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## Immunisation delay in the 0-18 month age group in the Kimberley Region of Western Australia

Anne Mahony  
*Edith Cowan University*

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**IMMUNISATION DELAY  
IN THE 0-18 MONTH AGE GROUP  
IN THE KIMBERLEY REGION OF WESTERN AUSTRALIA**

**By**

**Anne Mahony**

**A Thesis Submitted in Partial Fulfilment of the  
Requirements for the Award of**

**Bachelor of Nursing with Honours**

**at the School of Nursing, Edith Cowan University**

**Date of Submission: 26 May 1995**

## ABSTRACT

In two separate complementary exploratory descriptive studies the cover and timing of vaccine administration to children in the 0-18 month age group in the remote Kimberley Region of Western Australia were quantified, and reasons for delay in vaccine administration were investigated. The adapted PRECEDE model was used to guide the research and to integrate and interpret the findings.

**Study One:** Three separate computer immunisation databases were combined to provide the first validated age-appropriate infant immunisation data in Western Australia. For the first time in WA, the timing of administration of vaccines was investigated, and for the first time in Australia, the timing of vaccine administration to children in different racial groups was investigated. Epi Info 5.01. was used to calculate the timeliness of vaccine administration. During the first six months of life the overall cover and timing of vaccine administration for the total population appeared to be satisfactory. However, at 12 and 18 months of age, the overall cover decreased and delay increased. The overall vaccine cover for Aboriginal children was significantly lower than that of all other racial groups; and a higher percentage of Aboriginal children experienced delay in administration of all vaccines, at all ages. Over 50% of these children were immunised against measles four months later than the age recommended by the World Health Organisation. Due to immunisation delay, over 60% of Aboriginal children in the study population who are already "at risk" in terms of health were also at

serious risk of vaccine preventable diseases for an increased length of time.

**Study Two:** Using a questionnaire to gather data, reasons for delay in vaccine administration were sought from the Kimberley community nurses. SPSS 6.0.1 was used to calculate frequency distributions. The respondents suggested two major reasons for delay: the poor general health of the children and the mobility of the Aboriginal population. The findings indicated that, although limited on-going immunisation education was reported, the community nurses were knowledgeable of childhood immunisation, and administered vaccines to "at-risk" Aboriginal children appropriately. The respondents stated they were "active" in following-up children overdue for immunisation. As this was the first study of community nurses administering vaccines in a remote area of Australia, it provided important baseline data on immunisation practice and education. However, it also highlighted the need for further investigation of the immunisation education requirements of community nurses.

The findings of both studies suggest that, in some areas of the Kimberley Region, the numbers of community nurses were not adequate to cope with a highly mobile client population with multiple health problems. There is an urgent need for: investigation of staffing levels in community health in the Kimberley; the increased involvement of other health agencies in childhood immunisation; as well as culturally-appropriate research to provide data from Aboriginal health-workers and Aboriginal parents and care-givers on immunisation delay in children in the 0-18 month age group.

## DECLARATION

"I certify that this thesis does not incorporate, without acknowledgement, any material previously submitted for a degree or diploma in any institution of higher education; and that to the best of my knowledge and belief, it does not contain any material previously published or written by another person except where due reference is made in the text."

Anne Mahony

26 May 1995

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## CHAPTER ONE

### STUDY ONE AND STUDY TWO

#### Introduction

#### Background of the Study

Over the past several decades, seven diseases have been controlled in Australia by immunisation: four viral (measles, mumps, rubella, and poliomyelitis), and three bacterial (diphtheria, tetanus and pertussis). None of them, however, has been eradicated. Although eradication of the vaccine-preventable viral diseases is possible, this cannot happen until immunisation against each one reaches a very high level (Anderson & May, 1990). Even in populations with high levels of immunisation, outbreaks can still occur among unimmunised people (Feery, 1994). In Australia the level of immunisation and herd immunity against these diseases is less than optimum and epidemics still occur (Bazely & Kemp, 1994). In Western Australia, 570 cases of pertussis, and 133 cases of measles were notified in 1994 (WA Communicable Diseases Bulletin, 1995).

Immunisation rates in Australia are assessed by means of periodic surveys, as this country does not have a national immunisation database (Kelly, 1993, 1994). According to the 1989-90 Survey of Western Australian children aged 0 to 6 years, rates of immunisation varied from 71% against pertussis to 87% against measles. The percentage of

children fully immunised against measles, mumps, diphtheria, tetanus and pertussis was 53% (Australian Bureau of Statistics (ABS), 1992a).

More recently, Kelly (1993, 1994) found that over 80% of children in the Midwest Gascoyne and Great Southern Health Regions of Western Australia were fully immunised by school age. The immunisation status of Western Australian children in the 0-18 month age group has, however, not been investigated. Also, the timing of administration of vaccines and the possibility of immunisation delay were not investigated.

Apart from the Measles Mumps Rubella vaccine, which is administered as a single dose, a course of several doses of vaccine is required for full protection against most vaccine-preventable childhood diseases. The National Health and Medical Research Council of Australia recommends the age at which each vaccine is administered. The recommended timing, and age of administration of vaccines is set out in the Recommended Immunisation Schedule for Western Australia (Appendix A). Age-specific factors influencing this timing, include, risk of disease, complications, response to the vaccine and immune response (NHMRC, 1991). Until each dose in each course has been administered, a child is not fully protected against that particular disease.

Prior to this present research, the timing of administration of childhood immunisations, and the possibility of immunisation delay had not been investigated in Western Australia. Furthermore, apart from the

National Health Survey of 1989-90, no research in the area of immunisation had been conducted in the Kimberley Region of WA.

The Kimberley is a vast rugged region in the far north of the state. Its area is approximately 356,500 sq.km with sub-tropical rain-forest in the north and semi-arid desert in the south. It is a sparsely populated region with the total population of 29,613, comprising less than 1.87% of the total population of Western Australia. The Kimberley population is predominantly young, with children in the 0-4 year age group (3,035) comprising more than 10% of the region's total population (ABS, 1992b).

Over 65% of children in the 0-18 month age group in the Kimberley are Aboriginal: many of these are socially disadvantaged, and experience a standard of health considerably lower than that enjoyed by other Australian children. Aborigines and Torres Strait Islanders "comprise the least healthy identifiable sub-population in Australia" (Thomson, 1991, p.37). Walker (1994) argued that Aboriginal children "suffer health problems similar to children in Third World Countries" (p.44). This group of children often suffer from multiple infections, and their admission rate to hospital is high. In 1984, in the regional hospital in Derby in the Kimberley, 90% of admissions to the paediatric unit were Aboriginal, and 60% of these admissions were children under two years of age (Harris, Knight & Henderson, 1986).

During 1991, the proportion of Aboriginal deaths in the under one year age group was almost five and a half times greater than for the total

Australian population, and almost six times greater in the 1-14 year age group than for the same age group in the total population (ABS, 1993, p.10). Without complete, and age appropriate immunisation, the danger of potentially serious vaccine-preventable diseases is added to the multiple existing health problems of Aboriginal children.

In addition to other routine childhood immunisations, Aboriginal children have been vaccinated against tuberculosis and tuberculous leprosy since the late 1960's (Gracey & Spargo, 1987), and against hepatitis B since 1988 (Gill, Bucens, Hatton, Carey & Quadros, 1990). A vaccine against invasive *Haemophilus influenzae* type b (Hib), has also been part of the standard immunisation schedule for all Australian children since 1993 (NHMRC, 1994).

Consequently, for immunisation against all vaccine-preventable diseases to be completed according to the recommended schedule, the number of vaccine injections a child must receive in the first 18 months of life is quite high. For an Aboriginal child to be fully immunised by the age of eighteen months, that child must receive a total of twelve injections and three doses of Oral Polio Vaccine (OPV). A Caucasian child would have a minimum of eight injections and three doses of OPV.

The initial stimulus for this study came from the researcher's professional experience as a community nurse in the Kimberley Region. Evidence from several years of personal practice suggested that, although courses of childhood immunisations were usually completed,

each dose of vaccine in each course was often not administered by the due date. Moreover, the delay often exceeded one month beyond the date immunisation was due.

Although immunisation delay was evident from the clinical perspective, there was no information available on the timing of vaccine administration to Kimberley children. At the time of commencing the present research, reliable immunisation data were available on every child in the 0-18 month age group in the Kimberley Region. However, it was stored on three separate incompatible computer databases. In order to determine the immunisation cover, as well as the timing of administration of vaccines to children in the 0-18 month age group this data needed to be combined, sorted and analysed.

As the majority of children in the Kimberley are Aboriginal with an already compromised health status, there was also a need to determine and seek differences, if any, in the timing of administration of vaccines to children in different racial groups in the region.

As well as establishing the actual timing of vaccine administration, there was also a need to investigate possible reasons for immunisation delay from the perspective of the community nurses, who administer almost all vaccines in the Kimberley. These nurses are often working in remote and isolated conditions, administering vaccines to a highly mobile population without the back-up of a medical officer.

Although Registered Child Health and generalist community nurses practicing in rural Australia are important providers of immunisation, the expertise and knowledge of these practitioners had not previously been sought regarding childhood immunisation. The need for research to provide information about nursing practice in the administration of vaccines and the follow-up of children overdue immunisations in remote areas was, therefore, also indicated.

#### Importance of the Study

The present research was the first in Australia to investigate the immunisation status and timing of administration of vaccines to children in different racial groups. This is of particular importance to the Kimberley population, as the majority of children are Aboriginal. Without complete appropriate immunisation, these children, (whose health status is already compromised), are also at risk of serious illness or death from vaccine-preventable diseases.

In addition, the present research provides important baseline data for Western Australia. Combining the three Kimberley computer databases, containing the immunisation records of all children in the 0-18 month age group in that region, provided the first complete validated age-appropriate immunisation data in this state. It is the first study to determine the timing of vaccine administration and investigate possible

immunisation delay in WA. Also, it is the first immunisation study to be carried out in the Kimberley Region.

There is also a dearth of information about nursing practice in the area of vaccine administration in Australia. Again, this is the first study to describe nursing practice in the administration of vaccines and follow-up of children overdue for immunisation in a remote area of Australia. It is also the first study to seek possible reasons for immunisation delay from the practitioners administering vaccines.

### Purpose of the Research

As the purpose of this research was twofold, two separate studies were carried out. The purpose, objectives and methodology of each of these studies are, therefore, presented separately.

### Study One: The Vaccine Uptake and Timeliness Study

#### Purpose of Study One.

The purpose of Study One was to determine the overall immunisation status, and the timing of administration of all childhood vaccines to children in all racial groups in the 0-18 month age group in the Kimberley Region, as in the Recommended Immunisation Schedule for Western Australia (Appendix A). This was done by combining the data from three databases in the region.

### Objectives of Study One.

The specific objectives of this study were:

1. To set up a computer database containing all the immunisation data on children in the 0-18 month age group in the Kimberley Region.
2. To determine the timing of administration of each dose of vaccine in each course of vaccines to all children in the 0-18 month age group in the Kimberley Region.
3. To determine any differences in the timing of administration of vaccines to Kimberley children of different racial groups in the 0-18 month age group.
4. To determine any differences in the timing of administration of vaccines to children in the 0-18 month age group living in remote communities, and those living in towns in the Kimberley Region.
5. To determine any differences in the timing of administration of vaccines to children in the 0-18 month age group living in the East Kimberley, and those living in the West Kimberley.
6. To determine the percentage of all children in the 0-18 month age group in the Kimberley Region, who have received each vaccine.
7. To determine the percentage of children in each racial group in the 0-18 month age group in the Kimberley Region who have received each vaccine.



8. To set up a computer database and the necessary computer programmes for use by the Kimberley Public Health Unit for future regular monitoring of immunisation cover and timing of administration of vaccines to these children.

### Study Two: The Community Nurse Study

#### Purpose of Study Two.

The purpose of Study Two was to seek reasons for delay in the administration of vaccines to children in the 0-18 month age group in the Kimberley Region. This was done by sending a questionnaire to the community nurse practitioners who administer vaccines to children. This study also sought to describe community nursing practice in the areas of vaccine administration and the follow-up of children who experience immunisation delay, as well as to gather data on the immunisation education of community nurses in the Kimberley Region.

#### Objectives of Study Two.

The specific objectives of this study were:

1. To seek community nurses' perceptions of possible reasons for delay in the administration of vaccines to children in the 0-18 month age group in the Kimberley Region

2. To ascertain the availability of immunisation for children in the 0-18 month age group in the Kimberley Region.
3. To identify the principal source of nursing knowledge of childhood immunisation procedures.
4. To describe community nurses' practice in administering immunisations.
5. To describe community nurses' practice in the follow-up of children who are overdue for immunisation.
6. To investigate the extent of inter-referral from other health agencies and personnel, of children in the 0-18 month age group due for immunisation in the Kimberley Region.

#### Definition of Terms

Community Nurse: A nurse who practices in the community setting, "simultaneously considering and enabling the health care needs of individuals, families, aggregates,...and the total community...with...both a clinical and public health focus of care" (McMurray, 1990, p.8).

Immunisation: Artificial active immunisation, which "involves the administration of an antigen which stimulates immunity" (Dick, 1986, p.5).

Immunisation or Vaccination Delay: Failure to administer a vaccine within thirty days of the due date, according to the Western Australian Recommended Immunisation Schedule.

Vaccine: A "suspension of attenuated or killed infectious agents...given to establish resistance to the infectious agent itself" (Stewart, Russell, & MacKinlay, 1982, p.259).

Vaccination: The exercise of physically administering a vaccine by the appropriate route, that is; by mouth, subcutaneously, intra-dermally, or intra-muscularly.

BCG: bacillus Calmette-Guerin vaccine, administered to prevent the mycobacterial diseases, tuberculosis and leprosy (Fine & Rodrigues, 1990). The vaccine is administered routinely to Aboriginal children soon after birth.

DTP: Vaccine given to prevent diphtheria, tetanus and pertussis (whooping cough). This vaccine is given routinely to all Australian children at two, four, six, and eighteen months of age (NHMRC, 1994). (DTP1, DTP2, DTP3, DTP4).

Hep B: Hepatitis B vaccine which is given routinely to infants in ethnic groups with a high hepatitis B carrier rate of over 2% (this includes Aboriginal children as well as children from most Asian, Oceanic and African countries). The vaccine is administered soon after birth, and at one and three months of age (NHMRC, 1994). (HepB1, HepB2, HepB3).

Hib: Vaccine given to prevent infections due to the *Haemophilus influenzae* type b organism (Hib). The Hib vaccine has been part of the routine immunisation schedule since 1993 (NHMRC, 1994).

MMR: Measles-Mumps-Rubella vaccine which contains "live attenuated measles, mumps and rubella viruses" (NHMRC, 1994, p.38). This vaccine is administered routinely to all West Australian children at 12 months of age.

OPV: (oral poliomyelitis vaccine), a "live attenuated vaccine containing the three strains of polio virus" (Nicoll & Rudd, 1989, p.213). This vaccine is administered routinely to all Western Australian children at two, four, and six months of age (OPV1, OPV2, OPV3).

### Organisation of the Thesis

**Chapter Two** presents the literature review relevant to both Study One and Study Two.

**Chapter Three** presents and describes the adapted PRECEDE model, the conceptual model used to guide both studies.

**Chapter Four** and **Chapter Five** describe the methodology used and present the findings of Study One: The Vaccine Uptake and Timeliness Study.

**Chapter Six** and **Chapter Seven** describe the methodology used and present the findings of Study Two: The Community Nurse Study.

**Chapter Eight** presents a discussion of the results of both Study One and Study Two. Using the adapted PRECEDE model, the findings of the complementary studies are combined and interpreted.

**Chapter Nine** the final chapter, presents the conclusions, implications, and recommendations for future practice, education and research.

## CHAPTER TWO

### STUDY ONE AND STUDY TWO

#### Review of the Literature

Research from four different relevant areas was examined, and is presented in this literature review in four separate sections.

The first section presents Australian research which has investigated infant immunisation rates, cover and timing. Studies which focused specifically on the health status of the predominantly Aboriginal population of the Kimberley Region are reviewed in section two. The third section includes research from Australia and overseas which has investigated nursing education, knowledge and practice in the areas of childhood immunisation and vaccine administration. Studies which examined the knowledge and attitudes of parents with regard to childhood immunisation and vaccine uptake are presented in section four.

#### Immunisation Cover in Australia

As Australia does not have a national immunisation database (Kelly, 1993,1994), immunisation status in this country is assessed by means of periodic surveys. Consequently, the information available on childhood immunisation in each state, and the country as a whole, lacks uniformity. In addition, most studies have focused on rates and cover in

pre-school or school age children, rather than infants. Although children are not fully immunised until they have completed each course of each vaccine, research which has examined the timing of vaccine administration and immunisation delay has been extremely limited. Furthermore, until the present study, none had looked at the age appropriate administration of vaccines to children in different racial groups.

Possible immunisation delay was first reported in 1985, by Hanna and Kass, who carried out a survey of the immunisation status of Aboriginal children born in Central Australia in 1982 following the measles epidemics in the Northern Territory in 1979, 1981 and 1982. The findings of the study indicated that the proportion of children covered by individual vaccines was high. However, the researchers reported that, in the case of measles immunisation, although 90% of children were eventually immunised, "in many children vaccination was overdue at the time of its administration" (p.57). In this study the timing of administration of vaccines was not investigated further.

The timing of administration of vaccines was, however, investigated in a recent study carried out in Queensland by Hanna, Wakefield, Doolan, & Messner (1994). A survey was carried out to determine the immunisation status of pre-school-aged children following an outbreak of measles in Cairns. Using a two-stage cluster design, formal child care centres (pre-school and family care facilities were not

included) in the Cairns-Mulgrave area were randomly selected, then clusters of 25 children randomly selected. A large sample of 613 children, (approximately a quarter of the total number of children in formal childcare in the area) were surveyed. Hanna et al. were confident that, from this sample, (even allowing for a 15 per cent non-response rate), the probability of estimates of immunisation coverage being within 5 per cent of the actual level of coverage of the entire population was greater than 95 per cent (p.16).

The results of that study showed that, although 97.5% of the children had received the first dose of DTP, only 85% were administered age-appropriately. Moreover, the timeliness of vaccine administration decreased as the children got older. Less than 20% of the children received all vaccines within the recommended time-frame. Only 60% of children were fully immunised and only 82% of children had received measles vaccine by two years of age. This latter finding is particularly significant as "a vaccine coverage of 92 to 95 per cent is required for the control of measles...and...the delay in acquisition of immunity means that young children remained susceptible to potentially severe infections, such as pertussis, for longer than was necessary" (Hanna et al., 1994, p.18).

In the study by Hanna et al. (1994), the race of each child was not identified. This limitation was not present in research conducted by Kelly in the Mid-west and Gascoyne Region (1993), and in the Great Southern



Region of WA (1994). In those studies, the timing of administration of vaccines was not investigated, although comparisons were made between immunisation rates of Aboriginal and non-Aboriginal children at school entry. In the Great Southern Region, Aboriginal and non-Aboriginal children were equally well immunised (Kelly, 1994). In the Mid West and Gascoyne Health Region, however, the percentage of non-Aboriginal children who were fully immunised (88.7%), was higher than the percentage of fully immunised Aboriginal children (74.7%) (Kelly, 1993).

The overall immunisation cover rates of WA children at school entry reported by Kelly (1993, 1994) were greater than those recorded in the 1989-1990 National Health Survey (ABS, 1992a). In the Mid West and Gascoyne Health Region, 86.5% children were fully immunised (Kelly, 1993). Apart from the 5 year old booster against diphtheria and tetanus, immunisation rates were also satisfactory in the Great Southern Region, ranging from 84.8% among Aboriginal boys, (for the 18 month diphtheria, tetanus, pertussis booster (DTP)), to 96.3% for the 2 month DTP/OPV (polio) in non-Aboriginal girls (Kelly, 1994).

Similar findings were reported from surveys by Roden (1992), Guthridge & Patel (1993), and Hanna et al. (1994) in New South Wales, the Northern Territory, and Queensland respectively. All reported immunisation cover rates which were greater than those recorded in the National Health Survey.

Conversely, the findings of a recent survey carried out to determine the immunisation status of Aboriginal children in north east New South Wales indicated that vaccine cover was poor (Young, Taylor, Beard, Randall & Coldwell, 1994). The immunisation records of 1179 children, 55% of the total population of Aboriginal children aged 12 years and less living in a specific health region were examined. Only 9% had fully documented records and 27% partial documentation of up to date vaccination. The results indicated an immunisation cover rate for these children which was less than half the overall rates reported for Australia and NSW in the 1989-1990 National Health Survey.

The findings from the survey by Young et al. (1994) also indicated that Aboriginal children living in larger centres were more fully immunised than those living in more isolated areas. In contrast, Guthridge & Patel (1993) reported that children living in remote communities in the NT were better immunised than those living in larger towns. A similar finding was reported in WA by Kelly (1993). Findings from this survey in the Mid-west and Gascoyne Region indicated that children living in more remote parts of the region were better immunised than those living in the Geraldton area. Although reasons for a better immunisation cover of children living in remote communities were not investigated, Kelly argued that it was "undoubtedly due to the different practice of the community health nurses in different parts of the region" (1993, p.31).

The surveys carried out by Kelly (1993, 1994) provide valuable data on the immunisation cover of Aboriginal and non-Aboriginal children in central and southern Western Australia at school entry age. However, no data on the immunisation cover of infants in WA could be located. Also, no immunisation data from the Kimberley Region could be located. Prior to the present study, the timing of administration of vaccines had not been examined in this state. Furthermore, the timing of administration of vaccines to children in different racial groups had not been investigated anywhere in Australia.

Considering that over 65% of the children in the 0-18 month age group in the Kimberley Region are Aboriginal or part Aboriginal, these gaps in knowledge of infant immunisation status, cover and timing are important. The present study sought to provide the missing information about this group of children, who are already "at risk" in terms of health and survival.

#### The Health Status of Aboriginal Children in the Kimberley Region

From before birth, an Aboriginal child's chance of survival is less than that of a non-Aboriginal child. An early study by Seward and Stanley (1981) compared the live births and stillbirths to Aboriginal and Caucasian mothers in Western Australia from 1975 to 1978. At this time, the percentage of low birthweight Aboriginal babies averaged 13% compared with 5.5% for Caucasian babies, and Aboriginal stillbirth and

neonatal deathrates were 50% to 100% higher than Caucasian. These findings were confirmed in a more recent study by Kliewer and Stanley (1993), which examined infant mortality risk by birthweight and gestational age of all singleton Aboriginal and Caucasian infants born in WA during the period 1980 to 1986. Stillbirth, neonatal and post neonatal mortality rates were again reported to be significantly higher in the Aboriginal population.

In addition to reporting on infants, the studies by Seward and Stanley (1981) and Kliewer and Stanley (1993) reported on mothers. A high proportion of Aboriginal mothers were found to be teenagers or women of higher parity. These women often had poor growth and nutritional status. Kliewer & Stanley argued that "relative to White mothers, the characteristics of Aboriginal mothers are such that the Aboriginal foetus is at increased risk for low birthweight, preterm birth and death" (p48). Maternal smoking, higher infection risks and alcohol consumption, were included as risk factors for the foetus.

The poor nutritional status of Kimberley Aboriginal mothers was also evident from the results of a cross-sectional anthropometric survey carried out in the region in the early 1980s by Gracey et al. (1984). Findings from that study indicated that the nutritional status (defined as 20% more or less than expected weight for height) was satisfactory in less than 60% of almost 400 Aboriginal girls and women of child-bearing age surveyed.

Other studies conducted in the region in the 1980s indicated that a high percentage of Aboriginal infants and children were suffering from undernutrition. Low birth weight Aboriginal infants often failed to "catch-up" and gain weight normally, contributing to their poor health status (Gracey & Spargo, 1987; Roberts, Gracey & Spargo, 1988; Gracey, Anderson & Brooks, 1989; Gracey, 1991a, 1991b).

According to Gracey (1991b), "the failure of Kimberley Aboriginal children to compensate for their growth deficits may be due to environmental factors as well as the nutritional deficit which they had at birth" (p.399). Inadequate living conditions, lack of hygiene, exposure to repeated infections and poor nutrition are included as "environmental factors". Difficulties recruiting experienced long term medical and nursing staff in the remote and climatically harsh Kimberley Region was also suggested as having an important influence on the health status of these children (Gracey, 1991b; Gracey & Anderson, 1989).

The growth deficits and poor health status of Aboriginal children were confirmed by a comprehensive study carried out by Roberts, Gracey & Spargo (1988). All children (40 boys and 40 girls) up to 12 years of age living in a remote Aboriginal community were surveyed. The results of this study indicated that over one third of the subjects had impaired growth, 17 were undernourished (less than 80% standard weight for age), two were stunted (less than 90% height for age), and two were marasmic

(less than 60% weight for age). There was a high prevalence of infections, particularly of the skin, ear, eye and respiratory tract.

The poor health status of Aboriginal children is reflected in their high hospital admission rate for multiple infections. In 1984, in the paediatric unit in the regional hospital in Derby in the Kimberley, "90% of admissions involved Aboriginal children, 60% of admissions were for children under two years of age...and...the children often had more than one disease" (Harris, Knight & Henderson 1986, p.441). Most admissions were for gastroenteritis, respiratory infections, failure to thrive and renal disease.

The results of a study of hospital admissions of Aboriginal and non-Aboriginal children in WA over the years 1981-86, carried out by Gracey & Anderson (1989), also indicated significantly higher rates of admission and bed usage for Aboriginal children than non-Aboriginal. The rates of admissions of Aboriginal infants for respiratory tract infections were more than 10 times those for other infants. The overall rate ratio of bed usage for infants (Aborigines : others) was 20-25:1. For gastroenteritis this rate ratio was 40-50 times higher. Furthermore, Gracey and Anderson reported that there was no overall improvement in hospital admission rates for Kimberley Aboriginal children during the years 1981-86; in fact there were substantial increases in bed occupancy rates for gastroenteritis by this group of Aboriginal infants and children during this time

Recent studies have indicated that Aboriginal infants and children are at a significantly greater risk of *Haemophilus influenzae* type b disease (Hib) (Hanna & Wild, 1991; Hanna, 1992; Harris et al, 1994). Hib has been reported as being the causative organism in 70% of cases of childhood bacterial meningitis in WA and is often responsible for severe pneumonia in Aboriginal children (Hanna & Wild, 1991). Harris et al (1994), estimated the incidence of Hib in Australian children under 5 years of age as 53 per 100,000 among non-Aboriginal children, and 460 per 100,000 among Aboriginal children. Hib disease also occurs at an earlier age in Aboriginal children, which is more typical of the disease pattern in less developed countries (p.483).

The features of measles in Aboriginal children are also similar to those seen in children in developing countries (Hanna, Macintyre, Worswick & Burrell, 1989). The risks associated with measles for Aboriginal children are so great that these children are immunised against measles in the Northern Territory at nine months of age as recommended by the World Health Organisation (NHMRC, 1994). When the initial dose is administered at nine months of age, a second dose may need to be administered at 15 to 18 months of age to achieve a higher sero-conversion rate (Sieving, 1988; Hanna, Macintyre, Worswick & Burrell, 1989). The second dose of the Measles Mumps Rubella vaccine is administered to Aboriginal children in the Northern Territory at 10 to 16 years of age (NHMRC, 1994).

Overall, the health problems of Aboriginal children in some areas of Australia, including the north of Western Australia, were described by Walker (1994) as similar to those suffered by children in Third World countries. If there is delay in immunisation of these children, the potential problem of vaccine-preventable diseases is added to their multiple existing health problems. However, until the present study, when separate immunisation databases were combined and the data analysed, there was no information available on the immunisation cover or the timing of administration of vaccines to children in the Kimberley Region. The possibility of immunisation delay had not previously been investigated.

#### Nurses and Immunisation

No previous nursing studies investigating immunisation delay could be located. Most research investigating immunisation default was carried out in Britain in urban settings, not in a remote area. Research studies of nursing education, knowledge and practice in the area of immunisation have also been limited.

#### Nurses' Knowledge of Immunisation and Low Vaccine Uptake

A comprehensive national study of factors influencing uptake of pre-school immunisations was carried out by Bedford in Britain in 1990. The study included 16 district health authorities, over 2,000 health professionals, including 500 health visitors (community nurses) and 3,000



parents of 2 year old children. The findings indicated that the factors determining whether a child is immunised are interrelated and complex, involving parents, service organisations and health professionals. The results also indicated that health professionals were poorly informed regarding contra-indications to vaccines, and this contributed significantly to poor vaccine uptake.

Pertussis outbreaks in the early 1980s had prompted researchers to investigate childhood immunisation levels and to assess the knowledge of health visitors administering vaccines to infants and children. All of these studies found a marked degree of ignorance, doubt and disagreement amongst those nurses about contraindications to vaccines. Nicoll and Ross (1985) surveyed a convenience sample of health visitors at an Immunisation Seminar. Carter (1985), and Walker (1990) both surveyed nurses in Fife, Moules (1987) sent a questionnaire to health visitors in Cheltenham, and Reid (1989) conducted a survey of health visitors in Liverpool. Given the population, size of cities and towns, and number of health visitors in Britain, the studies carried out by Nicoll & Ross, Carter, Walker, Moules and Reid were limited in size and location, and perhaps not representative of all British health visitors. The sample sizes were 40, 43, 98, 20 and 105 respectively. However, regardless of these limitations, the findings of all these studies were similar, all indicated a lack of knowledge of some aspects of

immunisation and vaccine contraindications among the health visitors who participated in the studies.

Other researchers have reported that myths regarding immunisation prevailed, for example, withholding immunisation in the case of prematurity, egg allergy, family history of convulsions, or antibiotic therapy (Carter, 1985; Nicoll & Ross, 1985; Reid, 1989; Walker, 1990). Myths were not confined to contra-indications to vaccines. Research findings indicated a widespread belief among health visitors that measles was a trivial childhood illness (Carter, 1985; Moules, 1987; Reid, 1989; Bedford, 1990). Carter and Reid also reported that a considerable number of health visitors believed the efficacy of the measles and pertussis vaccines to be lower than that of other vaccines. Carter (1985), Reid (1989), and Walker (1990) stated that disagreement and lack of belief in the efficacy of vaccines by health professionals directly contributed to public apathy toward immunisation.

Health professionals' sound knowledge of vaccines and their contra-indications was the most frequently stated factor influencing the uptake of vaccines in studies which investigated immunisation uptake (Carter, 1985; Dalphinis, 1986; Moules, 1987; Robertson & Bennett, 1987; Reid, 1989; Bedford, 1990; McGuire, 1992; Moreton, 1992).

#### Education of Immunisation Nurses

Despite researchers reporting that vaccine uptake is significantly influenced by immunisation nurses' knowledge of vaccines and

immunisation, the number of studies evaluating education have, however, so far been limited. White (1989) carried out a study which identified the levels of responsibility and education needs of immunisation nurses in South Australia. The response rate in this survey was high (86%). However, the sample for this study was obtained by contacting registered nurses who had chosen to complete an Immunisation Service Directory questionnaire in 1987; therefore the possibility of bias in selection of the sample for this study cannot be ruled out. White found that immunisation education was ad hoc and there was no formal immunisation course. Of the 94 respondents in the study, 68% had received no orientation to immunisation and over 60% requested further education.

White's (1989) study was the only research which actually investigated the immunisation education of nurses. Moules (1987), and Robertson & Bennett (1987) examined the general nursing education and background of British immunisation nurses, but not specifically immunisation education. Both researchers reported a marked disparity of education among nurses administering vaccines.

Immunisation education in WA, however, is standardised. In order to administer vaccines, immunisation nurses must have completed a programme of education developed by the Western Australian Health Department and hold a Certificate of Competency. The present study sought to provide information on the immunisation education of

community nurses in the Kimberley Region following their initial immunisation training.

#### Immunisation Practice of Nurses Administering Vaccines

In South Australia, White (1989) found a lack of co-ordination and uniformity of service delivery by immunisation nurses. British studies also found inconsistencies in nurses' immunisation practice. Carter (1985) and Moules (1987) reported a description of nursing practice which did not correspond with the assertion of belief in immunisation. Moules found that although 100% of nurses surveyed felt full immunisation was important, only 36.8% sent out appointment cards or reminders.

A high level of commitment and an integrated approach from health visitors and other members of the primary health care team was identified as being essential in order to achieve optimal levels of immunisation (Robertson & Bennett, 1987; Bedford, 1990). In line with this recommendation the present research sought to obtain data on the practice of the Kimberley community nurses and their interaction with other agencies, as well as the involvement of all members of the Region's primary health care team in the immunisation of children in the 0-18 month age group.

### Parental Knowledge and Immunisation Uptake

A number of Australian and British studies have investigated and evaluated parental knowledge and immunisation uptake (Dalphinis, 1986; Bedford, 1990; and Roden, 1992). The sample surveyed by Dalphinis in Hackney, London was small (31), and only the parents of pre-school immunisation defaulters were included in the study, whereas the samples in the studies carried out by Bedford and Roden were much larger and more representative of the general population. Bedford surveyed 3,000 parents of 2 year old children in 16 British district health authorities, and Roden surveyed 450 parents of kindergarten children living in the Western Metropolitan District of Sydney, NSW. However, similar findings were reported from each of these studies.

Bedford (1990) and Roden (1992) reported a knowledge deficit among parents regarding the potential seriousness of measles. Also, the belief among parents that diseases are now under control and immunisation is no longer necessary, was reported as a reason for immunisation default (Dalphinis, 1986; Bedford 1990). Another important reason for immunisation default was parental fear of the side-effects of vaccines (Dalphinis, 1986; Roden, 1992). The findings of all these studies indicated that when there was low socio-economic and low educational status, poor knowledge of immunisation and lack of uptake were likely.

Conversely, Honig (1985) reported that the majority of parents surveyed were knowledgeable of and had a positive attitude towards immunisation. However, these findings were from a small non-representative sample of parents in one Western Australian suburb, the majority of whom had higher than average educational and socio-economic status.

Inappropriate advice and misinterpretation of contra-indications to vaccines on the part of health professionals was also given as a reason for default by parents (Carter, 1985; Dalphinis, 1986; Bedford, 1990), confirming the findings of studies of immunisation nurses regarding the importance of health professionals' knowledge of immunisation. According to Bedford (1990), "it is clear that once a child is presented for immunisation, the health professional's knowledge of contra-indications will determine whether they are immunised" (p. 417).

### Summary and Implications

Australia does not have a national computer database for immunisation. Moreover, research investigating the timing of vaccine administration is limited, with findings available, suggesting immunisation delay. The researcher's clinical experience reinforces this. There is also a lack of information in Australia on the timing of administration of vaccines to children in different racial groups; a lack of any information on the timing of vaccine administration in WA; and a lack of information

on the immunisation status and cover of children in the 0-18 month age group in WA, as well as a dearth of immunisation data from the Kimberley Region.

Research also confirmed the poor health status of Aboriginal children living in the Kimberley Region. If immunisation is delayed, the potential problem of vaccine-preventable diseases is added to their multiple existing health problems.

In Study One (of the present research), these gaps in knowledge were addressed. A computer database containing the complete immunisation records of all children in the 0-18 month age group in the Kimberley Region was established. The overall immunisation cover and timing of vaccine administration to this group of children was then determined. Furthermore, the cover and timing of administration of each vaccine to children in each racial group was determined and immunisation delay was identified.

No previous nursing research investigating possible reasons for immunisation delay could be located. Research from Britain has suggested that nurses' knowledge, education and practice influence vaccine uptake. Poor knowledge of vaccine-preventable diseases was identified in studies of nurses, as well as parents of infants, particularly parents from a low socio-economic background. Limited previous research identified a marked disparity in nurses' immunisation training, and conflicting ideas regarding contraindications to immunisation. Only

one Australian study evaluating nursing knowledge and practice in immunisation was located. No published research in a remote area where nurses practise independently (as in the Kimberley Region) was found.

Study Two (of the present research) addressed this deficit by investigating community nurses' knowledge, practice and education. In particular, their perception of reasons for delay in administration of vaccines was sought.



## CHAPTER THREE

### Conceptual Framework

An adapted PRECEDE (predisposing, reinforcing, and enabling causes in educational diagnosis and evaluation) model was used to guide this research. The model was designed originally for Public Health Nurses to evaluate reasons for the limited use of childhood screening programmes in rural North Carolina, and to guide the development and research evaluation of Public Health Nursing interventions.

The role of Community or Public Health Nursing differs both in concept and practice from clinical nursing. McMurray (1990) noted that "the boundaries of the community health nursing role are much less distinct than those of the institutional nurse" (p.10). The "community" is the client, however, as Stanhope and Lancaster (1984) state "the units of service may be individuals, families or other interacting groups, aggregates, institutions and communities" (p.382).

The recognition and acceptance of the community as the client is essential to community nursing practice. According to Stanhope and Lancaster (1984) this definition of community client "recognizes the potential power of a merger between nursing practice that is oriented to the individual and community health practice that is oriented to the collective"...and that..."the health of the collective is the goal" (p.382).

Consequently, as the designers of the adapted PRECEDE Model explain: "planning must occur at the aggregate level, based on assessment of the characteristics of the target population rather than of the individual client" (Selby, Riportella-Muller, Sorenson & Walters, 1989, p. 175).

Unable to find a model which incorporated all the concepts of Public Health Nursing, Selby, Riportella-Muller, Sorenson and Walters (1989) synthesised concepts from a number of theories relevant to Public Health Nursing to develop this practice-based research model. Green's PRECEDE model (1980) provided the basic framework. To this was added concepts from "The Health Belief Model (Becker et al., 1977) and Pender's (1982, 1987) models for health promotion and disease prevention, as well as principles of learning (Roger's 1969), human behavior during crisis (Morley et al., 1967), and program evaluation (Flay 1986)" (Selby, Riportella-Muller et al, 1989, p. 176).

As this research model was designed specifically to provide a "framework suitable for Public Health Nursing...and to guide research in Public Health Nursing Practice" (Selby, Riportella-Muller, et al 1989, p.174) it was ideally suited to guide the present study. The model has the capacity to successfully guide the researcher from the initial step of the research process, identification of the problem, through a systematic course of investigation, evaluation of the findings, development of interventions and finally to evaluation of the interventions.

The specific purpose of this descriptive study was to gather new data about a potential health problem, and for the first time investigate and describe an important area of community nursing practice. In Study One the timing of administration of vaccines to children in the 0-18 month age group were analysed and quantified. Using this framework, relevant variables or characteristics associated with immunisation delay were identified. In Study Two, factors relating to the behavioural cause of the potential health problem, delay in administration of vaccines were investigated. Then using the conceptual framework, the findings of Study One and Study Two were combined and analysed to identify possible reasons for delay in administration of vaccines quantified in Study One.

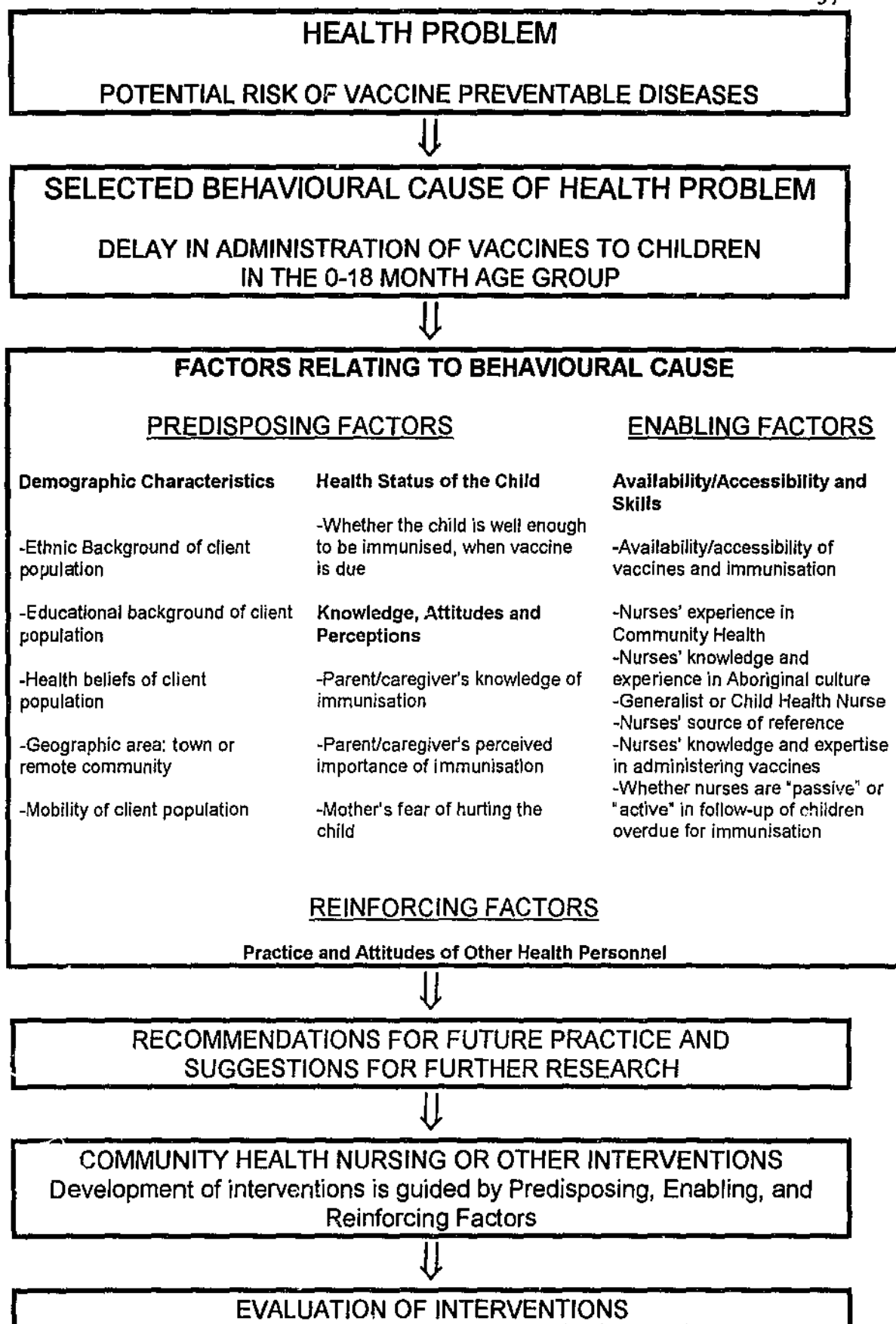
Important relevant characteristics of the client population, in this case children in the 0-18 month age group in the Kimberley Region and their caregivers, were identified as "Predisposing Factors". All variables which relate to the community nurses administering the vaccines, and to the availability and accessibility of vaccines, which could influence the timing of administration of vaccines to this group of children were identified as "Enabling Factors". Factors relating to other health personnel which could also influence the timeliness of vaccine administration were included as "Reinforcing Factors".

The characteristics and variables included as "Predisposing", "Enabling" and "Reinforcing" factors in the adapted model used for this study have been identified as being relevant to the predominantly

Aboriginal population of the Kimberley Region. This population is not dissimilar to the client population this model was originally designed to investigate: both are rural, socially disadvantaged, minority groups and (in terms of health) are at-risk.

All variables included in the conceptual framework for this study were identified by the researcher from personal nursing experience as a practitioner administering immunisations in the Kimberley Region. These variables were verified by colleagues with practical knowledge of immunisation in a similar population in a similar setting. Further verification came from Aboriginal Health Workers currently practicing in the area of Child Health and Immunisation in the Perth Metropolitan area.

Using this model, the findings from Study One and Study Two were integrated, analysed and logically processed. Development, implementation and evaluation of interventions were beyond the scope of this project. However, recommendations for future practice, and suggestions for further research were made, and this model provides the framework to guide subsequent research in this area. The adapted model used for this study is summarised in Figure 1.



**Figure 1.** Conceptual model for investigating immunisation delay in children in the 0-18 month age group in the Kimberley Region in 1994.

(Adapted from Selby, Riportella-Muller, Sorenson & Walters, 1989, p.176).

## CHAPTER FOUR

### STUDY ONE: THE VACCINE UPTAKE AND TIMELINESS STUDY

#### Methodology

##### Purpose

The purpose of this study was to determine the overall immunisation cover, and the timing of administration of all childhood vaccines to children in all racial groups in the 0-18 month age group in the Kimberley Region, as recommended in the Immunisation Schedule for Western Australian (Appendix A). This was done by combining the data from three computer databases in the Region.

##### Design

An exploratory descriptive design was used in Study One. The timing of vaccine administration to a cohort of children born during a specific twelve month period was analysed in relation to the Recommended Immunisation Schedule for Western Australia (Appendix A). Each child's immunisation history from birth to a minimum of twenty months of age was examined.

##### Setting and Study Population

The immunisation histories of all Kimberley children (total 557) born between 1st November 1991 and 31st October 1992 (inclusive), who received immunisations (in the Kimberley Region and elsewhere)

between 1st November 1991 and 20th June 1994 were examined. This time-frame was chosen as it provided the most recent immunisation data available. Children born in November 1991 should have received their 18 month DTP injection in May 1993, and children born in October 1992 were due to have their 18 month DTP injection in April 1994. As the data for this study were collected in the last week of June 1994, this allowed at least six weeks for administration of the last vaccines due, and for data to be entered onto an immunisation database. Any children in this age group who may have been resident in the Kimberley Region but had not received any vaccines were not included in the study population.

### Procedure

The researcher travelled to the Kimberley Region to access the relevant data for this phase of the study. To obtain the necessary data on children in all areas of the Region, three separate non-compatible computer databases in the Kimberley Region had to be accessed:

1. One database in Broome contained information on children immunised in that town,
2. Another in Fitzroy Crossing contained immunisation data on children in the Fitzroy Valley,
3. The third database in Derby, contained data on children in all other towns and communities in the region.

As transfer of information from the three databases to computer disk was not possible at the time of data collection for this study, all information on each child in the study population was transferred on print-outs from the immunisation databases and entered onto the newly created computer database for this study. This included: name, identification number, date of birth, gender, race, area code (a code used on all Kimberley community health records which denotes the place of residence of each client), and the date of administration of each vaccine. Some of this personal data was not used by the researcher in the study, but it was included for the specific purpose of providing baseline immunisation data for the future use of the Kimberley Public Health Unit.

The same racial grouping was used in the present study as is used by the Public Health Unit in the Kimberley. Apart from the Fitzroy Valley area a child's racial group was determined according to the race of both of the child's parents. In the Fitzroy Valley Aboriginal-Caucasian children had been included on the database as Aboriginal. For the purposes of this study, the researcher numbered the racial groups identified:

1. Group 1: Aboriginal; the children were Aboriginal only, there was no mixture of any other race.
2. Group 2: Caucasian; the children were Caucasian only, there was no mixture of any other race.
3. Group 3: Aboriginal-Caucasian; the children were a mixture of Aboriginal and Caucasian.



4. Group 4: Other; a small group of children (19) who had been registered on the Kimberley records as Asian, Mixed, Aboriginal-Asian-Mixed, or Asian-Caucasian, whose records were combined into a single group named "Other" for the present study.

As the information came from three sources and the client population is highly mobile, there were many duplicate records. Records were cross-referenced, and combined where necessary. The records of deceased children were not included. The three source databases also included records of 20 Caucasian children who had received only one vaccine; these were considered to be transient, and not included. The data from the three source databases were combined, providing complete immunisation records on the total 0-18 month population in the Kimberley Region.

#### Reliability

When the timing of administration of each vaccine had been established (in order to minimise human error, and to verify accuracy of the data), the researcher re-checked records of early or late dates of vaccine administration at the original data source. Records of vaccine administration more than 8 days early, or more than 20 days later than the due date were cross-referenced with data entries on the Kimberley immunisation database printouts.

### Data Analysis

Epi Info Version 5.01, a statistics program for epidemiology on microcomputers was used to create the database and to analyse the data in this study; this statistics program is also used in the Kimberley Region. A total of 557 records were included for analysis. The percentage of children in each racial group as well as the percentage of the total population who had received each vaccine, was calculated.

To investigate the timing of vaccine administration, and identify any delay, twelve separate programs were written in Epi Info. These were then used to calculate the timeliness of administration of each of the following vaccines:

1. BCG
2. Hepatitis B (1st, 2nd and 3rd doses)
3. Oral Polio Vaccine (1st, 2nd and 3rd doses)
4. Diphtheria Tetanus Pertussis (1st, 2nd, 3rd and 4th doses)
5. Measles Mumps Rubella.

Each of these programs calculated the date a particular vaccine was due, and then calculated the number of days early or late that vaccine was administered by subtracting the date the vaccine was due from the date it was given. The programs differentiated between race; the records of Caucasian children were not included in the BCG or HepB calculations. The date each vaccine was due to be administered was

calculated according to the Recommended Immunisation Schedule for Western Australia (Appendix 1).

The timing of administration of each dose of each vaccine to the entire Kimberley 0-18 month population, and to children in this age group in each racial group in the region was then established.

The overall cover and the timing of vaccine administration to children in the 0-18 month age group in each racial group in each Kimberley town and remote community was also established. However, for ethical reasons, these data are not presented in this study. The researcher has undertaken not to disclose any information which might identify any individual community or community nurse. This information will be forwarded to the Kimberley Public Health Unit, and can be accessed only with permission from the Kimberley Health Region.

When the timing of vaccine administration in each racial group was established, in each vaccine category 2 X 2 analysis of all combinations of the four racial groups were carried out to establish the most significant grouping. The following Odds Ratios were then calculated:

1. The odds of Caucasian and "other" children (racial groups 2 and 4) being immunised within 30 days of the due date relative to the odds of Aboriginal and Aboriginal-Caucasian children (groups 1 and 3) being immunised within 30 days of the due date.

2. The odds of all children except Aboriginal children (groups 2, 3, and 4) being immunised within 30 days of the due date relative to the odds of Aboriginal children (group 1) being immunised within 30 days of the due date.
3. The odds of children living in remote communities in the Kimberley Region being immunised within 30 days of the due date relative to the odds of children living in Kimberley towns being immunised within 30 days of the due date.
4. The odds of children living in the East Kimberley being immunised within 30 days of the due date relative to the odds of children living in the West Kimberley being immunised within the 30 days of the due date.

The Hib vaccine was not included in the Recommended Immunisation Schedule for Western Australia as a routine immunisation until 1993. At the time of data collection for this study the Immunisation Programme in the Kimberley Region was still in a "catch-up" phase to administer this course of vaccines to all eligible children. It would therefore be neither feasible nor relevant to quantify the timing of administration of this particular vaccine as outlined above. However, the number of children in each racial group in the Region who had received the first, second and third dose of this vaccine was quantified.

As the administration of a vaccine at an interval shorter than that recommended can lessen the antibody response (NHMRC, 1991), the

number and proportion of vaccines administered earlier than the due date to the study population were also examined. For all vaccines except MMR, the number of vaccines administered earlier than 14 days before the due date were quantified. MMR is a single dose vaccine administered routinely to children at 12 months of age in WA. However, it has been recommended that MMR be given to children at high-risk at an earlier age. This vaccine is routinely administered to Aboriginal children at nine months of age in the Northern Territory (NHMRC, 1994, p.39). Only MMR vaccines administered earlier than 90 days before the due date were calculated.

#### Ethical Considerations

Study one commenced when approval to proceed had been granted by the Northern Regions Ethics Review Group (Appendix B).

All named data, that is, the original computer printouts containing the immunisation records analysed for Study One, will be returned to the Kimberley Region at completion of the study, where they will be kept for seven years. All computerised data, programs and information generated, have been transferred to a computer disk for the use of the Kimberley Public Health Unit. This information may then only be accessed with the permission of the Kimberley Health Region. Throughout the study, only the researcher and her Research Supervisors had access to these data. The researcher will keep only unnamed data

on disk, which will be kept securely locked away; only the researcher will have access, and the information will be deleted at the end of seven years.

Apart from naming the Kimberley towns and communities where community nurses are working, and quantifying the number of children in the 0-18 month population who are immunised from each of these centres, no named data was included in the study. No individual, town or community in the Kimberley Region was identified for any other purpose.

## CHAPTER FIVE

### STUDY ONE: THE VACCINE UPTAKE AND TIMELINESS STUDY

#### Results

##### Demographic Information

The immunisation histories of all children (total 663) born between 1st November 1991 and 31st October 1992 (inclusive) who received immunisations in the Kimberley Region between 1st November 1991 and 20th June 1994 were selected from the three source immunisation databases. Six children, all either Aboriginal or Aboriginal-Caucasian, had died by June of 1994 and were excluded from the study. A total of 557 records were selected and included in the database for the present study.

Of the 557 children surveyed, 41% were Aboriginal-Caucasian, 31% were Caucasian, 25% were Aboriginal, and 3% were included in a small "Other" group (this group included children who were registered on the Kimberley databases as Asian, Mixed, Aboriginal-Asian-Mixed, or Asian-Caucasian). The number and proportion of children in each racial group is shown in Figure 2.

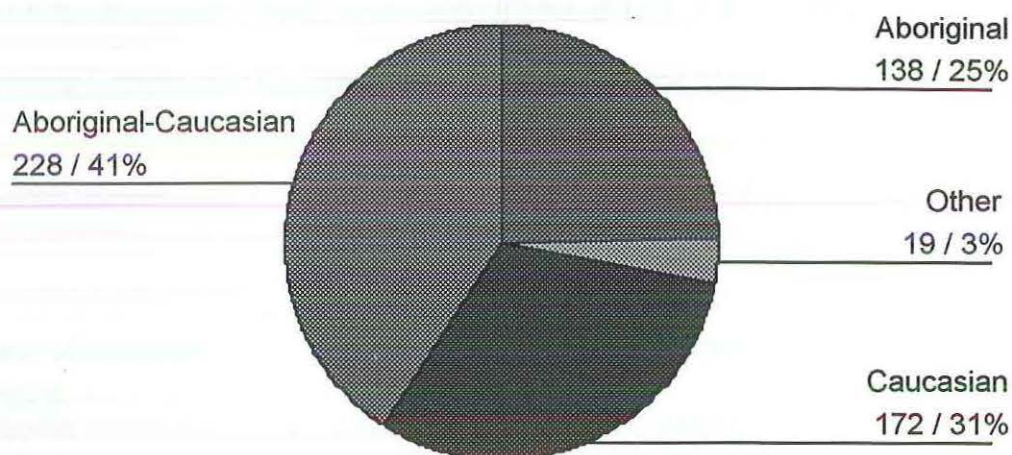


Figure 2. Number and proportion of children aged 0-18 months by race in the Kimberley Region, 01 November 1991 to 20 June 1994.

The number of children in the 0-18 month age group immunised by community nurses in each Kimberley town and community during the study period is shown in Table 1. This is the population immunised from each centre or clinic, not the actual population in each town or community, hence not every remote Kimberley community is included in this table. Community nurses from most of the towns and many of the communities undertake field trips to remote communities to immunise children; the immunisation data from these small communities have been included with the immunisation data of children living in the town or community from which an immunisation service is provided.



Table 1

Number (and proportion) of Children Immunised in Each Town andRemote Community 01 November 1991 to 20 June 1994

<b>Town/Community</b>	<b>Population n(%)</b>
<b>West Kimberley</b>	<b>341(61.2)</b>
<u>Towns</u>	
Broome	183(32.9)
Derby	99(17.8)
Fitzroy Crossing	36(6.5)
<u>Remote Communities</u>	
One Arm Point	8(1.4)
Lombadina	9(1.6)
Looma	6(1.1)
<b>East Kimberley</b>	<b>198(35.5)</b>
<u>Towns</u>	
Hall's Creek	31(5.6)
Kununurra	90(16.2)
Wyndham	22(3.9)
<u>Remote Communities</u>	
Balgo	25(4.5)
Warmun	12(2.2)
Oombulgurri	2(0.4)
Kalumburu	16(2.9)
<b>Other</b>	<b>18(3.3)</b>
Central File	12(2.2)
Address Unknown	6(1.1)
<b>TOTAL</b>	<b>557(100)</b>

### Vaccine Cover for the Total Study Population and Each Racial Group

The total number of vaccines administered to children in the 0-18 month age group by community nurses from 01 November 1991 to 20 June 1994, are shown in Table 2. The number of vaccines and percentage of children covered by immunisation in each racial group as well as all groups combined has been presented in this table.

As shown in the table, in all vaccine categories, the immunisation cover for Aboriginal children (Group 1) was consistently lower than for children in all other racial groups. Furthermore, the decrease in immunisation cover as the immunisation schedule progressed, was greater in each vaccine category, for Aboriginal children, than for children in all other racial groups.

Table 2

Vaccine Cover of Kimberley Children Aged 0-18 months in June 1994

	Total Number Immunised	Group 1 Aboriginal	Group 2 Caucasian	Group 3 Aboriginal- Caucasian	Group 4 Other
Vaccine	n(%)	n(%)	n(%)	n(%)	n(%)
BCG <sup>a</sup>	344(89)	113(82)	n/a	216(95)	15(79)
HepB 1 <sup>a</sup>	351(91)	116(84)	n/a	217(95)	18(95)
HepB 2 <sup>a</sup>	338(88)	107(78)	n/a	216(95)	18(95)
HepB 3 <sup>a</sup>	338(88)	104(75)	n/a	216(95)	18(95)
OPV 1 <sup>b</sup>	522(94)	114(83)	172(100)	217(95)	19(100)
OPV 2 <sup>b</sup>	506(91)	105(76)	170(99)	212(93)	19(100)
OPV 3 <sup>b</sup>	498(89)	101(73)	166(97)	212(93)	19(100)
DTP 1 <sup>b</sup>	524(94)	115(83)	172(100)	218(96)	19(100)
DTP 2 <sup>b</sup>	507(91)	105(76)	170(99)	213(94)	19(100)
DTP 3 <sup>b</sup>	500(90)	104(75)	165(96)	212(93)	19(100)
DTP 4 <sup>b</sup>	374(67)	82(59)	123(72)	154(67)	15(79)
MMR <sup>b</sup>	467(84)	97(70)	157(91)	195(86)	18(95)

Note.

<sup>a</sup> These vaccines are not routinely administered to Caucasian children. The total number of children eligible for these vaccines in the study population was 385.

<sup>b</sup> These vaccines are routinely administered to all Australian children. All 557 children in the study population were eligible.

### The Timing of Vaccine Administration For The Total Population

The timing of administration of each vaccine to all children in the 0-18 month age group in the Kimberley Region between 01 November 1991 and 20 June 1994 is summarised in Table 3. The total number of vaccines administered and the percentage of the population covered is shown. Also shown are the number and proportion of vaccines administered within 30 days of the due date, and the number and proportion of delayed immunisations (>30 days after the due date). The due date was calculated from the date of birth and Recommended Immunisation Schedule for Western Australia (Appendix 1). The delay in timing of vaccine administration increased as the schedule progressed. Also shown is the median and time-range in days for the administration of each vaccine, relative to the due date.

Table 3

The Timing of Vaccine Administration for the Total Study Population

	Total Number Vaccines Given	Vaccines given ≤30 days of due date <sup>a</sup>	Vaccines given >30 days of due date <sup>a</sup>	Range <sup>b</sup>	Median
Vaccine	n(%) <sup>c</sup>	n(%) <sup>d</sup>	n(%) <sup>d</sup>	Days	Days
BCG	344(89)	327(95)	17(5)	0 → 477	+3
HepB 1	351(91)	341(97)	10(3)	0 → 203	+3
HepB 2	338(88)	267(79)	71(21)	-26 → 565	+5
HepB 3	338(88)	239(71)	99(29)	-35 → 599	+8
OPV 1	522(94)	429(82)	93(18)	-16 → 395	+4
OPV 2	506(91)	415(82)	91(18)	-41 → 583	+4
OPV 3	498(89)	386(78)	112(22)	-35 → 377	+8
DTP 1	524(94)	461(83)	96(17)	-16 → 332	+5
DTP 2	507(91)	415(82)	92(18)	-41 → 583	+5
DTP 3	500(90)	390(78)	110(22)	-35 → 478	+8
DTP 4	374(67)	262(70)	112(30)	-84 → 335	+12
MMR	467(84)	286(61)	181(39)	-92 → 455	+20

Note.

<sup>a</sup> Due date calculated from date of birth and Recommended Immunisation Schedule for Western Australia (See Appendix 1)

<sup>b</sup> A negative number indicates a vaccine given before the due date

<sup>c</sup> % = % of total study population

<sup>d</sup> % = % of those vaccinated with each vaccine

### Age-Appropriate Immunisation of Children in Each Racial Group

The number of vaccines administered within 30 days of the due date to children in each racial group, between 01 November 1991 and 20 June 1994, is presented in Table 4. The number and percentage of vaccines administered within 30 days to the total population is included for reference.

Table 4

#### Vaccines Administered Age-Appropriately by Racial Group

Vaccine	Each Racial Group					
	Total Population	Aboriginal	Caucasian	Aboriginal-Caucasian	Other	
	Total Number Vaccines Given n(%) <sup>a</sup>	Vaccines given ≤30 days of due date n(%) <sup>b</sup>	Vaccines given ≤30 days of due date n(%) <sup>b</sup>	Vaccines given ≤30 days of due date n(%) <sup>b</sup>	Vaccines given ≤30 days of due date n(%) <sup>b</sup>	Vaccines given ≤30 days of due date n(%) <sup>b</sup>
BCG	344(89)	327(95)	108(96)	n/a	207(96)	13(87)
HepB 1	351(91)	341(97)	113(97)	n/a	213(98)	15(83)
HepB 2	338(88)	267(79)	82(77)	n/a	170(80)	15(83)
HepB 3	338(88)	239(71)	73(70)	n/a	151(70)	15(83)
OPV 1	522(94)	429(82)	85(75)	162(94)	165(76)	17(90)
OPV 2	506(91)	415(82)	79(75)	157(92)	166(78)	13(68)
OPV 3	498(89)	386(78)	69(68)	137(83)	163(77)	17(89)
DTP 1	524(94)	461(83)	87(76)	163(95)	167(77)	17(89)
DTP 2	507(91)	415(82)	78(74)	158(93)	166(78)	13(68)
DTP 3	500(90)	390(78)	71(68)	137(83)	165(78)	17(89)
DTP 4	374(67)	262(70)	45(55)	91(74)	115(75)	11(73)
MMR	467(84)	286(61)	49(51)	95(61)	127(65)	11(61)

Note.

<sup>a</sup> % = % of total study population

<sup>b</sup> % = % of those vaccinated with each vaccine

### Comparison of Timeliness of Vaccine Administration to Children in Different Racial Groups

The comparison of timeliness of administration of each vaccine to children in different racial groups are presented in Tables 5 and 6.

In Table 5, the odds of all children except Aboriginal children (groups 2, 3 and 4) being immunised within 30 days of the due date relative to the odds of Aboriginal children being immunised within 30 days of the due date are presented. As shown in this Table, the odds are that children in groups 2, 3 and 4 will receive all vaccines except BCG and Hep B1 age-appropriately relative to the odds of Aboriginal children receiving the vaccines age-appropriately. The results were significant for seven of the twelve vaccines.

In Table 6, the odds of Caucasian children and "other" children (groups 2 and 4) being immunised age-appropriately relative to the odds of Aboriginal children and Aboriginal-Caucasian children (groups 1 and 3) being immunised age appropriately are presented. As shown in this Table, the odds are that children in groups 2 and 4 will receive all vaccines except BCG and Hep B1 within 30 days of the due date relative to the odds of Aboriginal children receiving the vaccines within 30 days of the due date. The results were significant for six of the twelve vaccines.

It should be noted that BCG and HepB vaccines are not administered to Caucasian children (group2).

Table 5

Timeliness of Vaccination of Caucasian, Aboriginal-Caucasian and Other Children Relative to Aboriginal Children

Vaccine	Racial Groups 2,3 & 4		Group1 - Aboriginal		Odds Ratio <sup>a</sup>	95% Confidence Limits for Odds Ratio
	Vaccine given ≤30 days of due date	Vaccine given >30 days of due date	Vaccine given ≤30 days of due date	Vaccine given >30 days of due date		
	n(%)	n(%)	n(%)	n(%)		
BCG	220(95)	11(5)	108(96)	5(4)	0.93	(0.27 <OR< 2.98)
HepB 1	228(97)	7(3)	113(97)	3(3)	0.86	(0.17 <OR< 3.80)
HepB 2	185(80)	46(20)	82(77)	25(23)	1.23	(0.68 <OR< 2.20)
HepB 3	166(71)	68(29)	73(70)	31(30)	1.04	(0.61 <OR< 1.77)
OPV 1	344(84)	64(16)	85(75)	29(25)	1.83 *	(1.08 <OR< 3.11)
OPV 2	336(84)	65(16)	79(75)	26(25)	1.70	(0.98 <OR< 2.94)
OPV 3	317(80)	80(20)	69(68)	32(32)	1.84 *	(1.10 <OR< 3.07)
DTP 1	347(85)	62(15)	87(76)	28(24)	1.80 *	(1.05 <OR< 3.07)
DTP 2	337(84)	65(16)	78(74)	27(26)	1.79 *	(1.04 <OR< 3.08)
DTP 3	319(81)	77(19)	71(68)	33(32)	1.93 *	(1.16 <OR< 3.20)
DTP 4	217(74)	75(26)	45(55)	37(45)	2.38 *	(1.39 <OR< 4.08)
MMR	233(63)	137(37)	49(51)	48(49)	1.67 *	(1.04 <OR< 2.68)

Note.

<sup>a</sup> = Odds Ratio of Caucasian, Aboriginal-Caucasian and Other children being immunised within 30 days of due date relative to Aboriginal children.

\* = Significant result



Table 6

Timeliness of Vaccination of Caucasian and Other Children Relative to  
Aboriginal and Aboriginal-Caucasian Children

Vaccine	Racial Groups 2 & 4 Caucasian & Other		Racial Groups 1 & 3 Aboriginal & Aboriginal Caucasian		Odds Ratio <sup>a</sup>	95% Confidence Limits for Odds Ratio
	Vaccine given ≤30 days of due date	Vaccine given >30 days of due date	Vaccine given ≤30 days of due date	Vaccine given >30 days of due date		
	n(%)	n(%)	n(%)	n(%)		
BCG	13(87)	2(13)	315(96)	14(4)	0.29	(0.05 <OR< 2.05)
HepB 1	15(83)	3(17)	326(98)	7(2)	0.11	(0.02 <OR< 0.59)
HepB 2	15(83)	3(17)	252(79)	68(21)	1.35	(0.35 <OR< 6.05)
HepB 3	15(83)	3(17)	224(70)	96(30)	2.14	(0.57 <OR< 9.54)
OPV 1	179(94)	12(6)	250(76)	81(24)	4.83 *	(2.47 <OR< 9.64)
OPV 2	170(90)	19(10)	245(77)	72(23)	2.63 *	(1.49 <OR< 4.70)
OPV 3	154(83)	31(17)	232(74)	81(26)	1.73 *	(1.07 <OR< 2.83)
DTP 1	180(94)	11(6)	254(76)	79(24)	5.09 *	(2.54 <OR< 10.43)
DTP 2	171(90)	18(10)	244(77)	74(23)	2.88 *	(1.61 <OR< 5.20)
DTP 3	154(84)	30(16)	236(75)	80(25)	1.74 *	(1.07 <OR< 2.85)
DTP 4	102(74)	36(26)	160(68)	76(32)	1.35	(0.82 <OR< 2.21)
MMR	106(61)	69(39)	176(60)	116(40)	1.01	(0.68 <OR< 1.51)

Note.

<sup>a</sup> = Odds Ratio of Caucasian, and Other children being immunised within 30 days of due date relative to Aboriginal and Aboriginal-Caucasian children.

\* = Significant result

Comparison of Timeliness of Vaccine Administration to Children in  
Different Geographic Areas

The comparison of timeliness of administration of each vaccine to children in the 0-18 month age group in different geographical areas in the Kimberley Region are presented in Tables 7 and 8.

In Table 7, the odds of children living in remote communities in the Kimberley being immunised within 30 days of the due date relative to the odds of children living in Kimberley towns being immunised within 30 days of the due date are presented. As shown in Table 7, the odds of children living in remote communities receiving all vaccines age-appropriately are greater than the odds of children living in towns receiving vaccines age-appropriately. The results were significant for five of the twelve vaccines.

In Table 8, the odds of children living in the East Kimberley being immunised age-appropriately relative to the odds of children living in the West Kimberley being immunised age appropriately are presented. As shown in this Table, the odds are that children living in the East Kimberley are more likely to receive all vaccines except BCG within 30 days of the due date, relative to children living in the West Kimberley. The results were significant for five of the twelve vaccines.

Table 7

Timeliness of Vaccination of Children Living in Kimberley Remote  
Communities Relative to Children Living in Kimberley Towns

Vaccine	Remote Communities		Towns		Odds Ratio <sup>a</sup>	95% Confidence Limits for Odds Ratio
	Vaccine given ≤30 days of due date	Vaccine given >30 days of due date	Vaccine given ≤30 days of due date	Vaccine given >30 days of due date		
	n(%)	n(%)	n(%)	n(%)		
BCG	71(99)	1(1)	249(94)	15(6)	4.28	(0.58 <OR< 88.28)
HepB 1	71(99)	1(1)	263(97)	9(3)	2.43	(0.31 <OR< 52.04)
HepB 2	60(90)	7(10)	202(77)	62(23)	2.63 *	(1.09 <OR< 6.65)
HepB 3	53(79)	14(21)	182(69)	81(31)	1.68	(0.85 <OR< 3.38)
OPV 1	65(90)	7(10)	352(81)	82(19)	2.16	(0.91 <OR< 5.36)
OPV 2	67(96)	3(4)	336(80)	86(20)	5.72 *	(1.68 <OR< 23.33)
OPV 3	59(80)	15(20)	317(77)	94(23)	1.17	(0.61 < OR< 2.26)
DTP 1	68(94)	4(6)	356(82)	80(18)	3.82 *	(1.29 <OR< 12.69)
DTP 2	68(97)	2(3)	336(73)	87(27)	8.80 *	(2.07 <OR< 52.99)
DTP 3	60(81)	14(19)	320(77)	93(23)	1.25	(0.64 <OR< 2.45)
DTP 4	46(77)	14(23)	214(69)	97(31)	1.49	(0.75 <OR< 2.99)
MMR	55(74)	19(26)	232(59)	163(41)	2.06 *	(1.14 <OR< 3.74)

Note.

<sup>a</sup> = Odds Ratio of children living in Kimberley remote communities being immunised within 30 days of due date relative to children living in Kimberley towns.

\* = Significant result

Table 8

Timeliness of Vaccination of Children Living in the East Kimberley  
Relative to Children Living in the West Kimberley

Vaccine	East Kimberley		West Kimberley		Odds Ratio <sup>a</sup>	95% Confidence Limits for Odds Ratio
	Vaccine given ≤30 days of due date	Vaccine given >30 days of due date	Vaccine given ≤30 days of due date	Vaccine given >30 days of due date		
	n(%)	n(%)	n(%)	n(%)		
BCG	120(94)	7(6)	200(96)	9(4)	0.77	(0.26 <OR< 2.37)
HepB 1	124(98)	4(2)	210(97)	6(3)	0.89	(0.22 <OR< 3.82)
HepB 2	102(83)	21(17)	160(77)	48(23)	1.46	(0.80 <OR< 2.68)
HepB 3	102(80)	25(20)	133(66)	70(34)	2.15 *	(1.23 <OR< 3.76)
OPV 1	158(84)	31(16)	259(82)	58(18)	1.14	(0.69 <OR< 1.90)
OPV 2	163(90)	19(10)	240(77)	70(23)	2.50 *	(1.41 <OR< 4.48)
OPV 3	155(83)	31(17)	221(74)	78(26)	1.76 *	(1.08 <OR< 2.88)
DTP 1	159(84)	30(16)	263(82)	56(18)	1.13	(0.68 <OR< 1.89)
DTP 2	164(90)	18(10)	240(77)	71(23)	2.70 *	(1.50 <OR< 4.88)
DTP 3	155(84)	30(16)	225(75)	77(25)	1.77 *	(1.08 <OR< 2.91)
DTP 4	101(72)	40(28)	159(69)	71(31)	1.13	(0.69 <OR< 1.84)
MMR	120(65)	64(35)	167(59)	118(41)	1.32	(0.89 <OR< 1.98)

Note.

<sup>a</sup> = Odds Ratio of children living in East Kimberley being immunised within 30 days of due date relative to children living in West Kimberley.

\* = Significant result

Hib Vaccines Administered to Children in Each Racial Group

Table 9 presents the number of each dose of Hib vaccine (*Haemophilus influenzae* type b) administered to children in each racial group since this vaccine was included in the Recommended Immunisation Schedule for Western Australia in 1993. As shown in the Table, overall, Aboriginal-Caucasian children had the highest Hib vaccine cover, and Caucasian children the lowest.

Table 9

Hib Vaccines Administered to Children in Each Racial Group

HIB Vaccines Administered: 1993 - June 1994				
Racial Group	n	HIB 1	HIB 2	HIB 3
		n(%)	n(%)	n(%)
Aboriginal	138	98(71)	65(47)	22(16)
Caucasian	172	126(73)	54(31)	21(12)
Aboriginal-Caucasian	228	196(86)	138(61)	56(25)
Other	19	13(68)	9(47)	5(26)

### Early Vaccine Administration

One MMR vaccine (0.2%) was administered earlier than 90 days before the due date. The number of each of the other vaccines administered earlier than 14 days before the due date, (and proportion of children immunised early) are shown in Table 10. The number and percentage of vaccines administered is included for reference. BCG and HepB 1 vaccines are not included as they are administered soon after birth.

Table 10

### Vaccines Administered Earlier Than The Due Date

Vaccine	Total Number Vaccines given	Vaccines given >14 days earlier than due date
	n(%)	n(%)
HepB 2	338(88)	4(1.2)
HepB 3	338(88)	28(8.3)
OPV 1	522(94)	3(0.6)
OPV 2	506(91)	29(5.7)
JPV 3	498(89)	22(4.4)
DTP 1	524(94)	3(0.6)
DTP 2	507(91)	25(4.9)
DTP 3	500(90)	21(4.2)
DTP 4	374(67)	27(7.2)

### Summary of Results

Of the 663 Kimberley children born between 1st November and 31st October 1992, and identified in the study population, six Aboriginal or Aboriginal-Caucasian children had died by June 1994. Of the 557 children included in the study, 41% were Aboriginal-Caucasian, 31% were Caucasian, 25% were Aboriginal, and another small group of 3% were a mixture of other races.

The immunisation cover for Aboriginal children was found to be consistently lower than for children in all other racial groups. The timing of vaccine administration was also found to be more delayed for Aboriginal children.

The delay in timing of vaccine administration to the entire population increased as the children got older. Only a small proportion of all children received the MMR and DTP4 vaccines (due at 12 and 18 months respectively) age appropriately.

The time taken to administer vaccines ranged from 92 days before the due date to 599 days after the due date. However, the median number of days for administration of vaccines due in the first six months did not exceed eight. The median number of days for administration of vaccines due at 12 and 18 months was 20 and 12 days after the due date, respectively. Less than 8.5% of Hep B, OPV or DTP vaccines were administered earlier than 14 days before the due date, and one MMR vaccine was administered earlier than 90 days before the due date.

The odds were that Caucasian and other children would be immunised age-appropriately relative to Aboriginal and Aboriginal-Caucasian children being immunised as per schedule.

Also, the odds were that children living in remote areas in the Kimberley would be immunised age-appropriately relative to children living in towns in the region. Also, the odds were that children living in the East Kimberley would be immunised as per schedule relative to children living in the West Kimberley.

Overall, Aboriginal and Aboriginal-Caucasian children had the highest Hib vaccine cover at the time of data collection for the present study.



## CHAPTER SIX

### STUDY TWO: THE COMMUNITY NURSE STUDY

#### Methodology

##### Purpose

The purpose of this study was to seek reasons for delay in the administration of vaccines to children in the 0-18 month age group in the Kimberley Region, by sending a questionnaire to the community nurse practitioners who administer vaccines to these children. This study also sought to describe community nursing practice in the areas of vaccine administration and the follow-up of children who experience immunisation delay and to gather data on the immunisation education and source of reference of Kimberley community nurses.

##### Design

An exploratory, descriptive survey design was used to seek reasons for delay in administration of vaccines. Nursing practice in ensuring timeliness in the administration of vaccines and follow-up of infants overdue for immunisation was investigated and described.

##### Setting and Sample

The setting for this study was the Kimberley Region of Western Australia. All community nurses involved in the immunisation of children in the 0-18 month age group in the town or community in which they

worked were invited to participate. Nurses working for the Mercy Balgo Health Service as well as the Kimberley Health Service community nurses were invited to participate in the study. Generalist, as well as Registered Child Health Nurses were included.

Twenty eight community nurses administer vaccines to children in the 0-18 month age group in the Kimberley Region. However, at the time of data collection for this phase of the study there were several nursing positions vacant in the Region. In addition one community nurse was away due to ill health, and another newly-appointed nurse had not completed the Immunisation Certificate, and had not commenced administering vaccines. Consequently, the number of nurses eligible to participate in the study was reduced to 22. Of these 22 community nurses who were invited to participate in the study, 20 (90.9%) of the available eligible target population completed and returned the questionnaires.

### Instrument

This study was the first to investigate the timing of administration of vaccines to children in the 0-18 month age group, and to survey nurses regarding the follow-up of infants overdue immunisation. This was also the first study to explore and describe the practice of community nurses administering vaccines in a remote area of Australia to a predominantly Aboriginal population. Consequently, a tool suitable for the purposes of

this study was not available. A questionnaire was designed specifically for use in this study (see Appendix D).

#### Development of the Questionnaire

The questionnaire was designed by the researcher, in consultation with colleagues and experts in the fields of Immunisation, Disease Control, Community Health Research and Aboriginal Child Health. The Western Australian Immunisation Handbook (1991) was used to provide background information. There were several stages in the development of the instrument:

1. As with the development of the conceptual framework, the appropriateness of the content of the questionnaire was initially verified by colleagues with practical knowledge of infant immunisation in remote areas similar to the Kimberley, as well as Aboriginal Health Workers involved in Child Health and Immunisation in Perth. The content of the questionnaire mirrored the variables included in the conceptual framework which guided the study.
2. The writer then sought and received advice on the content and development of the questionnaire from the following experts: the Senior Medical Officer, and the Senior Community Nurse, Disease Control, Public Health Unit, Kimberley Region; a Senior Research Nurse experienced in Community Nursing and Health Research,

the Institute for Child Health Research, Perth; and a Senior Research Nurse from the Immunisation Clinic, Perth.

3. When development of the instrument was nearing completion, the writer presented the questionnaire for feed-back from colleagues and lecturers at the Thesis Preparation Seminar at Edith Cowan University.

#### Content validity.

To ensure content validity, the researcher used the process developed by Lynn (1986), and recommended by Burns and Grove (1993 p.344-345). The "judgement-quantification" stage of Lynn's procedure to determine content validity of a research tool entails "the assertion by a specific number of experts that the items are content valid, and that the entire instrument is content valid" (p.383).

According to Lynn, the number of experts required is arbitrary, but suggests a minimum of three, and the number is unlikely to exceed ten. The judgement of nine experts from relevant fields was sought for the validation of the tool for this study.

As the questionnaire had been designed to gather data from community nurses administering vaccines to a predominantly Aboriginal infant population in a remote area, validation was needed from experts from several fields. The researcher sought the judgement and advice of experts in the areas of Immunisation, Aboriginal Health and Research, Communicable Disease Control in the Kimberley, Remote Area

Community Nursing, and Community Nurse Staff Development in the Kimberley. The following nine experts assessed the content validity of the tool:

1. The Senior Medical Officer and a Senior Research Nurse from the Immunisation Clinic in Perth.
2. The Advanced Nurse Practitioner, Staff Development in the Kimberley Region.
3. Also from the Kimberley Region, the Senior Medical Officer, Disease Control, Public Health Unit; and a Doctor of Science (both of these latter experts have many years of experience in research into Aboriginal Health in the Kimberley).
4. The three Senior School Health Nurses in the Kimberley Region. These nurses were not included in the study, as they do not administer immunisations to infants. However, as members of the small community nursing teams in each centre, they are often involved in the follow-up of children who are due for immunisation. Collectively these nurses have more than thirty years of experience in community nursing in the Kimberley and the Northern Territory.
5. Final validation was sought from the Senior Community Nurse responsible for the co-ordination of the Immunisation Programme in the Eastern Goldfields. This expert assessed the validity of the

revised questionnaire which was used in the pilot-study following validation and advice received from the other eight experts.

Following the procedure described by Lynn, each expert was sent a package designed for the purpose of assessing content validity of each question, and the entire questionnaire. This included a letter of request, a list of instructions, a brief summary of the purpose of the research project, and the specific objectives of the study. The number of each question was listed with the specific objective it was designed to address. A tool which featured questions on one page, and a rating scale on the facing page was designed by the researcher to facilitate judgement and rating of the content validity of each question (see Appendix E). A copy of the article by Lynn (1986) was also included in the package.

The researcher then re-examined and re-assessed each question in the tool, guided by the collective assessment and comments of the panel of experts. As suggested by several of the experts, two more questions were added, and the writer chose to delete one of the questions. The changes however were minimal.

#### Pre-pilot study.

While the researcher was in the Kimberley Region, a pre-pilot study was carried out by the three Kimberley Senior School Health Nurses. Although expert assessment of content validity of the instrument had not been completed at this time, the researcher took the opportunity

to carry out a pre-pilot study. Apart from suggestions about the type-setting format of some of the questions, these nurses considered the instrument appropriate.

#### Pilot study.

Following assessment of the content validity of the tool by eight of the experts and the completion of any changes required, the pilot study was conducted to test that nurses understood the questions included in the questionnaire. Subjects chosen for the pilot study were practitioners administering vaccines to children in the 0-18 month age group in the Eastern Goldfields Health Region. The Goldfields and Kimberley Regions are similar in climate and remoteness, and have predominantly Aboriginal client populations. Both regions must cope with high population mobility, and consequently have similar health service delivery problems.

Five community nurses participated in the pilot study, three in Kalgoorlie-Boulder, one in Coolgardie, and one in Kambalda. The researcher travelled to each of these centres and observed each participant complete the questionnaire. Two participants had difficulty understanding the same section of one question. That particular section was not included in the final questionnaire. Two nurses made suggestions regarding the format similar to those previously made by the Kimberley School Health Nurses. Otherwise, the nurses who participated in the pilot study considered the instrument appropriate. While in the

Goldfields, the researcher sought final validation of content validity of the questionnaire by the ninth expert (the Senior Community Nurse responsible for the co-ordination of the Immunisation Programme in that region). The final questionnaire was set out with the format suggested by the participants of the pre-pilot, and pilot study. (See Appendix D).

### Procedure

A letter outlining the purpose of the study and inviting community nurses to participate in the research project, was sent to every generalist and Child Health Nurse in the Kimberley Region (See Appendix C). This letter was sent out after permission was obtained from the Northern Regions Ethics Review Group to proceed with the project, and prior to the researcher visiting the Kimberley to collect data for Study One.

While in the Kimberley, the researcher followed up the initial written contact which invited the community nurses to participate in the study. The researcher visited Derby, Fitzroy Crossing and Broome and spoke to at least one community nurse in each town and community in the region about the study, either in person or by phone. This gave prospective participants the opportunity to ask the researcher any questions about the study. The researcher was able to assure the community nurses that the study was subjective, voluntary and anonymous, and that the strictest confidentiality guidelines would be



adhered to. Assurance was also given that results would be forwarded to all participants at completion of the study.

In summary, assessment of content validity of the tool by the panel of experts was completed, and modifications made as suggested. This was followed by the pilot-study of the questionnaire, which was carried out in the Goldfields. The questionnaire was then posted out to the community nurses in the Kimberley Region.

### Data Analysis

In this study the Statistical Package for the Social Sciences (SPSS for Windows Release 6.0.1) was used to analyse data. Frequency distributions were used for closed questions. Open-ended questions were measured, analysed and interpreted using content analysis, which is used for "identifying, measuring and describing, specified characteristics within or reflected by written or verbal text" (Waltz, Strickland & Lenz, 1991, p. 299).

### Ethical Considerations

Study Two commenced when approval to proceed had been granted by the Northern Regions Ethics Review Group (Appendix B).

Assurance was given to all community nurses participating, that the study was subjective, anonymous and voluntary. A returned completed reply was taken as that person's implicit consent to participate.

The questionnaires were coded for analysis; no names were included. Throughout the study, only the researcher and her Research Supervisors had access to these data. No individual, town or community in the Kimberley Region was identified in the study.

All questionnaires will be kept by the researcher for seven years. During that time they will be securely locked away, with only the researcher having access. At the end of seven years the questionnaires will be destroyed.

## CHAPTER SEVEN

### STUDY TWO: THE COMMUNITY NURSE STUDY

#### Results

In this study, data were analysed using the Statistical Package for the Social Sciences (SPSS for Windows, Release 6.0.1), and content analysis was used to analyse and interpret answers to open-ended questions.

#### Demographic Characteristics

Of the 22 community nurses eligible and available to participate in the study, 20 returned the questionnaire (response rate 91%). All six Kimberley towns and four of the seven remote communities staffed by community nurses were represented in this sample.

Sixteen respondents had further qualifications in addition to general nursing, seven had three or more additional qualifications. Ten were Registered Child Health Nurses, 15 were midwives, three were psychiatric nurses, and two had Bachelor Degrees in Nursing. Other qualifications included the following certificates or diplomas: Tropical Community Medicine and Health (UK); Paediatrics; Intensive Care; Family Planning; Health Visiting (UK); Community Health Nursing; and Health Counselling. One respondent had a Masters Degree in Epidemiology.

The length of time the participants had worked in areas relevant to this study are summarised in Table 11.

Table 11

Community Nurses' Length of Employment and Experience

	Range	Standard Deviation	Mean	
Length of Time	(Months)	(Months)	(Months)	≥ 2 Years n(%)
As a community nurse	0.16-23	89.73	108.25	17(85)
With Aboriginal people	0.25-25	77.03	93.90	18(90)
In present town or community	0.16-6.33	24.33	27.85	9(45)
Certified to administer immunisations in WA	0.08-13	41.16	44.95	14(70)

### Reasons for Delay in Administration of Vaccines

The first objective of this study was to seek possible reasons for delay in administration of vaccines. The participants were asked how often, under different circumstances, they had been unable to administer a vaccine to a child who had presented at the clinic and was due for immunisation. As shown in Table 12, the most frequent reason given was the child was not well enough to be immunised: either the nurse or the mother was concerned that the child was not well enough to have the vaccine.

Table 12

#### Community Nurses' Reasons for Not Administering a Vaccine to a Child who has Presented at the Clinic

Reason	Never n(%)	Rarely n(%)	Sometimes n(%)	Often n(%)	Always n(%)
Insufficient vaccines	5(25)	11(55)	4(20)		
Nurse considers the child is not well		2(10)	14(70)	2(10)	2(10)
Child has lost weight	5(25)	12(60)	3(15)		
Child is due to have two injections	8(40)	4(20)	6(30)	2(10)	
Mother is concerned the child is not well	1(5)	5(25)	8(40)	6(30)	
Mother concerned about side-effects of vaccines	9(45)	9(45)	2(10)		

The participants were also asked whether they considered the parents who used their clinic, understood the importance of immunisation in maintaining their child's health. The majority of community nurses felt parents understood the importance of childhood immunisation. The respondent who answered "yes and no", considered that 50% of the parents understood the importance of immunisation and brought their children to be immunised, whereas, the other 50% needed numerous reminders. (See Table 13).

Table 13

Parental Understanding of Importance of Immunisation

Parental Understanding of Importance of Immunisation	n(%)
Yes: parents understand	14(70)
No: parents do not understand	5(25)
Yes and No	1(5)

When asked to give reasons for their replies to the previous question, 60% responded (including the participant who answered "yes" and "no"). Two reasons were given by the participants who answered yes. Twenty per cent felt that parents understood the concept of disease-prevention and the value of immunisation because of the large amount of immunisation education they received. Another two respondents replied

that high clinic attendance and immunisation cover in their areas was an indication that parents understood the importance of immunisation.

The respondents who considered parents did not understand the importance of immunisation gave the same reasons from the opposite perspective. Twenty per cent of respondents considered that due to lack of general education and/or immunisation education, parents did not understand the concept of disease, and, therefore, did not understand the importance of immunisation. One community nurse responded that, as parents constantly needed to be reminded that their child's vaccines were due/overdue, the parents did not understand the importance of immunisation.

The researcher also sought the participants' opinion with regard to the most effective method of education about immunisation for parents in the town or community where each community nurse worked. Their responses to this question are shown in Table 14.

Table 14

The Most Effective Method of Education about Immunisation for Parents

Teaching Method	n(%)
Group teaching sessions	1(5)
One to one teaching	19(90)
"Women's magazines, TV ads"	1(5)

To seek information about parents' motivation with regard to immunisation, participants were asked how often parents or caregivers brought their children to the clinic for immunisation without being reminded or assisted with transport. Possible responses included rarely, sometimes and often, approximately equal numbers of respondents selected each response (see Table 15).

Table 15

Parents' Motivation with Regard to their Child's Immunisation

How often parents bring their children for immunisation	n(%)
Rarely	6(30)
Sometimes	7(35)
Often	7(35)



### Availability of Immunisation

The second objective of this study was to ascertain the availability of immunisation to children in the 0-18 month age group in the Kimberley Region. Ten (50%) of the community nurses responded that immunisation was available at anytime in the clinic where they worked, and five (25%) indicated more than one day each week (see Table 16).

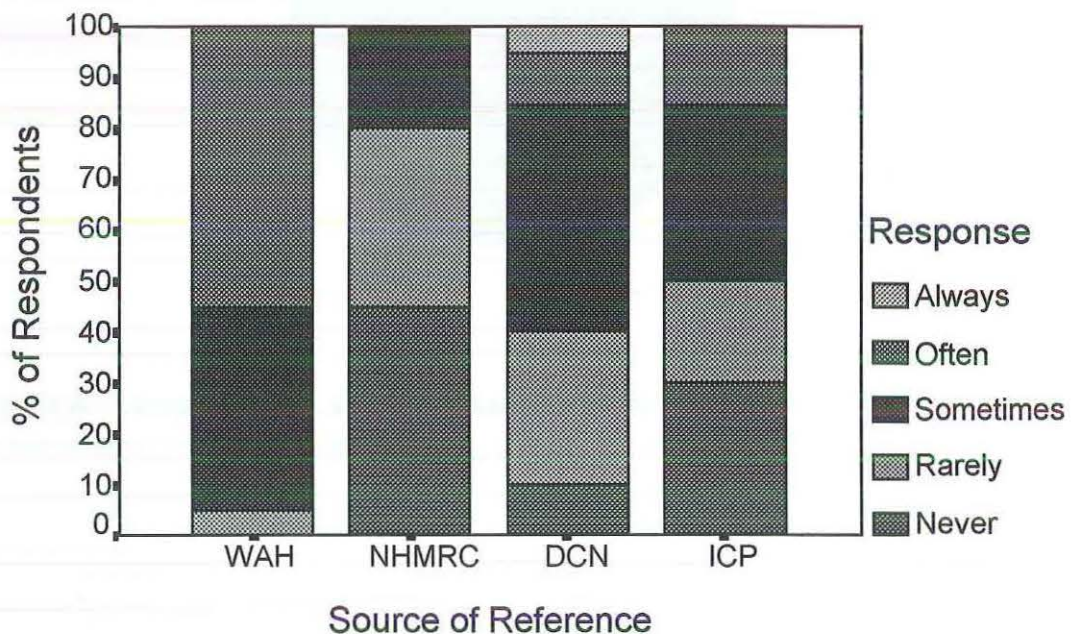
Table 16

#### Availability of Immunisation for Children in the 0-18 Month Age Group

Availability of Immunisation	n(%)
One day each week	5(25)
More than one day each week	5(25)
Anytime	10(50)

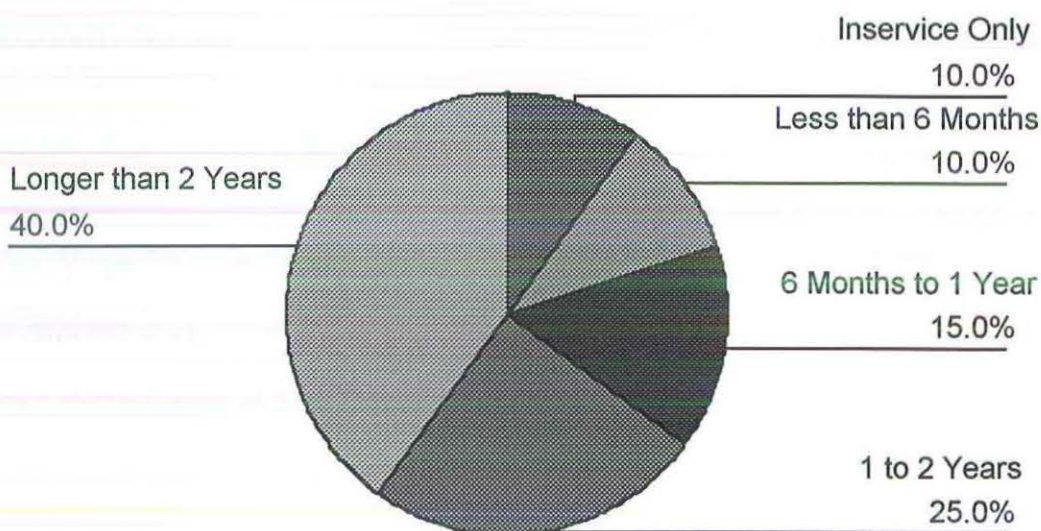
### Nurses' Immunisation Knowledge and Education

The third objective of Study Two was to identify the principal source of nursing information about childhood immunisation procedures. The participants were asked how often they referred to the following resources when they required information (or advice) about vaccines or immunisation: the WA Immunisation Handbook (WAH); the National Health and Medical Research Council Manual for Immunisation Procedures (NHMRC); the Senior Disease Control Nurse in the Kimberley (DCN); or the Immunisation Clinic in Perth (ICP). No other source of reference was given by any of the respondents. The community nurses' response to this question are presented in Figure 3.



**Figure 3.** Source of reference for immunisation information of community nurses in the Kimberley Region.

Participants were also asked to specify the length of time since they last received in-service education or updating on the topic of immunisation (excluding initial immunisation training). For eight respondents (40%), more than two years had elapsed since their last immunisation inservice. These data are presented in Figure 4.



**Figure 4.** Length of time since each respondent last received immunisation training or updating.

Participants were also asked who provided their last immunisation inservice or updating. This question was not applicable to two participants who had been certified to administer vaccines only one month before completion of the study questionnaire. Responses to this question are summarised in Table 17.

Table 17

Providers of the Most Recent Immunisation In-service for Kimberley  
Community Nurses

Immunisation Inservice Providers	n(%)
Senior Nurse Disease Control, Derby	4(20)
Self directed study	4(20)
Senior Nurse Regional Staff Development	1(5)
Senior Nurse Staff Development, East Kimberley	1(5)
Child Health Nurse, Derby	1(5)
Senior Medical Officer, Disease Control, Perth	1(5)
"Can't remember" or "nothing"	3(15)
Not answered	3(15)
Not applicable	2(10)

In addition participants were asked to specify topics covered in their last update or in-service on the topic of immunisation. This question was not applicable to two of the respondents. Three respondents (15%) did not answer this question (it was longer than two years since they had any immunisation in-service). The community nurses' responses to this question (several in their own words) are shown in Table 18, along with the time since they last received immunisation in-service.

Table 18

Topics Covered in Most Recent In-service Received by Kimberley

Community Nurses

Topic	n(%)	Time Range
Hib: - Pedvax, Hibtiter	4(20)	6 months-2 years
Self-directed study	4(20)	6 months ->2 years
"General overview"	1(5)	> 2 years
"Re-sat immunisation certificate after 5+ years"	1(5)	6 months - 1 year
"Running an Immunisation Clinic"	1(5)	< 6 months
"The schedule, common misconceptions, future possible developments"	1(5)	6 months - 1 year
"Can't remember"	1(5)	> 2 years
"Nothing - Not done"	1(5)	> 2 years
"Nil - ie nil since initial training but keep myself updated through journals & flyers"	1(5)	> 2 years

### Nurses' Immunisation Practice

The fourth objective of the study was to describe community nurses' practice in administering immunisations. The respondents were asked how often they would administer an immunisation to a child in a variety of situations. The results are shown in Table 19, with the answers shown in bold type being the most appropriate.

Table 19

#### Community Nurses' Practice in Administering Vaccines

Situation	Vaccine given				
	Never n(%)	Rarely n(%)	Sometimes n(%)	Often n(%)	Always n(%)
Febrile child (temperature 37 <sup>4</sup> - 38° c)	<b>13(65)</b>	6(30)	1(5)		
Febrile child (temperature > 38°c)	<b>20(100)</b>				
Upper respiratory tract infection but afebrile	4(20)		7(35)	<b>5(25)</b>	<b>4(20)</b>
On penicillin or amoxil	5(25)		7(35)	<b>5(25)</b>	<b>3(15)</b>
Has "failure to thrive", is well but has lost weight since last weighed		1(5)	2(10)	4(20)	<b>13(65)</b>
Previously gaining weight but lost weight at last two consecutive weighings		1(5)	4(20)	5(25)	<b>10(50)</b>
Has diarrhoea and/or vomiting and due MMR, Hib or HepB vaccines	6(30)	5(25)	<b>7(35)</b>	<b>1(5)</b>	1(5)
Has diarrhoea and/or vomiting and due OPV	<b>18(90)</b>	1(5)	1(5)		

### Follow-up of Children Overdue for Immunisation

The fifth objective of Study Two was to describe the Kimberley community nurses' practice in the follow-up of children in the 0-18 month age group who were overdue for immunisation. The respondents were asked how often they would take specified actions when a child was overdue for immunisation. In Table 20 these actions have been listed, along with the participants' responses. As shown in the Table, apart from sending a reminder letter or administering a vaccine to a child at their home, the majority of the Kimberley community nurses would take all other actions possible to follow-up children who were overdue for immunisation.

Table 20

### Follow-Up of Children Overdue for Immunisation

Action	Never n(%)	Rarely n(%)	Sometimes n(%)	Often n(%)	Always n(%)
Visit the parent			6(30)	13(65)	1(5)
Send a reminder letter	3(15)	4(20)	4(20)	5(25)	4(20)
Aboriginal Health Worker to visit			4(20)	12(60)	4(20)
Administer vaccine at home	10(50)	4(20)	3(15)	3(15)	
Provide transport		3(15)	6(30)	10(50)	1(5)

Respondents were also asked whether there was a specific protocol regarding the follow-up of overdue immunisations in the town or community where they worked. Thirty five per cent of respondents replied "yes" and 60% replied "no", and one reply of "don't know" was given.

Respondents were then asked how and when they decided to discontinue following-up children who were overdue for immunisation. Responses were received from 19 participants (95%), with three giving more than one reason. As shown in Table 21, the replies received fell into four distinct categories. The most common response was "to keep trying, not to give up".

Table 21

Nurses' Reasons for Discontinuing Follow-Up of Children Overdue for Immunisation

Reason	n(%)
After set number of reminders	4(20)
Child is impossible to contact	4(20)
Keep trying, do not discontinue follow-up	11(55)
Parents discontinue immunisation	3(15)



### Inter-Referral Between Kimberley Health Agencies of Children Due for Immunisation

The sixth and final objective of Study Two was to investigate the extent of inter-referral between health agencies and health personnel of children in the 0-18 month age group due for immunisation in the Kimberley Region. Respondents were asked how often a list of children who were overdue for immunisation was sent to other health agencies from the clinic where they worked, and how many children were referred to them for immunisation by these same agencies in an average month.

There is a hospital and a community health centre in each town in the Kimberley. However Aboriginal Medical Service (AMS) health centres operate only in Broome, Hall's Creek and Kununurra, and Broome is the only centre with private General Practitioners (GPs). Consequently, not all participants answered these two questions, or answered only parts of each question. The replies received are summarised in Tables 22 and 23. Inter-referral between agencies (including the local hospitals) was infrequent. Community health nursing colleagues were identified by 5 respondents (25%) as "other" agencies who were informed of names or lists of children who were due or overdue for immunisation. Ten (50%) of the respondents identified community health colleagues as "other" health agents who referred children to them for immunisation.

Table 22

Frequency of Referrals of Overdue Immunisations from Community  
Nurses to Other Agencies

<b>Agency</b>	<b>Never n(%)</b>	<b>Monthly n(%)</b>	<b>Fortnightly n(%)</b>	<b>Weekly n(%)</b>
AMS	7(35)	4(20)	1(5)	1(5)
GPs	8(40)	1(5)		
Hospital	9(45)			
Community Health (Other)		3(15)	2(10)	

Table 23

Monthly Immunisation Referrals to Community Nurses from Other  
Agencies

<b>Agency</b>	<b>0-5 n(%)</b>	<b>6-10 n(%)</b>
AMS	10(50)	1(5)
GPs	6(30)	
Hospital	10(50)	
Community Health (Other)	9(45)	1(5)

### Additional Comments from Respondents

The respondents were asked for additional comments they would like to make on any aspect of immunisation in the 0-18 month age group in the town or community where they worked. Thirteen (65%) of the respondents provided additional information, most made several comments.

Two particular characteristics of the Aboriginal client population were identified by nine (45%) respondents as important contributing factors in immunisation delay. Five (25%) community nurses identified the high mobility of the client population, and four (20%) felt that Aboriginal people had a different concept of time, and timeliness. These and other factors identified by the respondents are shown in Table 24.

Table 24

#### Contributory Factors in Immunisation Delay

<b>Factor</b>	<b>n(%)</b>
High mobility	5(25)
Different concept of time	4(20)
Lack of transport	3(15)
Lack of computerised immunisation data	3(15)
Lack of culturally appropriate education material	3(15)
Lack of parental responsibility	3(15)

The respondents also gave positive comments as to why they felt the immunisation cover was high, and follow-up of children who were due/overdue for immunisation was successful in the area where they worked. Four respondents (20%) felt that the close working relationship between community nurses and the mothers or caregivers contributed significantly to successful follow-up. Two (10%) considered a lack of anti-immunisation influences (TV, publications) was important. Another two (10%) respondents felt that immunisation is a priority to Kimberley community nurses, therefore the immunisation cover is high.

### Summary of Results

There was a 91% response rate to the questionnaire. Eighty per cent of respondents had further qualifications and a minimum of 70% had more than two years experience in immunisation in WA, community nursing and working with Aboriginal people. Immunisation was available at any time at the clinics where 50% of the respondents worked, and available more than one day each week where another 25% worked.

From the questionnaire, the following findings were identified: The poor health of the child was the most frequent reason preventing respondents from administering a vaccine to a child who had presented at the clinic. The majority of community nurses considered parents understood the importance of childhood immunisation. Similarly, 90% of

respondents considered one-to-one teaching to be the most appropriate method of immunisation education for parents.

The WA Immunisation Handbook was the information source most frequently referred to by the respondents. For 40% of the respondents it was more than two years since they last received inservice training in immunisation.

The majority of community nurses stated they would take every possible action to follow-up children who were overdue for immunisation. There was no specific regional protocol for discontinuing follow-up of overdue immunisations after initial attempts. Fifty five per cent of respondents would not discontinue follow-up of children overdue for immunisation. Inter-referral between health agencies of children due and overdue for immunisation was found to be infrequent.

In addition to completing the closed-ended questions, 65% of respondents volunteered important comments and information. Nine (45%) identified particular characteristics of the Aboriginal population as important factors in immunisation delay.

## CHAPTER EIGHT

### STUDY ONE AND STUDY TWO

#### Discussion

#### Introduction

In order to investigate immunisation delay in the 0-18 month age group in the Kimberley Region of Western Australia, two separate studies were carried out, each with different objectives and methodology. The purpose of Study One was to determine the actual overall immunisation cover and timing of administration of all routine vaccines to Kimberley children in all racial groups in the 0-18 month age group. This information came from the data obtained when three separate immunisation computer databases in the Kimberley Region were combined. Study Two sought community nurses' perceptions of the reasons for delay in the administration of vaccines to this group of children. This latter study also sought to describe community nursing practice in the areas of vaccine administration and follow-up of children overdue for immunisation, and to gather information on community nurses' source of immunisation information and education. A questionnaire was used to gather the data in Study Two. The findings of each of these studies were presented separately in Chapters Five and Seven.

In this chapter, the adapted PRECEDE Model is used to combine and integrate the findings of the two complementary studies. The chapter commences with a description of the overall immunisation cover and timing of vaccine administration for children in all racial groups, and then for children in separate racial groups. The adapted PRECEDE Model was then used to interpret the analysed data so that possible reasons for the immunisation delay found in Study One could be identified from the findings of Study Two

Each reason for immunisation delay identified from the findings of Study One and Study Two has been classified and presented in this chapter according to the group of characteristics or variables included in the conceptual framework to which it belongs:

1. "Predisposing factors" identified in the conceptual framework included important relevant characteristics of the study population, children in the 0-18 month age group in the Kimberley Region and their parents or care-givers.
2. "Enabling factors" included variables which related to the community nurses who administer vaccines, and could influence the timing of immunisation. These included the nurses' experience as well as immunisation knowledge and practice.
3. "Reinforcing factors" included the practice and attitudes of other Kimberley health personnel with regard to immunisation.

## Vaccine Cover and Timing of Immunisation for All Racial Groups

### Overall Vaccine Cover

When the immunisation records of the total study population were examined in Study One, the proportion of children covered by immunisation during the first six months of life was found to be satisfactory. The vaccine cover ranged from 88% for HepB2 and HepB3 to 94% for DTP1 and OPV1 (Table 2, p.51). These results indicated an overall immunisation cover rate for these children, which was greater than those reported for Australia and WA in the 1989-1990 National Health Survey (ABS, 1992a). Kelly (1993, 1994) reported similar findings from surveys of children at school entry age in the Mid-west Gascoyne and Great Southern Health Regions of Western Australia. Immunisation cover rates greater than those recorded in the National Health Survey were also reported from New South Wales, the Northern Territory, and Queensland respectively (Roden, 1992; Guthridge & Patel, 1993; and Hanna, Wakefield, Doolan, & Messner, 1994).

Although the immunisation cover was satisfactory for vaccines administered in the first six months of life, this was not the case, however, for subsequent vaccines. The immunisation cover for MMR and DTP4 (administered at 12 and 18 months of age) was only 84% and 67% respectively. In the case of measles this latter finding is clinically significant as a vaccine coverage of 92 to 95 per cent is required to prevent outbreaks of measles (Anderson & May, 1990). The extensive



time range for the administration of all vaccines found in this study (up to +599 days), suggests that the follow-up of children overdue for immunisation is not discontinued. It is, therefore, likely that satisfactory levels of vaccine cover will be achieved for MMR and DTP4 by the time these children reach school age. However, at the time of this study, and while immunisation is delayed, the 16% of children who had not been immunised against measles, mumps and rubella, and the 33% not fully immunised against diphtheria, tetanus and pertussis, were at risk of infection from these diseases.

#### Timing of Vaccine Administration

The age-appropriate administration of vaccines to all children in the total study population was also investigated. The timeliness of administration of the first three doses of DTP and all three doses of OPV which are administered to all children, was not optimum, however, it was satisfactory. Also, delay in timing did not increase markedly as the immunisation schedule progressed. This was not the case with Hepatitis B vaccine (which is administered to all except Caucasian children). Delay in administration increased as the schedule progressed.

It was, however, in the administration of the MMR and DTP4 vaccines that the greatest delay was found. When the combined study population was considered, only 51% of the 557 children in the 0-18 month age group were immunised age-appropriately. Although 84% of

the children were immunised against measles, mumps and rubella, only 286 (51%) received the vaccine within 30 days of the due date (Table 3, p.53).

In addition, only 47% of the 557 children in the study population were immunised age-appropriately with DTP4 vaccine. Of the 374 (67%) children who eventually received the DTP4 vaccine, only 262 were immunised within 30 days of the due date. Almost half of the study population were at risk of infection with measles, mumps, rubella, diphtheria, tetanus, and pertussis for an increased length of time due to delay in administration of vaccines.

#### Vaccine Cover and Timing of Immunisation for Different Racial Groups

##### Overall Vaccine Cover

Although the overall cover of the combined population for all vaccines administered to children in the first six months of age was satisfactory, when each racial group was examined separately, the picture was quite different. The immunisation cover for Aboriginal children was found to be significantly lower than that of children in all other racial groups (Table 4, p.54). The percentage of Aboriginal children immunised was the lowest in every vaccine category apart from BCG (which is administered in hospital, soon after birth). In the HepB3 and OPV3 vaccine categories, only 75% and 73% of Aboriginal children

had been immunised, compared with the next lowest cover of 95% and 93% respectively for Aboriginal-Caucasian children.

In addition, the vaccine cover for Aboriginal children for DTP4 was extremely low (59%), and the MMR vaccine had been administered to only 70% of Aboriginal children. The lowest MMR cover in the other racial groups was 86% for Aboriginal-Caucasian children. Moreover, the percentage of Aboriginal children immunised in each vaccine category, decreased as the immunisation schedule proceeded. For example, although 83% of Aboriginal children received the first dose of OPV, only 73% received the third dose. In all other racial groups, this progressive decrease was minimal.

#### Timing of Vaccine Administration

When the timing of vaccine administration to children in each racial group was examined, a higher percentage of Aboriginal children were found to experience delay in administration of more vaccines than children in all other racial groups. Only the BCG and HepB1 vaccines which are administered to Aboriginal children soon after birth in hospital, were given age-appropriately to the majority of these children. At least 23% of Aboriginal children immunised, experienced delay in administration of all other vaccines. Moreover, the number of Aboriginal children who were immunised later than 30 days after the due date

increased with age. For HepB3, DTP3 and OPV3 only 70% or less of children were immunised within the scheduled time-frame.

There was also a marked decrease in the number of Aboriginal children who received the MMR and DTP4 vaccines (due at 12 and 18 months of age respectively) within 30 days of the due date. Approximately one third of the Aboriginal study population received these vaccines age appropriately.

These findings are of extreme importance. Due to immunisation delay; over 60% of Aboriginal children in the study population were at serious risk of infection with measles, mumps, rubella, diphtheria, tetanus, and pertussis for an increased length of time. In the case of the MMR vaccine this finding is of particular relevance to the predominantly Aboriginal infant population of the Kimberley Region. As the risk of measles for Aboriginal children is so great, in the Northern Territory these children are given the MMR vaccine at 9 months of age, as recommended by the World Health Organisation (NHMRC, 1994). Although Kimberley Aboriginal children have the same compromised health status and risks as Aboriginal children living in the NT, findings of the present study showed that 64% of Aboriginal children in the study population did not receive the MMR vaccine until 13 months of age and older.

The findings regarding the timing of administration of most vaccines to Caucasian children were very different. A higher percentage

of Caucasian children were immunised within 30 days of the due date than children in all other racial groups. Furthermore, although immunisation delay for these children increased with age, the percentage of OPV3 and DTP3 vaccines administered age-appropriately at six months of age was still higher than the percentages of the first doses of these vaccines administered on-time to Aboriginal children at two months of age.

Although the timing of administration of vaccines to Caucasian children in the first 6 months of age was satisfactory, at 12 and 18 months of age there was delay in vaccine administration. The MMR vaccine was given within 30 days of the due date to only 55% of the total Caucasian study population (61% of Caucasian children immunised with MMR vaccine), and 53% of the total Caucasian population received the DTP4 vaccine within the recommended time-frame (74% of Caucasian children immunised with DTP 4 vaccine). This progressive increase in immunisation delay as Aboriginal and Caucasian children increased in age found in the present study was similar to the finding of Hanna et al (1994) in pre-school children in Cairns.

It was interesting that the pattern of timeliness of vaccine administration for Aboriginal-Caucasian children was quite different to that of Aboriginal and Caucasian children. The percentage of Aboriginal-Caucasian children who received the first dose of each vaccine administered routinely to all racial groups was almost as low as for

Aboriginal children (76% and 77%). However, apart from MMR vaccine (65%) the percentage of children immunised who experienced delay did not increase with age. Therefore, the number of Aboriginal-Caucasian children at risk from vaccine-preventable diseases did not increase substantially as these children increased in age, compared to Aboriginal children who experienced progressive immunisation delay and corresponding risk of vaccine-preventable diseases.

Overall the results of Study One indicated that Aboriginal and part-Aboriginal children experienced greater delay in the administration of all vaccines except BCG and HepB1 than non-Aboriginal children (Tables 5, 6, pp.56-57). In at least half of the vaccine categories, the delay was significantly greater. The odds ratio of children in all racial groups, except Aboriginal, being immunised within 30 days of the due date, relative to Aboriginal children being immunised within 30 days of the due date, was significant for seven of the 12 vaccines.

Also, a significant odds ratio was found for six of the 12 vaccines when the odds of non-Aboriginal children (racial groups 2 and 4) being immunised age-appropriately, relative to the odds of Aboriginal and Aboriginal-Caucasian children (groups 1 and 3) being immunised age-appropriately were calculated.

### Predisposing Factors

#### Predisposing Factor: Ethnic background

The predisposing factor which related to the children who were found in Study One to have the lowest vaccine cover and the greatest immunisation delay, had been identified in the conceptual framework as a demographic characteristic, the ethnic background of the children: all were Aboriginal or Aboriginal-Caucasian.

Over 65% of the 557 children in the study population were Aboriginal or Aboriginal-Caucasian, and in terms of health were "at risk". Of the cohort of 663 children born in the Kimberley Region between 01 November 1991 and 31 October 1992, and identified in Study One, six Aboriginal or part-Aboriginal children had died by the end of June 1994. No Caucasian children identified in the study population had died. This finding confirmed the high death rate of Aboriginal children (as compared with other Australian children), reported by the Australian Bureau of Statistics (ABS, 1993). None of the children had died of vaccine-preventable diseases. However, when data from the complete immunisation records of the other 557 children identified in the study were investigated, a lower percentage of Aboriginal children were found to have received each vaccine, and a higher percentage experienced immunisation delay. As a result, a high percentage of already "at risk" Aboriginal children have the added risk of serious illness or death from

vaccine-preventable diseases for prolonged periods of time. This finding is very important and relevant as over 65% of the 557 children in the study population were Aboriginal or Aboriginal-Caucasian.

#### Predisposing Factor: Poor Health Status

The results of Study One indicated that Aboriginal and part-Aboriginal children experienced greater delay in the administration of all vaccines except BCG and Hep B1 than non-Aboriginal children. In Study Two, community nurses reported two predisposing factors as being major contributors in immunisation delay; both of which they felt were also associated with the Aboriginal background of the client population: the poor health status of Aboriginal children, and the mobility of the (predominantly) Aboriginal population.

Community nurses considered the child's general ill-health to be the reason which most frequently prevented them from administering a vaccine to a child who had actually presented at the clinic for immunisation. Either the mother or the nurse was concerned that the child was not well enough to be immunised. Additional comments regarding the concern of Aboriginal parents for the health of their children being immunised were volunteered by three respondents, for example, "the parent/carer often asks for immunisation to be delayed because he/she feels the babe is not well enough".



The concern of the community nurses about the poor general health of Aboriginal children, as well as the reported concern of Aboriginal mothers for their infants, in this study was well-founded. The findings of Study One, that six Aboriginal or part-Aboriginal children born in the Kimberley Region between 01 November 1991 and 31 October 1992 had died by the end of June 1994, emphasised just how "at risk" these children are when compared to other Australian children. The poor health status of Kimberley Aboriginal children and their high admission rate to hospital for multiple infections has been well documented (Harris, Knight & Henderson, 1986; Gracey & Anderson, 1989). The results of other Kimberley studies also indicated that a high percentage of Aboriginal infants suffered from undernutrition, contributing to their poor health status (Gracey & Spargo, 1987; Roberts, Gracey & Spargo, 1988; Gracey, Anderson, & Brooks, 1989; Gracey, 1991a, 1991b).

#### Predisposing Factor: High Population Mobility

The other group of predisposing factors which almost half of the respondents identified as being an important cause of immunisation delay were also characteristics of the Aboriginal population. Specifically, these were the high mobility of the client population, and a concept of time and timeliness which differs from that of many other Australians. Respondents volunteered comments such as: "the importance of time concepts as you would be aware are not there in the Aboriginal culture

thus requiring much follow-up from CHN's in this area" ("CHN's", community health nurses). In an effort not to pre-empt responses regarding reasons for delay, the researcher purposely omitted to include questions in the questionnaire which actually asked the respondents directly for information on either of these characteristics.

#### Predisposing Factor: Perceived Importance of Immunisation

The community nurses were asked for their perceptions of other predisposing factors, including the knowledge and motivation of parents or caregivers with regard to immunisation.

Most of the community nurses (70%) considered parents or caregivers understood the importance of immunisation. Although time-consuming, one-to-one teaching was reported by 90% of respondents to be the most appropriate method of immunisation education of parents and caregivers.

However, although the majority of community nurses considered parents or caregivers were knowledgeable about immunisation, their responses to the question as to how motivated parents or caregivers were, with regard to having their children immunised were less positive. Only 35% of respondents reported that parents or caregivers often brought their children to the clinic for immunisation without being reminded or having transport provided.

Forty per cent of the respondents reported that having to administer more than one vaccine injection to a child at the same visit, was at times a cause of immunisation delay. This is important, because if vaccine administration is delayed in the first six months of life, Aboriginal children often require up to three separate injections at one clinic visit to catch up and continue immunisation as per schedule. If the parent or caregiver will permit only one injection at a time, delay in immunisation will inevitably occur.

#### Predisposing Factor: Geographic Location

Another predisposing factor related to immunisation delay identified in Study One, was the geographic location. The results indicated that the odds were that children living in remote communities in the Kimberley, would be immunised on-time, relative to the odds of children living in towns. Kelly (1993) also reported a better immunisation cover for children living in remote communities, than children living in towns in the Mid west and Gascoyne Region of WA. A similar finding was reported from the Northern Territory (Guthridge & Patel, 1993). Also, the timeliness of vaccine administration was better for children living in the East Kimberley, than for children living in the West Kimberley.

In interpreting these findings it must be noted however, that, the geographic distribution of the study population of Study One was not evenly distributed. Only 14% of children were living in remote

communities, compared to 83% living in Kimberley towns (the address was unknown for 3% of children). The population was also higher in the West Kimberley than the East Kimberley, 61% in the West, compared with 36% in the East.

### Enabling Factors

#### Enabling Factor: Community Nurses' Experience and Practice

Study Two investigated enabling factors which were interlinked with predisposing factors associated with immunisation delay. In the case of the poor health status and mobility of Aboriginal children (predisposing factors), the enabling factors identified in the conceptual model were the practice and knowledge of community nurses in administering vaccines and following-up children overdue for immunisation. Other enabling factors, or variables which could influence the community nurses' practice was their experience in community health, with Aboriginal people and whether they were generalist or Child Health Nurses.

When the demographic characteristics of the respondents who participated in Study Two were examined, they were found to be a well-qualified, experienced group of practitioners. At least 70% had been certified to administer vaccines in WA and had worked as community nurses, with Aboriginal people for longer than two years. The mean

length of time respondents had worked as community nurses was greater than nine years, and with Aboriginal people almost eight years.

Fifty per cent of the respondents were Registered Child Health Nurses and 50% were generalist nurses. There was no difference in their responses to a question designed to describe their knowledge and practice when administering vaccines to a predominantly Aboriginal 0-18 month age population. Although the respondents were concerned about the health status of children being immunised, they would, wherever possible, administer a vaccine. Children having failure to thrive, weight loss, infection without fever, or antibiotic therapy were often immunised by the majority of nurses.

It must be emphasised that the practice of Kimberley community nurses differed from that of most community nurses administering vaccines to healthy, less mobile non-Aboriginal children living in the metropolitan area. Metropolitan nurses would be reluctant to administer a vaccine to a child who is not well and is losing weight.

In the Kimberley however, where many of the children suffer from multiple infections and also have failure to thrive and/or weight loss, the nurses will administer vaccines, as the children are at particular risk because of their health problems. Also, due to their mobility, there is no certainty that there will be another opportunity to immunise the child in the near future. All respondents replied correctly that they would never administer a vaccine to a child who was febrile.

The findings of Study One also confirmed the community nurses were knowledgeable of the scheduled timing of vaccines for infants in the 0-18 month age group. All vaccines administered to children in the study population in the first six months of life, were administered within a median of eight days. Less than 8.4% of all vaccines administered (except MMR) were administered 14 days or earlier than the due date, and only one MMR vaccine was administered earlier than 90 days before the due date.

The median number days for administration of MMR vaccine at 12 months and DTP4 at 18 months of age were higher (20 days and 12 days respectively). However, there are other factors associated with the timing of these vaccines which need to be considered, including the mobility of Aboriginal people as well as the health status and nutritional status of Aboriginal children. This is a particularly vulnerable stage in the lives of Aboriginal children (the researcher's observation is that these children are often undernourished as breast-feeding is no longer adequate at 12 months, but the children have not commenced appropriate food).

Since the Hib vaccine was introduced as part of the routine immunisation schedule in 1993, the community nurses have targetted the most at-risk groups of children. Until the time of data collection for the present study in June 1994, overall, Kimberley Aboriginal and Aboriginal-Caucasian children had the highest vaccine cover.

The respondents also reported that they were "active" in the follow-up of highly mobile children due/overdue for immunisation. Apart from sending a reminder letter, or administering a vaccine at home (both of which may not be culturally-appropriate), the majority of community nurses would take all possible, appropriate action to follow-up children overdue for immunisation. In addition to completing closed-ended questions, several of the community nurses also chose to mention that they felt childhood immunisation was important, and described their practice in encouraging a high immunisation compliance rate where they worked: "I believe every child should be given the opportunity to be immunised" or "the compliance rate in ... is excellent because the policy is to actively seek the mother to immunize the child" and "compliance in an Aboriginal Community is good because we (nurses) push the issue with information and education and carers/parents agree readily".

More than half of the community nurses would not discontinue follow-up, their response was unequivocal, the wording of responses were similar: "I never do. Keep going till I locate them" and "When I receive notification that someone else has immunised them. Never discontinue pursuit because I can't be bothered!! Even after 2-3 years interstate, my colleagues and I pursue vigorously". A further 20% of respondents discontinued follow-up only when the child became impossible to locate.

The continued follow-up of children overdue for immunisation reported by the community nurses in Study Two was verified by the findings of Study One. The maximum time-range for the administration of vaccines ranged from 203 days for HepB1 vaccine to 599 days for HepB3 vaccine. These findings suggest that the follow-up of children overdue for immunisation is on-going, it is not discontinued.

#### Enabling Factor: Community Nurses' Immunisation Education

Study Two provided valuable baseline data on the immunisation education and source of reference of the Kimberley community nurses.

The amount of ongoing immunisation education received by the respondents was found to be extremely limited. Not including initial training; for 40% of the respondents it had been longer than two years since they had received any education, and only 25% had received education within the last year. Education provided by the Senior Nurse in Disease Control on Hib vaccines was the topic most frequently covered within the past two years (only 20% of respondents). This topic was relevant as Hib vaccines were included in the routine immunisation schedule in 1993. For another 20% of respondents, their most recent immunisation education was through self-directed study (the immunisation module in the Remote Area Nurses' Course), rather than in-service provided by the Health Department.



#### Enabling Factor: Community Nurses' Source of Reference

Findings of the study also indicated that the respondents did not refer to a variety of sources for information. The majority of Kimberley community nurses used local information sources; (95%) often referred to the Western Australian Immunisation Handbook, and 60% often contacted the Senior Nurse working in Disease Control in the region. It should be noted that since the data were collected for this study, the NHMRC manual has been distributed to all practitioners administering vaccines in Australia. As this national immunisation guide is now available to every community nurse administering vaccines in the Kimberley, it may be their principal source of reference at this time.

#### Enabling Factor: Geographic Location and Nursing Knowledge and Practice

The results of Study One showed that there were actual differences in the timing of vaccine administration in different geographic locations in the Kimberley Region. However, in Study Two, there were no differences in enabling factors in different geographic areas. There were no differences in the nurses' reports of their practice in administering vaccines to children in the 0-18 month age group, or in their practice in following-up children overdue for immunisation. It should be noted that it was not appropriate to carry out tests of significance in Study Two because of the small numbers in the study population.

The findings of Study Two suggest a greater proportion of immunisation delay identified in Kimberley towns and in the West Kimberley, cannot be attributed to differences in nursing practice. This finding is in contrast to the suggestion made by Kelly (1993) that the better immunisation cover of children living in remote communities in the Mid-west and Gascoyne Region was due to the different practice of the community nurses working in those remote communities.

Respondents reported that there was no standardised regional protocol regarding the follow-up of overdue immunisations. However local protocols were reported to be in place in four clinics. Most of these protocols contained strategies to facilitate follow-up of children, but included in the protocol in two of the larger towns was a specified cut-off point when follow-up was discontinued. In both of these centres though, up to five reminders were issued, including visits from community nurses and Aboriginal health workers before discontinuing active follow-up. Also, although the protocols in two of the larger towns were reported to have a specified cut-off point for "actively" following-up children overdue for immunisations, the maximum number of days taken to administer vaccines in every vaccine category, were in towns. This finding suggests that follow-up in the larger towns is not actually discontinued.

Also, in the larger towns where more resources were available, these were utilised to promote immunisation and advertise dates and times immunisation was available. These included the local Aboriginal

radio station, ABC radio, the local newspaper, the school newsletter and posters placed around the town. In another large town an "Immunisation Week" was organised every two to three months. During this time the principal work focus of the community health team was immunisation, and local publicity about immunisation was increased.

There was no difference in the availability of immunisation in the region. Community nurses reported immunisation was frequently available for children in the 0-18 month age group in most clinics in the region. Half of the community nurses stated that immunisation was available at anytime at the clinic where they worked. The least frequent immunisation service reported was weekly (25%). Furthermore, 85% of the respondents would provide transport for children who were overdue for immunisation, making immunisation more accessible for this group of children.

The higher population in the West Kimberley and in the towns identified in Study One, was the only factor common to these two groups of the study population who were found to be more likely to experience immunisation delay. In Study Two, there was no difference identified in the practice of nurses working in the West Kimberley, or the towns in the region. These findings would suggest that a review of the number of community nurses allocated to work in the areas with higher populations is indicated.

### Barriers to Enabling Factors

The findings of Study One and Study Two indicate that the enabling factors: the community nurses knowledge of immunisation, and their practice in the administration of vaccines and the follow-up of children overdue for immunisation are satisfactory. Findings from both studies also indicate that the Kimberley community nurses consider childhood immunisation to be important, and direct a considerable amount of time and effort into following-up children who are due and overdue for immunisation. However a lack of resources, both human and physical prevent the nurses from achieving age-appropriate immunisation for a higher proportion of highly mobile Aboriginal children with multiple health problems.

It must be noted, that although 20 (91%) of the total eligible population participated in Study Two, potentially, the total study population could have been 30. At the time of data collection, eight community nurse positions were either vacant, being held temporarily by short-term relief nurses, or the community nurse working in the position was newly-appointed and not yet certified to administer vaccines. Turn-over of such a large proportion of community nurse numbers was not unique to the time of data collection for this study. Difficulties in recruiting long-term nursing and medical staff in the Kimberley have been noted in previous studies and have been suggested as being an important influence on the health status of Aboriginal children (Gracey,

1991b; Gracey & Anderson, 1989). This constant change occurring in up to a third of community nurse positions must impact negatively on the work load of the other two-thirds of nurses who continue to work in community health in the region for long periods of time.

This group of nurses, 70% of whom were long-term members of the Kimberley community nursing work-force identified the poor health status of many Aboriginal children and the mobility of the Aboriginal population as the principal reasons for delay in immunisation of children in the 0-18 month age group. Moreover, they went further, and identified how these factors impacted on their work load. As identified by the respondents, the commodity needed in large quantities to cope with immunisation in the Kimberley, is time. Enormous amounts of time are required to administer vaccines to children who are not well, require physical examination prior to immunisation, and may not be well enough to be immunised, and require follow-up.

Also, obtaining the necessary immunisation information on Kimberley children was identified as being very time consuming by 20% of respondents. Locating highly mobile clients, and issuing multiple reminders can also be extremely time-consuming. Due to the remoteness of the region, a great deal of time can be spent travelling to small settlements. As one respondent pointed out, there can be up to 40 small communities in the Fitzroy Valley alone, which are covered for immunisation from Fitzroy Crossing.

However, the immunisation programme is only part of the community nurses' workload. The whole Kimberley community health care picture needs to be considered. Generalist community nurses, along with Aboriginal Health Workers in Community Health and other colleagues in Aboriginal Medical Service are also involved in the monitoring, treatment and follow-up of sexually transmitted diseases in the region. Over 50% of cases of gonorrhoea and almost 25% of cases of syphilis notified in WA in 1994 were from the Kimberley Region (WA Communicable Diseases Bulletin, 1995). In addition, the same group of nurses and community health personnel are involved in environmental health programmes, as well as programmes directed toward prevention of lifestyle diseases in the region.

In remote areas, community nurses also provide acute nursing and medical care. Child Health Nurses are involved in assessing, monitoring and following-up all children in the 0-5 year age group in the region. The total Kimberley 0-4 year population is 3,035 (ABS, 1992b). All of these are enormously time-consuming programmes. Considering the seriousness and frequency of health-care problems in the highly-mobile "at-risk" Aboriginal Kimberley population, the adequacy of the number of community nurses and other health personnel working in the community is questionable, particularly considering the high staff turn-over which constantly occurs (Gracey, 1991b; Gracey & Anderson, 1989).

The community nurses who participated in Study Two also identified other resources which could facilitate the follow-up of children due and overdue for immunisation, which were lacking in the Kimberley. These were culturally-appropriate immunisation teaching material; access to computerised region-wide immunisation data for all community health staff; and the availability of more transport to make immunisation more accessible for more children.

### Reinforcing Factors

#### Involvement of Other Health Personnel in Immunisation

The findings of Study Two suggested that referral of children requiring immunisation between health agencies in the Kimberley was minimal. Although the community nurses reported that they were active in following-up children overdue for immunisation, and the findings of Study One support this; their strategies did not include referral to other agencies. Lists of children overdue for immunisation were seldom sent to other agencies or health personnel by community nurses, and only a limited number of children were referred for immunisation to community nurses from other health agencies.

It was interesting that 50% of respondents identified other community health colleagues as "other" agencies who referred children to them for immunisation. Although geographically isolated, the working

relationship between community nurses and other community health colleagues, particularly Aboriginal health workers was close. However, the findings of this study indicated that, with regard to immunisation, members of the community health team worked in isolation. There appeared to be little involvement in immunisation by other health agencies.

This is of particular relevance to the Kimberley children as other studies have shown that optimum immunisation levels can only be achieved when there is a high level of commitment as well as an integrated approach from all members of the primary health care team (Robertson & Bennett, 1987; Bedford, 1990).

As these children often suffer from multiple infections and have more contact with health professionals and a higher number of hospital admissions than other groups of Australian children, many opportunities to either administer vaccines or refer children for immunisation are missed.

Furthermore, if there is not an integrated approach from all health agencies in the Kimberley, all available health personnel in the region are not being fully utilised to achieve complete and age-appropriate childhood immunisation in the region.



### Strengths and Limitations of the Study

#### Study One

An important strength of this study was the complete and accurate data available. When the three separate immunisation computer databases were combined to establish the database for this study, all relevant immunisation and demographic data on each child were available for analysis, providing the first validated, age-appropriate infant immunisation data in Western Australia. For the first time, investigation of the immunisation cover and timeliness of vaccine administration to children in different racial groups in the study population of a specific age group from an entire health region was possible. It is unlikely that such completeness and accuracy, and relevant demographic data, would have been available if a combination of information sources, e.g. immunisation cards and/or parent held records, had been used.

Another strength of this study is the possibility of replication. As computer programs have now been written in Epi Info to analyse the Kimberley immunisation data, subsequent studies of the children in the present study population, and/or investigation of immunisation data of later cohorts of Kimberley children will be possible.

### Study Two

An important strength of the study was the high response rate to the questionnaire; 91% of the total eligible population of community nurses who administer vaccines to children in the 0-18 month age group in the Kimberley Region participated in the study. Almost all questions included in the questionnaire (both open and closed) were completed by all respondents. Also, in response to an invitation to add comments on immunisation in the 0-18 month age group where they worked, 65% of the community nurses provided relevant valuable additional data. However, although 91% of the study population participated in the study, numbers were small, therefore it was not appropriate to conduct tests of significance in Study Two.

The tool used in this study was designed specifically to gather data from the Kimberley community nurses, who practice independently, administering vaccines to a predominantly Aboriginal population. Therefore, use of the questionnaire may not be widely generalisable. However, it would be useful in community nursing studies in other remote regions with large Aboriginal populations; including the Pilbara, parts of the Mid-west and Gascoyne, and the Goldfields Region of Western Australia, and in similar areas in the Northern Territory, western Queensland, and northern South Australia.

The principal aim of this study was to seek reasons for immunisation delay from community nurses, as they administer almost all

vaccines in the Kimberley Region. As a questionnaire was used to gather data, all findings are from information self-reported by the community nurses who participated in the study. Also, in Study Two the participants reported their perceptions of factors relating to Kimberley parents and caregivers. In order to obtain a more comprehensive insight into the problem of delay in administration of vaccines to infants in the region, the opinion and knowledge of several groups of people should be sought directly. These would include Aboriginal Health Workers, the parents or caregivers of children in the 0-18 month age group, and other relevant health care personnel. To gather data from these populations was beyond the scope of the present study. Furthermore, in the case of Aboriginal Health Workers and parents and caregivers of Aboriginal children, the research should be carried out by a culturally appropriate researcher.

## CHAPTER NINE

### STUDY ONE AND STUDY TWO

#### Conclusions, Implications and Recommendations

##### Conclusions

In this research, the immunisation cover and timing of administration of vaccines to children in all racial groups in the 0-18 month age group in the Kimberley Region were quantified by combining three immunisation databases. In addition, important baseline data were obtained about community nurse immunisation knowledge and practice. The adapted PRECEDE Model was used to identify community nurses' perceptions of possible reasons for immunisation delay, particularly in Aboriginal children.

The findings indicated that the overall immunisation cover for the children in the first 6 months of life was satisfactory. The immunisation rates were greater than those reported for Australia and WA in the 1989-1990 National Health Survey (ABS, 1992).

However, when the cover and timing of administration of vaccines to children in each racial group was analysed separately, immunisation rates and timing were not found to be uniform. During the first six months of life, the high cover and timeliness of vaccine administration to the 31% of Caucasian children in the study population, brought the overall immunisation cover to satisfactory levels. The percentage of Aboriginal

children who received each vaccine was much lower, and a higher percentage of Aboriginal children experienced immunisation delay than children in any other racial group.

At 12 and 18 months of age all children in the study population experienced delay in the administration of vaccines. Again, Aboriginal children experienced the greatest delay. With respect to the Measles Mumps Rubella vaccine, this is of particular relevance to Aboriginal children: the majority of Aboriginal children in the study population were not immunised until some four months later than the time recommended by the WHO (NHMRC, 1994).

The findings of the study also indicated that children living in remote communities in the Kimberley were more likely to be immunised age-appropriately compared to children living in Kimberley towns. Also the odds were that children living in the East Kimberley would be immunised on time relative to children living in the West Kimberley.

The Kimberley community nurses who participated in the research mentioned two main reasons for delay in administration of vaccines: the poor general health, and the mobility of the predominantly Aboriginal population. Both Registered Child Health Nurses and generalist community nurses were knowledgeable about vaccine administration, and administered vaccines appropriately to Aboriginal children with multiple infections, weight loss and failure to thrive. The findings also suggested nurses were active in the follow-up of children overdue for immunisation.

Although the immunisation practice of the respondents was found to be satisfactory, the amount of on-going immunisation education they reported was minimal. There was no difference found in the practice of community nurses in different geographic areas in the region. The findings suggested, however, that in Kimberley towns and in the West Kimberley (where the highest proportion of children lived), staffing levels were not adequate to cope with the higher numbers of highly mobile children with multiple health problems. Low staffing levels was the most probable reason for greater immunisation delay in these areas.

The findings also suggested that involvement of other health agencies in the immunisation programme was limited. Interaction between community nurses and personnel from other health agencies was reported to be minimal.

Due to immunisation delay, the risk of serious illness or death from vaccine-preventable diseases for prolonged periods of time was added to the other health problems of already "at risk" Aboriginal children. Just how "at risk" Aboriginal children are, was emphasised by the death of six Aboriginal or Aboriginal-Caucasian children from the cohort of 663 children born between 01 November 1991 and 31 October 1992.

### Implications and Recommendations for Future Practice and Research

These findings are important to the areas of Immunisation, Child Health generally and Aboriginal Child Health in particular, as well as Remote Area Community Nursing. There are important implications for Immunisation Policy and Practice; Education; and Research.

#### Immunisation Policy and Practice

From the findings of this research it is recommended that the initial dose of Measles Mumps Rubella vaccine be administered to Kimberley Aboriginal children at 9 months of age instead of at 12 months. It is also recommended that administration of a second dose of Measles Mumps Rubella vaccine to these children at 18 months of age, at the same time as the fourth Diphtheria Tetanus Pertussis vaccine, as suggested by Hanna, Macintyre, Worswick & Burrell (1989) be considered.

The immunisation knowledge and practice of community nurses should be assessed regularly. Moreover, the total work-load of Kimberley community nurses needs to be assessed, particularly in the West Kimberley, and in the larger towns in the region. In addition, the problem of low staffing levels needs to be addressed and monitored closely in the future.

To achieve complete and age-appropriate administration of vaccines in the Kimberley Region, the approach to immunisation needs to be integrated, multifaceted, and involve all members of the health care

team. Moreover, such an integrated approach would involve the use of appropriate resources. All health personnel in clinics, in the field and in hospitals throughout the region should have access to computerised immunisation information on all Kimberley children.

#### Immunisation Education.

Regular on-going immunisation education needs to be provided for community nurses and all members of the health care team in the Kimberley Region. In addition, more culturally-appropriate immunisation education material should also be available for Aboriginal parents and care-givers.

#### Immunisation Research.

The investigation of immunisation cover and timeliness of administration of all childhood vaccines to Kimberley children in the 0-18 month age group must be on-going. The Hib vaccine cover of all children in each racial group in the study population of Study One should be determined in two years time, and their immunisation status for all vaccines determined at school entry age.

The on-going immunisation education requirements of community nurses need to be assessed. Research of other groups of people involved in immunisation in the Kimberley is also required. The immunisation knowledge, practice and commitment to childhood



immunisation of other health professionals in all health agencies in the Region needs to be investigated.

As a matter of priority, a study should also be carried out by a culturally-appropriate person, to seek information from Kimberley Aboriginal Health Workers and Aboriginal parents and caregivers on immunisation and immunisation delay in the 0-18 month age group.

The findings of this study also have implications for areas outside the Kimberley and WA. The overall immunisation cover and timeliness of administration of all childhood vaccines to children in different racial groups should be investigated in other areas of Australia, particularly where a high percentage of the population are Aboriginal.

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## **APPENDICES**

- A. Recommended Immunisation Schedule for Western Australia
- B. Letter of Approval from Northern Regions Ethics Review Group
- C. Introductory Letter to Kimberley Community Nurses
- D. Final Questionnaire sent to Kimberley Community Nurses and List of Objectives
- E. Validation Package sent to the Panel of Experts  
Included:-
  - Instructions
  - List of Objectives
  - Scoring Tool and Questionnaire
  - Table of Scores from Experts
- F. Letter of Permission to use the Adapted PRECEDE Model
- G. Letter of Permission to use Health Publication HP2021

## APPENDIX A



## Recommended immunisation schedule for Aboriginal and Torres Strait Islander people.

Age	Immunisation	Against	How Given
*At birth	*Hepatitis B Immunoglobulin — if mother positive	Hepatitis B	Injection
	Hepatitis B vaccine *BCG	Tuberculosis	Injection
*1 month	*Hepatitis B vaccine	Hepatitis B	Injection
2 months	First DTP First oral polio vaccine (OPV) First Pedvax HIB	Diphtheria, tetanus, whooping cough Polio Hib meningitis	Injection By mouth Injection
*3 months	*Hepatitis B Vaccine	Hepatitis B	Injection
4 months	Second DTP Second OPV Second Pedvax HIB	Diphtheria, tetanus, whooping cough Polio Hib meningitis	Injection By mouth Injection
6 months	Third DTP Third OPV	Diphtheria, tetanus, whooping cough Polio	Injection By mouth
12 months	Measles/mumps/rubella vaccine (MMR) Third Pedvax HIB	Measles, mumps, rubella Hib meningitis	Injection Injection
18 months	Fourth DTP	Diphtheria, tetanus, whooping cough	Injection
5 years	Combined diphtheria – tetanus vaccine (CDT) Oral Polio Vaccine (OPV)	Diphtheria, tetanus Polio	Injection By mouth
12-15 years	Combined diphtheria – tetanus vaccine (ADT)	Diphtheria, tetanus	Injection
11-14 years	Measles/mumps/rubella vaccine (MMR)	Measles, mumps, rubella	Injection
Every 10 years thereafter	Combined diphtheria – tetanus vaccine (ADT)	Diphtheria, tetanus	Injection

\*These are additional to the routine community wide schedule.

Don't Wait Until It's Too Late

# Immunise Now

Produced by Health Promotion Services Branch For Disease Control Branch,  
© Health Department of Western Australia, November 1993.

HP2021

## APPENDIX B

Your ref:  
Our ref:  
Enquiries:

**40617COF1/abr**  
**Ms Ann-Britt Rohringer**

**Ms Anne Mahony**  
**PO Box 1330**  
**FREMANTLE 6160**

Dear Anne,

**RESEARCH PROPOSAL - IMMUNISATION DELAY IN THE 0 - 18 MONTH  
AGE GROUP IN THE KIMBERLEY REGION.**

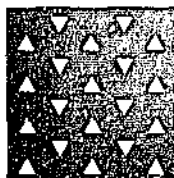
I am happy to advise you that the above research proposal has received the support of the Northern Regions Ethics Review Group. You are now free to proceed with the research as detailed in the proposal.

  
Mrs Christine O'Farrell  
Chairman,  
Northern Regions Ethics Review Group

17 June 1994

## APPENDIX C

**Institute for  
Child Health Research**



**Formerly**

**The Western  
Australian  
Research  
Institute for  
Child Health Ltd**

**Affiliated with  
The University of  
Western Australia,  
Princess Margaret  
Hospital for Children**

**Dear Colleague,**

I am writing to request your participation in a research project aimed at investigating the timing of immunisation in the 0-18 month age group in the Kimberley Region. In order to identify reasons for delay, I am seeking your opinion and knowledge as the practitioner administering immunisations.

The study is a joint venture with the Institute for Child Health Research and Edith Cowan University, and is part of my Post-graduate Honours Thesis in Nursing.

Permission to conduct this study has been granted by the Regional Director, Mrs Christine O'Farrell, in consultation with the Northern Regions Ethics Review Group. I will adhere to strict confidentiality guidelines. At no time will you be individually identified, or any identifying information be provided to anyone other than my Research Supervisors Dr Patricia Percival at Edith Cowan University and Dr Rob. Condon at the Institute for Child Health Research.

Nurses have not previously been consulted regarding the follow-up and administration of vaccines. Information about immunisation in remote areas is scarce, therefore I am inviting all Generalist and Child Health Nurses in the Kimberley Region to participate in the study. Although participation is voluntary, it is obviously important that I receive as many responses as possible, and I would therefore highly value your expertise and contribution to the study. The information you provide will contribute to a better understanding of immunisation in the Kimberley Region and other remote areas of Australia with similar populations.

I plan to be in Derby (at the Town Office, KHS), from 15th to 24th June. During this time, I hope to contact each Community Nurse. Apart from these dates, I can be contacted at home on [REDACTED]. Please feel free to call me if you have any queries about the study. I hope to send the questionnaires to you, towards the end of July. I will of course forward the results to all participants on completion of the study.

**Yours sincerely,**

[REDACTED]

**Anne Mahony,  
Community Nurse  
(Honours candidate, ECU)**

[REDACTED]

**Dr P. Percival,  
Senior Lecturer  
Edith Cowan University**

[REDACTED]

**Dr R. Condon,  
Infectious Diseases Epidemiologist  
Institute for Child Health Research**

**PO Box 855 West Perth WA 6872**

Postal address: GPO Box 1704, Perth WA 6001 Registered Office: Princess Margaret Hospital  
for Children, Roberts Road, Subiaco WA 6008 A.C.N. 009 278 755

Telephone: (09) 340 8533 or direct (09) 340 1111 Facsimile: (09) 388 3414  
email: ps@master@ichr.wa.edu.au



## APPENDIX D

## Study Two: The Community Nurse Study

The specific objectives of this study, and the number of the question/s designed for each objective were as follows:

1. To seek community nurses' perceptions of possible reasons for delay in the administration of vaccines to children in the 0-18 month age group in the Kimberley Region

**Question 10** - Parents' immunisation education

**Question 11** - Parents' understanding of immunisation

**Question 13** - Parents' motivation with regard to immunisation

**Question 18** - Reasons relating to the nurses

2. To ascertain the availability of immunisation for children in the 0-18 month age group in the Kimberley Region.

**Question 12**

3. To identify the principal source of nursing knowledge of childhood immunisation procedures.

**Question 6** - Resources referred to by community nurses

**Question 7** - Length of time since last inservice

**Question 8** - Topics covered in last inservice

**Question 9** - Who provided the last inservice

4. To describe community nurses' practice in administering immunisations.

**Question 16**

5. To describe community nurses' practice in the follow-up of children who are overdue for immunisation.

**Question 17 - Nursing actions in follow-up**

**Question 19 - Protocol regarding follow-up**

**Question 20 - If/when follow-up is discontinued by nurses**

6. To investigate the extent of inter-referral of other health agencies and personnel, of children in the 0-18 month age group due for immunisation in the Kimberley Region.

**Question 14 - Information sent to other agencies by nurses**

**Question 15 - Children referred by other agencies**



P.O. Box 1330,  
Fremantle, 6160

**Dear Colleague,**

*Following my previous letter to you, inviting you to participate in a research project aimed at investigating the timing of immunisation in the 0-18 month age group in the Kimberley Region, I am now ready to collect information for this study. Please find enclosed the questionnaire which has been designed to seek your knowledge and expertise as a Community Nurse administering immunisations in the town or community where you work.*

*So you will remain anonymous, I am not requesting a formal written consent from you. The return of this questionnaire will indicate to me, your consent to participate in the study.*

*A variety of questions have been included in this questionnaire.*

*The following are examples of the types of questions included:-  
Most questions require you to circle the number next to the answer which is most appropriate for you.*

e.g. How often do you go out to dinner?

- |                             |   |
|-----------------------------|---|
| One day each week           | 1 |
| More than one day each week | 2 |
| Anytime                     | 3 |
| Other, specify below        | 4 |
- 

*A few questions require the boxes next to them to be filled in*

e.g. How long since you last had a holiday

0	1
Years	

0	4
Months	

*Other questions require you to circle the number next to each part of the question which best applies to you.*

*e.g. How often do you do the following?*

	NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS
Eat chocolate	1	2	3	④	5
Drink Coffee	1	2	③	4	5

*Please answer all sections of each question.*

*The last page has been left free for your comments, ideas or suggestions. Please feel free to comment on any aspect of current practice in immunisation in the 0-18 month age group in the town or community where you work. I am seeking your opinion and knowledge, as the practitioner administering immunisations, so all comments will be appreciated.*

*When you have completed the questionnaire, please return it to me in the reply-paid envelope enclosed. I would be most grateful if you could return the questionnaire to me by the end of August.*

*I will forward the results to you, on completion of the study. I hope to be sending them to you early next year.*

*Thank-you most sincerely for participating in the study, your expertise and contribution is highly valued.*

Yours sincerely,

Anne Mahony,  
Community Nurse.  
(Honours candidate, ECU)

26.07.1994

## WELCOME TO THE STUDY!

***The first few questions are about yourself, where you work, and your source of information about immunisation.***

***Please circle the number next to the appropriate answer***

**Q1. Are you a**

Generalist Nurse 1

Registered Child Health Nurse 2

Other qualifications, please specify below

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***In the next group of questions, please fill in the boxes***

**Q2. How long have you worked in your present town or community?**

--	--

Years

--	--

Months

**Q3. How long have you worked as a Community Nurse?**

--	--

Years

--	--

Months

**Q4. How long have you worked with Aboriginal people?**

--	--

Years

--	--

Months

**Q5. How long have you been certified to administer immunisations in W.A.?**

--	--

Years

--	--

Months

**Q6. How often do you refer to the following resources when you require information about vaccines or immunisation?**

**Please circle the appropriate number next to each part of the question**

	NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS
The Western Australian Immunisation Handbook	1	2	3	4	5
The Senior Disease Control Nurse in the Kimberley	1	2	3	4	5
The Immunisation Clinic in Perth	1	2	3	4	5
The NHMRC Immunisation Manual	1	2	3	4	5
Other, (please list below and specify how often)	1	2	3	4	5
-----					
	1	2	3	4	5
-----					

**Q7. How long since you last received in-service training, or updating on the topic of immunisation? Please do not include your initial immunisation training.**

**Please circle the number next to the appropriate answer**

Less than 6 months	1
6 months to 1 year	2
1 to 2 years	3
Longer than 2 years	4

**Q8. Please specify what topics were covered in your last update, or in-service training on the topic of immunisation.**

-----

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**Q9. Please specify who provided this update or in-service training on the topic of immunisation.**

-----

**The next group of questions are concerned with education of parents and caregivers about immunisation of children in the 0-18 month age group, and the availability of vaccines in the town or community where you work.**

**Please circle the number next to the appropriate answer**

**Q10. What do you consider to be the most effective method of education about immunisation, for parents?**

- |  |   |
|--|---|
| Group Teaching Sessions                          | 1 |
| One to one teaching with the parent or caregiver | 2 |
| Other, specify below                             | 3 |

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**Q11. Do you consider parents who use your clinic understand the importance of immunisation in maintaining their child's health?**

Yes 1

No 2

Please specify reasons for your answer below

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**Q12. How often are immunisations available?**

One day each week 1

More than one day each week 2

Anytime 3

Other, please specify below 4

-----

**Q13. How often do parents bring their children to the clinic for immunisation, without being reminded, or assisted with transport?**

***Please circle the number next to the appropriate answer***

Never 1

Rarely 2

Sometimes 3

Often 4

**A couple of questions about the role of other health agencies in the immunisation of children in the 0-18 month age group in the town or community where you work.**

**Please circle the appropriate number next to each part of these questions**

**Q14. How often is a list of children who are overdue immunisation, sent to the following agencies from the clinic you work in?**

	NEVER	MONTHLY	FORTNIGHTLY	WEEKLY
Aboriginal Medical Service	1	2	3	4
General Practitioners	1	2	3	4
A hospital	1	2	3	4
Other, please specify below	1	2	3	4
-----				

**Q15. In an average month, how many children are referred to you for immunisation by the following agencies?**

	0 - 5	6 - 10	10 - 20	20 - 30	30 - 50
Aboriginal Medical Service	1	2	3	4	5
General Practitioners	1	2	3	4	5
A hospital	1	2	3	4	5
Other, please specify below	1	2	3	4	5
-----					

**The last five questions are about your current practice in the follow-up and administration of immunisations in the town or community where you work.**

**Please circle the appropriate number next to each part of the question**

**Q16. How often do you administer an immunisation to a child in the 0-18 month age group in the following situations?**

	NEVER	RARELY	SOMETIMES	OFTEN	ALWAYS
The child is febrile and has a temperature of 37.4 - 38°C	1	2	3	4	5
The child is febrile and has a temperature higher than 38°C	1	2	3	4	5
The child has an upper respiratory tract infection (URTI) but is afebrile	1	2	3	4	5
The child is well, but currently taking a course of penicillin or amoxil	1	2	3	4	5
The child is registered as having "failure to thrive", and although well, has lost weight since he/she was last weighed	1	2	3	4	5
The child was previously gaining weight normally, but has lost weight at the last two consecutive weighings	1	2	3	4	5
The child has diarrhoea and/or vomiting and is due to be immunised against MMR, Hib, or Hep B	1	2	3	4	5
The child has diarrhoea and/or vomiting and is due to have OPV (sabin)	1	2	3	4	5



**Q17. How often would you take the following actions to follow-up overdue immunisations?**

NEVER RARELY SOMETIMES OFTEN ALWAYS

**Visit the parent or caregiver and discuss the matter with them**

1            2            3            4            5

**Send a reminder letter to the parent or caregiver**

1                    2                    3                    4                    5

**Request an Aboriginal Health Worker to visit the parent or caregiver to discuss the matter with them**

1                      2                      3                      4                      5

Administer a vaccine to a child at their home

1            2            3            4            5

Transport the child and the parent or caregiver to the clinic for the child to be immunised

1            2            3            4            5

Other, (please list below and specify how often)

1            2            3            4            5

[illegible]

1            2            3            4            5

1. The first part of the paper discusses the importance of the research and the need for a new approach to the study of the history of the world.

1            2            3            4            5

**Abstract**

1            2            3            4            5

1            2            3            4            5



**Q19. Is there a specific protocol regarding the follow-up of overdue immunisations?**

***Please circle the number next to the appropriate answer***

Yes 1

No 2

If yes, please specify below

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**Q20. How and when do you decide to discontinue following-up children who are overdue immunisation?**

***Please specify below***

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***Please feel free to comment on any aspect of immunisation in the 0-18 month age group in the town or community where you work. I would be grateful for your comments.***

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***Thank-you very much for your time and kind assistance in participating in this study.***

## APPENDIX E

### Validation Package sent to the Panel of Experts:-

Instructions

List of Objectives

Scoring Tool and Questionnaire

Table of Scores from Experts

**Dear**

**Instructions for Determination and Quantification of Content  
Validity of the Questionnaire for the Kimberley Community Nurses,  
1994.**

*The page listing the specific objectives and the corresponding question/s  
needs to be used in conjunction with this document.*

*The proposed questionnaire is printed on the left page as you read this  
document. On the right page, immediately opposite each question is the  
scale designed by Lynn 1986, (p384 of the enclosed article), to  
determine the content validity of each question.*

*Please circle the number you consider to be most appropriate  
for each question, i.e.*

<i>Not relevant</i>	<i>1</i>
<i>Question is in need of such revision that it would no longer be relevant</i>	<i>2</i>
<i>Relevant but needs minor alteration</i>	<i>3</i>
<i>Extremely relevant</i>	<i>4</i>

-----

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-----

*If you have circled Number 1, 2 or 3, I would be grateful if you could  
advise me as to how the question can be improved. Space has been  
provided beneath each numbered scale for your advice.*

*When you have completed the tool to determine validity for each  
question, please could you return this document to me in the reply paid  
envelope enclosed. I would be most grateful, if you could return it to me  
by the 24th June, as I am hoping to carry out a pilot study in the  
Goldfields in early July.*

*Thank-you most sincerely, for your time and guidance,*

*Anne Mahony,*

*Community Nurse,  
(Honours candidate, ECU).*

## **Purpose of the Study**

The purpose of this study is to seek from the community nurses reasons for delay in the administration of vaccines to children in the 0-18 month age group in the Kimberley Region.

## **Specific Objectives:**

*(The number of the question included in the questionnaire to address each specific objective is listed below each objective)*

### **1. Where immunisation is delayed in the 0-18 month age group, to identify reasons for delay**

Question 10- The availability of immunisation in the Region

Question 11}  
Question 12} Is the education of parents about  
Question 13} immunisation adequate?

Question 18 Reasons for delay identified by community nurses

### **2. To identify the principal source of nursing knowledge of childhood immunisation procedures.**

Question 8 Inservice on immunisation given to community nurses

Question 9 The source of reference about immunisation of community nurses

### **3. To describe community nurses' practice in ensuring the timeliness of vaccine administration in the 0-18 month age group.**

Question 16

4. **To describe community nurses' practice in administering immunisations in the 0-18 month age group.**

Question 17

5. **To investigate the extent of inter-referral of other health agencies and personnel of children in the 0-18 month age group due for immunisation in the Kimberley Region.**

Question 14

Question 15



**Dear Colleague,**

**WELCOME TO THE STUDY!**

**Questionnaire Instructions:**

*Please answer all sections of each question*

*Most questions require you to circle the number next to the answer which is most appropriate for you and the town or community you work in.*

*e.g. How often are immunisations available?*

- |                             |   |
|-----------------------------|---|
| One day each week           | 1 |
| More than one day each week | 2 |
| Anytime                     | 3 |
| Other, specify below        | 4 |
- 

*Other questions require you to circle the number next to each part of the question which most applies to you.*

*e.g. How often would you take the following actions to follow-up overdue immunisations?*

1 = NEVER, 2 = RARELY, 3 = SOMETIMES, 4 = OFTEN, 5 = ALWAYS

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| Visit the parent or caregiver and discuss the matter with them | 1 | 2 | 3 | 4 | 5 |
| Send a reminder letter to the parent or caregiver              | 1 | 2 | 3 | 4 | 5 |

*A few questions require the boxes next to them to be filled in,*

*e.g. How long have you worked in this town or community?*

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Years		Months	

*The last page has been left free for your comments, ideas or suggestions. Please feel free to comment on **any** aspect of immunisation in the 0-18 month age group in the town or community where you work. As I am seeking your opinion and knowledge, as the practitioner administering immunisations, all comments will be appreciated.*

*So you will remain anonymous, I am not requesting a formal written consent from you. The return of this questionnaire will indicate to me, your consent to participate in the study.*

*When you have completed the questionnaire, please return it to me in the reply-paid envelope enclosed.*

*I will forward the results to you, on completion of the study. I hope to be sending them to you early next year.*

*Thank-you most sincerely for participating in the study, your expertise and contribution is highly valued.*

*Yours sincerely,*

*Anne Mahony,*

*Community Nurse.*

*(Honours candidate, ECU)*

**The first few questions are about yourself, where you work, and your source of information about immunisation**

**To answer these questions, please circle the number next to the appropriate answer**

**Q1. Are you a**

Generalist Nurse 1

Registered Child Health Nurse 2

**Q2. Do you work in**

A town 1

A community 2

Other, specify below 3

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**Q3 Which Shire do you work in? Please specify below**

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**In the next group of questions, please fill in the boxes. If unsure, please give an estimate.**

Q4. How long have you worked in this town or community? 

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--	--

  
Years Months

Q5. How long have you worked as a Community Nurse? 

--	--

--	--

  
Years Months

Q6. How long have you worked as a Community Nurse with Aboriginal people? 

--	--

--	--

  
Years Months

Q7. How long have you been certified to administer immunisations? 

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--	--

  
Years Months

***The first 7 questions on this page, have all been included to collect demographic data. I am not requesting your assistance in determining the content validity of this group of questions. However, I would welcome any comments you may like to make about them.***

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- Q8. Not including initial immunisation training, how long since you last received in-service training of 1/2 day or more on the topic of immunisation?**

***Please circle the number next to the appropriate answer***

Less than 6 months	1
6 months to 1 year	2
1 to 2 years	3
Longer than 2 years	4

- Q9. How often do you refer to the following resources when you require information about vaccines or immunisation**

***Please circle the appropriate number next to each part of the question***

**1 = NEVER, 2 = RARELY, 3 = SOMETIMES, 4 = OFTEN, 5 = ALWAYS**

The Western Australian Immunisation Handbook	1	2	3	4	5
--	---	---	---	---	---

The Senior Disease Control Nurse in Community Health in the Kimberley	1	2	3	4	5
---	---	---	---	---	---

The Senior Staff Development Nurse in Community Health in the Kimberley	1	2	3	4	5
---	---	---	---	---	---

The Immunisation Clinic in Perth	1	2	3	4	5
----------------------------------	---	---	---	---	---

The NHMRC Immunisation Manual	1	2	3	4	5
-------------------------------	---	---	---	---	---

Other, (please list below and specify how often)

	1	2	3	4	5
-----					

	1	2	3	4	5
-----					

**Question 8**

<i>Not relevant</i>	<i>1</i>
<i>Question is in need of such revision that it would no longer be relevant</i>	<i>2</i>
<i>Relevant</i>	<i>3</i>
<i>Extremely relevant</i>	<i>4</i>

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**Question 9**

<i>Not relevant</i>	<i>1</i>
<i>Question is in need of such revision that it would no longer be relevant</i>	<i>2</i>
<i>Relevant but needs minor alteration</i>	<i>3</i>
<i>Extremely relevant</i>	<i>4</i>

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**The next group of questions are concerned with education of parents and caregivers about immunisation of children in the 0-18 month age group, and the availability of vaccines in the town or community where you work**

**Please circle the number next to the appropriate answer**

**Q10. How often are immunisations available?**

- |                             |   |
|-----------------------------|---|
| One day each week           | 1 |
| More than one day each week | 2 |
| Anytime                     | 3 |
| Other, specify below        | 4 |

-----

**Q11. Who carries out most education for parents or caregivers about immunisation?**

- |                       |   |
|-----------------------|---|
| Medical Practitioners | 1 |
| Community Nurses      | 2 |
| Health Workers        | 3 |
| Other, specify below  | 4 |

-----

**Q12. What do you consider to be the most effective method of education about immunisation, for parents?**

- |  |   |
|--|---|
| Group Teaching Sessions                          | 1 |
| One to one teaching with the parent or caregiver | 2 |
| Other, specify below                             | 3 |

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**Question 10**

<i>Not relevant</i>	<i>1</i>
<i>Question is in need of such revision that it would no longer be relevant</i>	<i>2</i>
<i>Relevant but needs minor alteration</i>	<i>3</i>
<i>Extremely relevant</i>	<i>4</i>

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**Question 11**

<i>Not relevant</i>	<i>1</i>
<i>Question is in need of such revision that it would no longer be relevant</i>	<i>2</i>
<i>Relevant</i>	<i>3</i>
<i>Extremely relevant</i>	<i>4</i>

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**Question 12**

<i>Not relevant</i>	<i>1</i>
<i>Question is in need of such revision that it would no longer be relevant</i>	<i>2</i>
<i>Relevant but needs minor alteration</i>	<i>3</i>
<i>Extremely relevant</i>	<i>4</i>

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**Q13. Do you consider the education of parents about immunisation to be adequate?**

Yes 1

No 2

If No, please specify reason below

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**A couple of questions about the role of other health agencies in the immunisation of children in the 0-18 month age group in the town or community where you work.**

**Please circle the appropriate number next to each part of these questions**

**Q14. How often is a list of children who are overdue immunisation, sent to the following health agencies from the clinic you work in?**

1 = NEVER, 2 = MONTHLY, 3 = FORTNIGHTLY, 4 = WEEKLY

Aboriginal Medical Service 1 2 3 4

General Practitioners 1 2 3 4

A hospital 1 2 3 4

Other, specify below

1 2 3 4

-----

**Q15. In an average month, how many children are referred to you for immunisation by the following health agencies?**

1 = 0-5, 2 = 6-10, 3 = 10-20, 4 = 20-30, 5 = 30-50

Aboriginal Medical Service 1 2 3 4 5

General Practitioners 1 2 3 4 5

A hospital 1 2 3 4 5

Other, specify below

1 2 3 4 5

-----

**Question 13**

<i>Not relevant</i>	<i>1</i>
<i>Question is in need of such revision that it would no longer be relevant</i>	<i>2</i>
<i>Relevant but needs minor alteration</i>	<i>3</i>
<i>Extremely relevant</i>	<i>4</i>

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**Question 14**

<i>Not relevant</i>	<i>1</i>
<i>Question is in need of such revision that it would no longer be relevant</i>	<i>2</i>
<i>Relevant</i>	<i>3</i>
<i>Extremely relevant</i>	<i>4</i>

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**Question 15**

<i>Not relevant</i>	<i>1</i>
<i>Question is in need of such revision that it would no longer be relevant</i>	<i>2</i>
<i>Relevant but needs minor alteration</i>	<i>3</i>
<i>Extremely relevant</i>	<i>4</i>

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***The last three questions are about the follow-up and administration of immunisations in the town or community where you work.***

**Please circle the appropriate number next to each part of these questions**

**Q16. How often would you take the following actions to follow-up overdue immunisations?**

1 = NEVER, 2 = RARELY, 3 = SOMETIMES, 4 = OFTEN, 5 = ALWAYS

**Visit the parent or caregiver and discuss the matter with them**

1            2            3            4            5

**Send a reminder letter to the parent or caregiver**

1            2            3            4            5

**Request an Aboriginal Health Worker to visit the parent or caregiver to discuss the matter with them**

1            2            3            4            5

Administer a vaccine to a child at their home

1            2            3            4            5

Transport the child and the parent or caregiver to the clinic for the child to be immunised

1            2            3            4            5

Consider the parent or caregiver has decided against continuing with the child's immunisations and not discuss the matter any further with the family

1            2            3            4            5

Other, (please list below and specify how often)

1            2            3            4            5

1            2            3            4            5

1            2            3            4            5

### Question 16

<b>Not relevant</b>	<b>1</b>
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*Question is in need of such revision that it would no longer be relevant* 2

<i>Relevant but needs minor alteration</i>	3
--	---

**Extremely relevant** 4

[illegible]

**Q17. Do you administer an immunisation to a child in the 0-18 month age group in the following situations?**

*Please circle the appropriate number next to each part of the question*

**1 = NEVER, 2 = RARELY, 3 = SOMETIMES, 4 = OFTEN, 5 = ALWAYS**

The child is febrile and has a temperature of 37 <sup>4</sup> - 38 <sup>0</sup> c	1	2	3	4	5
The child is febrile and has a temperature higher than 38 <sup>0</sup> c	1	2	3	4	5
The child has an upper respiratory tract infection (URTI) but is afebrile	1	2	3	4	5
The child is currently taking a course of penicillin or amoxil	1	2	3	4	5
The child is registered as having "failure to thrive", and although well, has lost weight since he/she was last weighed	1	2	3	4	5
The child was previously gaining weight normally, but has lost weight at the last two consecutive weighings	1	2	3	4	5
The child has diarrhoea and/or vomiting and is due to be immunised against MMR, Hib, or Hep B	1	2	3	4	5
The child has diarrhoea and/or vomiting and is due to have OPV (sabin)	1	2	3	4	5

### Question 17

Not relevant	1
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*Question is in need of such revision that it would no longer be relevant* 2

<i>Relevant but needs minor alteration</i>	3
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*Extremely relevant* 4

[illegible]

**Q18. How often have you been unable to administer a vaccine to a child in the 0-18 month age group, for the following reasons?**

*Please circle the appropriate number next to each part of the question*

**1 = NEVER, 2 = RARELY, 3 = SOMETIMES, 4 = OFTEN, 5 = ALWAYS**

The mother or caregiver is reluctant to bring the child to the clinic for immunisation	1	2	3	4	5
--	---	---	---	---	---

There are insufficient vaccines available at the clinic to immunise the child	1	2	3	4	5
---	---	---	---	---	---

The mother tells you she has heard of possible side-effects of vaccines and does not want the child to be immunised	1	2	3	4	5
---	---	---	---	---	---

The child has lost weight	1	2	3	4	5
---------------------------	---	---	---	---	---

You consider the child is not well enough to be immunised	1	2	3	4	5
---	---	---	---	---	---

The child has moved from the town or community where you work	1	2	3	4	5
---	---	---	---	---	---

The child is due to have two different vaccines, and the mother is concerned that the child will be having two separate injections	1	2	3	4	5
--	---	---	---	---	---

The mother or caregiver is concerned that the child is not well enough to be immunised	1	2	3	4	5
--	---	---	---	---	---

Other, (please list below and specify how often)	1	2	3	4	5
-----					
	1	2	3	4	5
-----					
	1	2	3	4	5
-----					

### Question 18

**Not relevant**

1

**Question is in need of such revision that it would no longer be relevant**

2

***Relevant but needs minor alteration***

3

**Extremely relevant**

4

[illegible]



***Please feel free to comment on any aspect of immunisation in the 0-18 month age group in the town or community where you work. I would be grateful for your comments.***

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***Thank-you very much for your time and kind assistance in participating in this study.***

## Content Validity of the Questionnaire

The scores given by the Panel of Experts for each question are shown in the following Table. They were not asked to give a score for questions 1-7 as these had been included to collect demographic data. However five of the experts did make suggestions regarding these questions which were acted upon by the researcher.

Scores Given By Experts								
	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Expert 8
Question 8	4	4	4	4	4	3	4	4
Question 9	4	4	3	3	3	3	4	3
Question 10	4	4	4	4	4	4	2	4
Question 11	4	4	4	4	4	4	1	4
Question 12	3	4	4	4	4	4	3	4
Question 13	4	4	3	3	3	4	3	4
Question 14	4	4	4	4	4	4	4	3
Question 15	4	4	4	4	4	4	4	4
Question 16	4	3	4	4	4	4	/	4
Question 17	4	3	3	4	4	4	/	4
Question 18	4	3	4	4	4	4	/	4

Note

/ = No score given for that question

The ninth expert who examined the revised questionnaire used in the pilot study and finally for the Kimberley nurses, gave a score of 4 for all questions (6-20) except question 11 which was scored as 3.

## APPENDIX F and G

The Healthy Kids Project



School of Nursing  
University of North Carolina at Greensboro  
Greensboro, NC 27412-5001  
(919) 334-3621 (910) 334-3621

September 15, 1994

Ms. Anne Mahony  
PO Box 1330  
Fremantle  
Western Australia, 6160


Dear Ms. Mahony,

I am delighted to hear that the Adapted PRECEDE Model has been of use to you in your work. I am very gratified that public health nurses as far away as Australia are making use of the model.

You certainly do have my permission to use the Model. I would appreciate being kept apprised of your progress. When your research is completed, I would like a copy of any manuscript or report which describes your methods and findings.

I hope your research is successful, and I look forward to hearing about your results. Best wishes!

Sincerely,

  
Maija Selby-Harrington, DrPH, RN  
Professor and Director of Research



Health Department of Western Australia

*Western Australia*

Health Promotion Services Branch

Ms Anne Mahony  
PO Box 1330  
Fremantle WA 6160

Dear Anne

Thank you for your letter of 16 September 1994 requesting permission to include our publication HP 2021 'Recommended immunisation schedule for Aboriginal and Torres Strait Islander people' in your thesis.

Health Promotion Service is pleased to release this information for inclusion in your thesis. However, copyright for the publication will remain with the Health Department of Western Australia.

I have included a copy of the publication for your information and wish you the best for your thesis.

Yours sincerely



Perin Wood  
A/COORDINATOR  
PUBLISHING AND INFORMATION

20 September 1994

Ground Floor C Block 189 Royal Street East Perth Western Australia 6004  
Correspondence PO Box 8172 Perth Stirling Street Western Australia 6849  
Telephone (09) 222 2000 Facsimile (09) 222 2088

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