

How to Write a Scientific Article

Interactive workshop - DPU

From research findings to a clear, publishable manuscript

Explanation → Example → Practice → Feedback

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Workshop roadmap

A practice-led approach: short inputs followed by application.

1 Structure

IMRAD and manuscript planning

2 Front matter

Title, keywords and abstract

3 Core sections

Introduction, Methods,
Results, Discussion

4 Writing quality

Clarity, concision and
academic tone

5 Integrity

References, plagiarism
and responsible AI

6 Application

Mini-manuscript review
challenge

Why Good Scientific Writing Matters

Good Research Can Still Be Rejected if It Is Poorly Written

- First impressions matter
 - Editors' initial decision: title, abstract, clarity, structure, overall presentation
- Poor writing can contribute to desk rejection
 - Difficult to understand, poorly organized, not clearly communicate its novelty and relevance.
- Unclear writing can hide good science
 - Reviewers struggle to understand the research question, methods, findings, or implications.
- Language and structure affect credibility
 - Grammatical errors, inconsistency, excessive wordiness, and weak argumentation reduce confidence in manuscript.
- Good writing makes the science visible
 - Clear, concise, logical writing helps editors and reviewers quickly understand what was done, why it matters, and what the study adds.

A strong study needs strong writing.

Learning outcomes

By the end of the workshop, participants should be able to...

- Explain the purpose and logic of each IMRAD section.
- Write a focused title and concise structured abstract.
- Build an Introduction around context → problem → gap → aim.
- Report Methods and Results clearly and reproducibly.
- Write a Discussion that interprets rather than repeats findings.
- Edit scientific prose for clarity, concision, coherence and appropriate claims.
- Apply a manuscript self-review checklist before submission.

Opening activity: What makes scientific writing difficult?

PAIR DISCUSSION

In pairs, discuss for 3 minutes:

- Which section of a paper do you find most difficult to write?
- What usually slows you down?
- What is one writing habit you would like to improve?

Share back

Each pair contributes ONE challenge.

Facilitator groups responses under:

- Structure
- Language
- Analysis/reporting
- Literature/references
- Time/confidence

Workshop principle: we will practice the problems you actually face.

01

Anatomy of a Scientific Article

Plan the paper before polishing the sentences.

IMRAD: the logic of the paper

Each section answers a different question.

INTRODUCTION

Why was the study needed?

Problem • evidence • gap • aim

Sub-section titles

400 – 700 words

METHODS

What exactly did we do?

Design • participants • measures • analysis

Sub-section titles

700 – 1000 words

RESULTS

What did we find?

Findings • tables • figures • estimates

600 – 700 words

DISCUSSION

What do the findings mean?

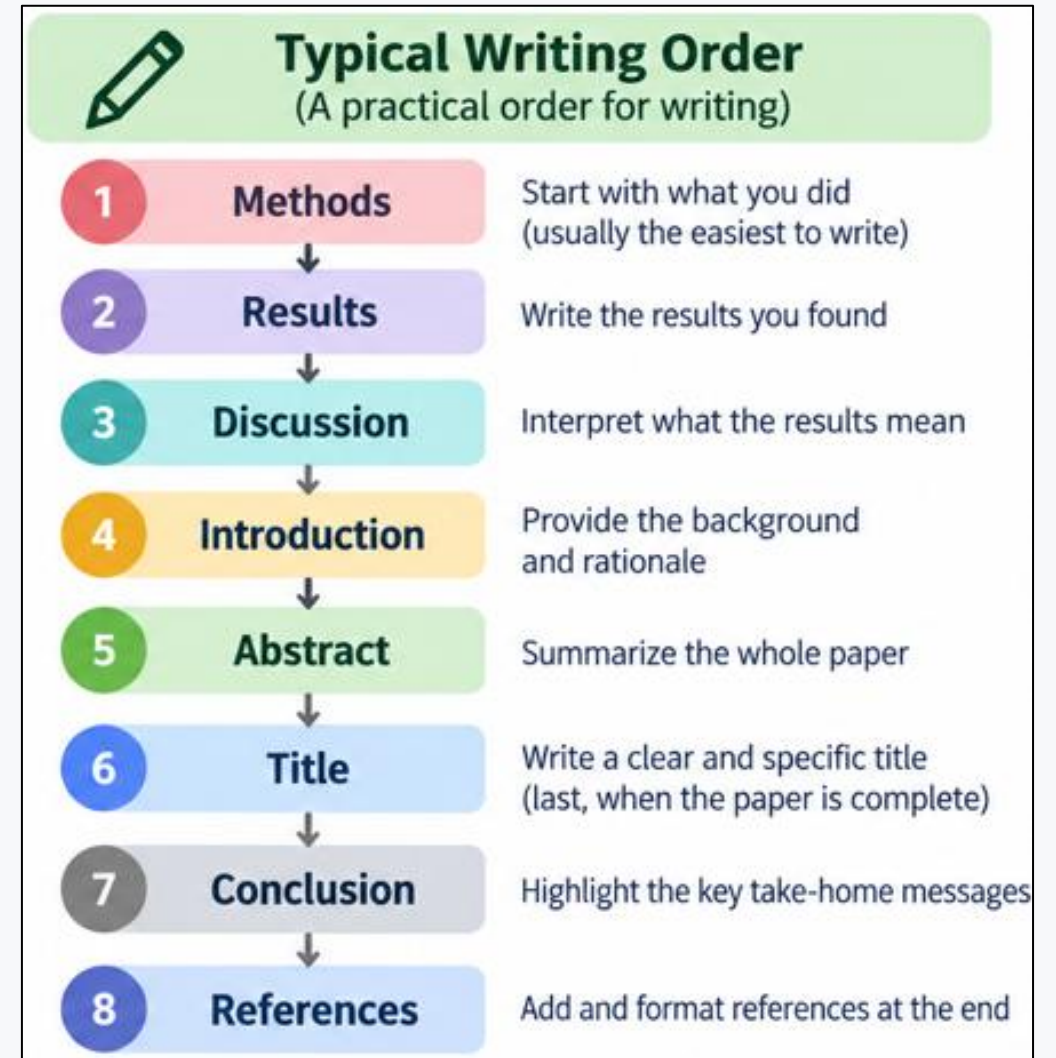
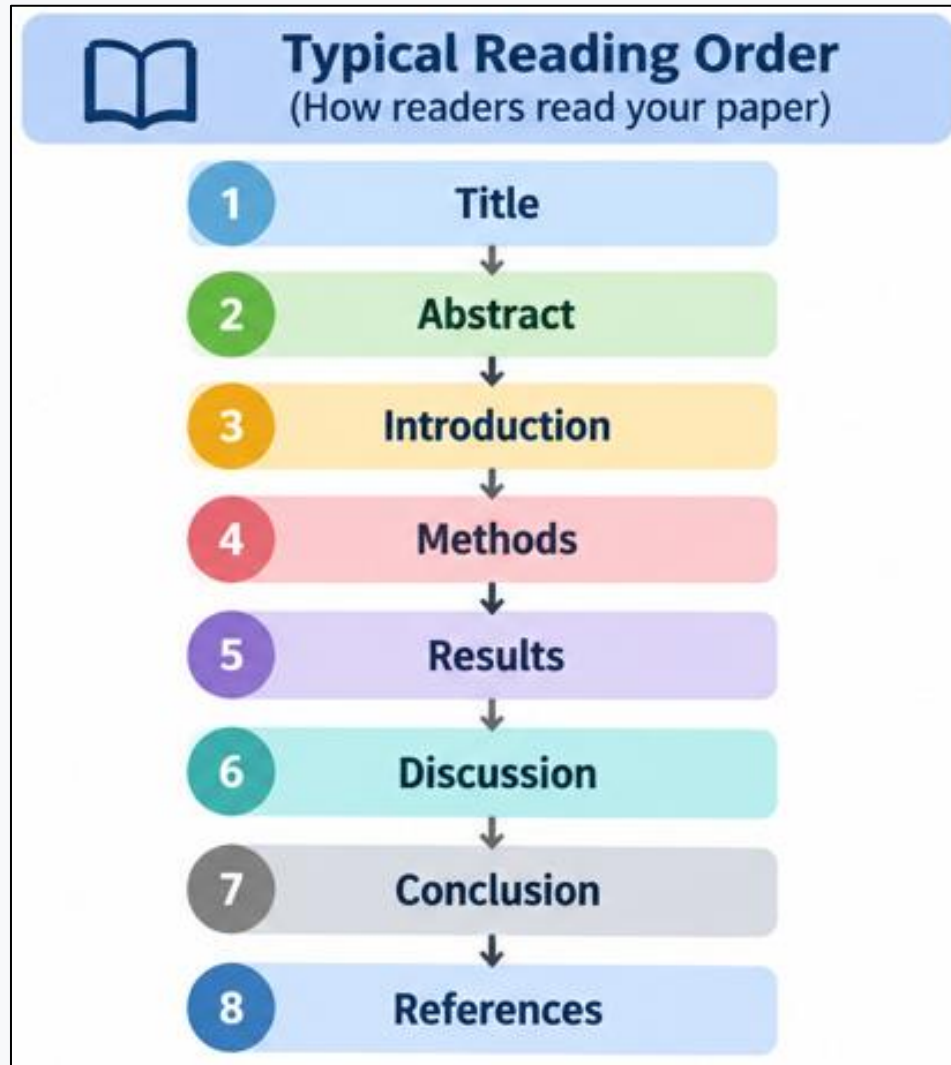
Interpretation • comparison • implications

Sub-section titles

800 – 1200 words

**A strong manuscript has a clear “red thread”:
the aim, methods, results and conclusions must align**

Sequence of Reading vs. Writing Order of a Scientific Manuscript



Readers scan from the front. Writers build from middle.

Practice: Which section does it belong to?

HANDS-ON PRACTICE

Assign each statement to Introduction, Methods, Results or Discussion — then explain why.

Results

“The prevalence of hypertension was 32.4%.”

Methods

“Participants were selected using systematic random sampling.”

Introduction

“Previous studies in Iraq have reported substantial variation...”

Discussion

“The higher prevalence may reflect the older age distribution...”

Introduction

“This study aimed to assess...”

Methods

“Ethical approval was obtained from...”

02

Title, Keywords & Abstract

Help readers understand the study before they read the paper.

Writing an effective title

Less effective

A Study of Hypertension Among People in Erbil

Problems:

- vague
- “a study of” adds little
- population unclear
- no indication of focus/design

✗ A Study of Healthcare Costs and Some Factors Affecting Patients with Chronic Diseases in Erbil

More informative

Prevalence and Factors Associated with Hypertension Among Adults Attending Primary Healthcare Centers in Erbil, Iraq: A Cross-Sectional Study

Specific • searchable • informative

✓ Out-of-Pocket Healthcare Expenditure and Its Associated Factors Among Adults With Noncommunicable Diseases in Erbil, Iraq: A Cross-Sectional Study

TITLE ENGINEERING

$$\left[\begin{array}{c} \text{What?} \\ \text{(topic/outcome)} \end{array} \right] + \left[\begin{array}{c} \text{Who?} \\ \text{(population)} \end{array} \right] + \left[\begin{array}{c} \text{Where?} \\ \text{(setting)} \end{array} \right] + \left[\begin{array}{c} \text{How?} \\ \text{(design)} \end{array} \right] = \left[\begin{array}{c} \text{Specific} \\ \text{Title} \end{array} \right]$$

Out-of-Pocket Healthcare Expenditure + Adults with NCDs +
Erbil, Iraq + Cross-sectional study

Practice: Improve these titles

SMALL GROUPS

- **Knowledge of Antibiotics Among Students**

Knowledge and Awareness of Antibiotic Use and Antimicrobial Resistance Among University Students: A cross-sectional study

- **A Study About Diabetes in Erbil**

Prevalence and Associated Risk Factors of Diabetes Mellitus Among Adults in Erbil, Iraq: A cross-sectional study

- **Research on Stress Among Nurses**

Prevalence of Occupational Stress and Its Associated Factors Among Nurses in Erbil, Iraq: A cross-sectional study

- **Assessing Dental Caries in Children**

Prevalence and Associated Factors of Dental Caries Among School-Aged Children in Erbil, Iraq: A cross-sectional study

Use this checklist

Can the reader identify:

- Main topic/outcome?
- Population?
- Setting?
- Important exposure/intervention?
- Study design, when useful?

Avoid unnecessary words.
10 – 16 words, <20

Task: rewrite TWO titles in 5 minutes.

Keywords: help the right reader find your paper

Avoid

- Avoid repeating every word from the title.
- Avoid overly broad terms such as “health”, “study”, or “research”.

Use

- Choose 3–8 specific terms representing the topic, population, exposure/intervention, outcome, and design where useful.
- Prefer established indexing terms when appropriate (e.g., MeSH terms in biomedical literature).

EXAMPLE

Title: “Women in healthcare leadership: assessment of experiences, challenges, and opportunities”

Keywords: Women; Leadership; Health settings; Barriers; Empowerment

The abstract: the paper in miniature

Background

Why does the topic matter?

Aim

What did the study seek to determine?

Methods

Design, setting, sample, key analysis

Results

Main numerical/qualitative findings

Conclusion

What do the findings mean?

Write the abstract last — after the main manuscript is stable.

Practice: Build a concise abstract

HANDS-ON PRACTICE

Study information

- Cross-sectional study
- 420 nurses
- 3 hospitals in Erbil
- Burnout measured using a validated scale
- 41% had high burnout
- High workload and night-shift frequency were independently associated with burnout.

Your task

In groups, draft FOUR sentences:

1. One sentence of background/aim
2. One sentence of methods
3. One sentence reporting the key results
4. One cautious conclusion

Then remove every unnecessary word.

Burnout is an important occupational concern among healthcare professionals; this study aimed to assess burnout and its associated factors among nurses in Erbil.

A cross-sectional study was conducted among 420 nurses from three hospitals, with burnout assessed using a validated scale.

Around 41% of nurses had high burnout, while high workload and frequent night shifts were independently associated with burnout.

Burnout is common among nurses, highlighting the need for strategies to reduce workload and improve night-shift arrangements.

Writing a Good Abstract

Out-of-Pocket Healthcare Expenditure and Its Associated Factors Among Adults With NCDs: A Cross-Sectional Study

Examples

Weak Abstract

Background: Noncommunicable diseases are an important problem worldwide and cause a lot of costs for patients.

Methods: A cross-sectional study was conducted among NCD patients in Erbil. Data were collected using a questionnaire and analyzed using SPSS.

Results: Four hundred patients participated. The results showed that healthcare expenditure was high. Medication was the main cost. Some factors were significantly associated with expenditure.

Conclusion: NCD patients have high healthcare expenditure and this is an important problem. More research is needed to understand this issue.

Why it is weak

No quantitative information.

Words such as: “high”, “some factors”, “important problem”, do not tell the reader much

Strong Abstract

Background: People living with noncommunicable diseases (NCDs) may face substantial financial burdens because of long-term treatment and healthcare utilization. Evidence on out-of-pocket expenditure among patients with NCDs in the Kurdistan Region of Iraq is limited.

Objective: To estimate out-of-pocket healthcare expenditure and identify factors associated with expenditure among adults receiving care for NCDs in Erbil, Iraq.

Methods: We conducted a cross-sectional study among 400 adults receiving care for NCDs at selected primary healthcare centers in Erbil between January and March 2026. Participants completed a structured questionnaire assessing healthcare utilization and direct out-of-pocket costs during the preceding three months. Expenditure was summarized using median and IQR, and multivariable regression was used to identify associated factors.

Results: The median three-month out-of-pocket healthcare expenditure was 185,000 IQD (IQR 90,000–340,000). Medication costs accounted for 64.2% of total expenditure. Participants with two or more chronic conditions had higher median expenditure than those with one condition (260,000 vs. 145,000 IQD; $p < 0.001$). In multivariable analysis, multimorbidity was independently associated with higher expenditure (adjusted $\beta = 82,400$ IQD; 95% CI 51,200–113,600).

Conclusion: Adults receiving care for NCDs in Erbil incurred substantial direct healthcare costs, with medicines representing the largest component. Strategies to improve access to affordable essential medicines and reduce out-of-pocket payments may help reduce the financial burden of chronic disease management.

03

Introduction

Move the reader logically from the problem to your research question.

A simple Introduction funnel

1 Context — What is already known?

2 Problem — Why is this important?

3 Evidence — What does previous research show?

4 Gap — What remains uncertain?

5 Aim — What will this study address?

Support with a theoretical framework, if applicable

WHAT IS KNOWN

Synthesize evidence; do not list studies one by one.

WHAT IS NOT KNOWN

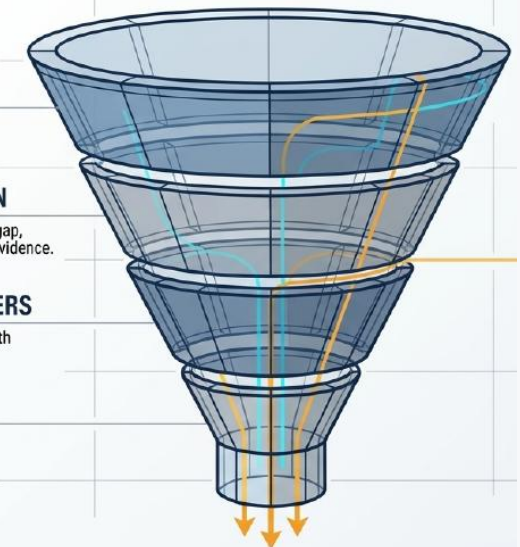
Identify the specific knowledge gap, inconsistencies, or incomplete evidence.

WHY THE GAP MATTERS

Scientific, clinical, or public-health significance.

WHAT WE DID

A precise, focused objective or hypothesis.



Example: From evidence to gap to aim

Evidence Burnout is common among healthcare workers and is associated with reduced wellbeing and poorer quality of care.

Gap However, evidence on the prevalence and occupational determinants of burnout among nurses in the Kurdistan Region remains limited.

Aim This study aimed to estimate the prevalence of burnout and identify associated occupational factors among nurses working in three hospitals in Erbil.

Check alignment

The aim should lead directly to the variables, analysis, Results headings and conclusion.

Practice: Find and write the research gap

HANDS-ON PRACTICE

Scenario

Antibiotic self-medication is common in many low- and middle-income settings. Studies from neighboring countries report prevalence ranging from 20% to 55%. Several factors have been linked to the practice, including easy access to antibiotics and previous experience with similar symptoms.

Task A

Write ONE sentence identifying a plausible research gap for Erbil/Iraq.

Task B

Write ONE aim statement that directly addresses your gap.

Research gap

Despite evidence from neighboring countries, the prevalence and determinants of antibiotic self-medication among the population in Erbil, Iraq, remain insufficiently studied.

Aim

To estimate the prevalence of antibiotic self-medication and identify factors associated with this practice among the population in Erbil, Iraq.

✗ Noncommunicable diseases are very important diseases that affect many people around the world. They are a major health problem in developed and developing countries. Patients with NCDs need healthcare services and medications, which can be expensive. Many studies have been conducted about healthcare expenditure. In Iraq, there are also many NCD patients and healthcare expenditure is an important issue. Therefore, this study was conducted to investigate healthcare expenditure among NCD patients in Erbil.

Problems

- Starts too broadly
- Repeats obvious information
- No clear **knowledge gap**
- No critical synthesis of previous research
- Does not explain why the study is needed
- Objective is buried at the end
- Uses generic phrases such as “very important” and “major health problem”

Introduction

✓ Good example

Noncommunicable diseases (NCDs) account for a substantial proportion of morbidity and mortality worldwide and frequently require long-term treatment and continued use of healthcare services. The resulting financial burden may be particularly important in health systems where patients bear a substantial proportion of healthcare costs.

Previous studies in low- and middle-income countries have reported considerable out-of-pocket expenditure among people living with NCDs, with medication costs and repeated healthcare visits representing important contributors. However, the magnitude and determinants of this expenditure vary considerably across settings because of differences in health financing arrangements, service availability, and household socioeconomic conditions.

Evidence on the financial burden of NCDs in the Kurdistan Region of Iraq remains limited, particularly regarding the factors associated with patients' out-of-pocket healthcare expenditure. Understanding these factors could help inform policies aimed at reducing financial barriers to chronic disease management.

Therefore, this study aimed to estimate out-of-pocket healthcare expenditure and identify factors associated with such expenditure among adults receiving care for NCDs in Erbil, Iraq.

Introduction

✓ Good example

Problem

Noncommunicable diseases (NCDs) account for a substantial proportion of **morbidity and mortality** worldwide and frequently require long-term treatment and continued use of healthcare services. The resulting **financial burden** may be particularly important in health systems where patients bear a substantial proportion of healthcare costs.

Evidence

Previous studies in low- and middle-income countries have reported considerable out-of-pocket expenditure among people living with NCDs, with medication costs and repeated healthcare visits representing important contributors. However, the magnitude and determinants of this expenditure vary considerably across settings because of differences in health financing arrangements, service availability, and household socioeconomic conditions.

Gap

Evidence on the financial burden of NCDs in the Kurdistan Region of Iraq remains **limited**, particularly regarding the factors associated with patients' out-of-pocket healthcare expenditure. Understanding these factors could help inform policies aimed at reducing financial barriers to chronic disease management.

Therefore, this study **aimed** to estimate out-of-pocket healthcare expenditure and identify factors associated with such expenditure among adults receiving care for NCDs in Erbil, Iraq.

Aim

04

Methods

Write so another researcher could understand and reproduce what you did.

What belongs in the Methods section?

Study design

Setting & period

Population

Eligibility criteria

Sample size

Sampling method

Variables / outcomes

Data collection tool

Validity / reliability

Data collection procedure

Statistical / qualitative analysis

Ethics

Report what was planned and done — not what you wish had been done.

Methods detective: What is missing?

HANDS-ON PRACTICE

“A cross-sectional study was conducted among university students in Erbil. A questionnaire was used to collect data. The data were analyzed using SPSS.”

Missing

- Study period and setting details
- Eligibility criteria
- Sample size and calculation
- Sampling method
- Questionnaire source/development and validation
- Variables and operational definitions
- Statistical tests and significance level
- Ethical approval and consent

✗ A cross-sectional study was conducted among NCD patients in Erbil. Data were collected using a questionnaire. Patients were asked about their healthcare expenditure and other information. The data were entered into SPSS and analyzed using appropriate statistical tests. Ethical approval was obtained from the relevant authorities.

Problems: The reader cannot reproduce the study.

Missing:

Study setting

Study period

Sampling method

Sample size

Inclusion/exclusion criteria

Definition of expenditure

Data collection procedure

Variables

Statistical tests

Missing-data handling

Ethical approval details

Good example

We conducted a cross-sectional study among adults receiving care for diabetes, hypertension, cardiovascular disease, or chronic respiratory disease at selected primary healthcare centers in Erbil, Iraq, between January and March 2026. Eligible participants were adults aged ≥ 18 years who had been receiving care for an NCD for at least three months. Patients who were unable to provide reliable information about their healthcare expenditure were excluded.

A structured interviewer-administered questionnaire was used to collect information on sociodemographic characteristics, disease history, healthcare utilization, medication expenditure, transportation costs, and other direct out-of-pocket healthcare costs incurred during the preceding three months. Total out-of-pocket expenditure was calculated as the sum of these direct costs and reported in Iraqi dinars.

Descriptive statistics were used to summarize participant characteristics and expenditure. Because expenditure data were right-skewed, median and interquartile range (IQR) were reported. Associations between participant characteristics and expenditure were initially examined using non-parametric tests. A multivariable regression model was subsequently fitted to identify factors independently associated with out-of-pocket expenditure. Statistical significance was assessed at $p < 0.05$.

Ethical approval was obtained from [name of ethics committee], and written informed consent was obtained from all participants.

✓ Good example

We conducted a **cross-sectional study** among **adults** receiving care for diabetes, hypertension, cardiovascular disease, or chronic respiratory disease at selected **primary healthcare centers in Erbil**, Iraq, between January and March **2026**. **Eligible** participants were adults aged ≥ 18 years who had been receiving care for an NCD for at least three months. Patients who were unable to provide reliable information about their healthcare expenditure were **excluded**.

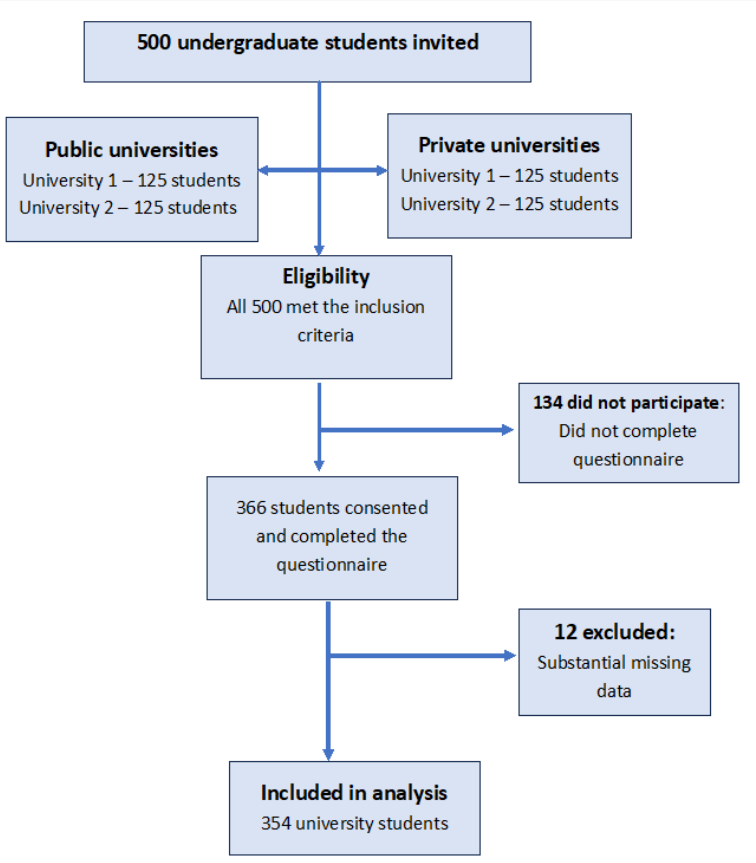
A structured **interviewer**-administered **questionnaire** was used to collect information on sociodemographic characteristics, disease history, healthcare utilization, medication expenditure, transportation costs, and other direct out-of-pocket healthcare costs incurred during the preceding three months. Total out-of-pocket **expenditure** was calculated as the sum of these direct costs and reported in Iraqi dinars.

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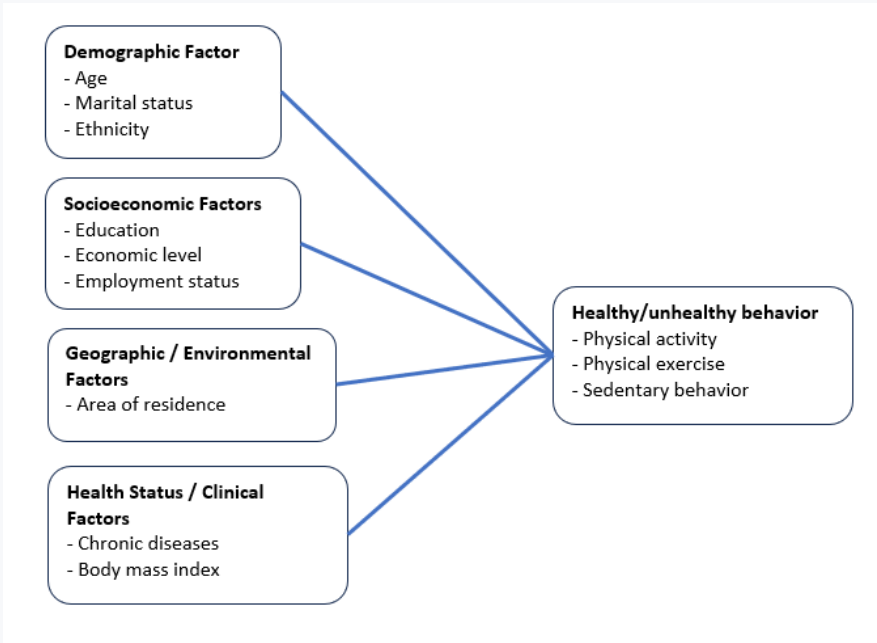
Ethical approval was obtained from [name of ethics committee], and written informed consent was obtained from all participants.

Enhance Methods section

Flow Chart for participants



Conceptual model for factors



Reporting guidelines

www.equator-network.org/reporting-guidelines/

CONSORT — randomized controlled trials

Item	STROBE requirement	Where addressed in manuscript
Title and Abstract		
1a	Indicate the study's design with a commonly used term in the title or abstract	Title/Abstract – Cross-sectional study (Pages 1 and 2)
1b	Provide an informative and balanced summary of what was done and what was found	Abstract (Page 2)
Introduction		
2	Explain the scientific background and rationale	Introduction (Pages 3 - 6)
3	State specific objectives, including any prespecified hypotheses	Introduction (Page 6)
Methods: Study Design		
4	Present key elements of study design early in the paper	Methods – Design and setting (Page 6)
Methods: Setting		
5	Describe setting, locations, relevant dates, recruitment, exposure, and data collection periods	Methods – Design and setting (Page 6)
Methods: Participants		
6a	Give eligibility criteria and sources/methods of selection	Methods – Participants and sampling

05

Results

Report the answer to the research question — clearly and without interpretation.

Results: What to report and how

DO

- Follow the order of objectives
- Start with participant characteristics
- Report key estimates and uncertainty
(OR 1.42, 95% CI 1.08–1.87)
- Use tables/figures for detail
- Use consistent denominators
- Report important negative findings

AVOID

- Explaining why findings occurred
- Repeating every table value in text
- Reporting p-values without effect estimates
- Introducing methods not previously described
- Selective reporting

REMEMBER

Text = key message

Table = detailed values

Figure = patterns/trends

Discussion = meaning

Practice: Turn a table into three sentences

HANDS-ON PRACTICE

Characteristic	n (%)
Women	252 (60.0)
Night shift ≥ 6 /month	189 (45.0)
High burnout	172 (41.0)
High workload	231 (55.0)

Your task

Write THREE Results sentences only.

Rules:

- Select the most important information.
- Do not repeat every number.
- Do not explain WHY.
- Keep denominators clear.

Among the 420 participants, 252 (60.0%) were women.
High workload was reported by 231 (55.0%) participants.
High burnout was identified in 172 (41.0%) participants.

Principle: tables show detail; text tells the reader what matters.

Quick check: Result or Discussion?

VOTE

A

The prevalence of burnout was 41%.

B

The higher prevalence may reflect frequent night shifts.

C

Burnout was independently associated with high workload (adjusted OR 2.1, 95% CI 1.4–3.2).

D

This association is consistent with studies reporting workload-related occupational stress.

Result

Discussion

Results: What to report and how

DO

✓ “Female participants had higher odds of ... (OR X.XX, 95% CI X.XX–X.XX).”

AVOID

✗ “This demonstrates that female participants were more likely to...”

REMEMBER

Don't interpret your results in the Results section.

✗ The study included 400 patients. Most patients were female and had low income. Healthcare expenditure was high among the participants. There was a significant relationship between income and expenditure. Some patients had difficulty paying for their treatment. The regression analysis showed that several factors were associated with expenditure.

Problems:

- Too vague
- No actual numbers
- “High” is undefined
- “Several factors” is meaningless
- No effect estimates
- No confidence intervals
- No indication of the magnitude of associations
- Uses interpretation (“difficulty paying”) without evidence

 Good example

A total of 400 patients participated in the study, of whom 238 (59.5%) were women. The median age was 56 years (IQR 47–65), and 247 participants (61.8%) reported a monthly household income below 1,000,000 IQD.

The median three-month out-of-pocket healthcare expenditure was 185,000 IQD (IQR 90,000–340,000). Medication costs accounted for the largest proportion of total expenditure (64.2%), followed by transportation (18.7%) and consultation and investigation costs (17.1%).

Median expenditure was higher among participants with two or more chronic conditions than among those with one condition (260,000 vs. 145,000 IQD; $p < 0.001$).

In the multivariable regression analysis, multimorbidity was independently associated with higher out-of-pocket expenditure (adjusted $\beta = 82,400$ IQD; 95% CI 51,200–113,600).

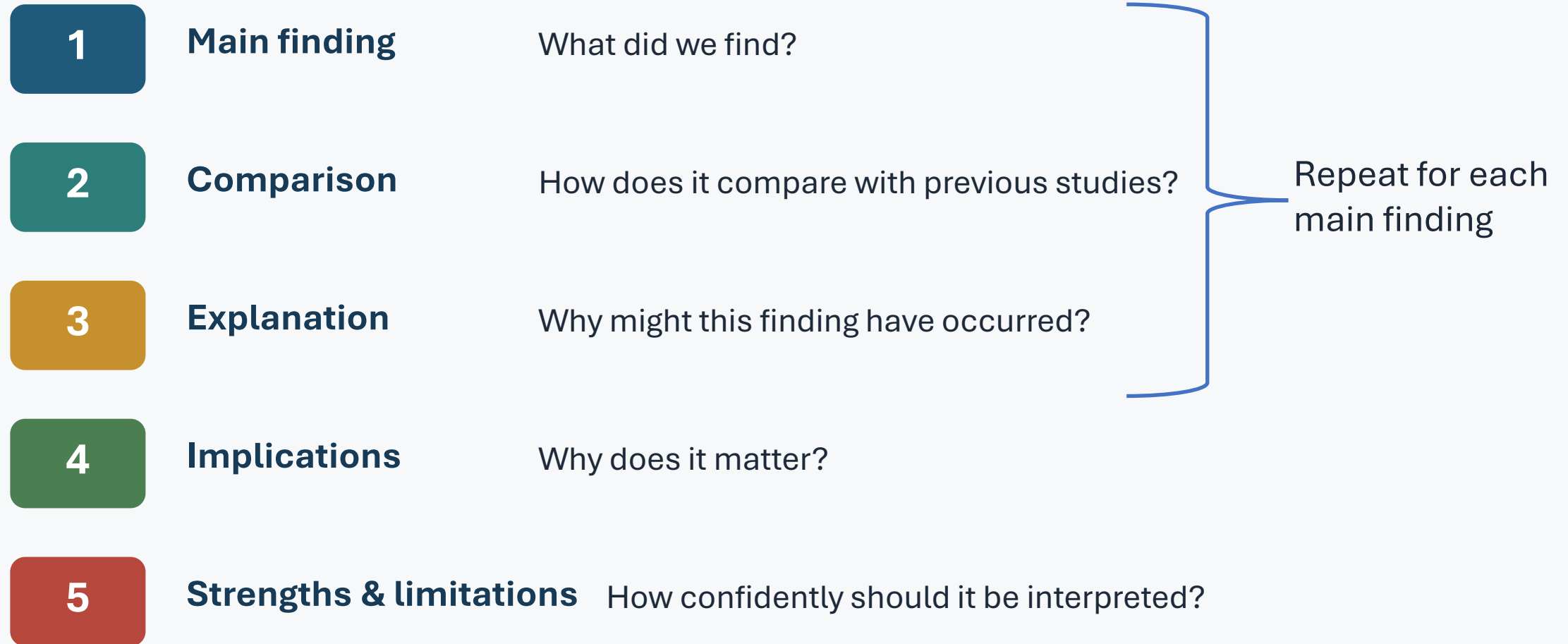
Participants in the lowest income category had lower absolute expenditure than those in the highest income category (adjusted $\beta = -34,700$ IQD; 95% CI -61,900 to -7,500).

06

Discussion & Conclusion

Interpret findings without overclaiming.

A five-part Discussion model



Practice: Write interpretation, not repetition

HANDS-ON PRACTICE

Finding: Nurses with >10 years of experience had significantly higher knowledge scores.

Compare

How might this agree or disagree with previous research?

Explain

What plausible mechanisms could account for it?

Implication

What could this mean for training or practice?

Draft a 3-sentence Discussion paragraph. Use cautious language: may, might, could, suggests.

This finding agrees with previous studies reporting higher knowledge among nurses with greater professional experience.

More experienced nurses may gain knowledge through repeated clinical exposure, continuing education, and accumulated practical experience.

Additional targeted training may help less-experienced nurses develop knowledge more rapidly.

Discussion



Our study found that healthcare expenditure was high among NCD patients. This finding is similar to other studies. This may be because NCDs are chronic diseases and patients need medications. Other studies have also found similar results. Our study is important because it shows that healthcare expenditure is a problem. The government should take action to reduce healthcare costs.

Problems

- Repeats the Results
- No meaningful comparison with previous studies
- No explanation of differences
- Speculation without evidence
- Generic policy recommendations
- Does not discuss strengths or limitations

Discussion



This study found that adults receiving care for NCDs incurred substantial out-of-pocket healthcare expenditure, with medications accounting for nearly two-thirds of total direct costs. Multimorbidity was independently associated with higher expenditure, suggesting that the financial burden increases as patients require more complex and sustained treatment.

The predominance of medication costs is consistent with findings from other low- and middle-income settings, where pharmaceutical expenditure represents a major component of household healthcare spending. However, the magnitude of expenditure observed in our study differs from estimates reported in other settings, potentially reflecting differences in medicine availability through public facilities, insurance coverage, and patterns of healthcare utilization.

Several strengths should be considered. The study collected detailed information on multiple components of direct healthcare expenditure and examined potential determinants using multivariable analysis. However, the cross-sectional design prevents causal inference, while expenditure data based on participant recall may have been affected by recall error. In addition, the study was conducted in selected healthcare facilities in Erbil and may not be generalizable to all patients with NCDs in the Kurdistan Region.

These findings highlight the importance of policies that improve access to affordable essential medicines and reduce direct healthcare payments for people living with multiple chronic conditions.

Discussion



Main finding

This study **found** that adults receiving care for NCDs incurred substantial out-of-pocket healthcare expenditure, with medications accounting for nearly two-thirds of total direct costs. Multimorbidity was independently associated with higher expenditure, suggesting that the financial burden increases as patients require more complex and sustained treatment.

Comparison

The predominance of medication costs is **consistent with findings** from other low- and middle-income settings, where pharmaceutical expenditure represents a major component of household healthcare spending. However, the magnitude of expenditure observed in our study **differs** from estimates reported in other settings, potentially **reflecting** differences in medicine availability through public facilities, insurance coverage, and patterns of healthcare utilization.

Strengths and limitations

Several **strengths** should be considered. The study collected detailed information on multiple components of direct healthcare expenditure and examined potential determinants using multivariable analysis. **However**, the cross-sectional design prevents causal inference, while expenditure data based on participant recall may have been affected by recall error. In addition, the study was conducted in selected healthcare facilities in Erbil and may not be generalizable to all patients with NCDs in the Kurdistan Region.

These findings **highlight** the importance of policies that improve access to affordable essential medicines and reduce direct healthcare payments for people living with multiple chronic conditions.

Implications

Explanation

Limitations

- Name and describe the limitation clearly
- Explain its likely impact on the findings and direction:
 - overestimation, underestimation, misclassification, reduced precision, or restricted generalizability
- Explain how the limitation was mitigated or could be addressed in future research



“This study has some limitations. The cross-sectional design and self-reported data may have introduced bias.”



“The cross-sectional design limits the ability to establish temporality and therefore does not permit causal inference. In addition, reliance on self-reported antibiotic use may have introduced recall or social desirability bias, potentially resulting in misclassification or underreporting. The use of a standardized questionnaire helped reduce measurement variability; however, future longitudinal studies incorporating objective measures of antibiotic use would strengthen the evidence.”

Writing the conclusion

Avoid overclaiming

This study proves that night shifts cause burnout and hospitals must eliminate night work.”

Problems:

- Causal claim from cross-sectional data
- Stronger than the evidence
- Recommendation exceeds findings

Prefer evidence-aligned wording

“Burnout was common and was associated with frequent night shifts and high workload. Interventions addressing modifiable workplace factors should be evaluated in future studies.”

Answers the aim • cautious • actionable

Writing the conclusion



In conclusion, NCDs are an important problem and healthcare expenditure is a major issue. More studies should be conducted in the future. The government and healthcare providers should work together to solve this problem.

Problems

- Generic
- Does not answer the research question
- Introduces no specific finding
- Makes broad recommendations unsupported by the study



Adults receiving care for NCDs in Erbil incurred substantial out-of-pocket healthcare expenditure, with medication costs representing the largest component. Expenditure was particularly high among patients with multiple chronic conditions. Strengthening access to affordable essential medicines and reducing direct healthcare payments may help reduce the financial burden of chronic disease management.

Writing the conclusion - recommendation

GENERIC

“The government should take action to improve healthcare.”

SPECIFIC

“Primary-care programs should prioritize reliable access to affordable essential medicines for patients with multimorbidity.”

07

Scientific Writing Style

Make the science easy to read — not impressive to decode.

Clarity and concision: remove verbal clutter

Due to the fact that

→ **Because**

A total number of 250 participants

→ **A total of 250 participants**

The majority of participants

→ **Most participants**

It is important to note that smoking was associated...

→ **Smoking was associated...**

The results of our study showed that there was an increase

→ **Our results showed an increase**

This proves that the intervention is effective

→ **This suggests that the intervention may be effective**

Writing clinic: Make each sentence stronger

PAIR EDITING

1. It is worth mentioning that the prevalence was found to be high.
2. A total of 45 participants did not give a response to this question.
3. There were many participants who reported that they were dissatisfied.
4. The intervention caused a significant improvement in knowledge in this cross-sectional study.
5. In our study, we found that there was an association between age and hypertension.

Challenge: shorten each sentence without changing the intended meaning — and correct any inappropriate claim.

Writing clinic: Make each sentence stronger

1. It is worth mentioning that the prevalence was found to be high.
 - The prevalence was high.
2. A total of 45 participants did not give a response to this question.
 - Forty-five participants did not respond to this question.
3. There were many participants who reported that they were dissatisfied.
 - Many participants reported dissatisfaction.
4. The intervention caused a significant improvement in knowledge in this cross-sectional study.
 - Higher knowledge was associated with the intervention.
5. In our study, we found that there was an association between age and hypertension.
 - Age was associated with hypertension.

Causal language: choose carefully

Cross-sectional

“was associated with”

“was more common among”

Observational longitudinal

“was associated with
increased risk”

Randomized trial

causal wording may be appropriate for the intervention effect when randomization and analysis support it.

Qualitative study

Use language such as
“participants described”,
“participants perceived”,
“themes suggested”

Active voice often improves clarity

- Active: Subject + verb + object.
- Use it especially when it makes responsibility or action clearer.
- Passive voice remains legitimate when the action is more important than the actor.

PASSIVE

“Data were collected from 250 participants.”

ACTIVE

“We collected data from 250 participants.”

PASSIVE

“These findings can be explained by differences in access to healthcare services.” →

ACTIVE

“Differences in access to healthcare services may explain these findings.”

Active voice often improves clarity

Passive:

These findings can be explained by the differences in access to healthcare services.

Active:

Differences in access to healthcare services may explain these findings.

Passive:

The results are supported by previous studies.

Active:

Previous studies support our findings.

Passive:

Several factors were identified as potential barriers to vaccination.

Active:

Several factors emerged as potential barriers to vaccination.

Stigmatizing/Non-inclusive → Precise/Inclusive Language

The elderly

Older adults / adults aged ≥ 65 years

The poor

People experiencing poverty / people with low income

The disabled

People with disabilities

Diabetics

People with diabetes / adults living with diabetes

Obese people

People with obesity

Drug addicts

People with substance use disorder / people who use drugs

AIDS victims

People living with HIV

Non-compliant patients

Patients with low adherence to treatment

Uneducated women

Women with limited formal education

Normal weight

Healthy weight / reference weight range

He/she was asked...

Participants were asked...

Build coherent paragraphs

One paragraph = one main idea

Topic sentence

Introduces the point

Evidence / detail

Supports the point

Interpretation

Explains significance

Link / transition

Connects to what follows

Editing question

Can the reader identify the main point of this paragraph from the first sentence?

If a paragraph contains two unrelated ideas, split it.

Use transitions to show contrast, addition and consequence.

Build coherent paragraphs

Topic sentence

Evidence / detail

Interpretation

Link / transition



Antibiotic resistance is a major problem worldwide. Many university students use antibiotics. In our study, 26.6% used antibiotics without a prescription. There were more females than males in the sample. Antibiotics are available from pharmacies, and students sometimes live in hostels. Health students also study pharmacology. The government should introduce strict regulations. Antibiotic resistance causes many deaths worldwide. More research is needed.



Topic sentence: Antibiotic self-medication among university students is an important public health concern because it may contribute to inappropriate antibiotic use. **Evidence/detail:** In a cross-sectional study in Erbil, 26.6% of surveyed university students reported using antibiotics without a prescription, with higher prevalence among hostel residents and students in health-related disciplines. **Interpretation:** These findings suggest that some student groups may have greater access to antibiotics or may be more likely to rely on their own knowledge when treating minor illnesses. **Link/transition:** Therefore, targeted educational interventions and stronger control of non-prescription antibiotic dispensing may help reduce inappropriate antibiotic use among university students.

08

Integrity, References & Responsible AI

Protect the credibility of the manuscript.

Paraphrasing is more than changing words

COPYING

Reproducing wording without quotation/citation.

High risk of plagiarism.

PATCHWRITING

Changing a few words while keeping the original sentence structure.

Still problematic.

TRUE PARAPHRASE

Understand the idea → set source aside → rewrite the meaning in your own structure → cite the source.

Citation is required even when the wording is entirely your own.

References: quality matters more than quantity

Avoid

- Citing sources you have not actually read
- Using weak or unreliable sources
- Over-reliance on old references
- Mismatch between text and reference list
- Citation padding and excessive self-citation
- Duplicate references
- Fabricated or AI-generated references
- Inconsistent reference style

Do

- Cite original research for important empirical claims where appropriate.
- Use high-quality reviews and authoritative guidance for established evidence.
- Check that every citation actually supports the statement.
- Use a reference manager such as Zotero, EndNote, or Mendeley.
- Before submission, verify that in-text citations and the reference list match exactly.

Responsible use of AI in scientific writing

Potentially useful

- Improve grammar and readability
- Suggest alternative wording
- Help organize ideas
- Generate editing checklists
- Explain unfamiliar concepts

Always verify output against your data and sources.

Declare the use of AI

High-risk uses

- Inventing references
- Generating results that were not observed
- Uploading confidential/sensitive data without authorization
- Accepting factual claims without verification
- Hiding AI use when disclosure is required

Follow journal and institutional policies.

AI Declaration

“An AI-assisted language-editing tool was used to improve grammar and readability. The authors reviewed all edited text and remain responsible for the accuracy, originality, and integrity of the manuscript.”

DO

Parity was not significantly different between the preeclampsia and control groups. More than half of the participants were multiparous, while around one-quarter were nulliparous. This finding differs from Maeda et al., who reported that multiparity was associated with a lower risk of preeclampsia (8). The relationship between parity and preeclampsia may be affected by several factors, including maternal age, previous preeclampsia, interpregnancy interval, and change of partner. The relatively small sample size in the present study may also explain the lack of a significant association.

Review suggestions 14

Correctness Clarity Engagement Delivery Style guide

The **Several factors may affect the** relationship between parity and preeclampsia ~~may be affected by several factors~~, including maternal age, previous preeclampsia, interpregnancy interval, and change of partner.

Use this version Dismiss

Correctness · Add a comma in a series ⓘ

...gestational age, and renal function...

Accept Dismiss ...

AVOID

preeclampsia, renal function, and characteristics of the study population. Therefore, NGAL values and cutoff points from one study should not be directly applied to another population without validation.

The increase in NGAL among women with preeclampsia can be explained by the pathophysiology of the disease. NGAL is released in response to inflammation, cellular stress, and tissue injury and is considered an

Clarity · Rewrite in active voice ⓘ

~~The increase in NGAL among women with preeclampsia can be explained by the pathophysiology of the disease~~ The pathophysiology of the disease can explain the increase in NGAL among women with preeclampsia.

Rewrite in active voice Dismiss ...

09

Final Manuscript Challenge

Apply the whole workshop to a realistic mini-manuscript.

Group challenge: Fix the manuscript

10 MINUTES

Your group receives a one-page mini-manuscript containing deliberate problems.

Vague title

Unclear objective

Overlong Introduction

Missing sampling details

Interpretation in Results

Table/text duplication

Unsupported causal language

Discussion repeats Results

Overstated conclusion

Inconsistent terminology

Wordiness

Citation / paraphrasing problem

Identify as many problems as possible. Then choose your THREE highest-priority corrections and justify them.

Mini-manuscript review challenge

A Study About Antibiotics Among University Students

Introduction

Antibiotics are very important medicines that have been used for many years to treat different types of infections and have saved millions of lives around the world. Antibiotics are widely used in hospitals, clinics, pharmacies, and communities. However, many people use antibiotics without consulting doctors, and this is becoming an important problem everywhere. Antibiotic resistance is also a very serious global problem that affects both developed and developing countries and causes many deaths every year. Many factors contribute to antibiotic resistance, including inappropriate prescribing, poor adherence, unnecessary use, and self-medication.

Self-medication means using medicine without getting proper medical advice. University students may use antibiotics because they are busy, have previous experience with illnesses, have easy access to pharmacies, or believe that they know which medicine they need. Previous studies have shown that self-medication is common among university students. One study stated that “university students commonly self-medicate with antibiotics because they have easy access to these medicines and believe that previous experience enables them to treat similar illnesses without consulting a physician” (Ahmed et al., 2020). Many studies have been conducted in different countries, but more research is still needed because antibiotic use is an important issue.

Therefore, this study aimed to look at antibiotic use among students and some related issues.

Methods

A cross-sectional study was conducted among university students in Erbil during 2026. Students from different colleges participated in the study. A questionnaire was distributed to students who agreed to participate. The questionnaire included demographic characteristics and questions about antibiotic use. A total of 420 students completed the questionnaire. Data were entered into SPSS and analyzed using appropriate statistical tests. A p-value of less than 0.05 was considered statistically significant.

Results

Of the 420 participants, 252 (60.0%) were females and 168 (40.0%) were males. The majority of the students were young. Overall, 168 students (40.0%) reported using antimicrobial drugs without a prescription during the previous 12 months. This high percentage clearly shows that students do not have sufficient knowledge about the dangers of antibiotics. Self-medication was significantly higher among students living in dormitories than among those living with their families (50.0% vs. 35.0%, $p=0.002$). This proves that living in dormitories causes students to self-medicate because they have less parental supervision.

Identify as many problems as possible

The reasons reported for antibiotic self-use included previous experience (45%), lack of time to visit a doctor (30%), and advice from friends (25%). Previous experience was the most commonly reported reason.

Table 1. Reasons for antibiotic self-medication among students

Reason	n	%
Previous experience	76	45
Lack of time	50	30
Advice from friends	42	25
Total	168	100

As can be seen in Table 1, 76 (45%) students reported previous experience, 50 (30%) reported lack of time to visit a doctor, and 42 (25%) reported advice from friends. Therefore, previous experience was the most common reason, followed by lack of time and advice from friends.

Discussion

The present study found that 40% of university students used antibiotics without prescription. We also found that self-medication was higher among students living in dormitories. The study also found that previous experience was the most common reason for self-medication, followed by lack of time and advice from friends. These are the main findings of our study.

Forty percent of students self-medicated with antibiotics, which is a high percentage. Dormitory students had higher self-medication than students living with their families. Previous experience was reported by 45%, lack of time by 30%, and advice from friends by 25%. Thus, our findings show that antibiotic self-medication is an important problem among university students.

Our results are similar to some previous studies but different from other studies. This may be because the populations and countries were different. The higher use among hostel residents is definitely because students who live away from their families have more freedom and therefore make poor decisions about medicines. The findings demonstrate that universities must introduce compulsory antibiotic education programs, which will reduce inappropriate antibiotic consumption and prevent antimicrobial resistance.

Conclusion

Antibiotic misuse is extremely common among university students in Erbil. This study proves that living in dormitories causes antibiotic self-medication and that inadequate knowledge is the main reason for inappropriate antibiotic use. University-wide educational programs will significantly reduce self-medication and solve the problem of antimicrobial resistance among students. These findings can be generalized to all university students in Iraq.

Deliberate problem types

1. Vague, nonspecific title
2. Unclear objective
3. Unnecessarily long and unfocused Introduction
4. Missing sampling method, eligibility criteria, recruitment setting, questionnaire validity, ethics, and sample-size details
5. Interpretation inserted into Results
6. Unnecessary duplication between the table and text
7. Causal language from a cross-sectional association
8. Discussion largely repeats Results instead of interpreting them
9. Overstated conclusion and unjustified generalization
10. Inconsistent terminology—"antibiotics," "antimicrobial drugs," "self-medication," "self-use," and "misuse"
11. Wordiness and vague expressions
12. A citation/paraphrasing problem, including a long direct quotation rather than appropriate synthesis/paraphrasing.

Before submission: a manuscript self-review



Title accurately represents the study



Discussion interprets and contextualizes findings



Aim is explicit and consistent throughout



Limitations are acknowledged appropriately



Methods are sufficiently reproducible



Conclusion does not exceed the evidence



Results answer the objectives



Language is clear, concise and consistent



Tables/figures add value rather than duplicate text



References are accurate and journal instructions followed

Summary

- 1 Plan before writing** Align aim → methods → results → conclusion.
- 2 One job per section** Keep findings in Results and interpretation in Discussion.
- 3 Prefer clarity** Simple, precise language is stronger than unnecessary complexity.
- 4 Show the evidence** Use effect estimates, uncertainty, tables and figures appropriately.
- 5 Revise deliberately** Good papers are rewritten, not merely written.

Your next paper: one action before you leave

1 MINUTE

Write down ONE specific change you will make in your next manuscript.

“In my next manuscript, I will...”

Optional: share your commitment with the person beside you.

Thank you

Questions • Discussion • Feedback
