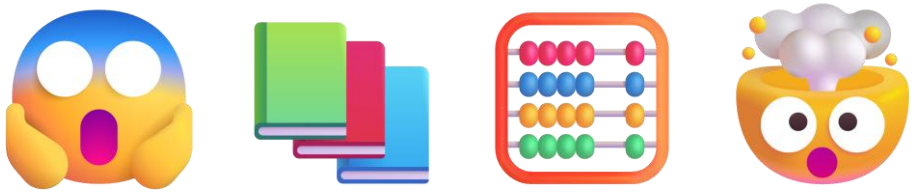


Research Methods in Nursing

COHECASE Mamfe | HES 411 | Week 1: What is research, and how do we choose who to study?

When they hear "Research Methods" on the timetable

WHAT STUDENTS EXPECT



Scary formulas, Greek letters, a 300-page book nobody understands

WHAT IT REALLY IS



Asking a good question about your patients, then finding the answer in an organised way

Our 10 Tuesdays together

1. **What is research? Sampling**
2. Principles of experiments
3. Experimental designs (CRD, RCBD, factorial)
4. Planning an experiment, plot layouts, data collection
5. Summarising and presenting data
6. Comparing two groups (two samples, paired samples)
7. Comparing 3+ groups: one-way ANOVA
8. Multifactor ANOVA
9. Correlation and linear regression
10. Clinical trials, presenting and interpreting results

How you earn your CA marks



End of every class

10 questions on the course website



5 points each week

Your quiz score counts toward your CA



Results shown at once

We look at the class results together before you leave

By the end of today you can...

1. Say in one sentence what research is
2. Explain population, sample and sampling frame using your own ward
3. Pick a sample using simple random, systematic and stratified sampling
4. Work out a sample size with a simple formula

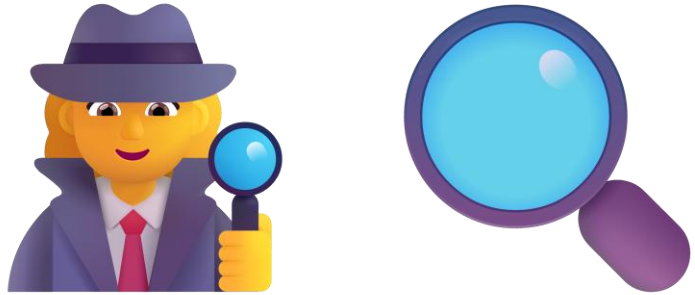


What is research?

Standard definition

"Systematic inquiry that uses disciplined methods to answer questions or solve problems."

Polit & Beck, Nursing Research (11th ed., 2021)



In simple words: ask a clear question, then find the answer in a careful, organised way that someone else could repeat.

Think of a detective 🕵️

- Detective: a crime happened. Who did it?
- Nurse researcher: do mothers in Mamfe who attend ANC 4 or more times deliver in a health facility more often?
- Both collect clues (data), check them, then reach a conclusion they can defend

Not research: "I feel this works."
Research: "I measured it in 60 patients and it worked in 48."

Why should a nurse care about research?



Safer patients

We stop doing things that harm and keep doing things that help



Evidence-based practice

Our care is based on proof, not habit or rumour



Solve ward problems

Long waiting times, missed drugs, falls: research finds the cause



Grow your career

Your HES 414 project, conferences, promotions and further studies

The most dangerous sentence in a hospital

New student: "Why do we do it this way?"

Senior on the ward:

"We have ALWAYS done it like this."



Research is how we check whether "always" is still right.

The research journey in 7 steps



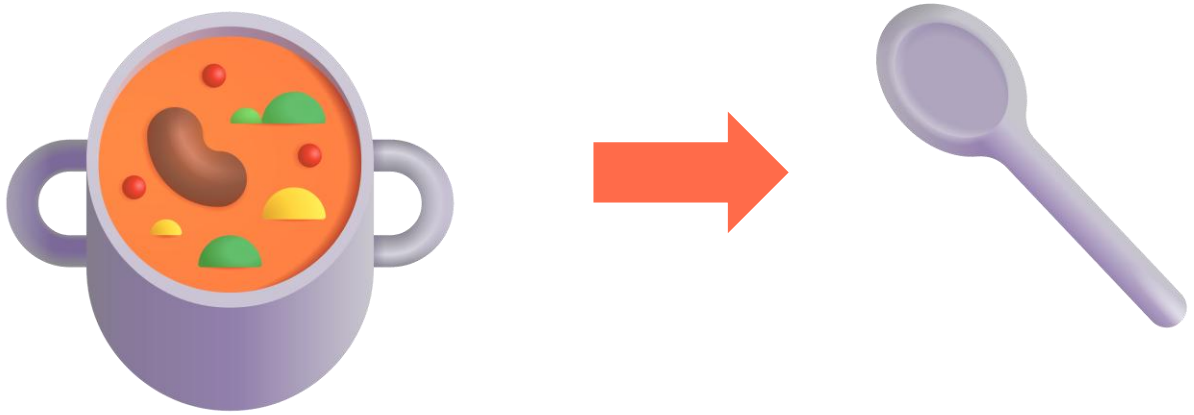
Example: Ask: do malaria patients in Mamfe who get health teaching finish their drugs more often? Read: what have others found? Plan: who, how many, how? Collect: count leftover tablets at follow-up. Analyse: compare the two groups. Present: a graph. Use: make health teaching routine.



Part 1: Population and sample

You do not need to eat the whole pot of eru to know it needs salt

The eru pot rule



Whole pot of eru = POPULATION

One spoon = SAMPLE

But only if you STIR first!

If all the salt and crayfish sit at the bottom and you taste from the top, your spoon lies to you.

Stirring = choosing the sample fairly, so every part of the pot has a chance to be in the spoon.

Key terms (1): who do we want to study?

Term	Standard definition	In simple words	Mamfe example
Population	*"The entire set of individuals or objects having some common characteristics."*	Everyone you want to know about	Pregnant women
Target population	*"The entire population in which a researcher is interested and to which he or she would like to generalize the study results."*	The group your answer will apply to	All pregnant women in Manyu Division
Accessible population	*"The population of people available for a particular study; often a nonrandom subset of the target population."*	The part of the group you can actually reach	Women attending ANC at Mamfe District Hospital
Sampling	*"The process of selecting a portion of the population to represent the entire population."*	Choosing who to study	Choosing 80 women from the ANC register

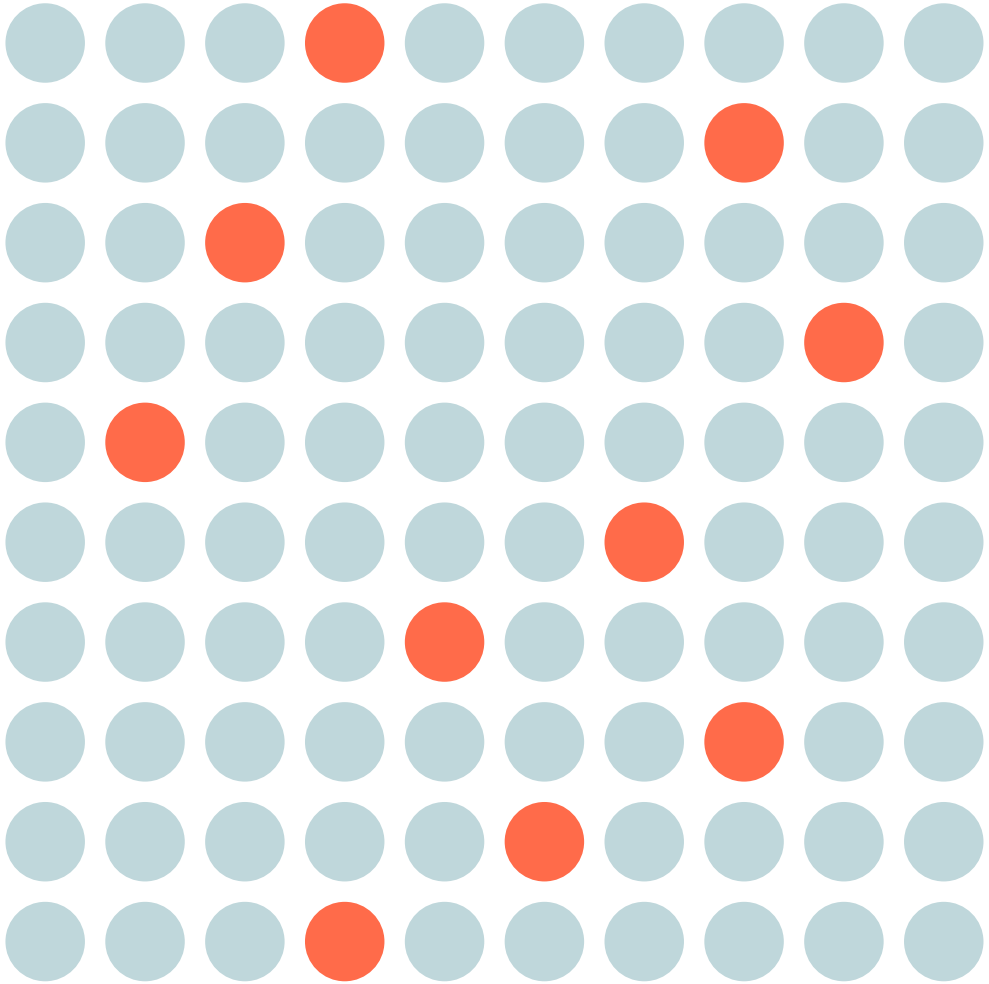
Definitions: Polit & Beck, Nursing Research: Generating and Assessing Evidence for Nursing Practice (11th ed., 2021), glossary.

Key terms (2): the sample

Term	Standard definition	In simple words	Mamfe example
Sample	*"A subset of a population comprising those selected to participate in a study."*	The people you actually study	The 80 women you interview
Sampling frame	*"A list of all the elements in the population, from which a sample is drawn."*	The actual list you pick from	The ANC register at Mamfe District Hospital
Element	*"The most basic unit of a population for sampling purposes, typically a human being."*	One person in the population	One pregnant woman
Representative sample	*"A sample whose characteristics are highly similar to those of the population from which it is drawn."*	A small copy of the whole group	Women from town and villages, young and older
Sampling bias	*"Distortions that arise when a sample is not representative of the population from which it was drawn."*	The sample leans to one side	Interviewing only women from Mamfe town

Definitions: Polit & Beck, Nursing Research: Generating and Assessing Evidence for Nursing Practice (11th ed., 2021), glossary.

Picture it: 100 patients in the OPD queue, we study 10



Grey dots: the population (N = 100)
Orange dots: the sample (n = 10)

Big N = population size
Small n = sample size

Notice the orange dots are spread all over. That is what a good sample looks like.

Why not just study everybody?



Time

You have one semester, not ten years



Money

Okada fares to Eyumojock and Tinto, printing, phone credit



Some tests use things up

You cannot test every blood bag or drug batch until nothing is left



Better quality

Fewer people means you can collect data more carefully

Final-year student planning the project:

"I will visit EVERY health centre in Manyu"

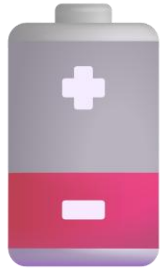




Week 1

Week 3: rain, muddy road, okada money finished, 4 questionnaires done







Moral: choose a sample

Good sample vs biased sample



Representative

Looks like a small copy of the population: men and women, young and old, day and night shift, all in fair proportion.

Results can be trusted for the whole group.

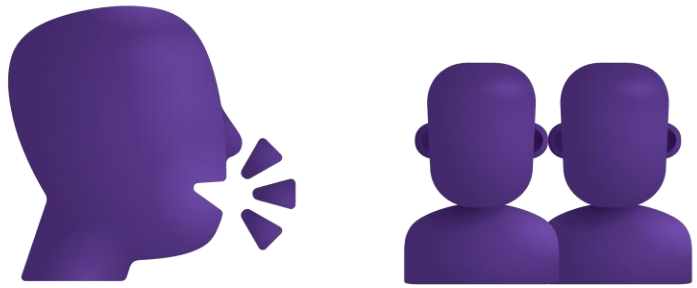


Biased

Example: to study access to care in Manyu you only interview people in Mamfe town on market day. Villages like Tinto and Kembong are left out.

Your answer will look better than reality.

Your turn: 3-minute think, pair, share



A COHECASE student wants to know how many nurses at Mamfe District Hospital wash their hands correctly. She watches only the nurses on the morning shift in the maternity ward.

1. What is her population?

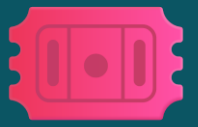
2. What is her sample?

3. Is the sample biased? Why?



10-minute break

Stretch, drink water, come back ready for the lottery

Part 2: How to pick a fair sample

Simple random, systematic and stratified sampling

Two families of sampling

Sampling methods

PROBABILITY (fair lottery)

Everyone has a known chance of being chosen

- **Simple random ← today**
- **Systematic ← today**
- **Stratified ← today**
- Cluster, multistage (for reading)

NON-PROBABILITY (choice)

The researcher decides who gets in

- Convenience: whoever is there
- Purposive: chosen for a reason
- Snowball: one person refers the next
- Quota: fill fixed numbers

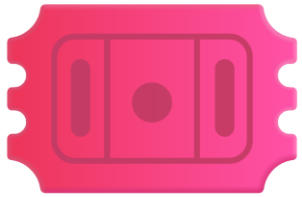
Sampling methods: the textbook definitions

Term	Standard definition	In simple words
Probability sampling	*"The selection of sampling units from a population using random procedures."*	Chance decides, like a lottery
Nonprobability sampling	*"The selection of sampling units from a population using nonrandom procedures."*	The researcher decides
Simple random sampling	*"Basic probability sampling involving the selection of sample members from a sampling frame through completely random procedures."*	Lottery from the full list
Systematic sampling	*"The selection of sample members such that every kth (e.g., every 10th) person or element in a sampling frame is chosen."*	Every k-th person on the list
Strata	*"Subdivisions of the population according to some characteristic."*	Groups
Stratified random sampling	*"The random selection of study participants from two or more strata of the population independently."*	Groups first, then lottery in each group

Definitions: Polit & Beck, Nursing Research: Generating and Assessing Evidence for Nursing Practice (11th ed., 2021), glossary.

1. Simple random sampling: the lottery





Every person has the SAME chance of being picked

Example: our class list of 100 students, we need 20

1. Get the class list of all 100 students (sampling frame)
2. Give each one a number: 001 to 100
3. Write the numbers on papers, mix them in a box
4. Draw 20 papers without looking
5. Those 20 students are your sample

Modern way: random number table, Excel =RANDBETWEEN(1,100), or a phone app.

2. Systematic sampling: every k-th person

$$k = N \div n$$

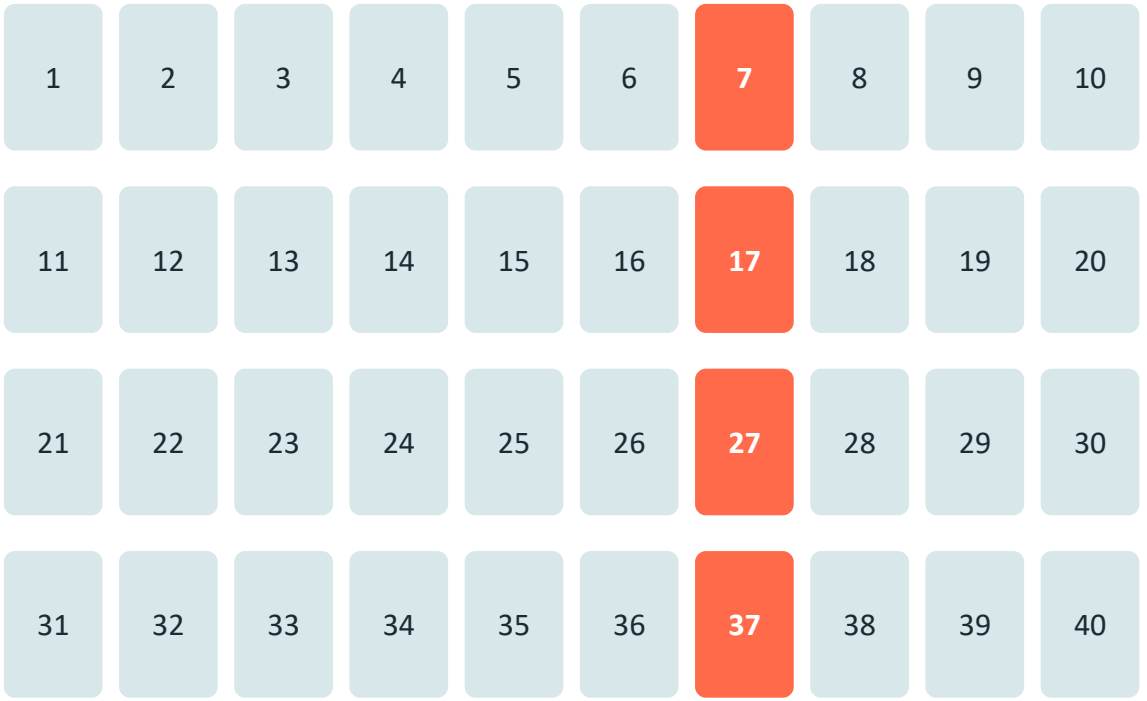
k = sampling interval (the "jump")

Example: 500 files at the hospital records office, we need 50

k = 500 ÷ 50 = 10

Pick a random start between 1 and 10, say 7

Then take files 7, 17, 27, 37 ... up to 497



Trap: if the list has a pattern (e.g. every 7th day is Sunday), you may pick only Sundays!

3. Stratified sampling: groups first, then lottery

Imagine 600 mothers in three areas. We need 60 (that is 10%).



Strata = groups that do not overlap. Inside each group we use simple random sampling.

The daily struggle of the research student

Use the register and draw names randomly

Just give the questionnaire to my 15 hostel mates



Only one of these is research. (Hint: your hostel mates are a convenience sample, and your supervisor will notice.)

Which method, when?

Method	Remember it as	Use it when	Watch out
Simple random	Lottery 🎟️	You have a full list and a small, mixed group	Needs a complete list
Systematic	Every k-th 🔢	Files, registers, patients in a queue	Patterns in the list
Stratified	Groups, then lottery 🧩	The population has clear sub-groups you must all include	You must know each person's group

Memory line: Lottery. Jump. Groups.

Real research from Mamfe and our region

Tarkang & Pencille (2018)

Pan African Medical Journal 29:215

Stratified sample of 254 road construction workers at sites along the Kumba-Mamfe road.

Lesson: Stratified sampling, in our own region

Ngomtcho et al. (2024)

BMC Infectious Diseases 24:370

165 blood donors at Mamfe District Hospital, recruited by consecutive sampling.

Lesson: Consecutive sampling is NON-probability: each donor who came was taken

Mekolle et al. (2023)

BMC Health Services Research 23:334

Data taken from the registers of Mamfe District Hospital, April 2021 to June 2022.

Lesson: Hospital registers can be a sampling frame and a data source



Part 3: How many people do I need?

Not too small, not too big: the Goldilocks sample

Too small, too big, just right



Too small

5 patients

Results can happen by luck. Nobody will trust them.



Too big

5,000 patients

Wastes time and money. Students give up halfway.



Just right

Calculated n

Enough to trust, small enough to finish.

What makes you need a BIGGER sample?

People are very different from each other • You want a very precise answer • You want to be more confident • Many people may refuse or drop out

The sample size formula (Cochran)

$$n = Z^2 \times p \times (1 - p) \div d^2$$

- ***Z*** — Confidence. For 95% confidence, Z = 1.96
- ***p*** — Expected proportion with the thing you study. If you do not know it, use 0.5 (50%)
- ***d*** — Margin of error you accept. Usually 0.05 (5%)

Worked example

$n = 1.96^2 \times 0.5 \times 0.5 \div 0.05^2$

$n = 3.8416 \times 0.25 \div 0.0025$

$n = 0.9604 \div 0.0025$

$n = 384.16$

Always round UP → n = 385

Sources: Cochran, Sampling Techniques (1977); Lwanga & Lemeshow, Sample Size Determination in Health Studies (WHO, 1991)

Two quick adjustments

A. Small population

Imagine the ANC register has only N = 500 women:

n adj = n ÷ (1 + (n − 1) ÷ N)

= 384.16 ÷ (1 + 383.16 ÷ 500)

= 384.16 ÷ 1.766

= 217.5 → 218

B. Some people will refuse

If you expect 10% to refuse, divide by 0.9:

Final n = n ÷ (1 – non-response)

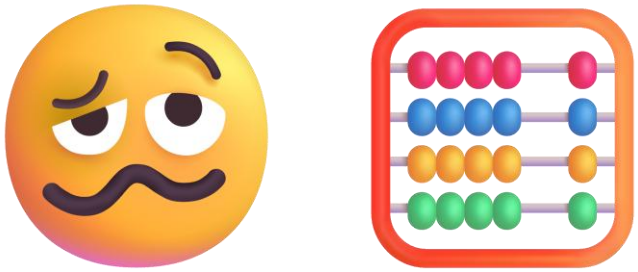
= 218 ÷ 0.9

= 242.2 → 243

Plan to approach 243 women.

Me in research class vs me in Mamfe market

Lecturer: "Calculate 1.96^2"



"Ma'am, I am a nurse, not a mathematician"

Mamfe market mami: "Eru is 3 bundles for 250. How much for 12?"



Me, in one second: "1,000. And you will add one bundle for free."

Group task (10 minutes)



Groups of 5

Imagine 400 health workers in Manyu: 200 in Mamfe town, 100 in Eyumojock, 60 in Tinto, 40 in Kembong. You want to study their hand-hygiene knowledge.

1. Which sampling method would you use? Why?
2. Using Cochran (Z = 1.96, p = 0.5, d = 0.05) and the small-population adjustment, how many health workers do you need?
3. Add 10% for refusals. Final number?
4. How many from each place?

Key points to remember

- ✅ Research: "systematic inquiry that uses disciplined methods to answer questions or solve problems"
- ✅ Population (N) = everyone; sample (n) = the ones you study
- ✅ Sampling frame = the list you pick from
- ✅ Simple random = lottery; everyone has the same chance
- ✅ Systematic = every k-th; $k = N \div n$; random start
- ✅ Stratified = split into groups, then random in each group
- ✅ Cochran: $n = Z^2p(1-p) \div d^2 = 385$ for 95%, $p = 0.5$, $d = 0.05$
- ✅ Always round sample size UP

Read more: textbooks and online sources

Nursing research textbooks

- Polit, D. F., & Beck, C. T. (2021). Nursing research: Generating and assessing evidence for nursing practice (11th ed.). Wolters Kluwer.
- Gray, J. R., & Grove, S. K. (2021). Burns and Grove's the practice of nursing research (9th ed.). Elsevier.
- LoBiondo-Wood, G., & Haber, J. (2022). Nursing research: Methods and critical appraisal for evidence-based practice (10th ed.). Elsevier.
- Cochran, W. G. (1977). Sampling techniques (3rd ed.). Wiley.

Free online

- Lwanga, S. K., & Lemeshow, S. (1991). Sample size determination in health studies: A practical manual. WHO (free on WHO IRIS).
- Tarkang, E. E., & Pencille, L. B. (2018). Pan African Medical Journal, 29, 215. doi:10.11604/pamj.2018.29.215.15130
- Ngomtcho, S. C. H., et al. (2024). BMC Infectious Diseases, 24, 370. doi:10.1186/s12879-024-09119-0
- Mekolle, E. J., et al. (2023). BMC Health Services Research, 23, 334. doi:10.1186/s12913-023-09323-9

- Search tips: PubMed (pubmed.ncbi.nlm.nih.gov) and Google Scholar. Type "Mamfe" or "Manyu" plus your topic.



CA quiz time: 10 questions, 5 points

Open the course website on your phone and choose the Week 1 quiz.

Work alone. You have 15 minutes. Results go on screen when time ends.

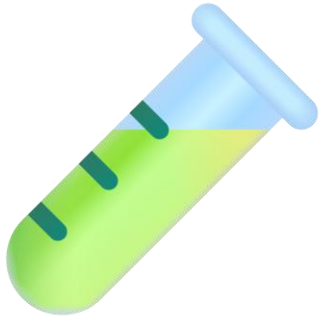
Today's results

__ / 5	__ / 5	__
Class average	Highest score	Students who took it

Hardest question today: Q__

Show the live results page from the website, or fill these boxes from the results sheet (Week 1 folder).

Next Tuesday: principles of experiments



Treatment, replication, randomization, experimental unit, experimental error

Homework: read the handout again and write ONE research question from your clinical placement. Bring it next week.

You came in afraid of research. You leave knowing how to stir the eru. 🫕