See the writing-up section of the CID project handbook, page 51 of 81.

For the document style

• (fin.) Use A4 paper size (210 x 297mm). Set your electronic copy up as if it were going to be printed.

• (fin.) Use standard Arial 11-point font for your main text. You may wish to put specific

headings in larger font sizes; and could use different fonts for specific elements i.e.

quotations, which should also usually be indented and surrounded by quote marks.

• (fin.) Set line spacing at 1.5, and leave a one-line gap between separate paragraphs.

• (fin.) Use margins of 2.54cm (1 inch) all round the page.

• (fin.) Number all pages (in the footer). Page numbers may appear outside the 1-inch margin.

• Tables may be presented in an alternative font, of no less than 8-point size, and

single-line spaced – to help improve visual appearance or fit to the page

Title page

TODO: replace with the template provided via the programmer director.

MSc Project Report 2022-2023

A quantitative simulation-based evaluation of the early detection of poliovirus using environmental surveillance.

Candidate number: 221098

Word count: ????

Standard Project: A minimum of 7,000 words and a maximum of 10,000. All the main content of the project (from the Introduction to the Conclusion, including tables and footnotes) should be included in the word count or page count. Numbers in tables should be counted as corresponding to one word each, as per standard software packages.

Project length: Standard

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# Abstract

TODO: Fill in the abstract in the final stage.

**Background:** Test

**Methods:** Method

**Results:** Reu

**Conclusions:** aaa

Word counts: ?? words

Not exceeding 300 words. Structured Abstract.

# Acknowledgements

## Acknowledgement of academic support

**Project development:** I express the large thanks for my supervisor, Dr Kath O’Reilly for organising and helping my research. I decided to conduct a modelling study in polio field, and Dr. Kath provided me with the aim of my research.

**Contact, input, and support:** I sought the help of feedback from Dr Kath on a monthly basis, and she kindly organised and planned the visit to South Africa.

**Main research work:** I originally conducted most of the literature searching, model formalisation and implementation of simulations. Dr Kath shared the several important literatures related to the environmental surveillance, steered me to focus on the low- and middle-income countries. She gave me the helpful comments on the improvements of the mathematical modelling and helped me interpret the results.

**Writing-up:** Dr Kath has read and left many comments on my master’s thesis.

## Acknowledgements of other support

**Practical assistance:** Dr Kath organised the travel plan for South Africa to conduct a scientific communication with modellers there.

**Permission you were granted:** My research did not need the ethical approval since my project only used secondary sources fully in the public domain.

**Assistance with finance and resources:** I obtained MSc project fund to cover the flight ticket to South Africa.

**Personal acknowledgements:** I would like to express my gratitude to Dr Akira Endo, Professor Sebastian Funk, and the members in the Centre for Mathematical Modelling and Infectious Disease. They all stimulated my academic curiosity and broadened my eyes about data interpretation, and modelling contributions.

I would also like to thank my friends, family and colleagues who supported me in several way. I am willing to give a great thanks to the Rotary Foundation to support me financially and making a community for Rotarians.

# Introduction

## Global situation

The start of the main content of your project report should be presented as a formal introductory section – which might typically account for between 10% and 30% of the overall word count. The Introduction should finish by describing the gap in knowledge that your aims and objectives will address.

Aa

## Environmental surveillance

Current situation

Ranta1, Surveillance probability2

# Aims and Objectives

## Aim

See 200809\_cross-species-prediction for reference. Aims (the overall goal of the work) and Objectives (what you hoped to be achieved during the project work itself).T

The present study aims to quantitatively assess the early detection ability of environmental surveillance for poliovirus in polio-free countries with mathematical modelling.

## Objectives

The objectives in the present study are as follows:

1. To develop stochastic models to simulate the poliovirus dynamics considering clinical and environmental surveillance.

2. Identify key parameters by calculating the proportion of simulations in which poliovirus is detected more rapidly by environmental surveillance than clinical one, changing various assumptions.

# Materials and Methods

Test

Test

# Results

Test

Table . Outbreaks

Table 2. Outbreaks of polio in outside African continent, Pakistan and Afghanistan.

Figure . Test Figure.

Outbreaks of polio in outside African continent, Pakistan and Afghanistan.

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|  |  |  |
|  |  |  |
|  |  |  |

# Discussion

Test

# Recommendations

Test.

The discussion should end with a paragraph linking the current findings with recommendations for further work. However, it may be appropriate to present the recommendations as a separate section. Your recommendations must follow from your findings and your analysis of them, and not simply be a list of unrelated ‘good ideas’

# Reference list

TODO: Zotero replacement.

1. Ranta, J., Hovi, T. & Arjas, E. Poliovirus Surveillance by Examining Sewage Water Specimens: Studies on Detection Probability Using Simulation Models. *Risk Anal.* **21**, 1087–1096 (2001).

2. O’Reilly, K. M. *et al.* Surveillance optimisation to detect poliovirus in the pre-eradication era: a modelling study of England and Wales. *Epidemiol. Infect.* **148**, e157 (2020).

# Appendices