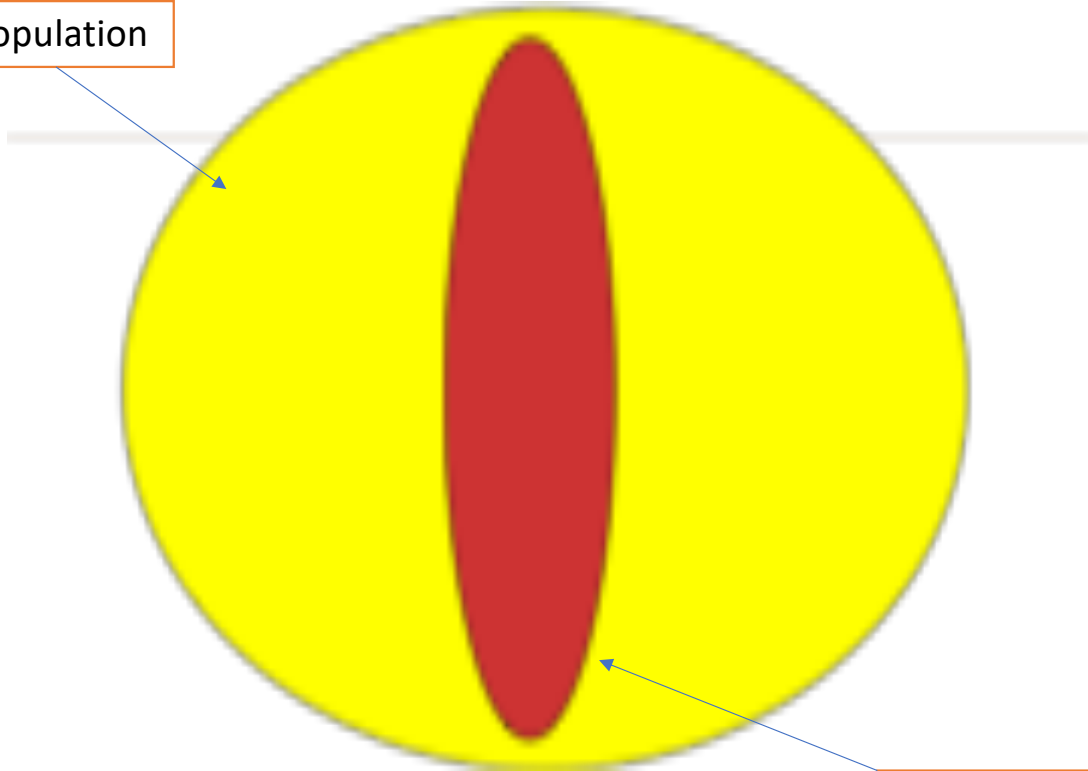
When do we sample?

Timing depends on:
- ❖ Epidemiology Aspects
- . Maternal immunity
- . Incubation time
- . Rate of transmission between herds
- . Intermittent or seasonal shedding
- ❖ Type of sample needed
- . Blood, milk
- . Lymph nodes, specific tissues (BSE: brain)

Target population

Study/Sample population

Sampling frame

★Need a frame for each stage of sampling

★Easier at higher level eg villages

★Needs to contain every member

★No duplications of members

★Uniquely identify all members

Sampling unit

Actual members sampled

1.Individual animals

2.Pen/paddock/group

3.Farm

4.Village

5.District

6.Province

The sample population needs to be representative of the target population

❑ How can we ensure the sample population is representative?

How many respondents does your survey require?

Population size	Confidence level = 95% Margin of error			Confidence level = 99% Margin of error		
	5%	2,5%	1%	5%	2,5%	1%
100	80	94	99	87	96	99
500	217	377	475	285	421	485
1.000	278	606	906	399	727	943
10.000	370	1.332	4.899	622	2.098	6.239
100.000	383	1.513	8.762	659	2.585	14.227
500.000	384	1.532	9.423	663	2.640	16.055
1.000.000	384	1.534	9.512	663	2.647	16.317

Sample design

There two principle types of sample frame:
1-Probabilty designs- is directly determined by the sampling fraction-*n/N*
Ex: N=300 of senior student at high school will be chosen only 60 students (60/600).
2- Non-probability designs- easy and does not have a sample frames–
Ex: if you ask a teacher how many student do you know smoking.

Non-probability sampling

✓ Purposive samples- focus group of employed mothers for a study of employed mothers "needs for child care"

✓ Chunk samples is simply a group of people who happen to be available at the time of the study-People at waiting room of emergency.

✓ Snowball sample is a type of purposive chain sampling- ex: drug users, homeless runway.

✓ Convenient sample-household in close proximity to a research center might be selected for study-Ex: rainwater cistern had been selected in a community.

1) Nonprobability sampling: Does not rely on random technique but the ability of a researcher to select elements for a sample, and that includes:

a) Purposive sample

Purposive sampling is a set of different methods that all involve using the researchers' judgment to choose a few subjects that can best answer their research question. Example, teacher ask students to give feedback about understanding class subjects.

a) Convenient sample

This can depend on costs, geographic distributions, or the facility of obtaining data. Some examples of convenience sampling could include recruiting friends to participate in your study, collecting data from nearby locations, sending a survey in the mail, or sharing a link on social media

a) Judgment sample

A judgement sample example is when a researcher wants to examine the motorcycle models the person buys by the age ratio of motorcycle owners.

Types of purposive sampling

Maximum variation sampling

Homogeneous sampling

Typical case sampling

Critical case sampling

Total Population Sampling

Expert Sampling

Extreme case sampling

forms.app

Probability sampling

✓ Simple random sample-is based on drawing number from a hat, using computer-generated random number, flipping coins, or throwing dice (lottery procedure).

Ex: 100 samples selected randomly ⬇

44 32 72 11 47 89 2 54 89 93 41 34 82 67 79 65 30

SYSTEMATIC SAMPLE

- Systematic random sample-the researcher selects a random staring point and then systematically selected cases from the sampling frame at a specified (sampling) interval. Ex: sample size (k=1,000/100=10)-this should count 10 cases after starting point from the cases as the random starting point within the first to ten interval.
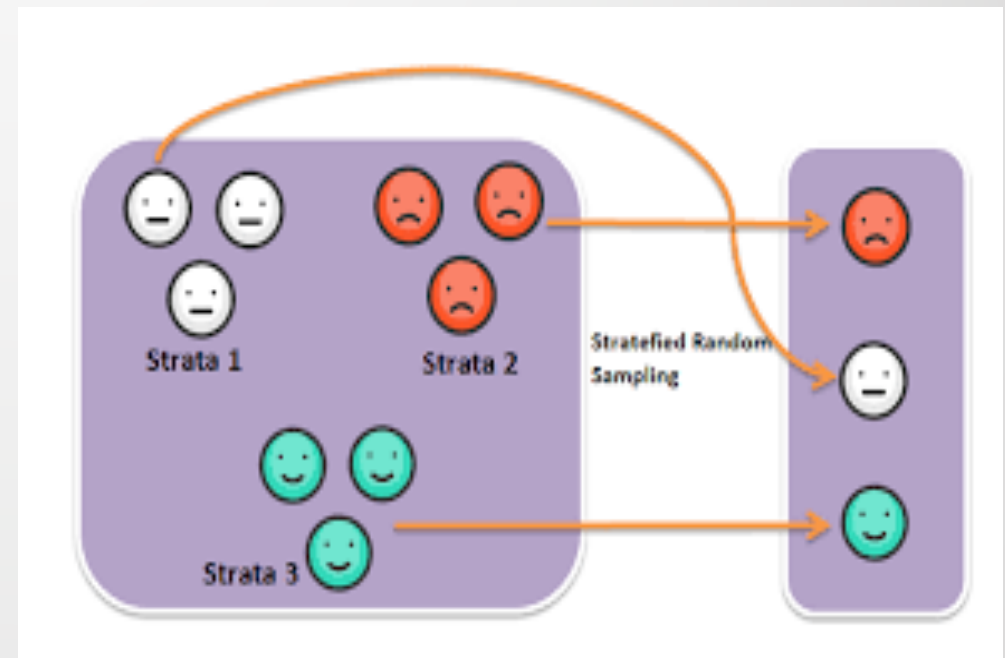
Stratified sample

The principle of this type of sample is to divided the sample into strata, identify the groups that is crucial to include based on the purpose- wait time is different in male and female; animal species and define young and adult based on their age.
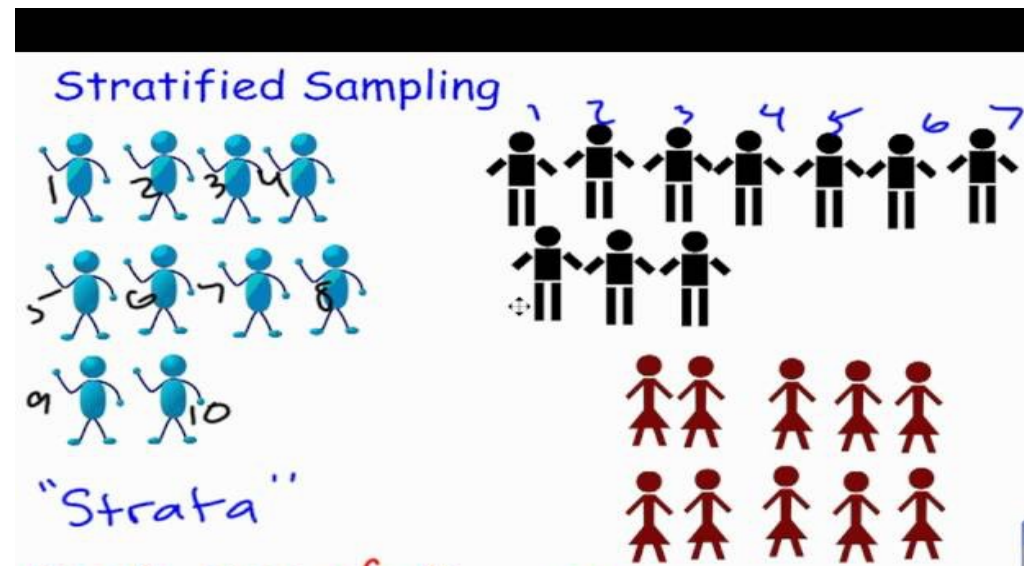
Cluster sample

- Community surveys of people who live in a certain geographical areas

- - Cluster of housing units- Ex: city blocks containing 50 houses- needs to obtain data previously from census.

- -This type of sample will be reduced travel cost which quite easy and different from random sample require travel as a distance between each sample unit.

Cluster Sampling

All units in cluster sampled

All units in cluster sampled

- Natural grouping within population
- Whole groups sampled
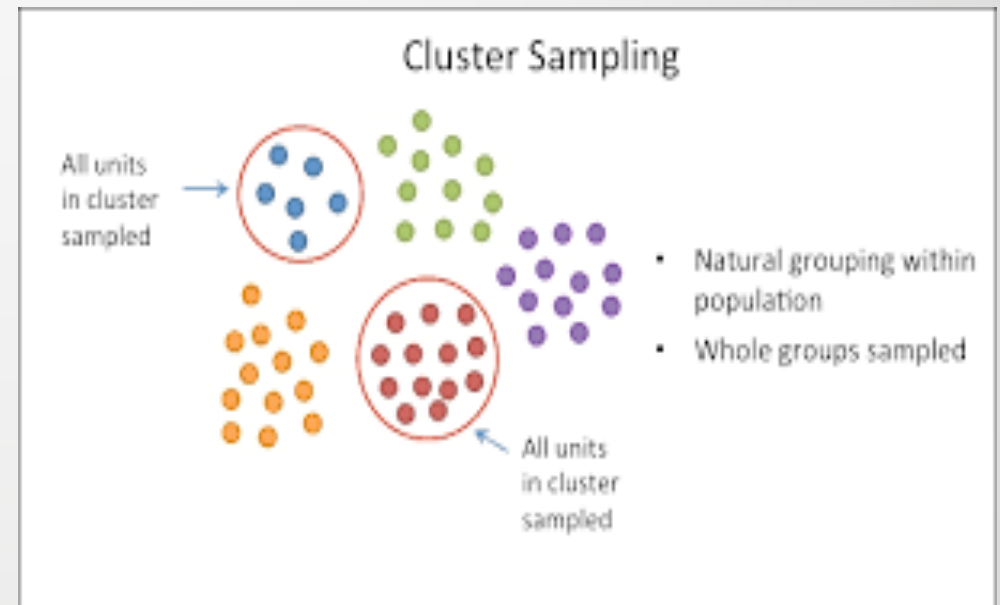
Multistage sampling

Similar to the cluster sample except that (*eg* households) have been chosen, then a sample of secondary sampling units (*eg* individuals) is selected.

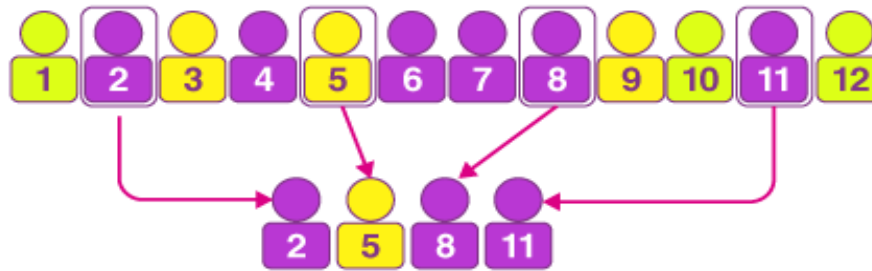Ex: Select---Province ➡ District ➡ Subdistrict ➡ Village ➡ animal ➡ type sample

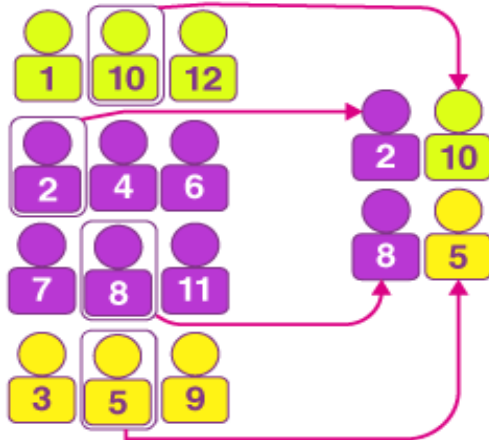Ex: Brucellosis in sheep from north of Iraq.

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Probability sampling Methods
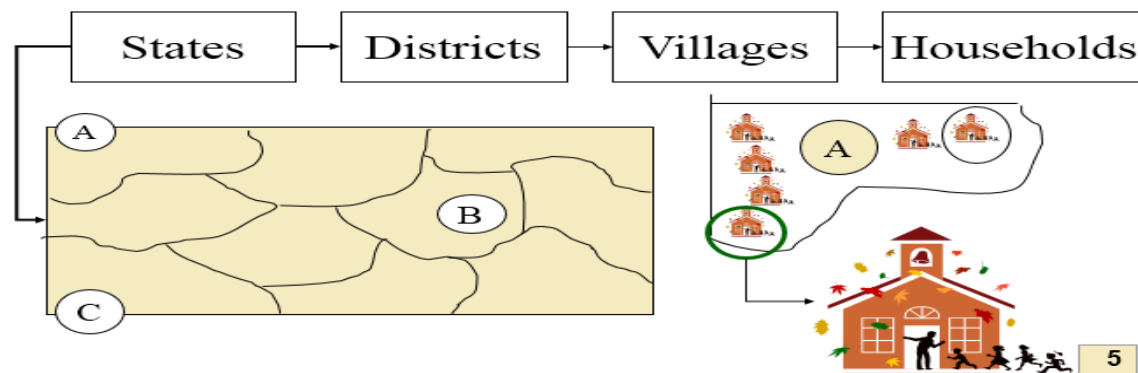
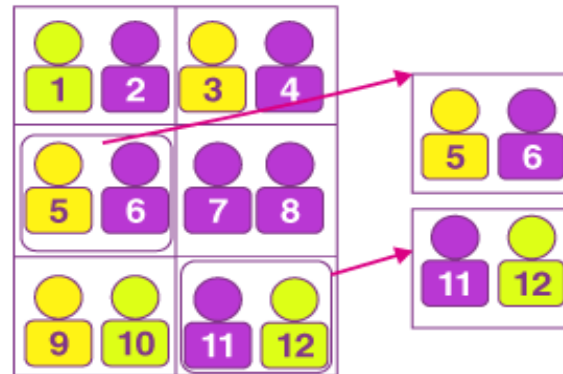Simple Random Sampling
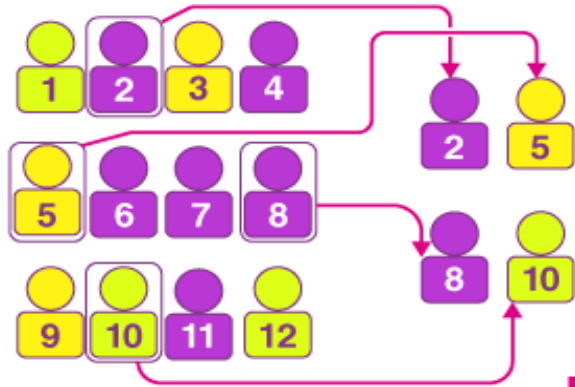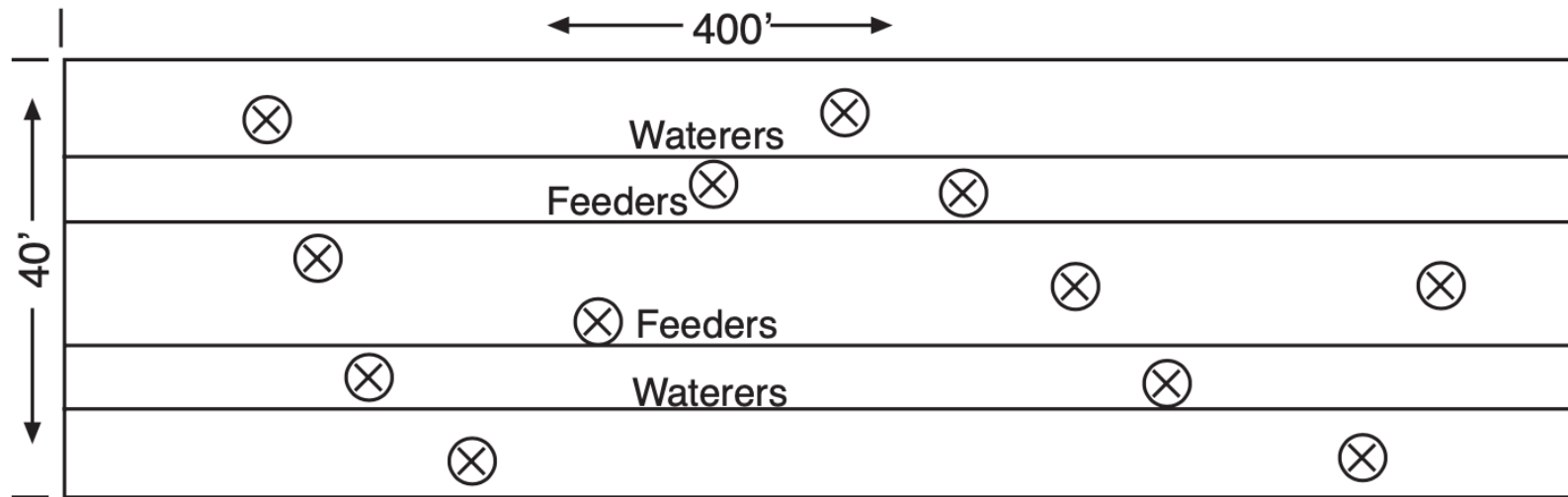
Systematic Sampling

Stratified Sampling

Clustered Sampling

Sampling Location In A Poultry House

Thanks for paying attention to the lecturer