Introduction to Research

From curiosity to evidence, and how to search for it



By Md. Sakhawot Hossain

By the end, you will be able to



Explain what research is

and what makes it different from casual inquiry



Describe why research matters

for society, policy, health and food safety



See how research builds your career

higher study, academia, industry, startups



Think like a researcher

question, verify, investigate

NEW



Search the literature smartly

using AND, OR, NOT and search tools



Choose a research area

that is relevant, feasible and impactful

Icebreaker: why are you interested in research?



Thesis requirement



Higher study



Publication



Scholarship



Career development



Pure curiosity



There are many reasons.
Let's hear yours!

Share your reason in one sentence.

01

Understanding Research

What research is, how it works, and its main types



What is research?

Research is

A systematic process of investigating a problem to generate new knowledge or validate existing knowledge.



Turning curiosity into knowledge

Key characteristics

Systematic
Follows an organized, structured process

Objective
Free from personal bias

Logical
Based on sound reasoning and critical thinking

Evidence-based
Supported by data and facts

Reproducible
Can be repeated to obtain similar results

The research process: from curiosity to impact



1. **Observation**
2. **Question**
3. **Literature review** — Today: smart searching
4. **Research design**
5. **Data collection**
6. **Analysis**
7. **Interpretation**
8. **Dissemination**

A systematic journey from curiosity to knowledge and impact; dissemination leads to new questions.

Types of research by purpose



Basic research

- Generates new knowledge
- Expands theories
- Answers 'how' and 'why'

Example

How does gut microbiota influence metabolism?



Applied research

- Solves real-world problems
- Leads to practical solutions
- Answers 'what can we do'

Example

How can we reduce anemia among garment workers?

Types of research by method



Quantitative

- Numerical data
- Statistical analysis
- Tests hypotheses

Example

Measuring BMI and dietary intake of 300 students



Qualitative

- Experiences and perceptions
- Interviews and focus groups
- Explores 'why'

Example

Interviewing mothers about infant feeding beliefs



Mixed methods

- Combines both approaches
- Numbers plus context
- Fuller picture

Example

Survey on street-food safety plus vendor interviews

Why is research important?

Research helps to

- Generate knowledge
- Solve societal problems
- Improve policies
- Improve healthcare
- Enhance food safety
- Drive innovation
- Support evidence-based decisions

When should we do research?



A problem exists



Information is lacking



Existing evidence is outdated



A solution needs evaluation



New questions emerge

Research is needed whenever a decision depends on evidence we do not yet have.

02

Why Research Matters for You

Opportunities, career paths and the skills you build



Research opens doors to



Higher studies



Scholarships



Industry jobs



Academic careers



Entrepreneurship



International collaboration



Consultancy

Four career paths built on research

Higher study

- MSc and PhD admission
- International scholarships
- Research assistantships
- Graduate fellowships

Academia

- Teaching
- Research and publications
- Grant writing
- Student supervision

Industry

- Product development and R&D
- Quality assurance, food safety
- Regulatory affairs
- Consumer and market research

Innovation and startups

- New food products
- Nutrition interventions
- Technology development
- Commercial innovations

Skills you build through research



Critical thinking

Analyze deeply, judge independently



Problem solving

Find causes and workable solutions



Scientific writing

Communicate ideas clearly



Data analysis

Turn numbers into insight



Presentation

Present findings with confidence



Time management

Plan, prioritize, meet deadlines



Teamwork

Collaborate and achieve more

Beyond skills, research gives you networking, collaboration and global exposure.

03

Think Like a Researcher

The mindset that turns opinions into evidence



General mindset vs researcher mindset

General mindset		Researcher mindset
Assumes	→	Questions
Believes	→	Verifies
Accepts	→	Investigates
Opinion-based	→	Evidence-based
Reactive	→	Curious

Great research begins with a mindset that asks, seeks and discovers.

Exercise: think like a researcher

Statement: *"Energy drinks improve academic performance."*

1. Is this always true?

- It may depend on the individual
- Effects vary with age, sleep, diet, caffeine tolerance
- Short-term and long-term effects may differ
- More energy is not always better performance

2. What evidence do we need?

- Scientific studies or experiments
- Data on performance (test scores, concentration)
- Ingredients and their effects
- Sample size, duration, reliability and validity

3. How would we test it?

- Form a hypothesis
- Randomly assign two groups: energy drink vs placebo
- Keep sleep, diet and study time constant
- Measure before and after, then analyze

04

Smart Literature Searching

Boolean logic: AND · OR · NOT, and the tools that make every search sharper



Why searching skill matters

Typing a full sentence

do energy drinks help students get good marks in exam

- Thousands of loosely related results
- Misses papers that use other words (caffeine, GPA)
- Hard to repeat or report in a thesis

Keywords + Boolean operators

("energy drink*" OR caffeine) AND ("academic performance" OR GPA)

- Focused and relevant results
- Catches synonyms and word variants
- Same search can be repeated and reported

Search engines match words, not meaning. You decide which words, and how they combine.

Where researchers search



Google Scholar

All subjects, free. Easiest place to start; shows citation counts.



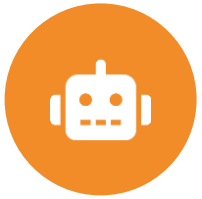
PubMed

Medicine, nutrition and life sciences, free. Supports full Boolean searching and field tags.



Scopus / Web of Science

Curated, high-quality journals with citation tools. Usually through university access.



AI research tools

Semantic Scholar, Consensus, Elicit. Good for exploring; always check the original paper.

Step 1: break your question into concepts

Research question: Does energy drink consumption affect the academic performance of university students?

Concept 1

Energy drinks

Synonyms and variants

- energy drink*
- caffeinated beverage*
- caffeine

+

Concept 2

Academic performance

Synonyms and variants

- academic performance
- academic achievement
- GPA
- exam score*

+

Concept 3

University students

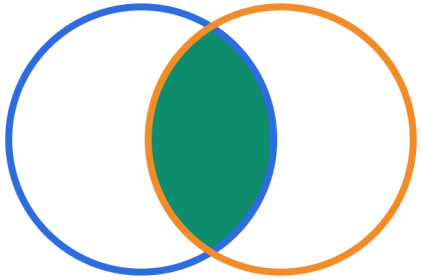
Synonyms and variants

- university student*
- college student*
- undergraduate*

Rule of thumb: synonyms inside a concept are joined with OR; different concepts are joined with AND.

Boolean operators at a glance

AND

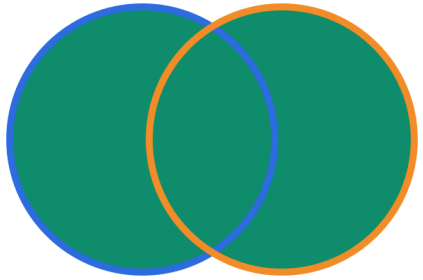


Both terms must appear

Fewer, more focused results

anemia AND pregnancy

OR

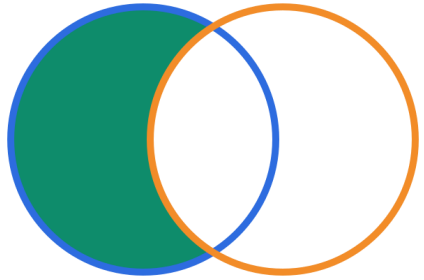


Either term may appear

More results, wider coverage

adolescent OR teenager

NOT



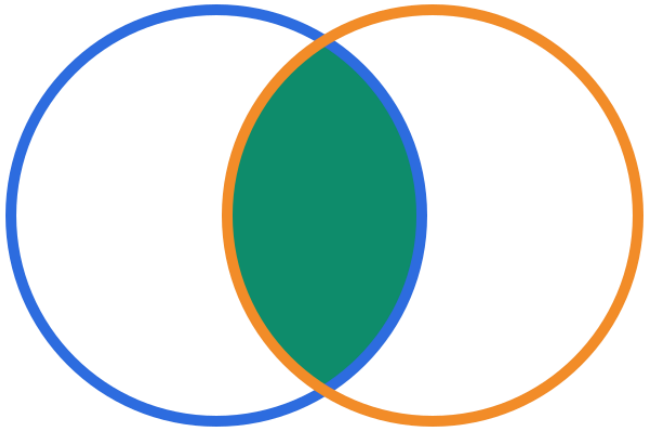
First term, but never the second

Removes unwanted results

obesity NOT children

AND: narrow your search

AND



Green = results you get

Finds papers that contain ALL of your terms.

Example

anemia AND "garment workers"

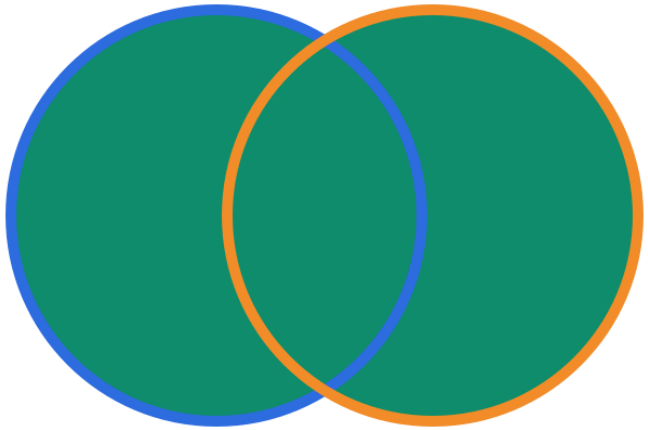
Only papers about anemia that also mention garment workers.

Remember

1. Use AND between different concepts
2. Each extra AND makes the result set smaller
3. Too many ANDs can give zero results

OR: broaden your search

OR



Green = results you get

Finds papers that contain ANY of your terms.

Example

(adolescent OR teenager OR "young people")

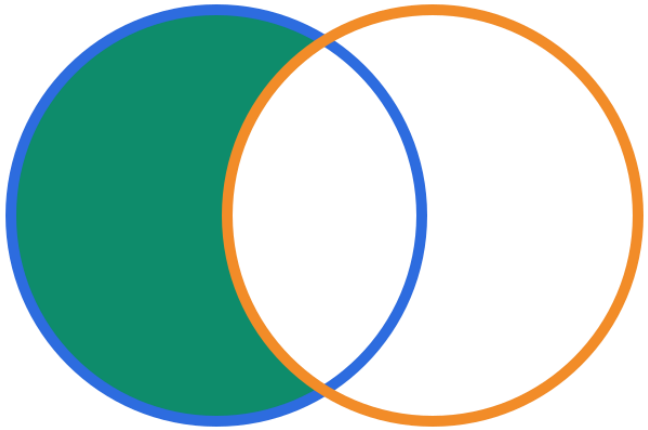
Papers using any of these words, so you do not miss authors who chose a different term.

Remember

1. Use OR between synonyms of the same concept
2. Include spelling variants: anemia OR anaemia
3. Put OR groups inside parentheses

NOT: exclude what you don't need

NOT



Green = results you get

Removes papers that contain a term.

Example

obesity NOT children

Papers on obesity, except any that mention children.

Remember

1. Use NOT sparingly
2. A paper on adults AND children is also removed
3. In Google Scholar use a minus sign: obesity -children

Search power tools beyond AND, OR, NOT

Quotation marks

"food security"

Exact phrase: the words must appear together, in order.

Truncation *

nutri*

nutrition, nutrient, nutritional, nutritious…

Parentheses ( )

(iron OR zinc) AND deficiency

Groups terms, like brackets in algebra: OR groups first.

Field tags

breastfeeding[tiab]

PubMed: search only the title and abstract.

Step 2: build your search string

("energy drink*" OR "caffeinated beverage*" OR caffeine)

Concept 1: energy drinks

AND

("academic performance" OR "academic achievement" OR GPA)

Concept 2: academic performance

AND

("university student*" OR "college student*" OR undergraduate*)

Concept 3: university students



Check the logic: OR inside the brackets, AND between brackets, operators in CAPITALS, every bracket and quote closed.

Same idea, different databases

Feature	PubMed	Google Scholar
AND	AND in capitals (also added automatically)	Added automatically between words
OR	OR in capitals	OR in capitals
NOT	NOT in capitals	Minus sign, no space: obesity -children
Exact phrase	"food security"	"food security"
Truncation *	nutri* (at least 4 letters before *)	Not supported; Scholar matches word forms itself
Search in title	term[ti] or term[tiab] for title/abstract	Advanced search: "in the title of the article"

Tip: every database has a Help or Search Tips page. Check it before running an important search.

Worked example from our field

Topic: anemia among garment workers in Bangladesh

1 Concepts

Anemia | Garment workers | Bangladesh

2 Synonyms

anemia, anaemia, "iron deficiency" | garment, textile, factory worker*

3 Search string

(anemia OR anaemia OR "iron deficiency") AND ("garment worker*" OR "textile worker*" OR "factory worker*") AND Bangladesh

Then refine with filters

- **Publication year**
- **Article type (e.g. review)**
- **Free full text**
- **Language**

Common mistakes and smart habits

Avoid

- Typing full sentences or questions
- Lowercase "and / or" in PubMed
- Only one word for each idea
- Using NOT too often
- Stopping at the first page of results

Do instead

- Use 2 to 4 key concepts
- Write operators in CAPITALS
- Add synonyms and spellings with OR
- Prefer filters over NOT
- Save your string and the date you searched

Practice: write your own search string

Topic: Effect of skipping breakfast on concentration in school children

1

List the concepts

What are the 3 to 4 key ideas?

2

Add synonyms

Other words, spellings, word endings (*)

3

Combine

OR inside brackets, AND between them

4

Test it

Run it in PubMed or Google Scholar and adjust

Your search string

(... OR ...) AND (... OR ...) AND (... OR ...)

05

Choosing Your Research Area

Where good ideas come from and how to pick the right one



Selecting a research area: what to consider



Personal interest

Choose a topic you are passionate about



Societal relevance

Address real problems and community needs



Available resources

Access to facilities, equipment and funding



Faculty expertise

Work with mentors who know the field



Future career goals

Align with your aspirations



Research gap

Find what is unknown or underexplored

The right research area is the first step toward meaningful research and lasting impact.

Where do research ideas come from?

Real-world problems

Society, health, food, environment, daily life

Industry challenges

Problems that need research-based solutions

Previous studies

What is done and what still needs exploring

Government reports

National and international data reveal gaps

Thesis repositories

Find unexplored areas in theses

Daily observations

Simple questions can lead to impactful research

Scientific journals

Recent articles show new directions

A great research idea is

- ✓ Relevant
- ✓ Researchable
- ✓ Feasible
- ✓ Impactful

Key takeaways



Research begins with curiosity



Research solves real problems



Research creates career opportunities



Researchers question, verify and investigate



Smart search = concepts + synonyms + AND / OR / NOT



Choosing the right area is the first step