

## Advanced Statistical Methods in Digital Epidemiology

MAHE DDS 6106: Statistical Research Methodology | Exemplar Reading Guide

### · Classification: Instructional Cumulative Thesis Teaching Model (Manuscript Style)

· Reading Time: 20-25 mins | · Difficulty: · Intermediate | · Audience: Graduate Research Students & PhD Candidates

? Why Selected: Compiles 3 published or submitted journal papers bound together with introductory and discussion chapters.

### STRUCTURAL COLOR LEGEND & ANNOTATION GUIDE

-  Title & Abstract: High-impact summary, study rationale, & indexing keywords
-  Introduction & Literature: Research problem, background literature, & study hypothesis
-  Methods & Study Design: Study design, participants, sample size, SAP, & ethics approval
-  Results & Data Analysis: Empirical findings, statistical tables, p-values, & figures
-  Discussion & Conclusion: Interpretation, comparison with literature, limitations, & conclusion

### · THESIS STRUCTURAL ROADMAP

- Front Matter & Declaration of Co-Authorship
- Chapter 1: Comprehensive Synthesis & Overview
- Chapter 2: Published Paper 1 (BMJ Open Protocol)
- Chapter 3: Published Paper 2 (PLOS ONE Cohort)
- Chapter 4: Published Paper 3 (Scientific Reports)
- Chapter 5: General Discussion & Overall Conclusions

### · MILESTONE ICONS TO LOCATE

- **Paper 1 (Published)**  
Study protocol in BMJ Open (2022)
- **Paper 2 (Published)**  
Observational study in PLOS ONE (2023)
- **Paper 3 (In Review)**  
Machine learning analysis in Sci Rep
- **Co-Author Declaration**  
Explicit candidate contribution percentage
- **General Synthesis**  
Unified summary connecting all 3 papers

### · HOW A THESIS BECOMES A JOURNAL PAPER (IMRaD)

In an article-based thesis, the candidate has ALREADY published the journal papers during their degree! The thesis consists of an overarching Chapter 1 synthesis, followed by the published papers as standalone chapters.

#### Full Monograph (150-200 Pages)

Contains literature review, raw tables, complete proofs, & code

#### · Select One Primary Question

Extract single core empirical finding or novel theoretical contribution

#### · Condense to 8-10 Pages (IMRaD)

Introduction (Ch1) -> Methods (Ch3) -> Results (Ch4) -> Discussion (Ch5)

#### · Submit to Peer-Reviewed Journal

Peer review, revision, and open-access journal publication

-> Turn page to inspect the annotated exemplar!

# ADVANCED STATISTICAL METHODS IN DIGITAL EPIDEMIOLOGY

A Dissertation Presented for the Degree of Thesis Blueprint 3: Article-Based / Cumulative Archetype

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Prasanna School of Public Health, MAHE, Manipal

## DECLARATION & CERTIFICATE

I hereby declare that this dissertation is my own original work and has not been submitted for any other degree.

## ABSTRACT

### ABSTRACT SUMMARY:

This dissertation presents a comprehensive investigation into advanced statistical methods in digital epidemiology. We detail theoretical foundations, execute simulation studies, and validate results on real health data.

# CHAPTER 1: OVERARCHING SYNTHESIS

## THESIS STRUCTURE:

This cumulative dissertation comprises three peer-reviewed research papers published or submitted during candidate candidature.

## UNIFYING RESEARCH QUESTION:

How can digital health records improve real-time outbreak surveillance in low-resource settings?

## CANDIDATE CONTRIBUTION STATEMENT:

The candidate was primary author (80%+ contribution) on all included manuscripts.

## CHAPTER 2: PAPER 1 (PUBLISHED PROTOCOL)

### MANUSCRIPT 1:

Title: Digital Surveillance Protocol for Acute Respiratory Infections.

Journal: BMJ Open (2022).

Role: Study design, protocol writing, and ethics submission.

Summary: Outlines prospective digital surveillance framework across 12 sentinel clinics.

## CHAPTER 3: PAPER 2 (PUBLISHED COHORT STUDY)

### MANUSCRIPT 2:

Title: Observational Analysis of Mobile Health Reporting Rates.

Journal: PLOS ONE (2023).

Role: Data cleaning, multivariable Poisson regression, and manuscript drafting.

Summary: Evaluates reporting compliance across 1,200 community healthcare workers.

# INTERACTIVE STUDENT CHECKLIST: CAN YOU LOCATE...?

MAHE DDS 6106: Statistical Research Methodology | Active Self-Assessment

Before closing this paper, test your ability to locate these 10 core research components:

## · 1. Research Problem & Gap ·

Where do the authors explicitly state what previous studies failed to solve?

## · 2. Research Question & Objectives ·

Where is the primary study aim or formal statistical hypothesis stated?

## · 3. Study Design & Target Population ·

Is this an RCT, Cohort, Case-Control, Cross-Sectional, or Methodological design?

## · 4. Variables & Primary Outcome ·

What is the primary dependent variable / clinical endpoint?

## · 5. Sample Size Calculation ·

Did the authors provide a formal power calculation or sample size justification?

## · 6. Statistical Analysis Plan (SAP) & Software ·

Which software packages (R, SAS, Python) and tests (ANOVA, Cox, Logistic) were used?

## · 7. Primary Empirical Finding & Effect Size ·

Locate the primary result, confidence interval, p-value, or Odds/Hazard Ratio.

## · 8. Study Limitations & Confounding ·

Where do the authors acknowledge unmeasured bias, attrition, or design constraints?

## · 9. Ethics Approval & IRB Number ·

Locate the institutional ethics committee protocol approval code.

## · 10. Funding & Conflict of Interest ·

Who funded the study, and did the authors declare any financial conflicts?

· Completed this checklist? Excellent work mastering scientific paper navigation!