

# **Factors affecting variations in the outcomes of pregnancy and trends associated with provision and utilisation of antenatal care in general practice.**

A comparative study of a pregnant adolescent population and a pregnant adult population in Christchurch 2004-2005



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## Abbreviations

<b>95% CI</b>	95% Confidence Interval
<b>ANC</b>	Antenatal care
<b>APNCU</b>	Adequacy of prenatal care utilisation
<b>CINAHL</b>	Cumulative Index to Nursing and Allied Health Literature
<b>DARE</b>	Database of Abstracts and Reviews of Effectiveness
<b>DF</b>	Degrees of Freedom
<b>EDD</b>	Estimated due date
<b>GP</b>	General Practitioner (Family Doctor)
<b>LMP</b>	Last menstrual period
<b>MOH</b>	Ministry of Health
<b>NICE</b>	National Institute for Clinical Evidence
<b>OR</b>	Odds ratio
<b>PAR</b>	Population Attributable Risk
<b>PNC</b>	Postnatal Care
<b>SAS</b>	Statistical Analysis Software (SAS) System
<b>SD</b>	Standard Deviation
<b>WHO</b>	World Health Organisation

## Glossary of Terms

**Access to health care** refers to the timely use of personal health services to achieve the best possible outcome

**Aetiology** refers to the study of the causes or origins of disease, the factors that produce or predispose an individual or group towards a certain disease or disorder

**Adolescent** refers to an individual being of the age of 13 through to 19

**Adult** refers to an individual being of the age of 18 years and over

**Antenatal care** refers to the medical care recommended for women before and during pregnancy. The aim of good antenatal care is to detect any potential problems early, to prevent them if possible (through recommendations on adequate nutrition, exercise, vitamin intake etc), and to direct the woman to appropriate specialists, hospitals, etc, if necessary. The availability of routine antenatal care has played a part in reducing maternal morbidity and miscarriages as well as low birth weight, preterm delivery and additional preventable infant problems.

Antenatal care generally consists of:

- monthly consultations during the first two trimesters (from week 1-28)
- fortnightly from 28 to week 36 of pregnancy
- weekly after week 36 (delivery at week 38-40)

**Birth** 1. Passage of the foetus from the uterus to the outside world; the act of being born.

2. Specifically, in the human, complete expulsion or extraction of a foetus from its mother, irrespective of gestational age, and regardless of whether the umbilical cord has been cut or the placenta is attached

**Case series** means description of several cases of a given disease usually covering the course of the disease and response to the intervention

**Chi-square test** is any statistical hypothesis test in which the test statistic has a chi-square distribution when the null hypothesis is true, or any in which the probability distribution of the test statistic (assuming the null hypothesis is true) can be made to approximate a chi-square distribution as closely as desired by making the sample size large enough. Specifically, a chi-square test for independence evaluates statistically significant differences between proportions for two or more groups in a data set.

**Claim** means the forwarding of a request for payment for a service or module to HealthPAC, MOH.

**Confidence interval** a method of expressing certainty about the findings from a study or a group of studies using statistical techniques, a range of values assumed with a specified degree of confidence to include a population parameter

**Data set** refers to a set of information that presents information in a form that can be readily analysed and conclusions drawn from the data. A minimum dataset is a widely agreed upon and generally accepted set of terms and definitions that form the core data



required for medical records and used for developing statistics and trends for different types of analyses and users.

**Degree of freedom describes** the number of values in the final calculation of a statistic that are free to vary. Estimates of parameters can be based upon different amounts of information. The number of independent pieces of information that go into the estimate of a parameter is called the degrees of freedom (df).

**Descriptive Study** is a study that is concerned with and designed to describe the existing distribution of variables without regard to casual or other hypothesis

**Estimated date of delivery (EDD)** means the estimated date of delivery of the baby (usually calculated from LMP)

**First Birth** means that a woman has not previously experienced a labour and birth.

**First Trimester** means the period from the LMP date until the end of the fourteenth (14th) week of pregnancy (1-12 weeks after conception).

**General Practitioner (GP)** means a Registered Medical Practitioner approved by the New Zealand Medical Council as a medical practitioner and who is the holder of a current annual practising certificate issued by the New Zealand Medical Council who provides primary medical care to individuals and families for a practice population.

**Gravida** means the total number of pregnancies the woman has experienced including the current one. For example, a woman who has had one prior pregnancy and is currently pregnant is designated 'Gravida 2'.

**Helicon** is an in house Pegasus Health application to handle electronic claims processing and reporting.

**Incidence** means the frequency with which something, such as a disease, appears in a particular population or area. In disease epidemiology, the incidence is the number of newly diagnosed cases during a specific time period.

**Last Menstrual Period Date (LMP)** means the first estimated or actual date of the beginning of the woman's last menstrual period.

**Lead Maternity Carer (LMC)** means the General Practitioner, Midwife or Obstetric Specialist who has been selected by the woman to provide her comprehensive maternity care including the management of her labour and birth and the postnatal period.

**Linear regression** refers to an analysis of data that takes into account two variables simultaneously

**Maternity Services** means the maternity services described in the service descriptions.

**Maternity Schedule** of fees which may be claimed by primary care providers (midwives, GPs and specialists) for basic services and consultations during the antenatal labour and delivery periods and specified postnatal period.

**Mean** refers to a measure of central tendency: the arithmetic average

**Miscarriage** means a pregnancy that ends spontaneously before 20 weeks gestation

**Multigravida** refers to a woman who has previously given birth

**Multiparous** refers to a woman having two or more offspring at one birth.

**Multiple regression** any analysis of data that takes into account more than two variables simultaneously

**National Health Index (NHI)** means the unique person identifier number allocated by the New Zealand Health Information Service.

**Obstetrician** means a registered Medical Practitioner included in the vocational register as an Obstetrician by the New Zealand Medical Council and who is a holder of a current annual practising certificate issued by that Council

**Odds Ratio (OR)** a measure of the degree or strength of an association, in a cross sectional study it is measured as the ratio of the odds of the exposure among the cases to that among the controls

**On Line Analytical Processing**, or OLAP, is an approach to quickly providing answers to analytical queries that are dimensional in nature. Databases configured for OLAP employ a multidimensional data model for efficient and complex queries.

**P Value** if no association really exists, statistical tests of significance determine the probability that the association could have occurred by chance alone. By convention, if the p value is less than 0.05, then the association is statistically significant

**Parity** means the number of times a woman has borne children counting multiple births as one and including stillbirths. (over 20 weeks gestation)

**Postnatal Care:** Basic services and referrals to consultants in the period after delivery and up to six weeks after delivery. Basic postnatal care comprises basic puerperal care and the six-week checks of mother and child. (also referred to as puerperal care)

**Pregnancy Episode** means the period from when the woman first seeks Maternity Services until 28 days following birth or up to six weeks if Maternity Services are required due to clinical reasons.

**Prevalence** refers to the proportion of individuals in a population having a disease. Prevalence is a statistical concept referring to the number of cases of a disease that are present in a particular population at a given time.

**Primary health care** refers to "Essential health care based on practical, scientifically sound, and socially acceptable methods and technology made universally accessible to individuals and families in the community by means acceptable to them and at a cost that the community and the country can afford to maintain at every stage of their development in a spirit of self-reliance and self-determination. It forms an integral part of the country's health system of which it is the central function and the main focus of the overall social and economic development of the community. It is the first level of contact

of individuals, the family and the community with the national health system, bringing health care as close as possible to where people live and work and constitutes the first element of a continuing health care process." (New Zealand Health Strategy)

**Primary Maternity Service** means those services provided by a midwife, a general Practitioner or an Obstetric Specialist for assessment, monitoring and care of a woman's pregnancy, labour and birth and postnatal care as described in the service descriptions.

**Primary Care Database (PCD):** A database compiled by an independent health researcher in Christchurch containing general practice information on all women who attended a Pegasus Health GP for a maternity related consult from 1<sup>st</sup> July 2004 -30<sup>th</sup> June 2005. This includes GP LMC and non-LMC levels of antenatal and postnatal services including first consultations, normal and urgent attendance in all trimesters, assessment prior to termination, threatened miscarriages, attendance at miscarriage and postnatal consultations.

**Primigravida** refers to a woman who is pregnant for the first time i.e. a women who has not previously given birth (also referred to as primous or parous)

**Second Trimester (2AN)** means the period of pregnancy from the beginning of the 15th week until the end of the 28th week after the LMP date (13-27 weeks after conception)

**Termination (also known as abortion)** Induced ending of a pregnancy. Termination defines foetal loss excluding stillbirths usually during the first 20 weeks of gestation. Induced terminations are those initiated voluntarily with the intention of terminating a pregnancy.

**Third Trimester (3AN)** means the period of pregnancy from the beginning of the twenty-ninth (29<sup>th</sup>) week from the LMP date until labour is established.

**Utilisation** is a measure of use of a health service, this can be in terms of a rate (e.g. mean consultations to a GP per year) or as a percentage of potential users who visit a service.

**Variance** a measure of variation shown by the set of observations defined by the sum of the squares of deviation from the mean divided by the number of degrees of freedom in the set of observations

# **1. Introduction**

## **1.1 Purpose**

The purpose of this research was to determine any variations that may exist in the utilisation of and outcomes from antenatal care maternity services for adolescents compared to the pregnant adult population in Christchurch between 1<sup>st</sup> July 2004 and 30th June 2005. There is a paucity of research about the uptake and utilisation of antenatal care by pregnant adolescents in New Zealand. Media coverage, public perceptions and societal values often presume that adolescents compared to other women generally initiate antenatal care extremely late if at all, and have adverse pregnancy outcomes such as low birth weight and preterm deliveries compared to other women.

## **1.2 Objectives**

The objectives of this project were

- To assess the health profile of pregnant adolescents (aged 12-19) and their patterns of utilization of primary health care services for antenatal care compared to the pregnant adult population (aged 20-42)
- To assess the prevalence of women (both adolescents and adults) who entered antenatal care and to identify factors relating to late initiation of care in Christchurch in 2004-2005
- To identify factors associated with inadequacy of antenatal care utilisation by adolescents and adults in Christchurch and to examine the demographic characteristics and additional factors associated with late initiation and inadequate antenatal care
- To assess whether differences exist in the utilisation of antenatal services within general practice in relation to pregnancy outcomes, in order to

provide recommendations for improved health service uptake and better utilisation

## 2. Literature Review

### 2.1. Antenatal care and pregnancy outcomes

Antenatal care is recognised as a crucial period to enhance the health and well-being of both mothers and babies (WHO 2003). A number of studies (Fergusson 2006 and Mumtaz 2007) have indicated that there is a strong association between the uptake and utilisation of antenatal care services and pregnancy outcomes. Antenatal care has provided a number of successes in prevention and management of birth defects and abnormalities (Bale 2003) and prevention of pregnancy loss and reduction in maternal and neonatal morbidity (WHO 1999). La Veist (1995) has established that timely initiation of antenatal care and adequate antenatal care is effective in reducing the likelihood of low birth weight babies and other adverse pregnancy outcomes. There are significant inequalities that exist between ethnic groups in accessing and utilising antenatal care. Ethnic minorities in the United States utilise antenatal care services less frequently and are more likely to receive inadequate care, an index that combines the initiation of antenatal care and the total number of visits. La Veist claims that in general adolescents tend to have poorer antenatal care than adults do. This may be because the majority of adolescents were not intending to become pregnant. Some adolescents may also be in denial about the pregnancy and fail to initiate antenatal care or seek care at all. In addition to adolescents presenting late they will not have early advice on health promotion or early antenatal care.

However, some preventable adverse outcomes still occur such as the increasing incidence of preterm births, intrauterine growth restriction (IUGR) and preeclampsia.

Research into maternal mortality has produced many contradictory findings (Bloom 1999). Antenatal care is also a desirable component of maternity services for reasons other than pregnancy outcomes, including long-term health and maternal health benefits, strengthening of social support networks, and cost effective delivery of health care (Krueger 2000).

Antenatal care is current routine practice in New Zealand, Australia, the United Kingdom and the United States, among other countries. The schedule is four weekly visits until 28 weeks gestation, followed by fortnightly visits until 36 weeks and weekly visits thereafter until birth (Hunt 2002).

In 2001, there was a systematic review by the World Health Organisation in relation to the safety of antenatal care and schedules involving less routine antenatal consultations. Evidence reviewed addressed the frequency and number of antenatal visits. The pattern of consultations recommended by NICE (2003) which consists of monthly until 30 weeks then fortnightly until 36 weeks then weekly until delivery is still applicable today. In recent years, obstetric care has become increasingly hospitalised and specialist based, with the majority of care being community based and provided by midwives; consequently, in many countries general practitioners have withdrawn services. The reasons for the withdrawal of GPs from maternity services have been described by Ferguson (2004) these include the erosion of the GPs traditional role in obstetrics with the 1996 maternity services changes, more importantly the funding model of maternity has directly discouraged GPs from practicing obstetrics because of the cost of providing a service to a pregnant women exceeds the reimbursement the GP receives from the Ministry of Health (MoH).

A problem underlying all areas of research on antenatal care is the method that is used to measure utilisation. The assessment of antenatal care is by using two variables namely the number and timing of antenatal consultations. This does not take

into account the content of antenatal care. Even in developed countries that have recommendations or guidelines the quality and content of antenatal care varies significantly. Bloom (1999) suggests that in order to evaluate the efficiency of antenatal care in developed countries effective guidelines are required as the basis for measurement of utilisation of antenatal care. Bloom (1999) also found that a number of studies in the United Kingdom and the United States have recognised important socio-demographic predictors that influence the likelihood of utilising professional health care prior to birth and puerperium.

### **2.1.1 Adolescents and antenatal care**

Wiemann's (1997) research suggests that early access and initiation into antenatal care may provide a number of benefits to specific subgroups of women, in particular adolescents. In the United States, pregnant adolescents often receive inadequate antenatal care. Up to 55% of adolescents enter antenatal care late or not at all. Therefore, Wiemann states that improving access to health services and education is seen as pivotal in reducing adolescent pregnancy (Wiemann 1997). General practice is a source of sexual and reproductive health services, which provides provision of contraceptives, however, adolescents may not fully utilise this service. Often, adolescents are reluctant to access general practitioners because of perceived fears about confidentiality, and often have trouble in accessing services.

## **2.2. Antenatal care in New Zealand**

Antenatal care emerged in the early 1900s, after raised concerns about consistently high rates of both maternal and infant mortality (Villar 2001). New Zealand's maternity system, compared to those of other developed countries, appears well organised. All eligible women have access to free comprehensive maternity care provided by highly trained health professionals. However, there are a number of

problems within the New Zealand maternity context, including inequalities in access and outcomes for some women.

Maternity services in New Zealand are available to women and their families throughout pregnancy, childbirth and for the first six weeks of a baby's life. These services are provided by a number of health professionals including general practitioners, midwives and private obstetricians, or a hospital specialist team working in either the public or private sector, yet ultimately the Lead Maternity Carer (LMC) is responsible for providing and coordinating the woman's maternity care.

The Ministry of Health (MoH 2002) policy directive recommends that it is ideal for a woman to register with a LMC by the fourteenth week of her pregnancy to develop jointly a care plan for pregnancy, birth and postnatal care. The plan includes frequency of consultations, screening tests and booking into an antenatal education course. The frequency and type of antenatal care a woman receives can be variable and is largely a result of personalising the antenatal care agreement between the woman and her LMC.

### **2.2.1 Adolescent pregnancy in New Zealand**

Adolescents aged between 15 and 24 represent 14% of the New Zealand population. The current context of youth sexual health in New Zealand is complex. There are significant disparities in adolescent health, including Maori and Pacific adolescents being at higher risks of unintended pregnancies and termination. The Australasian Adolescent Research Group (2001) confirms that New Zealand has the second highest rate of adolescent pregnancy in the OECD, and identifies barriers to accessing health services, with 48% of those interviewed confirming barriers to accessing health services. Fergusson (2006) from the Christchurch Health & Development Study notes that over 35% of all adolescents pregnancies resulted in a termination, and the continuation of an unintended pregnancy was associated with a number of physical, psychological and educational problems. There is a paucity of



published evidence on the actual utilisation made of general practices by pregnant adolescents, and on national comparisons of utilisation rates by adolescents and adults during pregnancy. Adolescent pregnancy is a public health concern; however, it is by no means a new phenomenon. Griggs (2006) notes that adolescents are becoming more biologically mature before they are socially mature, this may be problematic.

### **2.2.2 Influence of the media**

The social context of adolescent pregnancy today includes the impact of the media. Often the public, community and media express concerns and have strong views about the state of adolescent's health in terms of disease, behaviour and illness. The media can have either a significant positive or negative impact on individual sexual behaviours, the media is influential in providing adolescents with information and, secondly, in portraying adolescent pregnancy negatively, with adverse outcomes. The media is often the source of information that negatively influences adolescents. Alternatively, the media has the influence and scope that can be utilised as a positive tool that can be use for health promotion and community education.

## **2.3 Primary health care service provision of maternity services**

Mathias (2002) states that primary care is important, as it is the most significant medical care variable associated with increased health status within any developed country. General practitioners and primary health care organisations provide a large number of sexual and reproductive health related consultations. Primary health care is

Essential health care based on practical, scientifically sound, and socially acceptable methods and technology made universally accessible to individuals and families in the community by means acceptable to them and at a cost that the community and the

country can afford to maintain at every stage of their development  
in a spirit of self-reliance and self-determination. (MOH 2001 p29)

Maternity Care has an importance place within the context of the New Zealand health system and is strongly associated with General Practice (MOH 2001). Batchelor (2006) confirms that the role of the GP is influential within primary care as a General Practitioner is often the first health professional seen by a women to confirm a pregnancy. Significant changes have occurred in the provision of maternity services during the last 15-20 years within primary care. GPs are withdrawing from maternity practice at an unprecedented rate. Davis (2006) confirms that nationally only 54 GPs attended births last year and ultimately the majority of lead maternity care now the responsibility of midwives, which has ultimately lead to a reduction in choice and options for women for pregnancy care. Within the Christchurch context, only two Christchurch GPs offer full lead maternity carer (LMC) services; the two GPs are only able to do so because of the capacity of their general practice and the collaborative support. However there is acknowledgement that General Practitioners still continue to provide care during all parts of the pregnancy but much more infrequently and are most frequently consulted to confirm a pregnancy, to provide early antenatal care in the first twelve weeks of pregnancy and in most postnatal checks. Dr Simmers (2006) concludes that General Practitioners provide about 70 percent of care in the first twelve weeks of pregnancy. This is a significantly different maternity service context than in previous years. In 2000, there were over 70 GPs in Christchurch providing maternity services, but for a number of reasons there has been a rapid decline in the number of general practitioners practising maternity care. It is likely that the shared care model will be non-existent within a few years as the few general practitioners who are lead maternity carers also withdraw from maternity practice. Clearly, this would affect the

number of available choices or options for women and impact on the scope of practice for individual general practitioners.

Maternity services and care have a place within the wider integrated health service context, and are strongly associated with various services including general practice, well child, sexual and reproductive health and other areas of primary care including primary health organisations (PHO's). Low (2005) states that the provision and utilisation of health care for all pregnant women is usually in the form of consultations with a general practitioner, obstetrician and more predominately a midwife. This mode of health care is widely accepted as a way to decrease the risk of maternal and perinatal mortality.

### **2.3.1 Funding Context**

Currently, the Ministry of Health (MOH) funds all primary maternity services. Within the 2001-2002 financial years, 25% (\$97 million) of the funding for primary health care (\$385 million) was spent on maternity services (MOH 2003). Foley (2007) suggests that section 88 notice for funding maternity services still predominately focuses on the LMC model of care for maternity services and that is seen by GPs as a barrier to providing health services to pregnant women. Foley believes there are inherent deficiencies in section 88 including: the inability for flexible funding for additional services by non-LMC GPs and increased funding for postnatal non-LMC consultations. In recent months there has been substantial policy interest from the Ministry of Health in the maternity services and amendment to section 88. Ultimately, maternity services need to be integrated to ensure continuity of care with maternity care predominately provided by the primary care health sector and maternity care must be seen as part of continuum of care that is provided to enrolled patients under the primary health care strategy.

### **2.3.2 Current claiming situation for GPs for antenatal care and maternity services**

The claiming context for general practitioners has changed substantially in the last two years with many Pegasus Health GPs withdrawing from providing LMC services to now predominately providing first trimester care, postnatal care and ad hoc second and third trimester claims when the women's lead maternity carer is unavailable. Pegasus Health has supported this through upgrading the maternity claiming system in aligning claiming with HealthPAC section 88 requirements.

The first trimester (1AN) claims have remained steady, while second trimester (2AN) claims have decreased by 50%; on the other hand third trimester (3AN) claims have remained steady between the two periods. Assessments prior to terminations (ATOP) have also remained static, lead maternity carer registrations have substantially reduced from 223 claims to 2 claims, full deliveries decreased significantly from 110 to 28. Miscarriages have remained steady from 116 to 118 (while this number is small it only represents miscarriages that occurred while a GP was present), puerperal care claims have reduced from 675 to 221 predominately used by LMC GPs, and postnatal baby claims have increased marginally. While postnatal mother claims have reduced by 75% from 1205 in the 2004-2005 period to 355 for the 2005-2006 period, subsequent deliveries have reduced by 80% from 129 in the 2004-2005 period to 23 in the 2005-2006 period. Threatened miscarriages have remained constant with minimal variation from 557 in 2004-2005 to 466 in 2005-2006, and urgent attendance has reduced minimally. Overall General Practitioners are still providing maternity services at a 75% capacity level, from a total number of claims in the 2004-2005 period of 14,123 compared with 10,673 claims for the same specified period in 2005-2006.

### **2.3.3 Policy and practice context of the research**

There have been many recent publications at international (WHO 2003) and national levels that have emphasised the importance of reducing unintended pregnancies and increasing access to health services for minority groups within society. The World Health Organisation (WHO) provided policy considerations on antenatal care; the main message from the policy directives was that antenatal care was one of the most important services in health. The Sexual and Reproductive Health Strategy released by the Ministry of Health in 2003 was developed to improve the sexual and reproductive health of all New Zealanders. Antenatal care could potentially be an important component within this policy and strategies in reducing inequalities and improving health.

There has been an increased government focus on Primary Health Organisations and District Health Boards in the delivery of the goals of the strategy. The priorities and goals including a reduction of termination rates, reduction of unintended pregnancies, reduction and prevention of sexually transmitted infections (STI's) and the development of evidence based policy initiatives for delivery of health and reproductive services to Maori and Pacific peoples. There have been several mechanisms established to increase adolescent access to general practice including the low-cost access to health care for school age adolescents enrolled in primary health organisations from October 2003. The Primary Health Care Strategy was another policy drive in providing primary health care direction, as 'a strong primary health care system is central to improving the health of New Zealanders and tackling inequalities in health' (MOH 2001). Denny (2005) suggests that the Primary Health Care Strategy emphasised that the quality of primary health care services should be comprehensive and involve health promotion, education and counselling. International research from Denny (2005) suggests that few primary health care providers discuss or provide preventative health counselling and

education to adolescents on important adolescent health issues, despite research showing that engaging with adolescents in primary care settings reduces health risk behaviours, reduces adolescent's pregnancy rates and improves contraceptive use. International literature by Tabi and national research Fergusson (2006) and Moor (2003) suggests that societal attitudes and socio-economic factors play an important role in sexual and reproductive health outcomes. Health service provision and utilisation is required for adolescents in particular. This should include sexuality education that provides clear and comprehensive messages about the risks; youth focused primary health care and easy access to condoms and contraceptives.

#### **2.3.4 Access to primary care**

Denny (2005) defined access to primary care as 'the timely initiation and use of personal health services to achieve the best possible health outcome'. Previous research by Denny (2005) has shown that access to health services by adolescents is poor with over 50% of secondary students having difficulties accessing health care services in the past year. These barriers are associated with financial constraints, transport problems, concerns about the quality of care they receive and concerns about privacy and confidentiality for adolescents when accessing primary health care services.

#### **2.3.5 The role of the General Practitioner**

The role of the GP is crucial in both the treatment and prevention of health outcomes. General Practitioners are increasingly involved in providing information to patients about healthy lifestyle choices. There has been increased evidence of the effectiveness of their advice on certain patient behaviours because of the GPs knowledge of individual patients environmental and other health problems. General practitioners can potentially assist in the reduction of risk taking behaviours from lifestyle choices that can impact adversely affect on pregnancy outcomes and health

throughout life, and as the primary care provider, the General Practitioner needs to take advantage of each health encounter. International research from the Department of Health in Ireland (2000) indicates that 70% of consultations for contraception occur in general practice. This plays a pivotal role in providing opportunistic screening to reduce unintended pregnancies and increasing preconception education and knowledge. Mathias (2002) suggests General Practitioners have the ability to provide opportunistic targeting for sexual health because currently in New Zealand 88% of adolescents uses a general practice for primary health care services. The additional adolescents will access youth and student health clinics, family planning, emergency departments and after hours services. On average, an adolescent will consult a general practitioner at least three times a year.

An additional issue that requires further research is the influence on the availability of a female or young general practitioner in accessing health services for adolescents. Recent research by Bethea (2007) has indicated that the availability of young or female GPs associated with lower rates of adolescent pregnancy. Fergusson (2004) believes that the New Zealand maternity services context have already encountered adverse effects of GPs leaving obstetrics, such as significant increase in women presenting late with severe postnatal depression. Fergusson notes that GPs have a broader medical perspective and their involvement in a woman's antenatal care is in an ideal position to identify postnatal depression in the woman in the first three months of the birth. Fergusson (2004) emphasises by providing antenatal and postnatal care, GPs are in a position to 'seriously modify the health of the next generation'.

### **2.3.6 Preconception health care**

Preconception care is not a new concept. Appropriate preconception health care may improve pregnancy outcomes, although this is a difficult measure to achieve due to

the number of unintended pregnancies. Fiore (2002) found that more than 50% of all pregnancies are unintended and more than 70% of pregnancies among adolescents are unintended. The primary aim of preconception care is as a screening mechanism to reduce risk factors through both lifestyle and behaviour changes. This is important for the many women postponing childbearing until their thirties given the number of medical problems during pregnancy and chromosomal abnormalities in the foetus that may arise.

A number of factors influence pregnancy outcomes, including maternal age, reproductive history, medical history, nutritional status including body mass index, environmental exposures, genetic influences, a number of lifestyle factors and access to health services. There are a number of opportunities for a general practitioner to influence and integrate preconception care, including through annual health checks and regular health consultations. Preconception care should include a thorough and systematic identification of risks, the provision of education and initiation of desired interventions to provide the optimal outcomes for the pregnancy.

## **2.4 Outcomes of pregnancy**

A significant variation in health outcomes among pregnant adolescents and adults could be evaluated. Because of a restricted period for this study, the outcomes of pregnancy were limited to birth, termination and miscarriage and included birth data for GP LMC patients.

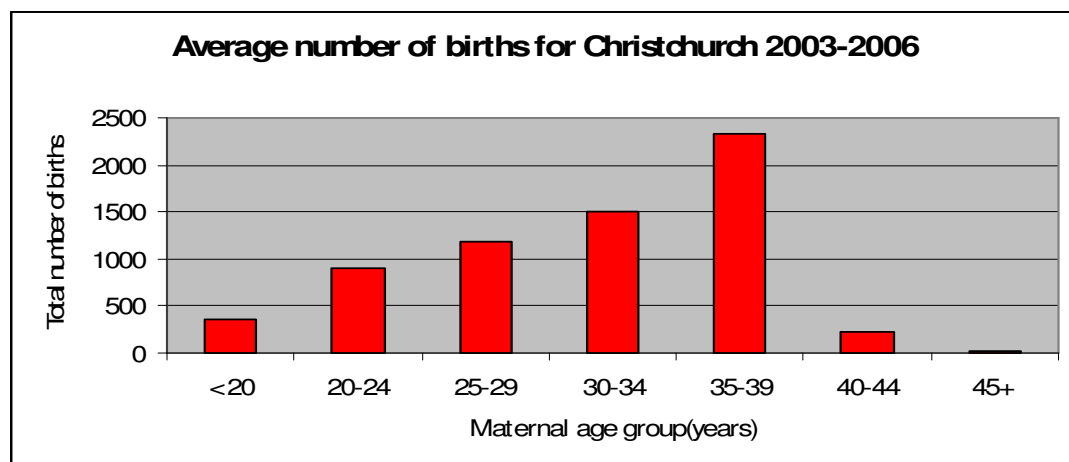
### **2.4.1 Birth**

Recently released figures from Statistics New Zealand (2006) state there were 57,745 live births registered in New Zealand in 2005. The total fertility rate was 2.00 births per woman in 2005. Although not directly comparable to our research timeframe and dates, the number of live resident births in Christchurch from October 2004 to



September 2005 were 4,360 live births. New Zealand has a higher total fertility rate than other developed countries and rates of births to adolescent mother's ages 15-19 years are higher than most other developed countries. The Adolescent Research Group (2001) showed the fertility rate for adolescents was 28.4 per 1000 women aged 15-19 in 2006 compared to 27.4 per 1000 in 2005 and 25.6 per 1000 in 2002. Maori have the highest adolescent fertility rate of 70 per 1000, followed by Pacific at 48 per 1000, while the European rate is 22 per 1000 based on fertility rates 2002-2003.

Figure 1: Average number of births in Christchurch



The annual average of births in Christchurch between 2003 and 2006 was 6,498. This consisted of 348 births for women under 20, 899 births for women aged 20-24 years, 1187 births for women aged 25-29, 1507 births for women aged 30-34, 2329 births for women aged 35-39, 218 births to women aged 40-44 and 10 births for women over 45 years of age.

#### 2.4.2 Miscarriage

Miscarriage is one of the more common complications of pregnancy. Miscarriage is not usually considered amenable to primary prevention for the reason that up to 2/3 of miscarriages, the fetus is abnormal or absent, and a significant percentage of the

remaining pregnancies that result in miscarriage show chromosomal abnormalities. Recent research from the Ministry of Health, (2006) reports that approximately 25% of all pregnancies end in miscarriage, and that 90% of miscarriages occur in the first 13 weeks of the pregnancy. Miscarriage is not usually able to be altered through primary prevention as in up to two thirds of miscarriages, the foetus is absent, abnormal or has a chromosomal abnormality. Miscarriages in the second trimester tend to occur as a result of maternal deficiencies and problems. There are a number of interventions such as taking folic acid, prenatal genetic diagnosis and encouraging women between the ages of 25 and 35 to plan their pregnancies, which may assist in the reduction of miscarriages. The significance of this is unclear, but may relate to the actual confirmation of pregnancy and varying degrees of access to miscarriage services, alternatively it may also be a result of inadequate access by adolescents to reproductive health services.

### **2.4.3 Termination**

Recent research by Naish (2004) has raised the concern within general practice in recent years that there is an unprecedented increase in adolescents requesting termination of pregnancies; this could indicate the use of termination as a form of contraception. Dickson (2000) suggests that approximately 1 in 5 pregnancies among New Zealand women end in termination, and that there are a number of short and long-term consequences associated with this. New Zealand is one of the few developed countries within the past 15 years to experience a substantial increase in the number of terminations performed. Statistics New Zealand data (2006) state that since 1995, termination rates have increased for all age groups. Approximately 50% of women who had a termination in 2005 had no children. Head (2005) notes that the circumstances of termination are varied and complex, results from the Adolescent Research Group

(2001) found that in 2005 adolescents had a termination rate of 25 per 1000 women aged 15-19 compared to 26 per 1000 in 2004. In 2005, women aged 20-24 had more terminations (37 per 1000 women aged 20-24 years) than other age groups, this consisted of approximately three out of ten terminations in any year. In 2004 and 2005 termination, rates for all women aged 15 and over decreased showing the first sustained reduction for many years. Maori women are more likely to have a termination than European women are. From 2000 to 2002, the termination rate for European adolescents was 21 per 1000 while the Maori adolescent termination rate was 30 per 1000.

The Contraception, Sterilisation and Termination Act 1977 regulates the provision of legal termination in New Zealand and overseen is by the Termination Supervisory Committee. The Act requires a number of steps prior to a woman having a termination; a general practitioner needs to refer the woman to specialist consultants. Two certified consultants must concur that the continuation of the pregnancy would seriously harm the life, physical or mental health of the woman and baby. Terminations in New Zealand are free and legal for all ages and parental consent is not required for adolescents under the age of 16. This is an important factor to consider when evaluating and assessing the rates of termination for adolescents. Evidence from international research by Rothwell (2003) suggests that termination rates are increasing worldwide. Although terminations performed in New Zealand in 2005 decreased to 17,531 compared to the previous year, in 2004 the number of terminations was 18,211. Statistics New Zealand (2006) reported that most terminations (64%) in 2004 and 2005 were first terminations compared with 72% of terminations being first terminations in 1995. In 2005 over 55 % (n=9730) of terminations were to women who identified as European, 22% (n=3880) were to women who identified as Maori, 17% (n=2960) were

to women who identified with the Asian ethnic group and 12% (n=2050) who identified with the Pacific ethnic group.

The Canterbury District Health Board (2005) recently released termination data for Christchurch. In 2005, there were 2242 terminations performed at Lyndhurst Hospital compared with 2248 in 2004 and 2121 in 2003. Since 2002, there has been a significant increase in terminations among Christchurch adolescents under 16 years. In 2004 77 adolescents under the age of 16 has terminations at Lyndhurst Hospital compared to 21 in 2003. An additional 497 adolescents aged 16-20 had a first trimester termination in 2004 (22% of the total population having terminations).

Table1: Termination of pregnancy by age group

	2003	2003	2004	2004
Age range	n	%	N	%
Under 16	21	1	77	3.4
16-20	497	23.4	497	22.1
21-25	607	28.6	688	30.6
26-30	409	19.3	393	17.5
31-35	319	15	291	12.9
36-40	200	9.4	217	9.7
41-45	64	3.1	79	3.5
46 & over	4	0.2	6	0.3
Total	2121	100	2248	100

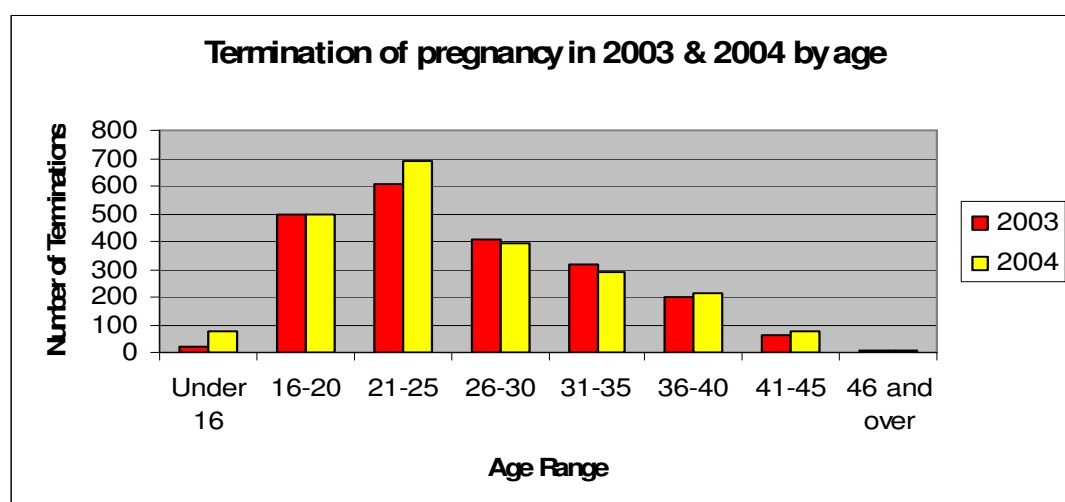


Figure 2: Termination of pregnancy by age group

First trimester terminations are preferable to second trimester terminations of pregnancy, because second trimester terminations carry a greater risk of complications. Rothwell (2003) indicates that, based on United States research and evidence 10% of terminations were performed between 13-20 weeks and 1% after 20 weeks. He concluded that most late terminations were performed on adolescents as they presented late for confirmation of pregnancy, the reasons stated for late presentation were denial, preceding menstrual irregularity, physician delay and ambivalence towards termination and failure to recognise symptoms of pregnancy.

## **2.5 Initiation and frequency of antenatal care**

Epidemiological studies such as Villar (2001) have demonstrated the benefits of antenatal care in reducing maternal and neonatal complications. However, it is difficult to attribute optimal pregnancy outcomes directly to the provision of antenatal care. Recently there have been a number of questions raised about the long established patterns of antenatal care, after the 2001 systematic review by the World Health Organisation. Sikorski (1996) suggested that research by some United Kingdom health agencies has failed to find any association between late initiation of care (after 28 weeks) and the number of antenatal consultations received and adverse either maternal or neonatal outcomes. Trinh (2006) states that early antenatal care is important for early detection and treatment of adverse pregnancy related outcomes. Recommendations made in initiating antenatal care during their first trimester of pregnancy as seen to maximise the benefits of screening for complications and monitoring foetal and maternal health. Several studies reviewed elaborate the importance of early initiation of antenatal care. Low (2005) suggests that early access to antenatal care may benefit specific subgroups of women including adolescents. Wiemann (1997) reports that pregnant adolescents are increasingly likely to receive

inadequate antenatal care. There is little reliable research on the factors associated with late initiation of antenatal care. There are a number of important variables that are associated with inadequate antenatal care these include ethnicity, parity and gravida and age. Research by Low (2005) clearly suggests that women who initiate their antenatal care later than the first trimester have poorer outcomes such as preterm birth, low birth weight babies and small for gestation age babies. Increasing the number of antenatal consultations does not necessarily improve the outcomes of the pregnancy. Lavender (2007) describes the number of influences that exist in the initiation of antenatal care; these include the pregnancy rejection of acceptance, personal capacity or incapacity in terms of the pregnancy and influence of continued access to health services.

Research undertaken by Cooney (1985) suggests women who initiate their antenatal care late or attend an inadequate number of consultations have similar demographic, situational and psychosocial variables and characteristics. Demographically women who attend antenatal care late or inadequately tend to be adolescents or young adults, have high parity or gravidity, of low socioeconomic status and low educational achievement. In addition, situation factors that influence the initiation or attendance at antenatal care include lack of transport, employment status, childcare difficulties and inconvenient practice hours. Low (2005) suggests that psychological factors that also influence initiation of antenatal care include the reaction and response to the pregnancy, delayed diagnosis, intended or unintended pregnancy, contemplation of termination and the availability of a social support networks.

### **2.5.1 The Andersen Health Seeking Behaviour Model**

Trinh (2006) discussed the Andersen Health Seeking Behaviour Model that assumes that health-seeking behaviour is a result of interactions between

characteristics of individuals, population and environment. The Andersen Model has been widely used by La Veist (1995) as a guiding framework to evaluate the utilisation of health care services by different populations by examining the use and utilisation of antenatal care. Andersen's model suggests that individuals with different demographic and educational characteristics and health beliefs would differ in their use of health services. The model considers several varying characteristics, these include:

- predisposing predictors such as age and ethnicity,
- enabling resources such as financial ability to pay for health services or private health services such as obstetrician,
- needs such as personal health complications,
- personal health care behaviour such as exercise and nutrition,
- outcomes such as satisfaction with general practitioner and health services and the environment such as the schedule of maternity claims that are confirmed through policies and strategies.

### **2.5.2 Adolescent pregnancy**

The traditional belief that adolescent pregnancy belongs to a high risk group has been challenged by the clearly articulated results of a number of studies, Lao (2000) and Tucker (2004) concludes improved antenatal care has decreased the incidences of preterm delivery and low birth weight babies. With appropriate psychosocial support and antenatal care, the obstetric outcomes for adolescent mothers would be comparable with or even better than for older mothers. Yet nationally, adolescents in New Zealand have a comparatively higher rate of pregnancies, terminations and sexually transmitted infections (STI's) and this has been an issue of concern in recent years. Fergusson (2006) suggests that results from the Christchurch Health and Development study clearly indicate that 60% of pregnancies that occurred before the

age of 25 years were unintended. Thirty percent of the pregnancies among adolescents in the Christchurch Health and Development study ended in termination. There is a paucity of information on antenatal care, in particular adolescent's utilisation of antenatal care.

### **2.5.3 Demographic profile and influences: ethnicity, age, gravida and parity**

A number of studies such as Kupek et al (2002) and Trinh (2006) assess a number of predictors that relate to late initiation of antenatal care. The related factors include age, ethnicity, education, gravida and parity, intention to get pregnant and use of contraceptives. Trinh (2006) suggests that the variables of ethnicity, age, gravida and parity play influential roles as predictors in accessing primary care.

#### **Ethnicity**

There is substantial variation in the access of health services by different ethnic groups and in the outcomes of pregnancy. This is a result of a number of factors including social and whanau support and support networks. Many Maori and Pacific island women and their families see pregnancy as a life course and not as a medicalised illness, which requires clinical involvement. In the adolescent population, Maori and Pacific are disproportionably over represented.

#### **Age**

Reynolds (2006) suggests that maternal age appears to influence the use of maternity and antenatal care services in many developed and developing countries, though previous research had often considered age predictors of use of antenatal care to be inconsistent. Some studies found a positive correlation with older ages while others found a linear relationship with age. The Department of Health (2000) found that



age is an important predictor as previous research had suggested that different age groups revealed much lower levels of contraceptive use and use of health services.

### **Gravida and Parity**

Maternal gravida and parity are often associated with differences or variations in the utilisation and initiation of antenatal care but overall there is no reduction in the number of consultations. Parity can have a negative association with the use of antenatal care. Increased parity (high number of live births) is often related to maternal age and is usually indicative that the mother has had significant experience giving birth before and can frequently be associated with late initiation of antenatal care. This principle is clearly articulated in previous research (Low 2005) as it suggests that women with high parity feel that they do not need to attend as early because they already know what to expect during pregnancy and labour. The late initiation for these women may be a result of a number of circumstances such as difficulty arranging childcare. Primigravida women (women pregnant for the first time) may also initiate antenatal care late, suggesting a lack of knowledge or experience as a contributing factor to late initiation of antenatal care, and these women may not have recognised the symptoms attributed to pregnancy until a later stage.

## **2.6 Health Services Research**

Health services research is important in providing information on evidence-based research for public policy debates. Fletcher (2005) states that health services research provides the ability to study how non-biological factors affect a patient's health and these studies ultimately provide medical practitioners with applications of best clinical guidelines and practices.

## **2.7 Importance of clinical guidelines**

Health care guidelines are designed to assist researchers by providing an analytical framework for evaluation in comparison to current clinical context and scope. Aday (1998) suggests that clinical guidelines are expected to reduce inappropriate care, control geographic variations and improve efficiency. Established guidelines by health agencies such as the World Health Organisation and the National Institute for Clinical Excellence (NICE) have provided information and recommendations for best practice such as timing and content of antenatal care. The WHO has suggested a schedule consisting of fewer antenatal visits for low risk women than the traditional model of care as an effective model of antenatal care. The World Health Organisation (WHO) recommends that pregnant women residing in developed countries such as New Zealand and the United Kingdom use the standard model of antenatal care guidelines. Trinh's (2006) research suggests recommendations that antenatal care initiation take place within the first twelve weeks of pregnancy. However, women are advised to attend antenatal care as early as possible, ideally prior to conception to identify and treat health conditions that could affect the mother and foetus during pregnancy. There are no official or mandated guidelines that apply to antenatal care and maternity care provision throughout New Zealand. Hunt (2002) suggests further guidelines from the Royal Australian and New Zealand College of Obstetricians and Gynecologists recommend that the number and timing of visits be discussed in advance with women and be flexible to suit the needs of each individual woman.

In April 2006, the Ministry of Health (MOH) released food and nutrition guidelines for healthy pregnant and breast feeding women in April 2006 that is intended to be used by health practitioners including GPs, midwives, health promoters and educators to provide sound and practical advice and support for pregnant and breastfeeding women and their families.



### **3. Methodology**

#### **3.1 Study Design**

This research uses a number of research methods to assess utilization rates to general practice for antenatal care. It is a retrospective analysis that evaluates the effectiveness of antenatal care using an extensively used tool called the APNCU index. This research applies both qualitative and quantitative methods to assess the variations in antenatal care that exist in Christchurch against best practice guidelines established by the World Health organization (WHO). The computerized records of 14,123 maternity-based consults for 528 adolescents and 5154 pregnant adults were examined. The cohort consisted of 102 general practices from an Independent Practitioner Association (IPA) in Christchurch were assessed and analyzed using SAS. Maternity claiming data included information on the woman's age, parity and gravida.

#### **3.2 Sample Size and Sampling Strategy**

Staff at Pegasus Health using maternity registrations within a specific timeframe identified the samples of women selected for the study: 1<sup>st</sup> July 2004- 30 June 2005. Two samples of women were identified, these consisting of all the adolescents who attended a GP for a maternity related consult within the specified timeframe (n=528), and a stratified random sample (n=536) from 5154 pregnant adults. The adult group was stratified based on maternal age to provide a sample that represented the population and so that no sub groups were over-sampled.

### 3.3 Health Information and sources of data

*Data source and analysis:* Secondary data was used to assess access to antenatal consultations in general practice, using general practice claim data and enabled timely completion of the research within the specified timeframe of six months. Data was collected retrospectively from the Pegasus Health claiming data relating to all maternity related services. The initial data source was provided on 26<sup>th</sup> July 2006. This sample contained 10,665 claims for consultations between the specified timeframe. Limitations included the lack of integration between maternal and baby data and the data source was not exclusively established to evaluate utilization trends for antenatal care in general practice. The data provided was with encoded, non-identifiable claimant and patient identifier information.

*Inclusion criteria:* The patient had accessed a Pegasus Health general practice for a maternity consult between July 1<sup>st</sup> 2004 and 30<sup>th</sup> June 2005.

*Information source:* Information from the antenatal records stored in helicon was prospectively recorded from the first to the last antenatal consultations for both GP LMC adolescents and adults and for the non-LMC GP consultations for adolescents and adults. Other variables also included timing in weeks of initiation of antenatal care. Total number of visits and gestational age at delivery were determined for both adolescents and adults.

*Descriptive statistics:* calculations were made using the SAS computer packages. Frequencies and means were used to report results and trends. Statistical significance using chi square and t-tests were utilised, the significance was established at the 0.05 level.

*Study design:* Descriptive analysis focuses on the demographic characteristics of the sample. Analytic research is used in understanding the cause and effect relationship between the variables and outcomes of interest. Analytical studies are

useful in investigating the impact of variables such as use of health services and associated clinical outcomes. Analytical research provides the opportunity to address the relationship between health service provision and health outcomes. Data assesses the association between antenatal health care utilisation and outcomes of pregnancy. Three antenatal care variables were used; the total number of antenatal consultations, initiation of antenatal care (number of weeks pregnant the woman when the women first presented), and the adequacy of antenatal care based on two established antenatal care utilisation indexes.

### **3.3.1 Literature and Document Search**

The aim of the literature search was to identify relevant studies that had utilised and evaluated antenatal models of care and guidelines. The systematic literature review used a number of health and scientific databases. PUBMED, Cochrane database of systematic reviews, Medline, EMBASE, CINAHL, National Guidelines Clearinghouse, Scottish Intercollegiate Guidelines Network (SIGN) and Database of Abstracts and Reviews of effectiveness (DARE) were searched for articles describing different models of antenatal care and trends in the selected countries. Internet searches were undertaken to find information on existing antenatal and antenatal care systems in several countries and disparities between adolescents and adults.

### **3.4 Data Analysis**

Ebrahim (2005) explored the nature of descriptive studies that are often used by health care providers and public health services to monitor communicable and non-communicable diseases, to plan health promotion programmes, and to assess allocation of resources. Researchers use descriptive studies to identify factors that may influence outcomes or to test particular hypotheses. Basic demographic, socio-economic and reproductive characteristics and data such as age, ethnicity, parity and

gravida was collected and then compared to the antenatal variables such as the number of weeks pregnant at first presentation and the number of consultations in each trimester including urgent attendance and threatened miscarriage claims. Descriptive studies are advantageous as they make use of routine collected health data. The results of the descriptive studies often provide the basis to investigate the determinants and inequalities that exist within the health sector. Farmer (2004) found descriptive research to be helpful in service planning; in previous year's health service planning determined on historical levels of provision. Helicon is an in house Pegasus Health application to handle electronic claims processing and reporting. Data were extracted from helicon and entered onto excel spreadsheet for manipulation. Cross sectional study describe the frequency of a particular attribute such as a specific exposure, disease or health related event in this instance pregnancy in a defined population or sample at a given point in time.

The cross sectional study was used within this research, to provide prevalence rates in different sub groups. In this instance pregnant adolescents within this study, to contrast the similarities and differences with pregnant adolescents and to test the hypothesis of disparity in trends and characteristics with adolescents compared to the pregnant adult population in attending and utilising antenatal care and initiation of care. Ebrahim's (2005) public health perspective cross sectional studies provide prevalence data that enable 'snapshots' of disease in a community, planning of health services, and monitoring of public health interventions and trends and changes in populations. Data were analysed using descriptive analysis with confidence intervals, and logistic regression analysis was applied using SAS statistical programmes in order to determine the association between different independent variables and the utilisation of antenatal care.

## **Data Collection**

Maternity data from Pegasus Health medical practices Medtech databases are sent electronically to Pegasus Health, which validates the files, and then transmits them to the MOH. The OLAP cube provided the following: variation of funding and claiming patterns for maternity consultations from Pegasus Health General Practices over the 2004-2005 & 2005-2006 period.

### **3.4.1 Tools used pivot table, OLAP cubes, Statistical analysis software (SAS) and Adequacy of Prenatal Care Utilisation index (APNCU)**

On Line Analytical Processing (OLAP), is an important tool that provides answers to analytical queries that are multidimensional in context, scope and range. The Pegasus Health databases configuration and integration of the OLAP tool, enable researchers and staff to make complex analytical assessments. Through a multidimensional data model, the researcher is able to assess correlations between age, ethnicity and parity and gravida on the outcome of pregnancy, number of weeks pregnant at first presentation to a general practitioner and adequacy of care received. Pivot tables and the OLAP cube tool provide demographic statistics for the different patient populations for specific projects such as maternity within Pegasus Health. Both the pivot table and OLAP cube provided flexibility to manipulate the data to assess the claims for funded maternity consultations with a Pegasus Health GP. The OLAP cube provided the researcher with a greater quantity of data while the pivot table tool had increased flexibility to manipulate the data. A logistic regression model of the maternity claiming data from the above sources, enabled extraction and analysis of the data using excel and then using the Statistical Analysis Software system version 8.2. Logistic regression methods assessed the variation of consultations in the pregnancy and because it provides information on the characteristics of the women (both adolescents



and adults). This technique enabled the researcher to control for variables such as age and ethnicity. Descriptive analyses investigated the cross sectional effects and chi-square statistics were used to compare the distribution across age and ethnicity strata. The level of statistical significance was taken as  $\leq 0.05$ .

### **3.4.2 Antenatal care indexes**

Several indexes have demonstrated the ability to assess the adequacy of antenatal care, and in the analysis of antenatal care. In this study, two indexes were used, the Kotelchuck APNCU index and Kessner model. Adequacy of antenatal care indexes is a measure of both access to antenatal care and frequency of antenatal care consultations; both indexes used within this research enable consideration of the total number of antenatal consultations, weeks pregnant at first initiation of antenatal care and gestational age at delivery. Two prominent models provide criteria and tools for evaluating the adequacy of antenatal care. The Kotelchuck index (adequacy of prenatal care utilisation (APNCU)) and the Kessner Index were used in this study. The antenatal utilisation (APNCU) index by Kotelchuck is an ideal tool to measure utilisation of antenatal care providing antenatal care timing by considering the number of antenatal consultations and gestational age at delivery. APNCU has four different categories of antenatal care these include intensive use, adequate, intermediate and inadequate. The APNCU index uses two prominent predictors in evaluating the adequacy of prenatal care, namely when antenatal care began (initiation of antenatal care) and the number of prenatal consultations from when prenatal care began until delivery (utilisation of services received).

The APNCU index classifies the adequacy of initiation of antenatal care into four categories: 1 and 2 months, 3 and 4 months, 5 and 6 months and 7 to 9 months with the underlying assumption, that the earlier the antenatal care begins the better. To

evaluate the adequacy of services, actual antenatal consultations were compared to the expected number of consultations for the period from when care began to the estimated date of delivery. The APNCU index is guideline and standards that are based from the American College of Obstetricians and Gynaecologists but is comparable to the World Health Organization guidelines for uncomplicated pregnancies. (The index adjusts for the gestational age when care began and for the gestational age at delivery.) The APNCU index by Kotelchuck (1994) provides an advantage over the Kessner index by evaluating and considering some weaknesses that existed in the previous index, including its failure to distinguish the inadequacy of care from late initiation into care and insufficient visits. The APNCU provides a useful tool to public health professionals, health care providers and health services researchers.

Table 2: APNCU Index: A ratio of observed to expected consultations is calculated and classified into three categories:

<b>Adequacy of care</b>	<b>Adequacy of initiation of antenatal care</b>	<b>Adequacy of received services (Number of consultations received)</b>	<b>Adequacy of Antenatal care utilisation index</b>	<b>Recommended consultations or guidelines*</b>
Inadequate Care	7 <sup>th</sup> month or later	Received less than 50% of expected consultations	< 50%	7 or less consultations
Intermediate Care	5 <sup>th</sup> or 6 <sup>th</sup> month	50-79% of expected consultations	50-79%	Between 8-10 Consultations
Adequate Care	3 <sup>rd</sup> or 4 <sup>th</sup> month	Received 80-100% of expected consultations	80-110%	Between 11-14 Consultations
Adequate Plus	1 <sup>st</sup> or 2 <sup>nd</sup> month	Received 110% or more of expected consultations	>110% of recommended visits	15 or more consultations

\*The recommended number of consultations for a normal pregnancy is 14 consultations (WHO) Adapted from Kotelchuck 1994 p1415

The strengths of using the Kotelchuck index with a primary health care claiming system, such as Pegasus Health's helicon programme provides, is the timing of the first consultations and the number of subsequent consultations. The Kotelchuck index also

shows women who are over- utilising maternity services more than the recommended care guidelines. However, the Kotelchuck Index appears to have a number of weaknesses as it does not measure the quality of antenatal care, uses recommendations for women with predominately-low risk pregnancies, and may not effectively measure the adequacy of care for high-risk women. The Kessner Index provides three different categories, adequate, inadequate, and intermediate for criteria components of prenatal care by assessing the timely initiation and frequency of antenatal care according to the gestational age of the baby. The Kessner adequacy categories were developed in accordance with recommendations of the World Health Organisation guidelines for antenatal care. However, it does not consider both the initiation and frequency of consultations. Adequate prenatal care must begin within the first trimester of the pregnancy and follow a prescribed number of antenatal consultations, inadequate care includes all women who start antenatal care after the sixth month of pregnancy and all women that had a low frequency of antenatal consultations.

Table 3: Criteria for adequacy of antenatal care using Kessner Index

<b>Adequacy of Care</b>	<b>Trimester of first Antenatal consultation</b>	<b>Gestation (weeks)</b>	<b>Number of prenatal consultations</b>	<b>Comments</b>
Adequate	First trimester (1-3 months)	-13 or less -14-17 -18-21 -22-25 -26-29 -30-31 -32-33 - 34-35 -36 or more	- and 1 or more or not stated - and 2 or more -and 3 or more -and 4 or more -and 5 or more -and 6 or more -and 7 or more -and 7 or more -and 9 or more	In addition to the specified number of consultations indicated for adequate care, the interval to the first antenatal consultation has to be within the 1 <sup>st</sup> trimester (13 weeks or less)
Inadequate	Third trimester (7-9 months)	-14-21 -22-29  -30-31  -32-33  -34 or more	-and 0 or not stated - and 1 or less or not stated -and 2 or less or not stated -and 3 or less or not stated -and 4 or less or not stated	In addition to the specified number of consultations that indicate inadequate care, all women who start care after 28 weeks (i.e. in the 3 <sup>rd</sup> trimester) are considered inadequate
Intermediate	Second Trimester	All combinations other than specified		

### 3.4.3 Prevalence and incidence rates

Prevalence and incidence rates provide a mechanism or tool to measure the occurrence of health related events. Both of these rates enable the researcher to

quantify the occurrence of the health related events, in this instance pregnancy, and occurrence of pregnancy related events such as outcomes and use of health services. Prevalence is defined by Ebrahim (2006) as the number of instances of a given disease or condition in a given population at a designated time.

Prevalence: 
$$\frac{\text{Number of existing cases in a defined population at a given point in time}}{\text{Number of people in the defined population at the same point in time}}$$

Ebrahim (2005) defines point prevalence as the prevalence based on a single examination at a fixed point in time and a period prevalence is defined as the prevalence over a stated period. Incidence is the defined rate at which new events occur in a population during a defined period.

Incidence risk 
$$\frac{\text{Number of new events in a defined population over a specified period of time}}{\text{Number of disease free people in that population at the start of the period}}$$

### **3.4.4 Mean**

The mean of a list of numbers is the sum of all the individuals within the sampled population of the list divided by the number of items in the list. This is relevant in providing comparisons and variations between the populations being studied.

### **3.4.5 Chi-squared test and Degrees of Freedom**

In statistics, the term degrees of freedom (DF) are a measure of the number of independent pieces of information on which the precision of a parameter estimate is based. The degrees of freedom for an estimate equal the number of observations (values) minus the number of additional parameters estimated for that calculation. As we have to estimate more parameters, the degrees of freedom available decreases. It

can also be thought of as the number of observations (values) which are freely available to vary given the additional parameters estimated. It can be thought of two ways: in terms of sample size and in terms of dimensions and parameters. A chi-square test is any statistical hypothesis test in which the test statistic has a chi-square distribution when the null hypothesis is true, or any in which the probability distribution of the test statistic (assuming the null hypothesis is true) can be made to approximate a chi-square distribution as closely as desired by making the sample size large enough. Specifically, a chi-square test for independence evaluates statistically significant differences between proportions for two or more groups in a data set.

### **3.5 Health Outcomes & Variables**

The primary outcome variable in this research is antenatal care utilisation. There are a number of measures that can be used when assessing the utilisation of antenatal care; these include total number of consultations, timely initiation of prenatal care and level of adequacy based on the Kessner and Kotlechuck indexes. Outcomes are often simplistic measures that are attributed to the quality of care. Within the context of this research, outcomes provide a basis for further research that will also consider community and social support network variables and genetic influences and variables. Issues of access (and utilisation as a proxy commonly used to measure access to a service) in comparison for pregnant adolescents and pregnant adults. Outcomes could predominately include birth, termination and miscarriage but also referred to preterm birth, immunisation, attending enrolled GP and subsequent pregnancies. An independent variable refers to one that can be predicted, while the dependent variable is the possible effect.

### **3.5.1 Preterm birth**

Preterm birth is used as a proxy attributing to inadequate care within this research. NICE (2003) refers to a preterm birth as the birth of a baby prior to 37 weeks gestation (less than 259 days) and is one of the largest contributors to neonatal morbidity and mortality in developed countries. Batchelor (2006) stated that approximately 5 to 8 percent of babies born in New Zealand are born before 37 weeks and are preterm babies. Pre-term labour cannot be prevented although it is difficult to assess since New Zealand does not have formal data collection for gestational age data at a national level. Some women are at a higher risk for pre-term labour. These risks include multiple pregnancies, bleeding in pregnancy, an abnormal uterus, previous preterm labour, low socioeconomic circumstances and lifestyle factors such as smoking. A significant number of studies both internationally (Lao 2000) and nationally (Woodward 2001) have compared the risk of preterm birth in adolescents and adults, and 24 of the 27 studies Lao investigated, found that the prevalence of preterm birth is considerably higher in adolescents than adults. The incidence rates of preterm labour in adolescent pregnancies remain higher compared to the general population. In Lao's Hong King Study, the incidence of preterm birth was inversely correlated with maternal age and the incidence was significantly high in the adolescents aged between 13 and 15 years of age. Research such as Lao's (2000) that an inherent risk of preterm delivery in adolescent mothers was the association of independent demographic factors. While actual maternal age appears to be a significant factor in preterm birth, the cause of preterm birth in adolescents could be attributable to biological immaturity. Preterm birth is a complex interaction of several factors, including maternal behaviour, nutrition, medical conditions and medical interventions. Other pregnancy outcomes such as termination and miscarriage were not included as an indicator of inadequate or adequate antenatal care.

### **3.5.2 Other factors: aetiology, health service planning and personal characteristics**

Aday (1998) confirms that there are a number of characteristics that affect individuals and populations access to health services, such as antenatal care. These include availability, organisation and financing of services, and predisposing characteristics of the population including basic demographic characteristics such as age and sex, social structural variables such as ethnicity and beliefs and knowledge about the specific disease, condition or illness.

### **3.5.3 Trends of antenatal care in primary health**

Simmers (2007) suggests that a general practitioner sees over 80% of women in the first instance for pregnancy. The NICE Antenatal care guidelines recommend that women access services early in pregnancy to benefit from antenatal screening. Appropriate antenatal care that is provided to women can enhance pregnancy outcomes by assessing risk, providing health care advice and managing chronic and pregnancy related health conditions, such as using screening tools to screen for diabetes.

### **3.5.4 Frequency of antenatal consultations**

International best practice suggests that seven antenatal visits are adequate for most normal pregnancies, (ten for a first pregnancy and seven for a subsequent pregnancy). Therefore, a schedule of antenatal consultations should be determined by the function of appointments. Current antenatal consultations policy was established in the mid 1920-1930's. As advances in clinical medicine and technology have occurred, amendments and additions have been made. Additional consultations have been included for screening purposes, although the significance of the frequency of antenatal



care consultations and intervals between them has not been tested scientifically until the WHO antenatal care randomised controlled trial in 1998. Currently, research by NICE (2003) on the optimum number of antenatal consultations is inconclusive. Many of the studies have not focused on the cost effectiveness or cost benefit of the number of antenatal appointments.

### **3.6 Subsequent pregnancy**

Raneri (2007) reinforces that women with multiple pregnancies in adolescence may experience medical, psychological and social complications. A subsequent pregnancy during adolescence is associated with challenges and poor outcomes for adolescent mothers and their children. Having a subsequent pregnancy during adolescence further increases these risks.

#### **3.6.1 Risk factors**

The chances or likelihood of an individual developing a disease or in this case falling pregnant may be enhanced by personal characteristics but not limited to age, ethnicity, personal habits and lifestyle choice, exposure to unsafe sexual practices and risk taking behaviour. Aday (1998) notes that age is a predisposing factor, and is significantly associated with all different types of health service use and provision including antenatal care provision and utilisation. However there are a number of barriers that exist, including the 'perceived' cost, substandard availability and organisational factors that influence utilisation of health services especially women seeking antenatal and maternity services. Aday (1998) states that while not discussed in this research, education is an important predictor of the use of preventative services for example better-educated women are more likely to have sought care early in their pregnancy. The influence of these predisposing factors on utilisation was remained relatively consistent over time. Farmer (2005) sees ethnicity as being often difficult to

disentangle the ethnic characteristics from a number of other factors, which affect the incidence of a disease or health condition. Ethnicity and having a regular source of care (i.e. attending your enrolled GP) are important predictors of the utilisation of health services. There are significant variations between ethnicities on the initiation of antenatal care. Aday's (1998) research suggests that contact with a regular GP or attending your enrolled GP or regular GP is a significant and consistent predictor of medical care utilisation, particularly with the initial decision to seek care. Having a regular identifiable provider directly influences the decision of whether to seek or not to seek care.

### **3.6.2 Unintended pregnancy**

An unintended pregnancy can be 'perceived' or seen as a barrier to receiving timely antenatal care because it may take a number of weeks or months for a woman to either realize or accept that she is pregnant. The consequences of an unintended pregnancy can have serious implications and health risks from lack or inadequate antenatal care and poor inter-pregnancy spacing.

### **3.6.3 Interactions of time, place and personal characteristics**

Frequently two or more factors correlate with the incidence of a disease and with each other. Within this research, the three variables evaluated include outcome of pregnancy, initiation of antenatal care and total number of consultations in both a GP LMC context and GP non-LMC context with the factors correlating to these being age, ethnicity and parity and gravida.

## **3.7 Secondary outcomes and variables**

### **3.7.1 Immunisation**

This research produced an unexpected outcome in immunisation rates, the well child and maternity contracted services better aligned to provide improved outcomes in terms of coverage and attendance for both postnatal checks and immunisation uptake in general practice. Improving the health of New Zealanders by reducing vaccine preventable diseases, such as hepatitis B, measles and influenza, is the key objective of the MOH's National Immunisation programme. Immunisation is one of the most effective actions we can take to safeguard the health of New Zealanders, and children and young people in particular. Immunisation not only prevents diseases, but also prevents the disability that can result from having the disease. Immunisations on the childhood schedule are free.

## 4. Results

A statistical summary of the results is provided below. The mean number of consultations, the standard deviation and range are provided for each type of consultation for group's, adults and adolescents. The findings discussed in this section focus on women's access to care and utilisation of health services including antenatal checks, looking predominately at the differences and similarities that exist between adolescents and adults and evaluating the relationship between age, ethnicity and first time mothers. Maternal variables were assessed, for an association with late initiation of antenatal care. Ethnicity, age, gravida and parity were associated with late initiation of antenatal care.

Table4: Overall results and variation between adolescent's and adults

Variable	Adolescents (n=528)	Adults (n=536)	Total Population
Mean Age (maternal)	17.6	29.9	23.89
Range of age (maternal)	12-19	20-48	12-48
<b>Ethnicity</b>			
Asian	13 (2.46%)	43 (8.02%)	5.26%
European	300(56.82%)	381 (78.1%)	64%
Maori	117 (22.16%)	48 (8.96%)	15.51%
Not stated	3 (0.57%)	6 (1.12%)	0.00
Other	61 (11.55%)	43 (8.02%)	10.62%
Pacific	34 (6.44%)	15 (2.8%)	4.61%
<b>Previous pregnancy</b>			
None	367 (69%)	200 (37%)	53%
1 or more	161 (31%)	336 (63%)	29.51%
<b>Total number of consults (mean)</b>			
Groups	2.69 (range 0-26)	2.99 (range1-21)	2.87 (0-26)
<b>Outcome of pregnancy</b>			
Birth	39% (n=210)	56% (n=299)	
Miscarriage	9% (n=49)	18.8% (n=99)	
Termination	47% (n=244)	16% (n=87)	
Pregnancy didn't continue	5% (n=23)	9% (n=50)	
Data incomplete	0.4% (n=2)	0.20% (n=1)	
<b>Gestation at delivery</b>			Mean 39.63 (27-42)
24-27 weeks	0.6% (n=1)	0.75% (n=2)	0.69%
28-36 weeks	11% (n=19)	9.9% (n=24)	9.84%
37-41 weeks	73 % (n=123)	81% (n=217)	77.80%
42 + weeks	15.4% (n=26)	9.25% (n=25)	11.67%
<b>1<sup>st</sup> presentation to GP (weeks pregnant)</b>			Mean 8.96 (1-36)
Prior to 8 weeks	68% (n=356)	74% (n=398)	N/A
Prior to 12 weeks	86% (n=454)	87% (n=466)	N/A
Less than 16 weeks	90.56% (n=478)	91.3% (n=489)	90.98%
Greater than 20 weeks pregnant	6.78% (n=36)	7.39% (n=40)	6.58%
<b>Additional Variables</b>			
Attended enrolled GP	66%	93%	
Immunisation of baby	69%	84%	
GP LMC	1.9% (n=10)	3.17% (n=17)	2.5% (n=27)

## 4.1. Socio-demographic characteristics of the women

This section provides the demographic data on and utilisation rates of women, both adolescents and adults, who attended a Pegasus Health general practitioner for a maternity related consult.

### 4.1.1 Age

Table 5: Age of women who attended a Pegasus Health GP for a maternity related consultation

Age in years	Number of Women	Population of adolescents (n=528) (0-19 yrs)	Population of adults(n=536) (20-45 + yrs)	Percent of Women
0-14 years	2	0.38%	N/A	0.19% *
15-19 years	526	99.60%	N/A	49.85%
20-24 years	98	N/A	18%	8.8%
25-29 years	115	N/A	21%	10.8%
30-34 years	178	N/A	33%	16.73%
35-39 years	110	N/A	20%	10.34%
40-44 years	31	N/A	6%	2.91%
45+ years	4	N/A	0.75%	0.38%
Total	1064	100%	100%	100%

\* Percentages do not add to 100% as a result of rounding error

The distribution of women according to age is provided in table 5. The age range was from the youngest at 12 years to the oldest being 52 years of age. Within the sample, the ages for adolescent's were 12-19 and for the stratified adult sample 20-49 years. In the adult women, one in three was aged 30-34 years, which is consistent with the national average of 30.4 years. One in five adult women were aged between 35-39 of age with over 50% of the adult cohort aged between 30-39 years, which is consistent with the trend of women having children later and the increase in fertility rates in New Zealand for women over the age of 30.

### 4.1.2 Ethnicity

Table 6: Ethnicity of women who attended a Pegasus Health GP for a maternity related consultation

	Adolescents	Adolescents	Adults	Adults	Current Christchurch Population*
Ethnicity	Frequency	%	Frequency	%	%
Asian	13	2.46	43	8.02	5.30
European	300	56.82	381	71.08	85.00
Maori	117	22.16	48	8.96	6.80
Not stated	3	0.57	6	1.12	2.80
Other	61	11.55	43	8.02	0.60
Pacific	34	6.44	15	2.80	2.30
Total	528	100.00	536	100.00	102.80

\* Source: Ethnicity of Christchurch according to census (2006) People could note more than one ethnicity therefore the total is greater than 100%.

Christchurch is becoming increasingly diverse, yet the vast majority of the adult cases (71%) are recorded as of European/Pakeha origin with the adult population not dissimilar to that represented in the 2001 census (refer to table six above) for Christchurch. Recent research from *Youth Sexual Health: Our Health, Our Issue* (NZPGPD) (2007) reports both Pacific and Maori adolescents are significantly overrepresented within the adolescent pregnant population. In fact, both Maori and Pacific adolescents have a pregnancy rate three times higher than European adolescents do. Maori women are more likely to be younger than women in other ethnic groups when they have their first or subsequent babies. Although Maori consistently have had a higher proportion of adolescent births, the reduction in adolescent births is attributable to an increasing rate of termination of pregnancy rather than a declining fertility rate.

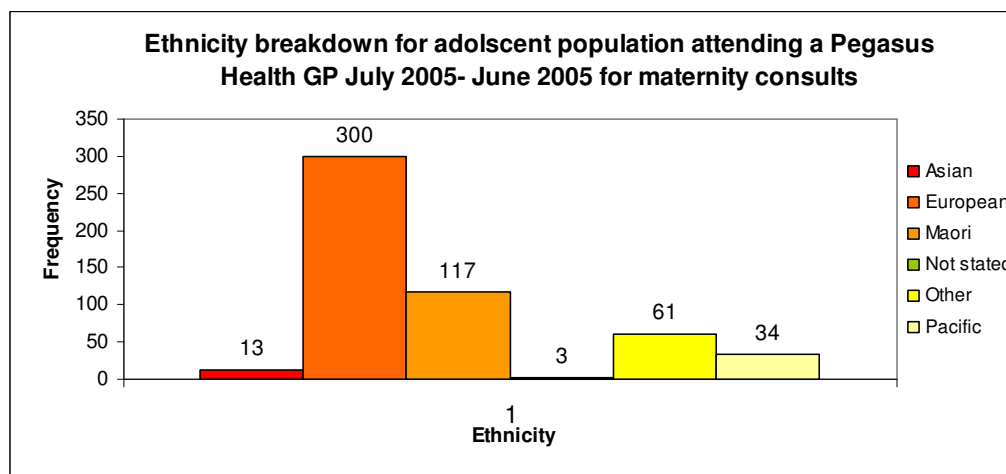


Figure 3: Ethnic breakdown of the adolescent population

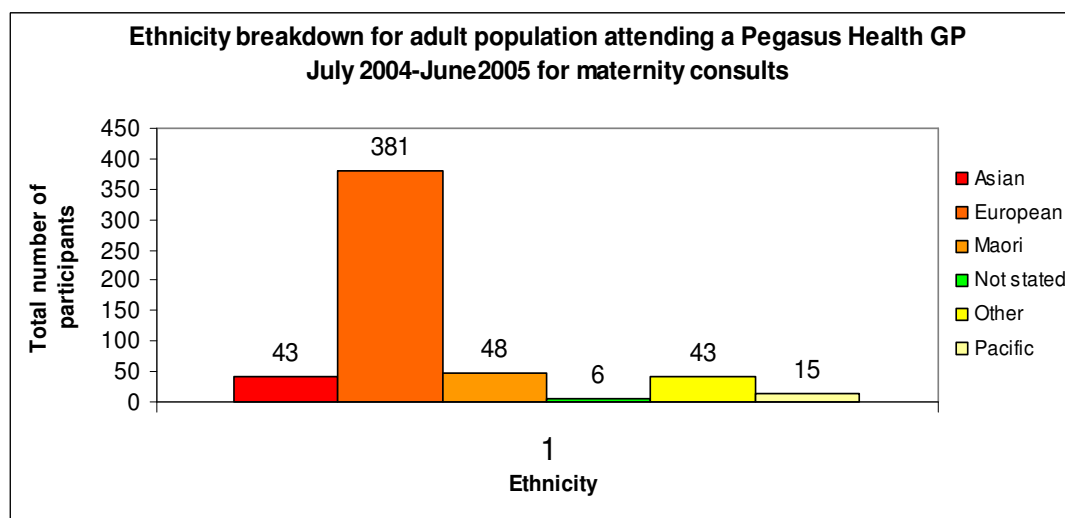


Figure 4: Ethnic breakdown of the adult population

#### 4.1.3 Parity and Gravida

The analysis by parity shows generally expected differences in patterns and utilisation of care and health services; however, the analysis on vulnerable groups such as adolescents provides a different perspective. There was a significant range and variation in gravida from first pregnancy to nine pregnancies, and parity from no previous live births to six live births. This variation or range was predominately within the adult pregnant population:

- 69% of adolescents were primigravidas (G: 1) while 35% of the adult population were pregnant for the first time.

- For 23% of adolescents this was their second pregnancy (G:2);
- 5% were pregnant for a third time (G:3),
- 3% were experiencing their fourth pregnancy (G:4),
- 89% had not previously given birth (this implies that of the 20% who had fallen pregnant previously, their pregnancy had not continued because of miscarriage or termination).

- 10% of the adolescents had already experienced a live birth (P:1) and 1% had two previous live births (P:2).

In contrast,

- 35% of the adult population were pregnant for the first time (G:1),
- for 30% this was their second pregnancy (G:2),
- 17% were pregnant for a third time (G:3),
- 8% were pregnant for a fourth time (G:4),
- 4% were pregnant for a fifth time (G:5),
- 3% were pregnant for the sixth time (G:6),
- 2% were pregnant for the seventh time (G:7),
- 1% of the adult population was experiencing their ninth pregnancy (G:9).

- Although 52% of the adult population had not previously given birth (P: 0),

(15% who had previously fallen pregnant during their reproductive life, the previous pregnancy had not continued because of a termination or miscarriage)



- 28% of the adults had experienced a previous live birth (P:1),
- 13% had two previous live births (P:2),
- 5% had three previous live births(P:3),
- 1% had four previous live births (P:4) ,
- 0.8% had five live births (P:5) and
- 0.2% had experienced six live births( P:6).

Gravida and parity are important components or proxies of evaluating antenatal care. Gravida and parity variables can have either a negative association and influence, or positive association and influence. Women who have high parity variables may have restricted or limited access to antenatal care because of parental roles of older children, and they may have problems organising childcare to attend consultations. Alternatively, they may feel that they are sufficiently organised in terms of previous knowledge and education for the current pregnancy. Women with low gravida variables may also have a negative association with initiation to antenatal care as a result of lack of education and knowledge.

Table 7: Gravida and Parity differences between population groups of adolescents and adults

<b>Gravida</b>	<b>Adolescents (%)</b>	<b>Adults (%)</b>	<b>Parity</b>	<b>Adolescents (%)</b>	<b>Adults (%)</b>
<b>1</b>	69.5	37.31	<b>0</b>	89.02	52.23
<b>2</b>	23.11	29.29	<b>1</b>	10.04	28.36
<b>3</b>	4.73	16.98	<b>2</b>	0.92	12.69
<b>4</b>	2.65	7.84	<b>3</b>	0	4.66
<b>5</b>	0	3.54	<b>4</b>	0	1.12
<b>6</b>	0	2.61	<b>5</b>	0	0.75
<b>7</b>	0	1.68	<b>6</b>	0	0.19
<b>9</b>	0	0.75	<b>0</b>	0	0
<b>Total</b>	100	100	<b>Total</b>	100	100

Overall, 89% of adolescent pregnancies do not continue within this cohort, 10% have experienced one previous live birth and 1% has experienced two live births prior to the current pregnancy. Adult women were more likely to have had previous live births compared with adolescents.

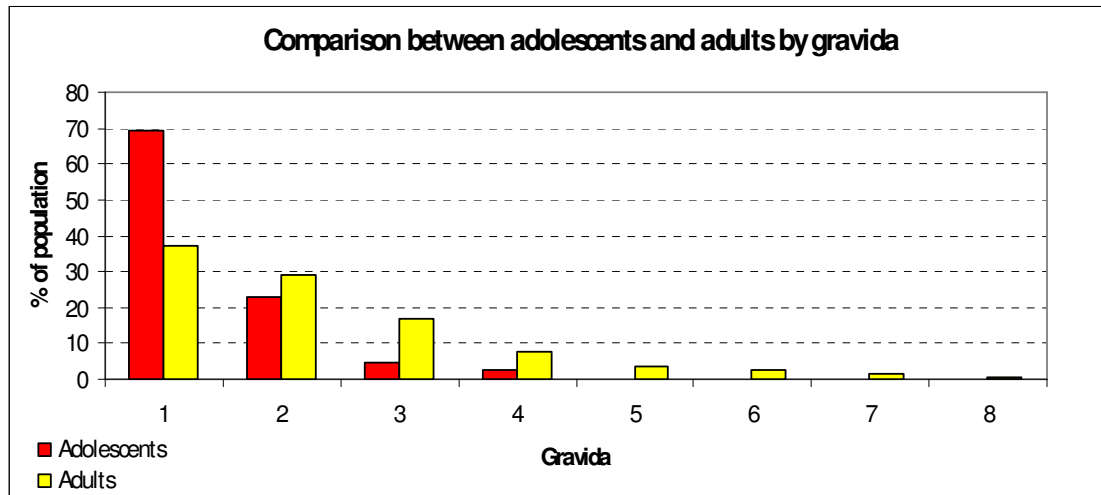


Figure 5: Comparison between adolescents and adults by gravida

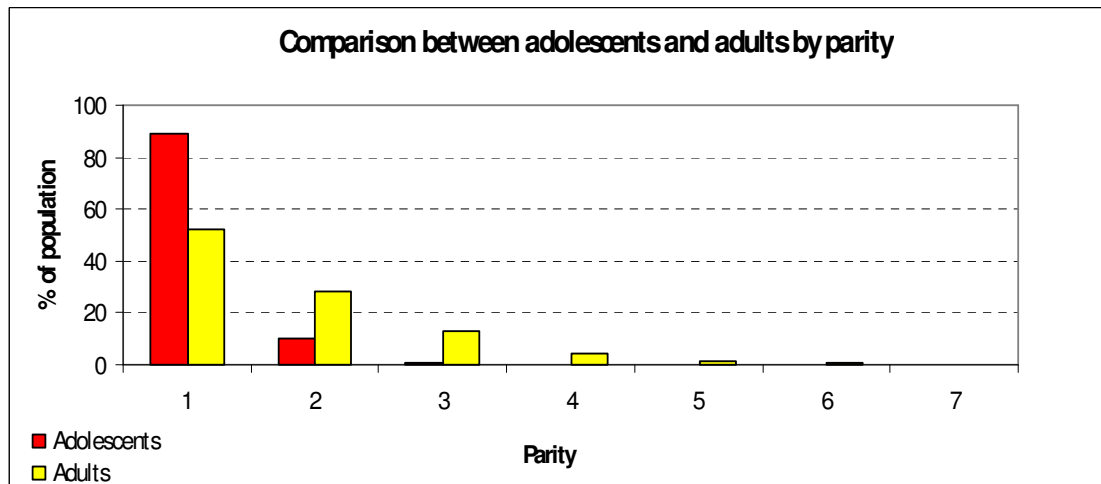


Figure 6: Comparison between adolescents and adults by parity

## 4.2 Primary outcomes and variables

Table 8: Primary outcomes of pregnancy

Outcome	Adolescence Frequency	Percentage	Adults Frequency	Percentage
Birth	210	39.77	299	55.78
Miscarriage	49	9.28	99	18.47
Termination	244	46.21	87	16.23
Baby information incomplete	11	2.08	18	3.36
No antenatal care registered	2	0.38	0	0
Pregnancy did not continue	12	2.27	33	6.16
<b>Total</b>	<b>528</b>	<b>100</b>	<b>536</b>	<b>100</b>

There is a statistically significant difference in primary outcomes between adolescents and adults ( $\chi^2 = 125.5$ ,  $p < 0.001$ ). The highest variation is in the three-fold increase in the rate of termination between adolescents and adults. Where 47% of the adolescent population ended their pregnancy by termination, only 16% of adults chose to terminate their pregnancy. While there was a two-fold increase in miscarriage for adults (19%) compared to adolescents (9%), this implies that there may be slight underreporting in the adolescents population with miscarriage as a result of an early miscarriage in that adolescents may not have realised that they were pregnant. In comparing the outcome of pregnancy between birth and other categories there is a statistically significant difference between adolescents and adults with 39.77% of the pregnant adolescents giving birth compared to 55.78% of pregnant adults giving birth,  $df = 1$ ,  $\chi^2 = 27.3249$ ,  $p < 0.0001$ . A contributing factor associated with 40% of adolescent pregnancies resulting in live births is the prevalence of terminations. For adults, a contributing factor associated with 56% of pregnancies resulting in live births is predominately miscarriages followed by terminations, where for this cohort of women 16% terminated confirmed pregnancies.

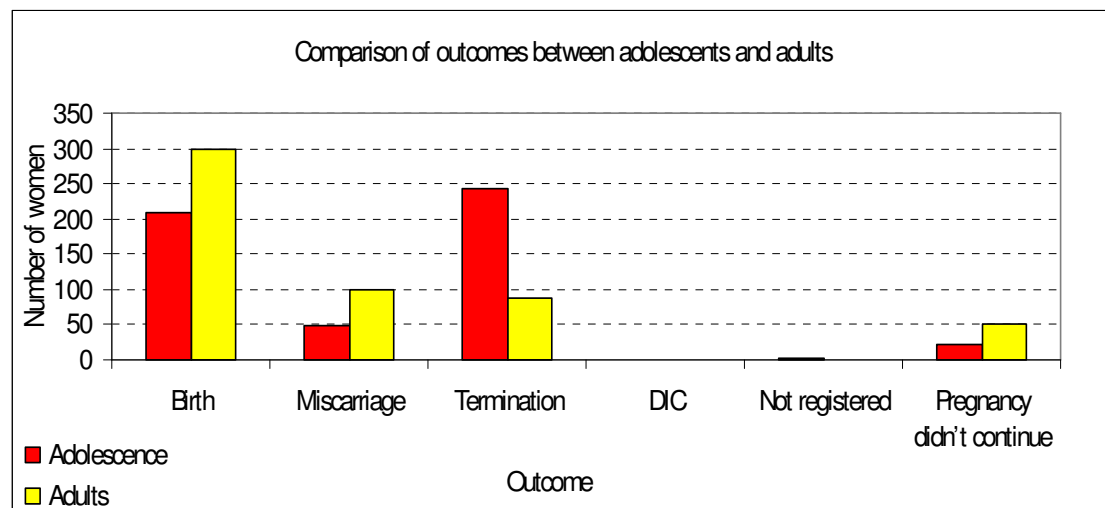


Figure 7: Comparison of pregnancy outcomes between Adolescents and Adults

For both groups within the adolescent cohort (14 and under, 15-19 yrs.) and for the adult cohort (20 years and older) there is a statistically significant difference in the outcome of pregnancy,  $\chi^2=18.63$ ,  $P<.0001$ . For the adolescent (15-19 age group) 42% of the pregnancies ended in a live birth compared to 55% of the adult cohort. Termination or miscarriage in the 15-19 year age group accounted for 58% of the birth outcomes compared to 45% of adults.

#### 4.2.1 Birth

The positive impact of antenatal care on birth outcomes is well known; 48% (n=509) of the cohort population had a birth as a pregnancy outcome. The incidence rate of birth for the adolescent population was 37%; the adolescents who presented to a Pegasus Health GP during the specified timeframe for a maternity related consult gave birth. In contrast, 56% of adults who presented to a Pegasus Health GP during the specified timeframe for a maternity related consult gave birth.

Table 9: Variations in the birth outcome of a pregnancy between adolescents and adults by ethnicity

<b>Birth</b>	<b>Adolescence (n=528)</b>	<b>Adolescents %</b>	<b>Adults (n=536)</b>	<b>Adults %</b>
Asian	1	0.05	16	5.38
European	114	54.3	224	74.92
Maori	58	27.7	24	8.03
Not stated	0	0	4	1.33
Other	16	7.6	22	7.33
Pacific	21	10.3	9	3.01
<b>Total</b>	210	99.95	299	100

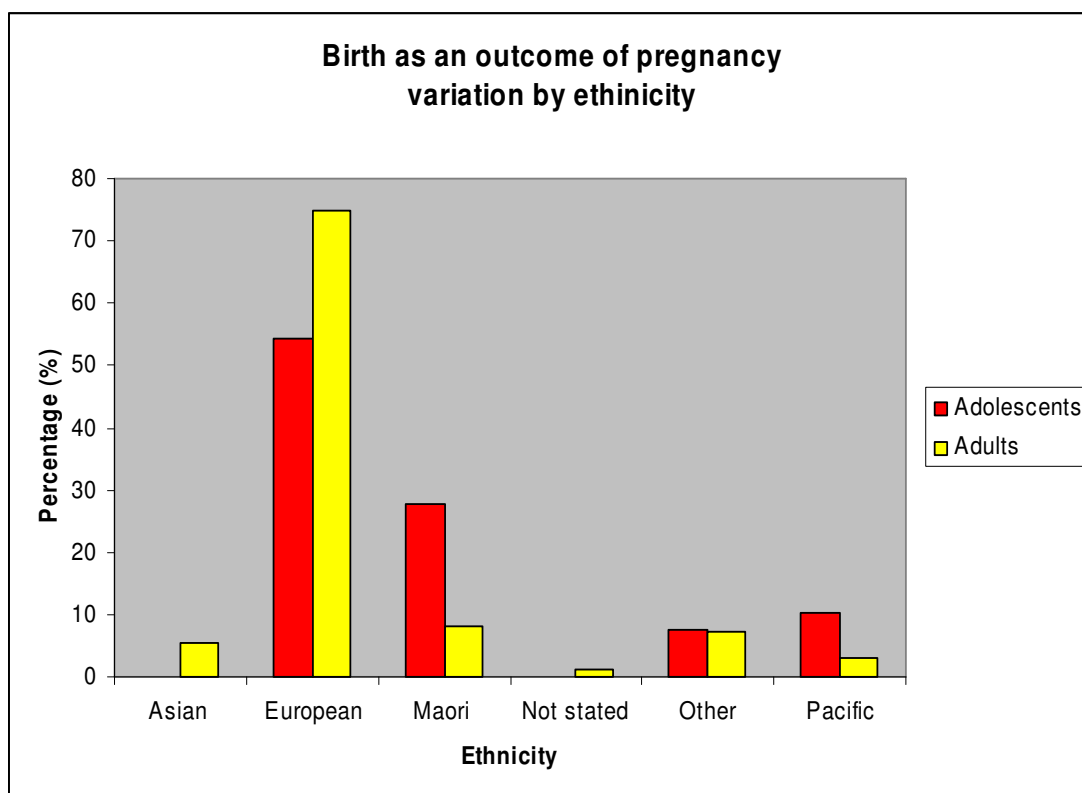


Figure 8: Variations in the birth outcome of a pregnancy between adolescents and adults by ethnicity

In the adolescent cohort, approximately

- 10 in 100 births were to Pacific adolescents,
- 28 in 100 were to Maori adolescents and
- 54 in 100 were to European adolescents.

By comparison,

- 3 in 100 adult women who gave birth were Pacific,
- 8 in 100 births were to Maori adult women and
- 75 in 100 births were to European adult women.

This result is consistent with the trend that Pacific and Maori women give birth at an earlier age compared to European women. Figure eight (above) shows that current research and associated outcomes provide an accurate and consistent view of pregnancy outcomes in society. Overall, adults are more likely to continue with their

pregnancy as 56% of all confirmed adult pregnancies ended in a birth, compared to 36% of adolescents. An additional point to note is the differences that exist between the adolescents in terms of ethnicity. Only one Asian adolescent within the study population continued with the pregnancy, while there were a number of Maori and Pacific adolescents that continued with their pregnancy. This could reflect the acceptance and social support networks that are prevalent in these groups and the way that cultural values and beliefs influence such pregnancy outcomes. For women with a normalised gestation at birth of 37-41 weeks (n=340), Asian women (85.71%) were more likely to first present and initiate antenatal care prior to 16 weeks gestation compare to Pacific women (60%). Only 7.1% of Asian women first presented and initiated antenatal care after 20 weeks compared to 40% of Pacific women who first initiated antenatal care after 20 weeks gestation. This was a statistically significant result  $\chi^2=26.19$ ,  $p<0.001$ .

#### 4.2.1.1 Preterm birth

Preterm birth is used as a proxy to indicate the adequacy of antenatal care, though such associations between young maternal age and preterm birth remains questionable.

Table 10: Gestation at birth by weeks for the total sample population (n=437)

Gestation	Frequency	Percent	Cumulative Frequency	Cumulative Percent
24-27 weeks	3	0.69	3	0.69
28-36 weeks	43	9.84	46	10.53
37-41 weeks	340	77.80	386	88.33
42 weeks and above	51	11.67	437	100.00

Table 11: Gestation at birth by weeks for adolescents and adults

Gestation	Adolescents (n=169)	Percent	Adults (n=268)	Percent
24-27 weeks	1	0.6%	2	0.75%
28-36 weeks	19	11%	24	9%
37-41 weeks	123	73%	217	81%
42 weeks and above	26	15.4%	25	9.25%

Gestation at birth by weeks for the total sample population (n=437) that gave birth 38% were adolescents (n=169) while 62% (n=268) were adults.

For the women with a gestation of 28-36 weeks at birth (n=43), three adults and five adolescents presented for their first antenatal consultation after 20 weeks gestation, even though more adolescents presented later this was not statistically significant,  $\chi^2=2.71$ ,  $p>0.05$ .

The percentage of babies delivered preterm (less than 37 completed week's gestation) was only 0.69% for the total population. It is interesting to note that there was a higher prevalence of preterm birth in weeks 24-27 in the adult population. While 27% of adolescent births are outside the normalised gestation period of 37-41 weeks, only 19% of adult births are outside this range. It is important to note that there is an evident bias in pregnancies that end in preterm delivery as most antenatal visits take place in the third trimesters and thus the number of 3rd trimester visits in preterm pregnancies is often small.

#### **4.2.2 Termination**

Both adolescents and adults in Asian, Pacific and Maori ethnic groups are over represented in the termination statistics. This study reinforces this and provides consistently aligned results with national comparisons, that the most common age of having terminations is 20-24 years. The mean age for this selected population of adults is 27 years while the mean age for this population of adolescents having a termination is 17.6 years. The mean age for adults within this selected population is marginally higher than the national mean age of between 20-24 years. This result excludes adolescents from the totals, as they have been sampled separately from the adult group. If both groups, adolescents and adults, were combined the age range for terminations would be 13.8 years to 42.5 years, and the mean age of a woman having a termination would

be 20.02 years, which is consistently aligned to the lower range of age within the national comparison of 20-24 years.

Table 12: Termination of Pregnancy by ethnicity

Termination	Number	Percentage (%)	Cohort (%)*
Asian	22	6.60	5.26
European	195	58.50	64.00
Maori	57	17.20	15.00
Not Stated	3	0.90	0.00
Other	42	12.60	10.64
Pacific	14	4.20	4.60
Total	333	100.00	100.00

\*Termination rates by ethnicity mirror the ethnicity composition of the cohort.

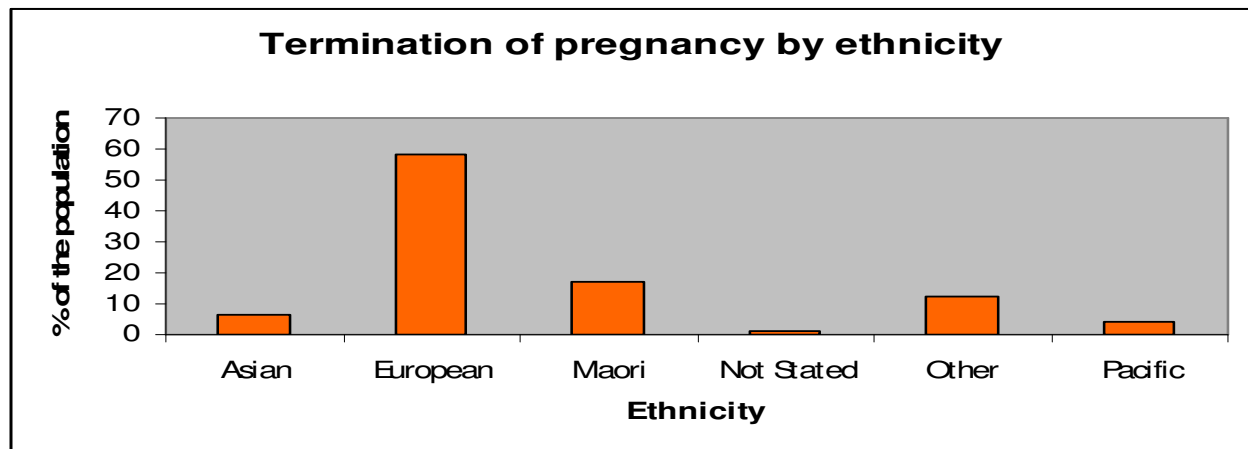


Figure 9: Termination of Pregnancy by ethnicity

Table 13: Termination of pregnancy by ethnicity and group (adolescents and adults)

Termination	Adolescents	Adolescents %	Adults	Adults %
Asian	10	4.10	12	13.79
European	148	60.66	50	57.47
Maori	41	16.80	11	12.64
Not stated	2	0.01	1	1.15
Other	33	13.52	9	10.34
Pacific	10	4.10	4	4.60
Total	244	100.00	87	100.00



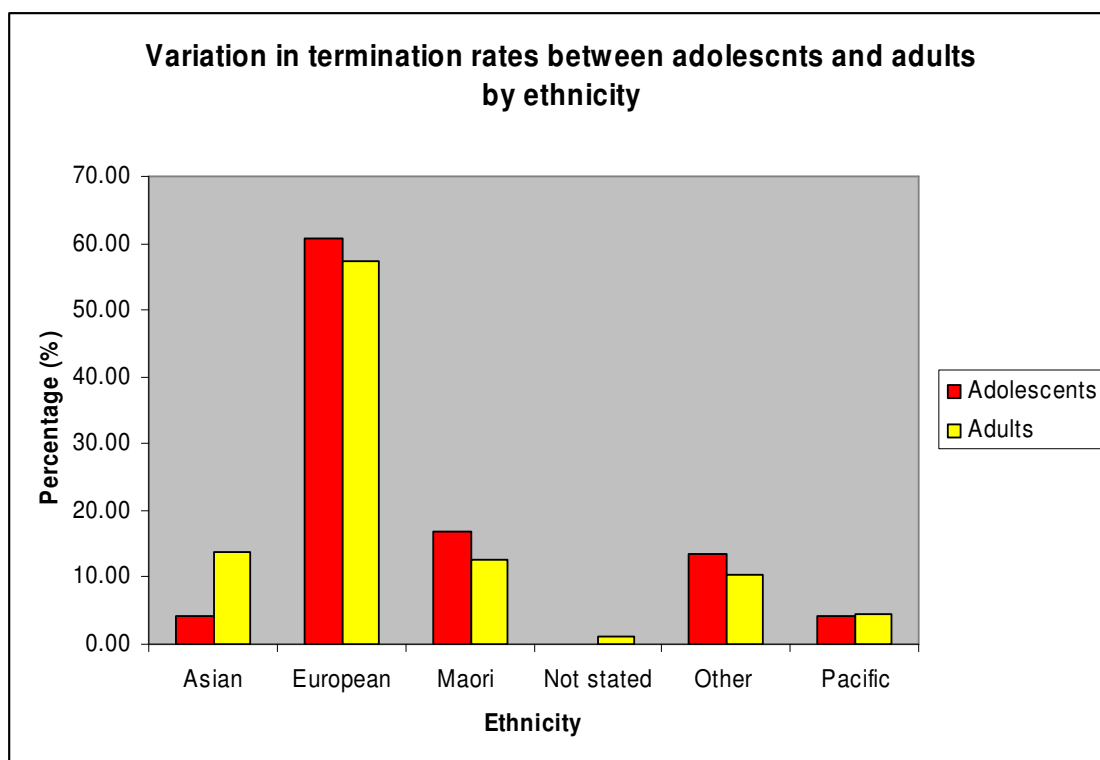


Figure 10: Termination of pregnancy by ethnicity and group (adolescents and adults)

Surprisingly, for pregnancies that ended in termination, Asian adolescents accounted for 4%, however Asian adults accounted for 14% of all adult terminations in this cohort. Previous research (Naish 2004) highlights the significant increase in the number of adolescents terminating pregnancies, and adolescents within this study are closely aligned to their national counterparts reinforce this; over 47% of adolescents within this study terminated their pregnancy compared to 16% of the adult population being studied.

### 4.2.3 Miscarriage

Table 14 & Figure 11 results show that more Pacific and Maori adolescents miscarry compared to their adult counterparts, but fewer European adolescents miscarry compared to their adult counterparts.

Table 14: Miscarriage of pregnancy by ethnicity and group (adolescents and adults)

Miscarriage	Adolescents	Adolescents %	Adults	Adults %
Asian	1	2.04	9	9.10
European	28	57.14	73	73.73
Maori	11	22.45	6	6.05
Not stated	1	2.04	1	1.01
Other	6	12.24	9	9.10
Pacific	2	4.09	1	1.01
<b>Total</b>	<b>49</b>	<b>100.00</b>	<b>99</b>	<b>100.00</b>

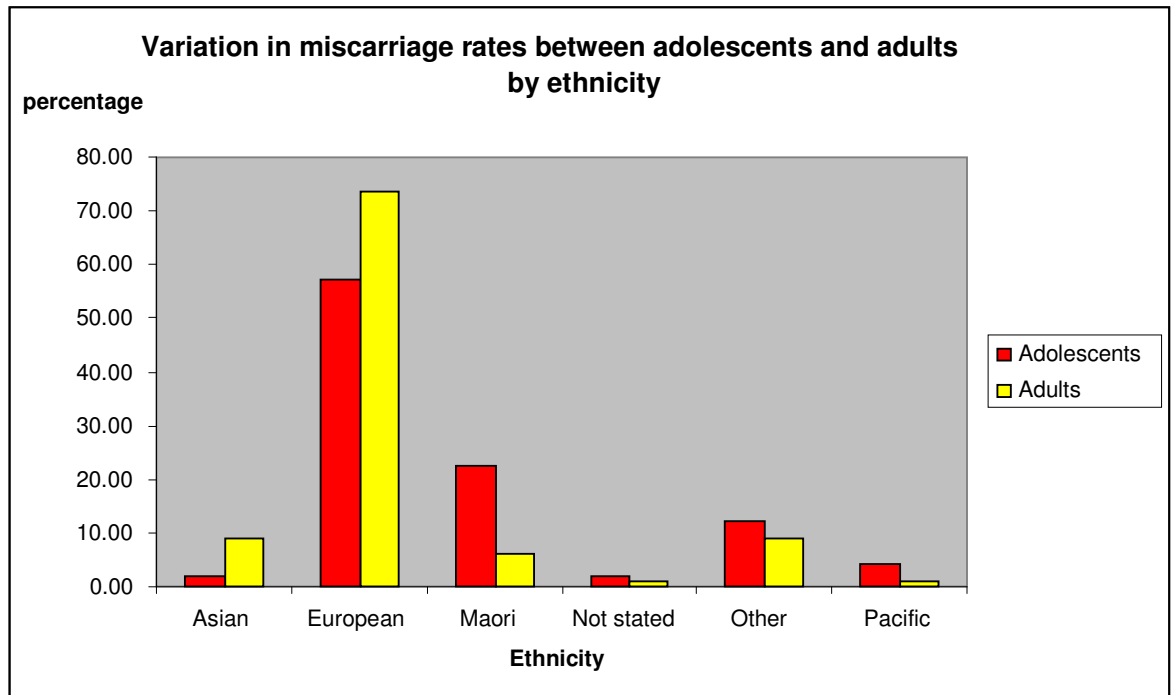


Figure 11: Miscarriage of pregnancy by ethnicity and group (adolescents and adults)

Further research is required in this field to understand the relationships determining these reported ethnicity results. This table and figure illustrate one of the common complications of pregnancy, a miscarriage, up to one in four pregnancies ending in miscarriage (Ministry of Health, 2006). This research is consistent with the well-established and evidential risk of miscarriage, which increases with maternal age; miscarriage is twice as prevalent in the adult cohort population, with 19% of pregnancies ending in miscarriage compared to 9% of pregnancies in adolescent cohort. The greatest variance in miscarriages occurs between the adolescents and

adults of European origin while Maori adolescents within this study are at higher risk than Maori adults. Overall, there was no increased risk of miscarriage related to late initiation of antenatal care and an inadequate number of consultations.

### **4.3. Frequency and timely initiation of antenatal care**

The NICE antenatal care guidelines recommend that women access services early in pregnancy to benefit from antenatal screening. Data are presented in relation to access early in pregnancy; 87% (n=5682) of the 6498 women who gave birth in Christchurch within the specified timeframe presented to a Pegasus Health General Practitioner at least once during their pregnancy.

There was no significant difference between the group of women, adolescents and adults in initiation of antenatal care, 6.78% of adolescents and 7.39 % of adults initiated their antenatal care late, or at an inadequate level after 20 weeks gestation. Timely initiation of antenatal care (within the first trimester i.e. prior 12 weeks) is optimal as it provides the woman and health providers with a number of opportunities to identify and treat health problems and change health compromising behaviour. Alcohol consumption and smoking is potentially damaging during the early stages of pregnancy when significant foetal development is occurring.

While there are extreme cases for both adolescents and adults, the consensus and societal view is that older women are more likely to receive early antenatal care than adolescents are. When presenting prior to 8 weeks, 74% of adults present before they are eight weeks compared to 68% of adolescents, and there have been a number of improvements with initiation of early antenatal care for both population groups. By 12 weeks, (end of the first trimester) both cohorts are highly comparable, both presenting at 86% and 87% respectively.

Table 15: Total Population (n=1064) weeks pregnant at first presentation

Weeks pregnant at first presentation	Frequency (n)	Percent	Cumulative Frequency	Cumulative Percent
Less than 16 weeks	968	90.98	968	90.98
16-20 weeks	26	2.44	994	93.43
Greater than 20 weeks	70	6.58	1064	100.00

Table: 16 Timing of contact with GP in week's gestation

Initiation to antenatal care	Adolescents (n=528)	Adults (n=536)
Presented to GP prior to 8 weeks	68% (n=356)	74% (n=398)
Presented to GP prior to 12 weeks	86% (n=454)	87% (n=466)
Presented GP after 12 weeks	14% (n=74)	14.55% (n=70)
Presented up to 16 weeks	90.56% (n=478)	91.3% (n=489)
After 20 weeks	9.78 (n=36)	7.39% (n=40)

68% of adolescents and 74% of adults presented to a General Practitioner within six of pregnancy, with smaller proportions taking longer to realise that they were pregnant: 86% of adolescents and 87% of adults presented to a Pegasus Health GP within the first trimester (i.e. within 12 weeks). This result was not statistically significant,  $\chi^2 < 1$ ,  $p > 0.05$ , NS. Minimal difference exists between adolescents and adults and between women who presented to a Pegasus Health general practitioner for a maternity related consult during the specified timeframe.

Table 17: Ethnicity Variation in initiation of antenatal care

	Asian	European	Maori	Other	Pacific
Presented to GP prior to 12 weeks	91% (n=51)	87% (n=590)	81% (n=133)	88% (n=99)	71% (n=35)
Presented to GP after 12 weeks	9% (n=5)	13% (n=91)	19% (n=32)	12% (n=14)	29% (n=14)
Total	100 (56)	100 (681)	100 (165)	100 (131)	100 (49)

There was a statistically significant difference,  $df = 4$ ,  $\chi^2 = 13.38$ ,  $p = 0.0095$ , illustrating significant variations between ethnic groups, with the most prominent being the Pacific women (see Figure 12 below).

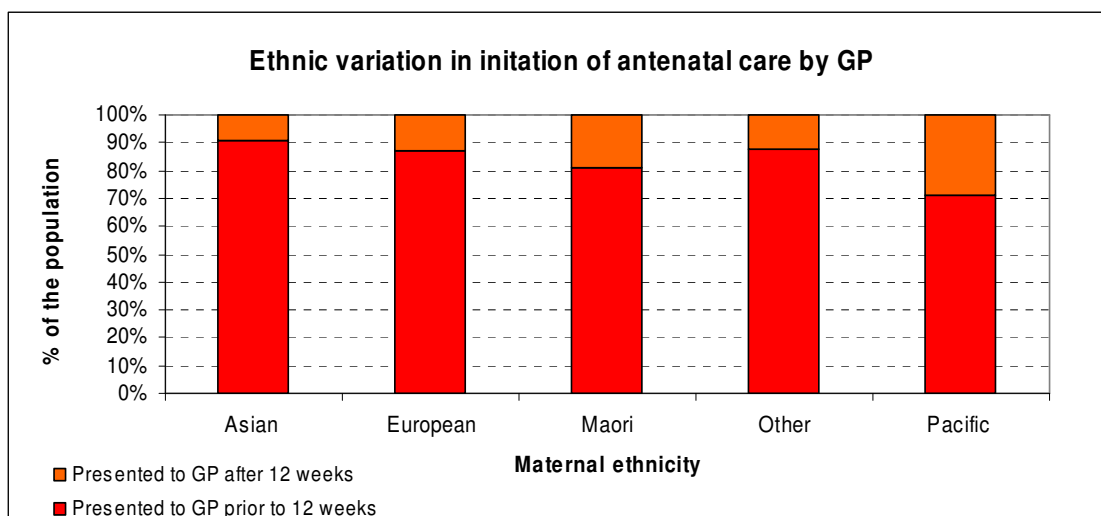


Figure 12: Ethnic variation in initiation of antenatal care

Ninety one percent of Asian women initiated antenatal care by presenting to a GP prior to 12 weeks gestation compared to 71% of Pacific women. By comparison, only 9% of Asian women initiated antenatal care by presenting to a GP after 12 weeks compared to 29% of Pacific women. This represented a statistically significant difference in presentation by ethnicity,  $\chi^2=13.39$ ,  $p<0.01$ . Despite similarities between both groups (adolescents and adults) informed decision making about first trimester antenatal screening and attendance to a maternity health care provider requires improvement. Pacific and Maori women have a tendency to present later, which may be seen as normal cultural practice. These women view pregnancy as a normal life course event requiring little or minimal medical intervention. Further research is required to elaborate on this.

### 4.3.1 Total Maternity Consultations by claiming codes variation

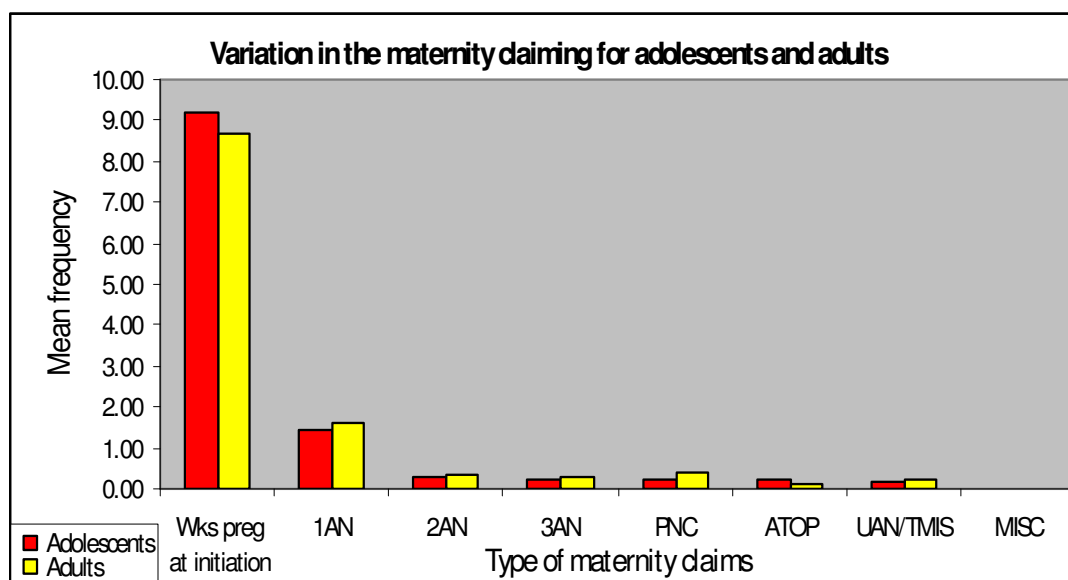


Figure 13: Maternity claiming variations between adolescents and adults

Table 18: Mean number of maternity claims

Claiming Codes for Maternity Consultations	Mean number for adolescents	Mean number for adults
Wks pregnant at initiation (weeks)	9.20	8.69
1 <sup>st</sup> Trimester (1AN)	1.45	1.61
2 <sup>nd</sup> Trimester (2AN)	0.29	0.32
3 <sup>rd</sup> Trimester (3AN)	0.25	0.31
Postnatal Consult (PNC)	0.24	0.38
Assessment prior to termination (ATOP)	0.24	0.12
Urgent attendance (UAN/TMIS)	0.20	0.24
Attendance at Miscarriage (MISC)	0.02	0.02

Figure 13 and Table 18 confirms the similarities that exist between adolescents and adults; there are minimal differences that are not statistically significant between the groups. Pregnant adults present only marginally earlier overall when initiating antenatal care; adults initiated antenatal care from a Pegasus Health GP at 8.69 weeks compared to adolescents at 9.20 weeks. Notable differences include the assessment prior to termination consultations; adolescents had a two-fold increase of 0.24 compared to 0.12 for adults. This is comparable to the different outcomes of pregnancy with regard to the number of pregnancies that end in terminations for adolescents. Consequently,

postnatal consultations for adults showed a 1.5 fold increase. This indicates the number of postnatal consults allocated for births compared to two postnatal consultations following a miscarriage or termination under the MOH maternity claiming schedule.

### 4.3.2 APNCU Index

Receiving timely initiation (prior to 12 weeks) and a consistent number of antenatal consultations increases the likelihood of optimal pregnancy outcomes for both mother and baby. Adequate antenatal care determines the initiation of antenatal care (number of weeks pregnant when a woman first presents to a health professional) and the appropriate number of consultations during a woman's pregnancy. Inadequate antenatal care poses a greater risk for pregnancy complications and adverse pregnancy outcomes. The Kessner and Kotelchuck (1994) indexes were utilised in determining the adequacy of antenatal care for the adolescent and adult populations.

Table 19: Adequacy of antenatal care components

Trimester	Month	Weeks	Adequacy Level
First (1AN)	One	1-4 weeks	Adequate Plus
	Two	5-8 weeks	
	Three	9-13 weeks	Adequate
Second (2AN)	Four	14-17 weeks	
	Five	18-21 weeks	Intermediate
	Six	22-26 weeks	
Third	Seven	27-30 weeks	Inadequate
	Eight	31-35 weeks	
	Nine	36-40 weeks	

Table 20: Comparative of adequacy of antenatal care between adolescents and adults

Adequacy rating	Adolescents (n)	Adolescents %	Adults (n)	Adults %
Adequate Plus	361	68%	398	74%
Adequate	125	24%	96	18%
Intermediate	21	4%	17	4%
Inadequate	18	4%	22	4%
<b>Total</b>	<b>525 *</b>	<b>100%</b>	<b>533</b>	<b>100%</b>

\*missing three women for each group had no consult data on the initiation of antenatal care

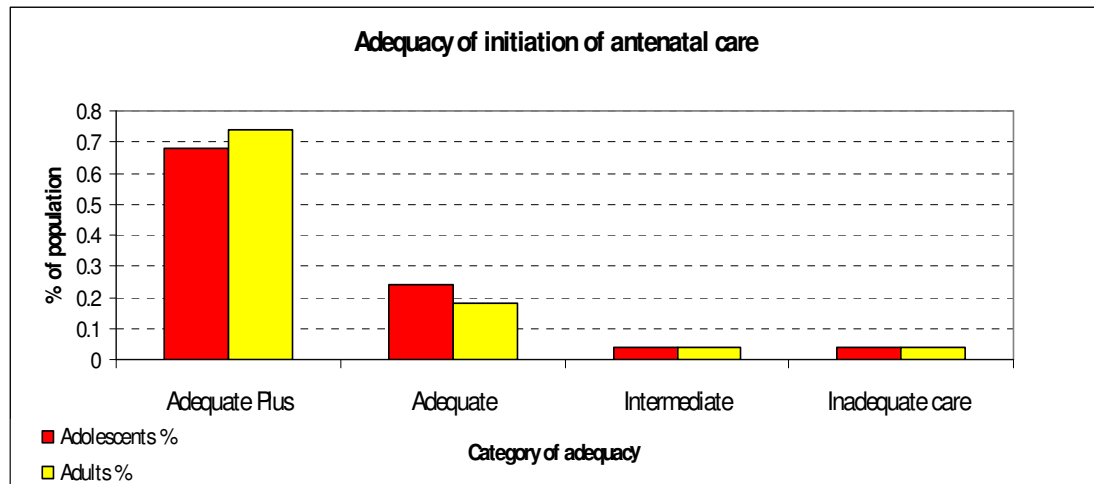


Figure 14: Comparison of Adequacy of initiation of antenatal care for adolescents and adults

Ninety six percent of adolescents and adults receive adequate care during pregnancy, and only 4% of the cohort population studied received inadequate care. There were small variations between adolescents and adults in the adequate plus and adequate categories: 68% of adolescents received adequate plus care, while 74% of adults received adequate plus care. Twenty four percent of adolescents received adequate care and 18% of the adult population received adequate care.

The mean number of weeks pregnant at first presentation for adolescents, who scored adequate plus rating, was 6.3 weeks; there was a range of 1- 8 weeks while the mean for adults was 5.9 with a range of 1-8 weeks. When assessing one of the three aspects the variation between both adolescents and adults is minimal. As the continuity of antenatal care is fragmented, the adequacy of initiation of antenatal care by health professional, a GP is the only component of the adequacy index that can be used in this cohort. The mean number of weeks pregnant at first presentation for adolescents, who scored an adequate rating, was 11.02 weeks (range 9-17weeks). The mean number of weeks pregnant for the adults in this category was 11.38 weeks (range 8-17 weeks). Both adolescents and adults received corresponding percentages for adequacy of antenatal care in the intermediate and inadequate care categories. Adolescents and



adults on both occasions had 4% intermediate care and 4% inadequacy antenatal care as a result of the number of weeks pregnant when they first presented to a Pegasus Health GP or initiated antenatal care.

The range for women who scored an intermediate level of care was 18-26 weeks; the adolescents mean was 23 while the adults mean was 22 weeks. The mean number of weeks pregnant at first presentation for adolescents who scored an inadequate score was 36 weeks, with a range of 28-36 weeks while the adults mean was marginally better with 34.52 weeks with a range of between 27-36 weeks. There was minimal variation between the adolescents and adults. However, within this research there is limited scope to ascertain the context and reasons for the differences in receiving adequate antenatal care, which proves that only 4% of both populations are receiving inadequate care. In fact, this suggests that inequalities in the health service utilisation, provision and access in relation to antenatal care amongst other health services does exist, not necessarily as a result of age determinants, but reveals outcomes that are more closely aligned towards the socioeconomic and ethnic differences and disparities that are prevalent within society.

Table 21: Ethnic differences amongst adolescents with adequacy of antenatal care

Adolescents (number)	Asian	European	Maori	Not Stated	Pacific	Other	Total
Adequate Plus	10	210	76	1	20	42	359
Adequate	2	72	29	2	4	17	126
Intermediate	0	9	8	0	4	1	22
Inadequate	1	9	3	0	4	1	18
Total	13	300	116	3	32	61	525

\*Missing 3 women from the adolescents population data information incomplete

Adolescents (percent)	Asian	European	Maori	Not stated	Pacific	Other
Adequate Plus	76.92	70	65.52	33.3	62.5	68.85
Adequate	15.39	24	25	66.7	12.5	27.87
Intermediate	0	3	6.9	0	12.5	1.64
Inadequate	7.69	3	2.58	0	12.5	1.64
Total	100	100	100	100	100	100

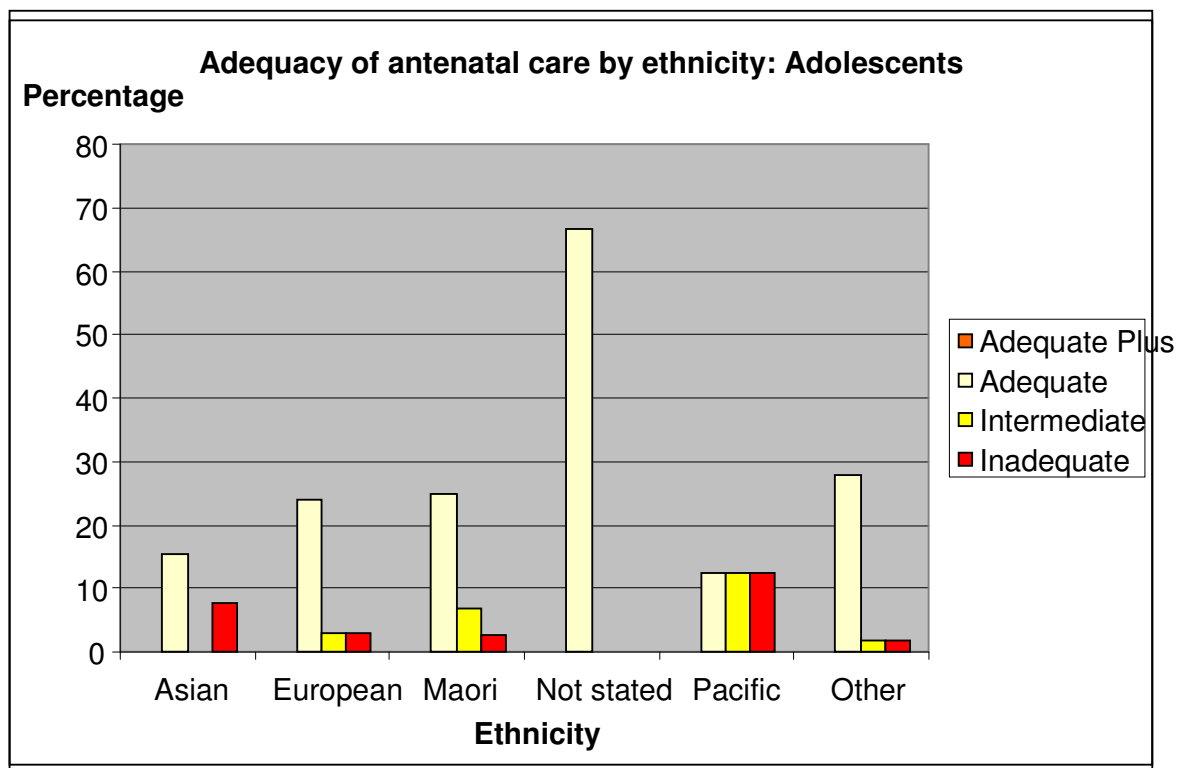


Figure 15: Ethnic differences amongst adolescents with adequacy of antenatal care

Figure 15 provides a comparison of antenatal care adequacy ratings for adolescents by ethnicity. It demonstrates the adequacy of care that is received by adolescents, 68% of adolescents receive adequate plus care, and 70% of the adequate plus population are European. Only 3.5% of all adolescents receive inadequate

antenatal care. The most vulnerable or disadvantaged group, who received inadequate antenatal care is the Pacific adolescents. Twelve and a half percent of the Pacific adolescent population received inadequate care. This is a significant finding, as the Pacific adult population does not appear to experience this difficulty. This needs further investigation to ascertain the barriers to care experienced by this group.

Table 22: Ethnic differences amongst adults with adequacy of antenatal care

<b>Adults (n)</b>	Asian	European	Maori	Not Stated	Pacific	Other	Total
Adequate Plus	34	292	33	2	8	27	396
Adequate	8	60	11	3	3	12	97
Intermediate	0	10	3	0	4	0	17
Inadequate	0	17	1	1	0	4	23
<b>Total</b>	42	379	48	6	15	43	533

\* Missing 3 women from adult population data information incomplete

<b>Adults (%)</b>	Asian	European	Maori	Not stated	Pacific	Other
Adequate Plus	81	77	68.8	33.3	53.3	62.8
Adequate	19	15.8	22.9	50	20	27.9
Intermediate	0	2.6	6.3	0	26.7	0
Inadequate	0	4.6	2	16.7	0	9.3
<b>Total</b>	100	100	100	100	100	100

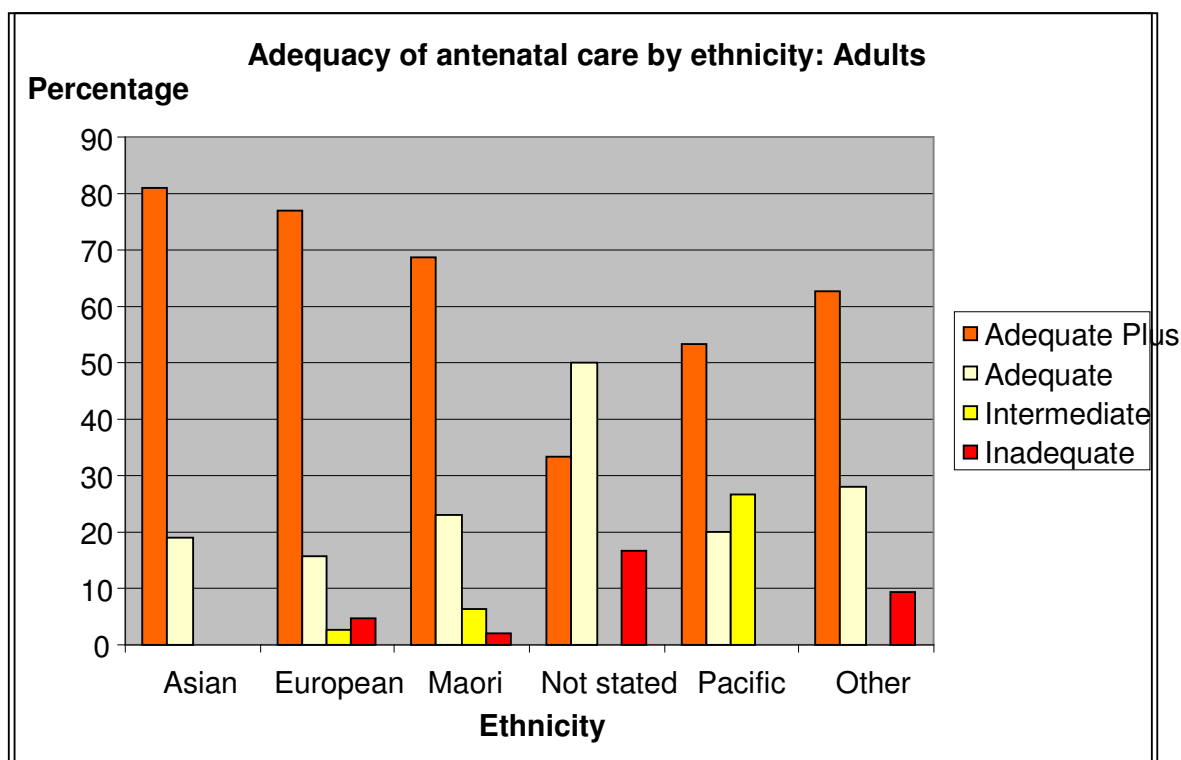


Figure 16: Ethnic differences amongst adults with adequacy of antenatal care

Figure 16 provides a comparison of antenatal care adequacy ratings for adults by ethnicity. It demonstrates the adequacy of care that is received for adults; 74% of adults receive adequate plus care, 74% of the adequate plus population are European. Significantly, adults appear to have a higher inadequacy rating; 4.3% of adults receive inadequate antenatal care compared to 3.5% for adolescents. The group with the highest prevalence in this instance is the European adults who comprise 74% of the inadequate population. This justifies further investigation to ascertain the barriers to care. Importantly, there are a number of different barriers for each ethnic and age group. Ultimately, antenatal care provision requires individualisation for each woman. The ethnicity group with the greatest inadequacy of care is the 'other' ethnicity this indicates the need to provide antenatal care that is appropriate for each women with regard to cultural and language barriers that may exist and belief customs from different ethnicities.

### 4.3.3 Total number of consultations from a Pegasus Health GP during pregnancy

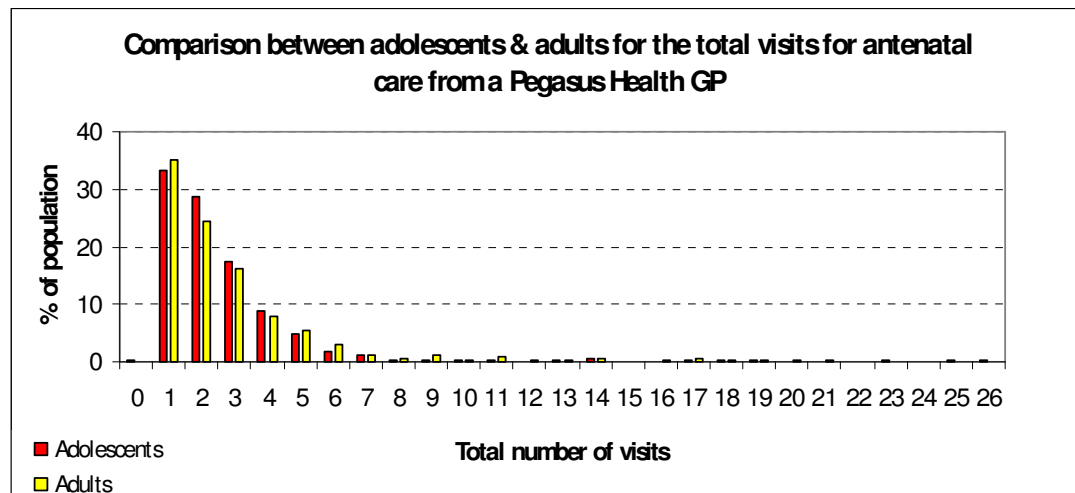


Figure17: Variation between adolescents and adults in the total number of consultation provided during a pregnancy

There is no statistically significant difference between adults and adolescents in the total number of consultations with a GP over the pregnancy period,  $df=23$ ,  $\chi^2=24.018$ ,  $p>0.05$ .

Table 23: Variation between adolescents and adults in the total number of consultation and type of consultation provided during a pregnancy

Total number of Consultations	1AN		2AN		3AN		ATOP		UAN/TMIS		MISC		PNC	
	Adolescents	Adults	Adolescents	Adults	Adolescents	Adults	Adolescents	Adults	Adolescents	Adults	Adolescents	Adults	Adolescents	Adults
0	25.86	19.59	83.46	84.89	92.97	90.67	78.86	87.87	82.7	81.34	98.29	98.32	81.56	71.46
1	32.7	37.13	10.46	7.46	3.04	4.66	23.57	11.57	14.64	15.11	1.52	1.68	14.83	22.39
2	22.24	23.51	2.85	2.8	1.71	1.12	0.57	0.56	2.28	2.43	0.19	0	2.47	3.92
3	11.98	10.26	1.33	2.97	0	0.19	0	0	0.38	0.56	0	0	0.38	1.49
4	5.13	6.15	0.95	1.12	0.19	0.19	0	0	0	0.37	0	0	0.57	0.19
5	1.14	1.86	0.38	0.19	0.38	0.56	0	0	0	0.19	0	0	0.19	0.19
6	0.57	0.56	0.38	0.19	0	0.56	0	0	0	0	0	0	0	0.37
7	0.19	0.37	0	0	0.76	0.93	0	0	0	0	0	0	0	0
8	0	0.19	0.19	0.19	0.19	0.56	0	0	0	0	0	0	0	0
9	0.19	0.19	0	0	0	0.37	0	0	0	0	0	0	0	0
10	0	0	0	0	0.19	0.19	0	0	0	0	0	0	0	0
11	0	0	0	0	0.19	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0.19	0.19	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0.19	0	0	0	0	0	0	0	0	0
16	0	0.19	0	0	0	0	0	0	0	0	0	0	0	0
Total	100	100	100	100	100	100	103	100	100	100	100	100	100	100

There is a statistically significant difference in the variation of the total number of consultations with a Pegasus Health GP during pregnancy, when controlling for ethnicity,  $df=92$ ,  $\chi^2=143.55$ ,  $p=0.0005$ .

There are no statistically significant differences between adolescents and adults when controlling for age relative to the total number of consultations for the pregnancy outcomes. Nevertheless, there are statistically significant differences apparent in the ethnic groups,  $df=92$ ,  $\chi^2=143.558$ ,  $p=0.0005$ . The total visits by ethnicity controlling for the adolescents and adult groups is statistically significant.

#### 4.3.4 Total number of consultations during antenatal care

Table 24: Funded maternity services: Statistical summary for total population ( $n=1064$ ) who attended a Pegasus Health GP for a maternity based consult between 1<sup>st</sup> July 2004 and 30<sup>th</sup> June 2005

Antenatal Services	Mean Adolescent Consultations (n=528)	Range (min value- max value)	Mean Adult Consultations (n=536)	Range (min value- max value)
1 <sup>st</sup> trimester consultation	1.45	1-9	1.61	1-16
2 <sup>nd</sup> Trimester consultation	0.29	1-8	0.32	1-14
3 <sup>rd</sup> trimester consultation	0.25	1-15	0.30	1-10
Assessment prior to termination (ATOP)	0.24	1-2	0.12	1-2
Urgent Attendance (UAN) & Threatened Miscarriage (TMIS)	0.20	1-1	0.24	1-5
Miscarriage (MISC)*	0.02	1-2	0.02	1-1
Postnatal consult (PNM/PNB)	0.24	1-6	0.38	1-6
Total	2.69		2.99	

\*a miscarriage claim (MISC) has to occur in GPs presence hence the small number of claims for the number of miscarriages that actually occur

Adolescents tend to have fewer first trimester (1AN) consultations compared to adults. The mean number of adolescents consultations during the first trimester was 1.45 (with a range of 1-9) compared to 1.61 (range from 1-16) for adult population. The small number of Pegasus Health GP 1<sup>st</sup> trimester consultations may be a result of adolescents accessing alternative health services such as Family Planning and the 198

Youth Health Centre. There was not a statistically significant difference in the number of 1AN consultations between adolescents and adults,  $\chi^2=10.67$ ,  $p=0.38$ , Non Significant result.

There are extreme variations in the number of first trimester antenatal consultations for both cohorts. This may be a result of discussions with GP concerning the continuation of pregnancy, assessment prior to termination, first trimester spotting, monitoring of other pregnancy related complications such as HCG levels, high risk and high anxiety pregnancy requiring reassurance and advice. The results show that there is a marked consistency between the two groups when presenting to a GP for confirmation of a pregnancy. In fact, for most adolescents fear about confidentiality and embarrassment is less of a barrier than previously perceived. Overall, this research confirms pregnant adolescents accessed a general practitioner (GP) to some extent more frequently than adults, although there is not a statistical difference between the two populations. There were two notable differences in accessing a GP. For the assessment prior to termination (ATOP) consultations, adolescents were twice as likely as adults to access the GP for this model of care. Consequently, this indicates the termination rates and variations in the outcomes of pregnancy for adolescents. There was also a difference in postnatal care consultations where the adult population accessed this model of care 1.5 times more frequently than adolescents. Once more, this confirms that the postnatal care is more frequently provided after a birth rather than a miscarriage or termination, which is more prominent within the adult population.

Seventy-four percent of adolescents and 80% of adults had first trimester claims (1AN) (see Appendix 8.1 for figures) which were used in this study as a proxy for initiation of antenatal care. Adolescents overall had fewer first trimester consultations; the range and variation in the number of first trimester claims varied from 0-9 for adolescents and 0-16 for adults. Only 17% of adolescents and 15% of adults attended

a Pegasus Health GP in their second trimester (2AN). This indicates that either the pregnancy was terminated by the second trimester or a lead maternity carer such as a midwife has been registered.

There is a significant decrease in the number of women presenting to a GP in their third trimester (often it is for a medical emergency and is claimed differently). Only 7% of adolescents and 9% of adults attended a Pegasus Health GP during their third trimester, due to the unavailability of their midwife or lead maternity carer.

The urgent attendance (UAN) or threatened miscarriage (TMIS) consultations are more prevalent in the adult population. With a range of 1-3 for adolescent and 1-5 for adults respectively, 83% of adolescents and 81% of adults do not present to a GP for an urgent attendance, however there is an increase in the frequency/range for adults. There are similar presentation rates for one consultation (14.64% for adolescents and 15% for adults), two consultations (2.28% and 2.43% respectively), three consultations (0.38% for adolescents and 0.56% for adults), 0.37% of adults have four consultations and 0.19% of adults have five. As a woman's age increases the risk of miscarriage also increases, and indicative of the increased number of threatened miscarriages (TMIS) consultations for adults compared to adolescents.

#### 4.3.5 Postnatal Care

Table 25 Postnatal consultations by the total population (adolescents and adults combined)

Postnatal consult (PNC)	Frequency	Percentage	Cumulative Frequency	Cumulative percent %
0	812	76.46	812	76.46
1	198	18.64	1010	95.1
2	34	3.2	1044	98.33
3	10	0.94	1054	99.25
4	4	0.38	58	99.62
5	2	0.19	4060	99.81
6	2	0.19	1062	100
<b>Total</b>	1062	100	1062	100



Table 26: Postnatal consultations by adolescents and adults.

Postnatal Consultations	Adolescent Frequency %	Adult Frequency %
0	81.56	71.45
1	14.83	22.39
2	2.47	3.92
3	0.38	1.49
4	0.57	0.19
5	0.19	0.19
6	0	0.37
<b>Total</b>	100	100

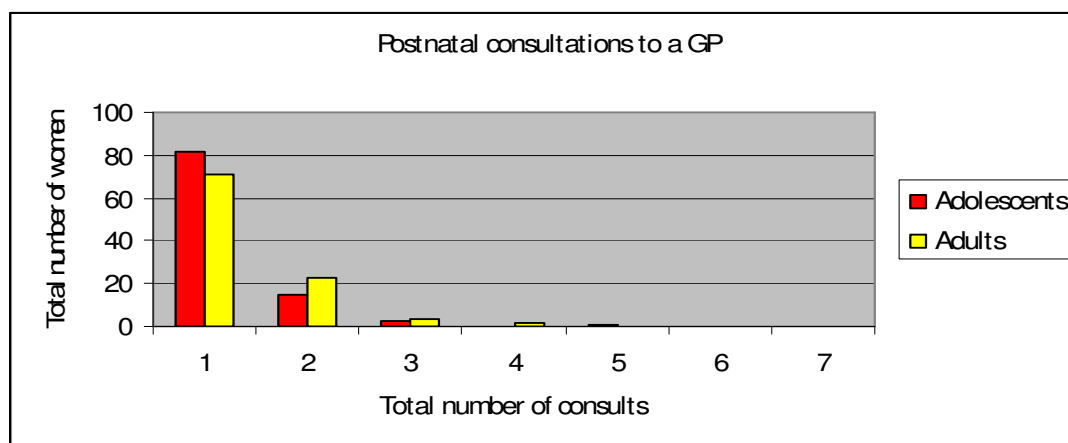


Figure18: Total number of postnatal consultations

Eighty-two percent of adolescents and 72% of adults did not have a postnatal consultation with a general practitioner after birth. The variation and range between adolescents (0-5) and adults (0-6) within this sample may reflect the 27 women who had a Pegasus Health GP as their lead maternity carer and consequently affects the research context of postnatal consultations. The minimal number of postnatal consults for GPs is consistent with the current scope and practice GPs have within the context of maternity care in New Zealand, as predominately midwives and other LMC such as obstetricians would claim the majority of the six postnatal claims. One needs to consider that postnatal consults (PNC) are inclusive of consults after birth, miscarriage and termination and are inclusive of postnatal mother check and postnatal baby check consultations.

## 4.4 Secondary outcomes and variables

### 4.4.1 Subsequent Pregnancy

Three and a half percent of the adult cohort (19/536) and 5% of the adolescent cohort (26/525) had 47 subsequent pregnancies within the research timeframe of July 2004-June 2005. There are a number of predictors that influence subsequent pregnancies that cannot be assessed from the current data available and this requires further research. These include the frequency of use of terminations as a form of contraception, the ideal recovery time from a miscarriage in order to gain optimal health both physically and mentally before trying to conceive again, and the education and knowledge about contraception after a birth while breastfeeding.

Table 27: Subsequent pregnancy rates of initiation to antenatal care

<b>Presentation rate of subsequent pregnancy</b>	<b>Adolescents %</b>	<b>Adults %</b>
No Change from previous pregnancy to subsequent pregnancy	19	10
Later presentation to GP for subsequent pregnancy	33	50
Earlier presentation to GP for subsequent pregnancy	48	40
Total	100	100

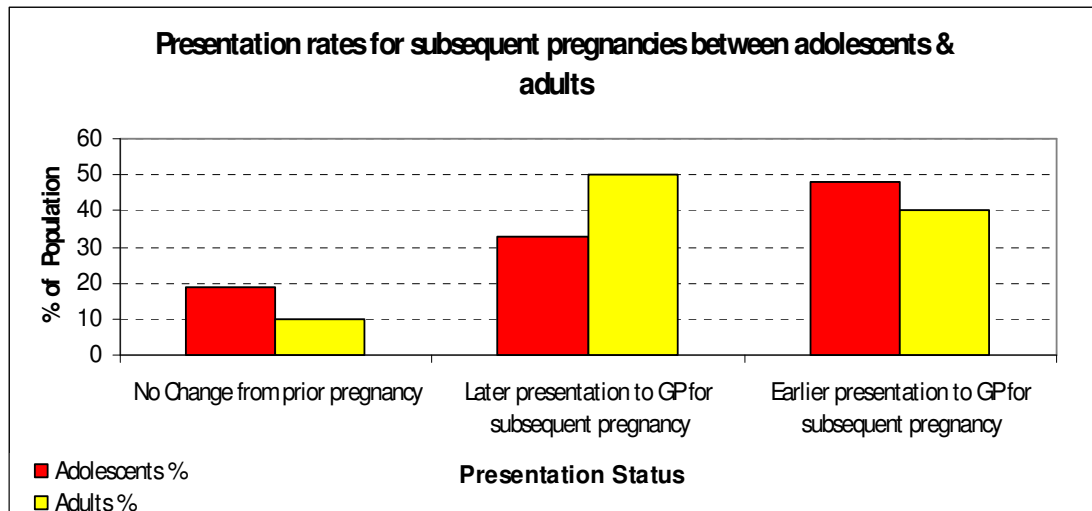


Figure19: presentation rates for subsequent pregnancies variations between adolescents and adults

In the subsequent pregnancies, adolescents appear to present earlier than adults. This may be a result of a natural learning process where adolescents may not have received optimal or adequate antenatal care in their first or previous pregnancy and that the importance of early antenatal care has been emphasised. An additional reason for earlier presentation to a GP may be a result of better connectedness to general practice. The variations in service utilisation may be a result of several factors including a lack of understanding about services that are available to them both antenatal and postnatal. Adults present later in a subsequent pregnancy and this may be a result of having trust and confidence in the process and service provision. The outcomes of subsequent pregnancies may reflect a number of factors and influences in society. One factor that needs to be considered with adults is return to the workforce and career focus. Many adults plan to become pregnant as their age increases, personal insistence to have a baby or subsequent pregnancy within short succession, which may be justified with age barriers.

The outcomes of subsequent pregnancies for adolescents are contextually different. There is an increase of risk taking behaviour with alcohol and unprotected sex. Despite the small number of multiple pregnancy episodes within the specified timeframe there are significant differences between adults and adolescents.

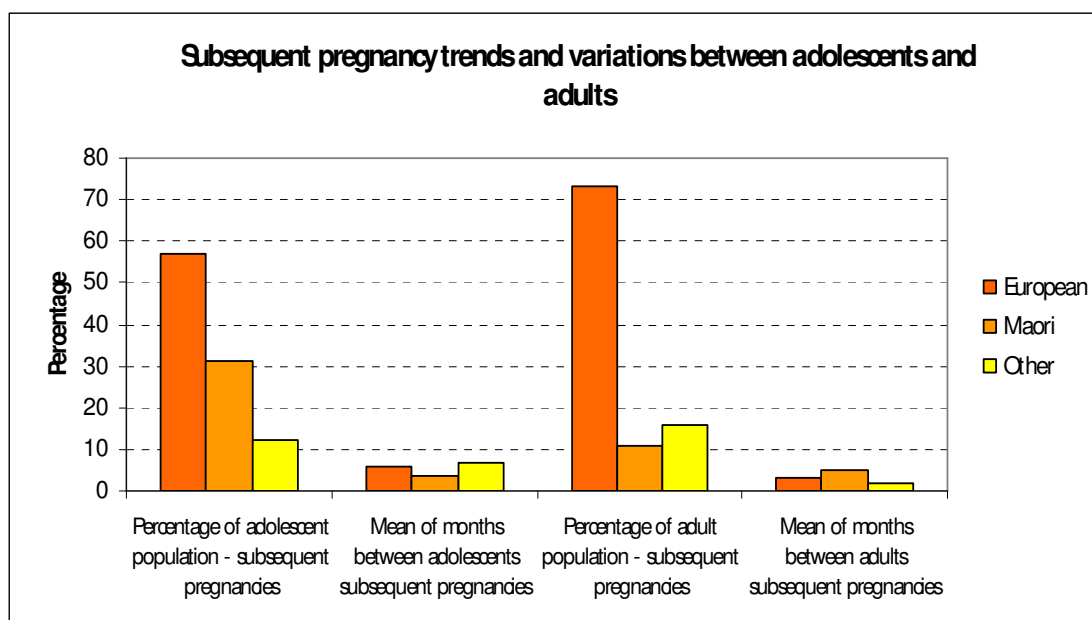


Figure 20: Subsequent pregnancy trends and variations by ethnicity

Table 28: Ethnicity differences in subsequent pregnancies

Ethnicity	European	Maori	Other
Percentage of adolescent population – subsequent pregnancies	57	31	12
Mean of months between adolescents subsequent pregnancies	5.90	3.40	7.00
Percentage of adult population - subsequent pregnancies	73	11	16
Mean of months between adults subsequent pregnancies	3.07	5.00	1.75

With regard to subsequent pregnancies, this research shows that, despite the small numbers

- 57% of births are to European adolescents compared to 73% of births are to European adults,
- 31% are to Maori adolescents and 11% are to Maori adults,
- 12% are to other ethnic adolescents and 16% are to other ethnic adults.

This provides an alternative context and scope to initiation of antenatal care and a number of options to reduce unintended pregnancies and subsequent pregnancies.

Table 29: Differences in the outcomes of pregnancies and subsequent pregnancies by adolescents and adults

<b>Outcomes of pregnancy &amp; Subsequent pregnancies</b>	<b>Adolescents</b>	<b>Adults</b>
Birth then Birth	6	2
Birth then Miscarriage	2	0
Birth then Termination	2	0
Termination then Birth	1	1
Termination then Miscarriage	1	0
Termination then Termination	6	2
Miscarriage then Birth	5	10
Miscarriage then Miscarriage	2	3
Miscarriage then Miscarriage then Miscarriage	0	1
Miscarriage then Miscarriage then Birth	1	0
<b>Total</b>	<b>26</b>	<b>19</b>

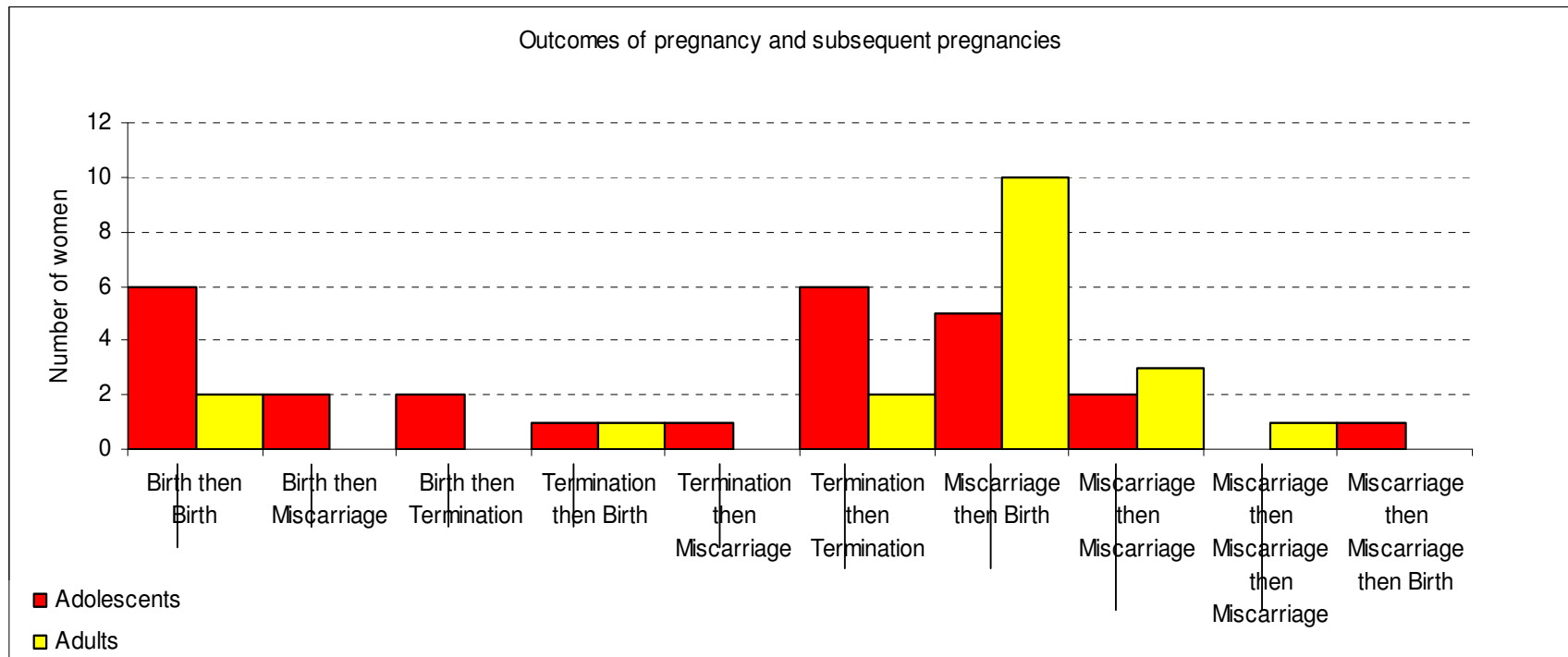


Figure 21: Variations in the outcomes of pregnancies and subsequent pregnancies by adolescents and adults

#### 4.4.2 Patients attending their enrolled GP for a maternity related consult

During normal working hours, 497 (93%) pregnant adults attended their enrolled GP compared to only 352 (66%) of pregnant adolescents which would suggest that pregnant adolescents tend to access health services from different sources, and do not necessarily trust their 'family' GP. Conversely only a minimal number of pregnant adults 10 (2%) do not attend their enrolled GP. Similarly, 5% (n=24) of adolescents and 5% (n=14) of the pregnant adults presented at the Pegasus Health after hours surgery. Further evaluation is required as there may be a number of barriers to accessing after hours care including the increase in transport and other perceived costs. There were also a number of patients that fluctuated between two GPs thus reducing the continuity of care and fragmenting service provision. A relatively small number of patients did this from both groups, yet between the groups there was a significant difference as only 5 (1%) pregnant adults presented at their enrolled GP and an additional GP compared to 24 (4.5%) of pregnant adolescents. Patients who are not enrolled at any practice (nine adolescents), may have poor understanding of general practice registration and enrolment.

Table 30: Variations in attending enrolled GP by adolescents and adults\*

	Adolescents (n)	Adults (n)
Attended enrolled GP	352 (66%)	497 (92.5%)
Attended other GP	128 (25%)	10 (2%)
Attended enrolled GP and other GP	24 (4.5%)	5 (0.9%)
Attended 24HS GP	24 (4.5%)	14 (4.5%)

\*There is a statistically significant variation in attending an enrolled GP by adolescents and adults,  $\chi^2=195.23$ ,  $p<0.0001$ . This result was most pronounced for those women attending their enrolled GP,  $\chi^2=74.04$ ,  $p<0.0001$ , compared to those women who were not attending an enrolled GP.

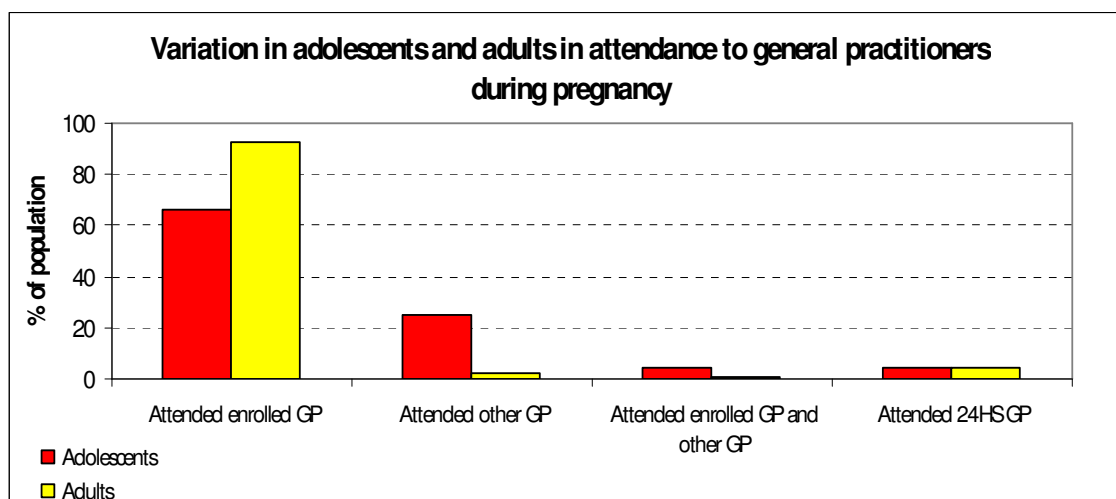


Figure: 22 Variation in adolescents and adults attendance to a Pegasus Health GP during pregnancy

There were statistically significant differences between adolescents and adults for attendance behaviour at general practice,  $df=7$ ,  $\chi^2=195.229$ ,  $p<0.0001$ . The variations in presentation rates to enrolled GP by adolescents are probably associated with concerns of privacy and confidentiality. As both adolescents and adults attended the 24 after hours surgery at similar rates, this illustrates the access for after hours care is for emergency consults and threatening miscarriage cases. Attendance at an enrolled GP also provides statistically significant variations across ethnicity and this may be the result of the continuity of care and an established relationship between the GP and patient,  $df=4$ ,  $\chi^2=747.042$ ,  $p<0.0001$ , (see Table 31 and Figure 23).

Table 31: Ethnicity variations in attending enrolled GP by adolescents and adults

Attended enrolled GP	Asian	European	Maori	Other	Pacific	
Adolescents	2	56	25	10	7	100
Adults	8.45	72	8.45	8.65	2.4	100



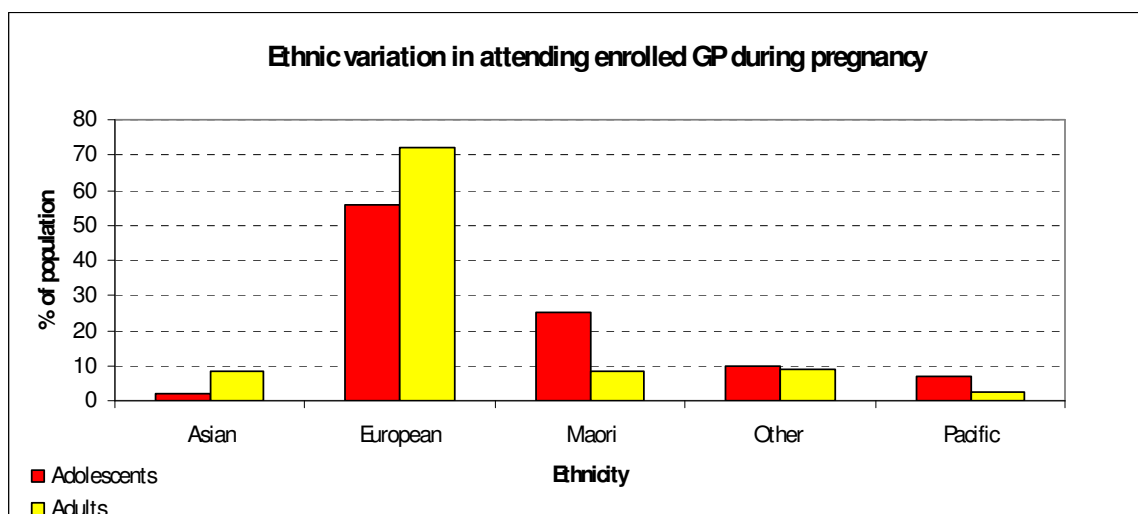


Figure 23 Ethnic variations in attending enrolled GP during pregnancy

#### 4.4.3 Immunisation

Immunisation status was an unexpected outcome of the study, where adults were more statistically significantly likely to immunise their babies compared to adolescents,  $\chi^2=590.26$ ,  $p<0.0001$ . Over 85% of adults immunised their babies compared to 69% of adolescents. The Ministry of Health's national indicator is to achieve 95% coverage by the age of 2 years. Personal correspondence with Immunisation Co-ordinator at Pegasus Health confirms that the results of this research are realistic and consistent with clinical experience in the general practice setting. Ultimately, it would be beneficial to realign the immunisation and maternity schedules. Reducing access barriers and time constraints would increase coverage rates and would increase utilisation rates of both services.

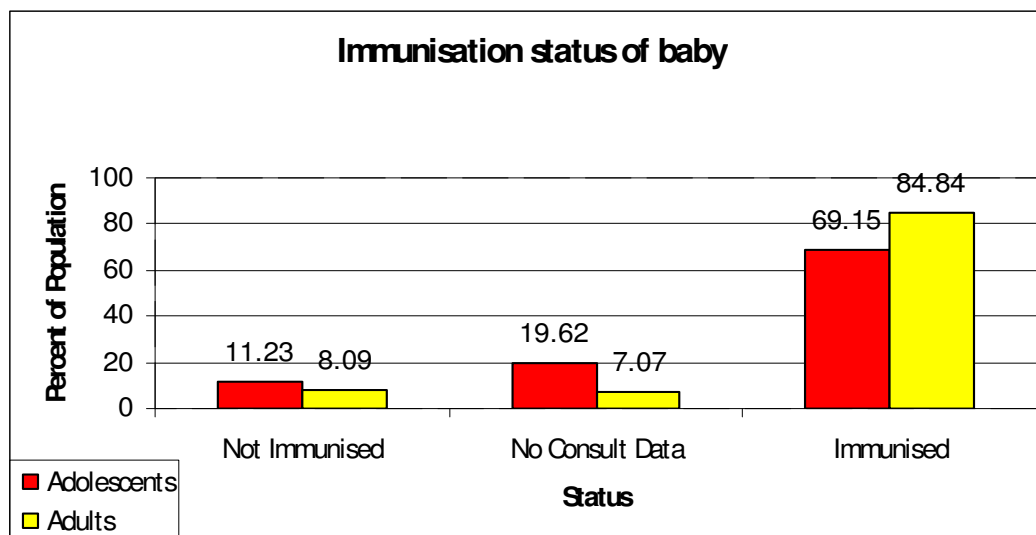


Figure 24 immunisation variations by adolescents and adults

#### 4.5 Weeks pregnant at first presentation & gestation of pregnancy (initiation of antenatal care and outcome)

The only statistically significant variance occurred in the initiation of antenatal care relative to the gestation period at birth of 37-41 weeks. There was a significant difference across ethnic groups with gestation age at birth, and with initiation of antenatal care. The significant variation occurred across the ethnicity proxy rather than maternal age and this was statistically significance,  $df=8$ ,  $\chi^2=26.189$ ,  $p=0.001$ .

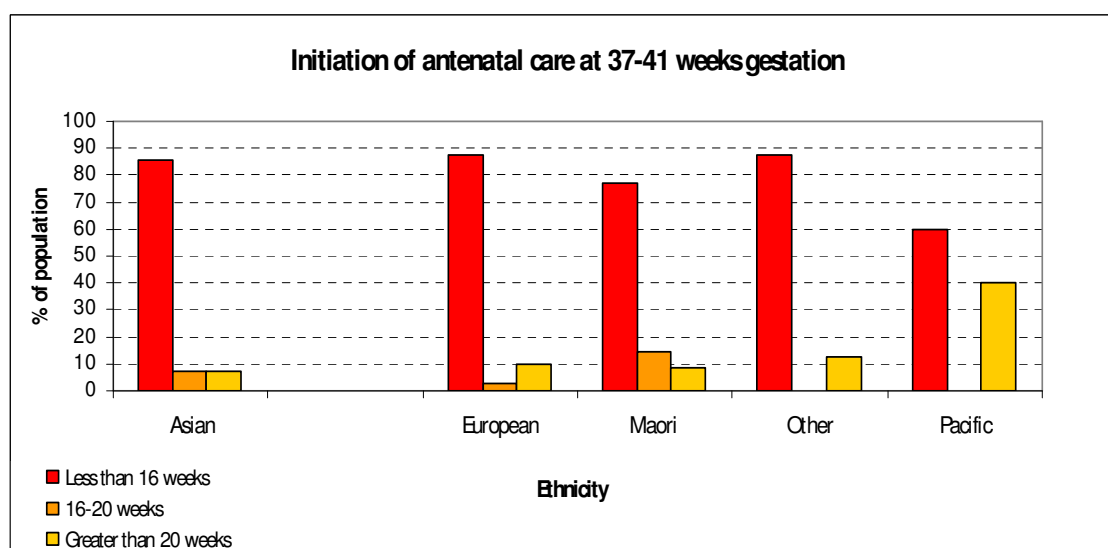


Figure 25: Initiation of antenatal care associated with delivery at 37-41 weeks by ethnicity

Table 32: Variation in the Initiation of antenatal care by ethnicity

	Asian	European	Maori	Other	Pacific
Less than 16 weeks	85.71	87.7	77.08	87.5	60
16-20 weeks	7.14	2.46	14.58	0	0
Greater than 20 weeks	7.14	9.84	8.33	12.5	40
Total	100	100	100	100	100

Table 33: Variation in the Initiation of antenatal care by adolescents and adults with a delivery between 37-41 weeks gestation

	Adolescents (n=123)	Adolescents	Adults(n=217)	Adults	Total
Less than 16 weeks	79% (n=98)	33.79	88% (n=192)	66.21	100
16-20 weeks	7% (n=8)	57.14	3% (n=6)	42.86	100
Greater than 20 weeks	14% (n=17)	47.22	9% (n=19)	52.78	100

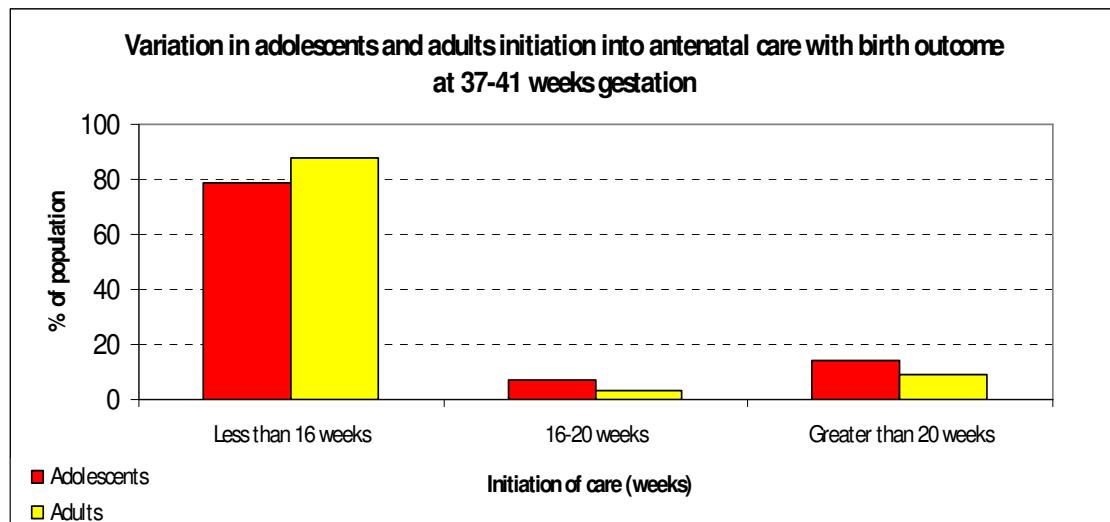


Figure 26: variation in the Initiation of antenatal care by adolescents and adults with a delivery between 37-41 weeks gestation

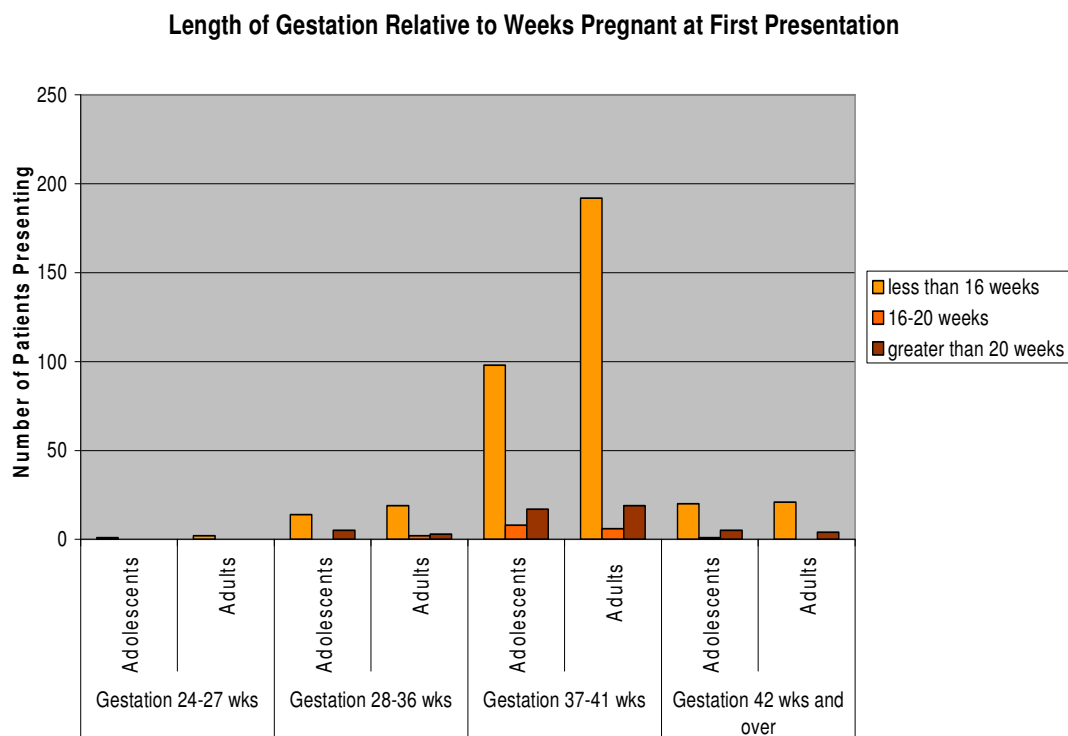


Figure 27: Weeks pregnant at first presentation and the gestational age at birth by age, ethnicity and gravida and parity

The relationship between the adequacy of care and preterm delivery was determined; the findings indicate that antenatal care appears to reduce the risk of preterm delivery.

#### 4.6 GP LMC context

Only 2.54% (27) of the research population had a GP as their LMC during their pregnancy. The number of GPs offering maternity care has substantially decreased in the last 5 years and this proportion of the study population represents this context; however, there are a number of prominent reasons for looking at LMC GPs. When considering factors that affect the utilisation of antenatal care, the examination of GP LMC care provides a complete scope of antenatal care. 10 adolescents and 17 adults (from the randomised stratified sample of 536 patients) between 1<sup>st</sup> July 2004 and 30<sup>th</sup> June 2005 requested a Pegasus Health GP as their Lead Maternity Carer. 1.9% (n=10)

of the 528 adolescents had a GP as their LMC while 3.2% (n=17) of the 536 adults had a GP as their LMC.

#### 4.6.1 Primary outcomes for GP as LMC

The mean age for adolescents was 17.42 years (with a range of between 16.2-18.8 years), and for adults it was 28.42 years (with a range of 20-36.2 years). One important variable of GP LMC is that 33% of the women who had a Pegasus Health general practitioner as their lead maternity were adolescents.

Table 34: Variation in uptake of GP LMC model by age

	1-14 yrs	15-19 yr	20-24 yr	25-29 yrs	30-34 yrs	35-39 yrs	40-44 yrs	45+ plus.	Total
GP LMC	0	9	5	6	3	4	0	0	27
%	0	33.33	18.53	22.22	11.11	14.81		0	100
Other LMC	2	392	217	109	175	106	31	4	1036
%	0.19	37.84	20.95	10.52	16.89	10.23	2.99	0.39	100

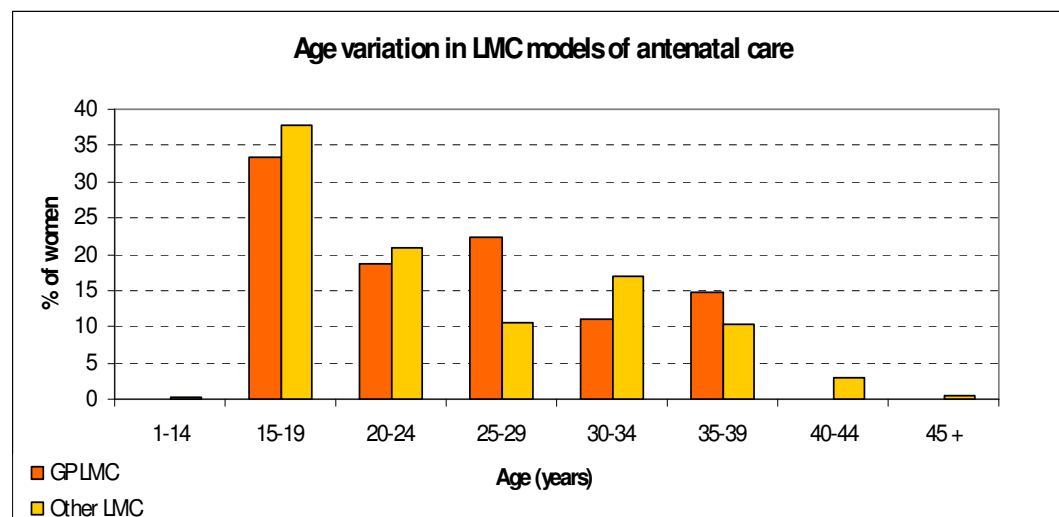


Figure 28: Variation in uptake of GP LMC model by age

#### 4.6.2 Ethnicity of GP LMC Patients

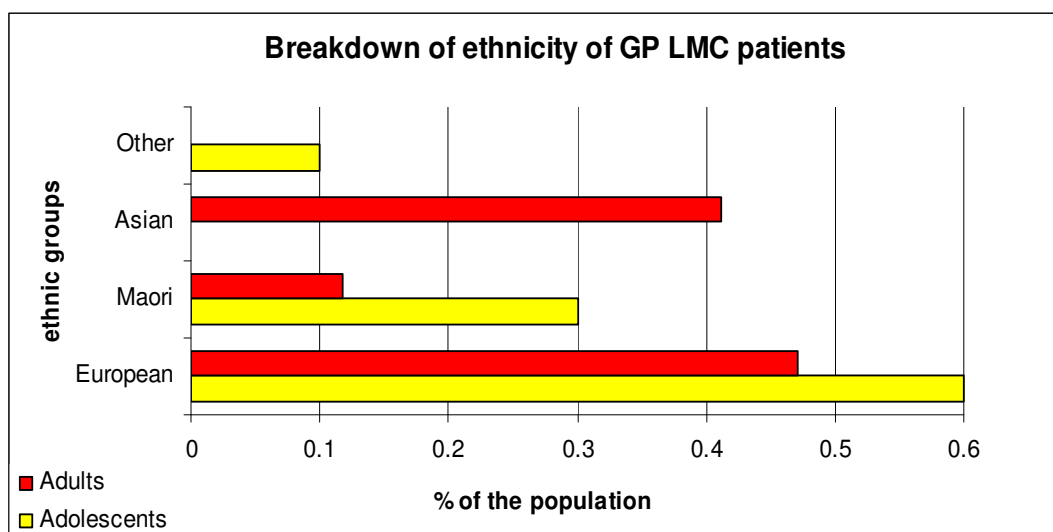


Figure 29: Variation of GP LMC pregnant women by ethnicity

There were a number of differences in the women in the GP LMC care. European ethnicity was the predominant ethnicity in both adolescent and adult cohorts, 60% of adolescents and 47% of adults that had a GP as their LMC. 30% of adolescents and 12% of adults were Maori, 41% of adults of were Asian descent and 10% of the adolescents were other. Because of the small numbers of GP LMC patients no Pacific were found within in this population.

#### 4.6.3 Gravida and Parity of GP LMC Patients

There was significant variation in the gravida and parity of the adult GP LMC patients: where the number of pregnancies varied from 1-7 and number of previous live births varied from nil to three. 29% of the GP LMC adult population were pregnant for the first time, 47% had a previous live birth, and 18% previously had two live births, 6% three previous live births. There was variation in the number of times an adolescent had been pregnant, the range was 1-4 yet the number of previous live births was minimal 0-1. 70% of the GP LMC adolescent population were pregnant for the first time, 10% no live births, while 20% had experienced one previous live birth.

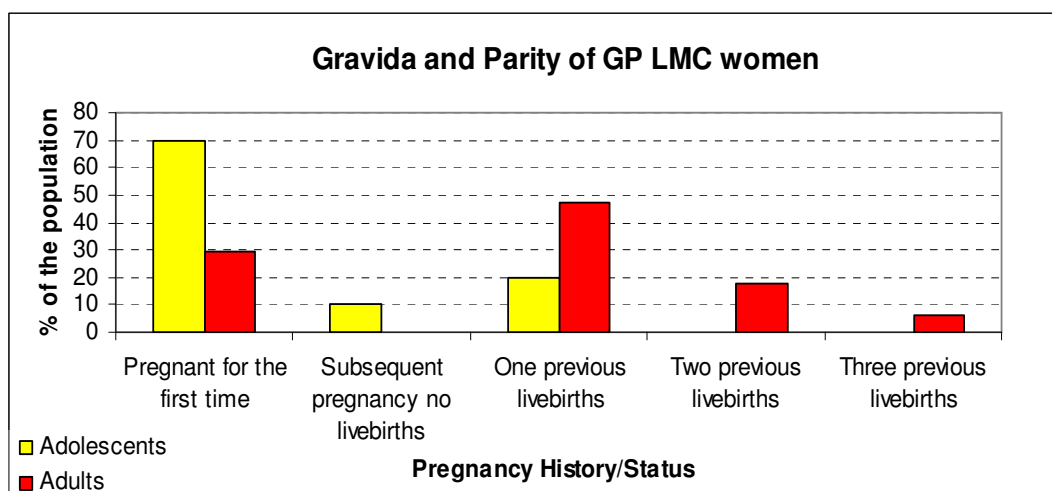


Figure 30: Variation in Gravida and Parity of GP LMC women

#### 4.6.4 Number of Maternity Consultations

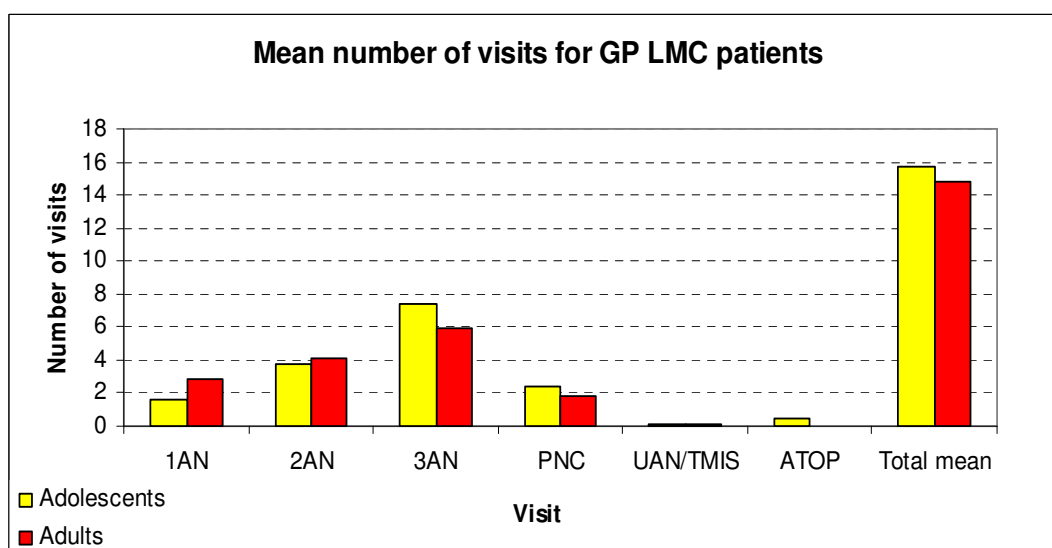


Figure 31: total mean number of consultations for GP LMC population by adolescents and adults

The mean number of consultations for adolescents in the first trimester (1AN) is 1.6 compared to 2.88 for adults, the second trimester (2AN) mean for both groups was 3.8 and 4.11 respectively, third trimester (3AN) mean is significantly larger as the frequency of visits increase to 7.40 visits for adolescents and 5.88 for adults. Urgent attendance and threatened miscarriages are not consistent with the GP non-LMC consultations as the adolescent population has a four-fold increase of 0.4 compared to

adults with 0.11. This is contrary to the assumption that urgent attendance becomes more frequent as age increases.

Under the maternity payment schedule, Lead maternity carers (LMC's) are required to provide five to ten consultations after birth. The data from this cohort suggests otherwise as postnatal claims for the GP as LMC appear to be relatively small; normal practice accounts for 6-10 postnatal claims from a LMC, the mean for adolescents is 2.4 and adults is 1.82. Adolescents have more consultations in the GP as LMC model (15.7 consultations) compared to 14.8 for adults.

Table 35: Comparison of GP LMC data for adolescents and adults

Labour & Birth Data Claims	Adolescents	Adults
First Full Delivery	7	5
Subsequent Full Delivery	2	7
Mean Weight (g)	3461	3595
Mean Apgar Score	10	9.58
Mean age	17.42(16.2,18.8)	28.42 (20,36.2)
Immunised	80%	94.11%
Attended enrolled GP	90%	100%
Mean gestation at birth	40.30	39.35

Birth weight is a composite outcome affected by two variables: foetal growth and foetal age. It is often used as a measure of maternity service utilisation as there are a number of pregnancy related factors that can be improved with intervention and that can ultimately lead to a high or low birth weight (Ministry of Health, 2006). The birth weight differences for the GP LMC adolescents and adults was minimal.

#### 4.6.5 Adequacy indexes for GP LMC population of adolescents and adults

Table 36 Kotelchuck (1994) Adequacy indexes for GP LMC patients

	Adolescents	Adults
Inadequate	20%	5.88%
Adequate	40%	41.18%
Adequate Plus	40%	52.94%
Total	100%	100.00%



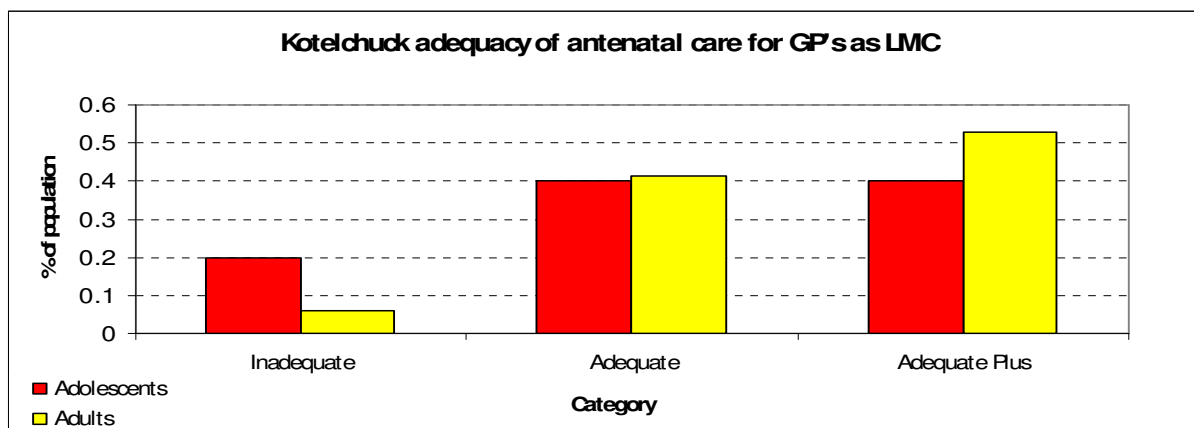


Figure 32 Kotelchuck (1994) Adequacy indexes for GP LMC patients

A cause for concern is inadequate antenatal care. Despite full LMC from a GP, 20% of the adolescent population had inadequate care (clinical guidelines and criteria in the Kotelchuck (1994) APNCU index) compared to 6% of adults. Significantly, only 4% of both the adolescent and adult cohort within the non-GP LMC context had inadequate care whereas 80% of adolescents and 94.22% of adults had adequate and adequate plus care. There are however disparities in access, content and quality of care, which emphasizes the need for adolescents to have pregnancy interventions and access to health services and care that are youth focused so that all education, resources, support services and health services are appropriate, accessible and orientated towards the needs of the adolescents on an individual basis.

Table 37 Kessner Index of adequacy of antenatal care

	Adolescents	Adults
Inadequate	30	5.88
Intermediate*	0	0
Adequate	70	94.12
<b>Total</b>	100	100

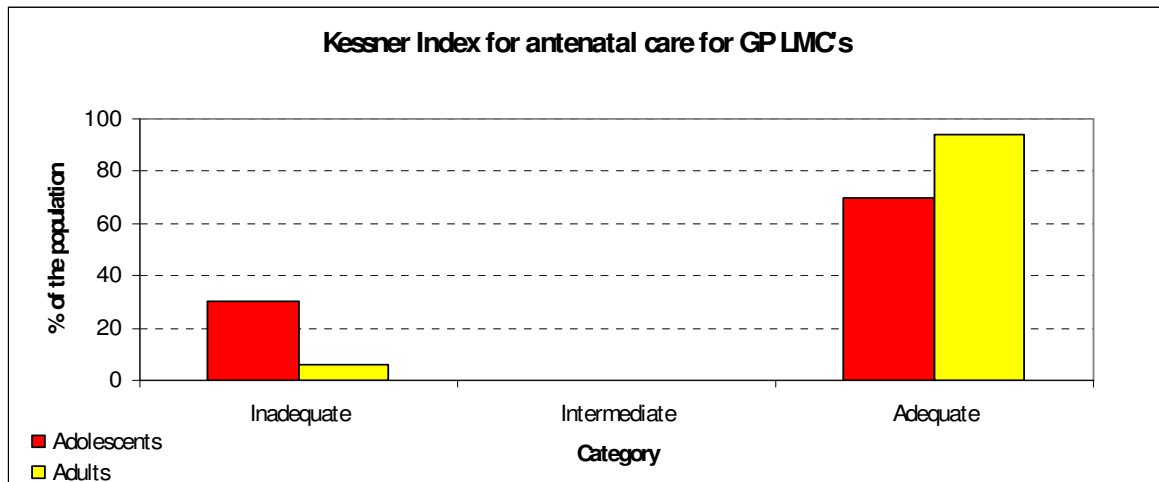


Figure 33 Kessner Index of adequacy of antenatal care

The second index, the Kessner model of adequacy provided similar results that showed variation. This model demonstrates that adolescents are five times (30%) more likely to receive inadequate antenatal care than adults (6%). The notable difference between Kotelchuck's index and Kessner's index is that no woman from either population experienced an intermediate rating antenatal care according to Kessner's index. 70% of adolescents and 94% of adults had an adequacy rating of adequate according to the Kessner criteria; this is highly consistent with Kotelchuck's rating of antenatal care. The notable variations in the adequacy of care within this cohort of patients with a GP as their LMC confirms that it is optimal, that adolescents have pregnancy interventions and access to health services and care that is predominately youth focused. Therefore all educational requirements, resources, support services and health service provision are highly appropriate, accessible and orientated towards the needs of the adolescents on an individual basis.

## **5. Discussion and conclusions**

Equity in access to health services is a key goal in the Primary Health Care Strategy. This achievement has been partially accomplished in terms of antenatal care because significant health disparities and inequalities still exist between different ethnic and socioeconomic groups and vulnerable populations such as adolescents and ethnic minorities are at risk of receiving less than optimal or less than adequate antenatal care. This study assessed pregnant women who initiated antenatal care in Christchurch during 2004-2005 and identified factors that affected antenatal care utilisation and provision. A full examination of routine antenatal care involves greater scope, content and associated factors, which were beyond the scope of this research. Continued research on antenatal care is critical in assisting a positive pregnancy outcome.

Research that assesses initiation of antenatal care and considers the adequacy of antenatal care based on the number of pregnancy related consultations. Although Coimbra (2003) argues that this mechanism does not provide information about the content, continuity and quality of care received, it does, however provide important and useful information as to the extent of antenatal care. The analysis provided divergent results regarding the age and ethnic differences in antenatal care utilisation in this cohort of pregnant women. There are a number of factors and predictors that effect the utilisation (initiation and uptake) of antenatal care, including social and behavioural factors that cannot be viewed in isolation.

### **5.1 Key results**

There is substantial variation in outcomes of pregnancies between adolescents and adults, including higher termination rates for adolescents, higher rates of

miscarriage for adults and differences between different ethnic groups. Although there are significant differences in reported miscarriage rates between adolescents and adults, it is important to note that not all miscarriages are reported via the claiming process or by the patient. The differences in miscarriage rates may be a result of genetic abnormalities and other factors that are more prevalent in older women. The significance of these outcomes is unclear, although it may relate to the actual confirmation of pregnancy, varying degrees of access to miscarriage services, prior knowledge about the availability of miscarriage services and inadequate access by adolescents to health services. Further qualitative research is required to investigate the reporting of miscarriage or the differences between adolescents or adults.

There are also notable differences in termination rates relative to both age and ethnicity, in that Asian, Pacific and Maori adolescents are over-represented in the termination statistics. Ng (2006) noted that international Asian students are more likely to seek a termination when they become pregnant, but are less likely to become pregnant in the first instance. Asian termination rates in Christchurch are below the overall average for adolescents, which seem to confirm Ng's (2006) hypothesis and results. With the Asian population, increasing in both absolute and relative size in New Zealand, further research is required to investigate whether Ng's findings for Asians who are international students apply in the wider New Zealand context.

#### **5.1.1 Access and initiation of antenatal care**

Health services are an important contributor to population health in terms of promotion, treatment and prevention of disease and injury, (Kaufman 2000). Reynolds (2006) noted that access, to and use of health care services for antenatal care is a key determinant of maternal and child health outcomes. The prominent challenge with antenatal care in developed countries such as New Zealand is uneven access (WHO

2005). Predisposing characteristics and enabling resources resulted in greater variation for both adolescents and adults in presenting to a Pegasus Health GP in the first instance for antenatal care and this result implies that inequalities exist in accessing antenatal care.

Research by Villar (2001) and Kupek (2002) considered the gestation of pregnancy at initiation of antenatal care, as a proxy to the access to health services. Initiation to care in an antenatal care setting was a significant factor when referring to adolescents and health outcomes such as termination rates and birth outcomes. There was no significant variation between pregnant adolescents and adults in the number of weeks pregnant when first presenting to a GP, with the adolescent mean being 9 weeks and 1 day compared to the adult mean being 8 weeks and 5 days. Significantly, this implies that adolescents and adults have a tendency to present to a GP and initiate antenatal care at a similar stage during pregnancy. Because antenatal care serves to help women to remain healthy, and to treat and prevent adverse health conditions that may arise due to pregnancy, health care and health education are essential. However, when Kotelchuck and Kessner's adequacy of antenatal care tool (Kotelchuck, 1994) is utilised in GP LMC context, there were substantial disparities in the rating of care between adolescents and adults in terms of adequate and inadequate antenatal care. This relates to the provision and delivery of care, the receptiveness to the information provided and the perceived barriers to care.

### **5.1.2 Attending enrolled or registered General Practitioner**

Research by Mathias (2002) suggests that access to a regular source of primary care is associated with some improvement in health status. Reducing disparities in access to health care can be achieved by providing patients with a usual and regular source of care. NZAAHD (2003) states that generally, adolescents have poor levels of enrolment in Primary Health Organisations (PHOs) and experience barriers to access, yet this research also suggests adolescents are ten times more likely to access primary health care if the services are 'youth orientated'. With the establishment of PHOs and enrolled GP populations, the extent to which adolescents have enrolled could be determined and then strategies developed to increase enrolment in this age group investigated.

There are a number of barriers such as privacy and confidentiality, issues of access and appropriateness of medical practice for adolescents. Many adolescents are not registered or 'enrolled' with a GP or alternatively are registered but do not attend their enrolled GP. Many adolescents also claim that the cost of consultations with the GP is a barrier to early contact and concerns about confidentiality and cost may be a major deterrent in using family GPs. This highlights the fact that adolescents often have a poor understanding of General Practice registration and enrolment. Even so, research by Mathias (2002) shows that GPs continue to be the main primary health care provider or first point of contact within primary care for the majority of the population, with over 88% of the adolescent population attending a GP.

For a confirmation of pregnancy, women can now access multiple avenues without presenting to a GP at a medical centre. Pregnancy tests are readily available from supermarkets and pharmacies over the counter, as well as the midwifery resource centre, family planning, health centres that are 'youth oriented' and youth focused such as 198 Youth Health Centre in Christchurch and health clinics on a university campus.

There is a challenge to motivate all adolescents, particularly those with high-risk behaviours, to access antenatal care in a timely manner. Alternatively, adolescents attracted to a youth centred environment with corresponding services and to achieve the desired outcome, engagement in such environments may be beneficial.

## **5.2 Strengths and limitations**

### **5.2.1 Intended vs. unintended pregnancy**

As previously suggested, a number of pregnancies in developed countries are unintended, the Christchurch Health and Development Study research and termination statistics indicate that up to 60% of pregnancies in New Zealand are unintended and this affects adversely on the life of both the mother and baby (Fergusson 2006). The study suggests that there is a higher prevalence of unintended pregnancies in some population groups, namely the socially and economically disadvantaged, such as Maori and Asian women. Internationally, the Guttmacher Institute (2001) confirms that higher levels of unintended pregnancy lead to higher levels of both unintended births and terminations. Women in low socio-economic circumstances are five times more likely to continue with the pregnancy than women in more affluent circumstances. Evidence from the United States indicates that many women with unintended pregnancies do not seek or receive care until after the first trimester. Cooney (1985) reinforced this by stating, consideration of this issue is needed because there is a high probability that the majority of adolescent pregnancies are unintended. Paucity of New Zealand based research in assessing the intention and planning of pregnancy has also been noted.

### **5.2.2 Strengths and weaknesses**

Each research project has strengths and weaknesses. This section summaries the strengths and weaknesses of this study. One weakness is that the understanding gained from this study of the relative effectiveness of early presentation to a health professional in a pregnancy is relatively limited because of the small number of GP LMC women from the sample population. However, this research enables a generalisation of the trends that two specific groups (adolescents and adults) have in accessing and utilising health services for maternity care.

Another weakness relates to the data. The data that was available for reviewing antenatal care in primary care was incomplete. For example, there was only a small proportion of patients that had a GP as their LMC. A complete review of antenatal care would have required scope from midwife organisations and specialist health services but this was beyond the scope of this dissertation. An additional data limitation is the use of secondary data. Because, for example, the purpose for the original data collection was different from the current researcher's interest, the secondary data lacks depth and detail, in turn limiting its applicability. Despite this, secondary data can be useful for understanding the use of health services and for organisational funding applications. It also provides an invaluable source of data to extract variables to form research hypothesis about utilisation rates to general practice during pregnancy.

Another limitation is that important information may be missing from the database; there may be variations in ethnicity identification and collection processes. General practice records can be incomplete and inaccurate with concepts such as parity and gravida being misunderstood by the receptionist or administrator who processes the maternity claims. Clearly, data coders and those who input the data into the patient management system (PMS) in general practice require training to minimise data input errors. An emphasis on accurate ethnicity data collection is required in an effort to



reduce both duplication and significant differences that are apparent for individuals within the Pegasus Health dataset. More generally, Bramley and Latimer (2007) reported this issue in a recent New Zealand Medical paper.

One strength of this study is that it analyses a large number of patients, which enables a large degree of statistical power and, ability to make robust generalisations. The sample is representative of the population in question, and therefore additional strengths include the possibility of linking large health-related databases, and documenting variations in service provision and the outcomes.

There are a number of methodological weaknesses. One relates to confounding variables: there are multiple factors that contribute to adolescent pregnancy and behaviours relating to accessing health services and a change in health status. In depth, investigation of these confounding influences was beyond the scope of this dissertation and needs further examination.

This research, as has previous studies on antenatal care have only focused on three components of antenatal care (total number of visits, adequacy rating of antenatal care and gestation of pregnancy at first presentation) but it has excluded the most important factor the content (what is in the consultations) provided during antenatal care. This too, is an area for further research.

A further methodological weakness of this study and the field generally, is that it is difficult to document and measure the adequacy of antenatal care without evaluating the content and quality of care. The provision of timely, accurate and complete data is essential to deliver effectively health care services such as maternity care. This is an area where aspects of clinical practice need further investigation.

While a number of weaknesses have emerged from using this data set, self reported data are also problematic when considering access to and utilisation of health services. For example, the length of gestation is largely self-reported by the mother in

the early initial stages of pregnancy. This can be somewhat problematic as the confirmation of actual gestation of pregnancy is often later after an ultrasound has been done and the adequacy of antenatal care indexes requires information of the woman's LMP prior to eighteen weeks.

Documented discussions about termination and assessments prior to termination in this research is problematic as that there is no differentiation in the claiming codes for an assessment prior to a termination (ATOP) for an unintended pregnancy or for a significant abnormality or genetic reason.

A more holistic approach is required. This study used a GP patient management system as the sole data source. The information on the provision and utilisation of antenatal care and services would be more complete if the LMC claims from midwives and obstetricians were included to add value to the GP based information provided in this study. Although this study described and analyzed the initiation of care and the percent of LMC GP adequacy of care information on the women's characteristics and variables were limited to age, ethnicity, gravida and parity. Additional variables that could be evaluated but are outside the scope of this project include educational attainment, family variables, as well as lifestyle factors and associated behaviours, such as smoking and drinking.

## **5.3 Implications for clinical practice**

### **5.3.1 Mental health after miscarriage and termination**

Although Fergusson (2006) suggests that the extent to which termination of pregnancy has consequences for mental health remains controversial, miscarriage and termination are both pregnancy outcomes and life events that can potentially cause mental distress. Fergusson provides research that there is a detectable increase in risk of concurrent and subsequent mental health problems, in young women who have a termination, when compared with their peers who continued their pregnancy and with non-pregnant peers. The current maternity claiming system is not well equipped to support women (and men for that case) after a miscarriage in terms of funding streams and entitlements. Miscarriage grief and depression may not occur immediately after the miscarriage, but it may emerge in a subsequent pregnancy, or when a family member or close friend is pregnant. The current postnatal claiming is restricted to claims within 28 days of a miscarriage. Although GPs provide a follow up role in offering different avenues and mechanisms for support groups and agencies, this can be problematic for a number of reasons. The GP is often the first point of contact after a miscarriage because if the miscarriage occurred prior to twelve weeks it is unlikely that the woman has been seen by a midwife, and mental health and assistance after a miscarriage or termination is not easily facilitated within the standard 11-15 minute GP consultation. Thus, the time constraints and cost of consultation could potentially act as a deterrent for this service to be provided by a GP, although it could be provided in a multidisciplinary general practice setting.

### **5.3.2 Postnatal depression after birth**

At least 50% of women who give birth experience low moods at some point in their pregnancy or in the initial days or weeks following birth (Fergusson 2004). The development of mental disorders in pregnancy and postpartum may be associated with a number of factors such as isolation, family pressures, demands and expectations of being a mother in addition to the psychological effects of delivery. For example, GPs in Australia see up to 90% of women postpartum ultimately providing a timely opportunity to screen for maternal wellbeing and depression. The rate of postpartum consults by a GP is much lower in New Zealand. This current research shows that GPs see only 15% of adolescents and 22% of adults postpartum. Fergusson (2004) believes that the 1996 legislative changes to maternity services resulted in many GPs leaving maternity and antenatal care. Fergusson (2004) notes a significant increase in the number of women presenting late with severe postnatal depression, which has resulted in further pressure on the resources of the maternal mental health services. Fergusson also suggests that GPs who are involved in antenatal care are able to identify postnatal depression in that woman in the first three months after birth, which provides an opportunity for clinical intervention and a beneficial health outcome for the woman.

### **5.3.3 Scope of antenatal care in general practice**

There are significant differences in the utilisation rates of antenatal care and outcomes of pregnancy between GPs and midwives and their corresponding organisations. This may be largely the result of the high prevalence of termination among adolescents in New Zealand, or the potential for both adolescents and adults to access alternative health services, such as family planning, youth health clinics and other sources of health care services as their first contact. Further research is required to determine the factors producing differences in the utilisation rates of antenatal care and pregnancy outcomes for each maternity service provider.

#### **5.3.4 Postnatal care**

Postnatal care encompasses the prevention and treatment of complications for both the mother and baby. Counselling, providing information on baby care, promotion and support of breastfeeding, contraceptive and nutritional advice and immunisation are essential components of postnatal health care that can be initiated in general practice by GPs or nurses. There is significant variation in the provision of postnatal services among GPs. The range being between 0-6 postnatal consultations (inclusive of GP LMC patients) which may have skewed it more positively demonstrated this. GPs in this study do not appear to see many women for a postnatal consultation. Over 82% of adolescents and 72% of adults did not see their GP postpartum, which probably reflects the different maternity health service contexts of New Zealand women have access to a number of services including plunket nurses, family centres and midwives who make home visits postpartum, and Australia, GPs play a far greater postpartum role.

#### **5.3.5 Scope and significance of postnatal care**

Malcolm (2002) notes ,that the New Zealand College of Midwives (NZCOM) emphasises the importance of continuity of care by a midwife for all young women in pregnancy. Midwifery care is effective in reducing adverse neonatal events, improving postpartum contraception use in adolescent mothers among other factors, including the importance of supporting adolescent's mothers in breastfeeding.

#### **5.3.6 Role of the General Practitioner**

GPs appear to be key 'information brokers' for many New Zealand women in understanding maternity services. However, there is a lack of information about the quality and scope of comprehensive information provision. Information concerning maternity care and services needs to be culturally, regionally and socially acceptable and appropriate for each woman. Improved knowledge of and access to, contraceptives

especially emergency contraceptives, is often advocated as a means of reducing unintended pregnancy.

### **5.3.7 Subsequent pregnancy**

There is strong empirical evidence to suggest that both extremes of short and long inter-pregnancy intervals are associated with an increased risk of adverse perinatal and maternal outcomes such as low birth weight, preterm delivery, stillbirth and neonatal death (Belizan 2000). The suggested median inter-pregnancy interval is 27 months, short intervals such as 6 months and long intervals 59 months and longer. Previous studies by Belizan (2000) and Raneri (2007) concluded that characteristics such as younger maternal age, histories of terminations, late initiation of antenatal care and a low number of antenatal consultations were associated with short intervals between pregnancies. Overall, the shorter the interval between pregnancies, the late initiation of antenatal care, and those women received a lower number of antenatal consultations. Given the above outcomes and consideration for subsequent pregnancies after termination or miscarriage must be undertaken and some adolescents and adults may plan a subsequent pregnancy within a relatively short timeframe because of grief and disappointment.

Adolescent mothers are at high risk for a rapid (within 24 months) subsequent pregnancy, Raneri (2007) suggests that compared with women aged 20-29, adolescents who experience a subsequent pregnancy are at greater risk of receiving inadequate antenatal care, having preterm deliveries and stillbirths. This requires further investigation by means of follow up with the cohort of women in this study in terms of assessing if the subsequent pregnancies were planned and the other associated factors as discussed above.

There are a number of catalysts for entry to, or initiation of, antenatal care. Research by Weimann (1997) concluded that risk-taking behaviour increased health care utilisation. In a subsequent pregnancy 50% of adolescents presented at the same time, and 30% presented earlier after a termination or miscarriage, while 60% of adults who have had a prior miscarriage or elective termination presented earlier for a subsequent one. Adolescents and adults, however, who have had a previous successful pregnancy, may believe that they already know how to care for themselves throughout their pregnancy and may delay seeking care within an appropriate timeframe. Research indicates that subsequent pregnancies represent more than a fifth of adolescent births. These births are often occurring in close proximity with almost 30% of adolescents whose first pregnancy occurred prior to 17 years have a second pregnancy within 24 months (Dalliard 2000). Investments in avoiding subsequent pregnancies and a reappraisal of current priorities are crucial, and interventions are required to address the complex and multifaceted aspects of adolescent lives to prevent subsequent pregnancies in short time intervals.

## **5.4 Issues for future development and research**

### **5.4.1 Preconception care**

Crucial decisions about our future are made before birth, and recent research from Revington (2004) illustrates that the type and quality of nutrients supplied to a foetus will determine a number of health factors associated with heart disease and obesity. Appropriate preconception health care improves pregnancy outcomes, which is highly relevant to adults as many adult women plan a pregnancy and therefore take the necessary steps such as taking folic acid supplements and have regular cervical smears. Data and information on preconception care are not available from the dataset used in this study. GPs however are in the ideal position to discuss and offer advice on

nutrition, alcohol moderation and cessation of smoking or drugs, and such advice and programmes are available.

#### **5.4.2 Antenatal care**

Research by Villar (2001) on antenatal care showed that antenatal care utilisation is often insufficient and requires improvement. Adolescents and adults have highly comparable statistics when initiating antenatal care and total number of visits. As discussed by Reynolds (2006) antenatal care can improve a number of outcomes during a pregnancy and can be used to manage complications as they arise. Adequate antenatal care can improve birth weight, and women who accessed antenatal care earlier were more likely to have better outcomes during their pregnancy. The results of this research support the argument that antenatal care is an integral part of maternal and child health care.

This research assessed antenatal care in a general practice context using measures of initiation of antenatal care and frequency of consultations; but due to time constraints did not assess the content of antenatal care. International indexes (Kotelchuk 1994) determine the adequacy of antenatal care, providing an evaluation of service provision within general practice and of individual risks. The ultimate purpose of this research was to measure the utilisation of rates of antenatal care in general practice and to compare the perceived high-risk group of adolescents with pregnant adults. Coimbra (2003) suggested that the conditions of antenatal care as well as the biological aspects of human reproduction heavily influence the maternal factors. Adverse and unfavourable pregnancy outcomes could be avoided by improving the quality of antenatal care and improving access to health services.

The utilisation of antenatal care services is relatively high in Christchurch for all women. However, there are significant variations in the content of care and inequality in



utilisation. The coverage of antenatal care varies and future research is required to assess the coverage of care and the content of antenatal care, which women receive. According to health agencies such as the Ministry of Health (MOH 2002), initiation of antenatal care should occur as early as possible in the pregnancy, have universal coverage, frequent consultations, involve the minimum recommended number of visits and integrate with the remaining preventative actions. The success of the above requirements is largely dependent on initiation of care and the total number of visits undertaken. Coimbra's extensive study in 2003 established the best outcomes in pregnancy were reported in women with an average number of consultations, with increased consultations often reflecting a high risk or complicated pregnancy.

#### **5.4.3 Adequacy of antenatal care**

Inequalities in the utilisation of antenatal care still exist and the adequacy and utilisation of antenatal care in many developed countries like New Zealand is significantly correlated to socioeconomic characteristics. Inadequacy of antenatal care is associated with social inequality where groups that are socially vulnerable often receive inadequate antenatal care. This emphasises the need for a greater focus for intervention strategies in the antenatal care for high-risk women, by increasing the number of visits and early initiation into antenatal care. Both the Kotelchuck and Kessner's indexes (Kotelchuck, 2004) used in the GP as LMC model, indicated that pregnant adolescents were less likely to initiate antenatal care in a timely manner compared to adults, and the adolescents were more likely to receive inadequate ratings on both indexes compared to adults. The significant variations in the adequacy of antenatal care for adolescents only become apparent when using the adequacy of antenatal care indexes as a tool. This shows the potential inadequacies and inefficiencies that exist within general practice when GPs in the role of lead maternity

carer are unable to provide adolescents with timely antenatal care that is appropriate and accessible to each adolescent as an individual. External influences that affect this relationship, such as lifestyle and personal behaviours of the adolescents, social support environment and other additional influences impede the utilisation and uptake of antenatal care. It is important to note, that the relationships reported in the study with a GP as lead maternity carer (LMC), might also be found with midwives as a lead maternity carer from the pregnant adolescents, but these relationships need to be investigated with a representative sample of midwives to determine if this is the case or not.

#### **5.4.4 Antenatal care guidelines**

International best practice suggests that seven antenatal consultations are adequate for most normal pregnancies (ten for a first pregnancy) (WHO, 2005). These results indicate that Christchurch women receive services to at least that level, although there is clearly a significant minority of both adolescents and ethnic minorities within this sample who did not receive adequate antenatal care.

#### **5.4.5 Actual practices of antenatal care for adolescents - should it be different?**

There is widespread acknowledgement that although adolescents are similar to adults, their health related problems and needs are significantly different. Adolescents have specific health needs and many of these are related to behaviour change. Teffers (2004) highlighted the need to be specifically appropriate on an individual basis among clinical health professionals, general practitioners and public health professionals. Trinh (2006) has provided evidence that suggests adolescents are more likely to have unintended pregnancies and lack access to information and resources to access antenatal care. Recent New Zealand research in *Youth sexual Health: Our Health: Our*

*Issue (2007)* suggested that there are a number of reported barriers for adolescents in accessing general practice, which include a lack of privacy, confidentiality and cost. Effective antenatal care for adults and adolescents should be aligned to effective sexual and reproductive health services, as suggested by the Ministry of Health (MOH, 2002) for general practices such as, accessibility in terms of location and opening hours, openness, and acceptable in terms of privacy and confidentiality. The needs of pregnant adolescents vary greatly depending on individual circumstances including age, social and family support networks and financial situation. Cherrington (2003) explained that it is imperative that adolescent pregnancy is not over-medicalised. Several important implications have arisen from Cherrington's research and other studies such as Wiemann's (1997) study showed that many pregnant adolescents may deny or hide their pregnancy and often have had limited exposure to reproductive health services. All health care providers need to emphasise the value of early antenatal care. The Guttmacher Institute (2001) notes that when adolescents receive social support, full information and positive messages about sexuality and sexual relationships, and have access to sexual and reproductive health services, that they achieve healthier outcomes, lower rates of pregnancy, births, terminations and sexually transmitted infections (STI). Adolescents need to be educated and informed about sexual health and associated issues at an earlier age, making sexuality education and associated issues a 'norm'. This general practice setting research found that even with GP LMC support, 80% of adolescents and 94% of adults had adequate and adequate plus care. There are, however, disparities in access and care, which emphasizes the requirement for adolescents to have pregnancy interventions and access to health services and care that are youth focused, so that all education, resources and services are appropriate, accessible and orientated towards the needs of the adolescents.

#### **5.4.6 Immunisation**

The timing of the immunisation schedule is essentially similar to the schedule and timing of antenatal consultations on the maternity schedules in that they are both aligned and based on clinical research, evidence and practice. Grant (2004) maintains that it is necessary to start immunisation as early as possible. One key determinant of successful immunisation is the 'on-time' delivery of the first vaccination given to children as research has shown that a delay in giving the first vaccine dose is one of the strongest and most consistent predictors of subsequent incomplete immunisation and coverage. In developed countries such as New Zealand, the three major contributors to incomplete immunisation are socioeconomic factors, healthcare factors and parental attitudes. Primary health care is highly influential in minimising health care system barriers, which include well-established barriers to healthcare such as costs and accessibility, provider beliefs, variability in provider practices and missed opportunities to immunise. The relationship between the patient and family and the primary health care provider may contribute to the prevalence of incomplete immunisation. Grant (2004) believes that there is the opportunity for maternity services to reduce the predictors of incomplete immunisations. This needs further investigation.

#### **5.4.7 Health Services Data**

Major health inequalities exist in New Zealand as reported by ethnic groups. This leads to significant differences by ethnicity in relation to health care access and outcomes (Bramley 2007). This research confirms that the quality and accuracy of ethnicity data in primary care needs to be improved. The collection and classification of ethnicity data is a complex process, and is highly dependent on how the ethnicity questions are asked and by whom. The Waitemata study by Bramley (2007) and the consistent results from this current research highlights the challenges and barriers that

exist with ethnic misclassification in New Zealand and reinforces the need for a national standardised, systematic and appropriate approach to ethnicity data collection. At present poor quality, ethnicity data is an ongoing issue in the New Zealand health sector.

There are several research opportunities that currently exist in pregnancy and antenatal care and recent publications from the Fergusson (2007) suggested the need to investigate the effects of pregnancy termination on mental health. The Public Health Intelligence Unit at the Ministry of Health is currently involved in birth linkage studies by developing methods for the anonymous linkage of antenatal care, delivery, birth and postnatal records, which potentially will help inform this issue. Ultimately, this integrative approach for the births database will provide longitudinal information on antenatal exposure and reproductive outcome, the impact of birth weight of mothers who smoked during pregnancy and the effect of a complication birth on child development. Increased recognition of the inherent relationship between unintended pregnancy and termination rates, and the critical role that contraceptives play in avoiding both terminations and unintended pregnancies for both adolescents and adults in evaluating access to reproductive and contraceptive health services is critical.

Improvements in funding would provide the opportunity to deliver high quality preventative services for adolescents in primary health care settings in New Zealand. Denny (2005) recommended the need for structural changes among primary care settings with the ability to fund services in order to provide longer consultation times and training for health care providers who work with adolescent health issues. Additional research could assess the effectiveness of postnatal care and the role of psychology in adolescent pregnancy prevention in reducing subsequent pregnancies, as an adolescent mother has a 30-50% chance of a second pregnancy within two years after their first delivery (Raneri 2007).

## **5.5 Recommendations**

This research highlights a number of potential interventions to increase early initiation of and improved access to antenatal care within general practice; however further research is required to determine appropriate models of care and service delivery to improve access to health services and outcomes. Given the heterogeneity between and within both groups of adolescents and adults, different standards and approaches may be needed for different populations.

### **5.5.1 Health Service Provision**

At risk women such as adolescents, low socioeconomic and ethnic minorities require maternity services that are accessible, acceptable and culturally appropriate. Adolescents require increased access to confidential, non-judgemental and adolescent orientated services for sexual health and maternity services. Further research is required to determine the effectiveness and efficiency of health service provision including equity and accessibility.

Preconception assessments and funded preconception consultations may also improve maternal health and wellbeing, and additional funding may support and improve more equitable service provision, for high-risk groups such as Maori and Pacific adults and adolescents. Mathias (2002) suggested that improvement in access to health care and health services reduces risk-taking behaviour, improves health status indicators and is important for equity. Interventions that require additional resources and funding include increased consultation time postpartum to manage and treat postnatal depression effectively and in a timely manner.

In traditional primary care settings, Denny (2005) considered that average maternity consultation times are for 10-15 minutes for adults and 10 minutes or less for adolescents and are shorter than average consultations for adults. This is problematic

in itself, as it has been estimated that the time for comprehensive adolescent health care, including preventative counselling is approximately 20-25 minutes for low risk adolescents and longer for high-risk adolescents. Stephansson (2001) explained that social inequalities exist and affect access to antenatal care. All pregnant women in New Zealand regardless of age, ethnicity and previous pregnancy history should have equal opportunities to receive free antenatal care. Delays in seeking care from health services and receiving appropriate care are barriers to care for all women and these barriers are prominent with adolescents who, have little knowledge and experience in seeking care antenatal care. There are significant ethnic differences, socioeconomic and age disparities that exist within this population and these groups are at greater risk of receiving late or minimal antenatal care, which results in an increased risk of adverse pregnancy outcomes. Timely and appropriate initiation of antenatal care can provide opportunities to prevent and manage a number of potentially adverse outcomes. An apparent difference in the initiation of antenatal care is demonstrated through ethnicity data providing statistically significant variations. In general, as the age of the mother increases the likelihood of receiving late or no antenatal care decreases, the research population is consistently represented in the findings.

Health Service recommendations include: the development of alternative health care models that eliminate or minimise barriers to services and are adolescent orientated, that improve confidentiality for adolescents within health service models and more importantly involve youth in identifying the health risks and barriers that exist.

### **5.5.2 Sexual Health Services**

The NZPPD (2007) suggested the development of an integrated youth health service model to include school, mobile and community based services that provide and promote consistent and comprehensive sexuality education (NZPPD 2007). Sexual health services within primary care need to include preventative education and services that are freely available to improve access to health services. There may be the need for ethnic specific services or have frameworks to assist with different ethnicities such as Asian students who are often inadequately prepared to live in New Zealand and have substantial language and cultural barriers. More importantly, sexual health discussions within families need to be open and become normalised.

### **5.5.3 Community Development and Collaboration**

Community and youth development is a key determinant for positive health outcomes. Timely intersectoral collaboration is required in terms of strengthening communication and fostering goodwill at the midwifery and general practice interface of health services (Milford 2005). There have been significant changes in the last five years in the number of GPs that have left maternity care and the LMC midwifery model. This requires some focus and support from women, midwives and GPs to promote a positive and informed working relationship that will have numerous benefits for the women and primary health care. Additional collaboration is required outside the health sector with education and social services and national agencies such as the Ministry of Social development (MSD) and Ministry of Education. Education, health and social services are primary points of contact for adolescents. There are a number of key opportunities in the health sector to meet the needs of adolescents (Kaufman 2000).



#### **5.5.4 Data quality and improvement**

Complete and high quality data are necessary to allow national and regional comparisons on access and utilisation rates. The provision interventions that could potentially increase access to antenatal care for all women including adolescents and ethnic minorities.

Data recommendations include:

- to establish and support data links with external agencies,
- collect regionally based data to supplement national data,
- the collection and analysis of data on specific populations and
- the use outcome data to improve service delivery and enhance evidence based decision-making.

#### **5.5.5 Women at high-risk (youth and at risk groups) developments**

The health and well-being of women (both adults and adolescents) is significantly influenced by the determinants of health, such as access to health services, personal health, social support networks and other lifestyle and behaviour factors including improvement the availability and accessibility to health services. The NZPPD (2007) made recommendations that included multiple strategies to improve the sexual health of women at high risk such as Maori and Pacific, by providing “by Maori, for Maori” (kaupapa) services to provide culturally appropriate and improved access to health services. Pacific buy-in, patient empowerment and ownership are also required by incorporating Pacific values into such strategies and policy development.

### **5.5.6 Policy development**

While there is little evidence to suggest that accessing antenatal care early improves clinical outcomes (Lavender 2007), there has been an emphasis on preventing adolescent pregnancies. There is also the desire to reduce unintended pregnancies within the general population, and therefore policy initiatives in this area should have greater scope to include a wider age range. Ultimately, the health sector needs to develop and implement guidelines, recommendations, strategies, policies and programmes to ensure that all women receive accessible, timely and appropriate individualised care during pregnancy.

## **5.6 Conclusions**

The benefits of effective and appropriate antenatal care and attendance needs to be promoted and provided not just to all pregnant women, but also to the wider community. In order to increase early initiation and adequate antenatal care attendance, antenatal care is pivotal to safeguard the health of mothers and babies, irrespective of prior experience with pregnancy (Low 2005). Overall, there needs to be a strategy that enhances the care of pregnant women and their babies by promoting communication and fostering goodwill at the interface of general practice and midwifery (Milford 2005).

Primary health care needs to continue to provide, promote and ensure improved access to services and appropriate delivery of services, and information to adolescents to provide opportunities for adolescents to make informed choices and decisions regarding their sexual health. New Zealand has a maternity service that appears to be delivering adequate maternity care and services for most pregnant women. There are a number of explanations of why inequalities and variations exist in accessing and

utilising antenatal care and why antenatal care remains less than optimal for some groups of women in society. The reasons for this are unclear, but current research from primary care indicates the importance of problems associated with poor levels of self-care, lack of information and education about health issues such as pregnancy and of health services availability to individuals.

Additional research is required to investigate how to improve access for high-risk and disadvantaged groups and individuals and to ascertain whether improved access to health services improve outcomes in pregnancy. Antenatal care is a crucial intervention in pregnancy that requires early initiation to optimise the outcomes of pregnancy, and challenges that still confront antenatal care include the increase in the rates of low birth weight and preterm births. Simply offering additional antenatal care services without evaluating the clinical significance of the services provided, however, may not lead to improved birth outcomes.

The traditional belief that adolescent pregnancy belongs to a high-risk group has been challenged by the clearly articulated results of a number of studies, for example, Lao (2000) showed improved antenatal care decreased the incidence of preterm delivery and low birth weight babies. Contrary to current public perception, the relationship of maternal age and utilisation of antenatal care within this study has not varied significantly. Geronimus and Korenman (1992) investigated antenatal care utilisation associated with the outcome of pregnancy in adolescents, and the results of this study suggest that inadequate antenatal care and unfavourable outcomes of pregnancies not as closely associated as often assumed. The variation in the adequacy levels as measured by indexes of adequacy for GP LMC adolescents were 30% receiving inadequate care compared to only 4% inadequacy in adolescents that have other LMC models of care. This may suggest that adolescents may be responsive to the holistic midwife model of antenatal care rather than a clinical model from the GP.

This is reflective of the assumptions of initiation of care and total number of consultations within this study. Lao's (2000) research suggested that with appropriate psychosocial support and antenatal care, the obstetric outcomes in adolescent mothers would be comparable with or even better than in older mothers. Good antenatal care may help improve health outcomes for women and their babies. Trinh (2006), on the other hand, maintains that inequalities are still prevalent between subgroups of women for effective use of resources, and for increased early initiation of, or entry into, antenatal care there needs to be an increased focus on high-risk groups.

In recent years there has been lengthy discussion and debate about the value of antenatal care, and the relationship between the number of antenatal consultations and outcome of pregnancy for both adolescents and adults is not as closely associated as it is often assumed. Since the 1920s there has been an increased emphasis on the quantity of antenatal consultations, but in recent years, there has been a stronger directive towards the content and quality of antenatal care. Antenatal care for adolescents is often viewed as being inadequate by media and society, presuming that adolescents often present late, and have poorer pregnancy outcomes but there are a few extreme cases where this occurs, where the media often oversimplifies the context of adolescent pregnancy.

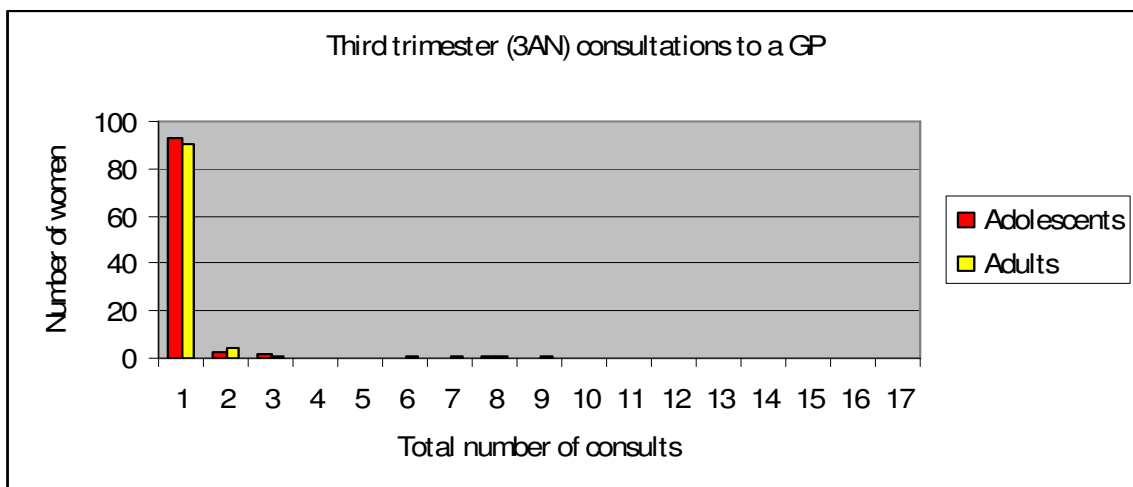
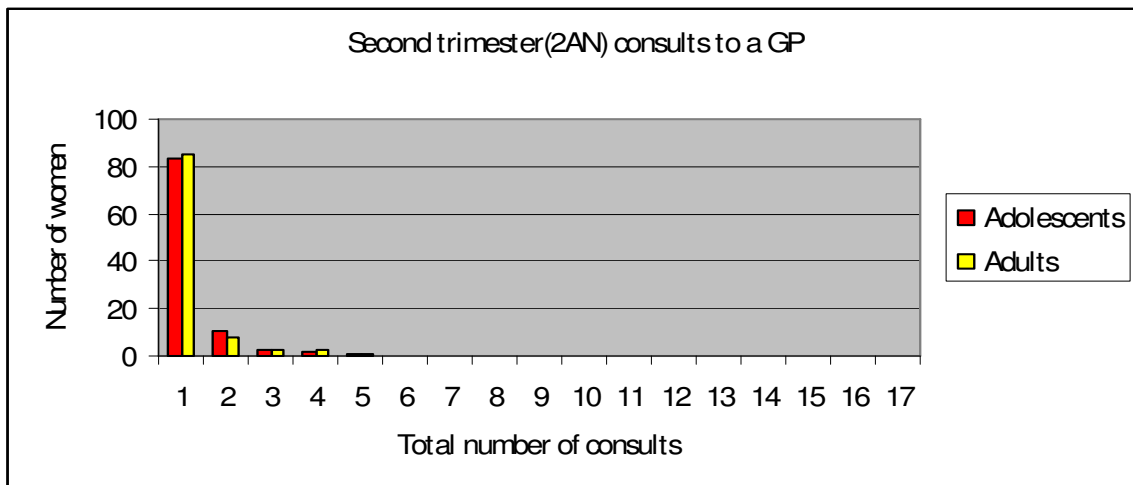
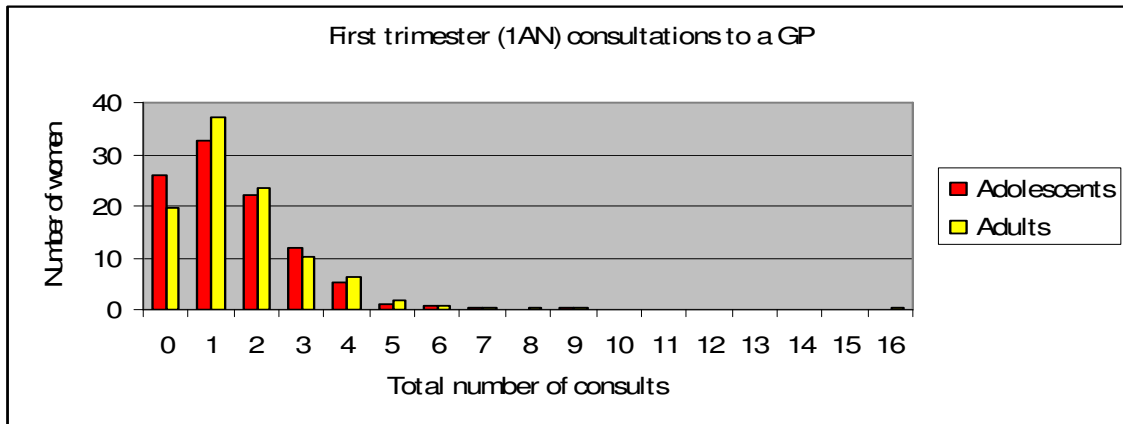
In this study, there are significant differences in the outcome of pregnancies because of termination and miscarriage between adults and adolescents; however, the birth outcomes and rates of initiation to antenatal care are relatively comparable between these groups of pregnant women. The relationship between quality of care and outcomes have been debated, but the most important component of antenatal care is that the care itself needs to be culturally appropriate, acceptable to the individual and her family, accessible and affordable for all women including adolescents. Adequate antenatal care is more applicable to pregnancy outcomes than maternal age, and there

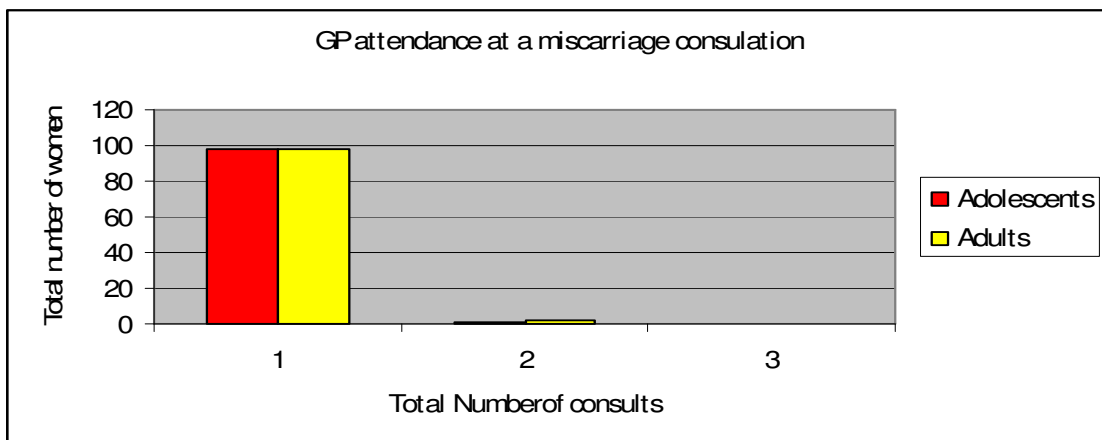
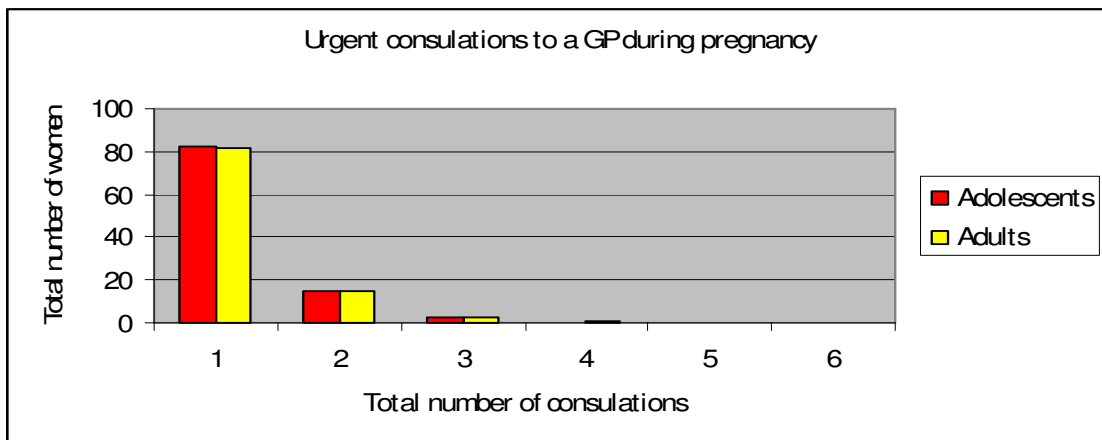
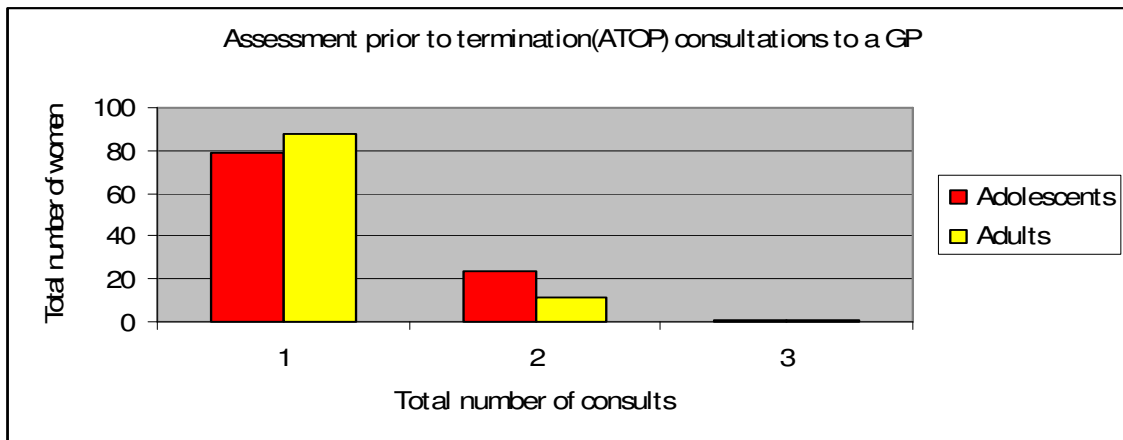
is a requirement by all health service organisations to provide early initiation and continuous antenatal care for all women that require it. This research study provides additional evidence based research for primary care, for example Bloom's (1999) research supported the importance of antenatal care to both maternal and child health and this potentially provides an evidence based practice for maternity services in a general practice. Many questions have arisen, in relation to the associated health benefits of antenatal care, especially in terms of costs.

Insufficient antenatal care for women and children in New Zealand is leading to less than optimal health outcomes. Full antenatal care has considerable potential for health gain for the mother and baby, a substantial effort to increase access to services and information would reduce the disparities and inequity that exists, and assist in the effort to provide cost-effective and appropriate antenatal care, that is based on the needs of each women.

## 9 Appendices

### 9.1 Appendix Graphs of Maternity Claim Modules





## 9.2 Appendices Pegasus Health Maternity Services Dataset 2006 developed for research:

Factors affecting variations in the outcomes and trends associated with provision and utilisation of antenatal care in General Practice.

A comparative study of pregnant adolescents and a pregnant adult population in Christchurch 2004-2005

Data Item	Description	Purpose	Variable
NHI of mother	Unique identifier of the pregnant women	Unique identifier	
Date of birth of mother	Date of birth of pregnant woman	Used to derive ages for comparison	
Ethnicity (mother)	Classification of ethnicity	Used to compare outcomes according to ethnicity	
GP code	Unique identifier of GP	To compare utilisation of services by GP	
Practice Code	Unique identifier of GP practice	To see if there are any prominent practices providing services	
Parity	Number of previous viable pregnancies (24 weeks gestation)	Used to determine which models of care may or may not be appropriate and to monitor outcomes comparing previously nulliparous and parous women	To investigate whether mother who has had a previous pregnancy present later for antenatal care
Gravida	Numb of times the mother has been pregnant		
Miscarriage	Evidence of diagnosis of 3 or more miscarriages which would be a complicating factor for maternity services	Used to identify complicated pregnancies	Count previous miscarriages
Previous Preg (live)	Evidence of previous live birth	Statistical analysis	Look at parity and gravida to ascertain this
Date of last menstrual period	Date on which last menstrual period began	Primary item to calculate EDD	
Estimated date of delivery	Date on which delivery might be expected	Used as a guide for calculation of timing of tests, regular antenatal consults. Other interventions and gestational age at birth	
Age band of mother	Derived from age of mother according to PERISTAT age bands	Used to compare outcomes for women according to age band	10-14 15-19 20-24 25-29 30-31 35-39 40-44 45+
Gestation at first pregnancy contact/ first antenatal assessment		Used to determine routine appointments and tests are appropriate for this pregnancy and timeliness accessing maternity services	Used to check the variance in provision or uptake of recommended routine antenatal care ( for example by unit, geographical location, demographic grouping)
Activity (antenatal appointment)	Activity of antenatal appointment	Used to identify antenatal appointments and to monitor consults as per the clinical guidelines	Compare 1AN, 2AN, 3AN and UAN
Gestational	Gestational age at appointment	Used to identify antenatal appointments	
Count antenatal	Number of antenatal appointments with GP	Used to calculate the extent to which maternity	



appt (GP)		services are community led	
Antenatal appointments before 12 weeks	A Yes/No based on evidence of having 1 or 2 appointments or consultations before 12 weeks gestation	Used to monitor implementation of guidelines and outcomes for mother and babies	Wks pregnant at 1 <sup>st</sup> presentation
Number of Consultations in different trimesters		To compare differences between ages, ethnicities and mother who have had previous pregnancies, miscarriages and terminations etc	1AN, 2AN 3AN By age, ethnicity and other (cross tab analysis)
Routine antenatal appointments planned	A Yes/No based on attendance of 1AN, 2AN & 3AN consultations (<12,16,18-20,25, 28, 31,34, 36,38,40)		Not sure if I can do this maybe for LMC lead GPs only
1 <sup>st</sup> time mothers Antenatal consultations Clinical guidelines	<12,16,18-20,25,28,31,34,36,38,40	Used to check the variance in provision or uptake of recommended routine antenatal care ( for example by unit, geographical location, demographic grouping)	
Subsequent pregnant	<12,16,18-20,28,34,36,38 weeks	Used to check the variance in provision or uptake of recommended routine antenatal care ( for example by unit, geographical location, demographic grouping)	Subsequent pregnancy and the outcome Correlated with age and ethnicity, and weeks presented.
Diagnosis (Threatened miscarriage)	Evidence of threatened miscarriage	Used to monitor the incidence of TMIS and UAN	Look at TMIS or UAN columns
Diagnosis (miscarriage)	Evidence of miscarriage	Used to monitor the incidence of miscarriage	Look at outcome column and MISC column for a practice to claim MISC the miscarriage has to occur on site Cross tab outcome variable + outcome variable
Diagnosis (termination)	Evidence pregnancy terminated	Used to monitor the incidence of termination	Look at the outcome column and ATOP column (cross tab )
Termination		Used to monitor differences in prevalence and incidence of terminations when adjusted for age	10-14 15-19 20-24 25-29 30-31 35-39 40-44 45+
Interval between termination and subsequent pregnancies			Mental health concept to this (look at duplicate NHI's for the period studied)
Interval between miscarriages and subsequent			Mental health concept to this

pregnancies			
NHI of baby	Unique identifier of baby in pregnant NHI number given at birth	Used to link child(ren) with pregnancy and mother	
Number of babies Delivered	Number of babies delivered	Used to monitor outcomes comparing singleton and multiple pregnancies	
Gestational Age (at birth)	Derived from EDD in weeks and days	Used to identify whether or not the baby was delivered at preterm, term or post term to compare outcomes and inform service provision	
Outcome of Pregnancy	Records the outcome of pregnancy	Used to monitor outcome of pregnancy compared to other factors in this case age, ethnicity	Live Miscarriage Termination Other
Gestation of pregnancy at birth		Correlation or relationship between number of weeks pregnant when they first presented and delivery	Compare both groups Adolescents and Adults Using indicators of gestation of pregnancy at delivery 24-27 weeks, 28-36 weeks, 37-41 weeks and 42+ weeks
Activity(postnatal check by GP)	Evidence that the mother has had a postnatal check or consultation at between 4-6 weeks by GP	Used to monitor the delivery of postnatal services and the incidence of these To monitor levels of postnatal care	Compare the number of postnatal checks (contraceptive advice re subsequent pregnancies)
Subsequent pregnancies within year			Repeat NHI in database within the year timeframe see if patient had PN check with previous pregnancy
Immunisation		The incidence of vaccinating the baby (Uptake %)	Compare vaccination differentials with mother ages etc
Attendance at regular enrolled GP		Continuity of care, find trends about GP in Christchurch	
Antenatal coverage in Christchurch		10 most prominent medical practices for antenatal and maternity services (compare adults and adolescents)	
APNCU Index	LMC GP APNCU index baseline recommended consults is 14	Antenatal care utilisation using when antenatal care was initiated and adequacy of received services	Weeks pregnant at 1 <sup>st</sup> presentation and total number of consultations 3 different categories of inadequate, adequate and adequate plus
Multivariate logistic regression		association between health service utilisation between maternal age and parity	
Post Code of mother		To compare outcomes and plan services in different areas	Future research

### 9.3 Pegasus Health maternity claiming data for comparison of claiming and trends using an OLAP query builder

1<sup>st</sup> July 2004- 30<sup>th</sup> June 2005 and 1<sup>st</sup> July 2005 to 30<sup>th</sup> June 2006

Year	Quarter	Month	1AN	2AN	3AN	ATOP	EG	FDEL	FDELFULL	MISC	PC	PNB	PNM	SDEL	SDELFULL	TMIS	UAN	Grand Total
2004	Quarter 3	July	754	122	29	71	26		21	16	57	5	114		26	46	76	1363
		August	747	93	19	61	25		15	13	64	2	121		16	52	100	1328
		September	700	109	25	52	32		3	10	105	10	176		18	29	69	1338
	Quarter 3 Total		2201	324	73	184	83		39	39	226	17	411		60	127	245	4029
	Quarter 4	October	649	102	20	57	9		18	11	73	6	154		11	41	95	1246
		November	715	83	31	77	19		11	11	79	4	106		8	54	83	1281
		December	603	85	21	78	23		5	7	57	17	99		18	40	65	1118
	Quarter 4 Total		1967	270	72	212	51		34	29	209	27	359		37	135	243	3645
<b>2004 Total</b>			<b>4168</b>	<b>594</b>	<b>145</b>	<b>396</b>	<b>134</b>		<b>73</b>	<b>68</b>	<b>435</b>	<b>44</b>	<b>770</b>		<b>97</b>	<b>262</b>	<b>488</b>	<b>7674</b>
2005	Quarter 1	January	619	93	28	44	19		5	6	45	10	91		11	55	73	1099
		February	661	94	22	63	28		5	10	57	21	78		4	45	58	1146
		March	700	69	16	64	20		2	8	45	11	87		5	53	53	1133
	Quarter 1 Total		1980	256	66	171	67		12	24	147	42	256		20	153	184	3378
	Quarter 2	April	629	101	10	68	14	4	8	7	28	14	71	2	1	45	44	1046
		May	663	93	15	57	5	4		9	37	3	56	7		53	47	1049
		June	652	71	11	55	3	9		8	28		52	2		44	41	976
	Quarter 2 Total		1944	265	36	180	22	17	8	24	93	17	179	11	1	142	132	3071
<b>2005 Total</b>			<b>3924</b>	<b>521</b>	<b>102</b>	<b>351</b>	<b>89</b>	<b>17</b>	<b>20</b>	<b>48</b>	<b>240</b>	<b>59</b>	<b>435</b>	<b>11</b>	<b>21</b>	<b>295</b>	<b>316</b>	<b>6449</b>
<b>Grand Total</b>			<b>8092</b>	<b>1115</b>	<b>247</b>	<b>747</b>	<b>223</b>	<b>17</b>	<b>93</b>	<b>116</b>	<b>675</b>	<b>103</b>	<b>1205</b>	<b>11</b>	<b>118</b>	<b>557</b>	<b>804</b>	<b>14123</b>
Year	Quarter	Month	1AN	2AN	3AN	ATOP	EG	FDEL		MISC	PC	PNB	PNM	SDEL		TMIS	UAN	Grand Total
2005	Quarter 3	July	521	47	20	54	1	13		7	28	3	45	8		37	43	827
		August	608	52	19	68		7		13	30	7	49	4		41	40	938
		September	563	49	20	59		1		10	33		39	6		31	29	840
	Quarter 3 Total		1692	148	59	181	1	21		30	91	10	133	18		109	112	2605
	Quarter 4	October	555	47	16	68		7		12	29	1	42	3		23	59	862

		November	572	60	13	62				6	18	8	56			36	45	876
		December	580	43	15	50	1			8	25	2	44	2		31	76	877
	Quarter 4 Total		1707	150	44	180	1	7		26	72	11	142	5		90	180	2615
<b>2005 Total</b>			<b>3399</b>	<b>298</b>	<b>103</b>	<b>361</b>	<b>2</b>	<b>28</b>		<b>56</b>	<b>163</b>	<b>21</b>	<b>275</b>	<b>23</b>		<b>199</b>	<b>292</b>	<b>5220</b>
2006	Quarter 1	January	579	41	10	51				6	23	3	39			38	63	853
		February	572	42	14	41				4	34	4	37			42	33	823
		March	604	74	13	54				13	1	32	1			42	53	887
	Quarter 1 Total		1755	157	37	146				23	58	39	77			122	149	2563
	Quarter 2	April	578	62	23	52				13		36				59	46	869
		May	758	82	28	74				13		48	2			46	37	1088
		June	632	77	20	63				13		42	1			40	45	933
	Quarter 2 Total		1968	221	71	189				39		126	3			145	128	2890
<b>2006 Total</b>			<b>3723</b>	<b>378</b>	<b>108</b>	<b>335</b>				<b>62</b>	<b>58</b>	<b>165</b>	<b>80</b>			<b>267</b>	<b>277</b>	<b>5453</b>
<b>Grand Total</b>			<b>7122</b>	<b>676</b>	<b>211</b>	<b>696</b>	<b>2</b>	<b>28</b>		<b>118</b>	<b>221</b>	<b>186</b>	<b>355</b>	<b>23</b>		<b>466</b>	<b>569</b>	<b>10673</b>

## 9.4 Pegasus Health Helicon Claiming Programme

Helicon for Windows

File Tools Window

Maternity - Pregnancy [MCMANUS, HAYLEY]

Pregnancy

LMP Date: 15/01/2006

Gravida: 2

Parity: 0

Registration(s)

Date	Surgery	Doctor	Model
12/03/2006	Aikmans Road Cl...	Cole, Alex	5: Single Service Episo

Patient

name	First Name	Date Of Birth
manus	ha	

History

Ja...	Other Names	DOB	Address	Eth Reqd?	Reg?
JUS	HAYLEY	27/10/1980	12 Darley		Y
JUS	HAYLEY MI...	27/10/1980	31 Oxley ...		
JUS	HAYLEY MI...	27/10/1980	12 Darley ...		

Pregnancies

LMP Date	Gravida	Parity
15/01/2006	2	0
07/09/2002	1	0

OK

Reference	Date	Surgery	Doctor	Code	LMP
106067	11/05/2005	Doctors on Riccarton	Chin, Colin Y.Y.K	PC	05/08
104276	30/04/2005	Doctors on Riccarton	Chin, Colin Y.Y.K	PNM	05/08
104276_A	29/04/2005	Doctors on Riccarton	Chin, Colin Y.Y.K	FDEL	05/08
104276	29/04/2005	Doctors on Riccarton	Chin, Colin Y.Y.K	PNB	05/08
104145	26/04/2005	Doctors on Riccarton	Chin, Colin Y.Y.K	3AN	05/08
104145	20/04/2005	Doctors on Riccarton	Chin, Colin Y.Y.K	3AN	05/08
103221	12/04/2005	Doctors on Riccarton	Chin, Colin Y.Y.K	3AN	05/08
101913	05/04/2005	Doctors on Riccarton	Chin, Colin Y.Y.K	3AN	05/08
101540	29/03/2005	Doctors on Riccarton	Chin, Colin Y.Y.K	3AN	05/08
BK5741	26/02/2005	Doctors on Riccarton	Chin, Colin Y.Y.K	3AN	05/08
BK5737	12/02/2005	Doctors on Riccarton	Chin, Colin Y.Y.K	2AN	05/08
BK5731	26/01/2005	Doctors on Riccarton	Chin, Colin Y.Y.K	2AN	05/08
BK5721	21/12/2004	Doctors on Riccarton	Chin, Colin Y.Y.K	2AN	05/08
BK5705	16/11/2004	Doctors on Riccarton	Chin, Colin Y.Y.K	2AN	05/08
BK5687	14/10/2004	Doctors on Riccarton	Chin, Colin Y.Y.K	EG	05/08
BK5679	30/09/2004	Doctors on Riccarton	Chin, Colin Y.Y.K	1AN	05/08
BK5676	23/09/2004	Doctors on Riccarton	Chin, Colin Y.Y.K	1AN	05/08
BK5676	21/09/2004	Doctors on Riccarton	Chin, Colin Y.Y.K	1AN	05/08

Connected SQL ROBYNS2\hayley INS CAPS NUM 22/04/2007 7:07 p.m.

Start Inbo... mas... Out... Heli... Book1 case... cont... MSN... 7:07 p.m.

## 9.5 Estimated due date computer programme

mastersongoin22APRIL (2) (2).doc - Microsoft Word

File Edit View Insert Format Tools Table Window Help Adobe PDF Acrobat Comments

Type a question for help

Heading 1 Frutiger 47LightCn 16 B I U

100% Read

EN EN Pref ?

Maternity Dates

LMP Date: 30/01/2006

Start: Finish:

1st Trimester: 31/01/2006 08/05/2006

2nd Trimester: 09/05/2006 15/08/2006

3rd Trimester: 16/08/2006 06/11/2006

End 21st Week: 26/06/2006

Expected Birth Date: 06/11/2006

Postnatal Finish: 04/12/2006

Calculate Close

Page 97 Sec 5 97/98 At Ln Col REC TRK EXT OVR English (Ne)

Start In... m... m... O... H... B... ca... co... M... M... D... 7:09 p.m.

## 9.6 Pivot table extraction of maternity services

Pegasus Health GPs between 01/07/2004 and 30/06/2005.

Microsoft Excel - Maternity\_NHI (3).xls

FileEditViewInsertFormatToolsDataWindowHelp

Type a question for help

Using these variables to extract the factors that were important at determining why some adolescents and adults initiate antenatal care at a later stage.

<pre> drop table #Min_Ethnic_Group Select  Isnull(p.parent_ID, p.patient_ID) as Parent_ID,         Min (e.priority) as Priority         ,Min(Dob) as DOB Into #Min_Eth_Priority From PMG..Pat_Register as p left join PMG.dbo.PAT_ETHNIC_GROUP as g on p.patient_id = g.patient_id left join PMG.dbo.ETHNIC_GROUP as e on g.ethnic_group_id = e.ethnic_group_id Group by Isnull(p.parent_ID, p.patient_ID) Select  a.Parent_ID,         a.DOB,         b.priority as Ethnic_Priority,         Case             when z.description is null then 'Other'             Else z.description end as Ethnic_Group Into #Min_Ethnic_Group From #Min_Eth_Priority as a left join PMG.dbo.ETHNIC_GROUP as b on a.priority = b.priority left join PMG.dbo.ETHNIC_GROUP_TYPE as z on b.type_ID = z.ETHNIC_GROUP_TYPE_ID Group by a.Parent_ID, a.DOB,         Case             when z.description is null then 'Other'             Else z.description End ,         b.priority </pre>	<pre> Select Count(*) as Count_Visits, Isnull(c.Parent_ID, a.Patient_ID) as Parent_ID, b.Surgery_ID, b.Doctor_ID, c.NHI, Month(a.Service_Date) as Visit_Month, Year(a.Service_Date) as Visit_Year Into #Maternity_Claims From PMG.dbo.MAT_CLAIM_DETAIL as a inner join PMG.dbo.MAT_CLAIM as b on a.Claim_ID = b.Claim_ID inner join PMG.dbo.PAT_REGISTER as c on a.patient_ID = c.patient_ID Where a.Service_Date between '01 JUL 2004' and '01 JUL 2005' Group by Isnull(c.Parent_ID, a.Patient_ID), b.Surgery_ID, b.Doctor_ID, c.NHI, Month(a.Service_Date) , Year(a.Service_Date) Select  a.*,         d.Fullname as Provider,         s.Name as Surgery,         b.Ethnic_Group,         PMG.dbo.ageinyears(b.dob,'01 JUL 2005') as Age From #Maternity_Claims as a inner join #Min_Ethnic_Group as b on a.Parent_ID = b.Parent_ID inner join PMG.dbo.vDoctor as d on a.Doctor_ID =d.Doctor_ID inner join PMG.dbo.vSurgery as s on a.Surgery_ID = s.Surgery_ID </pre>
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