



# Victorian Aboriginal Child Mortality Study Phase 1: The Birth Report

Patterns and Trends in Births to Victorian Aboriginal and  
Torres Strait Islander and Non-Aboriginal and Torres Strait Islander  
Mothers and/or Fathers 1988–2008 Inclusive

Jane Freemantle — Rebecca Ritte — Bree Heffernan — Tess Cutler — Dulce Iskandar



## The Victorian Aboriginal Child Mortality Study, 1988–2008

The overall aim of the Victorian Aboriginal Child Mortality Study (VACMS) is to measure accurately the patterns and trends of Aboriginal infant, child and youth mortality and the disparities between Aboriginal and non-Aboriginal populations for births occurring in Victoria spanning (birth) years 1988–2008, inclusive. In order to calculate mortality rates, an accurate count of births was an essential first step.

The VACMS is a total population, data linkage, child mortality study being undertaken at Onemda VicHealth Koori Health Unit at the University of Melbourne in conjunction with the Victorian Aboriginal Community Controlled Health Organisation. It is funded by the Australian Research Council, the Victorian Department of Health, the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs, the Lowitja Institute and the R E Ross Trust.

The study has four distinct phases:

Phase 1. Matching of vital statistics datasets containing birth information to obtain an accurate and complete identification of Aboriginal births, and appending of perinatal information describing all births in Victoria to the linked dataset.

Phase 2. Coding and classification of all deaths (reviewed by the Consultative Council on Obstetric & Paediatric Mortality and Morbidity), validation of the cause of death coding, analysis and preparation of a report describing the comprehensive death data and linking of birth and death datasets.

Phase 3. Analysis of the linked birth/death dataset and preparation of a report that describes the maternal and perinatal antecedents for all Victorian deaths (0–18 years) 1988–2008, inclusive, and the patterns and trends of deaths for Aboriginal compared with non-Aboriginal children (0–11 years) 1999–2008, inclusive.

Phase 4. Development of a Preventability Index.

This five-year study commenced in 2009 and will be completed by 2014.

This report is the third in a series, with the other two reports available from the VACMS website ([www.vacms.net.au](http://www.vacms.net.au)):

Heffernan, B., Sheridan, S. & Freemantle, J. 2009, *An Overview of Statutory and Administrative Datasets: Describing the Health of Victoria's Aboriginal Infants, Children and Young People*, Onemda VicHealth Koori Health Unit, The University of Melbourne, Melbourne.

Heffernan, B., Iskandar, D. & Freemantle, J. 2012, *The History of Indigenous Identification in Victorian Health Datasets, 1980–2011: Initiatives and Policies Reported by Key Informants*, The Lowitja Institute, Melbourne.

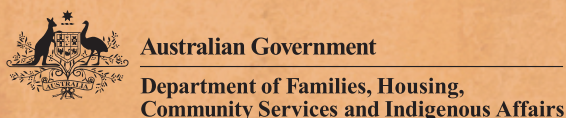




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A downloadable PDF of this publication is available on the Onemda, VACMS and Lowitja Institute websites, and a CD-ROM of this publication and a Summary Report can also be obtained from:

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This image represents 'connections' and their relevance to health and wellbeing. Our connections with mother earth and the natural world keep us well and our connections with one another through family and community heal us and keep us whole.

Shawana Andrews



An Australian Government Initiative





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This birth report, which is a component of the Victorian Aboriginal Child Mortality Study, represents a method of determining Indigenous identification based on linked population data and the application of the Ever-Aboriginal Rule. As such the data herein represent births outcomes for Aboriginal mothers and/or fathers that reflect a different method in the determination of Indigenous status to that used in the Victorian Perinatal Data Collection.

Access to the data for this study was provided by the Consultative Council on Obstetric & Paediatric Mortality and Morbidity (CCOPMM). The views expressed in this report are those of the authors and not of the CCOPMM.





## Key Messages and Significance of VACMS

### Key Messages

- The information contained in this report confirmed the misclassification and under-ascertainment of births in Victoria to mothers and/or fathers who identified as Aboriginal and/or Torres Strait Islander, 1999–2008 inclusive.
- The matching of birth information collected in the Victorian Perinatal Data Collection with birth registration information collected by the Registry of Births Deaths and Marriages enabled a more accurate ascertainment of these births to be calculated.
- Between 2006 and 2008, 1.8% of births in Victoria were to mothers and/or fathers who identified as Aboriginal and/or Torres Strait Islander.
  - » This compares with the proportion previously quoted for the same period in the Victorian Perinatal Data Collection of 0.9% of total births.
- Between 1999 and 2008, the Victorian Perinatal Data Collection reported slightly higher proportions of Aboriginal preterm births (12.3%) and birth weights <2500grams (13.6%) compared with the Matched Data: preterm births, 12.3%; birth weights <2500grams, 10.5%.
- Northern Metro (Melbourne) and Loddon Mallee (north-western Victoria) had the highest proportion of Aboriginal births (14.2% of all Aboriginal Victorian births) and the Grampians (central western Victoria) the lowest proportion (5% of all Aboriginal Victorian births).
- 7% of Aboriginal Victorian births were to mothers whose usual residential address was outside of Victoria.
- As a result of the matching exercise, a further 4,333 births were reclassified as Aboriginal and/or Torres Strait Islander. This represents an increase of 87% in the number of births classified as of Indigenous status.
  - » 3,024 of these additionally identified births (70%) were directly due to identification of fathers Aboriginal status and 30% to the reassignment of mothers status according to self-identified Indigenous status.

### Regional variation

- There was significant regional variation in maternal characteristics and birth outcomes
  - » This underestimation is highest in the metropolitan regions: between 200% (Eastern Metro) and 269% (Western Metro).
  - » The underestimation was lower in rural regions: between 33% (Loddon Mallee) and 86% (Barwon – South Western).

x

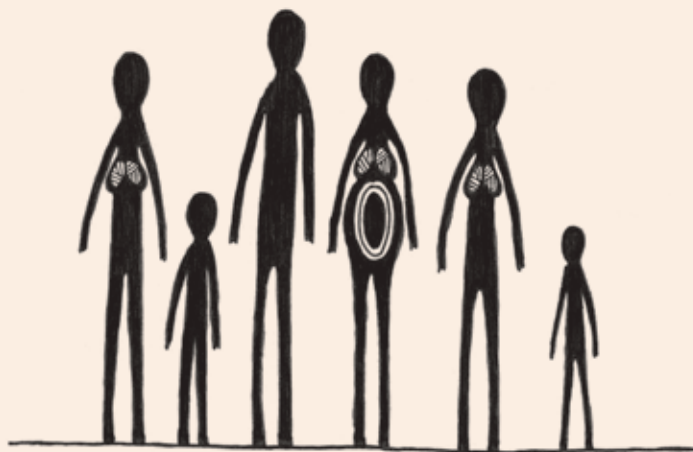




- » Loddon Mallee had the highest proportion of teenage mothers (25%) and Western Metro the lowest (8%).
- » Gippsland (eastern Victoria) had the highest proportion of preterm births and births <2500 grams (11.6% & 13.3%); Hume (north-eastern Victoria) had the lowest proportion preterm births (8.3%), and Western Metro the lowest proportion of births <2500grams (8.8%).

### Significance

- These data will enable Victorian Aboriginal infant and child mortality rates to be calculated more accurately.
- These data will enable a more accurate evidence base for development of strategies, interventions and evaluation of Close the Gap initiatives.
- The regional analyses of maternal and perinatal information will provide each region with specific information to inform evidence-based services and targeted priorities in maternal and infant health.
- The potential for the matching of birth information to be continued in perpetuity has been established through the successful development of a methodology, and systems and processes to enable the sharing of statutory data between two government jurisdictions.
- Improved ascertainment of births in Victoria to mothers and/or fathers who identified as Aboriginal and/or Torres Strait Islander will enable the inclusion of Victorian vital statistics data in national mortality reports.





## Glossary of Terms

Aboriginal	A person who identifies as Aboriginal or is identified as Aboriginal by the community within which he/she lives.  Note: The authors consulted with members of Onemda VicHealth Koori Health Unit and the Victorian Community Controlled Health Organisation with regards to the appropriate terminology to respect the Aboriginal and Torres Strait Islander population for the purposes of this report. Hence, throughout this report the Aboriginal and Torres Strait Islander population is generally referred to as the 'Aboriginal' population. When referring to 'identification' in statutory and administrative data collection, the terms 'Indigenous identification' and 'Indigenous status/identifier' are used.
Aboriginal and/or Torres Strait Islander infant/child	Born to a mother and or father who identifies as Aboriginal or Torres Strait Islander or is identified as such by responsible person on admission to hospital.
Aboriginal status	Defining whether a person/child identifies or is identified as Aboriginal or Torres Strait Islander or non-Aboriginal or Torres Strait Islander.
Birth weight	'The first weight (in grams) obtained after birth of a live born or stillborn baby' (Department of Health Victoria 2013:24).
Cause-specific death	Major categories of cause of death selected for analysis, Phase 3.
Geographic residence of mother at the time of the birth	Department of Human Services (Victoria) health services regions (DHS regions): Barwon – South Western, Loddon Mallee, Grampians, Hume, Gippsland, Western Metro, Northern Metro, Eastern Metro, Southern Metro. The 2003–2004 regions are used.
Infant death	A neonatal or post neonatal death; a death of a live-born infant that occurs before the first birthday.
Low birth weight	The birth weight of an infant of <2500grams.
Live born/Live birth	The birth of an infant, regardless of maturity or birth weight, who breathes or shows any other signs of life after being born (Department of Health Victoria 2013:23 ).
Matched data	Matched Victorian Perinatal Data Collection and Registry of Births, Deaths and Marriages data to establish a more complete and accurate Victorian Aboriginal and non-Aboriginal birth cohort, 1988–2008 inclusive.





Multiparous	A woman who has given birth on at least two occasions.
Non-Aboriginal	Includes all persons other than those who identify as an Aboriginal and/or Torres Strait Islander.
Other region	Refers to births that occurred in Victoria, where mothers' usual residence was outside Victoria.
Parity	The total number of previous pregnancies experienced by the woman that have resulted in a live birth or a stillbirth (Department of Health Victoria 2013:97).
Plurality	'The number of (fetuses or) babies resulting from the pregnancy. On this basis pregnancy may be classified as singleton or multiple' (Department of Health Victoria 2013).
Prematurity/ preterm	A birth where the gestation is less than 37 completed weeks.
Primiparous	A woman giving birth for the first time.
Sex	Gender of the infant/child.
Stillbirth	'The birth of an infant of at least 20 weeks' gestation or if gestation is unknown, weighing at least 400 grams, which shows no signs of life after birth (Department of Health Victoria 2013:23).
Torres Strait Islander	A person who identifies as a Torres Strait Islander or is identified as a Torres Strait Islander by the community within which he/she lives.
Very low birth weight	The birth weight of an infant of <1500grams.





## List of Abbreviations

ABS	Australian Bureau of Statistics
ACCHOS	Aboriginal Community Controlled Health Organisations
AHLO	Aboriginal Hospital Liaison Officer
AIHW	Australian Institute of Health and Welfare
ALRC	Australian Law Reform Commission
CCOPMM	Consultative Council on Obstetric & Paediatric Mortality and Morbidity
CCU	Clinical Councils Unit
DHS	Department of Human Services
DOB	Date of birth
DoH	Department of Health (Victoria)
GIS	Geographic Information Systems
HREC	Human Research Ethics Committee
ICAP	Improving Care for Aboriginal Patients
ID	Identifier
IPP	Information Privacy Principle
N	Total number of births in Source VPDC and Matched Data
n	Number of births in each category or sub-category thereof
PHW Act	Public Health and Wellbeing Act, 2008 (Vic.)
PIA	Privacy Impact Assessment
RBDM	Registry of Births, Deaths and Marriages
SDE	Secure Data Exchange
UR	Unit Record (number)
VACCHO	Victorian Aboriginal Community Controlled Health Organisation
VACMS	Victorian Aboriginal Child Mortality Study
VAED	Victorian Admitted Episodes Data
VPDC	Victorian Perinatal Data Collection
VPDCU	Victorian Perinatal Data Collection Unit
WIES	Weighted Inlier Equivalent Separation







## Summary

The Victorian Aboriginal Child Mortality Study (VACMS) is a total-population child mortality study undertaken through the Onemda VicHealth Koori Health Unit at the University of Melbourne. The overall aim of the VACMS is to measure accurately patterns and trends of Aboriginal infant, child and youth mortality and the disparities between Aboriginal and non-Aboriginal populations for births occurring in Victoria spanning (birth) years 1988–2008 inclusive.

The mortality study has four distinct phases. This report relates to Phase 1 of the VACMS. Phase 1 involved the matching of two sources of birth data to establish a more complete and accurate identification of births to Victorian Aboriginal and/or Torres Strait Islander mothers and/or fathers (and non-Aboriginal mothers and/or fathers) over the years 1988–2008. However, the analysis of the matched data, identified that ascertainment of Indigenous status for years prior to 1999, inclusive was significantly incomplete. Thus, the outcomes of births for the years 1999 to 2008, inclusive are described in this report.

Birth information collected by the Clinical Councils Unit (the CCU) through the Victorian Perinatal Data Collection (VPDC), have been matched with the birth registrations from the Registry of Births, Deaths and Marriages (RBDM). These data are referred to in this report as the 'Matched Data'. The data have established a denominator from which to statistically measure and compare Victoria's Aboriginal and non-Aboriginal births, 1999 to 2008, inclusive, and to generate Aboriginal and non-Aboriginal infant and child all-cause and cause-specific mortality rates (Phases 2 and 3) for Victoria for the years 1999 to 2008, inclusive. Further, Phase 1 of the VACMS

has established a sound baseline from which to measure the impact of previous policy, practice and health education initiatives and public health interventions.

In order to generate these statistics, significant negotiations were undertaken with the relevant data custodians. It was necessary to amend the regulations contained in the Victorian *Public Health and Wellbeing Act 2008* (PHW Act), which governs the sharing of sensitive data between State departments and the release of sensitive data to researchers. These amendments specified the RBDM as a body that the Consultative Council on Obstetric & Paediatric Mortality and Morbidity (CCOPMM) could provide information to if the CCOPMM considered the provision of this information was in the public interest. Significant governance protocols were developed to protect the data accessed and utilised during the VACMS.

The development of the technical and governance protocols to enable the matching of the birth information held by the CCU (contained within the VPDC) and the RBDM, validated by Aboriginal and/or Torres Strait Islander status, provides a unique opportunity for the matching process to be continued in perpetuity. This would ensure that the integrity of data underpinning the development of evidence-based policy, strategies and interventions aimed at redressing the disparities in health outcomes for Victorian Aboriginal and/or Torres Strait Islander infants, children and young people, is maintained into the future. The matching of population data sets should be established as a mandatory process if an accurate and complete ascertainment of births to mothers and/or fathers, who identify as Aboriginal and/or Torres Strait Islander, is to be achieved.



**Increased identification:** The Matched Data identified 4333 live births where the mother and/or father had identified as Aboriginal and/or Torres Strait Islander. This represented between an 87% and 120% increase to the number of births reported in the VPDC as Aboriginal and/or Torres Strait Islander. The proportions of Aboriginal teenage mothers, infants born preterm and low birth weight reported in the VPDC were greater than those reported by the Matched Data.

**Maternal and infant outcomes (according to Matched Data):** Between 1999 and 2008 inclusive, the largest proportion of Aboriginal mothers giving birth were between 20 and 29 years, the proportion of teenage mothers decreased and the proportion of mothers older than 30 increased among the Aboriginal population over the 10 years. The maternal age picture differed among the non-Aboriginal population where the largest proportions of mothers were older than 30 years at the time of the birth, and teenage mothers represented only 2.5% of the maternal age population (eight times less compared with Aboriginal mothers 16.3%).

The proportion of babies born preterm where mothers/and or fathers identified as Aboriginal was higher (10.0%) compared with babies of non-Aboriginal mothers and/or fathers (6.1%). The proportion of Aboriginal babies born <32 weeks was double (1.8%) the proportion of non-Aboriginal babies (0.9%)

The proportion of Aboriginal infants with a low birth weight where mothers/and or fathers identified as Aboriginal was more than double (8.9%) compared with infants of non-Aboriginal mothers and/or fathers (4.2%). The proportion of babies born >4500 grams was higher among Aboriginal infants (2.1%) compared with the proportion of non-Aboriginal babies (1.9%); the former did not increase over the years (2.0%) while the latter increased from 1.8% to 2.0%.

Thirty-eight per cent of Aboriginal births (38.1%) in the cohort were to mothers giving birth for the first time compared with 42.3% of non-Aboriginal births, while 17.9% of Aboriginal births in the cohort had at least three previous births compared with 7.5% in the non-Aboriginal birth cohort. The proportion

of mothers with three previous births in the Aboriginal population decreased over the 10 years (1999–2002, 19.2%, to 2006–2008, 17.4%). This decrease was minimal in the non-Aboriginal population (1999–2002, 7.7%, to 2006–2008, 7.5%).

There were significant differences in reported marital status at the time of birth: 41.5% of Aboriginal births reported to mothers as being single compared with 11.1% of non-Aboriginal births.

The largest proportion of hospital births for both Aboriginal (45.6%) and non-Aboriginal (72.9%) births were in the metropolitan hospitals. The smallest proportion of births was reported in hospitals in the inner rural area (Aboriginal, 8.6%) and outer rural area (non-Aboriginal, 3.2%).

The proportion of low Apgar scores was slightly higher, and normal Apgar scores slightly lower, in one minute and five minute scores (and in both datasets). Reporting for five minute scores, 97.8% of Aboriginal births compared with 98.6% for non-Aboriginal infants.

**Regional analyses:** The largest increases in numbers of births identified though the matching of the datasets were reported in the Department of Human Services (DHS) metropolitan regions:<sup>1</sup> Western Metro (269%), Southern Metro (255%), Eastern Metro (200%) and Northern Metro (110%). Coincidentally, the smallest proportions of Aboriginal births within the non-Aboriginal populations were observed in the metropolitan regions (therefore, the Aboriginal population was 'less visible').

In analysing the population groups, and maternal and infant outcome for all births in the DHS regions, a diversity in the size and proportion of the populations and maternal and infant outcome were observed both within the Aboriginal population and between the Aboriginal and non-Aboriginal populations. These diversities also changed over time.

**Outcome:** The results of this research will provide the empirical evidence to inform the Victorian strategic action plans and evaluate previous policies and initiatives aimed at closing the gap on Aboriginal and Torres Strait Islander disadvantage.

<sup>1</sup> The DHS regions described in this report refer to the Department of Human Services health services regions as designated by the Department of Human Services in 2004.





# 1 Introduction

This report represents the results of the first phase of the Victorian Aboriginal Child Mortality Study. The VACMS addresses the critical issue of incomplete data describing Aboriginal and Torres Strait Islander vital statistics, particularly focusing on maternal and infant birth outcomes and infant and child mortality. The VACMS uses an innovative method and research process to further reform the quality of Aboriginal and Torres Strait Islander data in health information systems. It employs a collaborative and consultative communication model to facilitate effective knowledge dissemination. This research is vital to ensure the availability of accurate and meaningful health information. The VACMS will also generate a complete births/deaths dataset describing Aboriginal and Torres Strait Islander children in Victoria, 0–11 years of age. The results will provide the empirical evidence to inform the Victorian strategic action plans and evaluate previous policies and initiatives aimed

at closing the gap on Aboriginal and Torres Strait Islander disadvantage.

In 1984, the Australian Government initiated moves nationally to improve the identification of Aboriginal Australians in births and deaths data collections (Freemantle 2003).<sup>2</sup> Prior to 1976, no Australian jurisdiction separately identified Aboriginal and Torres Strait Islander people in vital statistics or hospital-based collections. By the end of 1999, all major vital statistics and hospital-based collections included the Aboriginal status of people who were born, died or admitted to hospital in every Australian state and territory, although the collection of these data was not necessarily mandatory. In Victoria, a question to enquire how a person wished to identify their Aboriginal and/or Torres Strait Islander status on the RBDM birth registration form was not included on this form until 1986.

**Table 1.1: Identification of Aboriginal status in health and mortality administrative and statutory collections: year of commencement by jurisdiction**

Type of collection	Year of commencement of identifying Aboriginal status							
	NSW	VIC	QLD	SA	WA	TAS	NT	ACT
Birth notification	1986	1987	1996	1986	1991	1988	1988	1984
Death notification	1986	1987	1996	1986	1985	1988	1988	1984
Medical certificate of causes of death	1999	1987	1996	1997	1983	1999	1988	1998
Medical certificate of causes of perinatal death	1999	1995	1996	1997	1983	1998	1988	1999
Hospital separation	1979	1986	1993	1984	1981	1997	1976	1981
Perinatal (mother only)	1986	1982	1987	1981	1980	1996	1986	1989
Cancer register	1992	1982	1988	1977	1981	1991	1981	1992

Source: Australian Bureau of Statistics & Australian Institute of Health and Welfare 1997, *The Health and Welfare of Australian's Aboriginal and Torres Strait Islander Peoples*, cat. no. 4704.0 1997b, Australian Bureau of Statistics, Canberra.

<sup>2</sup> See note on terminology for Aboriginal Australians in Glossary of Terms, p.xii.





However, there is an acknowledged under-identification of Aboriginal people in statutory and administrative data collections and thus the complete ascertainment of Aboriginal people is questionable. Those states where ascertainment is of concern are Victoria, New South Wales, the Australian Capital Territory, Tasmania and Queensland (before 1998) (ABS 2008). Thus, currently it is not possible to provide a complete and accurate profile of the mortality of Australia's Aboriginal people.

In Victoria the introduction of Aboriginal identification occurred progressively from 1982 (perinatal and cancer collections, followed by hospital separations, 1986; birth and death registrations, and death certificates, 1987). The identification of the Aboriginal population was initially only included as a country of birth code in the hospital separation data, but in July 1993 it became a mandatory data item. In 2009 the VACMS team undertook a comprehensive review of data collections in Victoria that describe the health of Victorian infants, children and young people. The aim was to identify the integrity of the data that described Aboriginal and/or Torres Strait Islander people (Heffernan, Sheridan & Freemantle 2009).

An accurate picture of vital statistics (births and deaths) informs a moral society as to its social progress within each country or community. Partial ascertainment of these population data gives rise to errors in population statistics, often to the detriment of Aboriginal populations. Of particular interest for this report is the integrity of the ascertainment in Victoria of Aboriginal and/or Torres Strait Islander births (that is, the birth of an infant where the mother and/or father identify as Aboriginal). However, up until 2008, the Victorian Perinatal Data Collection only included information about the mother's Aboriginal status. Since 2009, the VPDC collected information on the Aboriginal status of mother and child (but not of the father).

The Registry of Births, Deaths and Marriages has collected information on mothers' and fathers' self-identified Aboriginal and/or Torres Strait Islander status since 1996. This report reflects the results of the matching of maternal and infant data collected by the VPDC and the RBDM in order to better ascertain births to mothers and/or fathers who identified as Aboriginal and/or Torres Strait Islander.

This study aligns with the interests of the Victorian Aboriginal community and the broader population of Victoria. It aligns with State and Commonwealth Government commitments to 'close the gap' in life expectancy between the Aboriginal and non-Aboriginal population, and to halve the gap in child mortality (COAG 2008). It brings together key organisations, including government and non-government organisations and academic institutions, to address this critical issue. This innovative collaboration involves researchers, policy makers and community members at Onemda VicHealth Koori Health Unit (The University of Melbourne), the Department of Forensic Medicine (Monash University), the Victorian Aboriginal Community Controlled Health Organisation (VACCHO), the Aboriginal Health Branch (Department of Health Victoria), the Victorian Perinatal Data Collection Unit (Department of Health Victoria), the Consultative Council on Obstetric & Paediatric Mortality and Morbidity (the CCOPMM is an independent council reporting to the Minister of Health) and the RBDM (Department for Communities/Department of Justice). This collaboration will ensure the involvement of those people best placed to provide the knowledge, expertise, communication, and policy conduits and networks to enable the success of this project. Onemda has worked with VACCHO to oversee the project and provide project leadership.

This study builds on past and continuing efforts of the State and Commonwealth governments to further reform the quality of Aboriginal data in health information



systems. These data will provide a more accurate baseline to enhance the State and Commonwealth governments' ability to plan services, allocate resources and evaluate funded initiatives. It will support future efforts and investment in policy development and contribute to building an evidence base of what works through accurate measurement and monitoring of progress towards equality in health. It is acknowledged that the CCOPMM has carefully reviewed all neonatal, infant and child deaths that occurred within the study cohort. The VACMS method represents an alternative method of death review that enables the development of a computerised, longitudinal data set that employs a method of classification and coding of deaths developed by Freemantle for the purposes of research.

The results of the VACMS will:

- determine the effect of a number of maternal and perinatal indicators on overall childhood mortality
- build on the existing methods to determine (and validate) the main causes of childhood death, and determine the effect of a number of maternal and perinatal indicators on cause-specific mortality
- quantify the disparity between Aboriginal and non-Aboriginal mortality in childhood
- identify the associations between mortality and the location where Aboriginal and non-Aboriginal children are born and live
- provide robust data on Aboriginal childhood health outcomes
- provide data to guide the development of Aboriginal health policy and strategies.

This report presents the results of Phase 1 of the VACMS which aimed to develop a more accurate denominator to describe births of mothers and/or fathers who identify as Aboriginal and/or Torres Strait Islander at the time of an infant's birth.

The next chapter provides the background to the VACMS and includes information that provides the context within which this report is couched.





## 2 Background

This section will briefly discuss both the identification of an Aboriginal infant in statutory and administrative data collections, and those policies and initiatives that have been undertaken over the study period to improve the identification of Aboriginal and Torres Strait Islander people in datasets. It also gives an overview of the VACMS and outlines the data sources. In so doing, it describes the two datasets used in the generation of the enhanced Aboriginal identifier, and the process undertaken to enable the matching of the two datasets. It then provides a demographic and economic summary for each of the Department of Human Services (DHS) regions (as constituted at the time that correlated with the data) to give the context within which the birth data are located.

### Identification of Aboriginal status in datasets

The Commonwealth definition of an Aboriginal or Torres Strait Islander person as per the High Court judgment in the case of *Commonwealth v Tasmania* (1983) 46 ALR 625 is:

*An Aboriginal or Torres Strait Islander is a person of Aboriginal or Torres Strait Islander descent who identifies as an Aboriginal or Torres Strait Islander and is accepted as such by the community in which he or she lives (AIHW 2006).*

There are three components to the Commonwealth definition:

- descent
- self-identification
- community acceptance.

In practice, it is not feasible in most general purpose statistical and administrative collections to ascertain whether a person is accepted by his or her community as an Aboriginal person. Therefore, the standard question about Aboriginal status relates to descent and self-identification only (AIHW 2006). In addition, there is no requirement to provide proof of descent. Each client should be given the opportunity to identify his/her Aboriginal and/or Torres Strait Islander origin by answering the question in the format prescribed by the Australian Bureau of Statistics (ABS).

The format of the standard question to establish Aboriginal identification is:

- 'Are you of Aboriginal or Torres Strait Islander origin?'

Different articulations of the question can be used where a friend or relative answers on behalf of the client (ABS 1999); for example:

- [Is the person]/[Is (name)] of Aboriginal or Torres Strait Islander origin?

It is not possible to determine a person's Aboriginal or Torres Strait Islander origin or identity based on his or her physical features, name or any existing knowledge of the client's cultural origins. Although a person's Aboriginal or Torres Strait Islander origin will not change over time, his/her willingness to identify might change depending on the context or circumstances in which he/she is asked.





Further, the ABS (1999) has prescribed that:

*..to achieve an acceptable quality of Aboriginal Status data, it is imperative that interviewers endeavour to apply the standard question module to all respondents and to record every response regardless of the person's appearance, name, country of birth or other perceptions about the person's background.*

### Enhancing the Aboriginal identifier

In the early stages of planning the VACMS, researchers recognised that there was little existing information that identified and described datasets that record the health of Aboriginal and/or Torres Strait Islander infants, children and young people in Victoria. Therefore, a review of the databases in Victoria that collected information on infants, children and young people was implemented to determine the integrity of the Aboriginal identifier. The following information is derived from the report *An Overview of Statutory and Administrative Datasets: Describing the Health of Victoria's Aboriginal Infants, Children and Young People* (Heffernan, Sheridan & Freemantle 2009).

The Aboriginal identification of an infant or child is ascertained in different ways. In some collections the Aboriginal status of the child is provided by the accompanying parent or guardian in response to the question asked by administrative personnel. In other collections, the identification of the child is derived from the identification of one or both of the parents, sometimes on a registration form either completed by a parent or by administrative staff.

In later years, a child, when answering for him or herself, might not identify in the same way as a parent identified him or her in the early years. In datasets where a patient record can be created at birth (e.g. the Victorian Admitted

Episodes Dataset (VAED)), this question should be re-asked at each subsequent episode of care to account for a person's changing propensity to identify his or her Aboriginal identity, but also to correct information that may have been incorrectly recorded at birth or at a previous episode of care.

If both the Aboriginal status of the child's mother and father are collected independently in a dataset, the status of the baby or child can be accurately derived from a positive identification from either parent. Similarly, if both the Aboriginal status of the mother and baby are recorded for a birth episode, the Aboriginal status of the father might in some circumstances be determined if the baby is identified as Aboriginal and the mother is identified as non-Aboriginal, assuming that the baby is taking the father's Aboriginal status.

Historically, Aboriginal status has been assigned to a baby based solely on the Aboriginal status of his or her mother. For example, reports released through the VPDC report on babies born to Aboriginal mothers, excluding the information describing the Aboriginality of the fathers. Even so, published counts of Aboriginal births in Victoria tend to vary between individual datasets, as demonstrated in Table 2.1.

One causal factor could be the inconsistent classification of 'Aboriginal births' between datasets (those born to Aboriginal mothers versus those born to Aboriginal mothers and/or fathers). Other potential barriers to the accurate recording of Aboriginal status are explored in greater detail later.



**Table 2.1: Aboriginal and Torres Strait Islander births by dataset and year, Victoria, 1999–2008/09**

Data source	1999	2000	2001	2002	2003/ 04	2004/ 05	2005/ 06	2006/ 07	2007/ 08	2008/ 09	Total
VAED—Births to Aboriginal mothers only	363	333	379	411	n/a	433	502	589	684	752	4,446
AHLO—Total Aboriginal births (in select public hospitals)	353	303	363	299	310	397	449	550	n/a	n/a	3,024
VPDCU—Births to Aboriginal mothers only	452	377	421	416	362	435	538	569	698	727	4,995
RBDM—Total Aboriginal births	521	452	522	601	722	719	802	782	1,025	1,096	7,242

AHLO: Aboriginal Hospital Liaison Officer. RBDM: Registry of Births, Deaths and Marriages. VAED: Victorian Admitted Episodes Data. VPDCU: Victorian Perinatal Data Collection Unit. Source: DHS 2008, *Koori Health Counts! 2006/07*, DHS, Melbourne; DoH 2011, *Koori Health Counts! 2009–10*, DoH, Melbourne. Victorian Aboriginal hospital data 2007–08 to 2008–09.

A comprehensive report addressing the historical and contemporary issues and indeed the complexity associated with Indigenous identification in statutory and administrative datasets has been published (Heffernan, Iskandar & Freemantle 2012). Further information regarding the integrity and availability of Indigenous identifiers in Victorian datasets was reported in the document: *An Overview of Statutory and Administrative Datasets: Describing the Health of Victorian Aboriginal Infants, Children and Young People* (Heffernan, Sheridan & Freemantle 2009).

The estimated under-identification and misclassification of Aboriginal status in health statistics is widely speculated to be due to a combination of two factors: a failure to ask the question and record a client's Aboriginal status, and/or a disinclination for the individual to self-identify his/her Aboriginal origin when asked.

The Australian Institute of Health and Welfare (AIHW) proposes a number of reasons why a service provider may feel uncomfortable asking a client if he/she is of Aboriginal or Torres Strait Islander origin and reasons why a client may feel uncomfortable self-identifying:

- service providers may not wish to appear to be discriminating against Aboriginal people
- the question may seem silly when the answer may appear to be obvious (especially for Aboriginal and Torres Strait Islander service providers who may have been assisting the client for some period of time)
- a service provider may feel that the information is intrusive (or that a client/patient may be offended by the question)
- a service provider may feel that they could not explain to a client/patient why the question needs to be asked if the client/patient wanted to know
- a service provider may feel that the question is irrelevant—staff members may assume that they have no clients who are Aboriginal (or, alternatively, have no clients who are not Aboriginal or Torres Strait Islander)
- Aboriginal people may not feel confident that the information will be kept confidential by the service provider



- Aboriginal people may feel that they are being ‘monitored’ or singled out for special attention (AIHW 2005).

The first phase of the VACMS aimed to provide a more accurate ascertainment of Aboriginal and/or Torres Strait Islander births. This was a critical step to provide a more accurate denominator describing births to mothers and/or fathers who identified as Aboriginal and/or Torres Strait Islander from which to generate the cause-specific mortality rates. Data linkage provided the appropriate method by which to enable a more robust denominator; data linkage is:

*a technique that makes possible more complete use of health and other data by bringing together data from many sources at the level of individual persons, populations, events or places, which is often needed to fully understand a population’s health (Friedman, Hunter & Parrish 2005:79).*

The Australian Law Reform Commission (ALRC) recognises data linkage as a method of best practice in preserving privacy in population datasets. The ALRC acknowledges that:

*.. ‘researchers generally do not need to know the identity of the individual, simply that certain health information relates to the same individual. This can be achieved through processes whereby independent intermediaries perform the linking of information, but do not have access to actual health information and researchers have access to the linked health information but not the identity of the individual’ (ALRC 2008:66.33).*

In the case of the VACMS, the data custodians (CCOPMM and the RBDM) undertook the negotiations for the release of the data from the Clinical Councils Unit to the RBDM for the matching process. Staff working within the CCU managing the Victorian Perinatal Data Collection appended the maternal and perinatal information to the matched dataset, categorised the variables and provided the de-identified data to the researchers.

## Policies and initiatives to improve identification

A further component of the VACMS was a study that provided a comprehensive timeline of initiatives aimed at improving the Aboriginal identification in administrative and statutory datasets. The study employed a mixed methods approach, which included a review of academic and public policy literature and face-to-face semi-structured key informant interviews (the latter were transposed into quantitative data through thematic analysis). The following information is derived from the report *The History of Indigenous Identification in Victorian Health Datasets, 1980–2011: Initiatives and Policies Reported by Key Informants* (Heffernan, Iskandar & Freemantle 2012).

There have been extensive efforts to improve the identification of Aboriginal patients, newborn infants and deceased persons over the past three decades in Victoria. Informants were able to recall many varied initiatives implemented with the aim of improving Aboriginal identification. Appendix A of this current report lists initiatives relevant to 1999–2008. Table 2.2 summarises significant initiatives that may have impacted on the Aboriginal identification of births in that period.

### Key informant views:

- *Ninety-four per cent of informants rated data collection training (as distinct from cultural awareness training) of high importance to improving Aboriginal identification.*
- *The schema of Initiatives identified that education programs have been infrequently implemented, in varying forms and by a variety of stakeholders.*
- *Both groups of informants acknowledged the employment of Aboriginal Hospital Liaison Officers (AHLsOs), system enhancements, and routine feedback by government to health services and community organisations using the data collected as highly important.*





- Informant responses identified some confusion regarding responsibility for the delivery of training. Based on DoH literature, responsibility appears to be shared between DoH (and the preceding Department of Human Services (DHS)) and individual hospitals.
- In the National Partnership Agreement on Closing the Gap in Indigenous Health Outcomes: Implementation Plan, the State government committed to work with 'local hospitals in providing targeted training on data recording, identification of [Aboriginal] status and management to improve data collection' (Victorian Department of Health) [COAG].
- The results of this study support data collection training for frontline staff as a leading priority in future efforts to improve [Aboriginal] identification.
- There was a marked inconsistency in opinions regarding the importance of financial incentives (predominantly the hospital Aboriginal Weighted Inlier Equivalent Separation [WIES] supplement) in improving [Aboriginal] identification. Likewise, inconsistency in opinions regarding the importance of strong relationships between health services and Aboriginal Community Controlled Health Organisations (ACCHOs) to improving [Aboriginal] identification was also observed.
- More than 70% of informants in each group regarded 'routine feedback provided by government to health services and community organisations using the data collected' of high importance to achieving accurate identification. Informants commented that feedback was 'an important indicator of Aboriginal people's access to mainstream services', that 'feedback to organisations is critical' and that 'we need more of it'. Conversely, in reference to the RBDM datasets, one informant commented that the RBDM 'should not do any community profiling—it is appropriate to give data back in other circumstances'.
- Staff training and the employment of AHLOs and Aboriginal staff were the most frequently cited effective initiatives implemented since 1980 to improve [Aboriginal] identification... Promotional activities, community engagement and education, accountability and accreditation were the initiatives reported as being the least effective methods for improving the accuracy... in administrative and statutory datasets.
- Although the Improving Care for Aboriginal Patients (ICAP) program was only explicitly mentioned six times, the program encompasses many other initiatives, such as the employment of AHLOs, Aboriginal artwork, promotional materials, financial incentives (WIES) and staff training. Therefore, the combined support for these initiatives is also attributable to the ICAP program. (Heffernan, Iskandar & Freemantle 2012:3–4)

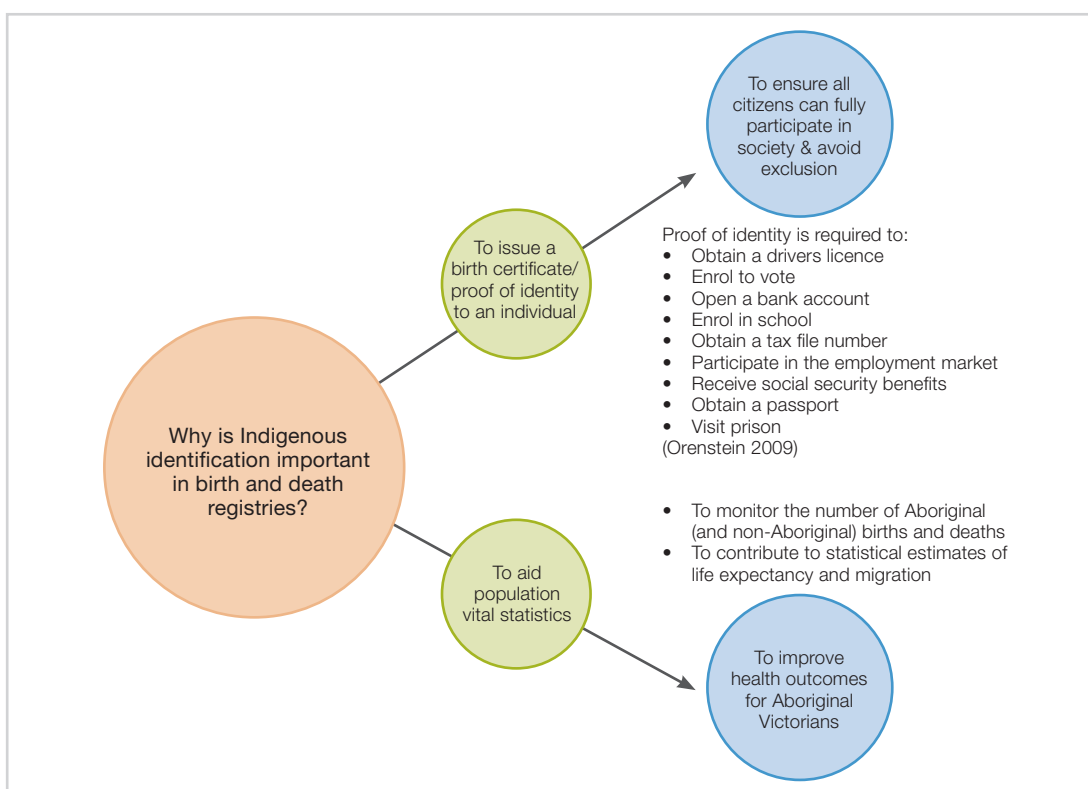
Thematic analysis of local initiatives reported produced four themes: Education and support material, partnerships, data validation and quality assurance, and cultural acknowledgment and safety.

The study found limited existence and/or knowledge of evaluations of initiatives and policies implemented to improve Aboriginal identification.

The study highlighted the significance of accurate and complete Aboriginal identification in the registration of births and deaths. This differs to public health service settings. Identification in birth and death registration data is important to ensure an individual's human right to proof of identity, and thus documents, to enable complete participation in societal activity. Accurate data also are critical in monitoring population vital statistics and, in the case of births, for providing an accurate denominator to enable the calculation of rates in public health statistics. Figure 2.1 provides a pictorial overview of this two-pronged role of identification in the RBDM.



Figure 2.1: Pictorial overview of the role/importance of Indigenous identification in registries of births and deaths



Source: Heffernan, Iskandar & Freemantle 2012:75; adapted from Orenstein 2008.

Staff training was mentioned most often by informants as the most effective initiative for improving identification (mentioned 23 times), followed by AHLOs and Aboriginal staff (19), and system enhancements/data improvements (12).

Few informants were aware of the AIHW *National Best Practice Guidelines* report (AIHW 2010a) when asked. Less than 35% of respondents rated the guidelines of high importance, while 18% rated them of low or no importance.



**Table 2.2: Schema of significant initiatives and policies implemented to improve identification of Aboriginal and/or Torres Strait Islander people in Victoria, 1999–2008 inclusive**

1999	2000	2001*	2002	2003	2004	2005	2006	2007	2008
VAED: introduction of the Aboriginal and Torres Strait Islander WIES 10% co-payment to the VAED for Aboriginal-identified patients	ABS identity posters and pamphlets developed in the Northern Territory and distributed nationally to funeral directors, general practitioners and hospital staff		VAED: 18 hospitals employing AHLOs	VAED: 18 hospitals employing AHLOs	VAED: launch of ICAP program, including Aboriginal and Torres Strait Islander WIES 30% co-payment loading, and establishment of three ICAP Project/Policy Officer roles based at VACCHO, DHS and at St Vincent's Health	VAED: 2005/06: disaggregation of unknown response into 'Question asked' and 'patient refused to answer' in the VAED	VAED: 25 hospitals employing AHLOs in 2005/06	VAED: 25 hospitals employing AHLOs in 2006/07	VAED: 2008/09: Change to VAED codeset meant that codes in each period were not the same, which may affect the quality of data
VAED: 1999/00: introduction of an 'Aboriginal status' variable in the VAED according to the (AIHW 2010b) (four responses: No, Yes Aboriginal, Yes Torres Strait Islander, and Yes both)	VAED: Patient Record System update to make the question of Aboriginal status a mandatory field in the VAED				VAED: DHS leaflet for hospitals: Principles of recording Aboriginal status in Victoria (DHS 2004)	VAED: changes to wording in hospital Quality of Care Reports to increase health service accountability for Aboriginal programs and identification	VAED: ABS identity posters updated to include a variety of Aboriginal faces	RBDM: Aboriginal Heritage Commemorative Birth Certificates introduced	VPDC: 2008–2011: ongoing presentations for midwifery students at Victorian universities provided by VPDC staff regarding asking the question and cultural factors relating to birth
Coding standards for responses to Aboriginal status question published in the Standards for Statistics on Cultural and Language Diversity (ABS 1999)						VAED: 2005–2007: removal of default value 'not Aboriginal' and update to Aboriginal status as a mandatory field in a number of hospitals	VAED: introduction of 'question unable to be asked' and 'patient refused to answer' options in the VAED, which highlighted hospitals that were using 'not stated' or 'non-Aboriginal' as a default	VAED: DHS data quality training pilot for registration staff conducted in two large public hospitals (results not published)	

\*there were no significant initiatives recorded for 2001

ABS: Australian Bureau of Statistics. AHLO: Aboriginal Hospital Liaison Officer. DHS: Department of Human Services. ICAP: Improving Care for Aboriginal Patients. RBDM: Registry of Births, Deaths and Marriages. VACCHO: Victorian Aboriginal Community Controlled Health Organisation. VAED: Victorian Admitted Episodes Data. VPDCU: Victorian Perinatal Data Collection Unit. VPDC: Victorian Perinatal Data Collection. WIES: Weighted Inlier Equivalent Separation.



## Overview of the Victorian Aboriginal Child Mortality Study

Reliable health data on Aboriginal and Torres Strait Islander people in Victoria are needed to inform policy development and program delivery, and to evaluate the effectiveness of policies and interventions aimed at improving services and population health status. Accurate service data also assist in monitoring changes in population wellbeing and accounting for government expenditure (AIHW 2006).

The initial fundamental aim of the VACMS was to develop a more accurate ascertainment of births to mothers and fathers who identified as Aboriginal and/or Torres Strait Islander in order to provide the denominator that would enable a more accurate measurement of Aboriginal infant, childhood and youth mortality in Victoria for birth cohorts from 1988–2008 inclusive. However, the analysis of the matched data identified that ascertainment of Indigenous status for the years prior to 1999 inclusive was significantly incomplete. Thus, the calculation of cause-specific mortality rates for Aboriginal children was restricted to deaths occurring between 1999–2009 inclusive. Therefore, the amended aim of the VACMS was to measure the disparities between Aboriginal and non-Aboriginal mortality for children who died before reaching their eleventh birthday.

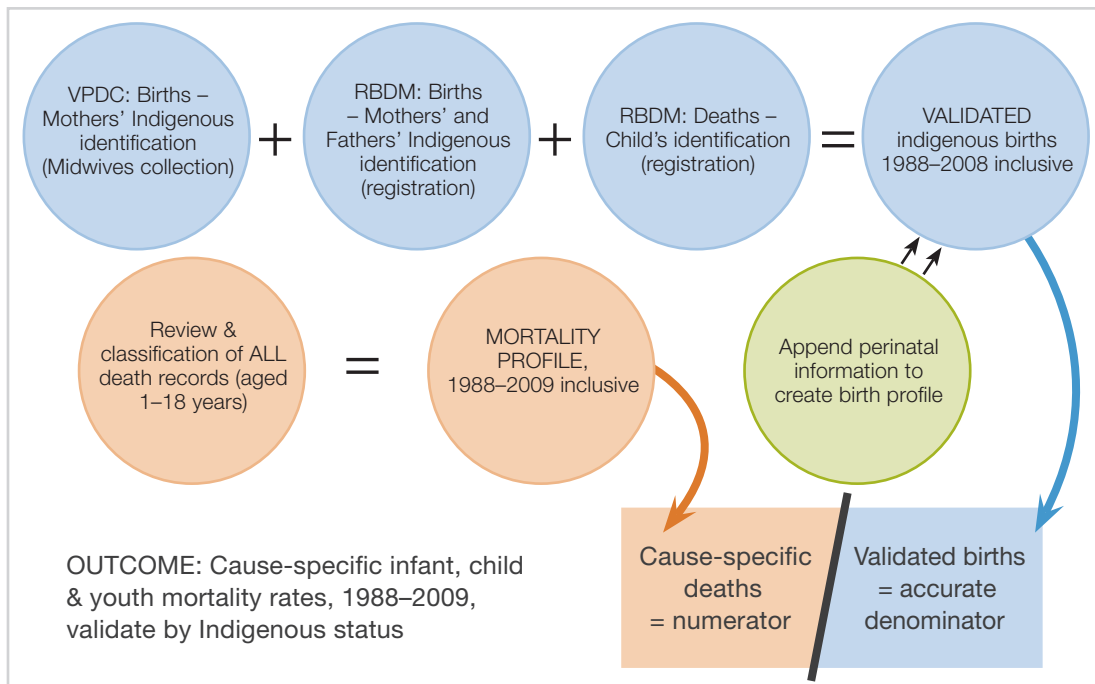
In addition, the project will also provide a comprehensive review of deaths of ALL children who were born between 1988 and 2008 inclusive and who died in Victoria before reaching their 19th birthday. This will be achieved through four distinct phases (Figure 2.2) (see next page):

- Phase 1 — development of denominator (births to Aboriginal and non-Aboriginal parent/s for the period 1999–2008 inclusive). Development of a birth dataset that includes the enhanced denominator and appended selected maternal and perinatal information. Analysis and reporting of the birth dataset.
- Phase 2—review, classification and coding derived from death information collected by the CCOPMM for all deaths occurring in Victoria, 1988–2009 inclusive; validation of coding ('building' a deaths' dataset); preparation of key information to enable the linkage of the birth dataset to the completed death dataset.
- Phase 3—descriptive analysis of the cause-specific mortality of all Victorian children, 1988–2009 inclusive, including the context within which these children died, and a focused analysis of the patterns and trends of mortality for Victorian-born Aboriginal and/or Torres Strait Islander children who died before reaching their eleventh birthday, and the context within which these children died, 1999–2009 inclusive.
- Phase 4—analytical analysis of the linked births/deaths datasets to determine the maternal and perinatal antecedents to poor outcomes for Victorian-born children, 1988–2009 inclusive; a focused analysis for Victorian-born Aboriginal and/or Torres Strait Islander children who died before reaching their eleventh birthday.

Consultation and dissemination of the results of the analyses have occurred throughout the project.



Figure 2.2: Victorian Aboriginal Child Mortality Study: Phases 1–4 overview



RBDM: Registry of Births, Deaths and Marriages. VPDC: Victorian Perinatal Data Collection.

### Phase 1

In order to calculate accurate mortality rates, an accurate count of births was an essential first step.

Phase 1 involved the matching of birth records collected by the CCU (VPDC) with birth records at the RBDM, with additional validation of Aboriginal status through the Victorian Hospital List accessed by the RBDM. The first part of the matching process was a pilot project that established the correct matching algorithms. A random sample was taken of 10% of birth records for each of the 20 years.

This process provided some very interesting information. For example, the following anomalies were identified as a result of the matching process:

1. The RBDM electronic hospital list was not established until 2003.

2. No electronic record of mother's date of birth (DOB) pre-1998; as a result, the 20-year dataset was separated into two tranches: 1988–1998 and 1999–2008 inclusive. In the former years mother's DOB was removed as a matching variable and the matching exercise was re-run.
3. Currently no 'supply' of mother's DOB in the electronic hospital notifications.
4. Although identification of Aboriginal status was requested on the birth registration form from November 1986, protocols for validation and collection of this information were not enforced until the mid-2000s.

This linkage produced a more complete ascertainment of births to Aboriginal and/or Torres Strait Islander mothers and/or fathers in Victoria for the period 1988–2008 inclusive, with the validated identification of Aboriginal status.



At the time of this report and given the inability to include further population datasets in the linkage, the researchers acknowledge that the enhanced identifier would potential still be an underestimation of the true number of births to Aboriginal mother and/or fathers.

Analysis of Phase 1 data included the estimated completeness of Aboriginal identification in each dataset, a definitive count of Aboriginal births each year using the matched datasets, and a review of disparities in maternal characteristics (maternal age and marital status) and birth characteristics (birth weight, parity, plurality and gestational age) between Aboriginal and non-Aboriginal births. Importantly, this analysis also included the geographical distribution of the births according to the mother's residential address at the time of the birth. Due to strict protocols on the provision of identifiable information, the VPDCU only provided this information at a DHS region level.<sup>3</sup>

The method undertaken is described in Chapter 3.

### The VACMS Matched Data

Phase 1 of the VACMS matched the birth information collected by midwives and collated within the CCU (VPDC) and RBDM data (birth registration) to produce a VPDC/RBDM dataset known as the VACMS Matched Data (hereafter, in this report, the Matched Data). The Matched Data provides more complete and accurate data describing the Indigenous status of Victorian Aboriginal and non-Aboriginal births, 1999–2008 inclusive, than previously available through the separate databases.

## Process to achieve the Matched Data

### Ethics

Complete confidentiality of all data was imperative and informed every aspect of this research. All researchers involved in working with the birth data were signatories to the legally binding confidentiality agreements. All data were kept in either locked metal filing cabinets within a locked office in a restricted area or as password-protected computer files on the securely controlled and centrally maintained data network at the University of Melbourne. Access was restricted to named research staff.

Given the complexity of this study from a regulatory perspective, and given the involvement of two government jurisdictions, various ethics applications were required. These were prepared and submitted before data matching commenced. Applications were successfully submitted to The University of Melbourne Human Research Ethics Committee (HREC), the DHS HREC, the Department of Justice HREC, the RBDM and the CCOPMM. The ethics approvals remained current throughout the period of data collection and analysis.

Ethics applications addressed issues relating to the use of health information without individual consent, the lawful use and disclosure of identifiable data, concerns for privacy, balancing concerns for privacy with public good, and specific consideration for research involving Aboriginal populations.

The specific privacy issues addressed in the ethics applications included and addressed key principles and regulations of the following legislation as they related to privacy, access, use and disclosure of data (Appendix B):

<sup>3</sup> At the time of the data used in this analysis, the overarching Victorian Government department was the Department of Human Services. In 2009, the Department of Human Services split to become Department of Health and the Department of Human Services.





1. *Births, Deaths and Marriages Registration Act 1996* (Vic.), section 48
2. Information Privacy Principles under the *Privacy Act 2000*
3. *Health Records Act 2001* (Vic.) Part 3 – Privacy of Health Information: section 19

### Privacy Impact Assessment

The VACMS proposed the use of data matching between two independent datasets that were held by two different data custodians. The original method provided for the linkage of the data between the VPDC and the RBDM to be undertaken within the Victorian DHS, (prior to the restructuring in 2009) namely the proposed Data Linkage Unit (Victoria). However, the data to be matched were considered 'highly sensitive' by the data custodians and the prevailing regulations governing the release of such data had hitherto precluded the release of data between (State) government jurisdictions. To enable the data to be considered for release, the Victorian Data Linkage Unit commissioned a Privacy Impact Assessment (PIA).

A PIA is a point-in-time assessment of the actual and/or potential privacy impacts that an existing or proposed initiative, system, data collection or program may entail. As such, a PIA highlights any unacceptable privacy risks. It also includes recommendations to mitigate negative impacts where possible, as well as to promote privacy positive outcomes. In essence, a PIA provides assurance to an organisation that a project complies with privacy law requirements and does not raise significant privacy policy concerns that cannot be mitigated. The consultant engaged to undertake the PIA, Dr Bridget Bainbridge, used the Victorian Office of the Victorian Privacy Commissioner's PIA methodology as a starting point. The PIA was duly undertaken and indicated that the benefit of the VACMS for 'public good' far outweighed the risk of disclosure of sensitive information. However, at this stage of the project, the Registrar of the RBDM was not inclined to release data to the VPDCU for matching. Thus, an alternative was sought, which necessitated

a change to the regulations of the *Public Health and Wellbeing Act 2008* (Vic.) to enable the CCOPMM to sanction the release of selected birth data collected by the VPDCU to the RBDM via a secure portal for matching.

### Regulatory change

At the commencement of the research in 2009, regulations within the *PHW Act* governed the release or sharing of data collected by the CCOPMM and prohibited the release of these data to another jurisdiction. Similarly, strict regulations governed the releases of data from the RBDM. However, after significant discussions and guidance by the legal team at the Victorian DoH, the regulations were amended in the *Public Health and Wellbeing Act 2008—Public Health and Wellbeing Amendment Regulations 2011* (Regulation 4) to read:

#### *New regulation 9A inserted*

*After regulation 9 of the Principal Regulations insert—*

**'9A Persons to whom a prescribed Consultative Council may provide certain information**

*For the purposes of section 41(1)(k) of the Act, the following persons are prescribed—*

- (a) *the Australian Institute of Health and Welfare established by section 4 of the Australian Institute of Health and Welfare Act 1987 of the Commonwealth;*
- (b) *the Registrar of Births, Deaths and Marriages employed in accordance with section 5 of the Births, Deaths and Marriages Registration Act 1996.'*

Successfully achieving the amendments to the regulations enabled the data collected by the CCOPMM on and in relation to the health of mothers and babies for the VPDC to be released to the RBDM for matching.



## Data sources

### Victorian Perinatal Data Collection

The Victorian Perinatal Data Collection Unit (VPDCU) was established in 1982 to provide CCOPMM with the ability to collect and analyse data to support its functions under the *Health Act 1958* (Vic.). It was established as a population-based surveillance system to collect and analyse information on and in relation to the health of mothers and babies in order to contribute to improvements in their health. Data collected via birth reports contain information on obstetric conditions, procedures and outcomes, neonatal morbidity and birth defects relating to every birth in Victoria of at least 20 weeks gestation or, if gestation is unknown, at least 400 grams birth weight. The VPDC is used to populate the National Perinatal Minimum Dataset, but it also contains additional items to enable more detailed analysis on the health of mothers and babies in Victoria. All states and territories must comply with the minimum dataset and submit their data to the National Perinatal Epidemiology and Statistics Unit.

Midwives collect information from mothers on all live births and stillbirths occurring in and out of hospitals in Victoria. Data regarding births are also collected from hospital and other relevant records. These data are compiled on notification forms and submitted to the Clinical Councils Unit for 'data processing, analysis and publication of reports' (Laws & Sullivan 2004). In addition, the Clinical Councils Unit then submits data to the National Perinatal Epidemiology and Statistics Unit for national reporting. The Indigenous status variable is completed by midwives. Prior to 2009, the birth notification form only included the Indigenous status of the mother and not that of the baby or father. An Indigenous identifier for the baby was added in January 2009, and midwives were required to ask the mother at the time of birth or during antenatal care, 'are you of Aboriginal or Torres Strait Islander origin?' and 'is your

baby of Aboriginal or Torres Strait Islander origin?' However, for the period of this study, the Indigenous status in the VPDC only relates to the mother.

The accuracy of the data on the Indigenous status of the mother was checked in the 2003 data and found to match that in the medical record in 92.8% of cases and not to be recorded in the medical record in a further 6.8% of cases (Davey et al. 2013).

### Registry of Births (Victorian Registry of Births, Deaths and Marriages)

The RBDM in each Australian jurisdiction provides birth, mortality and perinatal mortality data to the ABS Health and Vital Statistics Unit. The ABS co-ordinates requests for access to data for statistical purposes provided by each state and territory. Data remain the property of jurisdictional registries, and approval is required from registries for access to unit record level data from the ABS. The RBDM includes registries for the life/death events of people in Victoria, including births, marriages, relationships and deaths. The law requires that notification of birth be submitted to the RBDM within 48 hours by the doctor, midwife or other person attending to the mother at birth. When a child is born in a maternity hospital or during a home birth (with a midwife), a Birth Registration Statement is given to the new parent/s; in the case of a multiple birth, a separate statement must be completed for each child.

To register a child's birth, parents must jointly complete a Birth Registration Statement and send it to the Victorian RBDM for registration and to obtain a birth certificate (Heffernan, Sheridan & Freemantle 2009:153). However, the RBDM accepts registrations made at a later stage.

In November 1986, 'Aboriginality' was included on birth and death registration forms for health research. Registration of an Aboriginal birth is reliant on both parents



declaring their Aboriginal and/or Torres Strait Islander origin. The Indigenous status of the baby is not asked, but the status of both parents can be used to derive the Indigenous status of the baby being registered.

In response to the question of accuracy of Indigenous status data in the RBDM in 2009, a RBDM representative reported that 'information is provided by the child's parent/s and is presumed to be accurate' (Heffernan, Sheridan & Freemantle 2009:156).

## Data custodians

### Consultative Council on Obstetric & Paediatric Mortality and Morbidity

The CCOPMM was established under section 44 of the *PHW Act* and associated regulations, and is the advisory body to the Minister for Health on maternal, perinatal and paediatric mortality and morbidity. The Department of Health collects information on and in relation to the health of mothers and babies via the VPDC on behalf of the CCOPMM. The CCOPMM consists of 12 members and is administered within the DoH by the Clinical Councils Unit, which is part of the Quality, Safety and Patient Experience Branch within the Hospital and Health Services Performance Division.

The CCOPMM is able to disclose information obtained in the course of performing its functions, as described in section 38 of the *PHW Act*, to the RBDM under section 41(1) (k) of the *PHW Act*, if it considers it is in the public interest to do so.

### Registry of Births, Deaths and Marriages

The Victorian RBDM was established in 1853 and holds Registers of the life events of people in Victoria. Its role is to record all births, adoptions, marriages and deaths occurring in the State of Victoria. Other functions include changes of name in Victoria,

collecting and disseminating statistical data for government and other organisations, providing certificates for births, deaths and marriages in Victoria, and facilitating the legal process for people born or residing in Victoria to change their name.

The RBDM operates pursuant to the Births, Deaths and Marriages Registration Act 1996 and is administered by the Department of Justice.

The geographical location of the mother's residence at the time of the birth was also appended to the matched dataset. Due to the restrictions placed on the VPDCU regarding privacy issues, the geographical information was only provided at a Victorian DHS region level.

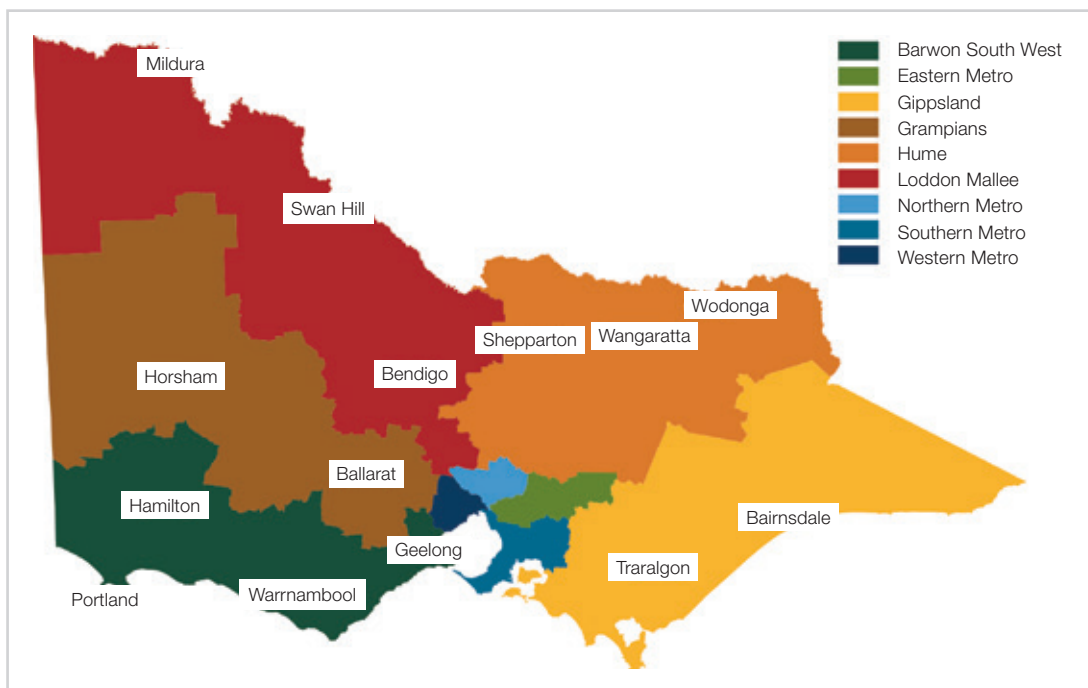
## Geographical locations— Department of Human Services regions

This section provides socio-economic and demographic information for each DHS region. The purpose of this information was to enable the outcomes of the analyses of the birth data to be considered within the context of the socio-economic and demographic environment. The Geographic Information Systems (GIS), Planning and Products, Strategy and Policy Division of the DoH (Victoria) provided this information and prepared the maps that are included in this section.

Over the years, the boundaries of the health services regions have changed (see Footnote 3). This project uses the regions defined by the DHS from 2003/04, but includes the separate Northern Metropolitan and Western Metropolitan regions. The DoH (Victoria) and the DHS delivers services through nine geographical regions: four metropolitan regions and five rural regions; (Figure 2.3). (See Table 3.9 in Chapter 3 for a summary of the history of name changes of service regions during the study period, 1988–2008.)



Figure 2.3: Department of Human Services regions in Victoria (2001)



Source: GIS, Planning and Products, Strategy and Policy.

The five rural regions are:

- Barwon – South Western Region
- Loddon Mallee Region
- Grampians Region
- Hume Region
- Gippsland Region.

The four Metropolitan regions are:

- Northern Metropolitan Region
- Western Metropolitan Region
- Eastern Metropolitan Region
- Southern Metropolitan Region.

Regions are responsible for:

- providing advice on the planning and development of programs and services to address changing needs

- monitoring the delivery and performance of most funded health and aged care services
- working with stakeholders to identify and implement service system improvements
- undertaking specified regulatory functions relating to the Supported Residential Services sector and environmental health.

### Rural and metropolitan regional profiles

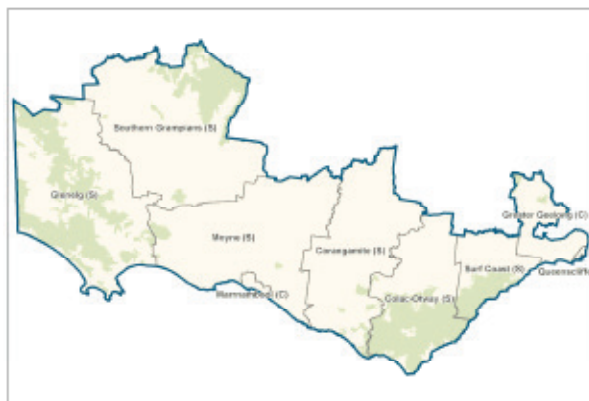
The following regional profiles provide a summary of each health services region in Victoria as defined by the DHS and include populations, education attainment and household income specific to each region. This information will enable the birth information to be placed within the socio-economic context of each region as reported through the 2001 and 2006 censuses. The source of these data is the DoH (Victoria), GIS, Planning and Products, Strategy and Policy.





## Region Profile 2.1

### Barwon – South Western Region Indigenous profile: 2001-2006



#### Main towns in region<sup>1</sup>

Aireys Inlet/Fairhaven	Leopold
Anglesea	Lorne
Apollo Bay	Mortlake
Camperdown	Ocean Grove/Barwon Heads
Casterton	Point Lonsdale/Queenscliff
Cobden	Port Fairy
Colac	Portarlington
Drysdale/Clifton Springs	Portland
Geelong	St Leonards
Hamilton	Terang
Heywood	Torquay/Jan Juc
Koroit	Warrnambool
Lara	Winchelsea

1. Towns with populations of 1000 or more – Urban Centres/Localities, Australian Bureau of Statistics, 2011

#### Population<sup>2</sup>

Age Group	2001			2006		
	Aboriginal	Non-Aboriginal	% Aboriginal	Aboriginal	Non-Aboriginal	% Aboriginal
Age 0-14	911	66,335	1.4%	1,079	64,226	1.7%
Age 15-24	410	39,681	1.0%	506	41,399	1.2%
Age 25-44	547	86,115	0.6%	648	82,767	0.8%
Age 45-64	269	72,726	0.4%	401	84,203	0.5%
Age 65+	78	44,600	0.2%	139	52,105	0.3%
<b>Total</b>	<b>2,215</b>	<b>309,457</b>	<b>0.7%</b>	<b>2,773</b>	<b>324,700</b>	<b>0.8%</b>

2. Census of Population and Housing 2001, 2006 – Australian Bureau of Statistics (excludes respondents with Indigenous status not stated)

#### Selected indicators<sup>3</sup>

Indicator	2001		2006	
	Aboriginal	Non Aboriginal	Aboriginal	Non Aboriginal
<b>% employed<sup>4</sup></b>				
Barwon – South Western	79.6%	92.7%	84.0%	94.6%
Victoria	82.1%	93.3%	84.3%	94.7%
<b>% completed year 12<sup>5</sup></b>				
Barwon – South Western	23.9%	34.1%	23.1%	38.1%
Victoria	24.6%	44.3%	25.9%	48.9%
<b>% completed year 10<sup>5</sup></b>				
Barwon – South Western	65.6%	74.8%	68.6%	78.6%
Victoria	66.0%	78.2%	69.4%	81.7%
<b>% weekly household income &lt; \$500<sup>6</sup></b>				
Barwon – South Western	44.7%	37.8%	29.6%	24.8%
Victoria	38.4%	30.9%	27.5%	20.8%
<b>% weekly household income &lt; \$1000<sup>6</sup></b>				
Barwon – South Western	75.8%	68.4%	63.5%	54.4%
Victoria	71.5%	60.1%	60.2%	47.8%
<b>% weekly household income &gt;=\$1000<sup>6</sup></b>				
Barwon – South Western	24.2%	31.6%	36.5%	45.6%
Victoria	28.5%	39.9%	39.8%	52.2%

3. Census of Population and Housing 2001, 2006 – Australian Bureau of Statistics.

4. % persons aged 15 years and older who are in the labour force and employed full or part time

5. % persons aged 15 years and older who have finished/never attended school and have completed year 10 and year 12

6. % households with gross weekly income in the specified brackets. Households with nil/negative incomes are excluded from calculations



## Region Profile 2.2

## Loddon Mallee Region Indigenous profile: 2001-2006

Main towns in region<sup>1</sup>

Bendigo	Maldon
Castlemaine	Maryborough
Cohuna	Merbein
Donald	Mildura
Echuca	Ouyen
Gisborne	Red Cliffs
Heathcote	Riddells Creek
Kerang	Robinvale
Koondrook	Rochester
Kyabram	Romsey
Kyneton	Swan Hill
Lancefield	Tongala
Macedon	Woodend

1. Towns with populations of 1000 or more – Urban Centres/Localities, Australian Bureau of Statistics, 2011

Population<sup>2</sup>

Age Group	2001			2006		
	Aboriginal	Non-Aboriginal	% Aboriginal	Aboriginal	Non-Aboriginal	% Aboriginal
Age 0-14	1,623	59,506	2.7%	1,843	57,369	3.1%
Age 15-24	670	33,086	2.0%	842	34,059	2.4%
Age 25-44	959	71,831	1.3%	1,100	67,575	1.6%
Age 45-64	476	64,798	0.7%	634	74,513	0.8%
Age 65+	124	37,189	0.3%	193	43,406	0.4%
<b>Total</b>	<b>3,852</b>	<b>266,410</b>	<b>1.4%</b>	<b>4,612</b>	<b>276,922</b>	<b>1.6%</b>

2. Census of Population and Housing 2001, 2006 – Australian Bureau of Statistics (excludes respondents with Indigenous status not stated)

Selected indicators<sup>3</sup>

Indicator	2001		2006	
	Aboriginal	Non Aboriginal	Aboriginal	Non Aboriginal
<b>% employed<sup>4</sup></b>				
Loddon Mallee	78.9%	93.2%	80.1%	94.6%
Victoria	82.1%	93.3%	84.3%	94.7%
<b>% completed year 12<sup>5</sup></b>				
Loddon Mallee	16.7%	30.0%	15.6%	34.0%
Victoria	24.6%	44.3%	25.9%	48.9%
<b>% completed year 10<sup>5</sup></b>				
Loddon Mallee	57.9%	71.9%	60.6%	76.1%
Victoria	66.0%	78.2%	69.4%	81.7%
<b>% weekly household income &lt; \$500<sup>6</sup></b>				
Loddon Mallee	50.0%	39.1%	34.9%	26.5%
Victoria	38.4%	30.9%	27.5%	20.8%
<b>% weekly household income &lt; \$1000<sup>6</sup></b>				
Loddon Mallee	84.1%	71.2%	74.0%	57.8%
Victoria	71.5%	60.1%	60.2%	47.8%
<b>% weekly household income &gt;=\$1000<sup>6</sup></b>				
Loddon Mallee	15.9%	28.8%	26.0%	42.2%
Victoria	28.5%	39.9%	39.8%	52.2%

3. Census of Population and Housing 2001, 2006 – Australian Bureau of Statistics.

4. % persons aged 15 years and older who are in the labour force and employed full or part time

5. % persons aged 15 years and older who have finished/never attended school and have completed year 10 and year 12

6. % households with gross weekly income in the specified brackets. Households with nil/negative incomes are excluded from calculations



## Region Profile 2.3

### Grampians Region Indigenous profile: 2001-2006



#### Main towns in region<sup>1</sup>

Ararat  
Bacchus Marsh  
Ballan  
Ballarat  
Bannockburn  
Creswick  
Daylesford/Hepburn Springs  
Dimboola  
Horsham  
Nhill  
St Arnaud  
Stawell  
Warracknabeal

1. Towns with populations of 1000 or more – Urban Centres/Localities, Australian Bureau of Statistics, 2011

#### Population<sup>2</sup>

Age Group	2001			2006		
	Aboriginal	Non-Aboriginal	% Aboriginal	Aboriginal	Non-Aboriginal	% Aboriginal
Age 0-14	614	41,984	1.4%	637	39,702	1.6%
Age 15-24	285	24,800	1.1%	319	25,271	1.2%
Age 25-44	377	52,111	0.7%	427	49,199	0.9%
Age 45-64	179	45,230	0.4%	251	52,752	0.5%
Age 65+	44	26,006	0.2%	116	29,896	0.4%
<b>Total</b>	<b>1,499</b>	<b>190,131</b>	<b>0.8%</b>	<b>1,750</b>	<b>196,820</b>	<b>0.9%</b>

2. Census of Population and Housing 2001, 2006 – Australian Bureau of Statistics (excludes respondents with Indigenous status not stated)

#### Selected indicators<sup>3</sup>

Indicator	2001		2006	
	Aboriginal	Non Aboriginal	Aboriginal	Non Aboriginal
<b>% employed<sup>4</sup></b>				
Grampians	74.7%	92.5%	80.3%	94.3%
Victoria	82.1%	93.3%	84.3%	94.7%
<b>% completed year 12<sup>5</sup></b>				
Grampians	21.9%	32.1%	25.4%	36.0%
Victoria	24.6%	44.3%	25.9%	48.9%
<b>% completed year 10<sup>5</sup></b>				
Grampians	62.7%	73.5%	67.2%	77.5%
Victoria	66.0%	78.2%	69.4%	81.7%
<b>% weekly household income &lt; \$500<sup>6</sup></b>				
Grampians	50.5%	38.9%	32.7%	26.0%
Victoria	38.4%	30.9%	27.5%	20.8%
<b>% weekly household income &lt; \$1000<sup>6</sup></b>				
Grampians	83.4%	71.0%	65.2%	57.3%
Victoria	71.5%	60.1%	60.2%	47.8%
<b>% weekly household income &gt;=\$1000<sup>6</sup></b>				
Grampians	16.6%	29.0%	34.8%	42.7%
Victoria	28.5%	39.9%	39.8%	52.2%

3. Census of Population and Housing 2001, 2006 – Australian Bureau of Statistics.

4. % persons aged 15 years and older who are in the labour force and employed full or part time

5. % persons aged 15 years and older who have finished/never attended school and have completed year 10 and year 12

6. % households with gross weekly income in the specified brackets. Households with nil/negative incomes are excluded from calculations



## Region Profile 2.4

## Hume Region Indigenous profile: 2001-2006

Main towns in region<sup>1</sup>

Alexandra	Nathalia
Baranduda	Numurkah
Beechworth	Rutherglen
Benalla	Seymour
Bright	Shepparton/Mooroopna
Broadford	Tatura
Cobram	Wahgunyah
Corryong	Wallan
Euroa	Wandong/Heathcote Junction
Kilmore	Wangaratta
Mansfield	Wodonga
Mount Beauty/Tawonga South	
Myrtleford	Yarrowonga
Nagambie	Yea

1. Towns with populations of 1000 or more – Urban Centres/Localities, Australian Bureau of Statistics, 2011

Population<sup>2</sup>

Age Group	2001			2006		
	Aboriginal	Non-Aboriginal	% Aboriginal	Aboriginal	Non-Aboriginal	% Aboriginal
Age 0-14	1,198	53,295	2.2%	1,474	49,088	2.9%
Age 15-24	541	29,272	1.8%	701	28,427	2.4%
Age 25-44	743	65,439	1.1%	850	59,105	1.4%
Age 45-64	342	55,526	0.6%	528	64,110	0.8%
Age 65+	71	29,767	0.2%	133	35,546	0.4%
<b>Total</b>	<b>2,895</b>	<b>233,299</b>	<b>1.2%</b>	<b>3,686</b>	<b>236,276</b>	<b>1.5%</b>

2. Census of Population and Housing 2001, 2006 – Australian Bureau of Statistics (excludes respondents with Indigenous status not stated)

Selected indicators<sup>3</sup>

Indicator	2001		2006	
	Aboriginal	Non Aboriginal	Aboriginal	Non Aboriginal
<b>% employed<sup>4</sup></b>				
Hume	81.6%	93.8%	83.0%	95.1%
Victoria	82.1%	93.3%	84.3%	94.7%
<b>% completed year 12<sup>5</sup></b>				
Hume	19.8%	31.5%	20.1%	33.7%
Victoria	24.6%	44.3%	25.9%	48.9%
<b>% completed year 10<sup>5</sup></b>				
Hume	60.0%	74.2%	65.6%	77.3%
Victoria	66.0%	78.2%	69.4%	81.7%
<b>% weekly household income &lt; \$500<sup>6</sup></b>				
Hume	38.0%	36.8%	29.0%	24.5%
Victoria	38.4%	30.9%	27.5%	20.8%
<b>% weekly household income &lt; \$1000<sup>6</sup></b>				
Hume	74.1%	69.6%	65.9%	55.5%
Victoria	71.5%	60.1%	60.2%	47.8%
<b>% weekly household income &gt;=\$1000<sup>6</sup></b>				
Hume	25.9%	30.4%	34.1%	44.5%
Victoria	28.5%	39.9%	39.8%	52.2%

3. Census of Population and Housing 2001, 2006 – Australian Bureau of Statistics.

4. % persons aged 15 years and older who are in the labour force and employed full or part time

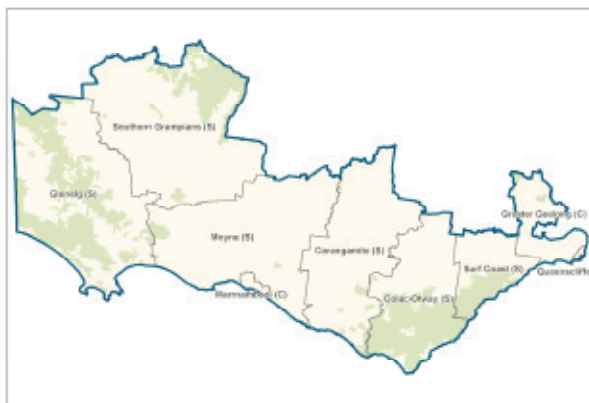
5. % persons aged 15 years and older who have finished/never attended school and have completed year 10 and year 12

6. % households with gross weekly income in the specified brackets. Households with nil/negative incomes are excluded from calculations





## Gippsland Region Indigenous profile: 2001-2006



### Main towns in region<sup>1</sup>

Bairnsdale	Morwell
Cape Woolamai	Orbost
Churchill	Paynesville
Cowes	Rosedale
Drouin	Sale
Foster	San Remo
Heyfield	Stratford
Inverloch	Trafalgar
Korumburra	Traralgon
Lakes Entrance	Warragul
Leongatha	Wonthaggi
Longwarry	Yallourn North
Maffra	Yarragon
Mirboo North	Yarram
Moe/Newborough	

1. Towns with populations of 1000 or more – Urban Centres/Localities, Australian Bureau of Statistics, 2011

### Population<sup>2</sup>

Age Group	2001			2006		
	Aboriginal	Non-Aboriginal	% Aboriginal	Aboriginal	Non-Aboriginal	% Aboriginal
Age 0-14	1,085	47,461	2.2%	1,227	43,861	2.7%
Age 15-24	409	26,076	1.5%	552	26,997	2.0%
Age 25-44	693	56,461	1.2%	740	52,217	1.4%
Age 45-64	325	53,853	0.6%	429	63,629	0.7%
Age 65+	76	31,373	0.2%	116	37,939	0.3%
<b>Total</b>	<b>2,588</b>	<b>215,224</b>	<b>1.2%</b>	<b>3,064</b>	<b>224,643</b>	<b>1.3%</b>

2. Census of Population and Housing 2001, 2006 – Australian Bureau of Statistics (excludes respondents with Indigenous status not stated)

### Selected indicators<sup>3</sup>

Indicator	2001		2006	
	Aboriginal	Non Aboriginal	Aboriginal	Non Aboriginal
<b>% employed<sup>4</sup></b>				
Gippsland	76.0%	91.2%	78.3%	93.8%
Victoria	82.1%	93.3%	84.3%	94.7%
<b>% completed year 12<sup>5</sup></b>				
Gippsland	15.0%	29.1%	16.0%	32.2%
Victoria	24.6%	44.3%	25.9%	48.9%
<b>% completed year 10<sup>5</sup></b>				
Gippsland	56.2%	72.5%	62.2%	76.4%
Victoria	66.0%	78.2%	69.4%	81.7%
<b>% weekly household income &lt; \$500<sup>6</sup></b>				
Gippsland	46.2%	42.6%	36.8%	28.9%
Victoria	38.4%	30.9%	27.5%	20.8%
<b>% weekly household income &lt; \$1000<sup>6</sup></b>				
Gippsland	80.6%	73.4%	73.7%	59.8%
Victoria	71.5%	60.1%	60.2%	47.8%
<b>% weekly household income &gt;=\$1000<sup>6</sup></b>				
Gippsland	19.4%	26.6%	26.3%	40.2%
Victoria	28.5%	39.9%	39.8%	52.2%

3. Census of Population and Housing 2001, 2006 – Australian Bureau of Statistics.

4. % persons aged 15 years and older who are in the labour force and employed full or part time

5. % persons aged 15 years and older who have finished/never attended school and have completed year 10 and year 12

6. % households with gross weekly income in the specified brackets. Households with nil/negative incomes are excluded from calculations



## Region Profile 2.6

## Western Metropolitan Region Indigenous profile: 2001-2006

Population<sup>1</sup>

Age Group	2001			2006		
	Aboriginal	Non-Aboriginal	% Aboriginal	Aboriginal	Non-Aboriginal	% Aboriginal
Age 0-14	818	112,750	0.7%	946	119,758	0.8%
Age 15-24	454	89,057	0.5%	576	98,686	0.6%
Age 25-44	708	189,908	0.4%	897	208,393	0.4%
Age 45-64	261	121,826	0.2%	374	141,992	0.3%
Age 65+	41	55,709	0.1%	86	64,339	0.1%
<b>Total</b>	<b>2,282</b>	<b>569,250</b>	<b>0.4%</b>	<b>2,879</b>	<b>633,168</b>	<b>0.5%</b>

1. Census of Population and Housing 2001, 2006 – Australian Bureau of Statistics (excludes respondents with Indigenous status not stated)

Selected indicators<sup>2</sup>

Indicator	2001		2006	
	Aboriginal	Non Aboriginal	Aboriginal	Non Aboriginal
<b>% employed<sup>3</sup></b>				
Western Metropolitan	82.4%	91.5%	86.7%	94.9%
Victoria	82.1%	93.3%	84.3%	94.6%
<b>% completed year 12<sup>4</sup></b>				
Western Metropolitan	32.3%	46.5%	32.5%	53.1%
Victoria	24.6%	44.3%	25.9%	48.9%
<b>% completed year 10<sup>4</sup></b>				
Western Metropolitan	72.0%	76.6%	75.5%	81.3%
Victoria	66.0%	78.2%	69.4%	81.7%
<b>% weekly household income &lt; \$500<sup>5</sup></b>				
Western Metropolitan	28.0%	29.1%	20.5%	20.0%
Victoria	38.4%	30.9%	27.5%	20.8%
<b>% weekly household income &lt; \$1000<sup>5</sup></b>				
Western Metropolitan	61.5%	58.1%	49.5%	45.9%
Victoria	71.5%	60.1%	60.2%	47.8%
<b>% weekly household income &gt;=\$1000<sup>5</sup></b>				
Western Metropolitan	38.5%	41.9%	50.5%	54.1%
Victoria	28.5%	39.9%	39.8%	52.2%

2. Census of Population and Housing 2001, 2006 – Australian Bureau of Statistics.

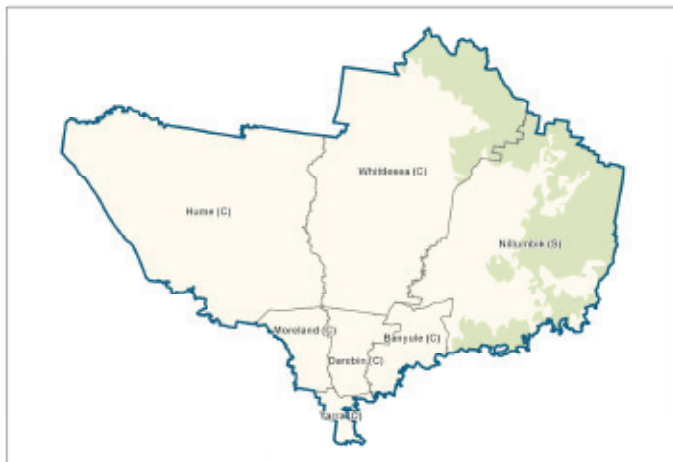
3. % persons aged 15 years and older who are in the labour force and employed full or part time

4. % persons aged 15 years and older who have finished/never attended school and have completed year 10 and year 12

5. % households with gross weekly income in the specified brackets. Households with nil/negative incomes are excluded from calculations



## Northern Metropolitan Region Indigenous profile: 2001-2006



### Population<sup>1</sup>

Age Group	2001			2006		
	Aboriginal	Non-Aboriginal	% Aboriginal	Aboriginal	Non-Aboriginal	% Aboriginal
Age 0-14	1,388	138,531	1.0%	1,528	137,486	1.1%
Age 15-24	745	100,380	0.7%	908	101,899	0.9%
Age 25-44	1,169	235,921	0.5%	1,224	236,092	0.5%
Age 45-64	436	148,382	0.3%	605	166,644	0.4%
Age 65+	108	78,734	0.1%	135	88,411	0.2%
<b>Total</b>	<b>3,846</b>	<b>701,948</b>	<b>0.5%</b>	<b>4,400</b>	<b>730,532</b>	<b>0.6%</b>

1. Census of Population and Housing 2001, 2006 – Australian Bureau of Statistics (excludes respondents with Indigenous status not stated)

### Selected indicators<sup>2</sup>

Indicator	2001		2006	
	Aboriginal	Non Aboriginal	Aboriginal	Non Aboriginal
<b>% employed<sup>3</sup></b>				
Northern Metropolitan	84.3%	92.6%	84.4%	94.4%
Victoria	82.1%	93.3%	84.3%	94.6%
<b>% completed year 12<sup>4</sup></b>				
Northern Metropolitan	29.1%	47.1%	32.8%	52.5%
Victoria	24.6%	44.3%	25.9%	48.9%
<b>% completed year 10<sup>4</sup></b>				
Northern Metropolitan	70.1%	75.7%	72.9%	79.8%
Victoria	66.0%	78.2%	69.4%	81.7%
<b>% weekly household income &lt; \$500<sup>5</sup></b>				
Northern Metropolitan	33.8%	29.4%	24.3%	20.5%
Victoria	38.4%	30.9%	27.5%	20.8%
<b>% weekly household income &lt; \$1000<sup>5</sup></b>				
Northern Metropolitan	64.6%	58.1%	53.0%	46.2%
Victoria	71.5%	60.1%	60.2%	47.8%
<b>% weekly household income &gt;=\$1000<sup>5</sup></b>				
Northern Metropolitan	35.4%	41.9%	47.0%	53.8%
Victoria	28.5%	39.9%	39.8%	52.2%

2. Census of Population and Housing 2001, 2006 – Australian Bureau of Statistics.

3. % persons aged 15 years and older who are in the labour force and employed full or part time

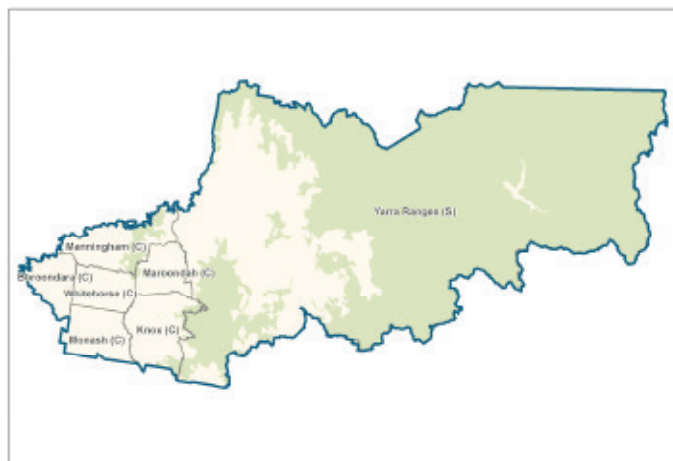
4. % persons aged 15 years and older who have finished/never attended school and have completed year 10 and year 12

5. % households with gross weekly income in the specified brackets. Households with nil/negative incomes are excluded from calculations



## Region Profile 2.8

## Eastern Metropolitan Region Indigenous profile: 2001-2006

Population<sup>1</sup>

Age Group	2001			2006		
	Aboriginal	Non-Aboriginal	% Aboriginal	Aboriginal	Non-Aboriginal	% Aboriginal
Age 0-14	776	173,367	0.4%	867	168,361	0.5%
Age 15-24	404	129,309	0.3%	470	131,455	0.4%
Age 25-44	656	262,536	0.2%	707	249,977	0.3%
Age 45-64	307	217,462	0.1%	392	236,010	0.2%
Age 65+	86	110,503	0.1%	141	128,118	0.1%
<b>Total</b>	<b>2,229</b>	<b>893,177</b>	<b>0.2%</b>	<b>2,577</b>	<b>913,921</b>	<b>0.3%</b>

1. Census of Population and Housing 2001, 2006 – Australian Bureau of Statistics (excludes respondents with Indigenous status not stated)

Selected indicators<sup>2</sup>

Indicator	2001		2006	
	Aboriginal	Non Aboriginal	Aboriginal	Non Aboriginal
<b>% employed<sup>3</sup></b>				
Eastern Metropolitan	89.0%	95.0%	91.1%	95.6%
Victoria	82.1%	93.3%	84.3%	94.7%
<b>% completed year 12<sup>4</sup></b>				
Eastern Metropolitan	32.6%	52.4%	33.5%	56.7%
Victoria	24.6%	44.3%	25.9%	48.9%
<b>% completed year 10<sup>4</sup></b>				
Eastern Metropolitan	74.7%	83.7%	77.2%	86.2%
Victoria	66.0%	78.2%	69.4%	81.7%
<b>% weekly household income &lt; \$500<sup>5</sup></b>				
Eastern Metropolitan	25.4%	24.1%	19.5%	16.3%
Victoria	38.4%	30.9%	27.5%	20.8%
<b>% weekly household income &lt; \$1000<sup>5</sup></b>				
Eastern Metropolitan	59.3%	51.0%	47.4%	40.5%
Victoria	71.5%	60.1%	60.2%	47.8%
<b>% weekly household income &gt;=\$1000<sup>5</sup></b>				
Eastern Metropolitan	40.7%	49.0%	52.6%	59.5%
Victoria	28.5%	39.9%	39.8%	52.2%

2. Census of Population and Housing 2001, 2006 – Australian Bureau of Statistics.

3. % persons aged 15 years and older who are in the labour force and employed full or part time

4. % persons aged 15 years and older who have finished/never attended school and have completed year 10 and year 12

5. % households with gross weekly income in the specified brackets. Households with nil/negative incomes are excluded from calculations





## Region Profile 2.9

### Southern Metropolitan Region Indigenous profile: 2001-2006



#### Population<sup>1</sup>

Age Group	2001			2006		
	Aboriginal	Non-Aboriginal	% Aboriginal	Aboriginal	Non-Aboriginal	% Aboriginal
Age 0-14	1,324	200,569	0.7%	1,511	207,804	0.7%
Age 15-24	651	133,545	0.5%	739	140,844	0.5%
Age 25-44	1,119	325,391	0.3%	1,227	330,604	0.4%
Age 45-64	455	229,898	0.2%	638	266,490	0.2%
Age 65+	111	128,555	0.1%	166	147,165	0.1%
<b>Total</b>	<b>3,660</b>	<b>1,017,958</b>	<b>0.4%</b>	<b>4,281</b>	<b>1,092,907</b>	<b>0.4%</b>

1. Census of Population and Housing 2001, 2006 – Australian Bureau of Statistics (excludes respondents with Indigenous status not stated)

#### Selected indicators<sup>2</sup>

Indicator	2001		2006	
	Aboriginal	Non Aboriginal	Aboriginal	Non Aboriginal
<b>% employed<sup>3</sup></b>				
Southern Metropolitan	84.4%	93.8%	86.7%	95.0%
Victoria	82.1%	93.3%	84.3%	94.7%
<b>% completed year 12<sup>4</sup></b>				
Southern Metropolitan	28.4%	48.8%	31.5%	53.1%
Victoria	24.6%	44.3%	25.9%	48.9%
<b>% completed year 10<sup>4</sup></b>				
Southern Metropolitan	72.0%	81.4%	74.0%	84.3%
Victoria	66.0%	78.2%	69.4%	81.7%
<b>% weekly household income &lt; \$500<sup>5</sup></b>				
Southern Metropolitan	33.7%	28.7%	24.1%	18.9%
Victoria	38.4%	30.9%	27.5%	20.8%
<b>% weekly household income &lt; \$1000<sup>5</sup></b>				
Southern Metropolitan	66.0%	57.6%	53.8%	45.4%
Victoria	71.5%	60.1%	60.2%	47.8%
<b>% weekly household income &gt;=\$1000<sup>5</sup></b>				
Southern Metropolitan	34.0%	42.4%	46.2%	54.6%
Victoria	28.5%	39.9%	39.8%	52.2%

2. Census of Population and Housing 2001, 2006 – Australian Bureau of Statistics.

3. % persons aged 15 years and older who are in the labour force and employed full or part time

4. % persons aged 15 years and older who have finished/never attended school and have completed year 10 and year 12

5. % households with gross weekly income in the specified brackets. Households with nil/negative incomes are excluded from calculations



Department of Health

This chapter has provided the background to the development of the enhanced dataset, Matched Dataset (Phase 1), including an overview of the phases of the VACMS. It included a summary of the policies and initiatives introduced between 1999 and 2008 aimed at improving Aboriginal identification in statutory and administrative datasets in Victoria. The chapter described the data sources and the method undertaken to match the datasets, identifying the legal impediments and solutions to these restrictions to enable the matching to proceed. It provided information about each DHS region to enable the data to be considered in the context

of this information, acknowledging that the numbers and percentages reported in the profiles represent the number of people living in each region according to the 2006 Census. The data in this report represent the number of live births according to matched birth files from the VPDC and the RBDM (the VACMS Matched Data).

The next chapter describes the methods undertaken in Phase 1 of the VACMS and, in particular, the generation of the denominator that described births to mothers and/or fathers who identified as Aboriginal and/or Torres Strait Islander.





## 3 Methods

This chapter describes the generation of the Matched Dataset used in this report and the process undertaken to match the data. It includes the methods used in the analyses, and a description of the calculation of 'ever-identified' and 'never-identified' Indigenous status.

The extensive processes undertaken to enable data to be released from the CCU of the DoH, (Victoria) then matched with information held by the Victorian RBDM, are described in Chapter 2.

The aim of this phase of the VACMS was to develop a more accurate and complete 'denominator' describing (live) births to Aboriginal and/or Torres Strait Islander and non- Aboriginal and/or Torres Strait Islander mothers and/or fathers. These data were derived from a dataset describing all live births occurring in Victoria, within the prescribed 20-year period. This was the first step in the VACMS. To achieve this, data were sourced from the VPDC and matched with RBDM data. Records held by each agency relating to a birth were matched on the basis of unique identifiers. For matching records, the Aboriginal and/or Torres Strait Islander status of the mother and/or father as recorded in RBDM information was added to the Aboriginal and/or Torres Strait Islander status of the mother recorded in VPDC data.

The matching of these data resulted in an enhanced Indigenous identifier derived from the matching of the Indigenous variable recorded in each dataset using an 'ever-identified' rule. This rule provides that a birth is recorded as 'Aboriginal' in the final dataset if either the child's mother or father ever identified as Aboriginal and/or Torres Strait Islander (see 'Development of an analytical framework' and 'Ever-Aboriginal rule' in this chapter).

The matching method relied on the availability of variables common to both VPDC and RBDM information for the purpose of determining that information from each source related to the same individuals.

### Pilot phase (proof of concept trial)—Methodology and steps

Prior to the matching of the birth information collected by the VPDCU and registered with the RBDM, a data matching proof of concept trial was undertaken between the CCU and the Victorian RBDM.

The aim of the proof of concept trial was to match VPDC and RBDM birth data and evaluate the success of the matching process. The proportion of records that matched determined the success of the matching process. The output was only reviewed internally by RBDM as it was not in a format that could be easily read and used by a third party. Following review of the pilot output, RBDM enhancements were made to the original technical specification to achieve clarity, to correct errors and to produce an output in the format required. The final specification is described in Appendix C.

### Matching methodology

The pilot data match was conducted in June 2012 following ethics clearance from all relevant custodians (Figure 3.2). Ten per cent of births from each year included in the study were randomly selected by staff at the CCU. These data were encrypted and delivered to the RBDM (by hand). The VPDC birth data were loaded onto a secure and isolated computer by RBDM technical staff. A technical expert was contracted to undertake the matching process



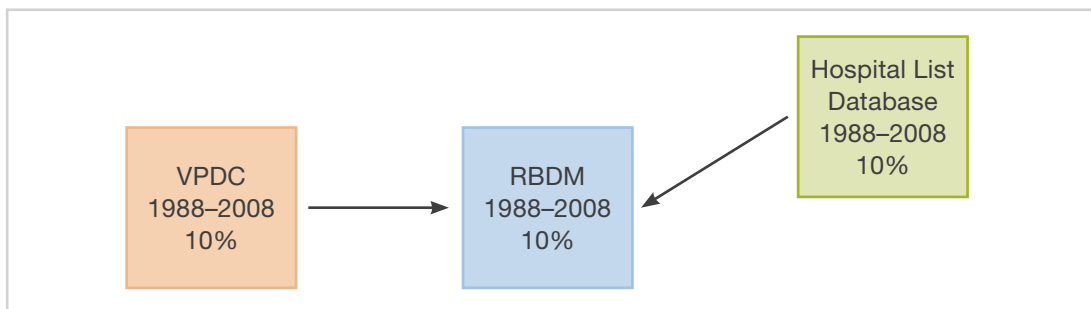
in consultation with the RBDM data matching expert team. Other data sources were used to supplement the data derived from the VPDCU and the RBDM and included the VAED and the death registration file.

There were three levels of matching: complete, partial and none. Further information was used in cases where there was partial matching (probable and possible) and also to randomly validate the matches. At the conclusion of the

pilot run, representatives from the VPDCU and the RBDM and the VACMS Chief Investigator met to review the process and outcome and, on the basis of these discussions, to refine the matching 'scripts' to ensure that all possible data were utilised to inform the matching process. Results of the pilot are provided in Appendix D.

Figure 3.1 identifies the datasets used in the matching process.

**Figure 3.1: Datasets used for the pilot phase of the matching process**



RBDM: Registry of Births, Deaths and Marriages. VPDC: Victorian Perinatal Data Collection.

### Selected variables

The following variables were proposed for matching VPDC and RBDM records relating to the same birth.

**Table 3.1: VPDC and RBDM variables proposed for matching: pilot project**

Matching variable	Victorian Perinatal Data Collection	Registry of Births, Deaths and Marriages
Mother's surname	Yes	Yes
Mother's first name	Yes	Yes
Mother's date of birth	Yes	Yes
Date of birth—baby	Yes	Yes
UR number—mother	Yes	Yes
Baby's sex	Yes	Yes
Hospital/campus code	Yes	Yes
Date of birth—mother	Yes	No

RBDM: Registry of Births, Deaths and Marriages. UR: VPDC: Victorian Perinatal Data Collection.





### Step 1: Provision of data to RBDM

The CCOPMM generated a random sample of 10% of the perinatal records from the period 1988–2008 inclusive. A new unique identification number was assigned to each record and the dataset was saved as ‘VPDC RBDM trial dataset’. The CCOPMM separated the new unique Indigenous identifier (Aboriginal and Torres Strait Islander status—mother)

and the matching variables identified above from the perinatal data. This file was saved as ‘VPDC RBDM matching data’. Identifiable perinatal data were released from the CCOPMM to the Registrar of the RBDM (under Section 41(1)(k) of the *PHW Act*). These data was provided to the RBDM via the Secure Data Exchange (SDE) portal. Table 3.2 shows the data items provided to the RBDM for the pilot matching process (via the SDE portal).

**Table 3.2: Data items provided to RBDM for matching trial**

Matching variable	Field name in VPDC	Values/format
1	Mother’s surname	
2	Mother’s first name	
3	Date of birth—mother	MBORN YYYYMMDD
4	Date of birth—baby	BBORN YYYYMMDD
5	UR number—mother	MOTHERUR 5–10 digit UR number
6	Baby’s sex	SEX 1=male
		2=female
		3=indeterminate
		9=unknown
6	Campus code	HOSPCODE 3 digit hospital code
Other variables	Field name in VPDC	Values/format
8	New unique ID	New unique ID 2=non Aboriginal 5=Aboriginal
9	Aboriginal and/or Torres Strait Islander status—mother	ABORIG 6=Torres Strait Islander 7=Aboriginal & TSI 9=Unknown

ID: identifier. UR Unit record; RBDM: Registry of Births, Deaths and Marriages. TSI: Torres Strait Islander. VPDC: Victorian Perinatal Data Collection. YYYYMMDD: year month day.



### Step 2: Running the matching syntax between birth datasets

The second step required the building of a 'bridge' between records from the VPDC and the RBDM and was undertaken at and by the RBDM using software and statistical processes determined by the RBDM. The technicians developed algorithms to enable the matching process between the two datasets. A number of iterations were undertaken on each successive year in order to yield the most efficient matching algorithm. The matching rules included 'exact' match versus 'loose' match; and that 'exact' match necessitated that Mother's Given Name, Surname, Date of Birth, UR Number and Hospital Code, Baby Date of Birth and Sex of Baby must match.

### Step 3: Matching with RBDM death data

After the VPDC and the RBDM birth records had been matched and before the RBDM identifiers were removed, the matched birth records were matched to the RBDM death records to determine whether any of the children were deceased.

### Step 4: Outcome of the matching trial

The RBDM prepared a short report on the outcome of the matching proof of concept trial: VACMS Specifications: Matching Rules for VPDC Data (Appendix C). The report indicated the proportion of VPDC birth records that matched to RBDM information. Apparent strengths and weaknesses of the matching were included and recommendations were made regarding the feasibility of extending the matching process to a larger population encompassing all births recorded in the VPDC for the period 1988–2008 inclusive.

The RBDM removed identifiers and provided a dataset to CCOPMM containing the new unique identifier, the VPDC mother's Aboriginal and Torres Strait Islander status, the RBDM mother's Aboriginal and Torres Strait Islander status, the RBDM father's Aboriginal and Torres Strait Islander status, and whether the child was deceased.

The RBDM reported back to the CCOPMM regarding the outcome of the matching process.

The RBDM technical syntax log file generated in the proof of concept trial exercise was then applied to the live phase/full data match/the complete birth cohort from the VPDC for the period 1988 to 2008 inclusive (Appendix D).

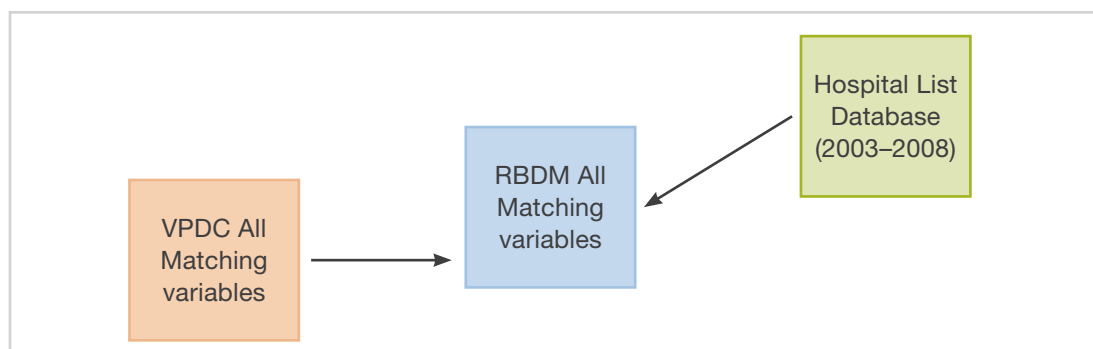
### Full data match

At the conclusion of the pilot study, records of all live births containing the matching variables for the 20-year period from 1 January 1988 to 31 December 2008 inclusive (based on date of birth) were extracted from the VPDC and provided to RBDM for matching. (Appendix D) identifies the variables used for the matching process.

The VPDC provided the data to RBDM via the SDE portal. Data for each of the 20 years was provided in separate Microsoft Excel Workbook files. If the number of records per worksheet exceeded 66,000, the records for that year were split into a second worksheet, due to the limitations of Microsoft Excel 2003. It was estimated that each year would contain approximately 65,000 records.



**Figure 3.2: Datasets used for the full matching process**



RBDM: Registry of Births, Deaths and Marriages. VPDC: Victorian Perinatal Data Collection.

A unique record number was created for each matched record, a copy of which will be retained by the VPDC. The RBDM matching

variables were removed and the RBDM and VPDC Aboriginal identifiers were retained (examples below).

**Table 3.3: Example of variables released to VPDCU from RBDM**

OUTPUT: BIRTH VARIABLES								
New unique record # (Matching key retained)	VPDC matching variables					RBDM		
	PCODE	SUR	FIRST	DOB	SEX	Mum Aboriginal/ and or Torres Strait Islander	Mum Aboriginal/ and or Torres Strait Islander	Dad Aboriginal/ and or Torres Strait Islander
11256	3102	Bloggs	Jo	04/05/1990	Female	Yes	Yes	Yes
11257	3190	Asterix	Fred	03/02/1999	Male	No	Yes	No
11258	3722	Jones	Jane	29/14/2008	Female	No	No	Yes
11259	3659	Smith	John	02/06/1990	Male	No	No	No

DOB: date of birth. PCODE: postcode. RBDM: Registry of Births, Deaths and Marriages. SUR: surname. VPDC: Victorian Perinatal Data Collection. VPDCU: Victorian Perinatal Data Collection Unit.

### Adding maternal and perinatal data

The RBDM conducted the data matching (description of the process in Appendix C). The enhanced (matched) data file was returned to the VPDCU via the secure portal in a Microsoft Excel file. The file included an 'Indigenous/non-Indigenous' identification variable which reflected mothers and/or fathers self identification on the birth registration form

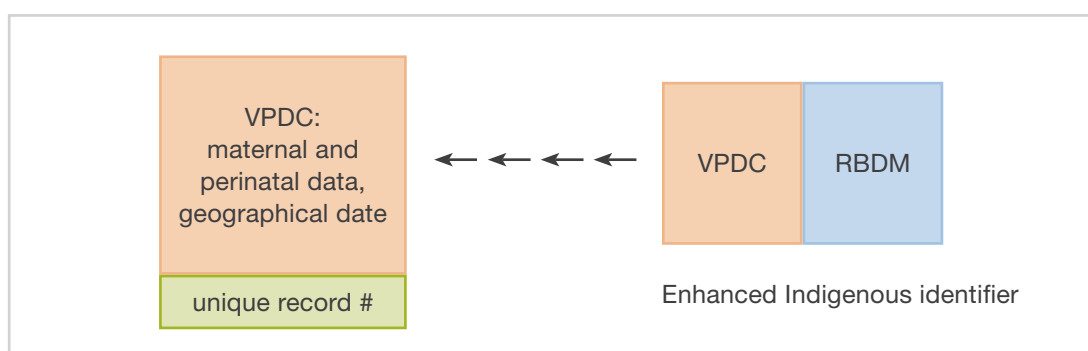
and recorded missing information. The file also included a flag indicating a death registration relating to any of the registered births. Selected maternal and perinatal information was then appended to the enhanced data file (below) and stored as an entity within the CCU for specific use in the VACMS. This created the master file for the analysis. Prior to the release of the data to the researchers, some variables



were categorised to further anonymise the data (see ‘Maternal and perinatal characteristic variables’ below). All identifying variables were

removed prior to release of the dataset to researchers for analysis.

**Figure 3.3: Process to VPDC Matched Dataset**



RBDM: Registry of Births, Deaths and Marriages. VPDC: Victorian Perinatal Data Collection.

### Maternal and perinatal characteristic variables

With the exception of Apgar scores at one and five minutes and mother’s marital status, when reporting on data for all Victoria, 1999–2008, categories used for maternal and perinatal characteristics are those that were predetermined by the source data (VPDC). Maternal and perinatal characteristics reported by the VPDC included maternal age ( $\leq 19$  years, 20–29 years, 30–39,  $\geq 40$  years), mother’s residence by DHS region (Eastern Metropolitan, Northern Metropolitan, Western Metropolitan, Southern Metropolitan, Barwon – South Western, Gippsland, Grampians, Hume, Loddon Mallee and Other (women who gave birth in Victoria but live outside Victoria)), sex (male, female and indeterminate), birth weight (<1500 grams, 1500–2499 grams, 2500–4499 grams and  $\geq 4500$  grams), gestational age in completed weeks (20–27; 28–31; 32–36; 37–41; >41 completed weeks) and plurality (single and multiple (twins, triplets, quadruplet, quintuplets, sextuplets)). Apgar scores at one and five minutes are reported in the following categories:

critically low (0–3), fairly low (4–6) and normal (7+). Marital status of the mother was reported as currently single (single, divorced, separated or widowed and married/de facto).

The hospital of birth (metro, inner rural, middle rural and outer rural), type of hospital (public/private) and percentage of expected birth weight (<10th centile, 10th–50th, 50th–90th and  $\geq 90$ th centile) were provided but are not reported in this report (available on request).

When the data are reported according to DHS regions and according to three- to four-year birth cohorts, some categories were collapsed in order to preserve anonymity. The collapsed maternal and perinatal characteristics include maternal age ( $\leq 19$  years, 20–29 years and  $\geq 30$  years), gestational age (preterm, term) and birth weight (<1500 grams, 1500–2499 grams,  $\geq 2500$  grams; also <2500 grams and  $\geq 2500$  grams). Cells that contained less than five observations were suppressed in accordance with epidemiological principles for the protection of anonymity. All categories of suppressed ‘unknown’ were less than 3%.

<sup>4</sup> The Apgar score is a screening test used worldwide to quickly assess the health of an infant one minute and five minutes after birth. The one-minute Apgar score measures how well the newborn tolerated the birthing process. The five-minute Apgar score assesses how well the newborn is adapting to the environment (University of Maryland Medical Center n.d.).





The following variables were reported as Aboriginal, Torres Strait Islander, and Aboriginal and Torres Strait Islander in the two datasets.

These variables were reconstructed to ensure consistency in the variables used in the Matched Data (see Table 3.4).

**Table 3.4: Variables used to describe Aboriginal and/or Torres Strait Islander in VPDC and RBDM, 1999–2008 inclusive**

VPDC variable (*)	Mother	RBDM variable**	Mother	Father
	n (%)		n (%)	n (%)
Non-Aboriginal (2)	648,695 (99.23)	No	592,312(90.60)	579,417(88.63)
Aboriginal (5)	4,604 (0.70)	Aboriginal	4,498 (0.69)	4,233 (0.65)
Torres Strait Islander (6)	127 (0.02)	Torres Strait Islander	417 (0.06)	444 (0.07)
Aboriginal and Torres Strait Islander (7)	227 (0.03)	Aboriginal and Torres Strait Islander	169 (0.03)	145 (0.02)
Unknown (9)	78 (0.01)	Unknown	20 (0.0)	50 (0.01)
Missing (.)	0	Missing	47,849 (7.32)	47,851 (7.32)
		Not stated	8466 (1.30)	21,591 (3.30)

n: number of births. RBDM: Registry of Births, Deaths and Marriages. VPDC: Victorian Perinatal Data Collection. \*The categorical value for the variable in the VPDC dataset. \*\*Variables in the RBDM were coded as a string and non-numerical (missing values were empty cells). Data Collection. VPDCU: Victorian Perinatal Data Collection Unit.

### Development of the analytical framework

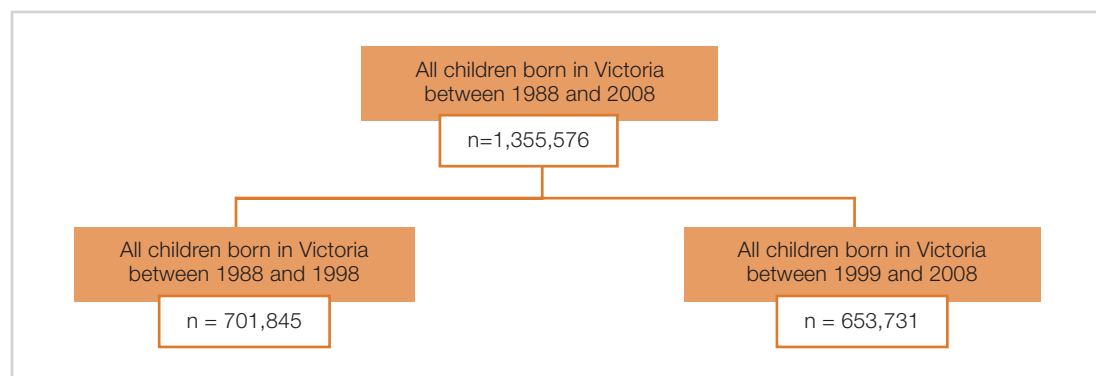
The complete Matched Data, with the appended perinatal data, comprised 1.34 million birth files. These data were separated into two birth cohorts: 1988–1998 and 1999–2008 (Table 3.6).

Figure 3.4 shows the total number of births reported in the VPDC provided to the RBDM

for matching to the births registered in the RBDM. The flow chart further indicates the number of births in the two birth cohorts.

Within the 20 years of matched birth files (1988–2008) there were significant numbers of birth files in the RBDM where there was no information on Aboriginal status of mother and/or father.

**Figure 3.4: Overview of all births in Victoria, 1988–2008 inclusive, categorised by 10-year birth cohorts**



**Table 3.5 Percentages of Aboriginal and non-Aboriginal births in Victoria, 1988–2008 inclusive (including births where the Aboriginal identifier was missing), in VDPC and RBDM databases**

Year of birth	VPDC database source data			RBDM database		
	Aboriginal N (%)	Non-Aboriginal N (%)	Missing Identifier # N (%)	Aboriginal N (%)	Non-Aboriginal N (%)	Missing identifier * N (%)
1988	342 (0.54)	62,783 (99.46)	0	14 (0.02)	158 (0.25)	62,953 (99.73)
1989	375 (0.59)	63,342 (99.41)	0	15 (0.02)	165 (0.26)	63,537 (99.72)
1990	431 (0.65)	65,943 (99.35)	0	11 (0.02)	165 (0.25)	66,198 (99.73)
1991	413 (0.64)	64,306 (99.36)	0	18 (0.03)	166 (0.26)	64,535 (99.72)
1992	407 (0.62)	65,449 (99.38)	0	25 (0.04)	235 (0.36)	65,596 (99.61)
1993	478 (0.74)	63,844 (99.26)	0	305 (0.47)	237 (0.37)	63,780 (99.16)
1994	429 (0.67)	64,019 (99.33)	0	499 (0.77)	278 (0.43)	63,671 (98.79)
1995	419 (0.66)	62,828 (99.34)	0	508 (0.80)	415 (0.66)	62,324 (98.54)
1996	447 (0.72)	62,037 (99.28)	0	550 (0.88)	756 (1.21)	61,178 (97.91)
1997	384 (0.62)	61,484 (99.38)	0	534 (0.86)	14,538 (23.50)	46,796 (75.64)
1998	449 (0.73)	61,236 (99.27)	0	683 (1.11)	52,053 (84.39)	8,949 (14.51)
1999	446 (0.72)	61,768 (99.27)	6 (0.01)	651 (1.05)	54,446 (87.51)	7,123 (11.45)
2000	376 (0.61)	61,772 (99.39)	0	575 (0.93)	54,780 (88.14)	6,793 (10.93)
2001	412 (0.67)	61,276 (99.33)	0	643 (1.04)	54,481 (88.32)	6,564 (10.64)
2002	415 (0.66)	62,266 (99.34)	0	747 (1.19)	54,925 (87.63)	7,009 (11.18)
2003	367 (0.58)	62,651 (99.42)	0	798 (1.27)	55,075 (87.40)	7,145 (11.34)
2004	433 (0.69)	62,647 (99.31)	2 (0.00)	821 (1.30)	55,129 (87.39)	7,132 (11.31)
2005	531 (0.80)	65,509 (99.19)	1 (0.00)	944 (1.43)	57,792 (87.51)	7,305 (11.06)
2006	567 (0.82)	68,641 (99.15)	22 (0.03)	965 (1.39)	60,815 (87.84)	7,450 (10.76)
2007	692 (0.96)	71,084 (99.03)	4 (0.01)	1,041 (1.45)	63,393 (88.32)	7,346 (10.23)
2008	719 (1.00)	71,081 (98.94)	43 (0.06)	1,063 (1.48)	63,124 (87.86)	7,656 (10.66)
<b>Total</b>	<b>9,532 (0.70)</b>	<b>1,345,966 (99.29)</b>	<b>78 (0.01)</b>	<b>11,410 (0.84)</b>	<b>643,126 (47.44)</b>	<b>701,040 (51.72)</b>

# includes missing Aboriginal identifier only. \* includes unlinked, missing Aboriginal identifier and multiple links. N: number of births. RBDM: Registry of Births, Deaths and Marriages. VPDC: Victorian Perinatal Data Collection.

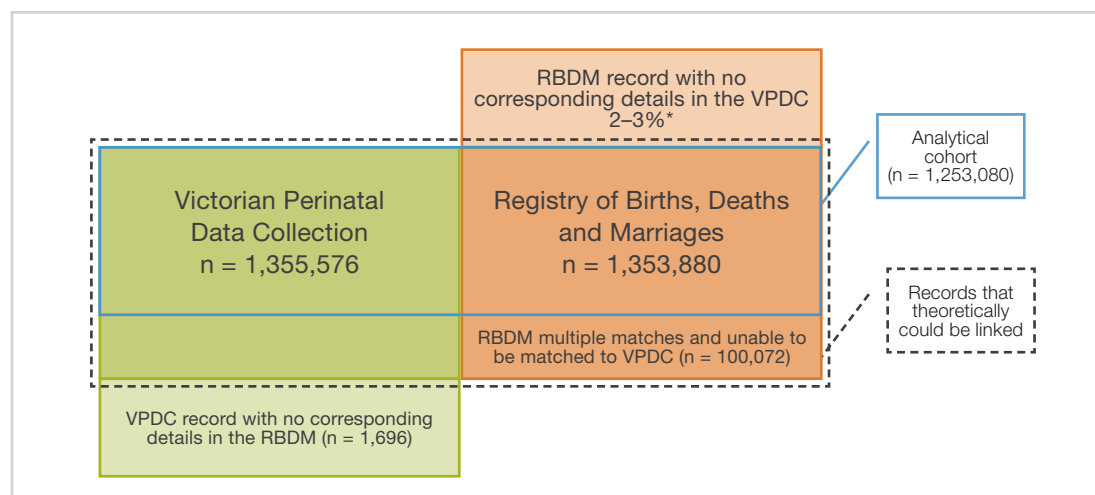


As indicated above, the VPDC was the source database. Figure 3.6 identifies the number of births registered in the RBDM databases that were not included in the complete matched dataset (1988–2008) due to missing Aboriginal identifier or non-linked data (adoptions or international births and birth files in the VPDC

where there were multiple possible matches in the RBDM).

Figure 3.5 provides the framework within which the data for analysis were determined from the complete dataset, 1988–2008 inclusive.

**Figure 3.5: Development of the analytical cohort using the VPDC and RBDM datasets, 1988–2008**



\*Calculated by extrapolating the subtracted number of births reported by the VPDC (source data) from the number of births registered for that year with the RBDM for the years 2007 and 2008. RBDM: Registry of Births, Deaths and Marriages. VPDC: Victorian Perinatal Data Collection.

The data included in the methods for the generation of the results in this report include all live births to Victorian resident mothers, 1988–2008 inclusive. However, given the relatively large number of missing birth files in the RBDM prior to 1999, it was decided to use the birth files in the years from 1 January 1999 to 31 December 2008 in the birth analysis. Thus, the data reported in Chapter 4 represent all live births to Victorian-born infants for the period 1999–2008 inclusive. These births are divided into three birth cohorts in reporting the outcomes of analyses: 1999–2002 (four years), 2003–2005 (three years) and 2006–2008 (three years) inclusive. Results from the analysis of the complete birth cohort, 1999–2008 inclusive, are also reported.

### Ever-Aboriginal rule

An ever-Aboriginal rule is where a person identified as Aboriginal and/or Torres Strait Islander in one of several data sources is deemed to be 'Aboriginal' in the final source after matching.

An ever-Aboriginal rule was applied by Kennedy, Howell and Breckell (2009) to assess the consistency of recording of Aboriginal status in the Queensland Hospital Admitted Patient Collection. In Draper et al. (2009) two methods were employed to determine Aboriginal status from linked data sources. The second method identified an individual as Aboriginal if any record for that individual was recorded as Aboriginal. The ever-Māori rule has



also been used in New Zealand to adjust the estimated under-count of ethnicity in cancer registrations, hospital admissions and death statistics (MHNZ 2006). Further, in a recent study by Xu et al. (2012), which also linked the New South Wales VPDC and RBDM, the ever-Aboriginal rule was found to provide a more accurate and complete Aboriginal identification. The authors concluded that the new ever-Aboriginal variable significantly improved the data at an individual record level (Owen 1999).

A limitation of the ever-Aboriginal rule is its potential to overestimate Aboriginal births due to a misclassification of a non-Aboriginal birth as Aboriginal from one dataset. However, the likelihood of a false positive identification is considered less than the chance of a false negative. Owen (1999) suggests that false positives do occur through either admission clerks or midwives assuming positive Aboriginality without asking the question. However, Owen (1999) concluded that the number of false positives would be small, a belief shared by Taylor and Lim (2000) in a study of the quality of Aboriginal status data in the New South Wales Midwives Data Collection.

Table 3.6 (see next page) reports the various categories within which the birth files were categorised in the development of the Aboriginal/non-Aboriginal identified variables for birth years 1999–2008 inclusive.

The final dataset reflected a number of exclusions—VPDC birth files where there was no corresponding information in the RBDM, including births where there was no Aboriginal identifier information in the RBDM; RBDM birth files where there was no corresponding birth files in the VPDC (probably due to the fact that these registrations were adoptions and/or international births, neither registrations would have been included in the VPDC); and VPDC birth files where there were multiple possible

matches in the RBDM. From these data an ‘ever identified as Aboriginal’ variable was created. For completeness, birth files that were successfully matched but did not have an Aboriginal identifier in the VPDC or the RBDM were maintained in the cohort, but identified as ‘missing’. Therefore, the final dataset for analysis included live births from 1 January 1999 to 31 December 2008.

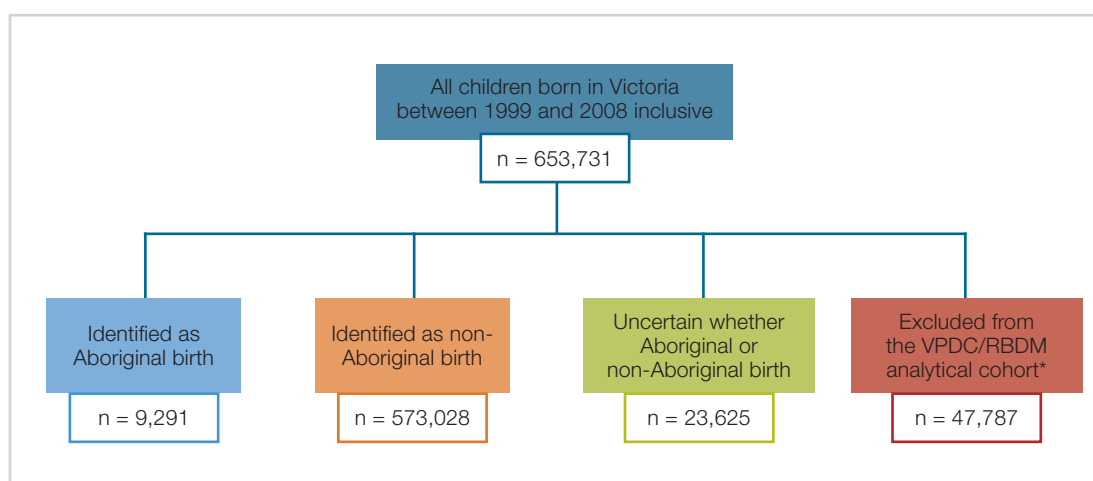
Figure 3.6 (see next page) provides a numerical summary in the development of the identification of ‘ever identified as Aboriginal variable’ and the ‘identified as non-Aboriginal’ variable calculated in the determination of the Aboriginal/non-Aboriginal denominator for the years 1999–2008 inclusive. It includes the missing data in both VPDC and the Matched Data. A summary of the results is provided in Chapter 4. The flow chart identifies the following denominators calculated using the ever-identified method and calculates the following classifications:

1. **Classified as ‘Aboriginal’** where the mother and/or father were ever identified as Aboriginal and/or Torres Strait Islander in the VPDC and/or the RBDM.
2. **Classified as ‘non-Aboriginal’** where the birth was never identified as Aboriginal and/or Torres Strait Islander and where the mother and father were identified as non-Aboriginal and/or Torres Strait Islander in the RBDM.
3. **Classified as ‘uncertain’** where the birth was never identified as Aboriginal and/or Torres Strait Islander and where the mother and/or father were identified as unknown in the RBDM.
4. **Data were ‘excluded’** if the RBDM data could not be linked to VPDC and if the RBDM data contained more than one possible match to the VPDC.





Figure 3.6: Categories of identification as an Aboriginal, non-Aboriginal birth, uncertain and excluded, for the years 1999–2008 inclusive



\*Data were excluded if the RBDM data could not be linked to VPDC (n = 632) and if the RBDM data contained more than one possible match to the VPDC (n = 47,155). RBDM: Registry of Births, Deaths and Marriages. VPDC: Victorian Perinatal Data Collection.

Table 3.6: Birth files categories for birth years 1999–2008 inclusive

	1. Aboriginal birth				2. Non-Aboriginal birth			3. Uncertain	
VPDC mother	✓	✓	✗	✗	✓	✗	•	✗	•
RBDM mother	✓	•	✓	✗/•	✗/•	✗	✗	•	•
RBDM father	✓/✗/•	✓	✓/✗/•	✓	✗/•	✗	✗	•	•
Total (N)	3,047	140	2,037	3,024	1,043	572,969	59	23,619	6

✓ = Identified as Aboriginal. ✗ = Identified as non-Aboriginal. • = Aboriginal identification unknown, not-stated or missing. N: number of births. RBDM: Registry of Births, Deaths and Marriages. VPDC: Victorian Perinatal Data Collection.

## Geographical regions

The postcode of the geographical location of the residence of the mother at the time of birth was used by the VPDCU to categorise the data into the DHS regions and further into metropolitan and rural entities. This enabled the researchers to analyse the distribution of births and birth outcomes by DHS region and rurality (Table 3.7).

Table 3.7: Victorian Department of Human Services regions and rurality

Region	Rurality
Barwon – South Western	Rural
Loddon Mallee	Rural
Grampians	Rural
Hume	Rural
Gippsland	Rural
Western Metropolitan	Metropolitan
Northern Metropolitan	Metropolitan
Eastern Metropolitan	Metropolitan
Southern Metropolitan	Metropolitan



Table 3.8 identifies the changes in the names of DHS regions during the study period. The categories set down in 2003/4 and in use until

2008/9 are used in this report, but include the Western and Northern Metropolitan regions as separate regions.

**Table 3.8 Victorian Department of Human Services regions over the period of study, 1988–2008**

1987/88–1989/90		1990/91–1992/93		1993/94–2002/03		2003/04–2008/09	
Community Services Victoria		Community Services Victoria		Health & Community Services (1993/94–1995/96) Department of Human Services (from 1996/97)		Department of Human Services	
1	Inner Urban	1	Inner Urban Metropolitan	1	Southern Metropolitan	1	Southern Metropolitan
2	Southern Suburbs						
3	Western Port	2	Southern Metropolitan				
		3	Westernport Metropolitan				
4	Inner East	4	Inner East Metropolitan	2	Eastern Metropolitan	2	Eastern Metropolitan
5	Outer Eastern Suburbs	5	Outer East Metropolitan				
6	North Western Suburbs	6	North West Metropolitan	3	Northern Metropolitan	3	North & West Metropolitan
7	Western Suburbs	7	Western Metropolitan	4	Western Metropolitan		
8	North Eastern Suburbs	8	North East Metropolitan				
9	Central Gippsland	9	Gippsland	5	Gippsland	4	Gippsland
10	East Gippsland						
11	Barwon Region	10	Otways	6	Barwon – South Western	5	Barwon – South Western
12	Glenelg						
13	Wimmera	11	Grampians	7	Grampians	6	Grampians
14	Central Highlands	12	Hume	8	Hume	7	Hume
15	Upper Murray						
16	Goulburn						
17	Loddon Campaspe	13	Loddon Mallee	9	Loddon Mallee	8	Loddon Mallee
18	Mallee						

Source: Table derived from Community Services Victoria and Department of Human Services annual reports.



## Reporting of data and data analyses

Two analytical cohorts are reported in this study. The numbers and proportions of Aboriginal and non-Aboriginal births by year, region, and by maternal and perinatal outcomes are reported according to the entire VPDC cohort (N = 653,731), 1999–2008 inclusive, and the matched and linked VPDC/RBDM cohort (the Matched Data) (N = 605,944), 1999–2008 inclusive. A third analysis that restricted the birth records in the VPDC dataset to those that were successfully matched and linked to the RBDM was also conducted. This was used to assess whether the numbers and proportions of maternal and perinatal outcomes were remarkably different to those reported in the full VPDC. No major differences were observed and the results are provided in Appendix E.

The authors note that the Ever-Aboriginal Rule applied in this category differs when considering non-Aboriginal mothers identifying in the VPDC with a corresponding ‘missing’ Indigenous status (mother and/or father) in the RBDM. The focus of the Ever-Aboriginal Rule is on identifying the Indigenous status for Aboriginal births in any datasets. Given the observed misclassification of Aboriginal mothers in the VPDC when matched with the available self-identified status in the RBDM (33%), we determined not to include the non-Aboriginal mother identified in the VPDC where there was no corresponding Indigenous status in the RBDM. The proportion of Aboriginal births in Victoria remain similar when the ‘uncertain’ non-Aboriginal births are added to the analytical cohort (1.5% compared with 1.6%).

The numbers and proportions of births comparing the VPDC dataset and the Matched Data are presented between Aboriginal and non-Aboriginal identified births by year, all years (1999–2008) and across DHS regions. Within Aboriginal-identified births, the numbers and proportions by all Aboriginal births, births to Aboriginal fathers

only and births to Aboriginal mothers are also presented. The number and proportion of births by maternal and perinatal outcomes comparing the VPDC dataset and the Matched Data are presented within Aboriginal and non-Aboriginal identified births across three- to four-year cohorts, all years (1999–2008) and by DHS region. For maternal age within the Matched Data, only births to Aboriginal mothers are reported. By restricting births to Aboriginal mothers in the Matched Data for maternal age, births to non-Aboriginal mothers are excluded.

The 11% missing data reported is composed of 7.3% that represented multiple matches (VPDC with RBDM) and 3.6% that were in the ‘uncertain’ category. The 11% were included in the VPDC analysis, that were excluded from the matched data analysis. The sensitivity analysis confirmed the exclusion of this group from the VPDC birth outcomes did not impact on the outcomes overall. However we could assume that given the 2% of births where there was information on the Indigenous status in the RBDM mothers and/or fathers self-identified as Aboriginal, then a further 2% with similarly be identified in the missing data in the matched dataset. Therefore, these data would underestimate the true number of births to Aboriginal and/or Torres Strait Islander mothers and/or fathers.

The data were analysed using both SPSS and SAS 9.3 (SAS Institute, Cary, North Carolina). Expert advice was sought about validating the development of the ‘ever identified as Aboriginal’ and ‘identified as non-Aboriginal’ variables (Professor John Carlin). An independent statistician (Dr Fiona Mensah) reviewed the data output to validate the statistical output. Statistical tests for trend over time and statistical test for differences between the VPDC dataset and the Matched Data were not completed for this report because the datasets are from population data sources and do not estimate the numbers and proportions of Aboriginal and non-Aboriginal births in Victoria.





## 4 Results

This chapter presents the results of the analysis resulting from the matching of the VPDC and RBDM (Matched Data), 1999–2008 inclusive. These results represent the Matched Data, excluding non-linked, multiple links and missing RBDM data. The VPDC data represent the data reported by the CCOPMM for births in Victoria, 1999–2008 inclusive. The births reflect births to mothers (VPDC) and mothers and/or fathers (Matched Data) who identified as Aboriginal and/or Torres Strait Islander.<sup>5</sup> The Matched Data were used to construct ever/never-identified categories. A summary of the different categories of the data according to Aboriginal identification in the VPDC and the Matched Data for the years 1999–2008 inclusive is presented as an important summary of the configuration of the ever/never-identified denominator. The summary includes files where there is missing Aboriginal identification information, non-matches and multiple matches.

The results are presented to build a picture of births in Aboriginal Victoria using the Matched Data. The geographical distribution of live births, according to DHS regions, is reported for both the VPDC and the Matched Data (over time), including the missing data. The data are then reported according to maternal age, gestational age and birth weight outcomes. Results are presented as above for each DHS region. The results of the sensitivity analysis are reported in Appendix E.

It is important to consider the scale identified in each of the maps because the scale differs between the maps to accommodate the differing proportions.

In these results, the use of the term 'significant' does not refer to *statistical* significance; as the data were population data, tests of significance were not performed. Proportions that are presented are corrected to the first decimal point. The numbers in categories that are less than five in the cells are suppressed. 'Unknown' numbers that are less than five remain, except where other numbers in that category are less than five.

### Summary of numbers in each category

The following summary should be read in conjunction with Figures 3.4; 3.6 (Chapter 3), which documents the number of all live births in Victoria between 1999 and 2008 inclusive, as reported by the VPDC, and the numbers of birth files included in the final Matched Data.

Between 1999 and 2008 inclusive there were 653,731 birth files provided to the RBDM for matching with the birth registrations collected by the RBDM. There were 71,412 (11%) birth files excluded from the analyses. These included 23,625 birth files excluded from the dataset due to no Aboriginal identification in either dataset (VPDC  $n = 6$ ; RBDM  $n = 23,619$ ) and a further 47,787 excluded due to non-linkage of RBDM files to VPDC files ( $n = 632$ ), or there were multiple possible links in the RBDM to the VPDC ( $n = 47,155$ ). Of birth files included in the analyses, 9291 live births were identified using the ever/never-identified calculation as being attributed to mothers and/or fathers who identified as Aboriginal at the time of the infant's birth. There were

<sup>4</sup> See note on terminology for Aboriginal Australians in Glossary of Terms, p.xii.



573,028 live births to mothers and/or fathers who identified as non-Aboriginal at the time of the infant's birth. Thus, the percentage of live births to mothers and/or fathers who identified as Aboriginal in the years 1999–2008 in Victoria was 1.6% (missing data excluded).

The VPDC reported 1043 live births to Aboriginal mothers where data could be linked to the RBDM. These births reflected those that were identified as non-Aboriginal (either mother or father) or where the Aboriginal identifier was not stated in the RBDM. Mothers who identified as Aboriginal and/or Torres Strait Islander in the RBDM and were identified as such in the VPDC numbered 3047 live births (33%). In 3024 birth files fathers identified as Aboriginal in the RBDM and the VPDC reported non-Aboriginal mother (33%). In 140 birth files fathers identified as Aboriginal in the RBDM and the mother was identified as Aboriginal in the VPDC (1.5%). In 22% of birth files ( $n = 2037$ ) the mother was reported as non-Aboriginal in the VPDC, but the mother identified as Aboriginal in the RBDM.

The VPDC reported 4958 live births to Aboriginal mothers between 1999 and 2008 inclusive. Using the ever-identified rule, and including fathers who identified as Aboriginal, the Matched Data reported 9291 live births in the same time period—a further 4333 births. The number of births in the Matched Data was almost double (ratio = 1.9) the numbers previously reported. The data reported in this section relate predominately to fathers and mothers who identified as Aboriginal and non-Aboriginal in the RBDM, but were not previously identified in the VPDC. This represents an increase of 87% in the number of births to Aboriginal mothers/and/or fathers; 70% of these births were directly due to identification of father's Indigenous status and 30% to the reassignment of mother's status according to the self-identified status in the RBDM. The Matched Data suggest that a more realistic (yet still conservative) ascertainment of the number of births to mothers and/or fathers who identified as Aboriginal and/or Torres Strait Islander in Victoria between 1999 and 2008 inclusive.

Table 4.1 reports the numbers (and proportions) of live births in Victoria over the study period for the VPDC and the Matched Data using the ever/never-identified variable for both Aboriginal/non-Aboriginal populations. Over the 10-year period the VPDC reported 4958 live births to Aboriginal mothers, which compared with the Matched Data which reported nearly double the number of live births ( $n = 9291$ ) to mothers and/or fathers who identified as Aboriginal (0.8% to 1.5%). Over this time period the VPDC only reported 78 missing birth files where there was a missing Aboriginal identifier, which compared with 3.9% of the birth files in the Matched Data where there were missing Aboriginal identifiers or multiple matches to the source birth file. There were 47,787 less birth files in the Matched Data when compared with the VPDC (7.3%). These missing birth files were a result of attrition through the matching process (see Figure 3.5: Development of the analytical cohort using the VPDC and RBDM datasets, 1988–2008 Figure 3.6: Categories of identification as an Aboriginal, non-Aboriginal birth, uncertain and excluded, for the years 1999–2008 inclusive, and the identification of ever and never identified as Aboriginal variable).

Over the 10 years studied, an increase in the numbers of live births was reported by the VPDC for Aboriginal mothers ( $n = 446$  in 1999,  $n = 719$  in 2008) and for mothers and/or fathers who were identified as Aboriginal in the Matched Data ( $n = 765$  in 1999,  $n = 1224$  in 2008). There were also increases in live births in the non-Aboriginal population over the same time period. Missing data remained generally constant over the time period.

Tables 4.2–4.7 (see pp.46–52) and Figures 4.1–4.3 (see pp. 48–52) represent the geographical distribution of births and also include a variable 'other'. 'Other' represents the number (%) of births recorded by midwives in the VPDC as having occurred in Victoria while the 'normal' residence of the mother was interstate.





Table 4.1: Numbers and proportions of live births to mothers and/or fathers who identified as Aboriginal/non-Aboriginal, 1999–2008 inclusive, as reported by VPDC (mothers) and Matched Data (mothers and/or fathers)

Births	Aboriginal		Non-Aboriginal		Missing		All births	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%) Source data	Matched Data N (%)
Total live births	4,958 (0.8)	9,291 (1.5)	648,695 (99.2)	573,028 (94.6)	78 (0.0)	23,625 (3.9)	653,731 (100.0)	605,944 (100.0)
Birth year								
1999	446 (0.7)	765 (1.3)	61,768 (99.3)	54,344 (94.6)	6 (0.0)	2,327 (4.1)	62,220 (100.0)	57,436 (100.0)
2000	376 (0.6)	665 (1.2)	61,772 (99.4)	54,698 (95.4)	0 (0.0)	1,994 (3.5)	62,148 (100.0)	57,357 (100.0)
2001	412 (0.7)	764 (1.3)	61,276 (99.3)	54,373 (95.3)	0 (0.0)	1,926 (3.4)	61,688 (100.0)	57,063 (100.0)
2002	415 (0.7)	838 (1.5)	62,266 (99.3)	54,847 (95.0)	0 (0.0)	2,040 (3.5)	62,681 (100.0)	57,725 (100.0)
2003	367 (0.6)	858 (1.5)	62,651 (99.4)	55,022 (94.2)	0 (0.0)	2,553 (4.4)	63,018 (100.0)	58,433 (100.0)
2004	433 (0.7)	886 (1.5)	62,647 (99.3)	55,076 (94.1)	* (0.0)	2,550 (4.4)	63,082 (100.0)	58,512 (100.0)
2005	531 (0.8)	1,013 (1.7)	65,509 (99.2)	57,729 (94.3)	* (0.0)	2,488 (4.1)	66,041 (100.0)	61,230 (100.0)
2006	567 (0.8)	1,081 (1.7)	68,641 (99.1)	60,709 (94.4)	22 (0.0)	2,510 (3.9)	69,230 (100.0)	64,300 (100.0)
2007	692 (1.0)	1,197 (1.8)	71,084 (99.0)	63,252 (94.6)	* (0.0)	2,400 (3.6)	71,780 (100.0)	66,849 (100.0)
2008	719 (1.0)	1,224 (1.8)	71,081 (98.9)	62,978 (93.9)	43 (0.1)	2,837 (4.2)	71,843 (100.0)	67,039 (100.0)

\* Suppressed numbers. N: number of births. VPDC: Victorian Perinatal Data Collection.





Table 4.2: Numbers and proportions of live births to mothers and/or fathers who identified as Aboriginal/non-Aboriginal, 1999–2008 inclusive, according to DHS regions as reported by VPDC and Matched Data

	Aboriginal			Non-Aboriginal			Missing			All births		
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Births</b>												
Total live births	4,958 (0.8)	9,291 (1.5)	648,695 (99.2)	573,028 (94.6)	78 (0.0)	23,625 (3.9)	653,731 (100.0)	605,944 (100.0)				
<b>Residence of mother (by DHS region)</b>												
Barwon – SW	416 (1.0)	772 (2.0)	41,449 (99.0)	37,365 (94.5)	5 (0.0)	1,402 (3.5)	41,870 (100.0)	39,539 (100.0)				
Loddon Mallee	990 (2.7)	1,315 (3.8)	35,499 (97.3)	31,498 (92.2)	6 (0.0)	1,351 (4.0)	36,495 (100.0)	34,164 (100.0)				
Grampians	292 (1.2)	466 (2.0)	24,848 (98.8)	22,226 (94.0)	* (0.0)	949 (4.0)	25,142 (100.0)	23,641 (100.0)				
Hume	670 (2.1)	1,015 (3.4)	31,445 (97.9)	27,849 (92.7)	6 (0.0)	1,181 (3.9)	32,121 (100.0)	30,045 (100.0)				
Gippsland	590 (2.1)	933 (3.5)	27,417 (97.9)	24,256 (92.2)	5 (0.0)	1,118 (4.2)	28,012 (100.0)	26,307 (100.0)				
Western Metro	233 (0.2)	859 (1.0)	96,005 (99.7)	83,759 (94.2)	10 (0.0)	4,335 (4.9)	96,248 (100.0)	88,953 (100.0)				
Northern Metro	628 (0.6)	1,318 (1.3)	111,433 (99.4)	97,648 (94.8)	17 (0.0)	4,082 (4.0)	112,078 (100.0)	103,048 (100.0)				
Eastern Metro	218 (0.2)	653 (0.6)	113,871 (99.8)	102,230 (96.6)	13 (0.0)	2,963 (2.8)	114,102 (100.0)	105,846 (100.0)				
Southern Metro	370 (0.2)	1,314 (0.9)	154,458 (99.8)	136,678 (95.1)	11 (0.0)	5,799 (4.0)	154,839 (100.0)	143,791 (100.0)				
Other <sup>†</sup>	551 (4.3)	646 (6.1)	12,270 (95.7)	9,519 (89.7)	* (0.0)	445 (4.2)	12,824 (100.0)	10,610 (100.0)				

\*Suppressed numbers. † 'Other' represents births in Victoria to (normally) non-resident in Victoria.

Table 4.2 (opposite) reports the numbers of live births to mothers and/or fathers who identified as Aboriginal/non-Aboriginal in Victoria between 1999 and 2008 inclusive as reported by VPDC and Matched Data according to DHS regions. The proportions represent the proportion of births within the VPDC and the Matched Data that were identified as Aboriginal according to each DHS region, including proportions of the missing data for the 10 years studied. The comparative proportions of live births for Aboriginal compared with non-Aboriginal mothers in the VPDC were consistently less than those reported in the Matched Data (which included fathers who identified as Aboriginal and/or Torres Straits Islander) in all DHS regions.

Excluding the proportion of births to mothers who normally resided in another state or territory, the proportion of births to Aboriginal compared with non-Aboriginal mothers and/or fathers was greatest in Loddon Mallee in both datasets (VPDC, 2.7%; Matched Data, 4.0%) and smallest in Eastern Metro (VPDC, 0.2%; Matched Data, 0.6%). There were negligible missing data in the VPDC data. However, the greatest proportion of missing data in the Matched Data was reported in Western Metro (4.9%); the smallest was in Eastern Metro (2.8%).

### Summary of the changes in the regional distribution of births to Aboriginal mothers and/or fathers: VPDC compared with the Matched Data

Considering the changes in the distribution of births to Aboriginal mothers and/or fathers reported in the Matched Data, the following were observed. Over the years 1999 to 2008, the smallest proportion (average) of Aboriginal (compared with non-Aboriginal) births was reported within the metropolitan regions: Eastern, 0.6%; Western 1.0%; Southern, 1.0%, and Northern 1.3%. However, these regions reported the largest increases in the number births to mothers and/or fathers who identified as Aboriginal as observed in the Matched Data when compared with the number of births reported in the VPDC: Western Metro, 269%; Southern Metro, 255%; Eastern Metro, 200%; and Northern Metro, 110% (Table 4.3). Conversely, the rural regions reported the largest proportions of Aboriginal (compared with non-Aboriginal) births within these regions: Loddon Mallee, 4.0%; Gippsland, 3.7%; Hume, 3.5%; Barwon, 2.0%; and Grampians, 2.1%. The rural regions also reported the smallest increases in the identification of births associated with the Matched Data: Barwon, 86%; Grampians, 60%; Gippsland, 58%; Hume, 51%; and Loddon Mallee, 33% (Table 4.3). The proportion increases in regional areas were all less than 100%.

Figure 4.1 (see next page) reports the distribution of the proportions of live births to mothers and/or fathers who identified as Aboriginal and/or Torres Strait Islander *within* Aboriginal and/or Torres Strait Islander population in Victoria between 1999 and 2008 inclusive using the Matched Data. The proportions are reported within Aboriginal and/or Torres Strait Islander population: Grampians 5.0%; Eastern Metro 7.0%; Barwon – South Western, 8.3%, Western Metro 9.2%; Gippsland, 10.0%; Hume, 10.9%; Southern Metro, 14.1%; Loddon Mallee 14.2%, Northern Metro, 14.2%.



Figure 4.1: Proportions of Aboriginal births in Victoria across DHS regions, 1999–2008 inclusive

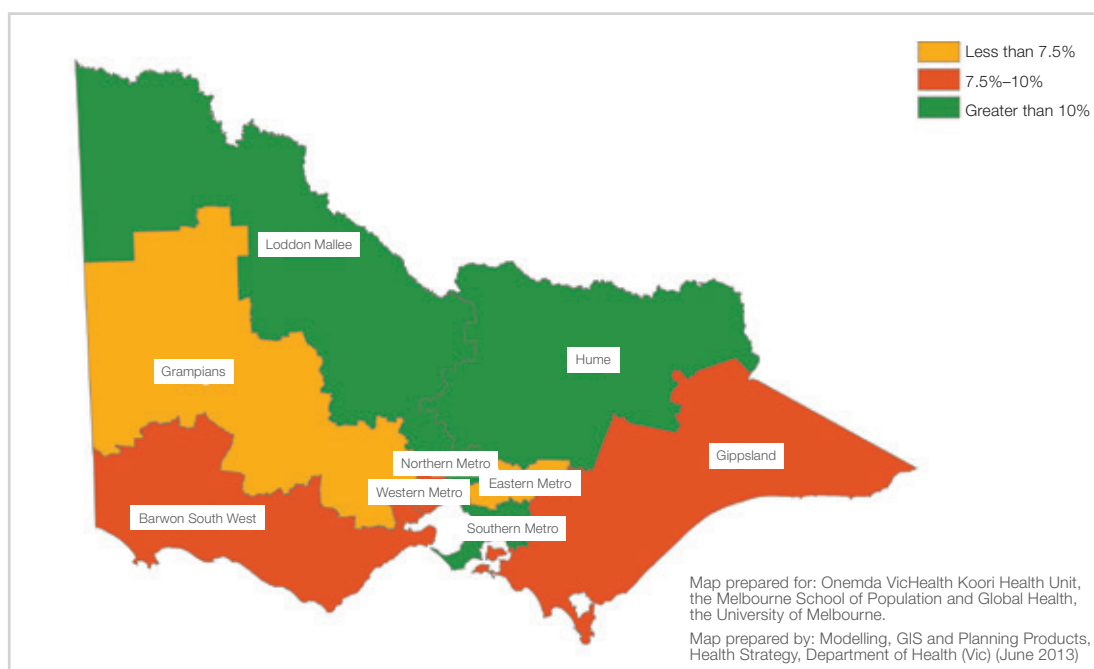


Table 4.3 reports the changes (ratio of increase/% increase) in the absolute numbers of births to mothers and/or fathers who

identify as Aboriginal as reported in the Matched Data, according to DHS region for all years 1999–2008 inclusive.

Table 4.3: Increase in numbers of live births, VPDC data and Matched Data, to mothers and/or fathers who identified as Aboriginal, 1999–2008 inclusive, according to DHS regions

	VPDC	Matched Data	Ratio of increase	% increase
Barwon – SW	416	772	1.86	86%
Loddon Mallee	990	1,315	1.33	33%
Grampians	292	466	1.60	60%
Hume	670	1,015	1.51	51%
Gippsland	590	933	1.58	58%
Western Metro	233	859	3.69	269%
Northern Metro	628	1,318	2.10	110%
Eastern Metro	218	653	3.00	200%
Southern Metro	370	1,314	3.55	255%
Other	551	646	1.17	17%

SW: South Western. VPDC: Victorian Perinatal Data Collection.



Table 4.4 reports the differences in the proportions reported in the VPDC and the Matched Data of live births to mothers and/or fathers who identified as Aboriginal across the DHS regions in Victoria between 1999 and 2008 inclusive. These changes differed according to regions. The proportions reported in the Matched Data were less in regional areas than reported in the VPDC. The greatest increases in proportions were reported in

metropolitan regions (Southern Metro and Western Metro; ratio of difference = 1.9% and 2.0% respectively). In summary, when considering the changes in the distributions of proportions of live births for the Aboriginal and/or Torres Strait Islander populations within Victoria reported in the Matched Data, the main changes were observed in Southern Metro and Western Metro (increases), and Hume and Loddon Mallee (decreases).

**Table 4.4: Changes in the distribution of proportions of live births according to DHS regions from VPDC data to Matched Data to mothers and/or fathers who identified as Aboriginal and/or Torres Strait Islander, 1999–2008 inclusive**

	VPDC	%*	Matched Data	%*	Proportion difference	Ratio of difference
Barwon – SW	416	8.4	772	8.3	-0.08	0.99
Loddon Mallee	990	20.0	1,315	14.2	-5.81	0.71
Grampians	292	5.9	466	5.0	-0.87	0.85
Hume	670	13.5	1,015	10.9	-2.59	0.81
Gippsland	590	11.9	933	10.0	-1.86	0.84
Western Metro	233	4.7	859	9.2	4.55	1.97
Northern Metro	628	12.7	1,318	14.2	1.52	1.12
Eastern Metro	218	4.4	653	7.0	2.63	1.60
Southern Metro	370	7.5	1,314	14.1	6.68	1.90
Other	551	11.1	646	7.0	-4.16	0.63

\*% add to 100. SW: South Western. VPDC: Victorian Perinatal Data Collection.

Table 4.5 (see next page) reports the numbers and proportions of live births where fathers only/mothers only identified as Aboriginal in the Matched Data according to DHS regions, 1999–2008 inclusive. The regions with the largest proportions of births where fathers (only) identified as Aboriginal were Southern Metro (16.1%), Northern Metro (12.6%) and Loddon Mallee (12.0%), and the least proportions were in Grampians (5.0%);

Barwon – South Western (8.8%) and Eastern Metro (8.9%). The regions with greatest/least proportion of births where mothers (only) identified as Aboriginal were similar to those of fathers only, although the region with the largest proportion where mothers only identified as Aboriginal was Loddon Mallee (15.2%), followed by Northern Metro (14.9%) and Southern Metro (13.2%).





**Table 4.5: Proportions of births to fathers only/mothers only who identified as Aboriginal, 1999–2008 inclusive, as identified through Matched Data, according to DHS regions**

Matched Data	Aboriginal N (%)	Aboriginal dads only N* (%)	Aboriginal mums only N* (%)	Non-Aboriginal N (%)
<b>Residence of mother (by DHS region)</b>				
Barwon SW	772 (8.3)	262 (8.8)	504 (8.0)	37,365 (6.5)
Loddon Mallee	1,315 (14.2)	358 (12.0)	952 (15.2)	31,498 (5.5)
Grampians	466 (5.0)	149 (5.0)	316 (5.0)	22,226 (3.9)
Hume	1,015 (10.9)	321 (10.8)	692 (11.0)	27,849 (4.9)
Gippsland	933 (10.0)	306 (10.3)	621 (9.9)	24,256 (4.2)
Western Metro	859 (9.2)	288 (9.7)	563 (9.0)	83,759 (14.6)
Northern Metro	1,318 (14.2)	375 (12.6)	935 (14.9)	97,648 (17.0)
Eastern Metro	653 (7.0)	264 (8.9)	385 (6.1)	102,230 (17.8)
Southern Metro	1,314 (14.1)	479 (16.1)	828 (13.2)	136,678 (23.9)
Other	646 (7.0)	173 (5.8)	471 (7.5)	9,519 (1.7)

DHS: Department Human Services. SW: South Western. \*Excludes babies born to Aboriginal fathers and with an uncertain Aboriginal status of the mother.

Table 4.6 and Figure 4.2 (opposite) report the data for proportions of live births where fathers only/mothers only identified as

Aboriginal in the Matched Data according to DHS regions for the early years in the birth cohort, 1999–2002 inclusive.

**Table 4.6: Proportions of Aboriginal births in Victoria, 1999–2002 inclusive, as identified through Matched Data according to DHS regions**

Matched Data	Aboriginal N (%)	Aboriginal dads only N* (%)	Aboriginal mums only N* (%)
Barwon – SW	241 (7.9)	77 (8.3)	164 (7.8)
Loddon Mallee	417 (13.8)	122 (13.2)	293 (14.0)
Grampians	176 (5.8)	45 (4.9)	130 (6.2)
Hume	302 (10.0)	74 (8.0)	228 (10.9)
Gippsland	334 (11.0)	105 (11.4)	228 (10.9)
Western Metro	255 (8.4)	76 (8.2)	177 (8.4)
Northern Metro	412 (13.6)	116 (12.6)	294 (14.0)
Eastern Metro	221 (7.3)	79 (8.6)	142 (6.8)
Southern Metro	453 (14.9)	175 (19.0)	278 (13.2)
Other	221 (7.3)	54 (5.9)	166 (7.9)

DHS: Department of Human Services. SW: South Western. \*Excludes babies born to Aboriginal fathers and with an uncertain Aboriginal status of the mother.



Figure 4.2 represents the distribution of the proportions of live births to mothers and/or fathers who identified as Aboriginal *within* the Aboriginal population in Victoria, 1999–2002 inclusive, using the Matched Data. The regional distribution of the proportions reported within the Aboriginal population from least to greatest are Grampians, 5.8%; Eastern Metro, 7.3 %; Barwon – South Western, 7.9%; Western Metro, 8.4%; Hume, 10.0%; Gippsland, 11.0%; Northern Metro, 13.6 %; Loddon Mallee, 13.8%; and Southern Metro, 14.9% (Table 4.6).

Figure 4.3 (see next page) represents the distribution of the proportions of live births to mothers and/or fathers who identified as Aboriginal *within* the Aboriginal population in Victoria for the most recent birth cohort years, 2006–2008 inclusive, using the Matched Data. The figure represents the data in Table 4.7. The proportions are reported within the Aboriginal population: Grampians, 4.9%; Eastern Metro, 6.8%; Barwon – South Western, 8.3%; Western Metro, 9.6%; Hume, 12.0%; Gippsland, 9.5%; Northern Metro, 14.5%; Loddon Mallee, 14.4%; and Southern Metro, 13.4%.

Figure 4.2: Proportions of Aboriginal births across Victorian DHS regions, 1999–2002 inclusive

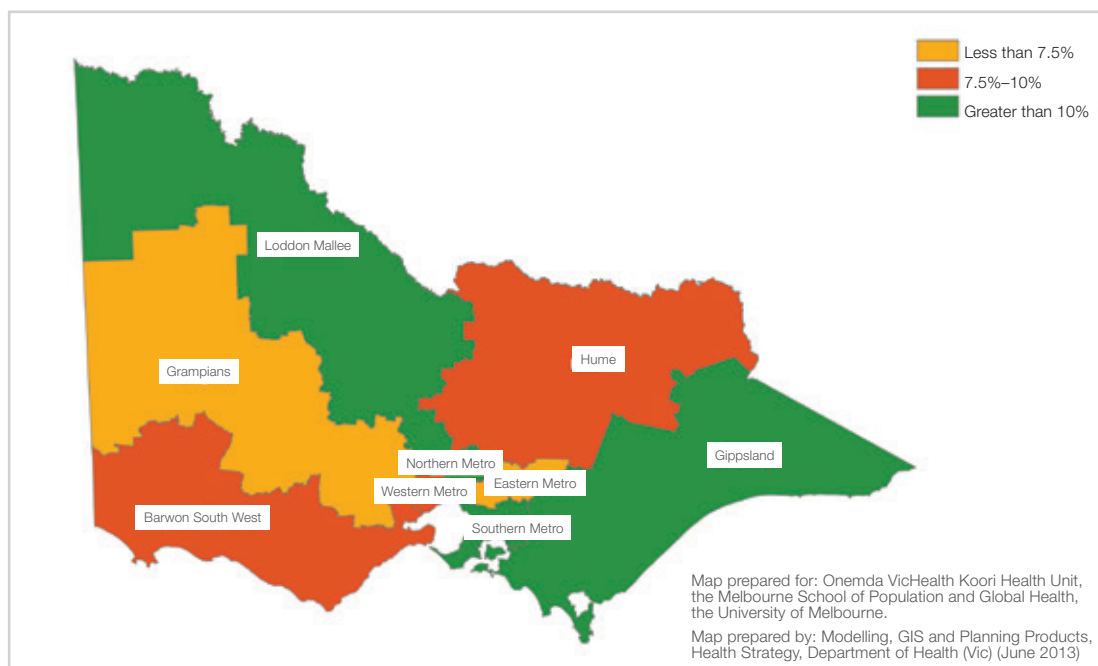


Figure 4.3: Proportions of Aboriginal births across Victorian DHS regions, 2006–2008 inclusive

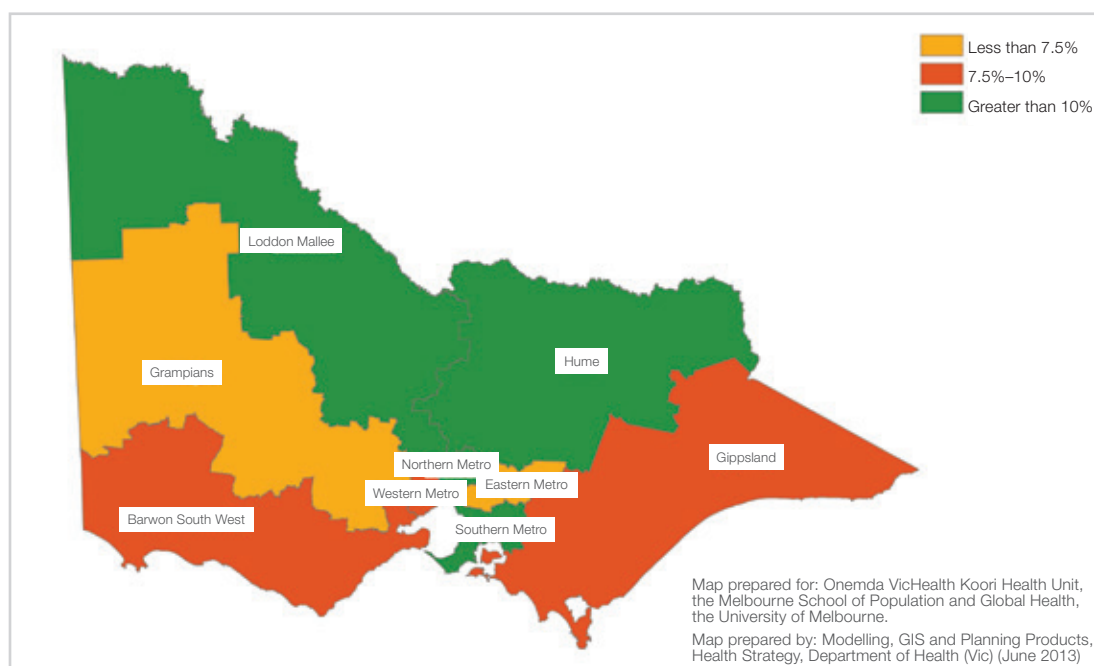


Table 4.7: Proportions of Aboriginal births, 2006–2008 inclusive, as identified through Matched Data, according to DHS regions

Matched Data	Aboriginal N (%)	Aboriginal dads only N* (%)	Aboriginal mums only N* (%)
Barwon – SW	289 (8.3)	94 (8.1)	191 (8.2)
Loddon Mallee	503 (14.4)	140 (12.1)	362 (15.6)
Grampians	170 (4.9)	64 (5.5)	106 (4.6)
Hume	419 (12.0)	135 (11.7)	283 (12.2)
Gippsland	334 (9.5)	121 (10.5)	212 (9.1)
Western Metro	335 (9.6)	123 (10.7)	208 (8.9)
Northern Metro	507 (14.5)	144 (12.5)	361 (15.5)
Eastern Metro	237 (6.8)	101 (8.8)	132 (5.7)
Southern Metro	471 (13.4)	164 (14.2)	303 (13.0)
Other	237 (6.8)	68 (5.9)	168 (7.2)

DHS: Department Human Services. SW: South Western. \*Excludes babies born to Aboriginal fathers and with an uncertain Aboriginal status of the mother.



### Key points

1. 1,357,272 birth files sourced from the VPDC, representing all births in Victoria between 1988 and 2008 inclusive, were matched with birth files registered in the RBDM:
  - a 99.7% of the VPDC birth files (n = 1,355,576) were successfully matched to the RBDM birth files. However, some of these linkages revealed multiple possible links. The level of probability was identified in the appendix using accepted probabilistic linkage rules. Where there were multiple matches, the births were excluded in the analysis of the matched datasets based on the Ever/ Never-Aboriginal identifier.
  - b approximately 5% of birth files recorded in the RBDM had no corresponding birth file in the VPDC (presumably international births and adoptions that were registered in the RBDM, but not in the VPDC).
2. Data describing Aboriginal births were not well described in the RBDM until after 1996.
3. Data included in this report represent all Victorian births recorded in the VPDC successfully matched with births registered in the RBDM, 1999–2008 inclusive.
4. An ever-identified method was used to determine the categories: classified as Aboriginal, classified as non-Aboriginal, and unable to be classified as either Aboriginal or non-Aboriginal.
2. In the years 1999–2008 inclusive, the Matched Data reported nearly double the number of births to Aboriginal mothers and/or fathers previously identified in the VPDC:
  - a in 33% of births ever identified as Aboriginal, fathers identified as Aboriginal and/or Torres Strait Islander (in the RBDM) and mothers were identified as non-Aboriginal and/or Torres Strait Islander in the RBDM and the VPDC
  - b in 23% of births ever identified as Aboriginal, mothers identified as Aboriginal and/or Torres Strait Islander (in the RBDM), but were identified as non-Aboriginal and/or Torres Strait Islander in the VPDC
  - c in 33% of births, the mother's identification as Aboriginal and/or Torres Strait Islander was consistent in the VPDC and the RBDM.
  - d in 11% of births, the mothers Indigenous status was identified solely from the VPDC
3. In the years 1999–2008 inclusive, the Matched Data reported the proportion of births in Victoria where mothers (and/or fathers) identified as Aboriginal and/or Torres Strait Islander as 1.6% of the birth population (VACMS, reported Aboriginal births as 0.8% of all births).
4. The Matched Data still represents an underestimation of the true population number of births to Aboriginal mothers and/or fathers. In the RBDM where there was information describing Aboriginal status, 0.9% of mothers and 0.8% of fathers identified as Aboriginal. Therefore, it is reasonable to suggest that there would be a further 1062 births to Aboriginal mothers/and or fathers in the missing data reported in the RBDM.

### Key findings: Population data

1. As the VPDC did not collect the Aboriginal status of fathers for each birth prior to 2009, the matching process with the RBDM (which collected self-identified Aboriginal status of fathers as well as mothers on all births) provided a greater number of births identified as Aboriginal.



### Key findings: Geographical distribution

1. Over the years 1999 to 2008, the smallest proportion (average) of Aboriginal (compared with non-Aboriginal) births was reported within the metropolitan regions: Eastern, 0.6%; Western, and Southern, 1.0%; and Northern, 1.3%.
2. The largest proportions of Aboriginal (compared with non-Aboriginal) births were within the rural regions: Loddon Mallee, 4.0%; Gippsland, 3.7%; Hume, 3.5%; Grampians, 2.1% and Barwon, 2.0%.
3. The largest increases in the number of births identified as being to mothers and/or fathers who identified as Aboriginal in the Matched Data when compared with the number of births reported in the VPDC: Western Metro, 269%; Southern Metro, 255%; Eastern Metro, 200%; and Northern Metro, 110%.
4. The rural regions reported the smallest increases in the identification of births as Aboriginal with the Matched Data compared with the VPDC reported data: Barwon, 86%; Grampians, 60%; Gippsland, 58%; Hume, 51%; and Loddon Mallee, 33%.

### Maternal and perinatal characteristics and geographical distribution

This section reports the results of appending the maternal and perinatal characteristics for Victorian births, 1999–2008 inclusive, to the datasets. The number (and proportion within each category for each of the variables) of births is reported for births to mothers (VPDC), and/or mothers and/or fathers (RBDM) who identified as Aboriginal and non-Aboriginal at the time of the infant's birth. The years reported have been categorised into three birth cohorts: 1999–2002, 2003–2005 and 2006–2008 inclusive. Data describing the geographical distribution of the births according to the DHS regions are reported accordingly. The following

describes notable results for Aboriginal compared with non-Aboriginal births. Specific reporting on maternal age, gestational age and birth weight according to geographical region specifically for babies born to mothers and/or fathers who identified as Aboriginal follows each summary table.

The Matched Data reported an additional 4333 Aboriginal live births in the period 1999–2008 inclusive, which represented an 87% increase in the number of births reported in the VPDC. The proportion of Aboriginal to non-Aboriginal births was 1.6%. The proportion of Aboriginal live births within the birth population of Victoria increased over the 10 years: 1999–2002, 1.4%; 2003–2005, 1.6%; 2006–2008, 1.8%.

Between 1999 and 2008, within the Aboriginal birth population, there were more male births (50.3%) than female births (49.7%) (Table 4.8), which was similar to the non-Aboriginal population (male, 51.3%; female, 48.7%) (Table 4.9, see p.59).

The largest proportion of Aboriginal births was to mothers/fathers residing in Northern Metro (14.2%), Southern Metro (14.1%) and Loddon Mallee (14.2%). Mothers/fathers residing in the Grampians represented the smallest proportion (5.0%) of Aboriginal births, followed by the Eastern Metro region and mothers whose normal residence was outside of Victoria (7.0%). In 9.2% of Aboriginal births, the residential address of mothers/fathers was in Western Metro; 10% in Gippsland; and 10.9% in Hume. The largest proportion of non-Aboriginal births was to mothers/fathers residing in the metropolitan regions: Southern Metro, 23.9%; Eastern Metro, 17.8%; Northern Metro, 17.0%; and Western Metro, 14.6%. Of note were the significantly smaller proportions of non-Aboriginal births of mothers/father residing in the rural regions at the time of the infant's birth (compared with the proportion of Aboriginal births): Grampians, 3.9%; Gippsland, 4.2%; Hume, 4.9%; Loddon Mallee, 5.5%; Barwon – South Western, 6.5%.





The largest proportion of hospital births for both Aboriginal (45.6%) and non-Aboriginal (72.9%) births were in the metropolitan hospitals. The smallest proportion of births was reported in hospitals in the inner rural area (Aboriginal, 8.6%) and outer rural area (non-Aboriginal, 3.2%) (data not cited).

There were significant differences in reported marital status at the time of birth: 41.5% of Aboriginal mothers were reported as being single compared with 11.1% of non-Aboriginal mothers.

The proportions of singleton births were similar in both populations (Aboriginal, 99.0%; non-Aboriginal, 98.7%). The proportion of mothers giving birth for the first time was less within the Aboriginal population (38.1%) compared with non-Aboriginal population (42.3%), and the proportion of Aboriginal births where there were three or more previous births was more than double the non-Aboriginal population (Aboriginal, 17.9%; non-Aboriginal, 7.5%).

The proportion of mothers with more than two previous births in the Aboriginal population decreased over the 10 years (1999–2002, 19.2%, to 2006–2008, 17.4%). This decrease was minimal in the non-Aboriginal population (1999–2002, 7.7%, to 2006–2008, 7.5%).

The proportion of low Apgar scores was slightly higher, and normal Apgar scores slightly lower, in both Apgar score categories (and in both datasets) for Aboriginal (97.8%) compared with non-Aboriginal infants (98.6%).

Comments regarding maternal age, gestational age and birth weight according to geographical region, specifically for babies born to mothers and/or fathers who identified as Aboriginal and/or Torres Strait Islander, are reported following the summary tables.

#### Summary tables

The following summary tables show births according to maternal and perinatal characteristics and geographical distribution for births to mothers (VPDC) and mothers and fathers (Matched Data) who identified as Aboriginal and/or Torres Strait Islander and non-Aboriginal and/or Torres Strait Islander at the time of the infant's birth, for birth years 1999–2008 inclusive. (See 'Maternal and perinatal characteristic variables', 'Geographical regions' and 'Reporting of data and data analyses' in Chapter 3 for further information about these tables.)



Table 4.8: Maternal and perinatal characteristics for Aboriginal births as reported by VPDC and Matched Data, 1999–2008 inclusive, according to DHS regions by birth cohorts and all years

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Births</b>								
Total live births	1,649 (100.0)	3,032 (100.0)	1,331 (100.0)	2,757 (100.0)	1,978 (100.0)	3,502 (100.0)	4,958 (100.0)	9,291 (100.0)
<b>Sex</b>								
Male	814 (49.4)	1,534 (50.6)	644 (48.4)	1,384 (50.2)	1,002 (50.7)	1,759 (50.2)	2,460 (49.6)	4,677 (50.3)
Female	835 (50.6)	1,498 (49.4)	687 (51.6)	1,373 (49.8)	976 (49.3)	1,743 (49.8)	2,498 (50.4)	4,614 (49.7)
<b>Location of birth</b>								
Barwon – SW	124 (7.5)	241 (7.9)	130 (9.8)	242 (8.8)	162 (8.2)	289 (8.3)	416 (8.4)	772 (8.3)
Grampians	116 (7.0)	176 (5.8)	74 (5.6)	120 (4.4)	102 (5.2)	170 (4.9)	292 (5.9)	466 (5.0)
Loddon Mallee	301 (18.3)	417 (13.8)	295 (22.2)	395 (14.3)	394 (19.9)	503 (14.4)	990 (20.0)	1,315 (14.2)
Hume	222 (13.5)	302 (10.0)	161 (12.1)	294 (10.7)	287 (14.5)	419 (12.0)	670 (13.5)	1,015 (10.9)
Gippsland	237 (14.4)	334 (11.0)	156 (11.7)	265 (9.6)	197 (10.0)	334 (9.5)	590 (11.9)	933 (10.0)
Western Metro	65 (3.9)	255 (8.4)	57 (4.3)	269 (9.8)	111 (5.6)	335 (9.6)	233 (4.7)	859 (9.2)
Northern Metro	187 (11.3)	412 (13.6)	180 (13.5)	399 (14.5)	261 (13.2)	507 (14.5)	628 (12.7)	1,318 (14.2)
Eastern Metro	91 (5.5)	221 (7.3)	61 (4.6)	195 (7.1)	66 (3.3)	237 (6.8)	218 (4.4)	653 (7.0)
Southern Metro	103 (6.2)	453 (14.9)	72 (5.4)	390 (14.1)	195 (9.9)	471 (13.4)	370 (7.5)	1,314 (14.1)
Other	203 (12.3)	221 (7.3)	145 (10.9)	188 (6.8)	208 (10.3)	237 (6.8)	551 (11.1)	646 (7.0)
<b>Marital status of mother</b>								
Currently single	742 (45.0)	1,230 (40.6)	634 (47.6)	1,175 (42.6)	922 (46.6)	1,452 (41.5)	2,298 (46.3)	3,857 (41.5)
Married/de facto	904 (54.8)	1,797 (59.3)	693 (52.1)	1,574 (57.1)	1,045 (52.8)	2,035 (58.1)	2,642 (53.3)	5,406 (58.2)
Unknown	3 (0.2)	5 (0.2)	4 (0.3)	8 (0.3)	11 (0.6)	15 (0.4)	18 (0.4)	28 (0.3)
<b>Maternal age (years) (cats)</b>								
≤ 19	319 (19.3)	357 (17.0)	273 (20.5)	321 (17.4)	336 (17.0)	346 (14.9)	928 (18.7)	1,024 (16.3)
20–29	881 (53.4)	1,126 (53.6)	729 (54.8)	975 (53.0)	1,048 (53.0)	1,212 (52.1)	2,658 (53.6)	3,313 (52.9)
>30	449 (27.2)	617 (29.4)	329 (24.7)	545 (29.6)	594 (30.0)	768 (33.0)	1,372 (27.7)	1,930 (30.8)

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
≤19	319 (19.3)	357 (17.0)	273 (20.5)	321 (17.4)	336 (17.0)	346 (14.9)	928 (18.7)	1,024 (16.3)
20–29	881 (53.4)	1,126 (53.6)	729 (54.8)	975 (53.0)	1,048 (53.0)	1,212 (52.1)	2,658 (53.6)	3,313 (52.9)
30–39	428 (26.0)	584 (27.8)	314 (23.6)	508 (27.6)	558 (28.2)	712 (30.6)	1,300 (26.2)	1,804 (28.8)
≥40	21 (1.3)	33 (1.6)	15 (1.1)	37 (2.0)	36 (1.8)	56 (2.4)	72 (1.5)	126 (2.0)
<b>Gestational age (weeks) (cats)</b>								
Preterm	203 (12.3)	293 (9.7)	168 (12.6)	266 (9.6)	237 (12.0)	366 (10.5)	608 (12.3)	925 (10.0)
Term	1,445 (87.6)	2,737 (90.3)	1,162 (87.3)	2,490 (90.3)	1,741 (88.0)	3,136 (89.5)	4,348 (87.7)	8,363 (90.0)
Unknown	1 (0.1)	2 (0.1)	1 (0.1)	1 (0.0)	–	–	2 (0.0)	3 (0.0)
<b>Gestational age (weeks)</b>								
20–27	20 (1.2)	21 (0.7)	18 (1.4)	19 (0.7)	19 (1.0)	27 (0.8)	57 (1.1)	67 (0.7)
28–31	15 (0.9)	31 (1.0)	19 (1.4)	35 (1.3)	22 (1.1)	39 (1.1)	56 (1.1)	105 (1.1)
32–36	168 (10.2)	241 (7.9)	131 (9.8)	212 (7.7)	196 (9.9)	300 (8.6)	495 (10.0)	753 (8.1)
37–41	1,416 (85.9)	2,686 (88.6)	1,147 (86.2)	2,455 (89.0)	1,716 (86.8)	3,081 (88.0)	4,279 (86.3)	8,222 (88.5)
>41	29 (1.8)	51 (1.7)	15 (1.1)	35 (1.3)	25 (1.3)	55 (1.6)	69 (1.4)	141 (1.5)
Unknown	1 (0.1)	2 (0.1)	1 (0.1)	1 (0.0)	–	–	2 (0.0)	3 (0.0)
<b>Plurality</b>								
Single	1,607 (97.5)	3,012 (99.3)	1,290 (96.9)	2,723 (98.8)	1,932 (97.7)	3,463 (98.9)	4,829 (97.4)	9,198 (99.0)
Multiple	42 (2.5)	20 (0.7)	41 (3.1)	34 (1.2)	46 (2.3)	39 (1.1)	129 (2.6)	93 (1.0)
<b>Parity (previous pregnancies)</b>								
0	512 (31.0)	1,082 (35.7)	496 (37.3)	1,111 (40.3)	711 (35.9)	1,351 (38.6)	1,719 (34.7)	3,544 (38.1)
1–2	743 (45.1)	1,367 (45.1)	556 (41.8)	1,171 (42.5)	855 (43.2)	1,542 (44.0)	2,154 (43.4)	4,080 (43.9)
≥3	394 (23.9)	583 (19.2)	279 (21.0)	475 (17.2)	412 (20.8)	609 (17.4)	1,085 (21.9)	1,667 (17.9)
<b>Birth weight (grams) (cats)</b>								
<1,500	35 (2.1)	46 (1.5)	31 (2.3)	50 (1.8)	37 (1.9)	58 (1.7)	103 (2.1)	154 (1.7)
1,500–2,499	187 (11.3)	268 (8.8)	159 (11.9)	258 (9.4)	222 (11.2)	304 (8.7)	568 (11.5)	830 (8.9)
≥2,500	1,427 (86.5)	2,718 (89.6)	1,140 (85.6)	2,448 (88.8)	1,719 (86.9)	3,140 (89.7)	4,286 (86.4)	8,306 (89.4)



Table 4.8 continued...

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
Unknown	–	–	1 (0.1)	1 (0.0)	–	–	1 (0.0)	1 (0.0)
<b>Birth weight (grams)</b>								
<1,500	35 (2.1)	46 (1.5)	31 (2.3)	50 (1.8)	37 (1.9)	58 (1.7)	103 (2.1)	154 (1.7)
1,500–2,499	187 (11.3)	268 (8.8)	159 (11.9)	258 (9.4)	222 (11.2)	304 (8.7)	568 (11.5)	830 (8.9)
2,500–4,499	1,406 (85.3)	2,656 (87.6)	1,115 (83.8)	2,388 (86.6)	1,692 (85.5)	3,070 (87.7)	4,213 (85.0)	8,114 (87.3)
≥4,500	21 (1.3)	62 (2.0)	25 (1.9)	60 (2.2)	27 (1.4)	70 (2.0)	73 (1.5)	192 (2.1)
Unknown	–	–	1 (0.1)	1 (0.0)	–	–	1 (0.0)	1 (0.0)
<b>Apgar at 1 minute</b>								
Critically low (0–3)	45 (2.7)	68 (2.2)	29 (2.2)	66 (2.4)	48 (2.4)	80 (2.3)	122 (2.5)	214 (2.3)
Fairly low (4–6)	180 (10.9)	340 (11.2)	128 (9.6)	238 (8.6)	180 (9.1)	302 (8.6)	488 (9.8)	880 (9.5)
Normal (7+)	1,411 (85.6)	2,610 (86.1)	1,167 (87.7)	2,439 (88.5)	1,740 (88.0)	3,112 (88.9)	4,318 (87.1)	8,161 (87.8)
Unknown	13 (0.8)	14 (0.5)	7 (0.5)	14 (0.5)	10 (0.5)	8 (0.2)	30 (0.6)	36 (0.4)
<b>Apgar at 5 minutes</b>								
Critically low (0–3)	15 (0.9)	15 (0.5)	10 (0.8)	15 (0.5)	11 (0.6)	16 (0.5)	36 (0.7)	46 (0.5)
Fairly low (4–6)	24 (1.5)	39 (1.3)	19 (1.4)	33 (1.2)	41 (2.1)	62 (1.8)	84 (1.7)	134 (1.4)
Normal (7+)	1,600 (97.0)	2,969 (97.9)	1,293 (97.1)	2,694 (97.7)	1,919 (97.0)	3,419 (97.6)	4,812 (97.1)	9,082 (97.8)
Unknown	10 (0.6)	9 (0.3)	9 (0.7)	15 (0.5)	7 (0.4)	5 (0.1)	26 (0.5)	29 (0.3)

DHS: Department of Human Services. N: number of births. SW: South Western. VPDC: Victorian Perinatal Data Collection.

**Table 4.9: Maternal and perinatal characteristics for non-Aboriginal births as reported by VPDC and Matched Data, 1999–2008 inclusive, according to DHS regions by birth cohorts and all years**

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Births</b>								
Total live births	247,082 (100.0)	218,262 (100.0)	190,807 (100.0)	167,827 (100.0)	210,806 (100.0)	186,939 (100.0)	648,695 (100.0)	573,028 (100.0)
<b>Sex</b>								
Male	126,664 (51.3)	111,912 (51.3)	97,717 (51.2)	85,986 (51.2)	108,533 (51.5)	96,310 (51.5)	332,914 (51.3)	294,208 (51.3)
Female	120,403 (48.7)	106,350 (48.7)	93,080 (48.8)	81,841 (48.8)	102,269 (48.5)	90,629 (48.5)	315,752 (48.7)	278,820 (48.7)
Indeterminate	15 (0.0)	111,912 (51.3)	8 (0.0)		*		26 (0.0)	–
Unknown	–	–	*	–	*	–	3 (0.0)	–
<b>Location of birth</b>								
Barwon – SW	16,293 (6.6)	14,838 (6.8)	12,150 (6.4)	10,914 (6.5)	13,006 (6.2)	11,613 (6.2)	41,449 (6.4)	37,365 (6.5)
Grampians	9,841 (4.0)	8,844 (4.1)	7,176 (3.8)	6,435 (3.8)	7,831 (3.7)	6,947 (3.7)	24,848 (3.8)	22,226 (3.9)
Loddon Mallee	14,257 (5.8)	12,711 (5.8)	10,288 (5.4)	9,170 (5.5)	10,954 (5.2)	9,617 (5.1)	35,499 (5.5)	31,498 (5.5)
Hume	12,432 (5.0)	11,040 (5.1)	9,129 (4.8)	8,073 (4.8)	9,884 (4.7)	8,736 (4.7)	31,445 (4.8)	27,849 (4.9)
Gippsland	10,760 (4.4)	9,494 (4.3)	7,920 (4.2)	7,040 (4.2)	8,717 (4.1)	7,722 (4.1)	27,417 (4.2)	24,256 (4.2)
Western Metro	34,217 (13.8)	29,766 (13.6)	28,242 (14.8)	24,475 (14.6)	33,546 (15.9)	29,518 (15.8)	96,005 (14.8)	83,759 (14.6)
Northern Metro	42,208 (17.1)	36,733 (16.8)	32,794 (17.2)	28,556 (17.0)	36,431 (17.3)	32,359 (17.3)	111,433 (17.2)	97,648 (17.0)
Eastern Metro	44,893 (18.2)	40,336 (18.5)	33,833 (17.7)	30,310 (18.1)	35,145 (16.7)	31,584 (16.9)	113,871 (17.6)	102,230 (17.8)
Southern Metro	57,542 (23.3)	50,880 (23.3)	45,539 (23.9)	39,980 (23.8)	51,377 (24.4)	45,818 (24.5)	154,458 (23.8)	136,678 (23.9)
Other	4,619 (1.9)	3,620 (1.7)	3,736 (2.0)	2,874 (1.7)	3,915 (1.9)	3,025 (1.6)	12,270 (1.9)	9,519 (1.7)
<b>Marital status of mother</b>								
Currently single	30,247 (12.2)	23,474 (10.8)	24,409 (12.8)	18,877 (11.2)	26,788 (12.7)	20,992 (11.2)	81,444 (12.6)	63,343 (11.1)
Married/de facto	216,577 (87.7)	194,590 (89.2)	165,994 (87.0)	148,623 (88.6)	183,592 (87.1)	165,612 (88.6)	566,163 (87.3)	508,825 (88.8)
Unknown	258 (0.1)	198 (0.1)	404 (0.2)	327 (0.2)	426 (0.2)	335 (0.2)	1,088 (0.2)	860 (0.2)
<b>Maternal age (years) (cats)</b>								
≤19	7,542 (3.1)	6,038 (2.8)	5,048 (2.6)	3,931 (2.3)	5,269 (2.5)	4,140 (2.2)	17,859 (2.8)	14,109 (2.5)
20–29	103,400 (41.8)	91,461 (41.9)	70,842 (37.1)	62,433 (37.2)	76,377 (36.2)	67,573 (36.1)	250,619 (38.6)	221,467 (38.6)
30 plus	136,139 (55.1)	120,763 (55.3)	114,916 (60.2)	101,462 (60.5)	129,160 (61.3)	115,226 (61.6)	380,215 (58.6)	337,451 (58.9)
Unknown	1 (0.0)	–	1 (0.0)	1 (0.0)	–	–	2 (0.0)	1 (0.0)





Table 4.9 continued...

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Maternal age (years)</b>								
≤19	7,542 (3.1)	6,038 (2.8)	5,048 (2.6)	3,931 (2.3)	5,269 (2.5)	4,140 (2.2)	17,859 (2.8)	14,109 (2.5)
20–29	103,400 (41.8)	91,461 (41.9)	70,842 (37.1)	62,433 (37.2)	76,377 (36.2)	67,573 (36.1)	250,619 (38.6)	221,467 (38.6)
30–39	128,751 (52.1)	114,386 (52.4)	107,997 (56.6)	95,593 (57.0)	120,324 (57.1)	107,624 (57.6)	357,072 (55.0)	317,603 (55.4)
≥40	7,388 (3.0)	6,377 (2.9)	6,919 (3.6)	5,869 (3.5)	8,836 (4.2)	7,602 (4.1)	23,143 (3.6)	19,848 (3.5)
unknown	1 (0.0)	–	1 (0.0)	1 (0.0)	–	–	2 (0.0)	1 (0.0)
<b>Gestational age (weeks) (cats)</b>								
Preterm	17,710 (7.2)	13,077 (6.0)	13,949 (7.3)	10,222 (6.1)	15,838 (7.5)	11,658 (6.2)	47,497 (7.3)	34,957 (6.1)
Term	229,345 (92.8)	205,166 (94.0)	176,850 (92.7)	157,602 (93.9)	194,959 (92.5)	175,278 (93.8)	601,154 (92.7)	538,046 (93.9)
Unknown	27 (0.0)	19 (0.0)	8 (0.0)	3 (0.0)	9 (0.0)	3 (0.0)	44 (0.0)	25 (0.0)
<b>Gestational age (weeks)</b>								
20–27	1,123 (0.5)	782 (0.4)	971 (0.5)	672 (0.4)	1,011 (0.5)	693 (0.4)	3,105 (0.5)	2,147 (0.4)
28–31	1,775 (0.7)	1,201 (0.6)	1,272 (0.7)	869 (0.5)	1,524 (0.7)	1,002 (0.5)	4,571 (0.7)	3,072 (0.5)
32–36	14,812 (6.0)	11,094 (5.1)	11,706 (6.1)	8,681 (5.2)	13,303 (6.3)	9,963 (5.3)	39,821 (6.1)	29,738 (5.2)
37–41	226,052 (91.5)	202,216 (92.6)	174,470 (91.4)	155,472 (92.6)	192,090 (91.1)	172,697 (92.4)	592,612 (91.4)	530,385 (92.6)
>41	3,293 (1.3)	2,950 (1.4)	2,380 (1.2)	2,130 (1.3)	2,869 (1.4)	2,581 (1.4)	8,542 (1.3)	7,661 (1.3)
Unknown	27 (0.0)	19 (0.0)	8 (0.0)	3 (0.0)	9 (0.0)	3 (0.0)	44 (0.0)	25 (0.0)
<b>Plurality</b>								
Single	238,949 (96.7)	215,644 (98.8)	183,999 (96.4)	165,461 (98.6)	203,453 (96.5)	184,462 (98.7)	626,401 (96.6)	565,567 (98.7)
Multiple	8,133 (3.3)	2,618 (1.2)	6,808 (3.6)	2,366 (1.4)	7,353 (3.5)	2,477 (1.3)	22,294 (3.4)	7,461 (1.3)
<b>Parity (previous pregnancies)</b>								
0	102,536 (41.5)	90,140 (41.3)	81,788 (42.9)	71,526 (42.6)	91,161 (43.2)	80,674 (43.2)	275,485 (42.5)	242,340 (42.3)
1–2	124,723 (50.5)	111,279 (51.0)	94,636 (49.6)	84,208 (50.2)	103,130 (48.9)	92,327 (49.4)	322,489 (49.7)	287,814 (50.2)
≥3	19,822 (8.0)	16,843 (7.7)	14,383 (7.5)	12,093 (7.2)	16,515 (7.8)	13,938 (7.5)	50,720 (7.8)	42,874 (7.5)
unknown	1 (0.0)	–	–	–	–	–	1 (0.0)	–



	1999–2002			2003–2005			2006–2008			All years (1999–2008)		
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)		
<b>Birth weight (grams) (cats)</b>												
<1,500	2,668 (1.1)	1,803 (0.8)	2,056 (1.1)	1,381 (0.8)	2,262 (1.1)	1,504 (0.8)	6,986 (1.1)	4,688 (0.8)				
1,500–2,499	12,847 (5.2)	9,282 (4.3)	10,010 (5.2)	7,158 (4.3)	10,874 (5.2)	7,739 (4.1)	33,731 (5.2)	24,179 (4.2)				
≥2,500	231,546 (93.7)	207,163 (94.9)	178,730 (93.7)	159,279 (94.9)	197,646 (93.8)	177,679 (95.0)	607,922 (93.7)	544,121 (95.0)				
Unknown	21 (0.0)	14 (0.0)	11 (0.0)	9 (0.0)	24 (0.0)	17 (0.0)	56 (0.0)	40 (0.0)				
<b>Birth weight (grams)</b>												
<1,500	2,668 (1.1)	1,803 (0.8)	2,056 (1.1)	1,381 (0.8)	2,262 (1.1)	1,504 (0.8)	6,986 (1.1)	4,688 (0.8)				
1,500–2,499	12,847 (5.2)	9,282 (4.3)	10,010 (5.2)	7,158 (4.3)	10,874 (5.2)	7,739 (4.1)	33,731 (5.2)	24,179 (4.2)				
2,500–4,499	227,190 (91.9)	203,164 (93.1)	175,214 (91.8)	156,080 (93.0)	193,628 (91.9)	173,988 (93.1)	596,032 (91.9)	533,232 (93.1)				
≥4,500	4,356 (1.8)	3,999 (1.8)	3,516 (1.8)	3,199 (1.9)	4,018 (1.9)	3,691 (2.0)	11,890 (1.8)	10,889 (1.9)				
unknown	21 (0.0)	14 (0.0)	11 (0.0)	9 (0.0)	24 (0.0)	17 (0.0)	56 (0.0)	40 (0.0)				
<b>Apgar at 1 minute</b>												
Critically low (0–3)	4,878 (2.0)	4,131 (1.9)	3,607 (1.9)	2,977 (1.8)	3,970 (1.9)	3,261 (1.7)	12,455 (1.9)	10,369 (1.8)				
Fairly low (4–6)	25,039 (10.1)	21,888 (10.0)	18,109 (9.5)	15,667 (9.3)	17,836 (8.5)	15,499 (8.3)	60,984 (9.4)	53,054 (9.3)				
Normal (7+)	216,831 (87.8)	191,969 (88.0)	168,864 (88.5)	149,006 (88.8)	188,709 (89.5)	167,948 (89.8)	574,404 (88.5)	508,923 (88.8)				
Unknown	334 (0.1)	274 (0.1)	227 (0.1)	177 (0.1)	291 (0.1)	231 (0.1)	852 (0.1)	682 (0.1)				
<b>Apgar at 5 minutes</b>												
Critically low (0–3)	683 (0.3)	538 (0.2)	629 (0.3)	462 (0.3)	666 (0.3)	481 (0.3)	1,978 (0.3)	1,481 (0.3)				
Fairly low (4–6)	2,496 (1.0)	2,117 (1.0)	1,834 (1.0)	1,541 (0.9)	2,524 (1.2)	2,141 (1.1)	6,854 (1.1)	5,799 (1.0)				
Normal (7+)	243,651 (98.6)	215,402 (98.7)	188,163 (98.6)	165,685 (98.7)	207,380 (98.4)	184,132 (98.5)	639,194 (98.5)	565,219 (98.6)				
Unknown	252 (0.1)	205 (0.1)	181 (0.1)	139 (0.1)	236 (0.1)	185 (0.1)	669 (0.1)	529 (0.1)				

\*numbers suppressed. DHS: Department of Human Services. N: number of births. SW: South Western. VPDC: Victorian Perinatal Data Collection.

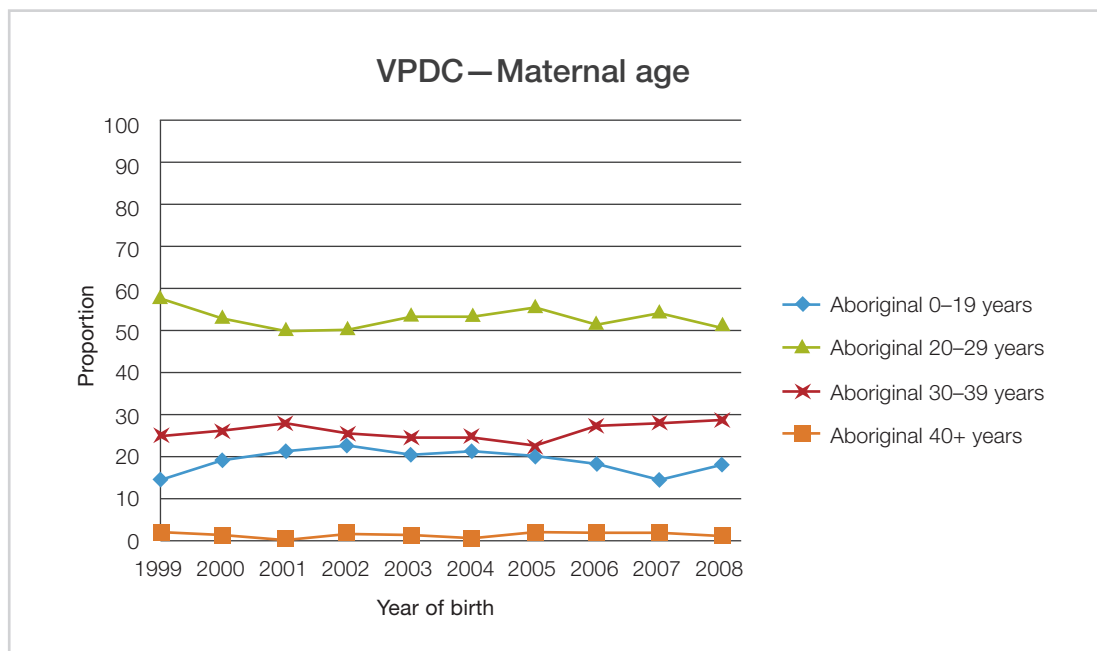


### Summary by maternal age

The following figures represent maternal age outcomes as reported by the VPDC and the Matched Data. Given that these data reflect

mothers who were identified in the VPDC, and identified in the RBDM as Aboriginal, it is not surprising that the outcomes reported in the two datasets are similar.

**Figure 4.4: Change in maternal age distribution across time for births to Aboriginal mothers as reported by the VPDC, 1999–2008 inclusive**



Figures 4.5 and 4.6 (opposite) show maternal age for Aboriginal and non-Aboriginal mothers reported in the Matched Data. The proportion of births 1999–2008 inclusive to Aboriginal teenage mothers (16.3%) was significantly higher compared with non-Aboriginal teenage mothers (2.5%). Births to mothers aged between 20 and 29 years accounted for the greatest proportion of births according to maternal age, but were higher in the Aboriginal populations (Aboriginal, 52.9%, compared with non-Aboriginal, 38.6%). The proportion of

births to mothers older than 30 years was also significantly higher in non-Aboriginal (58.9%) compared with Aboriginal mothers (30.8%). The proportion of teenage births decreased over the 10 years in both populations, but more so within the Aboriginal population (Aboriginal: 1999–2002, 17.0%; 2006–2008, 14.9%; non-Aboriginal: 1999–2002, 2.8%; 2006–2008, 2.2%).



Figure 4.5: Change in maternal age distribution across time for births to Aboriginal mothers as identified through Matched Data, 1999–2008 inclusive

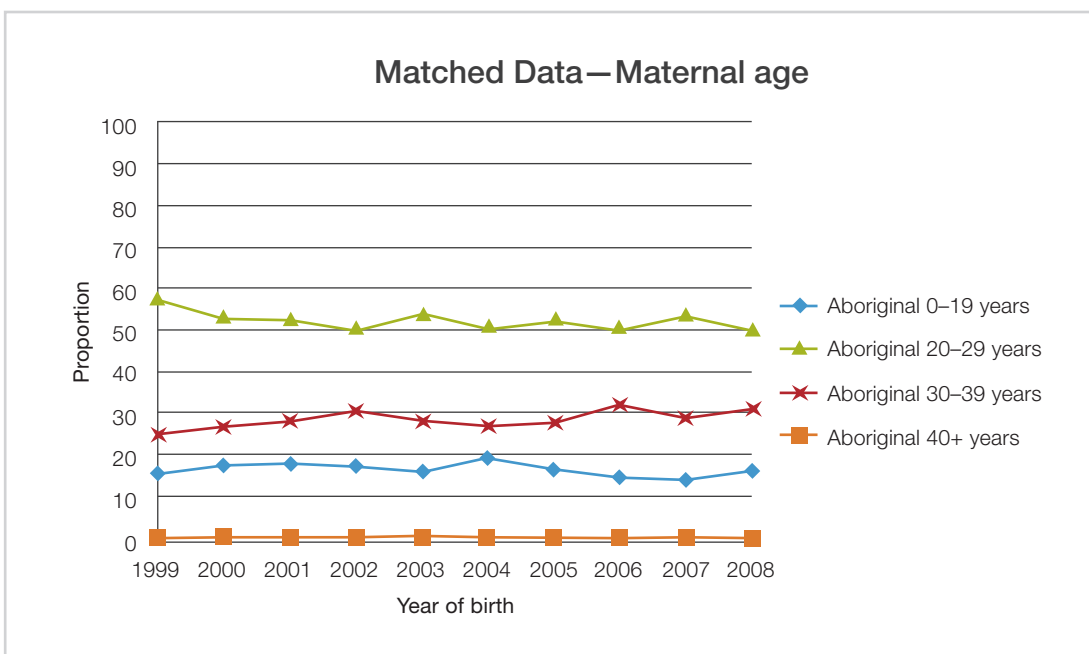
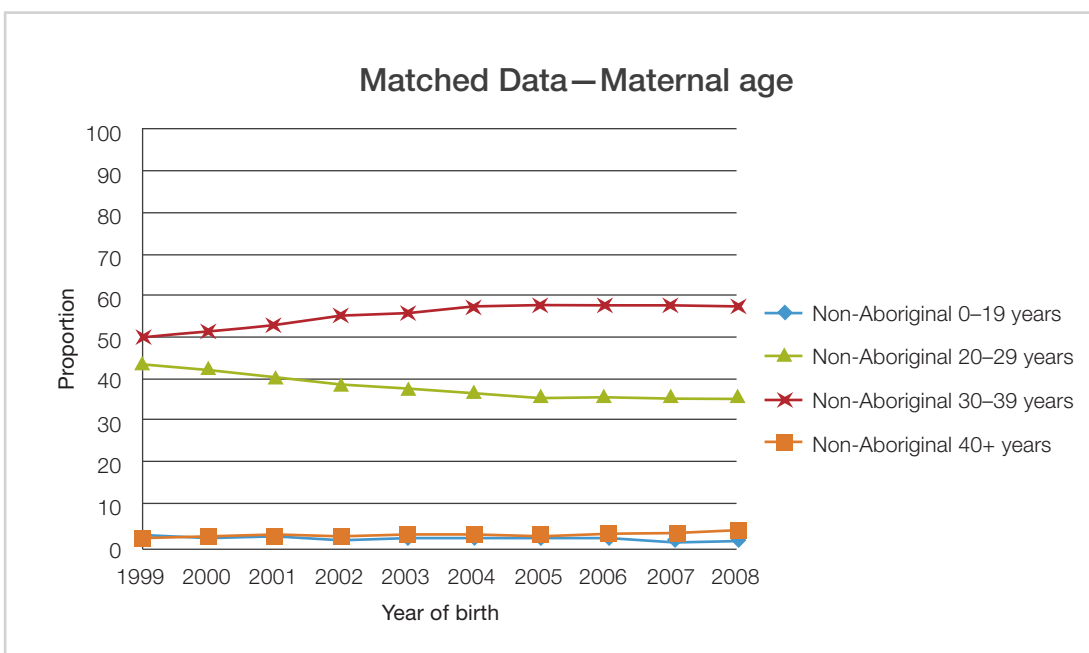


Figure 4.6: Change in maternal age distribution across time for births to non-Aboriginal mothers as identified through the Matched Data, 1999–2008 inclusive



The previous three maps (Figures 4.1–4.3) and the following five maps (Figures 4.7–4.9 and 4.13–4.14) present information describing the matched VPDC and RBDM Data. They identify the proportions of births to mothers who identified as Aboriginal according to DHS regions (as at 2001) and for the maternal age categories  $\leq 19$  years and  $>29$  years. The maps report proportions both across and *within* DHS regions.

Figure 4.7 (opposite) presents the proportions of births for mothers who identified as Aboriginal in the years 1999–2008 inclusive and were  $\leq 19$  years at the time of the birth. The smallest proportions of teenage births were reported in Eastern Metro (3.4%), Grampians (4.4%), Western Metro (4.5%) and Southern Metro (7.3%). The highest proportion of teenage births was reported in Loddon Mallee (23%). This proportion increased over the years (1999–2002, 21.3%; 2006–2008, 23.1%). Northern Metro reported 13.7%, Gippsland 13.4%, Hume 12.4% and Barwon – South Western 7.5%. Teenage births where the mothers' usual residence was outside Victoria accounted for 10.4% of the births.

Figure 4.8 (opposite) presents the proportions of births for mothers who identified as Aboriginal in the years 1999–2008 inclusive

and were  $\leq 19$  years at the time of the birth. It reports the proportions of births to Aboriginal and/or Torres Strait Islander teenage mothers within each DHS region. The lowest proportions of teenage births were reported in Western Metro (8.2%), Eastern Metro (9.1%) and Southern Metro (9.1%). The highest proportions were reported in Loddon Mallee (24.8%), Gippsland (22.1%) and Hume (18.4%). Barwon – South Western reported 15.3%; Northern Metro, 15.0%; and Grampians, 14.2%.

Figure 4.9 (see p.66) presents the proportions of births for mothers who identified as Aboriginal, 1999–2008, and were  $>29$  years at the time of the birth. The smallest proportion of births where maternal age was  $>29$  years was reported in Grampians (4.5%). This proportion remained similar over the years. The highest proportion of maternal age  $>29$  years was reported in Southern Metro (18.3%). This proportion decreased over the years (1999–2002, 19.1%; 2006–2008, 17.1%). Northern Metro reported 15.5%; Western Metro, 10.9%; Loddon Mallee, 10.6%; Eastern Metro, 9.2%; Hume, 8.7%; Gippsland, 8.1%; and Barwon – South Western, 7.6%. Births where the mothers' usual residence was outside Victoria accounted for 6.6% of births.





Figure 4.7: Proportions of births to Aboriginal mothers  $\leq 19$  years of age across DHS regions, 1999–2008 inclusive

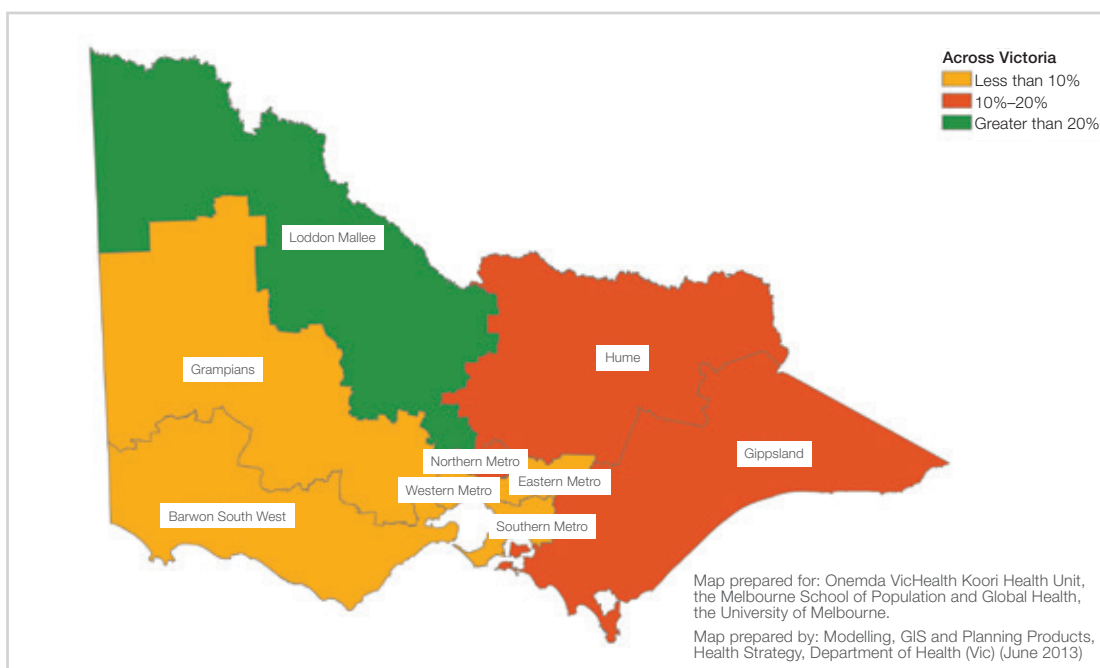


Figure 4.8: Proportions of births to Aboriginal mothers  $\leq 19$  years of age *within* DHS regions, 1999–2008 inclusive

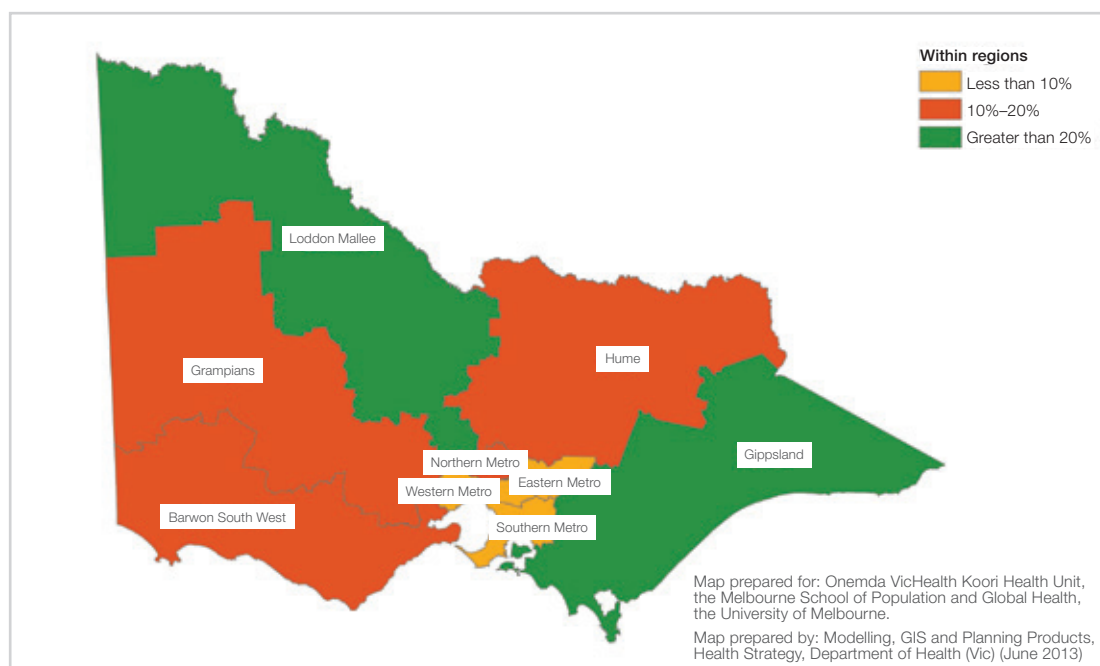
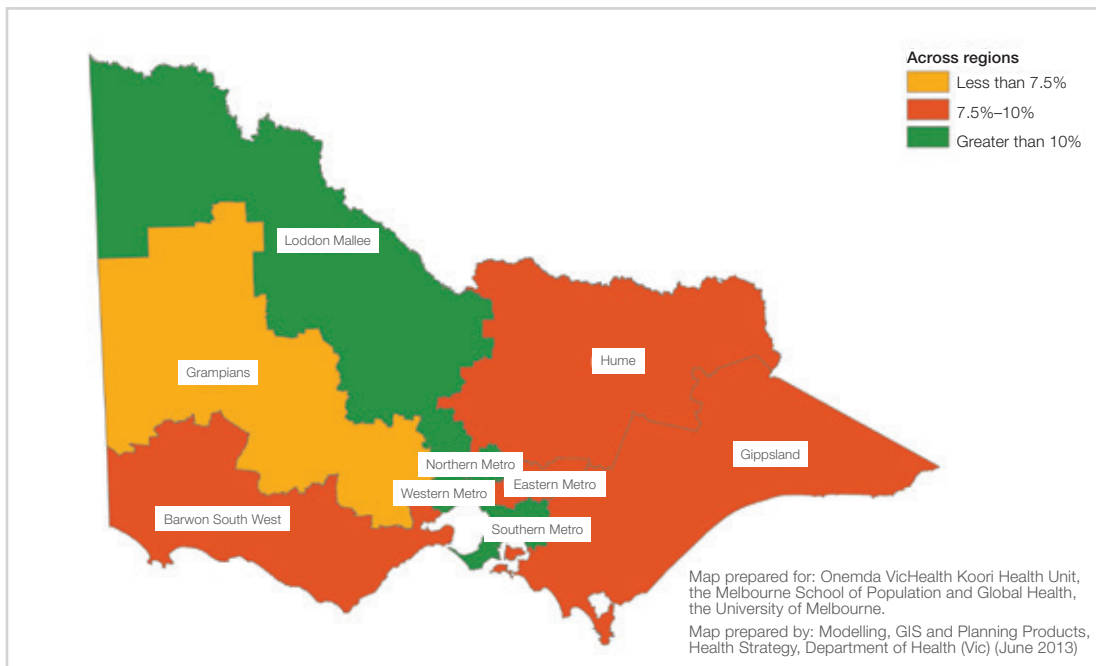


Figure 4.9: Proportions of births to Aboriginal mothers >29 years of age across DHS regions, 1999–2008 inclusive



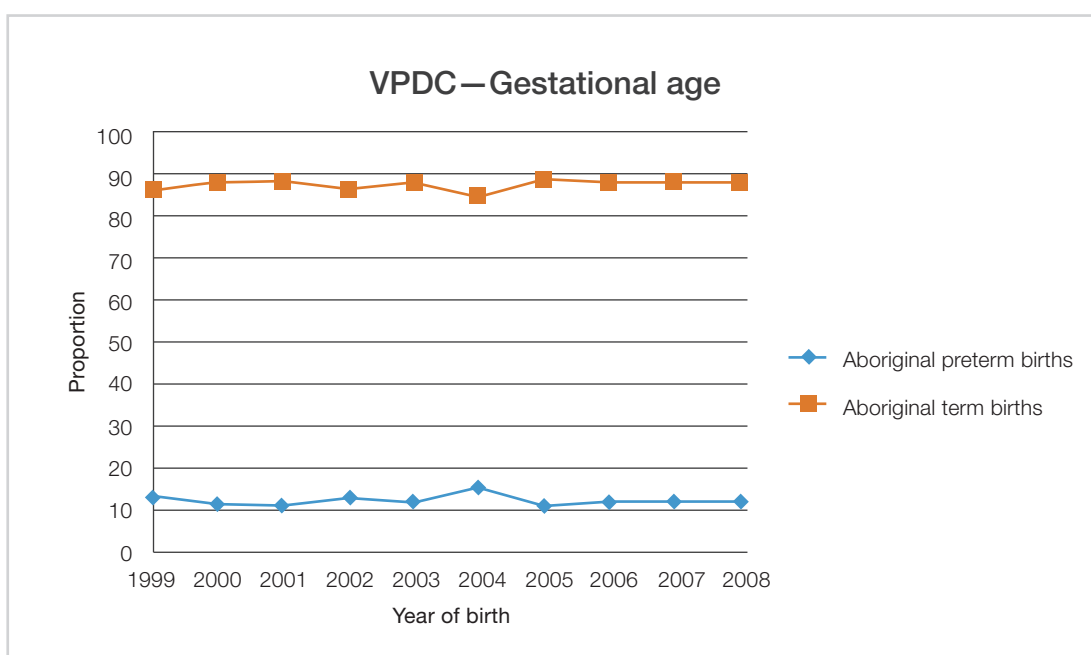
### Summary by gestational age

The following graphs represent the gestational age of infants as reported by the VPDC and the Matched Data for Aboriginal births. There was a small difference in outcomes reported by the VPDC (12.3% preterm births) and the

Matched Data (10.0%), 1999–2008 inclusive. However, there was a small increase in the proportion of preterm births reported in the Matched Data between the 1999–2002 birth cohort (9.7%) and the 2006–2008 birth cohort (10.5%).



Figure 4.10: Change in gestational age distribution across time for Aboriginal births as reported by the VPDC, 1999–2008 inclusive



The graphs on the following page report the gestational age outcomes from the Matched Data for 1999–2008 inclusive for Aboriginal infants (Figure 4.11) and non-Aboriginal infants (Figure 4.12). The proportion of babies born preterm where mothers/and or fathers identified

as Aboriginal was higher (10.0%) compared with babies of non-Aboriginal mothers and/or fathers (6.1%). The proportion of Aboriginal babies born <32 weeks was double (1.8%) the proportion of non-Aboriginal babies (0.9%) (see Tables 4.8 and 4.9, pp.56–61).



Figure 4.11: Change in gestational age distribution across time for Aboriginal births as identified through Matched Data, 1999–2008 inclusive

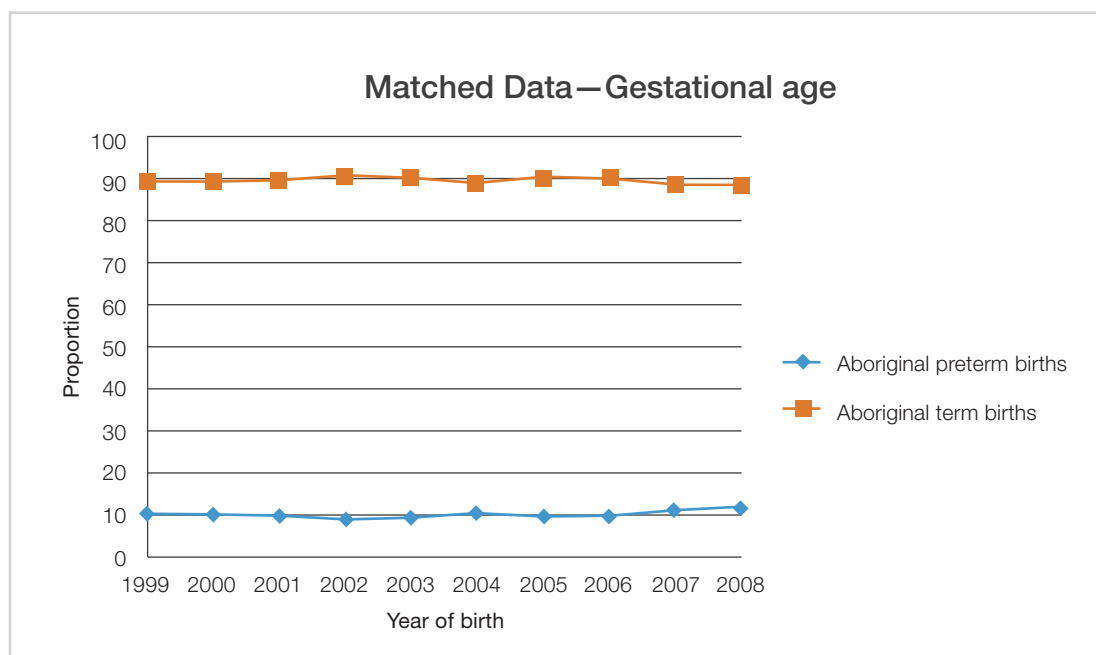
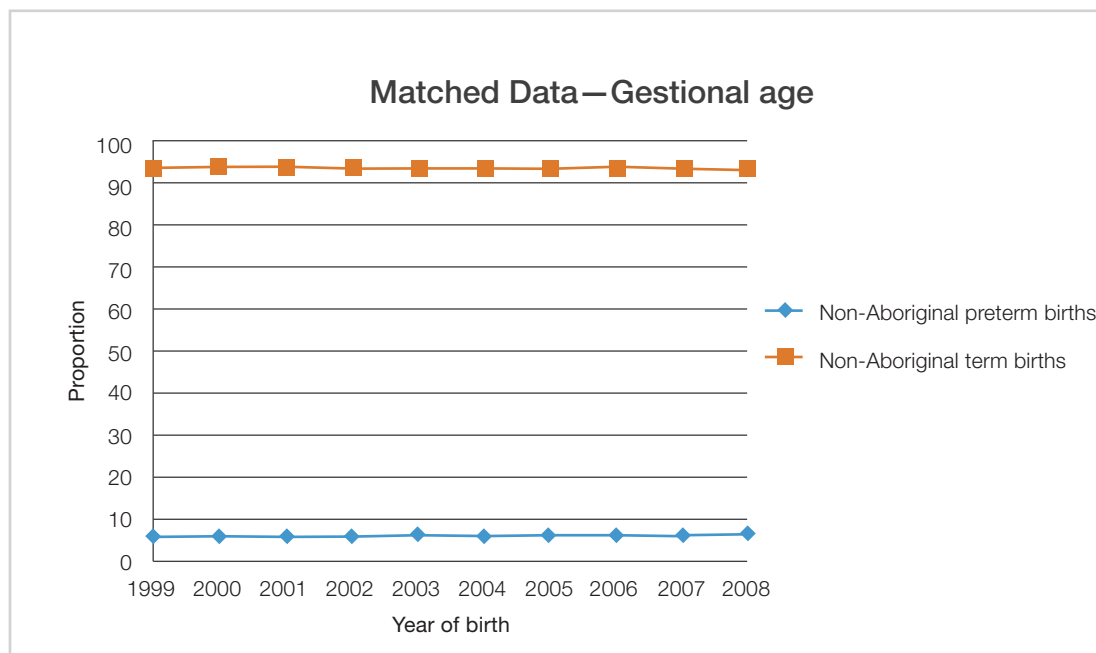


Figure 4.12: Change in gestational age distribution across time for non-Aboriginal births as identified through the Matched Data, 1999–2008 inclusive



The following maps identify the proportions of births to mothers and/or fathers who identified as Aboriginal and/or Torres Strait Islander according to DHS regions for infants who were born preterm. The maps report proportions both across Victorian DHS regions and within Victorian DHS regions.

Figure 4.13 presents the proportions of births for mothers (and/or fathers) who identified as Aboriginal and/or Torres Strait Islander in the years 1999–2008 and were born preterm across the DHS regions. These proportions would also reflect the population numbers. The smallest proportion of preterm births was reported in Grampians (5.3%), Eastern Metro (6.7%) and Barwon – South Western (7.1%). The highest proportions of preterm births were reported in Northern Metro (15.5%) and Loddon Mallee (14.8%). This proportion in Northern Metro decreased over the years (1999–2002, 15.0%; 2006–2008, 13.7%) and increased in

Loddon Mallee (1999–2002, 13.0%; 2006–2008, 16.9%). Southern Metro reported 13%; Gippsland, 11.7%; Hume, 9.1% and Western Metro, 8.7%. Preterm births where the mothers' usual residence was outside Victoria accounted for 8.1% of the births.

Figure 4.14 (see next page) presents the proportions of births to mothers (and/or fathers) who identified as Aboriginal in the years 1999–2008 and were born preterm within the DHS regions. The smallest proportions of preterm births were reported in Hume (8.3%) and Barwon – South Western (8.5%). The highest proportions of preterm births were reported in Gippsland (11.6%), Northern Metro (10.8%), Grampians (10.5%) and Loddon Mallee (10.4%). Other proportions were Southern Metro (9.1%), Western Metro (9.4%), and Eastern Metro (9.5%). Preterm births where the mothers' usual residence was outside Victoria accounted for (11.6%) of the births.

**Figure 4.13: Proportions of Aboriginal preterm births across DHS regions, 1999–2008 inclusive**

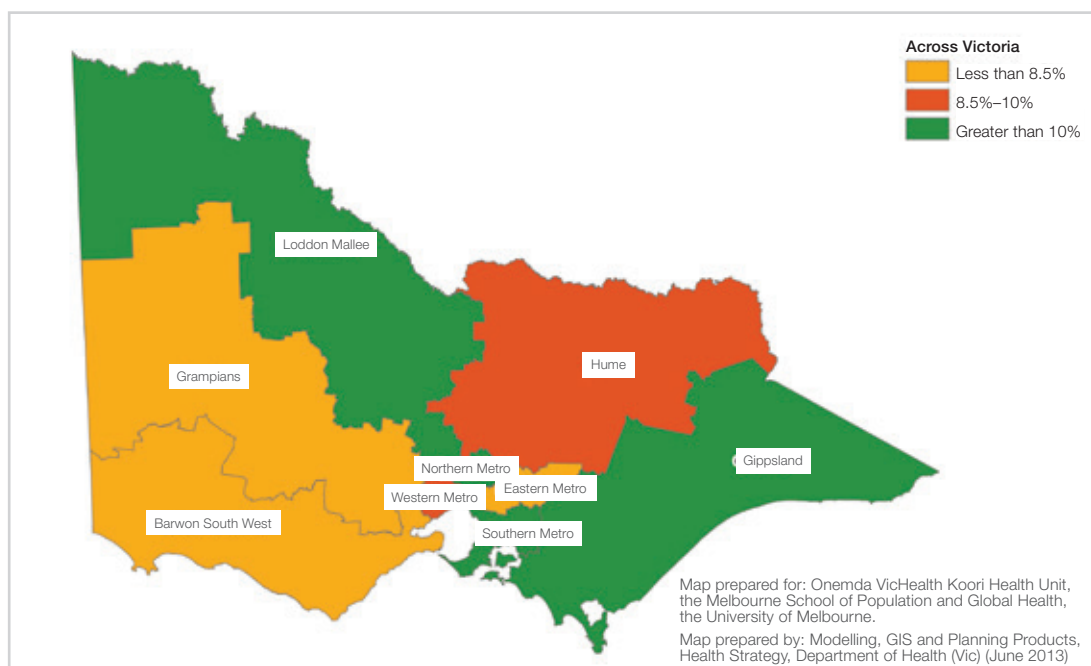
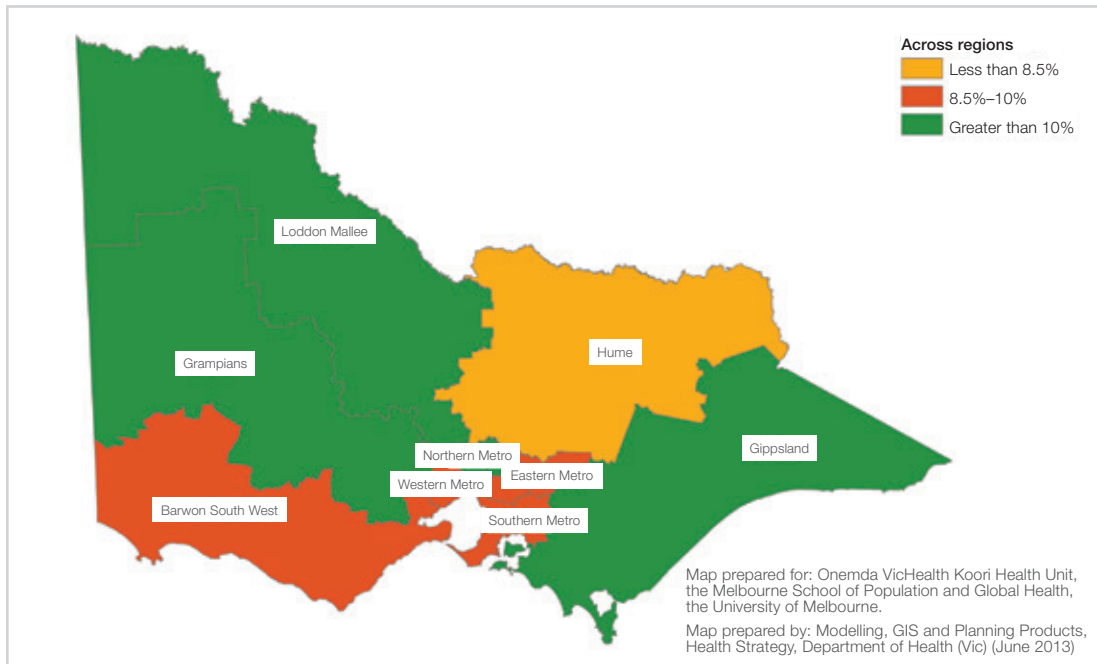


Figure 4.14: Proportions of Aboriginal preterm births *within* DHS regions, 1999–2008 inclusive



### Summary by birth weight

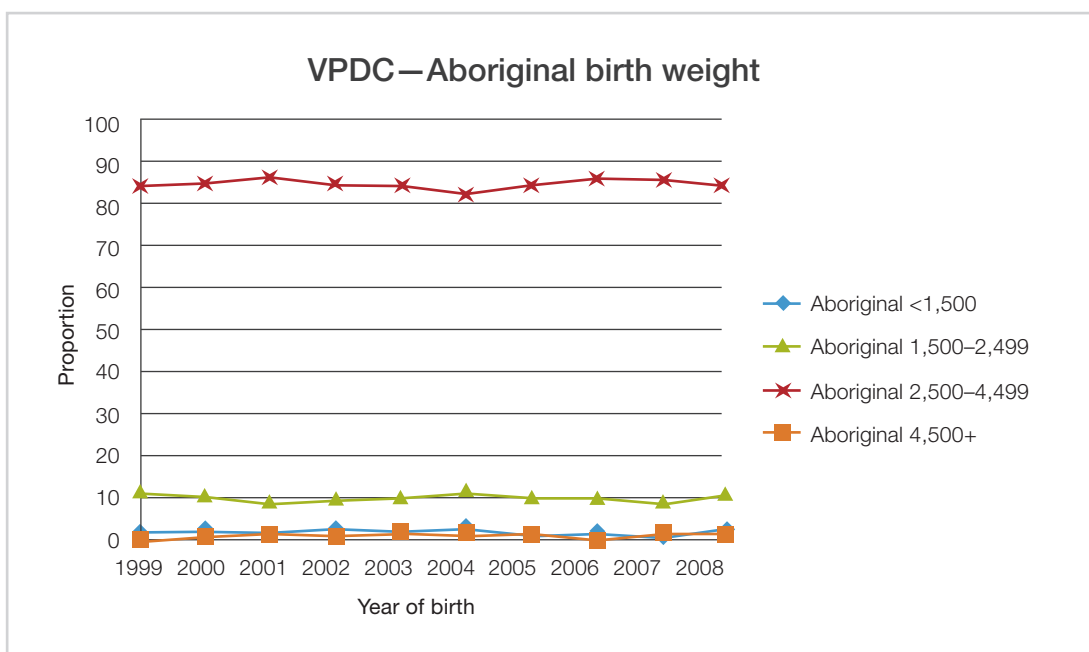
The following graphs represent the birth weight outcomes for infants as reported by the VPDC and the Matched Data for Aboriginal births. There was a slight decrease in the proportion of very low and low birth weights reported in the Matched Data when compared with the data reported in the VPDC

for all years 1999–2008 inclusive (very low birth weights, VPDC, 2.1%; Matched Data, 1.7%; low birth weights, VPDC, 11.5%; Matched Data, 8.9%). However, there was no change in the proportion of low birth weight infants reported in the Matched Data 1999–2002 birth cohort and the 2006–2008 birth cohort (see Table 4.8, pp.56–8).





Figure 4.15: Change in birth weight distribution across time for Matched Data births as reported by VPDC, 1999–2008 inclusive



The figures on the following page report birth weight outcomes from the Matched Data for years 1999–2008 inclusive for Aboriginal (Figure 4.16) and non-Aboriginal infants (Figure 4.17). The proportion of Aboriginal infants with a low birth weight where mothers/and or fathers identified as Aboriginal was more than double (8.9%) compared with

infants of non-Aboriginal mothers and/or fathers (4.2%). The proportion of babies born >4500 grams was higher among Aboriginal infants (2.1%) compared with the proportion of non-Aboriginal babies (1.9%); the former did not increase over the years (2.0%), while the latter increased from 1.8% to 2.0% (see Table 4.8 and Table 4.9, pp.56–61).



Figure 4.16: Change in birth weight distribution across time for Aboriginal births as identified through Matched Data, 1999–2008 inclusive

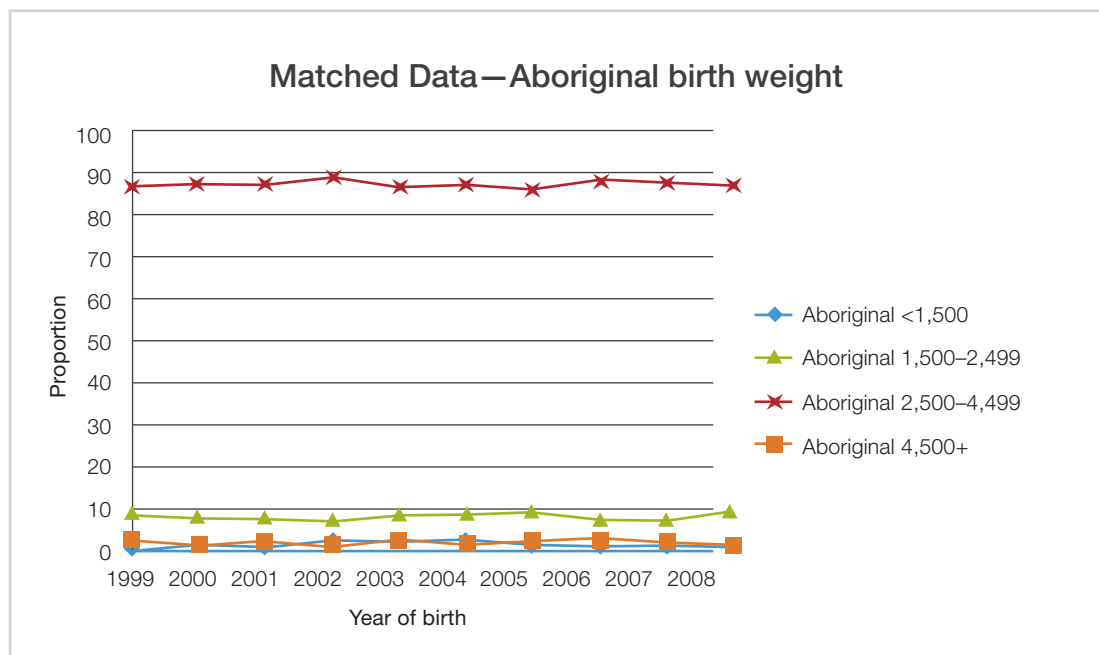
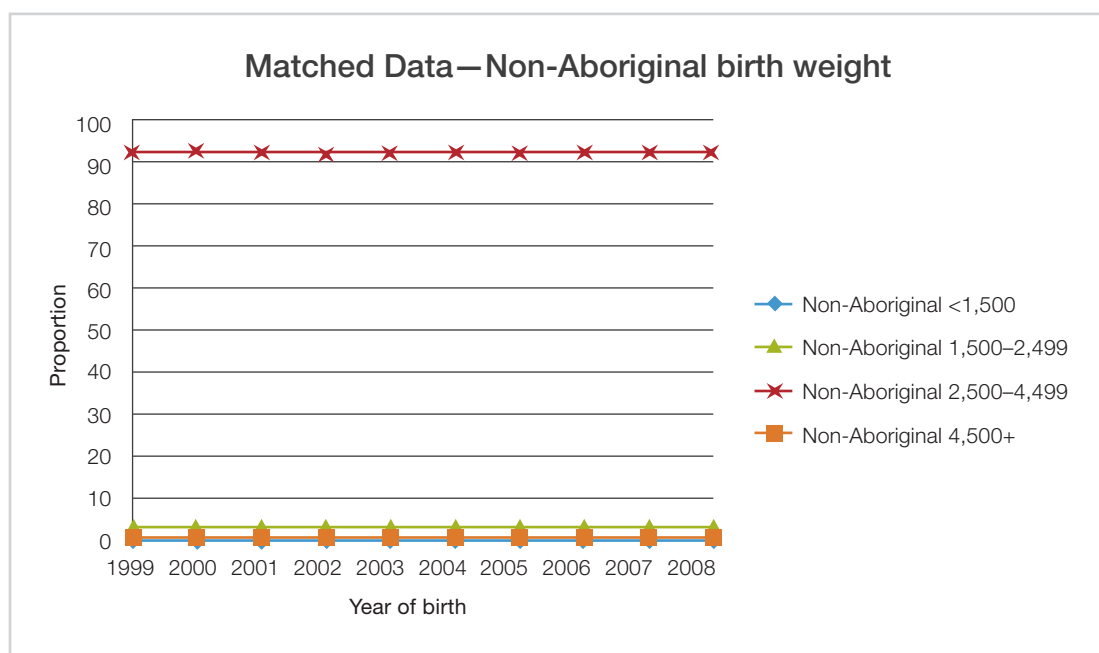


Figure 4.17: Change in birth weight distribution across time for non-Aboriginal births as identified through Matched Data, 1999–2008 inclusive



The following five maps (Figures 4.18–4.22) present information describing the matched VPDC and RBDM Data. They identify the proportions of births to mothers (and/or fathers) who identified as Aboriginal according to DHS regions (as at 2001) and for infants who had a very low (<1500 grams) and low birth weight (1500–2499 grams). The maps report proportions both *across* and *within* DHS regions.

Map 4.18 (see next page) presents the proportions of births for mothers (and/or fathers) who identified as Aboriginal in the years 1999–2008 where the birth weight was <1500 grams across the DHS regions. The smallest proportions of very low birth weight infants were reported in Grampians (3.2%), Eastern Metro (7.8%) and Western Metro (7.8%). The highest proportions of very low birth weight infants were reported in Northern Metro (17.5), Loddon Mallee (13.6%), Gippsland (13.0%) and Hume (11.0%). The proportions in Northern Metro and Loddon Mallee (1999–2002, 10.9%; 2006–2008, 15.5%) and Hume (1999–2002, 6.5%; 2006–2008, 19.0%) increased over the years, and decreased significantly in Gippsland (1999–2002, 17.4%; 2006–2008, 8.6%). Southern Metro reported 8.4%, and Barwon – South Western 9.1%. Infants who had a birth weight <1500 grams where the mothers' usual residence was outside Victoria accounted for 8.4% of the births.

Figure 4.19 (see p.75) presents the proportions of births for mothers (and/or fathers) who identified as Aboriginal and/or Torres Strait Islander in the years 1999–2008 and where the birth weight was <1500 grams within the DHS regions. The smallest proportions of very low birth weight infants were reported in Southern Metro (1.0%), Western Metro (1.4%) and Grampians (1.1%). The highest proportions of very low birth weight infants were reported in Gippsland (2.1%), Northern Metro (2.1%),

Eastern Metro (1.8%) and Barwon – South Western (1.8%). Loddon Mallee reported 1.6%, and Hume 1.7%. Infants who had a birth weight <1500 grams where the mothers' usual residence was outside Victoria accounted for 2.0% of the births.

Figure 4.20 (see p.75) presents the proportions of births for mothers (and/or fathers) who identified as Aboriginal in the years 1999–2008 where the birth weight was between 1500 and 2499 grams, across the DHS regions. These proportions would also reflect the population numbers. The smallest proportions of low birth weight infants were reported in Eastern Metro (5.7%), Grampians (6.5%) and Western Metro (7.7%). The highest proportions of low birth weight infants were reported in Northern Metro (14.5), Southern Metro (12.8%), Loddon Mallee (13.5%), Gippsland (12.5%) and Hume (10.4%). The proportions increased in Southern Metro (1999–2002, 11.6%; 2006–2008, 13.5%), Loddon Mallee (1999–2002, 12.7%; 2006–2008, 14.5%) and Hume (1999–2002, 9.0%; 2006–2008, 11.8%) over the years, and decreased in Northern Metro (1999–2002, 16.8%; 2006–2008, 10.2%). Barwon – South Western reported 8.8%. Infants who had a birth weight between 1500 and 2499 grams where the mothers' usual residence was outside Victoria accounted for 7.7% of the births.

Figure 4.21 (see p.76) presents the proportions of births for mothers (and/or fathers) who identified as Aboriginal in the years 1999–2008 where the birth weight was between 1500 and 2499 grams within the DHS regions. The smallest proportions of low birth weight infants were reported in Eastern Metro (7.2%), Western Metro (7.5%)<sup>6</sup> and Southern Metro (8.1%). The highest proportions of low birth weight infants were reported in Grampians (11.6%) and Gippsland (11.2%). Hume reported 8.5%; Northern Metro, 9.1%; Barwon – South Western,

<sup>6</sup> The proportion of low birth weight infants reported in Western Metro was 7.45%, rounded to 7.5% in the description.



9.5%; and Hume and Loddon Mallee each reported 8.5%. Infants who had a birth weight between 1500 and 2499 grams where the mothers' usual residence was outside Victoria accounted for 9.9% of the births.

Figure 4.22 (see p.76) presents the proportions of births for mothers (and/or fathers) who identified as Aboriginal in the years 1999–2008 where the birth weight was  $\geq 2500$  grams across the DHS regions. These proportions would also reflect the population numbers. The smallest proportions of normal birth weight infants were reported in Grampians (4.9%) and Eastern Metro (7.2%). The highest proportions

of normal birth weight infants were reported in Southern Metro (14.4%), Northern Metro (14.1%), Loddon Mallee (14.2%) and Hume (11.0%). These proportions decreased in Southern Metro (1999–2002, 15.3%; 2006–2008, 13.7%), and increased in Loddon Mallee (1999–2002, 13.9%; 2006–2008, 14.3%) and Northern Metro (1999–2002, 13.3%; 2006–2008, 14.9%) over the years. Gippsland reported 9.7% and Barwon – South Western reported 8.2%. Infants who had a normal birth weight where the mothers' usual residence was outside Victoria accounted for 6.8% of the births.

**Figure 4.18: Proportions of Aboriginal births where the weight at birth was <1500 grams across DHS regions, 1999–2008 inclusive**

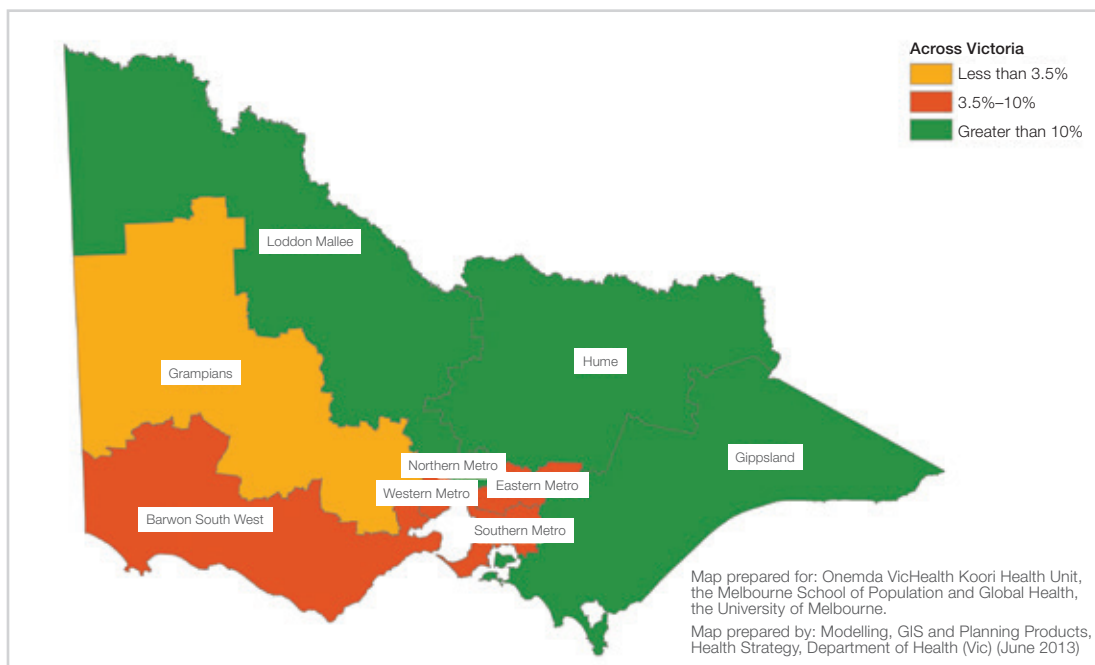


Figure 4.19: Proportions of Aboriginal births where the weight at birth was <1500 grams *within* DHS regions, 1999–2008 inclusive

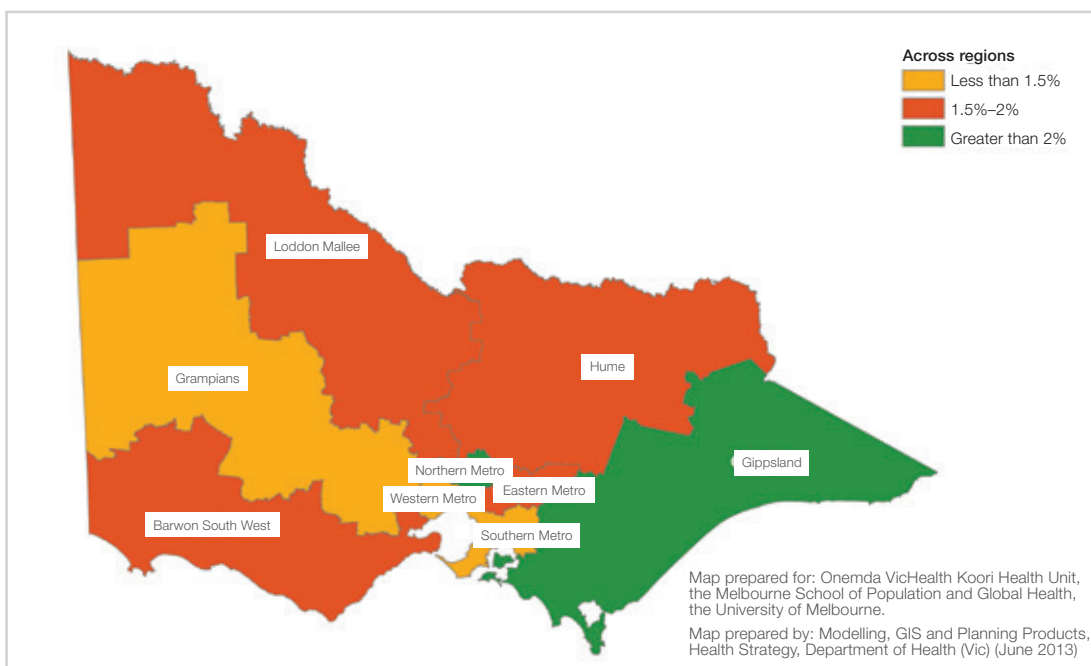


Figure 4.20: Proportions of Aboriginal births where the birth weight was 1500–2499 grams inclusive *across* DHS regions, 1999–2008 inclusive

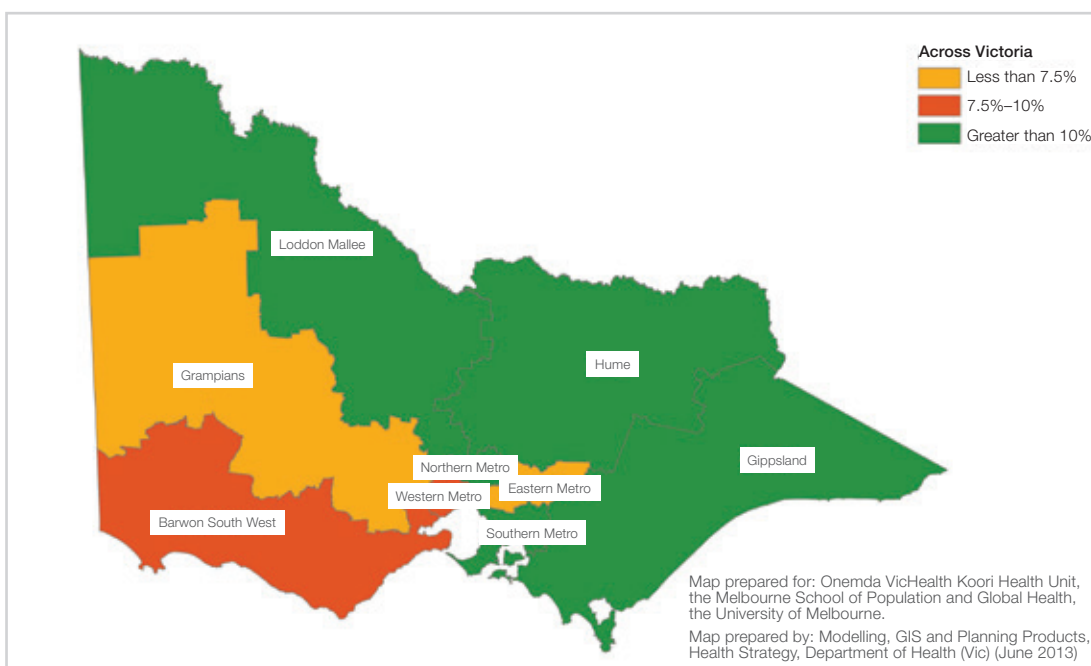


Figure 4.21: Proportions of Aboriginal births where the birth weight was 1500–2499 grams inclusive *within* DHS regions, 1999–2008 inclusive

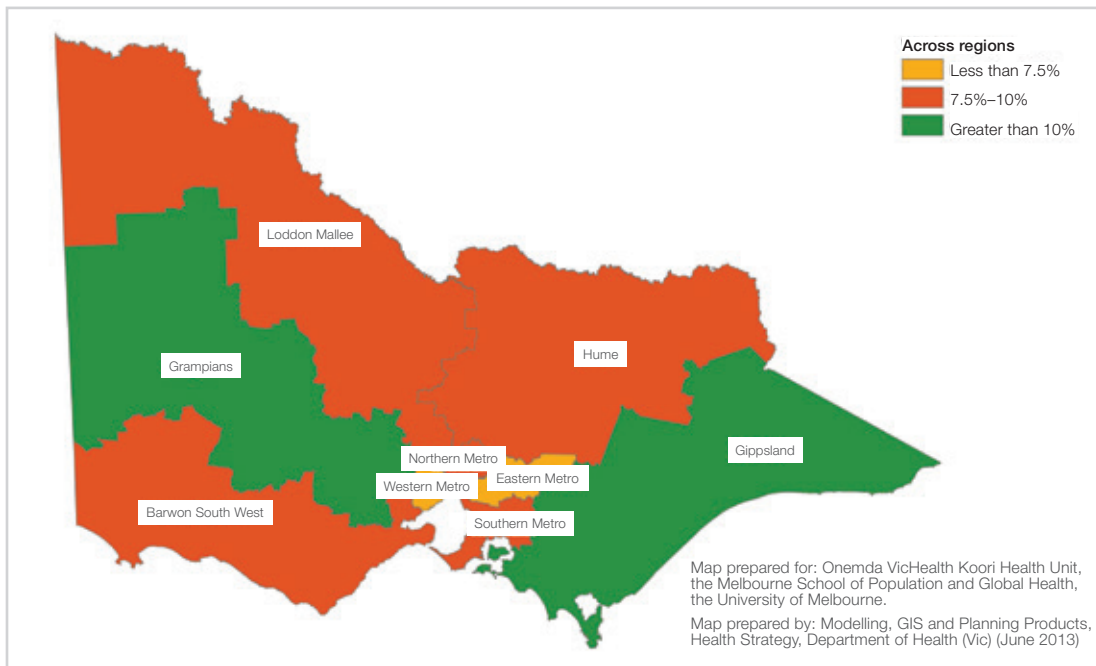
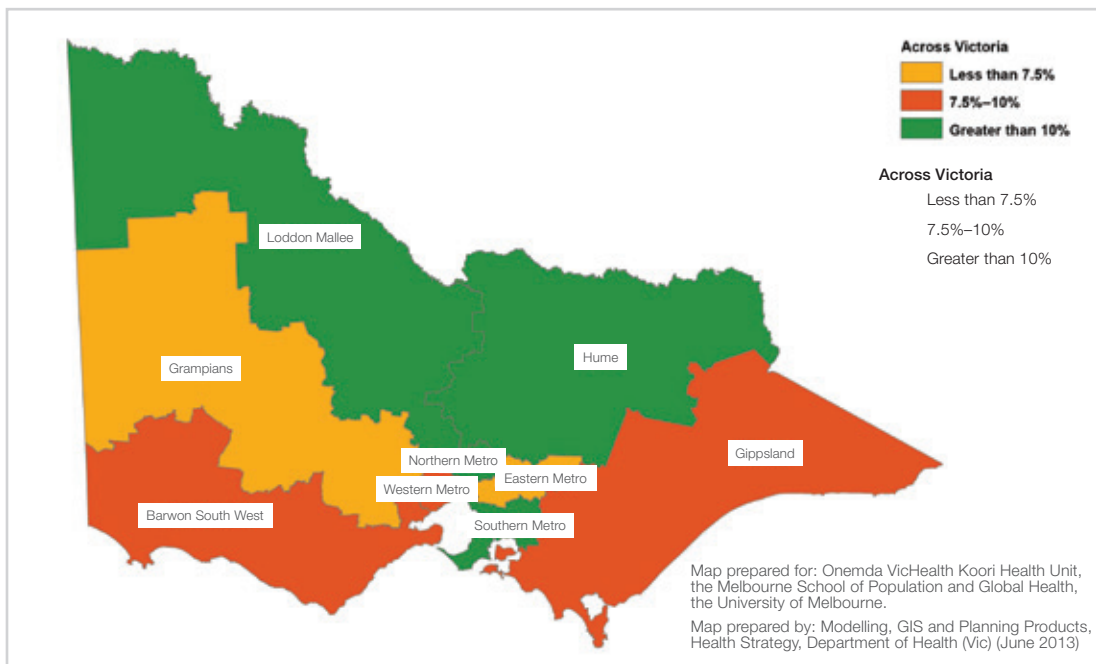


Figure 4.22: Proportions of Aboriginal births where the birth weight was  $\geq 2500$  grams *across* DHS regions, 1999–2008 inclusive





Within the regions the lowest proportions of normal birth weights were reported in Gippsland (86.7%) and Grampians (87.3%). Western Metro (91.2%), Eastern Metro (91.0%) and Southern Metro (90.9%) reported the highest proportions of normal birth weight. Loddon Mallee and Hume reported 89.9%; Northern Metro, 88.9%; and Barwon – South Western, 88.7%.

### Key findings

**Population numbers:** Over the 10 years, the Matched Data identified an extra 4333 births in Victoria to Aboriginal and/or Torres Strait Islander mothers and/or fathers. The proportion of Aboriginal to non-Aboriginal births in 2006–2008 inclusive was 1.9%, which was more than double the proportion reported by the VPDC (0.9%).

**Sex:** The Matched Data reported similar proportions of males to females born in the Aboriginal populations over the 10 years (male, 50.3%, compared with female, 49.7%), although these proportions were reversed in the VPDC data (male, 49.5%, compared with female, 50.4%); the difference was slightly larger within the non-Aboriginal populations (male, 51.3%, compared with female, 48.7%) and were similarly reported in the VPDC data.

**Regional distribution:** The largest proportions of Aboriginal births within the Victorian Aboriginal population were reported to mothers and/or fathers living in Loddon Mallee, Northern Metro and Southern Metro. The smallest proportions were reported to mothers and/or fathers living in Grampians and Eastern Metro.

The largest increase in proportions of births to Aboriginal mothers and/or fathers was reported in the Eastern, Western, Southern and Northern Metro regions.

The greatest increases in population numbers identified through the Matched Data were observed in the metropolitan regions, and were smallest within the rural regions.

There were increases in the proportions of Aboriginal births within the total population in each of the regions over the 10 years.

**Marital status:** The proportion of Aboriginal mothers who were single at the time of the infant's birth was significantly higher (41.5%) compared with non-Aboriginal mothers (11.1%).

**Maternal age:** The proportion of Aboriginal teenage births (16.3%) was significantly higher compared with teenage births among non-Aboriginal mothers (2.5%); this proportion decreased over the 10 years in both populations: Aboriginal, 17.0% (1999–2002) to 14.9% (2006–2008); non-Aboriginal, 2.8% (1999–2002) to 2.2% (2006–2008). The highest proportion of births according to maternal age among the Aboriginal population was within the 20–29 years age group (52.9%), and among non-Aboriginal mothers older than 30 years at the time of the infant's birth (58.9%). The proportion of older mothers ( $\geq 30$  years) increased in both populations over the years: Aboriginal, 29.4% (1999–2002) to 33.0% (2006–2008); non-Aboriginal, 55.3% (1999–2002) to 61.6% (2006–2008).

**Gestational age:** the proportion of preterm births reported in the Matched Data was significantly higher among the Aboriginal populations (10.0%) compared with the non-Aboriginal population (6.1%). The proportion of preterm births reported by the VPDC was higher than that observed in the Matched Data for both populations (VPDC: Aboriginal, 12.3%; non-Aboriginal, 7.3%).

**Plurality:** The proportion of singletons were similar in both populations (Matched Data: Aboriginal, 99.0%; non-Aboriginal, 98.7%) and reported by the VPDC as being lower than that observed in the Matched Data for both populations (VPDC: Aboriginal, 97.4%; non-Aboriginal, 96.6%).

**Parity:** The proportion of births to first time mothers reported in the Matched Data was lower among the Aboriginal compared with



the non-Aboriginal population (Matched Data: Aboriginal, 38.1%; non-Aboriginal, 42.3%) and the proportions among the Aboriginal population were lower in the VPDC reported data (34.7%) and similar in the VPDC for the non-Aboriginal population (42.5%). The proportion of three or more previous births among Aboriginal mothers was more than double (17.9%) the proportion reported in the Matched Data for the non-Aboriginal population (7.5%). The proportions of multiparous mothers reported in the VPDC were higher in both populations: Aboriginal, 21.9%; non-Aboriginal, 7.8%.

**Birth weight:** The proportion of Aboriginal infants born with very low (<1500gms, 1.7%) or low (1500–<2500 grams, 8.9%) birth weights was higher compared with the proportion of non-Aboriginal infants (<1500 grams, 0.8%; 1500–<2499 grams, 4.2%). The proportions reported in the VPDC were higher in both populations than those reported in the Matched Data (VPDC: Aboriginal, <1500 grams, 2.1%; 1500–2499 grams, 11.5%; non-Aboriginal, <1500 grams, 1.1%; 1500–2499 grams, 5.2%).

**Apgar at five minutes:** the proportion of Apgar scores for Aboriginal infants (97.8%) reported in the Matched Data was slightly lower compared with the non-Aboriginal population (98.6%). The scores observed for Aboriginal infants in the VPDC were slightly lower (97.1%), and similar in the non-Aboriginal population (98.5%).

### Summary

The Matched Data reported that within Victoria between 1999 and 2008 inclusive, when compared with non-Aboriginal births, Aboriginal mothers were younger and more likely to be single, and their infants were more likely to be born preterm, to weigh <2500 grams and to be the third or more baby. The proportions of teenage mothers, preterm births and <2500 gram infants reported by the VPDC were larger among the Aboriginal population than those reported by Matched Data over the 10 years. The descriptions of maternal age,

gestational age and birth weights are reported in conjunction with the relevant figures in all the following regional sections.

### Birth outcomes for metropolitan and rural health services regions

This section provides a summary of selected birth outcomes and the maternal and perinatal characteristics for each DHS metropolitan and rural health services region. Data are reported according to the birth cohorts 1999–2002, 2003–2005 and 2006–2008 inclusive and for all years, 1999–2008 inclusive. Data are reported for the VPDC and the Matched Data for both Aboriginal and non-Aboriginal populations. The tables can be considered within the context of the regional profiles in Chapter 3. The proportion of Aboriginal compared with non-Aboriginal live births and maternal and perinatal characteristics are reported using the Matched Data.

Note: proportions that are presented are corrected to the first decimal point. The numbers in categories that are less than five in the cells are suppressed. 'Unknown' numbers that are less than five remain, except where other numbers in that category are less than five.

#### Barwon – South Western

The following tables describe the maternal and perinatal characteristics for Aboriginal (Table 4.10) and non-Aboriginal (Table 4.11) births as reported by VPDC and Matched Data in the Barwon – South Western region between 1999 and 2008 inclusive.

The Matched Data reported an additional 356 Aboriginal live births in the period 1999–2008 inclusive, which represents an 86% increase in the number of births reported in the VPDC. The proportion of Aboriginal to non-Aboriginal births was 2.0%. The proportion of Aboriginal live births within the birth population of Barwon – South Western increased over the 10 years: 1999–2002, 1.6%; 2003–2005, 2.2%; 2006–2008, 2.4%.



Between 1999 and 2008, within the Aboriginal birth population, there were more male births (54.4%) than female births (45.6%), which was similar for the non-Aboriginal population (male, 51.6%; female, 48.4%). The proportion of Aboriginal single mothers at the time of the birth was significantly higher (40.5%) compared with non-Aboriginal single mothers (14.7%).

Between 1999 and 2008 inclusive, the proportion of Aboriginal teenage mothers was significantly higher (15.3%) compared with non-Aboriginal teenage mothers (3.5%). This proportion fluctuated over the years for Aboriginal mothers (1999–2002, 14.0%; 2003–2005, 19.5%; 2006–2008, 13.1%) and decreased for non-Aboriginal mothers (1999–2002, 3.8%; 2003–2005, 3.3%; 2006–2008, 3.2%).

More than 8% of Aboriginal births were preterm (8.5%) compared with 6.3% of non-Aboriginal births. Aboriginal preterm births increased over the 10 years (1999–2002, 7.9%; 2003–2005, 8.3%; 2006–2008, 9.3%) and remained similar among non-Aboriginal births (1999–2002, 6.3%; 2003–2005, 6.1%; 2006–2008, 6.4%).

The proportions of singleton births were similar in both populations (Aboriginal, 98.4%; non-Aboriginal, 98.7%). The proportion of first live births was less within the Aboriginal population (34.2%) compared with non-Aboriginal (39.5%) and the proportion of Aboriginal births with a parity of three or more previous births was double the non-Aboriginal population (Aboriginal, 19.9%; non-Aboriginal, 8.7%).

Over the 10 years the proportion of Aboriginal infants born with very low (1.8%) and low (9.5%) birth weights was significantly higher than non-Aboriginal infants born with very low (0.8%) and low (4.1%) birth weights. The proportion of Aboriginal infants with very low birth weights increased over the 10 years (1999–2002, 0.8%; 2003–2005, 1.7%; 2006–2008, 2.8%), and low birth weight proportions decreased (1999–2002, 9.5%; 2003–2005,

9.9%; 2006–2008, 9.0%). The proportions of very low birth weights were similar across the years among the non-Aboriginal population (0.8%–0.7%) and low birth weight proportions decreased (1999–2002, 4.3%; 2003–2005, 3.8%; 2006–2008, 3.9%). The proportion of Aboriginal infants born <2500 grams (11.3%) was more than double the non-Aboriginal proportion (4.9%).

The proportion of infants who had a ‘normal’ Apgar score after five minutes was slightly lower among the Aboriginal population (97.5%) compared with the non-Aboriginal population (98.6%).

**Case study:** Over the 10-year period, as observed through the analysis of the Matched Data, the proportion of Aboriginal births in Barwon – South Western increased from 1.6% to 2.4% of the regional birth population, and represented 8.3% of Aboriginal births in Victoria. There was an 86% increase in the number of births identified as a result of the Matched Data. However, among the Aboriginal birth population, 15.3% of births (compared with 3.5% non-Aboriginal) in this region were to teenage mothers; this proportion fluctuated over the years whereas the proportion of preterm births (8.5% compared with 6.3% non-Aboriginal) and infants born <2500 grams (11.3% compared with 4.9% non-Aboriginal) increased over the years.



Table 4.10: Maternal and perinatal characteristics for Aboriginal births as reported by VPDC and Matched Data, Barwon – South Western, 1999–2008 inclusive

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Births</b>								
Total live births	124 (100.0)	241 (100.0)	130 (100.0)	242 (100.0)	162 (100.0)	289 (100.0)	416 (100.0)	772 (100.0)
<b>Sex</b>								
Male	66 (53.2)	127 (52.7)	68 (52.3)	141 (58.3)	87 (53.7)	152 (52.6)	221 (53.1)	420 (54.4)
Female	58 (46.8)	114 (47.3)	62 (47.7)	101 (41.7)	75 (46.3)	137 (47.4)	195 (46.9)	352 (45.6)
<b>Marital status of mother</b>								
Currently single	49 (39.5)	95 (39.4)	62 (47.7)	102 (42.1)	67 (41.4)	116 (40.1)	178 (42.8)	313 (40.5)
Married/de facto	75 (60.5)	146 (60.6)	66 (50.8)	136 (56.2)	95 (58.6)	173 (59.9)	236 (56.7)	455 (58.9)
Unknown	–	–	2 (1.5)	4 (1.7)	–	–	2 (0.5)	4 (0.5)
<b>Maternal age (years) (cats)</b>								
≤19	21 (16.9)	23 (14.0)	26 (20.0)	29 (19.5)	26 (16.0)	25 (13.1)	73 (17.5)	77 (15.3)
20–29	70 (56.5)	98 (59.8)	67 (51.5)	76 (51.0)	92 (56.8)	107 (56.0)	229 (55.0)	281 (55.8)
≥ 30	33 (26.6)	43 (26.2)	37 (28.5)	44 (29.5)	44 (27.2)	59 (30.9)	114 (27.4)	146 (29.0)
<b>Gestational age (weeks) (cats)</b>								
Preterm	10 (8.1)	19 (7.9)	12 (9.2)	20 (8.3)	22 (13.6)	27 (9.3)	44 (10.6)	66 (8.5)
Term	114 (91.9)	222 (92.1)	118 (90.8)	222 (91.7)	140 (86.4)	262 (90.7)	372 (89.4)	706 (91.5)
<b>Plurality</b>								
Single	122 (98.4)	239 (99.2)	126 (96.9)	234 (96.7)	160 (98.8)	287 (99.3)	408 (98.1)	760 (98.4)
Multiple	*	*	*	8 (3.3)	*	*	8 (1.9)	12 (1.6)
Unknown	*	*	*	–	*	*	*	*
<b>Parity (previous pregnancies)</b>								
0	23 (18.5)	74 (30.7)	42 (32.3)	96 (39.7)	46 (28.4)	94 (32.5)	111 (26.7)	264 (34.2)
1–2	69 (55.6)	124 (51.5)	50 (38.5)	93 (38.4)	74 (45.7)	137 (47.4)	193 (46.4)	354 (45.9)
≥ 3	32 (25.8)	43 (17.8)	38 (29.2)	53 (21.9)	42 (25.9)	58 (20.1)	112 (26.9)	154 (19.9)

	1999–2002			2003–2005			2006–2008			All years (1999–2008)		
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Birth weight (grams) (cats)</b>												
<1,500	*	*	*	*	*	*	*	*	*	*	*	*
1,500–2,499	*	*	*	*	*	*	*	*	*	*	*	*
≥ 2,500	110 (88.7)	216 (89.6)	115 (88.5)	214 (88.4)	138 (85.2)	363 (87.3)	685 (88.7)	14 (1.8)	73 (9.5)	685 (88.7)	14 (1.8)	73 (9.5)
<b>Birth weight (grams)</b>												
<2,500	14 (11.3)	25 (10.4)	15 (11.5)	28 (11.6)	24 (14.8)	53 (12.7)	87 (11.3)	14 (1.8)	73 (9.5)	87 (11.3)	14 (1.8)	73 (9.5)
≥ 2,500	110 (88.7)	216 (89.6)	115 (88.5)	214 (88.4)	138 (85.2)	363 (87.3)	685 (88.7)	14 (1.8)	73 (9.5)	685 (88.7)	14 (1.8)	73 (9.5)
<b>Apgar at 1 minute</b>												
Critically low (0–3)	*	*	*	*	*	*	*	*	*	*	*	*
Fairly low (4–6)	13 (10.5)	25 (10.4)	14 (10.8)	22 (9.1)	14 (8.6)	41 (9.9)	69 (8.9)	16 (2.1)	16 (2.1)	69 (8.9)	16 (2.1)	16 (2.1)
Normal (7+)	110 (88.7)	214 (88.8)	114 (87.7)	211 (87.2)	144 (88.9)	368 (88.5)	684 (88.6)	3 (0.4)	3 (0.4)	684 (88.6)	3 (0.4)	3 (0.4)
Unknown	–	–	*	*	*	*	*	*	*	*	*	*
<b>Apgar at 5 minutes</b>												
Critically low (0–3)	–	*	–	*	–	–	–	–	–	–	–	–
Fairly low (4–6)	*	*	*	*	*	*	*	*	*	*	*	*
Normal (7+)	122 (98.4)	238 (98.8)	127 (97.7)	235 (97.1)	156 (96.3)	405 (97.4)	753 (97.5)	5 (0.6)	5 (0.6)	753 (97.5)	5 (0.6)	5 (0.6)
Unknown	*	–	*	2 (0.8)	1 (0.6)	2 (0.5)	2 (0.3)	2 (0.6)	2 (0.5)	2 (0.3)	2 (0.6)	2 (0.3)

\* numbers suppressed. N: number of births. VPDC: Victorian Perinatal Data Collection.



**Table 4.11: Maternal and perinatal characteristics for non-Aboriginal births as reported by VPDC and identified through Matched Data, Barwon – South Western, 1999–2008 inclusive**

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Births</b>								
Total live births	16,293 (100.0)	14,838 (100.0)	12,150 (100.0)	10,914 (100.0)	13,006 (100.0)	11,613 (100.0)	41,449 (100.0)	37,365 (100.0)
<b>Sex</b>								
Male	8,407 (51.6)	7,679 (51.8)	6,264 (51.6)	5,609 (51.4)	6,711 (51.6)	5,985 (51.5)	21,382 (51.6)	19,273 (51.6)
Female	7,886 (48.4)	7,159 (48.2)	5,886 (48.4)	5,305 (48.6)	6,294 (48.4)	5,628 (48.5)	20,066 (48.4)	18,092 (48.4)
Indeterminate	–	–	–	–	1 (0.0)	–	1 (0.0)	–
<b>Marital status of mother</b>								
Currently single	2,248 (13.8)	1,817 (12.2)	2,075 (17.1)	1,694 (15.5)	2,433 (18.7)	1,976 (17.0)	6,756 (16.3)	5,487 (14.7)
Married/de facto	14,031 (86.1)	13,010 (87.7)	9,953 (81.9)	9,121 (83.6)	10,551 (81.1)	9,618 (82.8)	34,535 (83.3)	31,749 (85.0)
Unknown	14 (0.1)	11 (0.1)	122 (1.0)	99 (0.9)	22 (0.2)	19 (0.2)	158 (0.4)	129 (0.3)
<b>Maternal age (years)</b>								
≤19	682 (4.2)	571 (3.8)	440 (3.6)	363 (3.3)	461 (3.5)	367 (3.2)	1,583 (3.8)	1,301 (3.5)
20–29	7,635 (46.9)	6,917 (46.6)	5,113 (42.1)	4,593 (42.1)	5,278 (40.6)	4,727 (40.7)	18,026 (43.5)	16,237 (43.5)
≥ 30	7,976 (49.0)	7,350 (49.5)	6,597 (54.3)	5,958 (54.6)	7,267 (55.9)	6,519 (56.1)	21,840 (52.7)	19,827 (53.1)
<b>Gestational age (weeks)</b>								
Preterm	1,197 (7.3)	934 (6.3)	902 (7.4)	669 (6.1)	1,000 (7.7)	741 (6.4)	3,099 (7.5)	2,344 (6.3)
Term	15,094 (92.6)	13,903 (93.7)	11,246 (92.6)	10,244 (93.9)	12,005 (92.3)	10,871 (93.6)	38,345 (92.5)	35,018 (93.7)
Unknown	2 (0.0)	1 (0.0)	2 (0.0)	1 (0.0)	1 (0.0)	1 (0.0)	5 (0.0)	3 (0.0)
<b>Plurality</b>								
Single	15,787 (96.9)	14,647 (98.7)	11,769 (96.9)	10,782 (98.8)	12,513 (96.2)	11,436 (98.5)	40,069 (96.7)	36,865 (98.7)
Multiple	506 (3.1)	191 (1.3)	381 (3.1)	132 (1.2)	493 (3.8)	177 (1.5)	1,380 (3.3)	500 (1.3)



	1999–2002			2003–2005			2006–2008			All years (1999–2008)		
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Parity (previous pregnancies)</b>												
0	6,317 (38.8)	5,702 (38.4)	4,902 (40.3)	4,384 (40.2)	5,240 (40.3)	4,681 (40.3)	16,459 (39.7)	14,767 (39.5)				
1–2	8,426 (51.7)	7,758 (52.3)	6,199 (51.0)	5,640 (51.7)	6,597 (50.7)	5,943 (51.2)	21,222 (51.2)	19,341 (51.8)				
≥ 3	1,550 (9.5)	1,378 (9.3)	1,049 (8.6)	890 (8.2)	1,169 (9.0)	989 (8.5)	3,768 (9.1)	3,257 (8.7)				
<b>Birth weight (grams) (cats)</b>												
<1,500	174 (1.1)	124 (0.8)	125 (1.0)	87 (0.8)	137 (1.1)	84 (0.7)	436 (1.1)	295 (0.8)				
1,500–2,499	850 (5.2)	645 (4.3)	579 (4.8)	417 (3.8)	632 (4.9)	457 (3.9)	2,061 (5.0)	1,519 (4.1)				
≥ 2,500	15,267 (93.7)	14,067 (94.8)	11,444 (94.2)	10,410 (95.4)	12,236 (94.1)	11,071 (95.3)	38,947 (94.0)	35,548 (95.1)				
Unknown	2 (0.0)	2 (0.0)	2 (0.0)	–	1 (0.0)	1 (0.0)	5 (0.0)	3 (0.0)				
<b>Birth weight (grams)</b>												
<2,500	1,024 (6.3)	769 (5.2)	704 (5.8)	504 (4.6)	769 (5.9)	541 (4.7)	2,497 (6.0)	1,814 (4.9)				
≥ 2,500	15,267 (93.7)	14,067 (94.8)	11,444 (94.2)	10,410 (95.4)	12,236 (94.1)	11,071 (95.3)	38,947 (94.0)	35,548 (95.1)				
Unknown	2 (0.0)	2 (0.0)	2 (0.0)	–	1 (0.0)	1 (0.0)	5 (0.0)	3 (0.0)				
<b>Apgar at 1 minute</b>												
Critically low (0–3)	259 (1.6)	219 (1.5)	210 (1.7)	166 (1.5)	288 (2.2)	249 (2.1)	757 (1.8)	634 (1.7)				
Fairly low (4–6)	1,498 (9.2)	1,365 (9.2)	1,060 (8.7)	949 (8.7)	1,143 (8.8)	1,003 (8.6)	3,701 (8.9)	3,317 (8.9)				
Normal (7+)	14,517 (89.1)	13,237 (89.2)	10,862 (89.4)	9,787 (89.7)	11,560 (88.9)	10,350 (89.1)	36,939 (89.1)	33,374 (89.3)				
Unknown	19 (0.1)	17 (0.1)	18 (0.1)	12 (0.1)	15 (0.1)	11 (0.1)	52 (0.1)	40 (0.1)				
<b>Apgar at 5 minutes</b>												
Critically low (0–3)	42 (0.3)	32 (0.2)	30 (0.2)	23 (0.2)	56 (0.4)	39 (0.3)	128 (0.3)	94 (0.3)				
Fairly low (4–6)	146 (0.9)	128 (0.9)	125 (1.0)	103 (0.9)	185 (1.4)	171 (1.5)	456 (1.1)	402 (1.1)				
Normal (7+)	16,092 (98.8)	14,666 (98.8)	11,982 (98.6)	10,780 (98.8)	12,753 (98.1)	11,395 (98.1)	40,827 (98.5)	36,841 (98.6)				
Unknown	13 (0.1)	12 (0.1)	13 (0.1)	8 (0.1)	12 (0.1)	8 (0.1)	38 (0.1)	28 (0.1)				

\* numbers suppressed. N: number of births. VPDC: Victorian Perinatal Data Collection.





### Loddon Mallee

The following tables describe the maternal and perinatal characteristics for Aboriginal (Table 4.12) and non-Aboriginal (Table 4.13) births as reported by VPDC and Matched Data in Loddon Mallee between 1999 and 2008.

The Matched Data reported an additional 325 Aboriginal live births in the period 1999–2008 inclusive, which represents a 33% increase in the number of births reported in the VPDC. The proportion of Aboriginal to non-Aboriginal births was 4.0%. The proportion of Aboriginal live births increased over the 10 years: 1999–2002, 3.2%; 2003–2005, 4.1%; 2006–2008, 5.0%.

Between 1999 and 2008, within the Aboriginal birth population, there were more male births (50.3%) than female births (49.7%), which was similar for the non-Aboriginal population (male 51.4%; female 48.6%). The proportion of Aboriginal single mothers at the time of the birth was significantly higher (44.3%) compared with non-Aboriginal single mothers (11.3%).

Between 1999 and 2008 inclusive the proportion of Aboriginal teenage mothers was significantly higher (24.8%) compared with non-Aboriginal teenage mothers (4.7%). This proportion decreased over the years for both Aboriginal (1999–2002, 25.9%; 2003–2005, 26.9%; 2006–2008, 22.1%) and non-Aboriginal mothers (1999–2002, 4.9%; 2003–2005, 4.4%; 2006–2008, 4.6%).

More than 10% of Aboriginal births were preterm (10.4%) compared with 6.1% of non-Aboriginal births. Aboriginal (1999–2002, 9.4%; 2003–2005, 9.1%; 2006–2008, 12.3%) and non-Aboriginal (1999–2002, 5.8%; 2003–2005, 6.0%; 2006–2008, 6.4%) preterm births increased over the 10 years.

The proportions of singleton births were similar in both populations (Aboriginal, 99.2%; non-Aboriginal, 98.9%). The proportion of first live births was slightly higher within the Aboriginal population (37.5%) compared with non-Aboriginal (36.5%) and the proportion of

births with a parity of three or more previous births was also higher among the Aboriginal population (19.5%) compared with the non-Aboriginal population (11.1%).

Over the 10 years the proportion of Aboriginal infants born with very low (1.6%) and low (8.5%) birth weights was significantly higher than non-Aboriginal infants born with very low (0.6%) and low (4.1%) birth weights. The proportion of Aboriginal infants with very low birth weights (1999–2002, 1.2%; 2003–2005, 1.8%; 2006–2008, 1.8%) and low birth weight proportions (1999–2002, 8.2%; 2003–2005, 8.6%; 2006–2008, 8.7%) increased over the 10 years. The proportions of very low birth weights were similar across the years among the non-Aboriginal population, and low birth weight proportions decreased (1999–2002, 4.2%; 2003–2005, 4.1%; 2006–2008, 4.1%). The proportion of Aboriginal infants born <2500 grams (10.1%) was more than double the non-Aboriginal proportion (4.8%).

The proportion of infants who had a 'normal' Apgar score after five minutes was slightly lower among the Aboriginal population (97.5%) compared with the non-Aboriginal population (98.3%).

Case study: Over the 10-year period, as observed through the analysis of the Matched Data, the proportion of Aboriginal births in Loddon Mallee increased from 3.2% to 5.0% of the regional birth population, and represented 14.2% of Aboriginal births in Victoria. There was a 33% increase in the number of births identified as a result of the Matched Data. However, among the Aboriginal birth population, 24.8% of births (compared with 4.7% non-Aboriginal) in this region were to teenage mothers (this proportion decreased over the years); 10.4% of Aboriginal births (compared with 6.1% non-Aboriginal) were preterm, and 10.1% (compared with 4.8% non-Aboriginal) of the infants were born <2500 grams (the proportion of the latter two outcomes increased over the years).

Table 4.12: Maternal and perinatal characteristics for Aboriginal births as reported by VPDC and identified through Matched Data, Loddon Mallee, 1999–2008 inclusive

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Births</b>								
Total live births	301 (100.0)	417 (100.0)	295 (100.0)	395 (100.0)	394 (100.0)	503 (100.0)	990 (100.0)	1,315 (100.0)
<b>Sex</b>								
Male	151 (50.2)	222 (53.2)	145 (49.2)	181 (45.8)	196 (49.7)	259 (51.5)	492 (49.7)	662 (50.3)
Female	150 (49.8)	195 (46.8)	150 (50.8)	214 (54.2)	198 (50.3)	244 (48.5)	498 (50.3)	653 (49.7)
<b>Marital status of mother</b>								
Currently single	133 (44.2)	169 (40.5)	143 (48.5)	163 (41.3)	212 (53.8)	251 (49.9)	488 (49.3)	583 (44.3)
Married/de facto	167 (55.5)	247 (59.2)	152 (51.5)	232 (58.7)	181 (45.9)	252 (50.1)	500 (50.5)	731 (55.6)
Unknown	1 (0.3)	1 (0.2)	–	–	1 (0.3)	–	2 (0.2)	1 (0.1)
<b>Maternal age (years) (cats)</b>								
≤19	81 (26.9)	76 (25.9)	80 (27.1)	80 (26.9)	88 (22.3)	80 (22.1)	249 (25.2)	236 (24.8)
20–29	153 (50.8)	149 (50.9)	165 (55.9)	165 (55.6)	224 (56.9)	197 (54.4)	542 (54.7)	511 (53.7)
≥30	67 (22.3)	68 (23.2)	50 (16.9)	52 (17.5)	82 (20.8)	85 (23.5)	199 (20.1)	205 (21.5)
<b>Gestational age (weeks) (cats)</b>								
Preterm	34 (11.3)	39 (9.4)	33 (11.2)	36 (9.1)	60 (15.2)	62 (12.3)	127 (12.8)	137 (10.4)
Term	267 (88.7)	378 (90.6)	262 (88.8)	359 (90.9)	334 (84.8)	441 (87.7)	863 (87.2)	1,178 (89.6)
<b>Plurality</b>								
single	294 (97.7)	413 (99.0)	286 (96.9)	393 (99.5)	380 (96.4)	499 (99.2)	960 (97.0)	1,305 (99.2)
Multiple	7 (2.3)	4 (1.0)	9 (3.1)	*	14 (3.6)	*	30 (3.0)	10 (0.8)
Unknown	–	–	–	*	–	*	*	*
<b>Parity (previous pregnancies)</b>								
0	103 (34.2)	156 (37.4)	106 (35.9)	155 (39.2)	141 (35.8)	182 (36.2)	350 (35.4)	493 (37.5)
1–2	119 (39.5)	173 (41.5)	132 (44.7)	175 (44.3)	170 (43.1)	217 (43.1)	421 (42.5)	565 (43.0)
≥3	79 (26.2)	88 (21.1)	57 (19.3)	65 (16.5)	83 (21.1)	104 (20.7)	219 (22.1)	257 (19.5)



Table 4.12 continued...

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Birth weight (grams) (cats)</b>								
<1,500	5 (1.7)	5 (1.2)	*	7 (1.8)	14 (3.6)	9 (1.8)	23 (2.3)	21 (1.6)
1,500–2,499	31 (10.3)	34 (8.2)	34 (11.5)	34 (8.6)	48 (12.2)	44 (8.7)	113 (11.4)	112 (8.5)
≥2,500	265 (88.0)	378 (90.6)	257 (87.1)	354 (89.6)	332 (84.3)	450 (89.5)	854 (86.3)	1,182 (89.9)
Unknown	–	–	*	–	–	–	*	–
<b>Birth weight (grams)</b>								
<2,500	36 (12.0)	39 (9.4)	38 (12.9)	41 (10.4)	62 (15.7)	53 (10.5)	136 (13.7)	133 (10.1)
≥2,500	265 (88.0)	378 (90.6)	257 (87.1)	354 (89.6)	332 (84.3)	450 (89.5)	854 (86.3)	1,182 (89.9)
<b>Apgar at 1 minute</b>								
Critically low (0–3)	11 (3.7)	12 (2.9)	7 (2.4)	13 (3.3)	7 (1.8)	11 (2.2)	25 (2.5)	36 (2.7)
Fairly low (4–6)	30 (10.0)	47 (11.3)	30 (10.2)	27 (6.8)	35 (8.9)	36 (7.2)	95 (9.6)	110 (8.4)
Normal (7+)	258 (85.7)	358 (85.9)	256 (86.8)	352 (89.1)	346 (87.8)	453 (90.1)	860 (86.9)	1,163 (88.4)
Unknown	2 (0.7)	–	2 (0.7)	3 (0.8)	6 (1.5)	3 (0.6)	10 (1.0)	6 (0.5)
<b>Apgar at 5 minutes</b>								
Critically low (0–3)	*	*	–	*	*	5 (1.0)	6 (0.6)	8 (0.6)
Fairly low (4–6)	7 (2.3)	9 (2.2)	8 (2.7)	7 (1.8)	*	5 (1.0)	18 (1.8)	21 (1.6)
Normal (7+)	290 (96.3)	406 (97.4)	285 (96.6)	384 (97.2)	383 (97.2)	492 (97.8)	958 (96.8)	1,282 (97.5)
Unknown	*	–	*	*	*	1 (0.2)	8 (0.8)	4 (0.3)

\* numbers suppressed. N: number of births. VPDC: Victorian Perinatal Data Collection.



Table 4.13: Maternal and perinatal characteristics for non-Aboriginal births as reported by VPDC and identified through Matched Data, Loddon Mallee, 1999–2008 inclusive

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Births</b>								
Total live births	14,257 (100.0)	12,711 (100.0)	10,288 (100.0)	9,170 (100.0)	10,954 (100.0)	9,617 (100.0)	35,499 (100.0)	31,498 (100.0)
<b>Sex</b>								
Male	7,375 (51.7)	6,561 (51.6)	5,261 (51.1)	4,694 (51.2)	5,656 (51.6)	4,943 (51.4)	18,292 (51.5)	16,198 (51.4)
Female	6,880 (48.3)	6,150 (48.4)	5,027 (48.9)	4,476 (48.8)	5,298 (48.4)	4,674 (48.6)	17,205 (48.5)	15,300 (48.6)
Indeterminate	*	–	–	–	–	–	*	–
Unknown	*	–	–	–	–	–	*	–
<b>Marital status of mother</b>								
Currently single	1,648 (11.6)	1,225 (9.6)	1,153 (11.2)	828 (9.0)	1,963 (17.9)	1,496 (15.6)	4,764 (13.4)	3,549 (11.3)
Married/de facto	12,597 (88.4)	11,477 (90.3)	9,132 (88.8)	8,340 (90.9)	8,993 (82.0)	8,117 (84.4)	30,712 (86.5)	27,934 (88.7)
Unknown	12 (0.1)	9 (0.1)	3 (0.0)	2 (0.0)	8 (0.1)	4 (0.0)	23 (0.1)	15 (0.0)
<b>Maternal age (years)</b>								
≤19	781 (5.5)	627 (4.9)	516 (5.0)	405 (4.4)	583 (5.3)	440 (4.6)	1,880 (5.3)	1,472 (4.7)
20–29	6,874 (48.2)	6,124 (48.2)	4,594 (44.7)	4,097 (44.7)	4,812 (43.9)	4,197 (43.6)	16,280 (45.9)	14,418 (45.8)
≥30	6,601 (46.3)	5,960 (46.9)	5,178 (50.3)	4,668 (50.9)	5,559 (50.7)	4,980 (51.8)	17,338 (48.8)	15,608 (49.6)
Unknown	1 (0.0)	–	–	–	–	–	1 (0.0)	–
<b>Gestational age (weeks)</b>								
Preterm	999 (7.0)	739 (5.8)	731 (7.1)	547 (6.0)	823 (7.5)	620 (6.4)	2,553 (7.2)	1,906 (6.1)
Term	13,253 (93.0)	11,969 (94.2)	9,555 (92.9)	8,623 (94.0)	10,128 (92.5)	8,997 (93.6)	32,936 (92.8)	29,589 (93.9)
Unknown	5 (0.0)	3 (0.0)	2 (0.0)	–	3 (0.0)	–	10 (0.0)	3 (0.0)
<b>Plurality</b>								
single	13,807 (96.8)	12,570 (98.9)	9,974 (96.9)	9,078 (99.0)	10,581 (96.6)	9,503 (98.8)	34,362 (96.8)	31,151 (98.9)
multiple	450 (3.2)	141 (1.1)	314 (3.1)	92 (1.0)	373 (3.4)	114 (1.2)	1,137 (3.2)	347 (1.1)

Table 4.13 continued...

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Parity (previous pregnancies)</b>								
0	5,163 (36.2)	4,569 (35.9)	3,773 (36.7)	3,347 (36.5)	4,070 (37.2)	3,576 (37.2)	13,006 (36.6)	11,492 (36.5)
1–2	7,405 (51.9)	6,677 (52.5)	5,380 (52.3)	4,853 (52.9)	5,609 (51.2)	4,985 (51.8)	18,394 (51.8)	16,515 (52.4)
≥3	1,688 (11.8)	1,465 (11.5)	1,135 (11.0)	970 (10.6)	1,275 (11.6)	1,056 (11.0)	4,098 (11.5)	3,491 (11.1)
Unknown	1 (0.0)	–	–	–	–	–	1 (0.0)	–
<b>Birth weight (grams) (cats)</b>								
<1,500	126 (0.9)	83 (0.7)	78 (0.8)	51 (0.6)	120 (1.1)	70 (0.7)	324 (0.9)	204 (0.6)
1,500–2,499	725 (5.1)	531 (4.2)	515 (5.0)	376 (4.1)	545 (5.0)	398 (4.1)	1,785 (5.0)	1,305 (4.1)
≥2,500	13,405 (94.0)	12,096 (95.2)	9,694 (94.2)	8,742 (95.3)	10,288 (93.9)	9,148 (95.1)	33,387 (94.1)	29,986 (95.2)
Unknown	1 (0.0)	1 (0.0)	1 (0.0)	1 (0.0)	1 (0.0)	1 (0.0)	3 (0.0)	3 (0.0)
<b>Birth weight (grams)</b>								
<2,500	851 (6.0)	614 (4.8)	593 (5.8)	427 (4.7)	665 (6.1)	468 (4.9)	2,109 (5.9)	1,509 (4.8)
≥2,500	13,405 (94.0)	12,096 (95.2)	9,694 (94.2)	8,742 (95.3)	10,288 (93.9)	9,148 (95.1)	33,387 (94.1)	29,986 (95.2)
Unknown	1 (0.0)	1 (0.0)	1 (0.0)	1 (0.0)	1 (0.0)	1 (0.0)	3 (0.0)	3 (0.0)
<b>Apgar at 1 minute</b>								
Critically low (0–3)	337 (2.4)	283 (2.2)	213 (2.1)	181 (2.0)	216 (2.0)	175 (1.8)	766 (2.2)	639 (2.0)
Fairly low (4–6)	1,788 (12.5)	1,561 (12.3)	1,173 (11.4)	1,025 (11.2)	1,158 (10.6)	1,024 (10.6)	4,119 (11.6)	3,610 (11.5)
Normal (7+)	12,092 (84.8)	10,836 (85.2)	8,887 (86.4)	7,951 (86.7)	9,560 (87.3)	8,403 (87.4)	30,539 (86.0)	27,190 (86.3)
Unknown	40 (0.3)	31 (0.2)	15 (0.1)	13 (0.1)	20 (0.2)	15 (0.2)	75 (0.2)	59 (0.2)
<b>Apgar at 5 minutes</b>								
Critically low (0–3)	41 (0.3)	28 (0.2)	29 (0.3)	20 (0.2)	47 (0.4)	31 (0.3)	117 (0.3)	79 (0.3)
Fairly low (4–6)	180 (1.3)	151 (1.2)	132 (1.3)	121 (1.3)	147 (1.3)	125 (1.3)	459 (1.3)	397 (1.3)
Normal (7+)	14,005 (98.2)	12,508 (98.4)	10,117 (98.3)	9,021 (98.4)	10,743 (98.1)	9,449 (98.3)	34,865 (98.2)	30,978 (98.3)
Unknown	31 (0.2)	24 (0.2)	10 (0.1)	8 (0.1)	17 (0.2)	12 (0.1)	58 (0.2)	44 (0.1)

\*numbers suppressed. N: number of births. VPDC: Victorian Perinatal Data Collection.



### Grampians

The following tables describe the maternal and perinatal characteristics for Aboriginal (Table 4.14) and non-Aboriginal (Table 4.15) births as reported by VPDC and Matched Data in the Grampians between 1999 and 2008.

The Matched Data reported an additional 174 Aboriginal live births in the period 1999–2008 inclusive, which represented a 60% increase in the number of births reported in the VPDC. The proportion of Aboriginal to non-Aboriginal births was 2.1%. The proportion of Aboriginal live births increased over the 10 years: 1999–2002, 2.0%; 2003–2005, 1.8%; 2006–2008, 2.4%.

Between 1999 and 2008, within the Aboriginal birth population, there were fewer male births (46.6%) than female births (53.4%), which differed from the non-Aboriginal population (male, 50.8%; female, 49.2%). The proportion of Aboriginal single mothers at the time of the birth was significantly higher (36.5%) compared with non-Aboriginal single mothers (12.1%).

Between 1999 and 2008 inclusive the proportion of Aboriginal teenage mothers was significantly higher (14.2%) compared with non-Aboriginal teenage mothers (4.1%). This proportion decreased over the years for both Aboriginal (1999–2002, 16.2%; 2003–2005, 17.5%; 2006–2008, 9.4%) and non-Aboriginal mothers (1999–2002, 4.4%; 2003–2005, 4.0%; 2006–2008, 4.0%).

More than 10% of Aboriginal births were preterm (10.5%) compared with 6.7% of non-Aboriginal births. Aboriginal preterm births decreased slightly (1999–2002, 10.8%; 2003–2005, 10.0%; 2006–2008, 10.6%) and non-Aboriginal (1999–2002, 6.4%; 2003–2005, 6.0%; 2006–2008, 7.6%) preterm births increased over the 10 years.

The proportions of singleton births were similar in both populations (Aboriginal, 98.1%; non-Aboriginal, 98.7%). The proportion of first live births was slightly less within the

Aboriginal population (37.1%) compared with non-Aboriginal (38.2%). However, the proportion of births with a parity of three or more previous births was higher among the Aboriginal population (18.5%) compared with the non-Aboriginal population (10.3%).

Over the 10 years the proportions of Aboriginal infants born with very low (1.1%) and low (11.6%) birth weights were higher than non-Aboriginal infants born with very low (0.9%) and low (4.4%) birth weights. As the numbers within these two categories for Aboriginal populations within the three birth cohorts were less than five, the categories have been combined and reported for <2500 grams. The proportion of Aboriginal infants with birth weights <2500 grams decreased over the 10 years (1999–2002, 13.1%; 2003–2005, 13.3%; 2006–2008, 11.8%). The proportions of birth weights <2500 grams were similar across the years among non-Aboriginal births (1999–2002, 5.2%; 2003–2005, 5.5%; 2006–2008, 5.3%).

The proportion of infants who had a 'normal' Apgar score after five minutes was slightly lower among the Aboriginal population (97.6%) compared with the non-Aboriginal population (98.4%).

Case study: Over the 10-year period, as observed through the analysis of the Matched Data, the proportion of Aboriginal births in the Grampians increased from 2.0% to 2.4% of the regional birth population, and represented 5.0% of Aboriginal births in Victoria. There was a 60% increase in the number of births identified as a result of the Matched Data. However, among the Aboriginal birth population, 14.2% of births (compared with 4.1% non-Aboriginal) in this region were to teenage mothers (this proportion decreased over the years); 10.5% of Aboriginal births (compared with 6.7% non-Aboriginal) were preterm, and 12.7% (compared with 5.3% non-Aboriginal) of the infants were born <2500 grams (the proportion of the latter two outcomes also decreased over the years).





Table 4.14: Maternal and perinatal characteristics for Aboriginal births as reported by VPDC and identified through Matched Data, Grampians, 1999–2008 inclusive

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Births</b>								
Total live births	116 (100.0)	176 (100.0)	74 (100.0)	120 (100.0)	102 (100.0)	170 (100.0)	292 (100.0)	466 (100.0)
<b>Sex</b>								
Male	55 (47.4)	86 (48.9)	28 (37.8)	54 (45.0)	47 (46.1)	77 (45.3)	130 (44.5)	217 (46.6)
Female	61 (52.6)	90 (51.1)	46 (62.2)	66 (55.0)	55 (53.9)	93 (54.7)	162 (55.5)	249 (53.4)
<b>Marital status of mother</b>								
Currently single	42 (36.2)	62 (35.2)	39 (52.7)	51 (42.5)	40 (39.2)	57 (33.5)	121 (41.4)	170 (36.5)
Married/de facto	74 (63.8)	114 (64.8)	35 (47.3)	69 (57.5)	59 (57.8)	109 (64.1)	168 (57.5)	292 (62.7)
Unknown	–	–	–	–	3 (2.9)	4 (2.4)	3 (1.0)	4 (0.9)
<b>Maternal age (years) (cats)</b>								
≤19	21 (18.1)	21 (16.2)	13 (17.6)	14 (17.5)	7 (6.9)	10 (9.4)	41 (14.0)	45 (14.2)
20–29	72 (62.1)	83 (63.8)	41 (55.4)	42 (52.5)	59 (57.8)	59 (55.7)	172 (58.9)	184 (58.2)
≥30	23 (19.8)	26 (20.0)	20 (27.0)	24 (30.0)	36 (35.3)	37 (34.9)	79 (27.1)	87 (27.5)
<b>Gestational age (weeks) (cats)</b>								
Preterm	14 (12.1)	19 (10.8)	7 (9.5)	12 (10.0)	8 (7.8)	18 (10.6)	29 (9.9)	49 (10.5)
Term	102 (87.9)	157 (89.2)	67 (90.5)	108 (90.0)	94 (92.2)	152 (89.4)	263 (90.1)	417 (89.5)
<b>Plurality</b>								
Single	110 (94.8)	173 (98.3)	72 (97.3)	117 (97.5)	102 (100.0)	167 (98.2)	284 (97.3)	457 (98.1)
Multiple	6 (5.2)	*	*	*	–	*	8 (2.7)	9 (1.9)
Unknown	–	*	*	*	–	*	*	*
<b>Parity (previous pregnancies)</b>								
0	36 (31.0)	67 (38.1)	29 (39.2)	47 (39.2)	31 (30.4)	59 (34.7)	96 (32.9)	173 (37.1)
1–2	59 (50.9)	80 (45.5)	25 (33.8)	48 (40.0)	47 (46.1)	79 (46.5)	131 (44.9)	207 (44.4)
≥3	21 (18.1)	29 (16.5)	20 (27.0)	25 (20.8)	24 (23.5)	32 (18.8)	65 (22.3)	86 (18.5)

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Birth weight (grams) (cats)</b>								
<1,500	*	*	–	*	–	*	*	5 (1.1)
1,500–2,499	*	*	*	*	*	*	*	54 (11.6)
≥2,500	100 (86.2)	153 (86.9)	62 (83.8)	104 (86.7)	93 (91.2)	150 (88.2)	255 (87.3)	407 (87.3)
Unknown	*	*	*	*	*	*	*	*
<b>Birth weight (grams)</b>								
<2,500	16 (13.8)	23 (13.1)	12 (16.2)	16 (13.3)	9 (8.8)	20 (11.8)	37 (12.7)	59 (12.7)
≥2,500	100 (86.2)	153 (86.9)	62 (83.8)	104 (86.7)	93 (91.2)	150 (88.2)	255 (87.3)	407 (87.3)
<b>Apgar at 1 minute</b>								
Critically low (0–3)	*	5 (2.8)	*	*	*	8 (4.7)	*	14 (3.0)
Fairly low (4–6)	12 (10.3)	17 (9.7)	5 (6.8)	9 (7.5)	6 (5.9)	8 (4.7)	23 (7.9)	34 (7.3)
Normal (7+)	101 (87.1)	152 (86.4)	68 (91.9)	110 (91.7)	95 (93.1)	154 (90.6)	264 (90.4)	416 (89.3)
Unknown	*	*	*	*	*	–	*	*
<b>Apgar at 5 minutes</b>								
Critically low (0–3)	*	*	*	*	–	*	*	*
Fairly low (4–6)	*	*	*	*	*	*	*	8 (1.7)
Normal (7+)	113 (97.4)	171 (97.2)	73 (98.6)	119 (99.2)	100 (98.0)	165 (97.1)	286 (97.9)	455 (97.6)
Unknown	*	*	*	*	*	*	*	*

\* numbers suppressed. N: number of births. VPDC: Victorian Perinatal Data Collection.



Table 4.15: Maternal and perinatal characteristics for non-Aboriginal births as reported by VPDC and identified through Matched Data, Grampians, 1999–2008 inclusive

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Births</b>								
Total live births	9,841 (100.0)	8,844 (100.0)	7,176 (100.0)	6,435 (100.0)	7,831 (100.0)	6,947 (100.0)	24,848 (100.0)	22,226 (100.0)
<b>Sex</b>								
Male	5,028 (51.1)	4,532 (51.2)	3,678 (51.3)	3,284 (51.0)	3,937 (50.3)	3,485 (50.2)	12,643 (50.9)	11,301 (50.8)
Female	4,813 (48.9)	4,312 (48.8)	3,498 (48.7)	3,151 (49.0)	3,894 (49.7)	3,462 (49.8)	12,205 (49.1)	10,925 (49.2)
<b>Marital status of mother</b>								
Currently single	1,291 (13.1)	969 (11.0)	1,015 (14.1)	795 (12.4)	1,215 (15.5)	928 (13.4)	3,521 (14.2)	2,692 (12.1)
Married/de facto	8,539 (86.8)	7,868 (89.0)	6,140 (85.6)	5,622 (87.4)	6,575 (84.0)	5,992 (86.3)	21,254 (85.5)	19,482 (87.7)
Unknown	11 (0.1)	7 (0.1)	21 (0.3)	18 (0.3)	41 (0.5)	27 (0.4)	73 (0.3)	52 (0.2)
<b>Maternal age (years)</b>								
≤19	478 (4.9)	387 (4.4)	334 (4.7)	256 (4.0)	346 (4.4)	277 (4.0)	1,158 (4.7)	920 (4.1)
20–29	4,668 (47.4)	4,190 (47.4)	3,150 (43.9)	2,857 (44.4)	3,370 (43.0)	2,986 (43.0)	11,188 (45.0)	10,033 (45.1)
≥30	4,695 (47.7)	4,267 (48.2)	3,691 (51.4)	3,322 (51.6)	4,115 (52.5)	3,684 (53.0)	12,501 (50.3)	11,273 (50.7)
Unknown	–	–	1 (0.0)	–	–	–	1 (0.0)	–
<b>Gestational age (weeks)</b>								
Preterm	718 (7.3)	562 (6.4)	533 (7.4)	389 (6.0)	698 (8.9)	528 (7.6)	1,949 (7.8)	1,479 (6.7)
Term	9,119 (92.7)	8,279 (93.6)	6,641 (92.5)	6,045 (93.9)	7,133 (91.1)	6,419 (92.4)	22,893 (92.1)	20,743 (93.3)
Unknown	4 (0.0)	3 (0.0)	2 (0.0)	1 (0.0)	–	–	6 (0.0)	4 (0.0)
<b>Plurality</b>								
Single	9,551 (97.1)	8,746 (98.9)	6,899 (96.1)	6,330 (98.4)	7,524 (96.1)	6,860 (98.7)	23,974 (96.5)	21,936 (98.7)
Multiple	290 (2.9)	98 (1.1)	277 (3.9)	105 (1.6)	307 (3.9)	87 (1.3)	874 (3.5)	290 (1.3)
<b>Parity (previous pregnancies)</b>								

	1999–2002			2003–2005			2006–2008			All years (1999–2008)		
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
0	3,595 (36.5)	3,245 (36.7)	2,887 (40.2)	2,576 (40.0)	3,008 (38.4)	2,671 (38.4)	3,008 (38.4)	2,671 (38.4)	9,490 (38.2)	8,492 (38.2)	9,490 (38.2)	8,492 (38.2)
1–2	5,037 (51.7)	4,597 (52.0)	3,574 (49.8)	3,248 (50.5)	4,027 (51.4)	3,601 (51.8)	4,027 (51.4)	3,601 (51.8)	12,688 (51.1)	11,446 (51.5)	12,688 (51.1)	11,446 (51.5)
≥3	1,159 (11.8)	1,002 (11.3)	715 (10.0)	611 (9.5)	796 (10.2)	675 (9.7)	796 (10.2)	675 (9.7)	2,670 (10.7)	2,288 (10.3)	2,670 (10.7)	2,288 (10.3)
<b>Birth weight (grams) (cats)</b>												
<1,500	100 (1.0)	71 (0.8)	98 (1.4)	61 (0.9)	85 (1.1)	63 (0.9)	85 (1.1)	63 (0.9)	283 (1.1)	195 (0.9)	283 (1.1)	195 (0.9)
1,500–2,499	503 (5.1)	386 (4.4)	400 (5.6)	290 (4.5)	426 (5.4)	302 (4.3)	426 (5.4)	302 (4.3)	1,329 (5.3)	978 (4.4)	1,329 (5.3)	978 (4.4)
≥2,500	9,238 (93.9)	8,387 (94.8)	6,677 (93.0)	6,083 (94.5)	7,320 (93.5)	6,582 (94.7)	7,320 (93.5)	6,582 (94.7)	23,235 (93.5)	21,052 (94.7)	23,235 (93.5)	21,052 (94.7)
Unknown	–	–	1 (0.0)	1 (0.0)	–	–	–	–	1 (0.0)	1 (0.0)	1 (0.0)	1 (0.0)
<b>Birth weight (grams)</b>												
<2,500	603 (6.1)	457 (5.2)	498 (6.9)	351 (5.5)	511 (6.5)	365 (5.3)	511 (6.5)	365 (5.3)	1,612 (6.5)	1,173 (5.3)	1,612 (6.5)	1,173 (5.3)
≥2,500	9,238 (93.9)	8,387 (94.8)	6,677 (93.0)	6,083 (94.5)	7,320 (93.5)	6,582 (94.7)	7,320 (93.5)	6,582 (94.7)	23,235 (93.5)	21,052 (94.7)	23,235 (93.5)	21,052 (94.7)
Unknown	–	–	1 (0.0)	1 (0.0)	–	–	–	–	1 (0.0)	1 (0.0)	1 (0.0)	1 (0.0)
<b>Apgar at 1 minute</b>												
Critically low (0–3)	194 (2.0)	163 (1.8)	136 (1.9)	119 (1.8)	155 (2.0)	120 (1.7)	155 (2.0)	120 (1.7)	485 (2.0)	402 (1.8)	485 (2.0)	402 (1.8)
Fairly low (4–6)	954 (9.7)	845 (9.6)	611 (8.5)	553 (8.6)	680 (8.7)	597 (8.6)	680 (8.7)	597 (8.6)	2,245 (9.0)	1,995 (9.0)	2,245 (9.0)	1,995 (9.0)
Normal (7+)	8,671 (88.1)	7,817 (88.4)	6,413 (89.4)	5,753 (89.4)	6,976 (89.1)	6,213 (89.4)	6,976 (89.1)	6,213 (89.4)	22,060 (88.8)	19,783 (89.0)	22,060 (88.8)	19,783 (89.0)
Unknown	22 (0.2)	19 (0.2)	16 (0.2)	10 (0.2)	20 (0.3)	17 (0.2)	20 (0.3)	17 (0.2)	58 (0.2)	46 (0.2)	58 (0.2)	46 (0.2)
<b>Apgar at 5 minutes</b>												
Critically low (0–3)	30 (0.3)	28 (0.3)	24 (0.3)	19 (0.3)	24 (0.3)	17 (0.2)	24 (0.3)	17 (0.2)	78 (0.3)	64 (0.3)	78 (0.3)	64 (0.3)
Fairly low (4–6)	103 (1.0)	84 (0.9)	75 (1.0)	68 (1.1)	117 (1.5)	101 (1.5)	117 (1.5)	101 (1.5)	295 (1.2)	253 (1.1)	295 (1.2)	253 (1.1)
Normal (7+)	9,689 (98.5)	8,715 (98.5)	7,065 (98.5)	6,341 (98.5)	7,668 (97.9)	6,811 (98.0)	7,668 (97.9)	6,811 (98.0)	24,422 (98.3)	21,867 (98.4)	24,422 (98.3)	21,867 (98.4)
Unknown	19 (0.2)	17 (0.2)	12 (0.2)	7 (0.1)	22 (0.3)	18 (0.3)	22 (0.3)	18 (0.3)	53 (0.2)	42 (0.2)	53 (0.2)	42 (0.2)

N: number of births. VPDC: Victorian Perinatal Data Collection.

## Hume

The following tables describe the maternal and perinatal characteristics for Aboriginal (Table 4.16) and non-Aboriginal (Table 4.16) births as reported by VPDC and Matched Data in the Hume region between 1999 and 2008.

The Matched Data reported an additional 345 Aboriginal live births in the period 1999 to 2008 inclusive, which represented a 51% increase in the number of births reported in the VPDC. The proportion of Aboriginal to non-Aboriginal births was 3.5%. The proportion of Aboriginal live births increased over the 10 years: 1999–2002, 2.7%; 2003–2005, 3.5%; 2006–2008, 4.6%.

Between 1999 and 2008, within the Aboriginal birth population, there were fewer male births (48.4%) than female births (51.6%), which differed to the non-Aboriginal population (male, 51.3%; female, 48.7%). The proportion of Aboriginal single mothers at the time of the birth was significantly higher (44.3%) compared with non-Aboriginal single mothers (11.1%).

Between 1999 and 2008 inclusive the proportion of Aboriginal teenage mothers was significantly higher (18.4%) compared with non-Aboriginal teenage mothers (3.8%). This proportion decreased over the years for both Aboriginal (1999–2002, 21.1%; 2003–2005, 18.8%; 2006–2008, 15.9%) and non-Aboriginal mothers (1999–2002, 4.1%; 2003–2005, 3.5%; 2006–2008, 3.8%).

More than 8% of Aboriginal births were preterm (8.3%) compared with 5.9% of non-Aboriginal births. Aboriginal preterm births decreased (1999–2002, 9.3%; 2003–2005, 8.2%; 2006–2008, 7.6%), and proportions of non-Aboriginal preterm births (1999–2002, 5.9%; 2003–2005, 6.1%; 2006–2008, 5.9%) were similar over the 10 years.

The proportions of singleton births (Aboriginal, 99.6%; non-Aboriginal, 98.7%) and first live births (Aboriginal, 37.2%; non-Aboriginal 37.1%) were similar in both populations. However, the

proportion of births with a parity of three or more previous births was higher among the Aboriginal population (17.0%) compared with the non-Aboriginal population (10.3%).

Over the 10 years the proportions of Aboriginal infants born with very low (1.7%) and low (8.5%) birth weights were higher than non-Aboriginal infants born with very low (0.9%) and low (4.3%) birth weights. As the numbers within these two categories for Aboriginal populations within the three birth cohorts were less than five, the categories have been combined and reported for <2500 grams. The proportion of Aboriginal infants with birth weights <2500 grams increased over the 10 years (1999–2002, 8.9%; 2003–2005, 9.9%; 2006–2008, 11.2%). The proportions of birth weights <2500 grams decreased very slightly across the years among the non-Aboriginal population (1999–2002, 5.3%; 2003–2005, 4.9%; 2006–2008, 5.2%).

The proportion of infants who had a 'normal' Apgar score after five minutes was slightly lower among the Aboriginal population (97.6%) compared with the non-Aboriginal population (98.4%).

**Case study:** Over the 10-year period, as observed through the analysis of the Matched Data, the proportion of Aboriginal births in Hume increased from 2.7% to 4.6% of the regional birth population, and represented 10.9% of Aboriginal births in Victoria. There was a 51% increase in the number of births identified as a result of the Matched Data. However, among the Aboriginal birth population, 18.4% of births (compared with 3.8% non-Aboriginal) in this region were to teenage mothers (this proportion decreased over the years); 8.3% of Aboriginal (compared with 5.9% non-Aboriginal) births were preterm (decreased over the years), and 10.1% of Aboriginal infants (compared with 5.2% non-Aboriginal) were born <2500 grams (the proportions of the latter two outcomes increased over the years).





Table 4.16: Maternal and perinatal characteristics for Aboriginal births as reported by VPDC and identified through Matched Data, Hume, 1999–2008 inclusive

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Births</b>								
Total live births	222 (100.0)	302 (100.0)	161 (100.0)	294 (100.0)	287 (100.0)	419 (100.0)	670 (100.0)	1,015 (100.0)
<b>Sex</b>								
Male	93 (41.9)	136 (45.0)	83 (51.6)	144 (49.0)	141 (49.1)	211 (50.4)	317 (47.3)	491 (48.4)
Female	129 (58.1)	166 (44.0)	78 (48.4)	150 (51.0)	146 (50.9)	208 (49.6)	353 (52.7)	524 (51.6)
<b>Marital status of mother</b>								
Currently single	110 (49.5)	126 (41.7)	70 (43.5)	126 (42.9)	153 (53.3)	198 (47.3)	333 (49.7)	450 (44.3)
Married/de facto	111 (50.0)	176 (58.3)	91 (56.5)	168 (57.1)	134 (46.7)	221 (52.7)	336 (50.1)	565 (55.7)
Unknown	1 (0.5)	–	–	–	–	–	1 (0.1)	–
<b>Maternal age (years) (cats)</b>								
≤19	56 (25.2)	48 (21.1)	29 (18.0)	34 (18.8)	43 (15.0)	45 (15.9)	128 (19.1)	127 (18.4)
20–29	120 (54.1)	137 (60.1)	98 (60.9)	101 (55.8)	159 (55.4)	160 (56.5)	377 (56.3)	398 (57.5)
≥30	46 (20.7)	43 (18.9)	34 (21.1)	46 (25.4)	85 (29.6)	78 (27.6)	165 (24.6)	167 (24.1)
<b>Gestational age (weeks) (cats)</b>								
Preterm	30 (13.5)	28 (9.3)	20 (12.4)	24 (8.2)	19 (6.6)	32 (7.6)	69 (10.3)	84 (8.3)
Term	192 (86.5)	274 (90.7)	140 (87.0)	269 (91.5)	268 (93.4)	387 (92.4)	600 (89.6)	930 (91.6)
Unknown	–	–	1 (0.6)	1 (0.3)	–	–	1 (0.1)	1 (0.1)
<b>Plurality</b>								
Single	220 (99.1)	302 (100.0)	149 (92.5)	290 (98.6)	285 (99.3)	419 (100.0)	654 (97.6)	1,011 (99.6)
Multiple	*	–	12 (7.5)	*	*	–	16 (2.4)	*
Unknown	*	–	–	*	*	–	*	*
<b>Parity (previous pregnancies)</b>								
0	78 (35.1)	102 (33.8)	53 (32.9)	110 (37.4)	102 (35.5)	166 (39.6)	233 (34.8)	378 (37.2)
1–2	106 (47.7)	154 (51.0)	80 (49.7)	133 (45.2)	120 (41.8)	177 (42.2)	306 (45.7)	464 (45.7)
3 plus	38 (17.1)	46 (15.2)	28 (17.4)	51 (17.3)	65 (22.6)	76 (18.1)	131 (19.6)	173 (17.0)



Table 4.16 continued...

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Birth weight (grams) (cats)</b>								
<1,500	*	*	*	*	*	11 (2.6)	*	17 (1.7)
1,500–2,499	*	*	*	*	*	36 (8.6)	*	86 (8.5)
≥2,500	196 (88.3)	275 (91.1)	140 (87.0)	265 (90.1)	256 (89.2)	372 (88.8)	592 (88.4)	912 (89.9)
<b>Birth weight (grams)</b>								
<2,500	26 (11.7)	27 (8.9)	21 (13.0)	29 (9.9)	31 (10.8)	47 (11.2)	78 (11.6)	103 (10.1)
≥2,500	196 (88.3)	275 (91.1)	140 (87.0)	265 (90.1)	256 (89.2)	372 (88.8)	592 (88.4)	912 (89.9)
<b>Apgar at 1 minute</b>								
Critically low (0–3)	*	6 (2.0)	*	6 (2.0)	9 (3.1)	10 (2.4)	15 (2.2)	22 (2.2)
Fairly low (4–6)	31 (14.0)	40 (13.2)	17 (10.6)	22 (7.5)	32 (11.1)	44 (10.5)	80 (11.9)	106 (10.4)
Normal (7+)	186 (83.8)	255 (84.4)	142 (88.2)	266 (90.5)	246 (85.7)	365 (87.1)	574 (85.7)	886 (87.3)
Unknown	*	*	*	–	–	–	*	*
<b>Apgar at 5 minutes</b>								
Critically low (0–3)	*	*	*	*	*	*	*	7 (0.7)
Fairly low (4–6)	*	*	*	*	9 (3.1)	10 (2.4)	13 (1.9)	16 (1.6)
Normal (7+)	217 (97.7)	295 (97.7)	159 (98.8)	289 (98.3)	276 (96.2)	407 (97.1)	652 (97.3)	991 (97.6)
Unknown	*	*	*	*	*	*	*	*

\* numbers suppressed. N: number of births. VPDC: Victorian Perinatal Data Collection.



Table 4.17: Maternal and perinatal characteristics for non-Aboriginal births as reported by VPDC and identified through Matched Data, Hume, 1999–2008 inclusive

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Births</b>								
Total live births	12,432 (100.0)	11,040 (100.0)	9,129 (100.0)	8,073 (100.0)	9,884 (100.0)	8,736 (100.0)	31,445 (100.0)	27,849 (100.0)
<b>Sex</b>								
Male	6,355 (51.1)	5,645 (51.1)	4,651 (50.9)	4,148 (51.4)	5,114 (51.7)	4,506 (51.6)	16,120 (51.3)	14,299 (51.3)
Female	6,076 (48.9)	5,395 (48.9)	4,477 (49.0)	3,925 (48.6)	4,770 (48.3)	4,230 (48.4)	15,323 (48.7)	13,550 (48.7)
Indeterminate*	–	–	–	–	–	–	*	–
Unknown	*	–	1 (0.0)	–	–	–	*	–
<b>Marital status of mother</b>								
Currently single	1,544 (12.4)	1,152 (10.4)	1,269 (13.9)	929 (11.5)	1,368 (13.8)	1,003 (11.5)	4,181 (13.3)	3,084 (11.1)
Married/de facto	10,881 (87.5)	9,882 (89.5)	7,853 (86.0)	7,138 (88.4)	8,485 (85.8)	7,705 (88.2)	27,219 (86.6)	24,725 (88.8)
Unknown	7 (0.1)	6 (0.1)	7 (0.1)	6 (0.1)	31 (0.3)	28 (0.3)	45 (0.1)	40 (0.1)
<b>Maternal age (years)</b>								
≤19	572 (4.6)	453 (4.1)	383 (4.2)	284 (3.5)	415 (4.2)	332 (3.8)	1,370 (4.4)	1,069 (3.8)
20–29	6,089 (49.0)	5,393 (48.8)	4,120 (45.1)	3,633 (45.0)	4,397 (44.5)	3,833 (43.9)	14,606 (46.4)	12,859 (46.2)
≥30	5,771 (46.4)	5,194 (47.0)	4,626 (50.7)	4,156 (51.5)	5,072 (51.3)	4,571 (52.3)	15,469 (49.2)	13,921 (50.0)
<b>Gestational age (weeks)</b>								
Preterm	888 (7.1)	647 (5.9)	657 (7.2)	490 (6.1)	698 (7.1)	513 (5.9)	2,243 (7.1)	1,650 (5.9)
Term	11,540 (92.8)	10,390 (94.1)	8,472 (92.8)	7,583 (93.9)	9,185 (92.9)	8,222 (94.1)	29,197 (92.9)	26,195 (94.1)
Unknown	4 (0.0)	3 (0.0)	–	–	1 (0.0)	1 (0.0)	5 (0.0)	4 (0.0)
<b>Plurality</b>								
Single	12,016 (96.7)	10,931 (99.0)	8,837 (96.8)	7,969 (98.7)	9,524 (96.4)	8,593 (98.4)	30,377 (96.6)	27,493 (98.7)
Multiple	416 (3.3)	109 (1.0)	292 (3.2)	104 (1.3)	360 (3.6)	143 (1.6)	1,068 (3.4)	356 (1.3)





Table 4.17 continued...

	1999–2002			2003–2005			2006–2008			All years (1999–2008)		
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Parity (previous pregnancies)</b>												
0	4,477 (36.0)	3,988 (36.1)	3,447 (37.8)	3,044 (37.7)	3,727 (37.7)	3,295 (37.7)	11,651 (37.1)	10,327 (37.1)				
1–2	6,601 (53.1)	5,899 (53.4)	4,665 (51.1)	4,192 (51.9)	5,082 (51.4)	4,549 (52.1)	16,348 (52.0)	14,640 (52.6)				
≥3	1,354 (10.9)	1,153 (10.4)	1,017 (11.1)	837 (10.4)	1,075 (10.9)	892 (10.2)	3,446 (11.0)	2,882 (10.3)				
<b>Birth weight (grams) (cats)</b>												
<1,500	155 (1.2)	104 (0.9)	108 (1.2)	72 (0.9)	105 (1.1)	70 (0.8)	368 (1.2)	246 (0.9)				
1,500–2,499	651 (5.2)	485 (4.4)	456 (5.0)	327 (4.1)	542 (5.5)	383 (4.4)	1,649 (5.2)	1,195 (4.3)				
≥2,500	11,623 (93.5)	10,448 (94.6)	8,564 (93.8)	7,674 (95.1)	9,236 (93.4)	8,282 (94.8)	29,423 (93.6)	26,404 (94.8)				
Unknown	3 (0.0)	3 (0.0)	1 (0.0)	–	1 (0.0)	1 (0.0)	5 (0.0)	4 (0.0)				
<b>Birth weight (grams)</b>												
<2,500	806 (6.5)	589 (5.3)	564 (6.2)	399 (4.9)	647 (6.5)	453 (5.2)	2,017 (6.4)	1,441 (5.2)				
≥2,500	11,623 (93.5)	10,448 (94.6)	8,564 (93.8)	7,674 (95.1)	9,236 (93.4)	8,282 (94.8)	29,423 (93.6)	26,404 (94.8)				
Unknown	3 (0.0)	3 (0.0)	1 (0.0)	–	1 (0.0)	1 (0.0)	5 (0.0)	4 (0.0)				
<b>Apgar at 1 minute</b>												
Critically low (0–3)	277 (2.2)	243 (2.2)	197 (2.2)	158 (2.0)	177 (1.8)	149 (1.7)	651 (2.1)	550 (2.0)				
Fairly low (4–6)	1,430 (11.5)	1,250 (11.3)	974 (10.7)	860 (10.7)	888 (9.0)	769 (8.8)	3,292 (10.5)	2,879 (10.3)				
Normal (7+)	10,707 (86.1)	9,533 (86.3)	7,942 (87.0)	7,046 (87.3)	8,795 (89.0)	7,800 (89.3)	27,444 (87.3)	24,379 (87.5)				
Unknown	18 (0.1)	14 (0.1)	16 (0.2)	9 (0.1)	24 (0.2)	18 (0.2)	58 (0.2)	41 (0.1)				
<b>Apgar at 5 minutes</b>												
Critically low (0–3)	44 (0.4)	38 (0.3)	38 (0.4)	26 (0.3)	27 (0.3)	23 (0.3)	109 (0.3)	87 (0.3)				
Fairly low (4–6)	155 (1.2)	133 (1.2)	121 (1.3)	98 (1.2)	121 (1.2)	98 (1.1)	397 (1.3)	329 (1.2)				
Normal (7+)	12,216 (98.3)	10,855 (98.3)	8,955 (98.1)	7,940 (98.4)	9,716 (98.3)	8,601 (98.5)	30,887 (98.2)	27,396 (98.4)				
Unknown	17 (0.1)	14 (0.1)	15 (0.2)	9 (0.1)	20 (0.2)	14 (0.2)	52 (0.2)	37 (0.1)				

\* numbers suppressed. N: number of births. VPDC: Victorian Perinatal Data Collection.

## Gippsland

The following tables describe the maternal and perinatal characteristics for Aboriginal (Table 4.18) and non-Aboriginal (Table 4.19) births as reported by VPDC and Matched Data in the Gippsland region between 1999 and 2008.

The Matched Data reported an additional 343 Aboriginal live births in the period 1999–2008 inclusive, which represented a 58% increase in the number of births reported in the VPDC. The proportion of Aboriginal to non-Aboriginal births was 3.7%. The proportion of Aboriginal live births increased over the 10 years: 1999–2002, 3.4%; 2003–2005, 3.6%; 2006–2008, 4.1%.

Between 1999 and 2008, within the birth population, there were more male than female births in both populations (Aboriginal, male, 51.6%; female, 48.4%; non-Aboriginal, male, 50.8%; female, 49.2%). The proportion of Aboriginal single mothers at the time of the birth was significantly higher (45.6%) compared with non-Aboriginal single mothers (13.8%).

Between 1999 and 2008 inclusive the proportion of Aboriginal teenage mothers was significantly higher (22.1%) compared with non-Aboriginal teenage mothers (4.8%). This proportion increased over the years for Aboriginal mothers (1999–2002, 20.2%; 2003–2005, 25.4%; 2006–2008, 21.2%) and decreased among non-Aboriginal mothers (1999–2002, 5.2%; 2003–2005, 4.6%; 2006–2008, 4.5%).

Nearly 12% of Aboriginal births were preterm (11.6%) compared with 6.5% of non-Aboriginal births. The proportion of preterm births remained similar within each population (Aboriginal, 1999–2002, 11.7%; 2003–2005, 11.3%; 2006–2008, 11.7%; non-Aboriginal, 1999–2002, 6.4%; 2003–2005, 6.6%; 2006–2008, 6.4%) over the 10 years.

The proportions of singleton births were the same in both populations (98.8%). The proportion of first live births was less in the Aboriginal population (34.8%) compared with non-Aboriginal (37.6%). However, the

proportion of Aboriginal births with a parity of three or more previous births was double the proportion in the non-Aboriginal population (Aboriginal, 21.8%; non-Aboriginal, 10.5%).

Over the 10 years the proportion of Aboriginal infants born with very low (2.1%) and low (11.1%) birth weights was significantly higher than non-Aboriginal infants born with very low (0.9%) and low (4.6%) birth weights. The proportion of Aboriginal infants with very low birth weights decreased over the 10 years (1999–2002, 2.4%; 2003–2005, 2.6%; 2006–2008, 1.5%), and low birth weight proportions increased (1999–2002, 11.1%; 2003–2005, 10.6%; 2006–2008, 11.7%). The proportions of very low birth weights were similar across the years among the non-Aboriginal population (0.9%) and low birth weight proportions increased (1999–2002, 4.4%; 2003–2005, 4.7%; 2006–2008, 4.8%). The proportion of Aboriginal infants born <2500 grams (13.3%) was more than double the non-Aboriginal proportion (5.5%).

The proportions of infants who had a ‘normal’ Apgar score after five minutes were similar among the populations (Aboriginal, 98.9%; non-Aboriginal, 98.5%).

**Case study:** Over the 10-year period, as observed through the analysis of the Matched Data, the proportion of Aboriginal births in Gippsland increased from 3.4% to 4.1% of the regional birth population, and represented 10.0% of Aboriginal births in Victoria. There was a 58% increase in the number of births identified as a result of the Matched Data. However, among the Aboriginal birth population, 22.1% of births (compared with 4.8% non-Aboriginal) in this region were to teenage mothers (this proportion increased over the years); 11.6% of Aboriginal births were preterm (compared with 6.5% non-Aboriginal), and 13.3% (compared with 5.5% non-Aboriginal) of the infants were born <2500 grams (the proportions of the latter outcome were similar over the years).





Table 4.18: Maternal and perinatal characteristics for Aboriginal births as reported by VPDC and identified through Matched Data, Gippsland, 1999–2008 inclusive

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Births</b>								
Total live births	237 (100.0)	334 (100.0)	156 (100.0)	265 (100.0)	197 (100.0)	334 (100.0)	590 (100.0)	933 (100.0)
<b>Sex</b>								
Male	130 (54.9)	174 (52.1)	67 (42.9)	137 (51.7)	111 (56.3)	170 (50.9)	308 (52.2)	481 (51.6)
Female	107 (45.1)	160 (47.9)	89 (57.1)	128 (48.3)	86 (43.7)	164 (49.1)	282 (47.8)	452 (48.4)
<b>Marital status of mother</b>								
Currently single	108 (45.6)	139 (41.6)	71 (45.5)	121 (45.7)	95 (48.2)	165 (49.4)	274 (46.4)	425 (45.6)
Married/de facto	129 (54.4)	194 (58.1)	85 (54.5)	144 (54.3)	102 (51.8)	169 (50.6)	316 (53.6)	507 (54.3)
Unknown	–	1 (0.3)	–	–	–	–	–	1 (0.1)
<b>Maternal age (years) (cats)</b>								
≤19	41 (17.3)	46 (20.2)	41 (26.3)	46 (25.4)	41 (20.8)	45 (21.2)	123 (20.8)	137 (22.1)
20–29	131 (55.3)	117 (51.3)	85 (54.5)	96 (53.0)	109 (55.3)	115 (54.2)	325 (55.1)	328 (52.8)
≥30	65 (27.4)	65 (28.5)	30 (19.2)	39 (21.5)	47 (23.9)	52 (24.5)	142 (24.1)	156 (25.1)
<b>Gestational age (weeks) (cats)</b>								
Preterm	36 (15.2)	39 (11.7)	25 (16.0)	30 (11.3)	23 (11.7)	39 (11.7)	84 (14.2)	108 (11.6)
Term	201 (84.8)	295 (88.3)	131 (84.0)	235 (88.7)	174 (88.3)	295 (88.3)	506 (85.8)	825 (88.4)
<b>Plurality</b>								
Single	226 (95.4)	330 (98.8)	154 (98.7)	265 (100.0)	192 (97.5)	192 (97.5)	572 (96.9)	922 (98.8)
Multiple	11 (4.6)	*	*	–	5 (2.5)	5 (2.5)	18 (3.1)	11 (1.2)
Unknown	–	*	*	–	–	–	*	*
<b>Parity (previous pregnancies)</b>								
0	59 (24.9)	102 (30.5)	65 (41.7)	110 (41.5)	63 (32.0)	113 (33.8)	187 (31.7)	325 (34.8)
1–2	105 (44.3)	146 (43.7)	57 (36.5)	112 (42.3)	85 (43.1)	147 (44.0)	247 (41.9)	405 (43.4)
≥3	73 (30.8)	86 (25.7)	34 (21.8)	43 (16.2)	49 (24.9)	74 (22.2)	156 (26.4)	203 (21.8)



	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Birth weight (grams) (cats)</b>								
<1,500	8 (3.4)	8 (2.4)	7 (4.5)	7 (2.6)	*	5 (1.5)	19 (3.2)	20 (2.1)
1,500–2,499	36 (15.2)	37 (11.1)	21 (13.5)	28 (10.6)	28 (14.2)	39 (11.7)	85 (14.4)	104 (11.1)
≥2,500	193 (81.4)	289 (86.5)	128 (82.1)	230 (86.8)	165 (83.8)	290 (86.8)	486 (82.4)	809 (86.7)
Unknown	–	–	–	–	*	–	*	–
<b>Birth weight (grams)</b>								
<2,500	44 (18.6)	45 (13.5)	28 (17.9)	35 (13.2)	32 (16.2)	44 (13.2)	104 (17.6)	124 (13.3)
≥2,500	193 (81.4)	289 (86.5)	128 (82.1)	230 (86.8)	165 (83.8)	290 (86.8)	486 (82.4)	809 (86.7)
<b>Apgar at 1 minute</b>								
Critically low (0–3)	*	*	*	6 (2.3)	*	*	10 (1.7)	10 (1.1)
Fairly low (4–6)	21 (8.9)	26 (7.8)	12 (7.7)	18 (6.8)	16 (8.1)	28 (8.4)	49 (8.3)	72 (7.7)
Normal (7+)	210 (88.6)	303 (90.7)	139 (89.1)	240 (90.6)	178 (90.4)	304 (91.0)	527 (89.3)	847 (90.8)
Unknown	*	*	*	1 (0.4)	–	–	*	*
<b>Apgar at 5 minutes</b>								
Critically low (0–3)	*	*	*	*	*	*	6 (1.0)	*
Fairly low (4–6)	*	*	*	*	*	–	5 (0.8)	*
Normal (7+)	231 (97.5)	330 (98.8)	151 (96.8)	260 (98.1)	193 (98.0)	333 (99.7)	575 (97.5)	923 (98.9)
Unknown	*	*	*	*	*	*	4 (0.7)	*

\* numbers suppressed. N: number of births. VPDC: Victorian Perinatal Data Collection.





Table 4.19: Maternal and perinatal characteristics for non-Aboriginal births as reported by VPDC and identified through Matched Data, Gippsland, 1999–2008 inclusive

	1999–2002			2003–2005			2006–2008			All years (1999–2008)		
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Births</b>												
Total live births	10,780 (100.0)	9,494 (100.0)	7,920 (100.0)	7,040 (100.0)	8,717 (100.0)	7,722 (100.0)	27,417 (100.0)	24,256 (100.0)				
<b>Sex</b>												
Male	5,475 (50.8)	4,811 (50.7)	4,037 (51.0)	3,600 (51.1)	4,451 (51.1)	3,914 (50.7)	13,963 (50.9)	12,325 (50.8)				
Female	5,304 (49.2)	4,683 (49.3)	3,883 (49.0)	3,440 (48.9)	4,266 (48.9)	3,808 (49.3)	13,453 (49.1)	11,931 (49.2)				
Indeterminate	*	–	–	–	–	–	*	–				
Unknown	*	–	–	–	–	–	*	–				
<b>Marital status of mother</b>												
Currently single	1,608 (14.9)	1,189 (12.5)	1,307 (16.5)	999 (14.2)	1,516 (17.4)	1,153 (14.9)	4,431 (16.2)	3,341 (13.8)				
Married/de facto	9,166 (85.0)	8,300 (87.4)	6,607 (83.4)	6,035 (85.7)	7,195 (82.5)	6,564 (85.0)	22,988 (83.8)	20,899 (86.2)				
Unknown	6 (0.1)	5 (0.1)	6 (0.1)	6 (0.1)	6 (0.1)	5 (0.1)	18 (0.1)	16 (0.1)				
<b>Maternal age (years) (cats)</b>												
≤ 19	625 (5.8)	489 (5.2)	414 (5.2)	326 (4.6)	455 (5.2)	349 (4.5)	1,494 (5.4)	1,164 (4.8)				
20–29	5,605 (52.0)	4,967 (52.3)	3,799 (48.0)	3,402 (48.3)	4,286 (49.2)	3,789 (49.1)	13,690 (49.9)	12,158 (50.1)				
≥30	4,550 (42.2)	4,038 (42.5)	3,707 (46.8)	3,312 (47.0)	3,976 (45.6)	3,584 (46.4)	12,233 (44.6)	10,934 (45.1)				
<b>Gestational age (weeks)</b>												
Preterm	867 (8.0)	609 (6.4)	621 (7.8)	466 (6.6)	695 (8.0)	497 (6.4)	2,183 (8.0)	1,572 (6.5)				
Term	9,913 (92.0)	8,885 (93.6)	7,299 (92.2)	6,574 (93.4)	8,021 (92.0)	7,225 (93.6)	25,233 (92.0)	22,684 (93.5)				
Unknown	–	–	–	–	1 (0.0)	–	1 (0.0)	–				
<b>Plurality</b>												
Single	10,428 (96.7)	9,399 (99.0)	7,639 (96.5)	6,943 (98.6)	8,409 (96.5)	7,618 (98.7)	26,476 (96.6)	23,960 (98.8)				
Multiple	352 (3.3)	95 (1.0)	281 (3.5)	97 (1.4)	308 (3.5)	104 (1.3)	941 (3.4)	296 (1.2)				



	1999–2002			2003–2005			2006–2008			All years (1999–2008)		
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Parity (previous pregnancies)</b>												
0	4,010 (37.2)	3,503 (36.9)	2,963 (37.4)	2,621 (37.2)	3,386 (38.8)	3,000 (38.9)	10,359 (37.8)	9,124 (37.6)				
1–2	5,562 (51.6)	4,968 (52.3)	4,135 (52.2)	3,713 (52.7)	4,371 (50.1)	3,911 (50.6)	14,068 (51.3)	12,592 (51.9)				
≥3	1,208 (11.2)	1,023 (10.8)	822 (10.4)	706 (10.0)	960 (11.0)	811 (10.5)	2,990 (10.9)	2,540 (10.5)				
<b>Birth weight (grams) (cats)</b>												
<1,500	139 (1.3)	82 (0.9)	84 (1.1)	64 (0.9)	94 (1.1)	69 (0.9)	317 (1.2)	215 (0.9)				
1,500–2,499	603 (5.6)	417 (4.4)	456 (5.8)	329 (4.7)	530 (6.1)	370 (4.8)	1,589 (5.8)	1,116 (4.6)				
≥2,500	10,036 (93.1)	8,994 (94.7)	7,379 (93.2)	6,646 (94.4)	8,091 (92.8)	7,283 (94.3)	25,506 (93.0)	22,923 (94.5)				
Unknown	2 (0.0)	1 (0.0)	1 (0.0)	1 (0.0)	2 (0.0)	–	5 (0.0)	2 (0.0)				
<b>Birth weight (grams)</b>												
<2,500	742 (6.9)	499 (5.3)	540 (6.8)	393 (5.6)	624 (7.2)	439 (5.7)	1,906 (7.0)	1,331 (5.5)				
≥2,500	10,036 (93.1)	8,994 (94.7)	7,379 (93.2)	6,646 (94.4)	8,091 (92.8)	7,283 (94.3)	25,506 (93.0)	22,923 (94.5)				
Unknown	2 (0.0)	1 (0.0)	1 (0.0)	1 (0.0)	2 (0.0)	–	5 (0.0)	2 (0.0)				
<b>Apgar at 1 minute</b>												
Critically low (0–3)	226 (2.1)	198 (2.1)	169 (2.1)	138 (2.0)	141 (1.6)	116 (1.5)	536 (2.0)	452 (1.9)				
Fairly low (4–6)	1,082 (10.0)	957 (10.1)	759 (9.6)	659 (9.4)	731 (8.4)	629 (8.1)	2,572 (9.4)	2,245 (9.3)				
Normal (7+)	9,454 (87.7)	8,322 (87.7)	6,986 (88.2)	6,237 (88.6)	7,833 (89.9)	6,969 (90.2)	24,273 (88.5)	21,528 (88.8)				
Unknown	18 (0.2)	17 (0.2)	6 (0.1)	6 (0.1)	12 (0.1)	8 (0.1)	36 (0.1)	31 (0.1)				
<b>Apgar at 5 minutes</b>												
Critically low (0–3)	34 (0.3)	28 (0.3)	35 (0.4)	26 (0.4)	19 (0.2)	15 (0.2)	88 (0.3)	69 (0.3)				
Fairly low (4–6)	133 (1.2)	111 (1.2)	85 (1.1)	70 (1.0)	103 (1.2)	84 (1.1)	321 (1.2)	265 (1.1)				
Normal (7+)	10,597 (98.3)	9,339 (98.4)	7,795 (98.4)	6,939 (98.6)	8,584 (98.5)	7,615 (98.6)	26,976 (98.4)	23,893 (98.5)				
Unknown	16 (0.1)	16 (0.2)	5 (0.1)	5 (0.1)	11 (0.1)	8 (0.1)	32 (0.1)	29 (0.1)				

\*number suppressed. N: number of births. VPDC: Victorian Perinatal Data Collection.



## Western Metro

The following tables describe the maternal and perinatal characteristics for Aboriginal (Table 4.20) and non-Aboriginal (Table 4.21) births as reported by VPDC and Matched Data in the Western Metro region between 1999 and 2008.

The Matched Data reported an additional 626 Aboriginal live births in the period 1999–2008 inclusive, which represented a 269% increase in the number of births reported in the VPDC. The proportion of Aboriginal to non-Aboriginal births was 1.0%. The proportion of Aboriginal live births increased over the 10 years: 1999–2002, 0.8%; 2003–2005, 1.1%; 2006–2008, 1.1%.

Between 1999 and 2008, within the birth population, there were fewer male than female births in the Aboriginal population (male, 48.3%; female, 51.7%) and more male than female births in the non-Aboriginal population (male, 51.2%; female, 48.8%). The proportion of Aboriginal single mothers at the time of the birth was significantly higher (38.4%) compared with non-Aboriginal single mothers (13.7%).

Between 1999 and 2008 inclusive the proportion of Aboriginal teenage mothers was significantly higher (8.2%) compared with non-Aboriginal teenage mothers (2.1%). This proportion decreased over the years for both populations (Aboriginal, 1999–2002, 11.3%; 2003–2005, 7.3%; 2006–2008, 6.3%; non-Aboriginal, 1999–2002, 2.5%; 2003–2005, 2.1%; 2006–2008, 1.8%).

More than 9% of Aboriginal births were preterm (9.4%) compared with 6.4% of non-Aboriginal births. The proportion of preterm births increased within the Aboriginal population (Aboriginal, 1999–2002, 8.6%; 2003–2005, 8.6%; 2006–2008, 10.7%) and remained similar within the non-Aboriginal population (1999–2002, 6.4%; 2003–2005, 6.3%; 2006–2008, 6.4%) over the 10 years.

The proportions of singleton births were similar in both populations (Aboriginal, 98.5%; non-Aboriginal, 98.7%). The proportion of first

live births was less in the Aboriginal population (40.3%) compared with non-Aboriginal (45.2%). However, the proportion of Aboriginal births with a parity of three or more previous births was more than double the proportion in the non-Aboriginal population (Aboriginal, 16.1%; non-Aboriginal, 7.0%).

Over the 10 years the proportion of Aboriginal infants born with very low (1.4%) and low (7.5%) birth weights was significantly higher than non-Aboriginal infants born with very low (0.9%) and low (4.5%) birth weights. As the numbers within these two categories for Aboriginal populations within the three birth cohorts were less than five in some cells, the categories have been combined and reported for <2500 grams. The proportion of Aboriginal infants with birth weights <2500 grams decreased over the 10 years (1999–2002, 9.0%; 2003–2005, 9.3%; 2006–2008, 8.4%). The proportions of birth weights <2500 grams were similar across the years among the non-Aboriginal population (1999–2002, 5.5%; 2003–2005, 5.5%; 2006–2008, 5.3%).

The proportion of infants who had a 'normal' Apgar score after five minutes was less among the Aboriginal population (Aboriginal 97.8%; non-Aboriginal 98.8%).

**Case study:** Over the 10-year period, as observed through the analysis of the Matched Data, the proportion of Aboriginal births in Western Metro increased from 0.8% to 1.1% of the regional birth population, and represented 9.2% of Aboriginal births in Victoria. There was a 269% increase in the number of births identified as a result of the Matched Data. However, among the Aboriginal birth population 8.2% of births (compared with 2.1% non-Aboriginal) in this region were to teenage mothers (this proportion decreased over the years); 9.4% of Aboriginal births (compared with 6.4% non-Aboriginal) were preterm (an increase over the years), and 8.8% of Aboriginal infants (compared with 5.4% non-Aboriginal) were born <2500 grams (the proportions of the latter outcome decreased over the years).



Table 4.20: Maternal and perinatal characteristics for Aboriginal births as reported by VPDC and identified through Matched Data, Western Metro, 1999–2008 inclusive

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Births</b>								
Total live births	65 (100.0)	255 (100.0)	57 (100.0)	269 (100.0)	111 (100.0)	335 (100.0)	233 (100.0)	859 (100.0)
<b>Sex</b>								
Male	32 (49.2)	126 (49.4)	27 (47.4)	130 (48.3)	55 (49.5)	159 (47.5)	114 (48.9)	415 (48.3)
Female	33 (50.8)	129 (50.6)	30 (52.6)	139 (51.7)	56 (50.5)	176 (52.5)	119 (51.1)	444 (51.7)
<b>Marital status of mother</b>								
Currently single	31 (47.7)	114 (44.7)	27 (47.4)	108 (40.1)	43 (38.7)	108 (32.2)	101 (43.3)	330 (38.4)
Married/de facto	34 (52.3)	141 (55.3)	30 (52.6)	161 (59.9)	67 (60.4)	226 (67.5)	131 (56.2)	528 (61.5)
Unknown	–	–	–	–	1 (0.9)	1 (0.3)	1 (0.4)	1 (0.1)
<b>Maternal age (years) (cats)</b>								
≤19	8 (12.3)	20 (11.3)	5 (8.8)	13 (7.3)	8 (7.2)	13 (6.3)	21 (9.0)	46 (8.2)
20–29	40 (61.5)	105 (59.3)	30 (52.6)	97 (54.5)	57 (51.4)	104 (50.0)	127 (54.5)	306 (54.4)
≥30	17 (26.2)	52 (29.4)	22 (38.6)	68 (38.2)	46 (41.4)	91 (43.8)	85 (36.5)	211 (37.5)
<b>Gestational age (weeks) (cats)</b>								
Preterm	5 (7.7)	22 (8.6)	7 (12.3)	23 (8.6)	17 (15.3)	36 (10.7)	29 (12.4)	81 (9.4)
Term	60 (92.3)	233 (91.4)	50 (87.7)	246 (91.4)	94 (84.7)	299 (89.3)	204 (87.6)	778 (90.6)
<b>Plurality</b>								
Single	65 (100.0)	251 (98.4)	55 (96.5)	263 (97.8)	105 (94.6)	332 (99.1)	225 (96.6)	846 (98.5)
Multiple	–	*	*	6 (2.2)	6 (5.4)	*	8 (3.4)	13 (1.5)
Unknown	–	*	*	–	–	*	*	*
<b>Parity (previous pregnancies)</b>								
0	29 (44.6)	102 (40.0)	17 (29.8)	103 (38.3)	49 (44.1)	141 (42.1)	95 (40.8)	346 (40.3)
1–2	26 (40.0)	111 (43.5)	29 (50.9)	119 (44.2)	46 (41.4)	145 (43.3)	101 (43.3)	375 (43.7)
≥3	10 (15.4)	42 (16.5)	11 (19.3)	47 (17.5)	16 (14.4)	49 (14.6)	37 (15.9)	138 (16.1)





Table 4.20 continued...

	1999–2002			2003–2005			2006–2008			All years (1999–2008)		
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Birth weight (grams) (cats)</b>												
<1,500	–	*	*	5 (1.9)	6 (1.8)	6 (2.6)	12 (1.4)					
1,500–2,499	7 (10.8)	*	5 (8.8)	*	22 (6.6)	21 (9.0)	64 (7.5)					
≥2,500	58 (89.2)	232 (91.0)	50 (87.7)	244 (90.7)	98 (88.3)	206 (88.4)	783 (91.2)					
Unknown	–	–	*	*	–	*	*					*
<b>Birth weight (grams)</b>												
<2,500	7 (10.8)	23 (9.0)	7 (12.3)	25 (9.3)	13 (11.7)	27 (11.6)	76 (8.8)					
≥2,500	58 (89.2)	232 (91.0)	50 (87.7)	244 (90.7)	98 (88.3)	206 (88.4)	783 (91.2)					
<b>Apgar at 1 minute</b>												
Critically low (0–3)	*	*	*	7 (2.6)	8 (2.4)	12 (5.2)	19 (2.2)					
Fairly low (4–6)	6 (9.2)	28 (11.0)	8 (14.0)	28 (10.4)	28 (8.4)	24 (10.3)	84 (9.8)					
Normal (7+)	56 (86.2)	221 (86.7)	47 (82.5)	234 (87.0)	93 (83.8)	196 (84.1)	753 (87.7)					
Unknown	*	*	*	–	1 (0.3)	1 (0.4)	3 (0.3)					
<b>Apgar at 5 minutes</b>												
Critically low (0–3)	*	*	*	–	*	*	*					*
Fairly low (4–6)	1 (1.5)	*	–	*	8 (2.4)	10 (4.3)	13 (1.5)					
Normal (7+)	62 (95.4)	252 (98.8)	54 (94.7)	263 (97.8)	101 (91.0)	217 (93.1)	840 (97.8)					
Unknown	*	*	*	*	*	*	*					*

\* numbers suppressed. N: number of births. VPDC: Victorian Perinatal Data Collection.



Table 4.21: Maternal and perinatal characteristics for non-Aboriginal births as reported by VPDC and identified through Matched Data, Western Metro, 1999–2008 inclusive

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Births</b>								
Total live births	34,217 (100.0)	29,766 (100.0)	28,242 (100.0)	24,475 (100.0)	33,546 (100.0)	29,518 (100.0)	96,005 (100.0)	83,759 (100.0)
<b>Sex</b>								
Male	17,396 (50.8)	15,121 (50.8)	14,443 (51.1)	12,551 (51.3)	17,216 (51.3)	15,184 (51.4)	49,055 (51.1)	42,856 (51.2)
Female	16,820 (49.2)	14,645 (49.2)	13,797 (48.9)	11,924 (48.7)	16,330 (48.7)	14,334 (48.6)	46,947 (48.9)	40,903 (48.8)
Indeterminate	1 (0.0)	–	2 (0.0)	–	–	–	3 (0.0)	–
<b>Marital status of mother</b>								
Currently single	5,325 (15.6)	4,063 (13.6)	4,438 (15.7)	3,438 (14.0)	4,959 (14.8)	3,963 (13.4)	14,722 (15.3)	11,464 (13.7)
Married/de facto	28,829 (84.3)	25,658 (86.2)	23,703 (83.9)	20,962 (85.6)	28,436 (84.8)	25,437 (86.2)	80,968 (84.3)	72,057 (86.0)
Unknown	63 (0.2)	45 (0.2)	101 (0.4)	75 (0.3)	151 (0.5)	118 (0.4)	315 (0.3)	238 (0.3)
<b>Maternal age (years)</b>								
≤ 19	929 (2.7)	747 (2.5)	646 (2.3)	516 (2.1)	677 (2.0)	527 (1.8)	2,252 (2.3)	1,790 (2.1)
20–29	15,270 (44.6)	13,296 (44.7)	11,175 (39.6)	9,692 (39.6)	12,679 (37.8)	11,136 (37.7)	39,124 (40.8)	34,124 (40.7)
≥30	18,018 (52.7)	15,723 (52.8)	16,421 (58.1)	14,267 (58.3)	20,190 (60.2)	17,855 (60.5)	54,629 (56.9)	47,845 (57.1)
<b>Gestational age (weeks)</b>								
Preterm	2,596 (7.6)	1,904 (6.4)	2,108 (7.5)	1,532 (6.3)	2,594 (7.7)	1,887 (6.4)	7,298 (7.6)	5,323 (6.4)
Term	31,620 (92.4)	27,861 (93.6)	26,134 (92.5)	22,943 (93.7)	30,952 (92.3)	27,631 (93.6)	88,706 (92.4)	78,435 (93.6)
Unknown	1 (0.0)	1 (0.0)	–	–	–	–	1 (0.0)	1 (0.0)
<b>Plurality</b>								
Single	33,101 (96.7)	29,403 (98.8)	27,260 (96.5)	24,096 (98.5)	32,458 (96.8)	29,154 (98.8)	92,819 (96.7)	82,653 (98.7)
Multiple	1,116 (3.3)	363 (1.2)	982 (3.5)	379 (1.5)	1,088 (3.2)	364 (1.2)	3,186 (3.3)	1,106 (1.3)
<b>Parity (previous pregnancies)</b>								
0	14,898 (43.5)	12,956 (43.5)	12,836 (45.5)	11,102 (45.4)	15,628 (46.6)	13,770 (46.6)	43,362 (45.2)	37,828 (45.2)
1–2	16,841 (49.2)	14,730 (49.5)	13,398 (47.4)	11,721 (47.9)	15,396 (45.9)	13,620 (46.1)	45,635 (47.5)	40,071 (47.8)
≥3	2,478 (7.2)	2,080 (7.0)	2,008 (7.1)	1,652 (6.7)	2,522 (7.5)	2,128 (7.2)	7,008 (7.3)	5,860 (7.0)



Table 4.21 continued...

	1999–2002			2003–2005			2006–2008			All years (1999–2008)		
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Birth weight (grams) (cats)</b>												
<1,500	425 (1.2)	292 (1.0)	349 (1.2)	218 (0.9)	403 (1.2)	250 (0.8)	1,177 (1.2)	760 (0.9)				
1,500–2,499	1,879 (5.5)	1,356 (4.6)	1,528 (5.4)	1,132 (4.6)	1,815 (5.4)	1,303 (4.4)	5,222 (5.4)	3,791 (4.5)				
≥2,500	31,912 (93.3)	28,118 (94.5)	26,365 (93.4)	23,125 (94.5)	31,324 (93.4)	27,961 (94.7)	89,601 (93.3)	79,204 (94.6)				
Unknown	1 (0.0)	–	–	–	4 (0.0)	4 (0.0)	5 (0.0)	4 (0.0)				
<b>Birth weight (grams)</b>												
<2,500	2,304 (6.7)	1,648 (5.5)	1,877 (6.6)	1,350 (5.5)	2,218 (6.6)	1,553 (5.3)	6,399 (6.7)	4,551 (5.4)				
≥2,500	31,912 (93.3)	28,118 (94.5)	26,365 (93.4)	23,125 (94.5)	31,324 (93.4)	27,961 (94.7)	89,601 (93.3)	79,204 (94.6)				
Unknown	1 (0.0)	–	–	–	4 (0.0)	4 (0.0)	5 (0.0)	4 (0.0)				
<b>Apgar at 1 minute</b>												
Critically low (0–3)	712 (2.1)	605 (2.0)	585 (2.1)	456 (1.9)	699 (2.1)	555 (1.9)	1,996 (2.1)	1,616 (1.9)				
Fairly low (4–6)	3,553 (10.4)	3,066 (10.3)	2,591 (9.2)	2,196 (9.0)	2,521 (7.5)	2,169 (7.3)	8,665 (9.0)	7,431 (8.9)				
Normal (7+)	29,918 (87.4)	26,067 (87.6)	25,038 (88.7)	21,801 (89.1)	30,286 (90.3)	26,759 (90.7)	85,242 (88.8)	74,627 (89.1)				
Unknown	34 (0.1)	28 (0.1)	28 (0.1)	22 (0.1)	40 (0.1)	35 (0.1)	102 (0.1)	85 (0.1)				
<b>Apgar at 5 minutes</b>												
Critically low (0–3)	103 (0.3)	82 (0.3)	99 (0.4)	68 (0.3)	112 (0.3)	74 (0.3)	314 (0.3)	224 (0.3)				
Fairly low (4–6)	267 (0.8)	226 (0.8)	224 (0.8)	183 (0.7)	363 (1.1)	301 (1.0)	854 (0.9)	710 (0.8)				
Normal (7+)	33,823 (98.8)	29,440 (98.9)	27,896 (98.8)	24,204 (98.9)	33,036 (98.5)	29,113 (98.6)	94,755 (98.7)	82,757 (98.8)				
Unknown	24 (0.1)	18 (0.1)	23 (0.1)	20 (0.1)	35 (0.1)	30 (0.1)	82 (0.1)	68 (0.1)				

N: number of births. VPDC: Victorian Perinatal Data Collection.



### Northern Metro

The following tables describe the maternal and perinatal characteristics for Aboriginal (Table 4.22) and non-Aboriginal (Table 4.23) births as reported by VPDC and Matched Data in the Northern Metro region between 1999 and 2008.

The Matched Data reported an additional 690 Aboriginal live births in the period 1999–2008 inclusive, which represented a 110% increase in the number of births reported in the VPDC. The proportion of Aboriginal to non-Aboriginal births was 1.3%. The proportion of Aboriginal live births increased over the 10 years: 1999–2002, 1.1%; 2003–2005, 1.4%; 2006–2008, 1.5%.

Between 1999 and 2008, within the birth population, there were more male than female births in both populations (Aboriginal, male, 50.1%; female, 49.9%; non-Aboriginal, male, 51.5%; female, 48.5%). The proportion of Aboriginal single mothers at the time of the birth was significantly higher (46.5%) compared with non-Aboriginal single mothers (10.3%).

Between 1999 and 2008 inclusive the proportion of Aboriginal teenage mothers was significantly higher (15.0%) compared with non-Aboriginal teenage mothers (2.0%). This proportion increased over the years for Aboriginal mothers (1999–2002, 14.6%; 2003–2005, 15.4%; 2006–2008, 15.0%) and decreased among non-Aboriginal mothers (1999–2002, 2.3%; 2003–2005, 2.0%; 2006–2008, 1.7%).

Nearly 11% of Aboriginal births were preterm (10.8%) compared with 6.2% of non-Aboriginal births. The proportion of preterm births decreased within the Aboriginal population (1999–2002, 10.7%; 2003–2005, 12.3%; 2006–2008, 9.9%) and remained similar within the non-Aboriginal population (1999–2002, 6.1%; 2003–2005, 6.1%; 2006–2008, 6.3%) over the 10 years.

The proportions of singleton births were higher in the Aboriginal (99.4%) compared with the non-Aboriginal population (98.7%). The proportion of first live births was less in

the Aboriginal population (41.1%) compared with the non-Aboriginal population (44.4%). However, the proportion of Aboriginal births with a parity of three or more previous births was more than double the proportion in the non-Aboriginal population (Aboriginal, 14.5%; non-Aboriginal, 7.0%).

Over the 10 years the proportion of Aboriginal infants born with very low (2.0%) and low (9.1%) birth weights was significantly higher than non-Aboriginal infants born with very low (0.8%) and low (4.4%) birth weights. The proportion of Aboriginal infants with very low birth weights increased over the 10 years (1999–2002, 1.2%; 2003–2005, 3.3%; 2006–2008, 1.8%), and low birth weight proportions decreased significantly (1999–2002, 10.9%; 2003–2005, 11.0%; 2006–2008, 6.1%). The proportions of very low and low birth weights were similar across the years among the non-Aboriginal population (0.8%: 4.4%–4.3%). The proportion of Aboriginal infants born <2500 grams (11.2%) was more than double the non-Aboriginal proportion (5.2%).

The proportions of infants who had a ‘normal’ Apgar score after five minutes was similar among the populations (Aboriginal, 98.1%; non-Aboriginal, 98.9%).

**Case study:** Over the 10-year period, as observed through the analysis of the Matched Data, the proportion of Aboriginal births in Northern Metro increased from 1.1% to 1.5% of the regional birth population, and represented 14.2% of Aboriginal births in Victoria. There was a 110% increase in the number of births identified as a result of the Matched Data. However, among the Aboriginal birth population 15.0% of births (compared with 2.0% non-Aboriginal) in this region were to teenage mothers (this proportion increased over the years); 10.8% of Aboriginal births (compared with 6.2% non-Aboriginal) were preterm, and 11.2% of Aboriginal infants (compared with 5.2% non-Aboriginal) were born <2500 grams (the proportions of the latter two outcomes decreased over the years).





Table 4.22: Maternal and perinatal characteristics for Aboriginal births as reported by VPDC and identified through Matched Data, Northern Metro, 1999–2008 inclusive

	1999–2002			2003–2005			2006–2008			All years (1999–2008)		
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Births</b>												
Total live births	187 (100.0)	412 (100.0)	180 (100.0)	399 (100.0)	261 (100.0)	507 (100.0)	628 (100.0)	1,318 (100.0)				
<b>Sex</b>												
Male	90 (48.1)	209 (50.7)	78 (43.3)	185 (46.4)	134 (51.3)	266 (52.5)	302 (48.1)	660 (50.1)				
Female	97 (51.9)	203 (49.3)	102 (56.7)	214 (53.6)	127 (48.7)	241 (47.5)	326 (51.9)	658 (49.9)				
<b>Marital status of mother</b>												
Currently single	110 (58.8)	200 (48.5)	108 (60.0)	200 (50.1)	128 (49.0)	213 (42.0)	346 (55.1)	613 (46.5)				
Married/de facto	76 (40.6)	209 (50.7)	71 (39.4)	198 (49.6)	133 (51.0)	292 (57.6)	280 (44.6)	699 (53.0)				
Unknown	1 (0.5)	3 (0.7)	1 (0.6)	1 (0.3)	–	2 (0.4)	2 (0.3)	6 (0.5)				
<b>Maternal age (years) (cats)</b>												
≤19	32 (17.1)	43 (14.6)	37 (20.6)	43 (15.4)	45 (17.2)	54 (15.0)	114 (18.2)	140 (15.0)				
20–29	97 (51.9)	160 (54.4)	99 (55.0)	156 (55.7)	132 (50.6)	179 (49.6)	328 (52.2)	495 (52.9)				
≥30	58 (31.0)	91 (31.0)	44 (24.4)	81 (28.9)	84 (32.2)	128 (35.5)	186 (29.6)	300 (32.1)				
<b>Gestational age (weeks) (cats)</b>												
Preterm	29 (15.5)	44 (10.7)	27 (15.0)	49 (12.3)	27 (10.3)	50 (9.9)	83 (13.2)	143 (10.8)				
Term	157 (84.0)	366 (88.8)	153 (85.0)	350 (87.7)	234 (89.7)	457 (90.1)	544 (86.6)	1,173 (89.0)				
Unknown	1 (0.5)	2 (0.5)	–	–	–	–	1 (0.2)	2 (0.2)				
<b>Plurality</b>												
Single	187 (100.0)	411 (99.8)	176 (97.8)	396 (99.2)	259 (99.2)	503 (99.2)	622 (99.0)	622 (99.0)				
Multiple	–	*	*	*	*	*	6 (1.0)	6 (1.0)				
Unknown	–	*	*	*	*	*	*	*				
<b>Parity (previous pregnancies)</b>												
0	68 (36.4)	159 (38.6)	80 (44.4)	187 (46.9)	92 (35.2)	196 (38.7)	240 (38.2)	542 (41.1)				
1–2	85 (45.5)	181 (43.9)	71 (39.4)	163 (40.9)	120 (46.0)	241 (47.5)	276 (43.9)	585 (44.4)				
≥3	34 (18.2)	72 (17.5)	29 (16.1)	49 (12.3)	49 (18.8)	70 (13.8)	112 (17.8)	191 (14.5)				

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Birth weight (grams) (cats)</b>								
<1,500	5 (2.7)	5 (1.2)	10 (5.6)	13 (3.3)	*	9 (1.8)	17 (2.7)	27 (2.0)
1,500–2,499	32 (17.1)	45 (10.9)	21 (11.7)	44 (11.0)	23 (8.8)	31 (6.1)	76 (12.1)	120 (9.1)
≥2,500	150 (80.2)	362 (87.9)	149 (82.8)	342 (85.7)	236 (90.4)	467 (92.1)	535 (85.2)	1,171 (88.8)
Unknown	–	–	–	–	*	–	*	–
<b>Birth weight (grams)</b>								
<2,500	37 (19.8)	50 (12.1)	31 (17.2)	57 (14.3)	25 (9.6)	40 (7.9)	93 (14.8)	147 (11.2)
≥2,500	150 (80.2)	362 (87.9)	149 (82.8)	342 (85.7)	236 (90.4)	467 (92.1)	535 (85.2)	1,171 (88.8)
<b>Apgar at 1 minute</b>								
Critically low (0–3)	7 (3.7)	11 (2.7)	5 (2.8)	6 (1.5)	*	10 (2.0)	15 (2.4)	27 (2.0)
Fairly low (4–6)	26 (13.9)	42 (10.2)	17 (9.4)	34 (8.5)	24 (9.2)	54 (10.7)	67 (10.7)	130 (9.9)
Normal (7+)	153 (81.8)	358 (86.9)	156 (86.7)	356 (89.2)	234 (89.7)	443 (87.4)	543 (86.5)	1,157 (87.8)
Unknown	1 (0.5)	1 (0.2)	2 (1.1)	3 (0.8)	*	–	3 (0.5)	4 (0.3)
<b>Apgar at 5 minutes</b>								
Critically low (0–3)	*	*	*	*	*	*	*	6 (0.5)
Fairly low (4–6)	*	6 (1.5)	–	*	*	9 (1.8)	5 (0.8)	16 (1.2)
Normal (7+)	183 (97.9)	405 (98.3)	176 (97.8)	392 (98.2)	259 (99.2)	496 (97.8)	618 (98.4)	1,293 (98.1)
Unknown	*	*	*	*	*	*	*	3 (0.2)

\* numbers suppressed. N: number of births. VPDC: Victorian Perinatal Data Collection.





Table 4.23: Maternal and perinatal characteristics for non-Aboriginal births as reported by VPDC and identified through Matched Data, Northern Metro, 1999–2008 inclusive

	1999–2002			2003–2005			2006–2008			All years (1999–2008)		
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Births</b>												
Total live births	42,208 (100.0)	36,733 (100.0)	32,794 (100.0)	28,556 (100.0)	36,431 (100.0)	32,359 (100.0)	111,433 (100.0)	97,648 (100.0)				
<b>Sex</b>												
Male	21,790 (51.6)	19,045 (51.8)	16,649 (50.8)	14,496 (50.8)	18,875 (51.8)	16,774 (51.8)	57,314 (51.4)	50,315 (51.5)				
Female	20,414 (48.4)	17,688 (48.2)	16,141 (49.2)	14,060 (49.2)	17,556 (48.2)	15,585 (48.2)	54,111 (48.6)	47,333 (48.5)				
Indeterminate	*	-	*	-	-	-	8 (0.0)	-				
Unknown	*	-	*	-	-	-	*	-				
<b>Marital status of mother</b>												
Currently single	4,942 (11.7)	3,854 (10.5)	3,963 (12.1)	3,130 (11.0)	3,984 (10.9)	3,102 (9.6)	12,889 (11.6)	10,086 (10.3)				
Married/de facto	37,206 (88.1)	32,833 (89.4)	28,745 (87.7)	25,352 (88.8)	32,347 (88.8)	29,175 (90.2)	98,298 (88.2)	87,360 (89.5)				
Unknown	60 (0.1)	46 (0.1)	86 (0.3)	74 (0.3)	100 (0.3)	82 (0.3)	246 (0.2)	202 (0.2)				
<b>Maternal age (years) (cats)</b>												
≤19	1,076 (2.5)	861 (2.3)	703 (2.1)	561 (2.0)	696 (1.9)	553 (1.7)	2,475 (2.2)	1,975 (2.0)				
20–29	16,990 (40.3)	14,833 (40.4)	11,586 (35.3)	10,163 (35.6)	12,305 (33.8)	10,941 (33.8)	40,881 (36.7)	35,937 (36.8)				
≥30	24,142 (57.2)	21,039 (57.3)	20,505 (62.5)	17,832 (62.4)	23,430 (64.3)	20,865 (64.5)	68,077 (61.1)	59,736 (61.2)				
<b>Gestational age (weeks)</b>												
Preterm	3,073 (7.3)	2,246 (6.1)	2,410 (7.3)	1,742 (6.1)	2,765 (7.6)	2,050 (6.3)	8,248 (7.4)	6,038 (6.2)				
Term	39,131 (92.7)	34,485 (93.9)	30,383 (92.6)	26,814 (93.9)	33,666 (92.4)	30,309 (93.7)	103,180 (92.6)	91,608 (93.8)				
Unknown	4 (0.0)	2 (0.0)	1 (0.0)	-	-	-	5 (0.0)	2 (0.0)				
<b>Plurality</b>												
Single	40,790 (96.6)	36,268 (98.7)	31,591 (96.3)	28,156 (98.6)	35,196 (96.6)	31,960 (98.8)	107,577 (96.5)	96,384 (98.7)				
Multiple	1,418 (3.4)	465 (1.3)	1,203 (3.7)	400 (1.4)	1,235 (3.4)	399 (1.2)	3,856 (3.5)	1,264 (1.3)				





	1999–2002	2003–2005	2006–2008	All years (1999–2008)
<b>Parity (previous pregnancies)</b>				
0	18,355 (43.5)	14,604 (44.5)	14,793 (45.7)	43,390 (44.4)
1–2	20,694 (49.0)	15,831 (48.3)	15,320 (47.3)	47,421 (48.6)
≥3	3,159 (7.5)	2,359 (7.2)	2,246 (6.9)	6,837 (7.0)
<b>Birth weight (grams)</b>				
<1,500	447 (1.1)	338 (1.0)	407 (1.1)	1,192 (1.1)
1,500–2,499	2,269 (5.4)	1,784 (5.4)	1,896 (5.2)	4,263 (4.4)
≥2,500	39,488 (93.6)	30,672 (93.5)	34,125 (93.7)	92,593 (94.8)
Unknown	4 (0.0)	–	3 (0.0)	4 (0.0)
<b>Birth weight (grams)</b>				
<2,500	2,716 (6.4)	2,122 (6.5)	2,303 (6.3)	7,141 (6.4)
≥2,500	39,488 (93.6)	30,672 (93.5)	34,125 (93.7)	92,593 (94.8)
Unknown	4 (0.0)	–	3 (0.0)	4 (0.0)
<b>Apgar at 1 minute</b>				
Critically low (0–3)	711 (1.7)	522 (1.6)	691 (1.9)	1,924 (1.7)
Fairly low (4–6)	4,016 (9.5)	2,819 (8.6)	3,080 (8.5)	8,505 (8.7)
Normal (7+)	37,437 (88.7)	29,421 (89.7)	32,636 (89.6)	87,477 (89.6)
Unknown	44 (0.1)	32 (0.1)	24 (0.1)	84 (0.1)
<b>Apgar at 5 minutes</b>				
Critically low (0–3)	111 (0.3)	88 (0.3)	114 (0.3)	231 (0.2)
Fairly low (4–6)	320 (0.8)	218 (0.7)	438 (1.2)	806 (0.8)
Normal (7+)	41,748 (98.9)	32,459 (99.0)	35,861 (98.4)	96,548 (98.9)
Unknown	29 (0.1)	29 (0.1)	18 (0.0)	63 (0.1)

\* numbers suppressed. N: number of births. VPDC: Victorian Perinatal Data Collection.

## Eastern Metro

The following tables describe the maternal and perinatal characteristics for Aboriginal (Table 4.24) and non-Aboriginal (Table 4.25) births as reported by VPDC and Matched Data in the Eastern Metro region between 1999 and 2008.

The Matched Data reported an additional 435 Aboriginal live births in the period 1999 to 2008 inclusive, which represented a 200% increase in the number of births reported in the VPDC. The proportion of Aboriginal to non-Aboriginal births was 0.6%. The proportion of Aboriginal live births has slightly increased over the 10 years: 1999–2002, 0.5%; 2003–2005, 0.6%; 2006–2008, 0.7%.

Between 1999 and 2008, within the birth population, there were fewer male than female births in the Aboriginal population (male, 49.5%; female, 50.5%) and more male than female births in the non-Aboriginal population (male, 51.6%; female, 48.4%). The proportion of Aboriginal single mothers at the time of the birth was significantly higher (31.4%) compared with non-Aboriginal single mothers (7.2%).

Between 1999 and 2008 inclusive the proportion of Aboriginal teenage mothers was significantly higher (9.1%) compared with non-Aboriginal teenage mothers (1.2%). This proportion increased over the years for the Aboriginal population (1999–2002, 7.7%; 2003–2005, 6.3%; 2006–2008, 12.9%) and decreased slightly among the non-Aboriginal population (1999–2002, 1.3%; 2003–2005, 1.1%; 2006–2008, 1.1%).

More than 9% of Aboriginal births were preterm (9.5%) compared with 5.7% of non-Aboriginal births. The proportion of preterm births decreased within the Aboriginal population (Aboriginal, 1999–2002, 9.5%; 2003–2005, 10.8%; 2006–2008, 8.4%) and slightly increased within the non-Aboriginal population (1999–2002, 5.6%; 2003–2005, 5.7%; 2006–2008, 5.9%) over the 10 years.

The proportions of singleton births were similar in both populations (Aboriginal, 98.2%:

non-Aboriginal, 98.6%). The proportion of first live births was less in the Aboriginal population (42.0%) compared with non-Aboriginal (43.1%). However, the proportion of Aboriginal births with a parity of three or more previous births was more than double the proportion in the non-Aboriginal population (Aboriginal, 13.5%; non-Aboriginal, 5.2%).

Over the 10 years the proportion of Aboriginal infants born with very low (1.8%) and low (7.2%) birth weights was significantly higher than non-Aboriginal infants born with very low (0.8%) and low (3.8%) birth weights. As the numbers within these two categories for Aboriginal populations within the three birth cohorts were less than five in some cells, the categories have been combined and reported for <2500 grams. The proportion of Aboriginal infants with birth weights <2500 grams increased over the 10 years (1999–2002, 7.2%; 2003–2005, 10.3%; 2006–2008, 9.7%). The proportions of birth weights <2500 grams were similar across the years among the non-Aboriginal population (1999–2002, 4.5%; 2003–2005, 4.6%; 2006–2008, 4.5%).

The proportion of infants who had a 'normal' Apgar score after five minutes was less among the Aboriginal population (Aboriginal, 97.4%; non-Aboriginal, 98.6%).

**Case Study:** Over the 10-year period, the proportion of Aboriginal births in Eastern Metro increased from 0.5% to 0.7% of the regional birth population, and represented 7.0% of Aboriginal births in Victoria. There was a 200% increase in the number of births identified as a result of the Matched Data. However, among the Aboriginal birth population 9.1% of births (compared with 1.2% non-Aboriginal) were to teenage mothers (increasing over the years); 9.5% of Aboriginal births (compared with 5.7% non-Aboriginal) were preterm (the proportion decreased over the years), and 9.0% of Aboriginal infants (compared with 4.5% non-Aboriginal) were born <2500 grams (the proportions of the latter outcomes increased over the years).



Table 4.24: Maternal and perinatal characteristics for Aboriginal births as reported by VPDC and identified through Matched Data, Eastern Metro, 1999–2008 inclusive

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Births</b>								
Total live births	91 (100.0)	221 (100.0)	61 (100.0)	195 (100.0)	66 (100.0)	237 (100.0)	218 (100.0)	653 (100.0)
<b>Sex</b>								
Male	44 (48.4)	105 (47.5)	31 (50.8)	100 (51.3)	32 (48.5)	118 (49.8)	107 (49.1)	323 (49.5)
Female	47 (51.6)	116 (52.5)	30 (49.2)	95 (48.7)	34 (51.5)	119 (50.2)	111 (50.9)	330 (50.5)
<b>Marital status of mother</b>								
Currently single	25 (27.5)	62 (28.1)	18 (29.5)	63 (32.3)	21 (31.8)	80 (33.8)	64 (29.4)	205 (31.4)
Married/de facto	66 (72.5)	159 (71.9)	43 (70.5)	132 (67.7)	45 (68.2)	156 (65.8)	154 (70.6)	447 (68.5)
Unknown	-	-	-	-	-	1 (0.4)	-	1 (0.2)
<b>Maternal age (years) (cats)</b>								
≤19	6 (6.6)	11 (7.7)	4 (6.6)	7 (6.3)	8 (12.1)	17 (12.9)	18 (8.3)	35 (9.1)
20–29	36 (39.6)	61 (43.0)	31 (50.8)	54 (48.6)	23 (34.8)	58 (43.9)	90 (41.3)	173 (44.9)
≥30	49 (53.8)	70 (49.3)	26 (42.6)	50 (45.0)	35 (53.0)	57 (43.2)	110 (50.5)	177 (46.0)
Unknown	49 (53.8)	-	26 (42.6)	-	35 (53.0)	-	110 (50.5)	-
<b>Gestational age (weeks) (cats)</b>								
Preterm	12 (13.2)	21 (9.5)	7 (11.5)	21 (10.8)	7 (10.6)	20 (8.4)	26 (11.9)	62 (9.5)
Term	79 (86.8)	200 (90.5)	54 (88.5)	174 (89.2)	59 (89.4)	217 (91.6)	192 (88.1)	591 (90.5)
<b>Plurality</b>								
Single	88 (96.7)	219 (99.1)	59 (96.7)	189 (96.9)	63 (95.5)	233 (98.3)	210 (96.3)	641 (98.2)
Multiple	*	*	*	6 (3.1)	*	*	8 (3.7)	12 (1.8)
Unknown	*	*	*	-	*	*	*	*
<b>Parity (previous pregnancies)</b>								
0	30 (33.0)	84 (38.0)	25 (41.0)	81 (41.5)	28 (42.4)	109 (46.0)	83 (38.1)	274 (42.0)
1–2	41 (45.1)	100 (45.2)	27 (44.3)	85 (43.6)	26 (39.4)	106 (44.7)	94 (43.1)	291 (44.6)
≥3	20 (22.0)	37 (16.7)	9 (14.8)	29 (14.9)	12 (18.2)	22 (9.3)	41 (18.8)	88 (13.5)





Table 4.24 continued...

	1999–2002			2003–2005			2006–2008			All years (1999–2008)		
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Birth weight (grams) (cats)</b>												
<1,500	*	5 (2.3)	*	*	*	*	*	*	*	*	*	*
1,500–2,499	5 (5.5)	11 (5.0)	6 (9.8)	17 (8.7)	8 (12.1)	19 (8.0)	19 (8.7)	47 (7.2)	19 (8.7)	47 (7.2)	19 (8.7)	47 (7.2)
≥2,500	84 (92.3)	205 (92.8)	54 (88.5)	175 (89.7)	57 (86.4)	214 (90.3)	195 (89.4)	594 (91.0)	195 (89.4)	594 (91.0)	195 (89.4)	594 (91.0)
Unknown	*	-	*	*	*	*	*	*	*	*	*	*
<b>Birth weight (grams)</b>												
<2,500	7 (7.7)	16 (7.2)	7 (11.5)	20 (10.3)	9 (13.6)	23 (9.7)	23 (10.6)	59 (9.0)	23 (10.6)	59 (9.0)	23 (10.6)	59 (9.0)
≥2,500	84 (92.3)	205 (92.8)	54 (88.5)	175 (89.7)	57 (86.4)	214 (90.3)	195 (89.4)	594 (91.0)	195 (89.4)	594 (91.0)	195 (89.4)	594 (91.0)
<b>Apgar at 1 minute</b>												
Critically low (0–3)	*	5 (2.3)	*	*	*	*	*	*	*	*	*	*
Fairly low (4–6)	11 (12.1)	37 (16.7)	*	19 (9.7)	7 (10.6)	16 (6.8)	22 (10.1)	72 (11.0)	22 (10.1)	72 (11.0)	22 (10.1)	72 (11.0)
Normal (7+)	78 (85.7)	178 (80.5)	56 (91.8)	172 (88.2)	55 (83.3)	214 (90.3)	189 (86.7)	564 (86.4)	189 (86.7)	564 (86.4)	189 (86.7)	564 (86.4)
Unknown	*	1 (0.5)	*	*	*	*	*	*	*	*	*	*
<b>Apgar at 5 minutes</b>												
Critically low (0–3)	*	*	*	*	*	*	*	*	*	*	*	*
Fairly low (4–6)	*	*	*	*	*	*	*	*	*	*	*	*
Normal (7+)	88 (96.7)	216 (97.7)	59 (96.7)	192 (98.5)	62 (93.9)	228 (96.2)	209 (95.9)	636 (97.4)	209 (95.9)	636 (97.4)	209 (95.9)	636 (97.4)
Unknown	*	-	-	*	*	*	*	*	*	*	*	*

\* numbers suppressed. N: number of births. VPDC: Victorian Perinatal Data Collection.

Table 4.25: Maternal and perinatal characteristics for non-Aboriginal births as reported by VPDC and identified through Matched Data, Eastern Metro, 1999–2008 inclusive

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Births</b>								
Total live births	44,893 (100.0)	40,336 (100.0)	33,833 (100.0)	30,310 (100.0)	35,145 (100.0)	31,584 (100.0)	113,871 (100.0)	102,230 (100.0)
<b>Sex</b>								
Male	23,065 (51.4)	20,732 (51.4)	17,494 (51.7)	15,673 (51.7)	18,197 (51.8)	16,394 (51.9)	58,756 (51.6)	52,799 (51.6)
Female	21,825 (48.6)	19,604 (48.6)	16,337 (48.3)	14,637 (48.3)	16,948 (48.2)	15,190 (48.1)	55,110 (48.4)	49,431 (48.4)
Indeterminate	*	–	*	–	–	–	5 (0.0)	–
<b>Marital status of mother</b>								
Currently single	3,841 (8.6)	3,138 (7.8)	2,740 (8.1)	2,141 (7.1)	2,683 (7.6)	2,123 (6.7)	9,264 (8.1)	7,402 (7.2)
Married / de facto	41,019 (91.4)	37,173 (92.2)	31,091 (91.9)	28,158 (92.9)	32,446 (92.3)	29,448 (93.2)	104,546 (91.8)	94,779 (92.7)
Unknown	33 (0.1)	25 (0.1)	12 (0.0)	11 (0.0)	16 (0.0)	13 (0.0)	61 (0.1)	49 (0.0)
<b>Maternal age (years)</b>								
≤ 19	676 (1.5)	543 (1.3)	428 (1.3)	331 (1.1)	437 (1.2)	339 (1.1)	1,541 (1.4)	1,213 (1.2)
20–29	15,556 (34.7)	14,040 (34.8)	9,664 (28.6)	8,658 (28.6)	9,855 (28.0)	8,894 (28.2)	35,075 (30.8)	31,592 (30.9)
30 plus	28,661 (63.8)	25,753 (63.8)	23,741 (70.2)	21,320 (70.3)	24,853 (70.7)	22,351 (70.8)	77,255 (67.8)	69,424 (67.9)
Unknown	–	–	–	1 (0.0)	–	–	–	1 (0.0)
<b>Gestational age (weeks)(cats)</b>								
Preterm	3,008 (6.7)	2,255 (5.6)	2,349 (6.9)	1,731 (5.7)	2,536 (7.2)	1,868 (5.9)	7,893 (6.9)	5,854 (5.7)
Term	41,879 (93.3)	38,076 (94.4)	31,484 (93.1)	28,579 (94.3)	32,608 (92.8)	29,715 (94.1)	105,971 (93.1)	96,370 (94.3)
Unknown	6 (0.0)	5 (0.0)	–	–	1 (0.0)	1 (0.0)	7 (0.0)	6 (0.0)
<b>Plurality</b>								
Single	43,351 (96.6)	39,827 (98.7)	32,552 (96.2)	29,855 (98.5)	33,874 (96.4)	31,149 (98.6)	109,777 (96.4)	100,831 (98.6)
Multiple	1,542 (3.4)	509 (1.3)	1,281 (3.8)	455 (1.5)	1,271 (3.6)	435 (1.4)	4,094 (3.6)	1,399 (1.4)
<b>Parity (previous pregnancies)</b>								
0	19,406 (43.2)	17,325 (43.0)	14,617 (43.2)	12,970 (42.8)	15,432 (43.9)	13,804 (43.7)	49,455 (43.4)	44,099 (43.1)
1–2	22,932 (51.1)	20,768 (51.5)	17,468 (51.6)	15,806 (52.1)	17,900 (50.9)	16,194 (51.3)	58,300 (51.2)	52,768 (51.6)
3 plus	2,555 (5.7)	2,243 (5.6)	1,748 (5.2)	1,534 (5.1)	1,813 (5.2)	1,586 (5.0)	6,116 (5.4)	5,363 (5.2)





Table 4.25 continued...

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Birth weight (grams)(cats)</b>								
<1,500	448 (1.0)	324 (0.8)	344 (1.0)	229 (0.8)	343 (1.0)	237 (0.8)	1,135 (1.0)	790 (0.8)
1,500–2,499	2,103 (4.7)	1,511 (3.7)	1,624 (4.8)	1,151 (3.8)	1,691 (4.8)	1,199 (3.8)	5,418 (4.8)	3,861 (3.8)
2,500 plus	42,338 (94.3)	38,498 (95.4)	31,862 (94.2)	28,926 (95.4)	33,104 (94.2)	30,143 (95.4)	107,304 (94.2)	97,567 (95.4)
Unknown	4 (0.0)	3 (0.0)	3 (0.0)	4 (0.0)	7 (0.0)	5 (0.0)	14 (0.0)	12 (0.0)
<b>Birth weight (grams)</b>								
<2,500	2,551 (5.7)	1,835 (4.5)	1,968 (5.8)	1,380 (4.6)	2,034 (5.8)	1,436 (4.5)	6,553 (5.8)	4,651 (4.5)
2,500 plus	42,338 (94.3)	38,498 (95.4)	31,862 (94.2)	28,926 (95.4)	33,104 (94.2)	30,143 (95.4)	107,304 (94.2)	97,567 (95.4)
Unknown	4 (0.0)	3 (0.0)	3 (0.0)	4 (0.0)	7 (0.0)	5 (0.0)	14 (0.0)	12 (0.0)
<b>% of expected birth weight</b>								
<10th centile	3,774 (8.4)	3,302 (8.2)	2,691 (8.0)	2,356 (7.8)	2,750 (7.8)	2,414 (7.6)	9,215 (8.1)	8,072 (7.9)
10th–<50th centile	17,053 (38.0)	15,216 (37.7)	12,588 (37.2)	11,201 (37.0)	13,441 (38.2)	12,055 (38.2)	43,082 (37.8)	38,472 (37.6)
50th–<90th centile	18,793 (41.9)	17,040 (42.2)	14,460 (42.7)	13,068 (43.1)	14,876 (42.3)	13,452 (42.6)	48,129 (42.3)	43,560 (42.6)
90th plus centile	5,157 (11.5)	4,727 (11.7)	4,015 (11.9)	3,657 (12.1)	3,996 (11.4)	3,633 (11.5)	13,168 (11.6)	12,017 (11.8)
Unknown	116 (0.3)	51 (0.1)	79 (0.2)	28 (0.1)	82 (0.2)	30 (0.1)	277 (0.2)	109 (0.1)
<b>APGAR at 1 minute</b>								
Critically low (0–3)	1,002 (2.2)	877 (2.2)	697 (2.1)	610 (2.0)	692 (2.0)	574 (1.8)	2,391 (2.1)	2,061 (2.0)
Fairly low (4–6)	4,667 (10.4)	4,145 (10.3)	3,486 (10.3)	3,077 (10.2)	3,265 (9.3)	2,895 (9.2)	11,418 (10.0)	10,117 (9.9)
Normal (7+)	39,176 (87.3)	35,273 (87.4)	29,619 (87.5)	26,595 (87.7)	31,155 (88.6)	28,087 (88.9)	99,950 (87.8)	89,955 (88.0)
Unknown	48 (0.1)	41 (0.1)	31 (0.1)	28 (0.1)	33 (0.1)	28 (0.1)	112 (0.1)	97 (0.1)
<b>APGAR at 5 minutes</b>								
Critically low (0–3)	132 (0.3)	107 (0.3)	123 (0.4)	92 (0.3)	97 (0.3)	69 (0.2)	352 (0.3)	268 (0.3)
Fairly low (4–6)	479 (1.1)	427 (1.1)	323 (1.0)	284 (0.9)	405 (1.2)	341 (1.1)	1,207 (1.1)	1,052 (1.0)
Normal (7+)	44,244 (98.6)	39,769 (98.6)	33,365 (98.6)	29,912 (98.7)	34,613 (98.5)	31,149 (98.6)	112,222 (98.6)	100,830 (98.6)
Unknown	38 (0.1)	33 (0.1)	22 (0.1)	22 (0.1)	30 (0.1)	25 (0.1)	90 (0.1)	80 (0.1)





### Southern Metro

The following tables describe the maternal and perinatal characteristics for Aboriginal (Table 4.26) and non-Aboriginal (Table 4.27) births as reported by VPDC and Matched Data in the Southern Metro region between 1999 and 2008.

The Matched Data reported an additional 944 Aboriginal live births in the period 1999–2008 inclusive, which represented a 255% increase in the number of births reported in the VPDC. The proportion of Aboriginal to non-Aboriginal births was 1.0%. The proportion of Aboriginal live births slightly increased over the 10 years: 1999–2002, 0.9%; 2003–2005, 1.0%; 2006–2008, 1.0%.

Between 1999 and 2008, within the birth population, there were more male than female births in both populations (Aboriginal, male 51.1%; female, 48.9%; non-Aboriginal, male 51.2%; female, 48.8%). The proportion of Aboriginal single mothers at the time of the birth was significantly higher (37.4%) compared with non-Aboriginal single mothers (11.2%).

Between 1999 and 2008 inclusive the proportion of Aboriginal teenage mothers was significantly higher (9.1%) compared with non-Aboriginal teenage mothers (2.0%). This proportion decreased over the years for Aboriginal (1999–2002, 9.7%; 2003–2005, 10.9%; 2006–2008, 6.9%) and only slightly decreased for non-Aboriginal mothers (1999–2002, 2.3%; 2003–2005, 1.9%; 2006–2008, 1.9%).

Nine per cent of Aboriginal births (9.1%) were preterm compared with 5.9% non-Aboriginal births. The proportion of preterm births increased within both populations (Aboriginal, 1999–2002, 8.2%; 2003–2005, 8.7%; 2006–2008, 10.4%; non-Aboriginal, 1999–2002, 5.7%; 2003–2005, 6.1%; 2006–2008, 6.0%) over the 10 years.

The proportions of singleton births were higher in the Aboriginal (99.1%) compared with the non-Aboriginal population (98.7%). The proportion of first live births was less in

the Aboriginal population (39.3%) compared with the non-Aboriginal population (43.3%). However, the proportion of Aboriginal births with a parity of three or more previous births was more than double the proportion in the non-Aboriginal population (Aboriginal, 16.7%; non-Aboriginal, 6.9%).

Over the 10 years the proportion of Aboriginal infants born with very low (1.0%) and low (8.1%) birth weights was significantly higher than non-Aboriginal infants born with very low (0.8%) and low (4.2%) birth weights. As the numbers within these two categories for Aboriginal populations within the three birth cohorts were less than five in some cells, the categories have been combined and reported for <2500 grams. The proportion of Aboriginal infants with birth weights <2500 grams increased over the 10 years (1999–2002, 8.2%; 2003–2005, 10.3%; 2006–2008, 8.9%). The proportions of birth weights <2500 grams slightly decreased across the years among the non-Aboriginal population (1999–2002, 5.0%; 2003–2005, 5.2%; 2006–2008, 4.8%).

The proportion of infants who had a 'normal' Apgar score after five minutes was lower among the populations (Aboriginal, 97.7%; non-Aboriginal, 98.6%).

**Case study:** Over the 10-year period, as observed through the analysis of the Matched Data, the proportion of Aboriginal births in Southern Metro slightly increased from 0.9% to 1.1% of the regional birth population, and represented 14.1% of Aboriginal births in Victoria. There was a 255% increase in the number of births identified as a result of the Matched Data. However, among the Aboriginal birth population 9.1% of births (compared with 2.0% non-Aboriginal) in this region were to teenage mothers (this proportion decreased over the years); 9.1% of Aboriginal births (compared with 5.9% non-Aboriginal) were preterm, and 9.1% of Aboriginal infants (compared with 5.0% non-Aboriginal) were born <2500 grams (the proportions of the latter two outcomes increased over the years).





Table 4.26: Maternal and perinatal characteristics for Aboriginal births as reported by VPDC and identified through the Matched Data, Southern Metro, 1999–2008 inclusive

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Births</b>								
Total live births	103 (100.0)	453 (100.0)	72 (100.0)	390 (100.0)	195 (100.0)	471 (100.0)	370 (100.0)	1,314 (100.0)
<b>Sex</b>								
Male	44 (42.7)	236 (52.1)	34 (47.2)	211 (54.1)	89 (45.6)	224 (47.6)	167 (45.1)	671 (51.1)
Female	59 (57.3)	217 (47.9)	38 (52.8)	179 (45.9)	106 (54.4)	247 (52.4)	203 (54.9)	643 (48.9)
<b>Marital status of mother</b>								
Currently single	33 (32.0)	160 (35.3)	29 (40.3)	163 (41.8)	70 (35.9)	169 (35.9)	132 (35.7)	492 (37.4)
Married/de facto	70 (68.0)	293 (64.7)	42 (58.3)	224 (57.4)	124 (63.6)	299 (63.5)	236 (63.8)	816 (62.1)
Unknown	–	–	1 (1.4)	3 (0.8)	1 (0.5)	3 (0.6)	2 (0.5)	6 (0.5)
<b>Maternal age (years) (cats)</b>								
≤19	10 (9.7)	27 (9.7)	9 (12.5)	27 (10.9)	18 (9.2)	21 (6.9)	37 (10.0)	75 (9.1)
20–29	50 (48.5)	133 (47.8)	33 (45.8)	115 (46.6)	101 (51.8)	151 (49.8)	184 (49.7)	399 (48.2)
≥30	43 (41.7)	118 (42.4)	30 (41.7)	105 (42.5)	76 (39.0)	131 (43.2)	149 (40.3)	354 (42.8)
<b>Gestational age (weeks) (cats)</b>								
Preterm	12 (11.7)	37 (8.2)	12 (16.7)	34 (8.7)	17 (8.7)	49 (10.4)	41 (11.1)	120 (9.1)
Term	91 (88.3)	416 (91.8)	60 (83.3)	356 (91.3)	178 (91.3)	422 (89.6)	329 (88.9)	1,194 (90.9)
<b>Plurality</b>								
Single	100 (97.1)	453 (100.0)	72 (100.0)	388 (99.5)	193 (99.0)	461 (97.9)	365 (98.6)	1,302 (99.1)
Multiple	*	*	*	*	*	10 (2.1)	5 (1.4)	12 (0.9)
Unknown	*	*	*	*	*	*	*	*
<b>Parity (previous pregnancies)</b>								
0	36 (35.0)	161 (35.5)	26 (36.1)	150 (38.5)	85 (43.6)	206 (43.7)	147 (39.7)	517 (39.3)
1–2	51 (49.5)	207 (45.7)	31 (43.1)	174 (44.6)	87 (44.6)	196 (41.6)	169 (45.7)	577 (43.9)
≥3	16 (15.5)	85 (18.8)	15 (20.8)	66 (16.9)	23 (11.8)	69 (14.6)	54 (14.6)	220 (16.7)

	1999–2002		2003–2005		2006–2008		All years (1999–2008)	
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Birth weight (grams) (cats)</b>								
<1,500	6 (5.8)	6 (1.3)	*	6 (1.5)	–	*	9 (2.4)	13 (1.0)
1,500–2,499	7 (6.8)	31 (6.8)	*	34 (8.7)	16 (8.2)	*	32 (8.6)	106 (8.1)
≥2,500	90 (87.4)	416 (91.8)	60 (83.3)	350 (89.7)	179 (91.8)	429 (91.1)	329 (88.9)	1,195 (90.9)
<b>Birth weight (grams)</b>								
<2,500	13 (12.6)	37 (8.2)	12 (16.7)	40 (10.3)	16 (8.2)	42 (8.9)	41 (11.1)	119 (9.1)
≥2,500	90 (87.4)	416 (91.8)	60 (83.3)	350 (89.7)	179 (91.8)	429 (91.1)	329 (88.9)	1,195 (90.9)
<b>Apgar at 1 minute</b>								
Critically low (0–3)	7 (6.8)	12 (2.6)	2 (2.8)	11 (2.8)	2 (1.0)	9 (1.9)	11 (3.0)	32 (2.4)
Fairly low (4–6)	10 (9.7)	46 (10.2)	7 (9.7)	35 (9.0)	16 (8.2)	43 (9.1)	33 (8.9)	124 (9.4)
Normal (7+)	86 (83.5)	392 (86.5)	62 (86.1)	342 (87.7)	176 (90.3)	416 (88.3)	324 (87.6)	1,150 (87.5)
Unknown	–	3 (0.7)	1 (1.4)	2 (0.5)	1 (0.5)	3 (0.6)	2 (0.5)	8 (0.6)
<b>Apgar at 5 minutes</b>								
Critically low (0–3)	*	*	*	*	–	*	6 (1.6)	5 (0.4)
Fairly low (4–6)	*	6 (1.3)	–	5 (1.3)	1 (0.5)	6 (1.3)	*	17 (1.3)
Normal (7+)	98 (95.1)	442 (97.6)	69 (95.8)	380 (97.4)	194 (99.5)	462 (98.1)	361 (97.6)	1,284 (97.7)
Unknown	*	*	*	*	*	*	*	8 (0.6)

\* numbers suppressed. N: number of births. VPDC: Victorian Perinatal Data Collection.





Table 4.27: Maternal and perinatal characteristics for non-Aboriginal births as reported by VPDC and identified through Matched Data, Southern Metro, 1999–2008 inclusive

	1999–2002			2003–2005			2006–2008			All years (1999–2008)		
	VPDC N (%)	Matched Data N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	Matched Data N (%)
<b>Births</b>												
Total live births	57,542 (100.0)	50,880 (100.0)	45,539 (100.0)	39,980 (100.0)	45,818 (100.0)	51,377 (100.0)	45,818 (100.0)	154,458 (100.0)	136,678 (100.0)			
<b>Sex</b>												
Male	29,399 (51.1)	25,949 (51.0)	23,323 (51.2)	20,457 (51.2)	23,604 (51.5)	26,403 (51.4)	23,604 (51.5)	79,125 (51.2)	70,010 (51.2)			
Female	28,141 (48.9)	24,931 (49.0)	22,215 (48.8)	19,523 (48.8)	22,214 (48.5)	24,971 (48.6)	22,214 (48.5)	75,327 (48.8)	66,668 (48.8)			
Indeterminate	*	-	-	-	-	*	-	*	-			
Unknown	-	-	*	*	-	*	-	*	-			
<b>Marital status of mother</b>												
Currently single	7,236 (12.6)	5,702 (11.2)	5,962 (13.1)	4,617 (11.5)	4,967 (10.8)	6,189 (12.0)	4,967 (10.8)	19,387 (12.6)	15,286 (11.2)			
Married / de facto	50,257 (87.3)	45,136 (88.7)	39,537 (86.8)	35,332 (88.4)	40,814 (89.1)	45,140 (87.9)	40,814 (89.1)	134,934 (87.4)	121,282 (88.7)			
Unknown	49 (0.1)	42 (0.1)	40 (0.1)	31 (0.1)	37 (0.1)	48 (0.1)	37 (0.1)	137 (0.1)	110 (0.1)			
<b>Maternal age (years)(cats)</b>												
≤19	1,449 (2.5)	1,163 (2.3)	990 (2.2)	770 (1.9)	848 (1.9)	1,038 (2.0)	848 (1.9)	3,477 (2.3)	2,781 (2.0)			
20–29	22,534 (39.2)	19,981 (39.3)	15,937 (35.0)	14,020 (35.1)	15,687 (34.2)	17,601 (34.3)	15,687 (34.2)	56,072 (36.3)	49,688 (36.4)			
30 plus	33,559 (58.3)	29,736 (58.4)	28,612 (62.8)	25,190 (63.0)	29,283 (63.9)	32,738 (63.7)	29,283 (63.9)	94,909 (61.4)	84,209 (61.6)			
<b>Gestational age (weeks)</b>												
Preterm	3,958 (6.9)	2,914 (5.7)	3,293 (7.2)	2,440 (6.1)	2,743 (6.0)	3,694 (7.2)	2,743 (6.0)	10,945 (7.1)	8,097 (5.9)			
Term	53,583 (93.1)	47,965 (94.3)	42,245 (92.8)	37,539 (93.9)	43,075 (94.0)	47,681 (92.8)	43,075 (94.0)	143,509 (92.9)	128,579 (94.1)			
Unknown	1 (0.0)	1 (0.0)	1 (0.0)	1 (0.0)	-	2 (0.0)	-	4 (0.0)	2 (0.0)			
<b>Plurality</b>												
Single	55,667 (96.7)	50,270 (98.8)	43,888 (96.4)	39,414 (98.6)	45,192 (98.6)	49,590 (96.5)	45,192 (98.6)	149,145 (96.6)	134,876 (98.7)			
Multiple	1,875 (3.3)	610 (1.2)	1,651 (3.6)	566 (1.4)	626 (1.4)	1,787 (3.5)	626 (1.4)	5,313 (3.4)	1,802 (1.3)			
<b>Parity (previous pregnancies)</b>												
0	24,559 (42.7)	21,599 (42.5)	20,288 (44.6)	17,713 (44.3)	19,905 (43.4)	22,415 (43.6)	19,905 (43.4)	67,262 (43.5)	59,217 (43.3)			
1–2	28,781 (50.0)	25,728 (50.6)	22,104 (48.5)	19,641 (49.1)	22,633 (49.4)	25,057 (48.8)	22,633 (49.4)	75,942 (49.2)	68,002 (49.8)			
3 plus	4,202 (7.3)	3,553 (7.0)	3,147 (6.9)	2,626 (6.6)	3,280 (7.2)	3,905 (7.6)	3,280 (7.2)	11,254 (7.3)	9,459 (6.9)			

	1999–2002			2003–2005			2006–2008			All years (1999–2008)		
	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)	VPDC N (%)	Matched Data N (%)
<b>Birth weight (grams)(cats)</b>												
<1,500	589 (1.0)	394 (0.8)	473 (1.0)	336 (0.8)	515 (1.0)	359 (0.8)	1,577 (1.0)	1,089 (0.8)				
1,500–2,499	2,994 (5.2)	2,167 (4.3)	2,435 (5.3)	1,724 (4.3)	2,594 (5.0)	1,826 (4.0)	8,023 (5.2)	5,717 (4.2)				
2,500 plus	53,957 (93.8)	48,318 (95.0)	42,629 (93.6)	37,918 (94.8)	48,263 (93.9)	43,630 (95.2)	144,849 (93.8)	129,866 (95.0)				
Unknown	2 (0.0)	1 (0.0)	2 (0.0)	2 (0.0)	5 (0.0)	3 (0.0)	9 (0.0)	6 (0.0)				
<b>Birth weight (grams)</b>												
<2,500	3,583 (6.2)	2,561 (5.0)	2,908 (6.4)	2,060 (5.2)	3,109 (6.1)	2,185 (4.8)	9,600 (6.2)	6,806 (5.0)				
2,500 plus	53,957 (93.8)	48,318 (95.0)	42,629 (93.6)	37,918 (94.8)	48,263 (93.9)	43,630 (95.2)	144,849 (93.8)	129,866 (95.0)				
Unknown	2 (0.0)	1 (0.0)	2 (0.0)	2 (0.0)	5 (0.0)	3 (0.0)	9 (0.0)	6 (0.0)				
<b>% of expected birth weight</b>												
<10th centile	5,542 (9.6)	4,808 (9.4)	4,266 (9.4)	3,669 (9.2)	4,440 (8.6)	3,828 (8.4)	14,248 (9.2)	12,305 (9.0)				
10th–<50th centile	22,515 (39.1)	19,759 (38.8)	17,420 (38.3)	15,199 (38.0)	19,566 (38.1)	17,420 (38.0)	59,501 (38.5)	52,378 (38.3)				
50th–<90th centile	23,402 (40.7)	20,902 (41.1)	18,813 (41.3)	16,693 (41.8)	21,382 (41.6)	19,181 (41.9)	63,597 (41.2)	56,776 (41.5)				
90th plus centile	5,976 (10.4)	5,373 (10.6)	4,939 (10.8)	4,381 (11.0)	5,905 (11.5)	5,354 (11.7)	16,820 (10.9)	15,108 (11.1)				
unknown	107 (0.2)	38 (0.1)	101 (0.2)	38 (0.1)	84 (0.2)	35 (0.1)	292 (0.2)	111 (0.1)				
<b>APGAR at 1 minute</b>												
Critically low (0–3)	1,047 (1.8)	881 (1.7)	785 (1.7)	645 (1.6)	836 (1.6)	710 (1.5)	2,668 (1.7)	2,236 (1.6)				
Fairly low (4–6)	5,561 (9.7)	4,893 (9.6)	4,273 (9.4)	3,698 (9.2)	4,035 (7.9)	3,478 (7.6)	13,869 (9.0)	12,069 (8.8)				
Normal (7+)	50,853 (88.4)	45,044 (88.5)	40,424 (88.8)	35,586 (89.0)	46,416 (90.3)	41,556 (90.7)	137,693 (89.1)	122,186 (89.4)				
Unknown	81 (0.1)	62 (0.1)	57 (0.1)	51 (0.1)	90 (0.2)	74 (0.2)	228 (0.1)	187 (0.1)				
<b>APGAR at 5 minutes</b>												
Critically low (0–3)	129 (0.2)	105 (0.2)	140 (0.3)	105 (0.3)	153 (0.3)	119 (0.3)	422 (0.3)	329 (0.2)				
Fairly low (4–6)	642 (1.1)	540 (1.1)	480 (1.1)	400 (1.0)	600 (1.2)	522 (1.1)	1,722 (1.1)	1,462 (1.1)				
Normal (7+)	56,714 (98.6)	50,194 (98.7)	44,874 (98.5)	39,438 (98.6)	50,566 (98.4)	45,128 (98.5)	152,154 (98.5)	134,760 (98.6)				
Unknown	57 (0.1)	41 (0.1)	45 (0.1)	37 (0.1)	58 (0.1)	49 (0.1)	160 (0.1)	127 (0.1)				

\* numbers suppressed. N: number of births. VPDC: Victorian Perinatal Data Collection





## 5 Conclusion

### Risks and benefits

#### Risks of not continuing this research

- Without institutionalising the matching process, births to Aboriginal and Torres Strait Islander Victorians will continue to be significantly under-ascertained and/or misclassified.
- Victoria will continue to lag behind the other States in receiving the benefits of population data linkage.
- Continued under-ascertainment of Aboriginal and Torres Strait Islander births in Victoria will result in Federal underfunding for 'Close the Gap' programs.
- Continued inaccurate and misleading assessment of the health of Aboriginal people in Victoria.

#### Benefits of continuing this research

- Provide the empirical evidence to identify initiatives that have been successful (and unsuccessful) in reducing inequalities in maternal, perinatal and child health outcomes for Aboriginal and Torres Strait Islanders.
- Ensure improvement in the ascertainment of Aboriginal and Torres Strait Islander people in vital statistics data. This imperative accords with State and Federal priorities and formal commitments to 'improve the collection of information describing Aboriginal and/or Torres Strait Islander People'.

- Development of specific regional profiles to enable regions and Aboriginal Community Controlled Health Organisations (ACCHOs) to formulate evidence-based funding priorities and the development of evidence-based policy and practice aimed at reducing Aboriginal inequalities.
- Provide empirical evidence to support State and regional evaluation of 'Close the Gap' initiatives and to evaluate the efficacy of initiatives and policies.
- Demonstrate the importance and benefits of data linkage and form the basis for further data linkage programs.

### Recommendations

#### Data linkage

- Implement a formal program to ensure the ongoing matching of birth information and the systematic review and analysis of these data to ensure accurate ascertainment of Aboriginal births:
  - » This would entail the development of systems, processes, policies, personnel and funding to support the matching of birth information collected by VPDC with the RBDM (undertaken at the RBDM) for years 2009–2013 inclusive.
- Explore the legal and administrative processes to enable further linkages with other datasets, e.g. Child Protection; Early Development Index; Maternal and Child Health; Immunisation; and socio-economic data.





### Use of data

- A formal process be determined to enable researchers/health service providers to have access to the completed and linked birth/death dataset. This would be predicated on determining data custodians and developing a protocol for the use of data. Further studies would include:
  - » in-depth studies of the maternal and perinatal antecedents, circumstances and context of cause-specific and age-specific deaths within the Victorian-born Aboriginal community (before reaching their 11th birthday).
- The development of a preventability index using the 20-year cohort to be undertaken by a PhD candidate currently enrolled at the University of Melbourne.
- Appropriate methods to further disaggregate these data according to more localised areas will be developed and implemented to ensure the preservation of anonymity in the data.

### Data application

- Further disaggregation of regional data to more localised areas (preserving anonymity and confidentiality at all times). All births have been geo-coded, so the only impediment to more localised information is the legal barriers associated with the 'interpretation' of the regulations and legislation governing CCOPMM and the VPDC data.
- A health services needs analysis be applied to the regional data.

- Data profiles specific to each region be prepared and distributed to health service providers including ACCHOs in the relevant region.
- Preparation of a series of evidence-based policy papers for future directions for the provision of maternal, infant and child health services within Victoria.
- The inclusion of fathers' self-identified Aboriginal and/or Torres Strait Islander status should be included in the VPDC.

### Recommendations: From consultations with VACCHO

#### Maternal and infant health program

- Review of antenatal and postnatal programs and service provision in view of these data, particularly within communities that are distances away from major hospitals.
- Increasing maternal and infant health services (including home visiting) in metro areas where there is a smaller proportion of Aboriginal births (low visibility).
- Improved communication between Maternal and Child Health (M&CH) nurses and the Koori Midwives System (KMS).
- Expansion (funding) of the KMS visiting program to beyond the current six weeks postnatal.
- Mandatory cultural awareness and safety training with regular updates for M&CH nurses, preferably 'off-line'.





## References

- Australian Bureau of Statistics (ABS) 1999, *Standards for Statistics on Cultural and Language Diversity*, ABS, Canberra.
- Australian Bureau of Statistics 2008, *The Health and Welfare of Australian's Aboriginal and Torres Strait Islander Peoples*, ABS, Canberra.
- Australian Institute of Health & Welfare (AIHW) 2005, *Improving the Quality of Indigenous Identification in Hospital Separations Data, Health Services Series No.25*, AIHW, Australian Government, Canberra.
- Australian Institute of Health & Welfare 2006, *The ABS Standard Question on Indigenous Status*, AIHW, Australian Government, Canberra. Accessed on 18 March 2009 at: <[www.aihw.gov.au/indigenous/national\\_standards/abs\\_standard.cfm](http://www.aihw.gov.au/indigenous/national_standards/abs_standard.cfm)>.
- Australian Institute of Health & Welfare 2010a, *National Best Practice Guidelines for Collecting Indigenous Status in Health Datasets*, AIHW, Australian Government, Canberra. Accessed on 2 August 2013 at: <<http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=6442458759>>.
- Australian Institute of Health & Welfare 2010b, *National Community Services Data Dictionary*, version 6, cat. no. HWI 109, AIHW, Australian Government, Canberra. Accessed on 23 August 2013 at: <<http://www.aihw.gov.au/publication-detail/?id=6442468386>>.
- Australian Institute of Health & Welfare n.d., *Collecting Indigenous Status Information*, AIHW, Australian Government, Canberra. Accessed on 18 May 2009 at: <[www.aihw.gov.au/indigenous/national\\_standards/collecting\\_ind\\_status.cfm](http://www.aihw.gov.au/indigenous/national_standards/collecting_ind_status.cfm)>.
- Australian Law Reform Commission (ALRC) 2008, *For Your Information: Australian Privacy Law and Practice* (Report 108), Section 66—Research: Databases and Data Linkage, ALRC, Australian Government, Canberra.
- Council of Australian Governments (COAG) 2008, *National Partnership Agreement on Closing the Gap in Indigenous Health Outcomes: Implementation Plan*, COAG, Australian Government, Victoria. Accessed on 12 January 2012 at: <[www.federalfinancialrelations.gov.au/content/npa/health\\_indigenous/ctg-health-outcomes/VIC\\_IP.pdf](http://www.federalfinancialrelations.gov.au/content/npa/health_indigenous/ctg-health-outcomes/VIC_IP.pdf)>.
- Davey, M-A. et al., *Methodological Processes in Validating and Analysing the Quality of Population-based Data: A Case Study Using the Victorian Perinatal Data Collection*, Health Information Management Association of Australia Limited, North Ryde, NSW, page 12.
- Department of Human Services (DHS) 2004, *Principles of Recording Aboriginal Status in Victoria*, Koori Human Services Unit, DHS, Victoria.
- Department of Human Services 2008, *Koori Health Counts! 2006/07*, DHS, Victoria.
- Department of Health (DoH) 2013, *Victorian Perinatal Data Collection (VPDC) Manual, Section 3: Data Definitions, V3.0*, DHS, Victoria. Accessed 2 August 2013 at: <<http://docs.health.vic.gov.au/docs/doc/Victorian-Perinatal-Data-Collection-Manual-Section-3--Data-Definitions-V3-0-Release-date-23-April-2013>>.



- Draper, G. K., Somerford, P. J., Pilkington, A. S. & Thompson, S. C. 2009, 'What is the impact of missing Indigenous status on mortality estimates? An assessment using record linkage in Western Australia', *Australian and New Zealand Journal of Public Health*, vol. 33, no. 4, pp. 325–31.
- Freemantle, C. J. 2003, 'Indicators of infant and childhood mortality for Indigenous and non-Indigenous infants and children born in Western Australia from 1980 to 1997 inclusive', PhD Thesis, University of Western Australia, Perth.
- Friedman, D. J., Hunter, E. L. & Parrish, R. G. 2005, *Health Statistics: Shaping Policy and Practice to Improve the Population's Health*, Oxford University Press, New York.
- Heffernan, B., Iskandar, D. & Freemantle, J. 2012, *The History of Indigenous Identification in Victorian Health Datasets, 1980–2011: Initiatives and Policies Reported by Key Informants*, The Lowitja Institute, Melbourne.
- Heffernan, B., Sheridan, S. & Freemantle, J. 2009, *An Overview of Statutory and Administrative Datasets: Describing the Health of Victoria's Aboriginal Infants, Children and Young People*, Onemda VicHealth Koori Health Unit, The University of Melbourne, Melbourne.
- Kennedy, B., Howell, S. & Breckell, C. 2009, *Technical Report 3: Indigenous Identification in Administrative Data Collections and the Implications for Reporting Indigenous Health Status*, Health Statistics Centre, Queensland Health, Brisbane. Accessed on 5 January 2010 at: <[www.health.qld.gov.au/hic/tech\\_report/techreport\\_3.pdf](http://www.health.qld.gov.au/hic/tech_report/techreport_3.pdf)>.
- Laws, P. J. & Sullivan, E. A. 2004, *Australia's Mothers and Babies 2002*, AIHW, National Perinatal Statistics Unit, Sydney.
- Ministry of Health New Zealand (MHNZ) 2006, *Tatau Kahukura: Māori Health Chart Book*, MHNZ, New Zealand Government, Wellington.
- Orenstein, J. 2008, 'The difficulties faced by Aboriginal Victorians in obtaining identification', *Indigenous Law Bulletin*, vol. 7, no. 8. Accessed 12 January 2012 at: <[www.austlii.edu.au/au/journals/ILB/2008/37.html](http://www.austlii.edu.au/au/journals/ILB/2008/37.html)>.
- Owen, T. 1999, *Indigenous Identification in Victorian Birth Records: 1996/97*, Department of Human Services, Melbourne.
- Taylor, L. & Lim, K. 2000, 'Quality of reporting of Aboriginality to the NSW Midwives Data Collection', *NSW Public Health Bulletin*, vol. 11, pp. 206–10.
- University of Maryland Medical Center n.d., 'Apgar score', University of Maryland Medical Center. Accessed 24 July 2013 at: <<http://umm.edu/health/medical/pregnancy/labor-and-delivery/apgar-score#ixzz2YtDOFcW5>>.
- Xu, F., Sullivan, E. A., Madden, R. C., Black, D. & Jackson Pulver, L. R. 2012, 'Improvement of maternal Aboriginality in NSW birth data', *BioMed Central Medical Research Methodology*, vol. 12, no. 8.





## Schema of initiatives and policies implemented to improve identification of Aboriginal and/or Torres Strait Islander people in Victoria, 1999–2008

Victorian Admitted Episodes Dataset			
1999	2000	2001	2002
<p>Introduction of the ATSI WIES 10% Co-payment to the VAED for Indigenous identified patients</p> <p>1999/00: Introduction of an 'Indigenous status' variable in the VAED according to the National Health Data Dictionary (NHDD) V6 (four responses: No, Yes Aboriginal, Yes Torres Strait Islander, and Yes both)</p> <p>ABS published Standards for statistics on Cultural and Language diversity (6)</p>	<p>Linking of perinatal, VAED and RBDM births data in a study by DHS (results not published)</p> <p>ABS identity posters and pamphlets developed in the NT and distributed nationally to Funeral Directors, General Practitioners and hospital staff</p> <p>Patient Record System update to make the question of Indigenous status a mandatory field in the VAED</p>	<p>2002–2011: adhoc DHS/DoH hospital registration staff training across the state</p> <p>18 hospitals employing AHLOs.</p> <p>18 hospitals employing AHLOs.</p> <p>VACCHO ICAP Officer role introduced raising awareness among the VACCHO membership &amp; community</p>	<p>2003</p>
<b>2002–2011: adhoc DHS/DoH hospital registration staff training across the state</b>			
<p>VicHealth Koori Health Research and Community Development Unit report: Summary of Findings from Hospital Case Studies &amp; Recommendations for Accreditation</p> <p>'Launch of ICAP program including:</p> <p>2004/05 ATSI WIES 30% Co-payment loading, and establishment of three ICAP Project/Policy Officer roles based at VACCHO, DHS and at St Vincent's Health (7)</p> <p>DHS Hospital circular 12/2004 Recording of Aboriginal status on death certificates (9)</p> <p>DHS leaflet for hospitals: Principles of recording Aboriginal status in Victoria</p>	<p>2005/06: disaggregation of unknown response into 'Question unable to be asked' &amp; 'patient refused to answer' in the VAED</p> <p>Changes to wording in hospital Quality of Care Reports to increase health service accountability for Aboriginal programs and identification</p> <p>2005–2007: Removal of default value 'not Indigenous' and update to Indigenous Status as a mandatory field in a number of hospitals"</p>	<p>25 hospitals employing AHLOs in 2005/06</p> <p>ICAP calendars and posters produced by DHS ICAP Officers featuring local community members</p> <p>ABS identity posters updated to include a variety of Aboriginal faces</p> <p>Introduction of 'question unable to be asked' &amp; 'patient refused to answer' options in the VAED, which highlighted hospitals that were using 'not stated' or 'non-Indigenous' as a default</p>	<p>2006</p>
<p>2004</p>	<p>2005</p>	<p>2007</p>	<p>2008</p>
<b>2002–2011: adhoc DHS/DoH hospital registration staff training across the state</b>			
<p>VicHealth Koori Health Research and Community Development Unit report: Summary of Findings from Hospital Case Studies &amp; Recommendations for Accreditation</p> <p>'Launch of ICAP program including:</p> <p>2004/05 ATSI WIES 30% Co-payment loading, and establishment of three ICAP Project/Policy Officer roles based at VACCHO, DHS and at St Vincent's Health (7)</p> <p>DHS Hospital circular 12/2004 Recording of Aboriginal status on death certificates (9)</p> <p>DHS leaflet for hospitals: Principles of recording Aboriginal status in Victoria</p>	<p>2005/06: disaggregation of unknown response into 'Question unable to be asked' &amp; 'patient refused to answer' in the VAED</p> <p>Changes to wording in hospital Quality of Care Reports to increase health service accountability for Aboriginal programs and identification</p> <p>2005–2007: Removal of default value 'not Indigenous' and update to Indigenous Status as a mandatory field in a number of hospitals"</p>	<p>DHS data quality training pilot for registration staff conducted in two large public hospitals (results not published)</p> <p>25 hospitals employing AHLOs in 2006/07</p> <p>Vic hospital data audit conducted by DHS on behalf of AIHW as part of a national project. Report published by AIHW in 2007/08 whereby Vic hospital data was accepted by AIHW for future publication</p>	<p>2008/09: Change to VAED codeset meant that codes in each period were not the same, which may affect the quality of data</p>

# Appendix A

## Schema of initiatives and policies implemented to improve identification of Aboriginal and/or Torres Strait Islander people in Victoria, 1999–2008

Victorian Perinatal Data Collection				
1999	2000	2001	2002	2003
<p>Births in Victoria 1996-1998 report with analysis by Aboriginality published by CCOPMM (18)</p> <p>"Perinatal birth statistics reported in the DHS report Koori Health Counts! (1996 birth data) and cross-referenced with RBDM, VAED &amp; AHLOC data</p> <p>Coding standards for responses to Indigenous status question published in the ABS Standards for Statistics on Cultural and Language Diversity (6)</p>	<p>Linking of midwives data, hospital data and births registry data in a study by DHS (results not published)</p>	<p>Births in Victoria 1999-2000 report with analysis by Aboriginality published by CCOPMM (18)</p>		<p>Births in Victoria 2001-2002 report with analysis by Indigenous status published by CCOPMM (18)</p> <p>Mercy Hospital for Women report: Data quality study on patient information (Aboriginal &amp; Torres Strait Islander Status) (20)</p>
2004	2005	2006	2007	2008
				<p>2008-2011 Ongoing presentations for midwifery students at Victorian universities provided by VPDC staff regarding asking the question and cultural factors relating to birth.</p> <p>Presentations and pamphlets provided to midwives throughout Victoria as part of information sessions regarding changes to the Perinatal Data Collection effective 1 Jan 2009 including the introduction of a variable to record the Indigenous status of the baby</p> <p>Births in Victoria 2005-2006 report with analysis by Indigenous status published by CCOPMM (21)</p>



**Schema of initiatives and policies continued...**

Registry of Births, Deaths and Marriages (births)				
1999	2000	2001	2002	2003
	Linking of perinatal, VAED and RBDM births data in a study by DHS (results not published)  ABS identity posters and pamphlets developed in the NT and distributed nationally to Funeral Directors, General Practitioners and hospital staff.			
2004	2005	2006	2007	2008
			Aboriginal Heritage Commemorative Birth Certificates introduced (23)	

Registry of Births, Deaths and Marriages (deaths)				
1999	2000	2001	2002	2003
	ABS identity posters and pamphlets developed in the NT and distributed nationally to Funeral Directors, General Practitioners and hospital staff.			
2004	2005	2006	2007	2008
DHS Hospital circular 12/2004 Recording of Aboriginal status on death certificates (9)		ABS identity posters were updates to include a variety of Aboriginal faces		ABS Information Paper: Cause of Death Certification Australia 2008 (25)  ABS Information Paper: Census Data Enhancement – Indigenous Mortality Quality Study, 2006–07 (26)



## Appendix B

### Principles and regulations of legislation related to privacy, access, use and disclosure of data

#### *Births, Deaths and Marriages Registration Act 1996 (Vic.), section 48*

##### **Access to Register**

1. The Registrar may, on conditions the Registrar considers appropriate-
  - a) allow a person or organisation that has an adequate reason for wanting access to the Register, access to the Register; or
  - b) provide a person or organisation that has an adequate reason for wanting information from the Register, with information extracted from the Register.
2. In deciding whether an applicant has an adequate reason for wanting access to the Register, or information extracted from the Register, the Registrar must have regard to-
  - a) the nature of the applicant's interest; and
  - b) the sensitivity of the information (in particular, whether it concerns a birth registration that has been altered under Part 4A); and
  - c) the use to be made of the information; and
  - d) other relevant factors.
3. In deciding the conditions on which access to the Register, or information extracted from the Register, is to be given under this section, the Registrar must, as far as practicable, protect the persons to whom the entries in the Register relate from unjustified intrusion on their privacy.

Access to accurate data is crucial for State and Commonwealth policy makers and the community-controlled health sector for developing and evaluating initiatives aimed at improving maternal health, preventing poor birth outcomes and premature mortality, and improving Aboriginal adult health later in life.

Results from this study will provide a more robust account of Victorian Aboriginal and non-Aboriginal births for the period 1988–2008 than using perinatal data alone. From the new dataset of births validated by Aboriginal status in two sources, Victoria will have a report on the outcomes of babies born to all Aboriginal parents, including Aboriginal fathers and non-Aboriginal mother couples. These data will provide a valuable baseline from which the State and Commonwealth governments can measure progress towards equality in health and the effectiveness of 'Closing the Gap' initiatives and investment.

This project will provide a baseline from which the Registry of Births, Deaths and Marriages, and other data custodians, can track improvements in identifying Aboriginal persons in statutory and administrative databases resulting from current initiatives.

Limited access to quality data or research in Aboriginal child health is recognised by the Aboriginal community as an issue of concern. This research has received support from the Aboriginal community and will be conducted in specific agreement and collaboration with the Aboriginal health peak agency (the Victorian Aboriginal Community Controlled Health Organisation).

Importantly, these results will provide the Aboriginal community with a more accurate report of the number of Aboriginal births and characteristics over the past two decades. These data will be of relevance to those working to ameliorate the continuing disparities in birth outcomes for Aboriginal infants in Victoria and the provision of targeted interventions and initiatives.

## Information Privacy Principles under the *Privacy Act 2000* (Vic.)

The following describe how the researchers will achieve the Information Privacy Principles as described in the *Privacy Act 2000* (Vic.).

### Information Privacy Principles under the *Privacy Act 2000* (Vic.)

- |                                     |  |
|-------------------------------------|--|
| 1. Principle 1 – Collection         | 6. Principle 6 – Access and Correction   |
| 2. Principle 2 – Use and Disclosure | 7. Principle 7 – Unique Identifiers      |
| 3. Principle 3 – Data Quality       | 8. Principle 8 – Anonymity               |
| 4. Principle 4 – Data Security      | 9. Principle 9 – Transborder Data Flows  |
| 5. Principle 5 – Openness           | 10. Principle 10 – Sensitive Information |

#### IPP 1: Collection

- Researchers will not collect information directly from individuals.

#### IPP 2: Use and Disclosure

- The secondary use of birth and death data in this study is necessary for research in the public interest. The data were originally collected by the State government to record and monitor population growth and migration, birth and health status, and to plan and deliver services where they are most needed. The purpose of this project is to better report the status of child health for the Victorian population and to provide an accurate analysis of how trends for the Aboriginal population compare to the non-Aboriginal population.
- Identifiable birth data will not be disclosed by RBDM to a third party. The data matching will occur at RBDM by RBDM personnel. The Aboriginal identifier for the mother and father at the time of birth, in addition to the Aboriginal status of the deceased at the time of death, will be disclosed to the VPDCU and in-turn, the researchers.
- Furthermore, it is impracticable to seek the consent of individuals birthing in the 20-year period 1988–2008, and doing so would interfere with the epidemiological merit of the total population study.
- Accurate identification of Aboriginal births in Victoria underpins reporting of key birth indicators such as low birth weight, preterm birth and young maternal age. These data will enable better evaluation of maternal and child health services implemented over the past 20 years. Furthermore, the data will provide an important baseline cohort for the following phase of the VACMS to enable comprehensive mortality profile for Aboriginal and non-Aboriginal infants, children and young people in Victoria, 1988–2008. Infant and child death poses a significant public health risk. Analysis of these data will inform future prevention strategies and policy with the aim of preventing future mortality.
- Results of the analysis will be published in aggregate, in a de-identified form, and cell sizes will not fall below 5 units. Information will not be disclosed by researchers to a third party or reported for any purpose other than that for which it has been provided to researchers and for which ethics approvals and agreement from custodians has been received.

#### IPP 3: Data quality

- Researchers will use best practice methodology to use, analyse and report the findings, as demonstrated by the Principal Investigator in similar work undertaken in Western Australia.



#### IPP 4: Data security

- Data will be kept secure by the RBDM and VPDCU until it is provided to researchers.
- Confidential de-identified electronic data will be stored on an isolated computer in password protected computer files in the Principal Investigator's office at The University of Melbourne. The office is located in a secure area that is kept locked at all times in the Investigator's absence. Data will only be accessible to the listed Principal Investigator and Research Officer.
- The study will be governed by a Management Group, Project Research and Development Steering (PRADS) group. The PRADS will ensure ongoing compliance with ethical guidelines. Principles of ethical conduct will be tabled and tracked through meetings of the Management Group.
- Associate Professor Freemantle, Principal Investigator, has proven experience handling sensitive confidential data without incident (see Attachment: Letter of support, Professor Nicholas de Klerk).

#### IPP 5: Openness

- This research will be supported by a well described, transparent and complete description of the methods for all phases of the research project. This information will be available and accessible via the website and upon application.

#### IPP 6: Access and correction

- Not applicable.

#### IPP 7: Identifiers

- A new unique identifier will be assigned to linked records before identifying variables are removed. This is necessary to perform the linkage and maintain the privacy of individual identifiable information.

#### IPP 8: Anonymity

- Not applicable.

#### IPP 9: Transborder data flows

- Not applicable.

#### IPP 10: Sensitive information

- The collection of sensitive information (e.g. Aboriginal status data) is necessary for the conduct of research in the public interest.



## **Health Records Act 2001 (Vic.)**

The following describe how the researchers will achieve the Health Privacy Principles 1.1 and 2.2 as described in the *Health Records Act 2001* (Vic.).

### **Health Privacy Principles under the *Health Records Act 2001* (Vic.)**

1. Principle 1 – Collection
2. Principle 2 – Use and Disclosure

#### **HPP 1.1 – Collection**

- The collection of identifiable birth/patient data is necessary for data linkage to enable the compilation and analysis of statistics in the public interest.
- The data linkage methodology proposes that data linkage be conducted by a DHS officer, on site at DHS. This is because three of the four datasets involved in the linkage and validation are housed at DHS. However, this would be negotiated between DHS and DoJ.
- The benefits of this research to the interests of the Aboriginal community, the Aboriginal community-controlled health sector and the State and Commonwealth governments (and thus the Victorian taxpayer) far outweigh public interest in privacy.
- It is impracticable to seek individual consent for the use of data from every mother giving birth in Victoria in the last two decades. In addition, the refusal of consent of some subjects would significantly compromise the epidemiological merit of the project.
- These data were originally collected by State government to monitor population health in Victoria, including maternal and child health, and to develop and deliver services and initiatives for the Victorian population. Similarly, the purpose of this project is to better report child health for a subset of the Victorian population and to provide an accurate analysis of how trends for this population compare to the non-Indigenous population to enable better allocation of health services.

#### **HPP 2.2 – Use and disclosure**

- Data provided to researchers will be de-identified and therefore used and disclosed in a de-identified form. The purpose of the research can be served by the use of information in a de-identified form.
- Confidential electronic data will be stored on an isolated computer in password protected computer files in the Chief Investigator's office at The University of Melbourne. The office is located in a secure area that is kept locked at all times in the Investigator's absence. Data will only be accessible to the listed Principal Investigators and Research Assistant.
- The use of unit record level data is necessary for research and the compilation or analysis of statistics in the public interest (as above).
- The disclosure will not be in a form that identifies individuals or from which an individual's identity can reasonably be ascertained.



# Appendix C

## VACMS RBDM specifications

### VACMS Specifications

Matching Rules for VPDC Data & BDM Birth/Hospital/Death Database

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Author: Lara Klass

TRIM ref: CD/12/389156

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### Brief overview

#### Phase I – Pilot

A pilot data match was conducted in June 2012. The output was only reviewed internally by BDM as it was not in a format that could be easily read and used by a third party. Following BDM's review of the Pilot output, enhancements were made to the original specification to achieve clarity, to correct errors and to produce an output in the format required. The final specification is described in this document.

#### Phase II – Live

Birth data was extracted from the Victorian Perinatal Data Collection (VPDC) and provided to BDM for matching in September 2012. All relevant data available was provided from the VPDC for all live births in the 20-year period; 1/1/1988 to 31/12/2008 (based on date of birth).

VPDC provided the data to BDM via the SDE Portal. Data for each of the 20 years, was provided in separate Microsoft Excel Worksheets. If the number of records per worksheet exceeded 66,000, the records for that year were split onto a second worksheet because of the limitations of Microsoft Excel 2003.

BDM conducted the data matching, as described below before appending the results for each record to the original VPDC data to create the output data (please refer to the document titled 'Data Dictionary').

### Description of files received from the VPDC

Each record will contain the data fields described in Table 1 (see next page).

The 'Field No.' is listed here as a reference only, and will not appear in the VPDC input data. The 'BDM Field Label' will be entered by BDM ICT, after taking receipt of the data. 'VACMS idno' and 'VACMS ABORIG' will not be used for matching, but will be retained with the BDM output.

Table 1

Field Description	Format/Remarks	BDM Field Label
Mother's surname	Free Text	VACMS surname
Mother's given name/s	Free Text	VACMS gnames
Child's date of birth	YYYYMMDD	VACMS bborn
Mother's UR number	5 to 10 digit UR number	VACMS motherur
Child's sex	1 = male 2 = female 3 = indeterminate 9 = unknown	VACMS SEX
Hospital/campus code	Alpha-numeric 3 digit hospital code	VACMS Hospcode
VPDC unique Identifier (unique for each child born)	nnnnnnnn	VACMS idno
Mother's ATSI status	2 = non-aboriginal 5 = Aboriginal 6 = Torres Strait Islander 7 = Aboriginal & TSI 9 = Unknown/not stated	VACMS ABORIG

### Validation of data

Data received from VPDC will be validated for the format as specified in the 'Format/Remarks' column in Table 1. A separate file will be created where records failing validation are recorded. VPDC will be provided with a report of any records failing validation. Only records that pass validation will be considered for matching.

### Data matching description and rules

The VPDC input data is matched with the Births Database, and then subsets of the data are matched with the Hospitals Database and the Deaths Database.

### Matching with the Births Database – All years 1988–98 and 1999–2008

#### Matching Rules – Births Database

The following rules are applied:

- Match with all record status in the Birth Database except Cancelled records.

Table 2

Input fields used for matching				Output		
VACMS surname	VACMS gname	VACMS bborn	VACMS SEX	Result	Multiple Births*	BDM data appended?
✓	✓	✓	✓	Match	1	YES
✗	✓	✓	✓	Match-00	more than 1	No
				Potential-01	1	YES
					more than 1	No
✓	Any of the given names	✓	✓	Potential-02	1	YES
					more than 1	No
✓	Any of the given names	✗	✓	Potential-03	1	YES
					more than 1	No
✗	Any of the given names	✓	✓	Potential-04	1	YES
					more than 1	No
Records not meeting the above criteria				No Match	N/A	No

✓ – Indicates match with this field ✗ – Indicates do not match with this field





## Output file format – Matching with Births

The fields listed in Table 3 are the results for the birth matching and will be appended to the original input data.

Table 3

Field Label	
BDM Mother ATSI	<ul style="list-style-type: none"> <li>Field Label</li> <li>BDM Mother ATSI</li> <li>BDM Father ATSI</li> <li>Result</li> <li>Multiple</li> </ul>
BDM Father ATSI	<ul style="list-style-type: none"> <li>Aboriginal</li> <li>Torres Strait Islander</li> <li>Aboriginal and Torres Strait Islander</li> <li>Not Stated</li> <li>No</li> <li>Unknown</li> <li>BLANK (if no match or multiple matches)</li> </ul>
Result	<ul style="list-style-type: none"> <li>Match</li> <li>Match-00</li> <li>No Match</li> <li>Potential-01</li> <li>Potential-02</li> <li>Potential-03</li> <li>Potential-04</li> </ul>
Multiple	<ul style="list-style-type: none"> <li>1</li> <li>2</li> <li>3</li> <li>4</li> <li>5 (indicating that 5 or more records matched)</li> </ul>

## Matching with the Hospital Database – ONLY years 2003–2008

For all records where DOB of the child is  $\geq$  1/1/2003 and the result of the Births Database match was no match (refer to birth matching rules above), query the Hospital List Database. If an exact match is found AND if linked to a birth record, extract the details from the births database (as specified in Table 4 below) and append to the result file. See the matching rule below.

### Matching Rules – Hospital Database

Table 4

VACMS surname	VACMS gnames	VACMS bdob	VACMS SEX	VACMS motherur	VACMS hospcode	BDM HOSP RESULT	BDM data appended?
✓	✓	✓	✓	✓	✓	Match	Yes
Records not meeting the above criteria						No Match	No



## Output file format – Matching with Hospitals

The fields listed in Table 5 will be appended to the result file.

Table 5

Field Label	Format/ Remarks
Result	<ul style="list-style-type: none"> <li>• Match</li> <li>• No Match</li> <li>• N/A (record not selected for hospital match)</li> </ul>
BDM Mother ATSI	<ul style="list-style-type: none"> <li>• Aboriginal</li> <li>• Torres Strait Islander</li> <li>• Aboriginal and Torres Strait Islander</li> <li>• Not Stated</li> <li>• No</li> <li>• Unknown</li> <li>• BLANK (for records not selected in hospital match or no match result)</li> </ul>
BDM Father ATSI	<ul style="list-style-type: none"> <li>• Aboriginal</li> <li>• Torres Strait Islander</li> <li>• Aboriginal and Torres Strait Islander</li> <li>• Not Stated</li> <li>• No</li> <li>• Unknown</li> <li>• BLANK (for records not selected in hospital match or no match result)</li> </ul>

## Matching with the Deaths Database – All years 1988–98 and 1999–2008

### Matching Rules – Deaths Database

Consider only records with the result 'match' from the Birth database matching exercise.

See Table 6 for the matching rules.

Table 6

VACMS surname	VACMS gnames	VACMS bdob	BDM DEATH RESULT	Number of Matches	BDM data appended?
✓	✓	✓	Match	1	YES
✓	✓	✓	Match	more than 1	No
✓	Any of the given names	✓	Potential	1	YES
✓	Any of the given names	✓	Potential	more than 1	No
Records not meeting the above criteria			No Match	0 (blank)	No

✓ – Indicates match with this field

\* – Indicates do not match with this field



## Output file format – Matching with Deaths

The fields listed in Table 7 will be appended to the result file.

Table 7

Field Label	Format/ Remarks
Result	<ul style="list-style-type: none"><li>• Match</li><li>• No Match</li><li>• Potential</li><li>• N/A (record not selected for death matching)</li></ul>
Multiples	<ul style="list-style-type: none"><li>• 1</li><li>• 2</li><li>• 3</li><li>• 4</li><li>• 5 (indicating that 5 or more records matched)</li></ul>
BDM Death Surname	<ul style="list-style-type: none"><li>• Child surname from matching death record: free text</li><li>• BLANK (N/A of no match)</li></ul>
BDM Death Given Name	<ul style="list-style-type: none"><li>• Child given name/s from matching death record: free text</li><li>• BLANK (N/A of no match)</li></ul>
Death Date of Birth	<ul style="list-style-type: none"><li>• Child DOB from matching death record: dd/mm/yyyy</li><li>• BLANK (N/A of no match)</li></ul>



# Appendix D

## Variables used in matching birth data

The following table (continued overleaf) outlines the matching rules and the variables and associated categories used in matching birth information from the VPDC with birth information in the RBDM. The VPDC is the source data. The 'VACMS' variables represent the data categories provided to the researchers as a result of the matching.

This is the BDM Internal Output Format for each record (includes the VPDC Input Fields and the Output Fields for the BIRTH, HOSPITAL and DEATH matching)		VPDC Input			
	Field Name:	VACMS surname	VACMS gnames	VACMS bborn	VACMS motherur
	Description:	Mother's surname	Mother given name/s	Child DOB	Mother's UR number
	Values:	free text	free text	yyyy/mm/dd	5–10 digit n (for multi births – number is unique for each child rather than each mother)

Is this field used in the matching rules?	Used for BIRTH Matching Rules?	Yes	Yes	Yes	No
	Used for HOSPITAL Matching Rules?	Yes	Yes	Yes	Yes
	Used for DEATH Matching Rules?	Yes	Yes	Yes	No

Is this field used for record selection?	Used for HOSPITAL match Record Selection?	No	No	YES >=1/1/2003	No
	Used for DEATH match Record Selection?	No	No	No	No



				VPDC Input	
VACMS SEX	VACMS Hospcode	VACMS idno	VACMS ABORIG	BDM Mother ATSI	BDM Father ATSI
Child's sex	Hospital / Campus code	unique # created by VPDC to re-match BDM output	Mother's ATSI status	Recorded on matching child's birth record	Recorded on matching child's birth record
1= male 2= female 3= indeterminate 9= unknown	alpha-numeric 3 digit code	nnnn...	2 = non-aboriginal 5 = Aboriginal 6 = Torres Strait Islander 7 = Aboriginal & TSI 9 = Unknown/not stated	Aboriginal Torres Strait Islander Aboriginal and Torres Strait Islander Not Stated No Unknown BLANK (no match)	Aboriginal Torres Strait Islander Aboriginal and Torres Strait Islander Not Stated No Unknown BLANK (no match)

	Yes	No	No	No	No	No
	Yes	Yes	No	No	No	No
	No	No	No	No	No	No
	No	No	No	No	No	No
	No	No	No	No	No	No

## Variables used in matching birth data continued...

This is the BDM Internal Output Format for each record (includes the VPDC Input Fields and the Output Fields for the BIRTH, HOSPITAL and DEATH matching)	VPDC Input		BDM Hospital Match		
	Field Name:	Result	Multiple Births	Result	BDM Mother ATSI
	Description:	See Birth Matching Rules	Number of matching records	See Hospital Matching Rules	Recorded on matching child's birth record
	Values:	Match Match-00 No Match Potential-01 Potential-02 Potential-03 Potential-04	1 2 3 4 5 (5 or more) BLANK (no match)	Match No Match N/A (record not selected for hospital match)	Aboriginal Torres Strait Islander Aboriginal and Torres Strait Islander Not Stated No Unknown BLANK (N/A)
Is this field used in the matching rules?	Used for BIRTH Matching Rules?	No	No	No	No
	Used for HOSPITAL Matching Rules?	No	No	No	No
	Used for DEATH Matching Rules?	No	No	No	No
Is this field used for record selection?	Used for HOSPITAL match Record Selection?	YES where = No Match	No	No	No
	Used for DEATH match Record Selection?	YES where = Match	No	No	No





		BDM Death Match				
BDM Father ATSI	Result	Multiple	BDM Death Surname	BDM Death Given Name	Death Date of Birth	
Recorded on matching child's birth record	See Death Matching Rules	Number of matching records	Child surname from matching death record	Child given name/s from matching death record	Child DOB from matching death record	
Aboriginal	Match	1	free text	free text	dd/mm/yyyy	
Torres Strait Islander	No Match	2	BLANK (N/A)	BLANK (N/A)	BLANK (N/A)	
	Potential-01	3				
Aboriginal and Torres Strait Islander	N/A (record not selected for death match)	4				
Not Stated		5 (5 or more)				
No		BLANK (no match)				
Unknown						
BLANK (N/A)						
No	No	No	No	No	No	
No	No	No	No	No	No	
No	No	No	No	No	No	
No	No	No	No	No	No	
No	No	No	No	No	No	



# Appendix E

## Sensitivity analysis

**Table E1: Numbers and proportions of live births to mothers and/or fathers who identified as Aboriginal and/or Torres Strait Islander or as non-Aboriginal and/or Torres Strait Islander in Victoria, 1999–2008 inclusive, by year of birth as reported by the VPDC for births that could be matched to the RBDM**

VPDC matched only	Aboriginal N (%)	Non-Aboriginal N (%)	Missing N (%)	All births N (%)
<b>Births</b>				
Total live births	4,230 (0.7)	601,649 (99.3)	65 (0.0)	605,944 (100.0)
<b>Birth year</b>				
1999	385 (0.7)	57,046 (99.3)	5 (0.0)	57,436 (100.0)
2000	311 (0.5)	57,046 (99.5)	0 (0.0)	57,357 (100.0)
2001	355 (0.6)	56,708 (99.4)	0 (0.0)	57,063 (100.0)
2002	349 (0.6)	57,376 (99.4)	0 (0.0)	57,725 (100.0)
2003	314 (0.5)	58,119 (99.5)	0 (0.0)	58,433 (100.0)
2004	367 (0.6)	58,144 (99.4)	1 (0.0)	58,512 (100.0)
2005	455 (0.7)	60,774 (99.3)	1 (0.0)	61,230 (100.0)
2006	484 (0.8)	63,797 (99.2)	19 (0.0)	64,300 (100.0)
2007	586 (0.9)	66,260 (99.1)	3 (0.0)	66,849 (100.0)
2008	624 (0.9)	66,379 (99.0)	36 (0.1)	67,039 (100.0)

N: number of births. RBDM: Registry of Births, Deaths and Marriages. VPDC: Victorian Perinatal Data Collection.

**Table E2: Numbers and proportions of live births to mothers and/or fathers who identified as Aboriginal and/or Torres Strait Islander or as non-Aboriginal and/or Torres Strait Islander in Victoria, 1999–2008 inclusive, within DHS regions as reported by the VPDC for births that could be matched to the RBDM**

VPDC matched only	Aboriginal N (%)	Non-Aboriginal N (%)	Missing N (%)	All births N (%)
<b>Location of birth</b>				
Barwon – SW	378 (8.9)	39,156 (6.5)	5 (7.7)	39,539 (6.5)
Loddon Mallee	821 (19.4)	33,339 (5.5)	4 (6.2)	34,164 (5.6)
Grampians	265 (6.3)	23,374 (3.9)	2 (3.1)	23,641 (3.9)
Hume	573 (13.5)	29,468 (4.9)	4 (6.2)	30,045 (5.0)
Gippsland	505 (11.9)	25,797 (4.3)	5 (7.7)	26,307 (4.3)
Western Metro	210 (5.0)	88,733 (14.7)	10 (15.4)	88,953 (14.7)
Northern Metro	550 (13.0)	102,483 (17.0)	15 (23.1)	103,048 (17.0)
Eastern Metro	194 (4.6)	105,642 (17.6)	10 (15.4)	105,846 (17.5)
Southern Metro	329 (7.8)	143,453 (23.8)	9 (13.8)	143,791 (23.7)
Other	405 (9.6)	10,204 (1.7)	1 (1.5)	10,610 (1.8)

DHS: Department of Human Services. N: number of births. RBDM: Registry of Births, Deaths and Marriages. SW: South Western. VPDC: Victorian Perinatal Data Collection.



**Table E3: Maternal and perinatal characteristics for Aboriginal births as reported by the VPDC for births that could be matched to the RBDM in Victoria, 1999–2008 inclusive, according to DHS health regions by birth cohorts and includes all years**

VPDC matched only	Aboriginal N (%)	Non-Aboriginal N (%)	Missing N (%)	All births N (%)
<b>Sex</b>				
Male	2,075 (49.1)	308,791 (51.3)	27 (41.5)	310,893 (51.3)
Female	2,155 (50.9)	292,857 (48.7)	38 (58.5)	295,050 (48.7)
Indeterminate	–	1 (0.0)	–	1 (0.0)
<b>Birth order</b>				
First	4,207 (99.5)	597,732 (99.3)	64 (98.5)	602,003 (99.3)
Second	23 (0.5)	3,877 (0.6)	1 (1.5)	3,901 (0.6)
Third	–	39 (0.0)	–	39 (0.0)
Fourth	–	1 (0.0)	–	1 (0.0)
<b>Metropolitan or rural birth</b>				
Metro	1,331 (31.5)	437,625 (72.7)	49 (75.4)	439,005 (72.4)
Inner rural	365 (8.6)	52,171 (8.7)	6 (9.2)	52,542 (8.7)
Middle rural	1,567 (37.0)	89,833 (14.9)	8 (12.3)	91,408 (15.1)
Outer rural	963 (22.8)	19,746 (3.3)	1 (1.5)	20,710 (3.4)
Unknown	4 (0.1)	2,274 (0.4)	1 (1.5)	2,279 (0.4)
<b>Marital status of mother</b>				
Currently single	1,928 (45.6)	75,539 (12.6)	23 (35.4)	77,490 (12.8)
Married/de facto	2,288 (54.1)	525,154 (87.3)	39 (60.0)	527,481 (87.1)
Unknown	14 (0.3)	956 (0.2)	3 (4.6)	973 (0.2)
<b>Maternal age (years)</b>				
≤19	793 (18.7)	16,669 (2.8)	5 (7.7)	17,467 (2.9)
20–29	2,235 (52.8)	234,295 (38.9)	26 (40.0)	236,556 (39.0)
30–39	1,139 (26.9)	329,695 (54.8)	32 (49.2)	330,866 (54.6)
≥40	63 (1.5)	20,990 (3.5)	1 (1.5)	21,054 (3.5)
unknown	–	–	1 (1.5)	1 (0.0)
<b>Maternal age (years) (cats)</b>				
≥19	793 (18.7)	16,669 (2.8)	5 (7.7)	17,467 (2.9)
20–29	2,235 (52.8)	234,295 (38.9)	26 (40.0)	236,556 (39.0)
≥30	1,202 (28.4)	350,685 (58.3)	33 (50.8)	351,920 (58.1)
Unknown	–	–	1 (1.5)	1 (0.0)
<b>Gestational age (weeks)</b>				
20–27	33 (0.8)	2,300 (0.4)	1 (1.5)	2,334 (0.4)
28–31	48 (1.1)	3,294 (0.5)	2 (3.1)	3,344 (0.6)
32–36	395 (9.3)	31,661 (5.3)	9 (13.8)	32,065 (5.3)
37–41	3,689 (87.2)	556,270 (92.5)	53 (81.5)	560,012 (92.4)
>41	63 (1.5)	8,090 (1.3)	–	8,153 (1.3)
Unknown	2 (0.0)	34 (0.0)	–	36 (0.0)
<b>Gestational age (weeks) (cats)</b>				
Preterm	476 (11.3)	37,255 (6.2)	12 (18.5)	37,743 (6.2)
Term	3,752 (88.7)	564,360 (93.8)	53 (81.5)	568,165 (93.8)
Unknown	2 (0.0)	34 (0.0)	–	36 (0.0)
<b>Plurality</b>				
Single	4,184 (98.9)	593,807 (98.7)	63 (96.9)	598,054 (98.7)
Multiple	46 (1.1)	7,842 (1.3)	2 (3.1)	7,890 (1.3)

Table E3 continued...

VPDC matched only	Aboriginal N (%)	Non-Aboriginal N (%)	Missing N (%)	All births N (%)
<b>Parity (previous pregnancies)</b>				
0	1,541 (36.4)	255,158 (42.4)	39 (60.0)	256,738 (42.4)
1–2	1,842 (43.5)	300,338 (49.9)	23 (35.4)	302,203 (49.9)
≥3	847 (20.0)	46,153 (7.7)	3 (4.6)	47,003 (7.8)
<b>Birth weight (grams) (cats)</b>				
<1,500	72 (1.7)	5,032 (0.8)	3 (4.6)	5,107 (0.8)
1,500–2,499	444 (10.5)	26,066 (4.3)	6 (9.2)	26,516 (4.4)
≥2,500	3,713 (87.8)	570,508 (94.8)	55 (84.6)	574,276 (94.8)
Unknown	1 (0.0)	43 (0.0)	1 (1.5)	45 (0.0)
<b>Birth weight (grams)</b>				
<2,500	516 (12.2)	31,098 (5.2)	9 (13.8)	31,623 (5.2)
≥2,500	3,713 (87.8)	570,508 (94.8)	55 (84.6)	574,276 (94.8)
Unknown	1 (0.0)	43 (0.0)	1 (1.5)	45 (0.0)
<b>% of expected birth weight</b>				
<10th centile	697 (16.5)	52,902 (8.8)	4 (6.2)	53,603 (8.8)
10th–<50th centile	1,769 (41.8)	229,975 (38.2)	30 (46.2)	231,774 (38.3)
50th–<90th centile	1,393 (32.9)	250,410 (41.6)	26 (40.0)	251,829 (41.6)
90th plus centile	361 (8.5)	67,742 (11.3)	5 (7.7)	68,108 (11.2)
unknown	10 (0.2)	620 (0.1)	–	630 (0.1)
<b>Apgar at 1 minute</b>				
Critically low (0–3)	98 (2.3)	11,042 (1.8)	3 (4.6)	11,143 (1.8)
Fairly low (4–6)	406 (9.6)	55,905 (9.3)	5 (7.7)	56,316 (9.3)
Normal (7+)	3,708 (87.7)	533,938 (88.7)	55 (84.6)	537,701 (88.7)
Unknown	18 (0.4)	764 (0.1)	2 (3.1)	784 (0.1)
<b>Apgar at 5 minutes</b>				
Critically low (0–3)	26 (0.6)	1,576 (0.3)	–	1,602 (0.3)
Fairly low (4–6)	69 (1.6)	6,193 (1.0)	2 (3.1)	6,264 (1.0)
Normal (7+)	4,120 (97.4)	593,287 (98.6)	62 (95.4)	597,469 (98.6)
Unknown	15 (0.4)	593 (0.1)	1 (1.5)	609 (0.1)

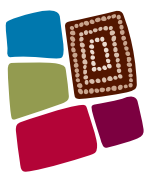
DHS: Department of Human Services. N: number of births. RBDM: Registry of Births, Deaths and Marriages. VPDC: Victorian Perinatal Data Collection.











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