Biostatistical Competencies and Attitudes in Health Research

Insights from a Delphi Study

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Background

Biostatistics is essential in Health Research, yet challenges remain :

- Misuse and misinterpretation frequently reported.
- Existing assessment tools mainly designed for students or specifics groups.
- The various roles of researchers: consumers and producers of statistics at different levels.
- Attitudes towards biostatistics also matter.

Context

To assess the level of biostatistical literacy in Health researchers

What statistics ?
What competencies ?
What attitudes ?

Definition

Be able to
- Read
- Understand
- Interpret
- Produce
- Communicate

Gal, 2000
Brearly et al, 2023

Framework

Associations between
- Knowledge
- Self-efficacy
- Attitudes
- Norm
- Intentions/Behaviours

Socio-cognitive theory
Theory of planned behavior

Objectives

A Delphi process

- To develop Core Biostatistical competencies in line with our Biostatistical literacy (BSL) definition that incorporates different profiles of biostatistics “consumers” and “producers”.
- To identify key attitudes towards biostatistics that may influence their application in research practice.

The Delphi process

Panellists

- Networking
- Snowball

25 experts
(7 Biostatisticians
15 Health researchers
3 Psychometricians
French-Speaking Belgian Universities)

Items

- Literature review
- Questionnaires
- List of competencies

(Oster et al, 2018)

- BSL definition

41 items for competencies
27 items for attitudes

Consensus

- 7-Likert scale rating
- Stability between rounds 1 & 2

Median ≥ 6

IQR ≤ 1

Qualitative data

Learn more about items

Fundamental skills as

- Interpret the p-value of a statistical test
- Distinguish between correlation and causation
- ….

To read, understand, interpret, conduct & communicate

- Descriptive statistics
- Basic statistics
- Advanced statistics
- Regression models

Attitudes (effort, difficulty, interest)

- Anxiety to
  - Read
  - Communicate
  - Conduct
- Utility
  - Training
  - Research
- Perceiving statistics as too complex of a field.
- …

Results – Round 1 (22/09/2025 to 12/10/2025)

23 (92%) panellists

Consensus

Competencies 27/41

Fundamental skills

Descriptive & Basic

Attitudes 6/27

Interest in training

Usefulness in research

Remarks/suggestions

Competencies

Recognise limitation

Consult Biostatistician

Attitudes

Clarifications needed

Vocabulary

Results – Round 2 (3/11/2025 to 30/11/2025)

21 (91%) panellists

Consensus

Competencies
58/66

Added items

Results consolidation

Attitudes
21/68

Effort & Difficulties

Usefulness depending on curriculum

Remarks/suggestions

Competencies & Attitudes

Stability

Vocabulary

Results – Last round (15/12/2025 to 30/01/2026)

18 (86%) panellists

Consensus

Competencies
6/11

Results consolidation

Attitudes
4/34

Effort & Difficulties

Differences between the panel groups

- For health researchers, essential competencies closely match biostatistician duties; biostatisticians, however, took a more nuanced perspective.
- Biostatisticians emphasized the complexity and anxiety of advanced analyses, noting researchers may misuse tests without full understanding or collaboration.

Results - Summary

Core Biostatistical competencies

- High level of consensus (64/71 items, 90.1%) regarding items related to fundamental knowledge and basic biostatistical methods.
- Consensus more difficult to achieve for items related to advanced statistical methods and regression models.

Attitudes towards Biostatistics

- Lower levels of agreement (26/70, 37.1%) and greater variability across rounds.
- Limited agreement for items related to more affective dimensions such as anxiety and discouragement.

Conclusion

- In line with existing literature;
- Challenges and Implications in Education and Collaboration;
  - Curriculum development / (lifelong) training programs
  - Appropriate collaboration
- Some limitations (selection of the panel, methodological choices, and definitions);
- Perspectives
  - Qualitative study
  - Health researchers' assessment

Any question?

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Feedbacks (in French) + dataset (after acceptance) available at https://doi.org/10.58119/ULG/IEG15H