

Investigation and Surveillance of Infectious Diseases

Master of Philosophy in Applied Epidemiology Bound Volume
National Centre for Epidemiology and Population Health,
Australian National University

Anna-Jane Glynn-Robinson

November 2014

Field placement:

Vaccine Preventable Diseases Surveillance Section,
Office of Health Protection, Australian Government Department of Health,
Canberra

***A thesis submitted for the degree of Masters of Philosophy in Applied
Epidemiology of the Australian National University.***

Field Supervisor

Ms. Rhonda Owen
Office of Health Protection



Australian Government
Department of Health

Academic Supervisor

Associate Professor Martyn Kirk
National Centre of Epidemiology
and Public Health



**Australian
National
University**

Deceleration of work

This thesis is comprised of multiple discrete projects that were undertaken collaboratively with multiple stakeholders and the author acknowledges the contributions made by each of the stakeholders involved in the projects. Taken as a whole document, the author certifies that this thesis is an original work. None of the work has been previously submitted by me for the purpose of obtaining a degree or diploma in any university or other tertiary education institution. To the author's best knowledge, this thesis does not contain material previously published by another person, except where a reference is made in the text. The author acknowledges that copyright of published works contained within this thesis resides with the copyright holders(s) of those works.

.....

Anna-Jane Glynn-Robinson

21/11/2014

Acknowledgements

To my husband Joseph Beckett, who helped me find the courage, strength and provided the support I needed to finish the masters. Thank you for being there for me when I need it most, and getting me to step back, breathe and clear my head.

To my mother Mary-Anne, thank you for your patience, for listening and taking my calls at all hours of the day and night.

To my brother Christopher, whose encouragement from the other side of the world always made me feel I could finish what I started. Our late night Skype chats gave me perspective and taught me to stop stressing about the small stuff.

To Noelle O'Hara, our weekly catch up over hot chocolate was more valuable than you'll ever know.

To my supervisors:

Rhonda Owen, whose patience, insight, support and advice helped me see the wood from the trees. Thank you for getting me to stand back and look at how it all fits together. Martyn Kirk, whose knowledge, technical skills and attention to detail was so invaluable.

To my colleagues in the Vaccine Preventable Diseases Surveillance section, who listened, laughed and guided me through the world of national surveillance. In particular, Rachel de Kluiver who listened and advised me on all things academic; Lynne Hawker who made me laugh and made me feel so welcome; Amy Bright and Kate Pennington, who provided me with the support, encouragement and guidance I needed in the last few weeks of my placement.

To my fellow MAE cohort: thanks for the ride. I have learnt so much from all of you. Our chat's and debriefs, via email, over drinks and on the phone, not only provided me with the answers to my burning issues, they made me laugh and smile.

To all those involved in my projects, thank you for taking the time to provide me with feedback and advice.

Finally, thank you to the National Centre for Epidemiology and Population Health, for the opportunity to undertake the MAE program, and the Australia Government Department of Health for providing me with the placement and funding to complete my Masters.

Table of Contents

<i>Deceleration of work</i>	<i>iii</i>
<i>Acknowledgements</i>	<i>v</i>
<i>Abstract</i>	<i>ix</i>
<i>Abbreviations and Acronyms</i>	<i>xi</i>

Chapter 1 Introduction

1.1 <i>Overview</i>	1-1
1.2 <i>Placement -Vaccine preventable Disease surveillance section</i>	1-1
1.3 <i>Summary of core activities</i>	1-2
1.4 <i>Public health impact of major projects</i>	1-4
1.5 <i>Structure of the bound volume</i>	1-6

Chapter 2 The problem with buffet meals: An investigation into a gastroenteritis outbreak associated with a buffet lunch in Canberra, Australian Capital Territory, 2012

1. <i>Prologue</i>	2-1
2. <i>Abstract</i>	2-3
3. <i>Introduction</i>	2-4
4. <i>Methods</i>	2-5
5. <i>Results</i>	2-7
6. <i>Discussion</i>	2-13
7. <i>Conclusion</i>	2-14
8. <i>Acknowledgments</i>	2-15
9. <i>References</i>	2-16
10. <i>Appendices</i>	2-17

Chapter 3 Legionellosis in Australia: a review of notified legionellosis from 2001 to 2012

1. Prologue	3-1
2. Abstract	3-3
3. Background	3-5
4. Methods.....	3-6
5. Results.....	3-9
6. Analysis of confirmed and probable legionellosis notifications.....	3-19
7. Discussion	3-23
8. Conclusion.....	3-27
9. Recommendations:.....	3-28
10. Acknowledgments	3-29
11. References	3-30
12. Appendix.....	3-33

Chapter 4 Evaluation of Human Papillomavirus (HPV) vaccination amongst Indigenous females: A review of current issues affecting the accuracy of vaccination estimates

1. Prologue	4-1
2. Abstract	4-3
3. Background	4-4
4. Methods.....	4-7
5. Results.....	4-13
6. Discussion	4-30
7. Conclusion.....	4-33
8. Recommendations.....	4-34
9. Acknowledgments	4-35
10. References	4-36
11. Appendices.....	4-39

Chapter 5 Evaluation of laboratory-confirmed influenza in the National Notifiable Diseases Surveillance System

1.	<i>Prologue</i>	5-1
2.	<i>Abstract</i>	5-3
3.	<i>The public health importance of influenza in Australia</i>	5-4
4.	<i>Evaluation Framework</i>	5-6
5.	<i>Analysis of laboratory-confirmed influenza notifications in the NNDDS, 2008-2013</i>	5-10
6.	<i>System description – National Notifiable Diseases Surveillance System</i>	5-12
7.	<i>Surveillance objectives of the NNDSS for laboratory-confirmed influenza</i> ..	5-21
8.	<i>Use of NNDSS laboratory-confirmed influenza notification data</i>	5-22
9.	<i>System performance</i>	5-23
10.	<i>Discussion</i>	5-35
11.	<i>Conclusion</i>	5-38
12.	<i>Recommendations</i>	5-39
13.	<i>References</i>	5-40
15.	<i>Appendices</i>	5-43

Chapter 6 Teaching and dissemination of information

1.	<i>Overview</i>	6-1
2.	<i>Lessons From the Field</i>	6-1
3.	<i>Teaching the first year MAE cohort of 2014</i>	6-2
4.	<i>Dissemination of information</i>	6-3
5.	<i>Other Public Health Experiences</i>	6-5
6.	<i>Appendices</i>	6-6

Abstract

In this thesis, I present selected works I conducted in my Master of Philosophy Applied Epidemiology (MAE) placement at the Vaccine Preventable Disease Surveillance (VPDS) Section of the Office of Health Protection (OHP), at the Australian Government Department of Health from March 2013 to November 2014. The works presented comprise my MAE requirements and describe my experiences as an MAE.

I discuss my role in the day-the-day activities of the VPDS section, including the surveillance of notifiable diseases, being the secretariat for the rotavirus working group, writing annual reports and editing *Communicable Disease Intelligence* Journal submissions. I also describe my role as a Watch Officer for the National Incident Room within the OHP.

I investigated a foodborne outbreak of gastroenteritis at a Mother's Day buffet luncheon in the Australian Capital Territory (ACT), where curried prawns and Caesar salad were the suspected cause of the outbreak. The investigation was unable to determine the aetiological cause of illness but highlighted the risk often associated with serving buffet style meals.

I present two epidemiological studies. The first is an analysis of notified *Legionella* infections from 2001 and 2012. Describing the epidemiology of legionellosis in Australia, the analysis found rates of infection are low and more likely to affect males and vulnerable populations such as the elderly. Comparing these results to a previous review of legionellosis in Australia (1991-2000), we found age, sex and season of infection were consistent, but notification rates were stable and higher compared with rates from 1991 to 2000, and *Legionella longbeachae* was notified more than *Legionella pneumophila*. I presented the findings of my analysis in an oral presentation at the 2014 Public Health Association of Australia 43rd Annual Conference in Perth.

The second epidemiological project I undertook examined why Indigenous status was underreported in National Human Papillomavirus Vaccination Register (NHVPR). Analysing female vaccination records from 2007 to 2012, we identified 46% were missing Indigenous status. We reviewed the literature, examined register data and consulted with jurisdictional health departments to identify what barriers exist that potentially prevent the reporting of Indigenous status to the NHVPR.

I evaluated the National Notifiable Diseases Surveillance System (NNDSS) as a surveillance system for influenza. The evaluation found that the NNDSS is an acceptable, simple and useable system that provides high quality data for the national surveillance of laboratory-confirmed influenza. However, improvements in the systems flexibility and sensitivity would ensure higher quality surveillance data continues to be available.

Lastly, to fulfil my teaching requirements I prepared a 'Lessons From the Field' case study on how to work with Aboriginal and Torres Strait Islander data and conducted a teaching session on measurement and information biases as part of a half day training session undertaken for the MAE cohort of 2014.

This thesis describes my experiences in my MAE placement, the fulfilment of requirements and the findings of my investigations. The work presented in this thesis contributes to the work of VPDS section by improving our understanding of communicable disease surveillance in Australia.

Abbreviations and Acronyms

Chapter 1

CDI	Communicable Diseases Intelligence journal
Department of Health	Australian Government Department of Health
HEMB	Health Emergency Management Branch
NNDSS	National Notifiable Diseases Surveillance System
NHVPR	National HPV Vaccination Programme Register
OHP	Office of Health Protection
PHAA	Public Health Association of Australia
VCS	Victorian Cytology Service
VPDS	Vaccine Preventable Diseases Surveillance

Chapter 2

ACTGAL	Australian Capital Territory Government Analytical Laboratory
ACT HPS	Australian Capital Territory Health Protection Service
ART	Acute Response Team
BDE	<i>Bacillus</i> Diarrhoeal Enterotoxin
CDI	Communicable Diseases Intelligence journal
EHO	Environmental Health Officers
SPC	Standard Plate Count
MDU	Microbiological Diagnostic Unit
SET	Staphylococcal Enterotoxin

Chapter 3

ABS	Australian Bureau of Statistics
ASGS	Australian Statistical Geography Standards
CDWG	Case Definitions Working Group
Department of Health	Australian Government Department of Health
NNDSS	National Notifiable Diseases Surveillance System
PHAA	Public Health Association of Australia

Chapter 4

ABS	Australian Bureau of Statistics
AIHW	Australia Institute of Health and Welfare
ASGS	Australian Statistical Geography Standards
DEC	Australian Government Department of Health Human Research Ethics Committee
DERC	Australian National University Science and Medical Delegated Ethics Review Committee
Department of Health	Australian Government Department of Health

GP	General Practitioner
HPV	Human Papillomavirus
LCG	Local Government Councils
NNDSS	National Notifiable Diseases Surveillance System
NHVPR	National HPV Vaccination Programme Register
WHINURS	Women's HPV Indigenous Non-Indigenous Urban Rural Study
VCS	Victorian Cytology Service
VIP	HPV Vaccine Impact in the Australian Population
VIP-I	Vaccine Impact in the Australian Indigenous Population

Chapter 5

ABS	Australian Bureau of Statistics
ASPREN	Australian Sentinel Practices Research Network
CDC	Centers for Disease Control and Prevention
CDI	Communicable Diseases Intelligence
CNDA	Communicable Disease Network Australia
CDA	Communicable Disease Australia
DAS	Data Acquisition system
FluCAN	Influenza Complications Alert Network
H	Hemagglutinin
ILI	Influenza-Like-Illness
Department of Health	Australian Government Department of Health
N	Neuraminidase
NISC	National Influenza Surveillance Committee
NNDSS	National Notifiable Diseases Surveillance System
NSC	National Surveillance Committee
OHP	Office of Health Protection
VPDS	Vaccine Preventable Diseases Surveillance
PHLN	Public Health Laboratory Network
YTD	Year-To-Date

Chapter 6

CDI	Communicable Diseases Intelligence journal
Department of Health	Australian Government Department of Health
HEMB	Health Emergency Management Branch
NNDSS	National Notifiable Diseases Surveillance System
NFP	National Focal Point
NHVPR	National HPV Vaccination Programme Register
NIR	National Incident Room

OHP	Office of Health Protection
PHAA	Public Health Association of Australia
VPDS	Vaccine Preventable Diseases Surveillance
WO	Watch Officer