



All Ireland Traveller Health Study Our Geels

The Birth Cohort Study

All Ireland Traveller Health Study

The Birth Cohort Study Part B of Technical Report 2

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Summary

The birth cohort study is a longitudinal study of Traveller babies born on the island of Ireland over a 1-year period. This follow up study is ongoing and will end on 13th October, 2010. The study captures the health status, immunisation uptake, developmental milestones, health services use and health needs of Traveller babies in their first year of life. However, as the birth cohort study is still ongoing, this interim report only provides some results up to the period June 2010. Complete results will be available after the cohort has ended.

From our estimates and the birth cohort study data, there are approximately 1,000-1,400 births to the Irish Travellers per annum. There are more male babies born, which mirrors that of the general population both in ROI and NI. Traveller mothers are relatively young compared to the general population.

The annual crude birth rate of Irish Travellers has fallen compared to 1986 but is relatively still higher than the general population. This gap however has decreased. The general fertility rate and total fertility rate have also decreased. However, the annual crude birth rate, general fertility rate and total fertility rate for ROI Travellers are higher compared to NI.

There are many challenges involved in conducting cohort studies, especially one involving a marginalised, minority group. A culturally sensitive approach needed to be taken throughout.

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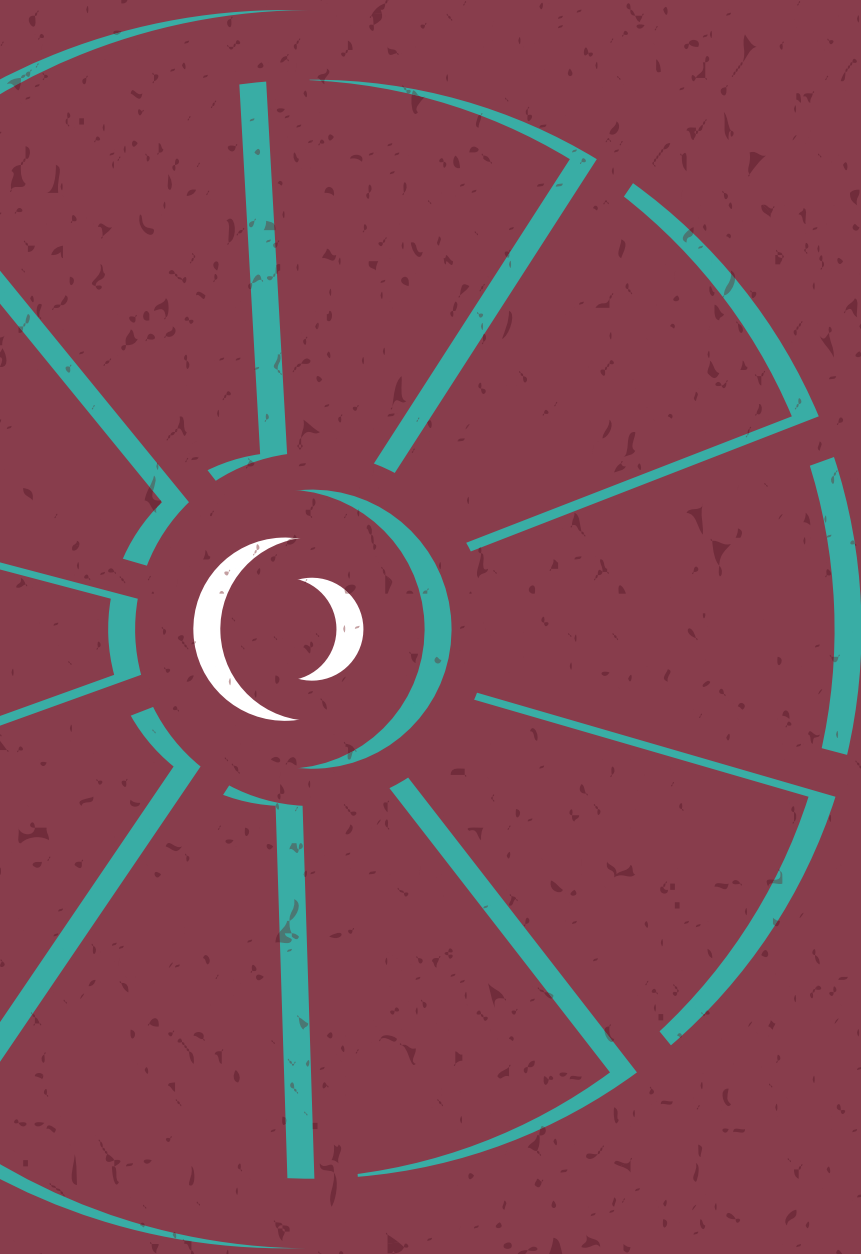
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The Birth Cohort Study



1. Introduction

The birth cohort study is a longitudinal study of Traveller babies on the island of Ireland (IOI). The study is ongoing and ends on 13th October, 2010. The purpose of the birth cohort study is to enumerate the number of births to Irish Travellers in 1 calendar year and follow up the babies for a year in order to capture important indicators of health. These include infant mortality, feeding methods, immunisation uptake, developmental performances, health services utilisation and health needs of Traveller babies. Data from the study is used to calculate other important indicators including crude birth rate and fertility rates. Full data collection will only be completed after the cohort ends on 13th October, 2010. A complementary report will be produced at a later date.

This report describes the methodology for the birth cohort study followed by the estimates of Traveller births in a year. Next it describes the profile of the birth cohort study to date and the fertility indicators. Section 6 describes some of the challenges faced by the study so far.

2. Study Methodology

The birth cohort study is a study of Traveller babies born between 14th October, 2008 and 13th October, 2009, with babies followed up for 1 year (Figure 1). First-wave data collection ends on 13th October, 2010. This methodology section describes the procedures and components of the birth cohort study.

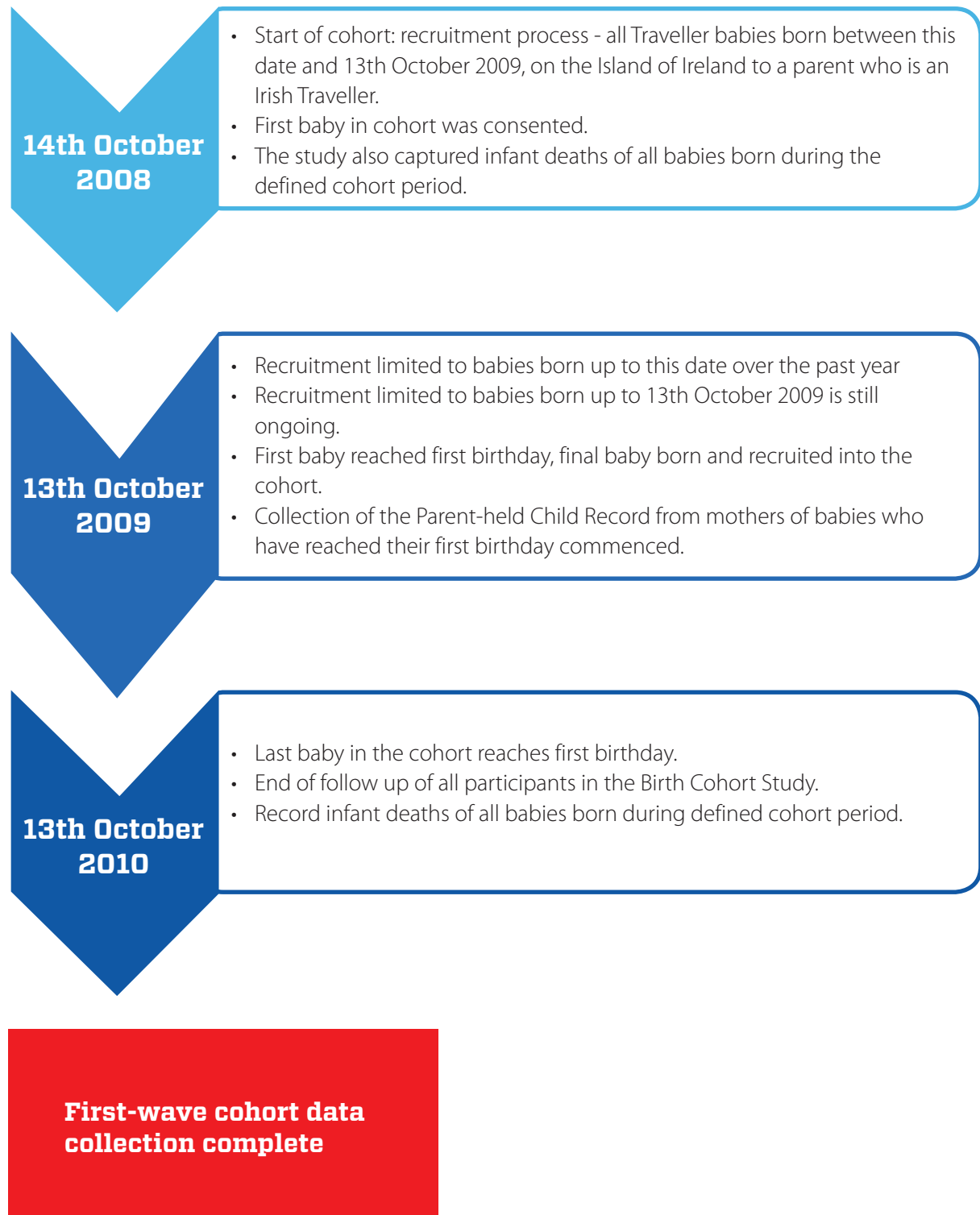
2.1 Study Participants

All Traveller mothers whose babies met the criteria below were invited to participate in the study.

The inclusion criteria included:

- Traveller babies born on the island of Ireland;
- Traveller babies born between 14th October, 2008 and 13th October, 2009;
- Traveller babies with a parent who self-identifies as an Irish Traveller.

Figure 1: Time scale for the birth cohort study processes



2.2 Study Team Membership

The multidisciplinary study team membership is outlined in Table 1. Due to structural and organisational differences in NI, the team membership is slightly different there.

Table 1: Membership and function in the birth cohort study team

Function	Republic of Ireland	Northern Ireland
Main study coordinator	All Ireland Traveller Health Study team, UCD	All Ireland Traveller Health Study team, UCD
Consent	Public Health Nurses	AITHS main study coordinator for Northern Ireland
Study promotion and participant identification	Public Health Nurses Traveller health projects - project coordinators Traveller Community Health Workers (TCHW)	Health Visitors Traveller projects

This varied team membership and the scale of the study demanded a solid structure for the study. This included both the communication structure and the study coordination. The main study team in UCD was the hub in communication delivery, provided a central support system to standardise the study methodology and acted as the main communication source for all the other members. It was also important that when procedures were modified according to the needs of the study that these were communicated effectively to all the members.

2.3 Study Network and Communication Structure

The study required communication between UCD, the Traveller health projects and the Public Health Nurses (PHNs)/ Health Visitors (HVs). The study coordinators are the coordinators for the Traveller health projects across Ireland, and also act as the main person responsible at a local level for the All Ireland Traveller Health Study (AITHS) and coordinate the peer researchers.

Like the study coordinators, Local Health Office (LHO) areas elected a representative as the main PHN liaising with the study team in UCD. The elected representative usually held the position of Assistant Director of Public Health Nursing. In certain areas, this was the Director of Public Health Nursing, the Traveller Health Unit Coordinator or the Designated Traveller Public Health Nurse. The main person linked to the study team was known as the 'link-PHN'. There were 32 link-PHNs involved in the study. However, as the study progressed, extra link-PHNs were included due to the geographical limitations and the amount of work which needed to be handled by each link-PHN.

In Northern Ireland (NI), a similar structure was employed; each of the 5 Trusts elected a dedicated Health Visitor (HV) as the link person involved for the study and a study Principal Investigator (PI). In most circumstances, the link-HV was the PI for the study. The role of the HVs in NI was slightly different than the role the PHNs in ROI. HVs were required to promote and then inform the main study coordinator in NI of any Traveller mothers who had verbally agreed to be formally consented. The link-HVs still form the main link between the study team and the HVs within their Trusts.

The Traveller project networks in some parts of NI were not as well established as many of those in ROI. In some circumstances, temporary projects were set up to aid the AITHS census. Thus the communication structure was mostly informal between the main study coordinator and local Traveller contacts.

For the purpose of participant protection and analysis, the data has been aggregated by Traveller Health Unit (THU) in ROI while for Northern Ireland it was aggregated for the whole of NI.

2.4 Study Promotion

PHNs, HVs, TCHWs and study coordinators formed the main group of health workers promoting the study to Traveller women. This was done using study leaflets and more importantly oral promotion. Radio, DVD and media were used for the AITHS census promotion and this included the birth cohort study.

2.5 Recruitment Strategy

The recruitment of participants was a 2-phase process.

Phase 1: During the AITHS census, the Peer Researchers identified potential participants and encouraged participation, followed by official consent by PHNs. In NI, this was further supported by the HVs' notifications.

Phase 2: Direct promotion and official invitation by the PHNs and HVs during postnatal visits.

Due to the lack of an ethnic identifier, PHNs and HVs used their local knowledge and other local registers to ensure all Traveller births were identified. These included the National Metabolic Screening register (ROI) and Birth Notification register. Both registers were not Traveller specific, thus potential participant recognition was based on local knowledge. Traveller health projects were also invaluable as a resource in potential participant identification. However, these projects were limited to certain areas.

2.6 Consenting Process

Each PHN who was ready to consent a potential participant was given a consenting pack. Included in this pack was a Parent-held Child Record (Figure 2). The participating mother carried this recording diary with her for a full year. When a Traveller mother consented to participate in the study, she also consented for linkage data to her maternity hospital record. However, the mother can waive the consent to hospital record access and still participate in the actual cohort.

2.7 Refusals

Enrolment into the study was as per ethical approval of the protocols in ROI and NI. If a mother refused, the PHNs informed UCD and gave a reason for the refusal. However, the PHNs re-promote the study on an ongoing basis. If a previously refused mother changed her mind, then the PHN followed the consenting procedure and informed UCD of this change. UCD then proceeded to remove a refusal and add the consent to the specified group. This allowed an accurate count of Traveller births in the LHO area.

2.8 Data

Data for the birth cohort study comes from 3 sources:

1. The consent form
2. The Parent-held Child Record (Figure 2)
3. Birth Notification forms- linkage data from the maternity hospitals.

Figure 2: The Parent-held Child Record used in the birth cohort study



All Ireland Traveller Health Study



Picture 1: (left) Margaret and baby Thomas (at 6 months old), one of the first babies in the birth cohort study with the team in Laois.



Picture 2 (left) Margaret and baby Thomas (at 1 year old on 14th October 2009). This later picture was taken with the team in Tallaght. The involvement of PHNs and Traveller Health projects is essential for the study. Also in picture are Freda and baby Johnny from Tallaght who are also participating in the birth cohort study. Far right is baby Thomas's elder brother, Johnny.

3. Population Birth Estimates

The initial estimated number of births for the birth cohort study was based on 2 sets of existing data and later, data from the All Ireland Traveller Health Study census 2008.

Estimate 1 was based on the Irish Census 2006 (CSO, 2007a) while estimate 2 was based on the 1986 Travellers' Health Status Study (Barry *et al.*, 1988) and the 2005 Vital Statistics Report (Department of Health and Children, 2006). In addition, the All Ireland Traveller Health Study 2008 provided the latest up-to-date census data on the Traveller population and was fully utilised to ensure that the birth cohort study captured the real number of Traveller births (Table 2). Detailed calculation methods and discussion on estimates are provided in Appendix A.

Table 2: Estimated number of Traveller births using different data sources

Sources	Estimated births
Irish census 2006	1,324
1986 Traveller Health Status Study and 2005 Vital Statistics Report	1,240
2008 AITHS census - range for number of Traveller children IOI (total under 1 year old - 3 years old)	862-1,400
2008 AITHS census - estimated number of pregnant women with potential live births in IOI	1,272-1,669

The final 'corrected' estimate was 1,000-1,400 births for the island of Ireland.

4. Preliminary Findings: the Birth Cohort Profile (June 2010)

As the birth cohort study is ongoing, the study can only profile some provisional results based on available data. It should be cautioned that results shown here are not final.

4.1 Pregnant Women Identified During Census

During the AITHS census, there were 670 women identified as being pregnant in ROI and 42 in NI. Of the 670 in ROI, 136 (20.3%) verbally consented for formal consent by the PHNs. 124 (18.5%) officially consented for the study. For NI, the AITHS census team did not ask for verbal consent due to delay in entering the field.

4.2 Study Ascertainment and Geographical Distribution of Births

980 live births were identified by the PHNs and HVs for the island of Ireland. Of these, 502 (51.2%) consented to the study. There were 465 (47.4%) refusals. There are 13 (1.3%) mothers who still have 'to be approached' in NI.

For ROI, there were 913 live births with 468 (51.2%) consented, while in NI there were 67 live births identified with 34 (50.7%) consented, 20 (29.9%) refusals and 13 (19.4%) 'to be approached' for consent. This is further detailed by region in Table 3. It should be noted that the consenting process is ongoing until the end of cohort on 13th October, 2010.

Table 3: The birth cohort study number of consents, refusals and ‘to be approached’ by regions

Region	The birth cohort study			
	Consents	Refusals	To be approached	Total
Republic of Ireland (THU)				
Eastern	138	81	0	219
Midland	48	38	0	86
Mid-Western	68	75	0	143
North Eastern	18	21	0	39
North Western	27	11	0	38
South Eastern	62	33	0	95
Southern	19	65	0	84
Western	84	112	0	196
Unknown	4	9	0	13
Total	468	445	0	913
Northern Ireland (Health and Social Care Trust)				
Belfast	8	1	0	9
Northern	0	1	0	1
Southern	16	13	5	34
South Eastern	5	1	0	6
Western	5	4	8	17
Total	34	20	13	67

‘To be approached’ status was included due to the time and geographical limitation in approaching the potential participants in Northern Ireland. This was due to the methodology and ethical requirement in NI. At the time of writing this report, the study team is still actively approaching these mothers for participation in the cohort.

The study’s boundary was based on the administrative boundary of the Health Service Executive’s LHO areas in ROI and Health and Social Care Trusts in NI. However, for the purpose of this report, data has been aggregated according to Traveller Health Units (THUs) and Northern Ireland (NI). Some of the analysis cannot be performed according to areas due to the small population size.

4.3 Refusals

To date, the refusal rates were 48.8% in the Republic of Ireland and 29.9% in Northern Ireland. Reasons for refusals are given in Table 4.

Table 4: Reasons given for refusal to participate in the birth cohort study

Reasons	n	%
No reason given	355	76.4%
Stress: baby in hospital, or families disputes	34	7.3%
No interest	20	4.2%
Left address/Travel out of country	15	3.3%
Partner refused	12	2.6%
Fear of being known to community	11	2.4%
Too much hassle	9	2.0%
Study makes no difference to Traveller health	9	2.0%
Total	465	100%

The majority of women who declined to participate in the study gave no reason for refusals (76.4%). 7.3% cited stress from the baby being in hospital or due to family disputes. 3.3% of the Traveller families left their residences before the PHNs, HVs or main study coordinator were able to approach the mothers for formal consent. Small percentages refused due to partner refusal, fear of their details being known due to the small community size or because they felt the study will not make any difference to Traveller health.

4.4 Number of Births

As of June 2010, there were 980 Traveller births identified on the island of Ireland for the period 14th October, 2008 to 13th October, 2009.

Of the 980 births, there were 7 twin pregnancies and 966 singleton pregnancies. There were 5 sets of twins included in the cohort. In this cohort, there were 257 (51.2%) male babies and 245 (48.8%) female babies. Based on this data, it was estimated that there were 502 male babies and 478 female babies born to the Traveller community on the whole island of Ireland. This was similar to the sex distribution for the Irish population (51.4% male babies in ROI and 51.5% male babies in NI) (Central Statistics Office, 2008; Northern Ireland Statistics and Research Agency, 2008).

There were 10 births that were classified as 'non-identifier' in the ROI. These were births the mothers of which do not identify themselves as Travellers. A further 13 cases were identified as Irish Travellers who gave birth outside the island of Ireland, thus do not meet the eligibility criteria of the cohort. Out of these 13, 9 subsequently resided in ROI and 4 in NI.

4.5 Maternal Age

The average age of Traveller mothers in the cohort is 25.9 (median=25; 25th percentile=21, 75th percentile=30).

4.5.1 Maternal Age: by 5-Years Age Group

The age of the mothers showed a younger age distribution with 74.3% under 30 years of age compared to 39.4% in ROI (CSO, 2008) and 50.8% in NI (NISRA, 2008: Figure 3, Table 5).

There has been a shift in age at maternity in ROI general population in 2008 compared to 1987 (Figure 4). In ROI general population, there has been a general overall shift to the right with women reaching maternity age at a later age. For ROI Travellers, the peak age of maternity is still at the 20-24 age group; however the numbers in the 25-29 age group have also increased with a drop in all the other older age groups.

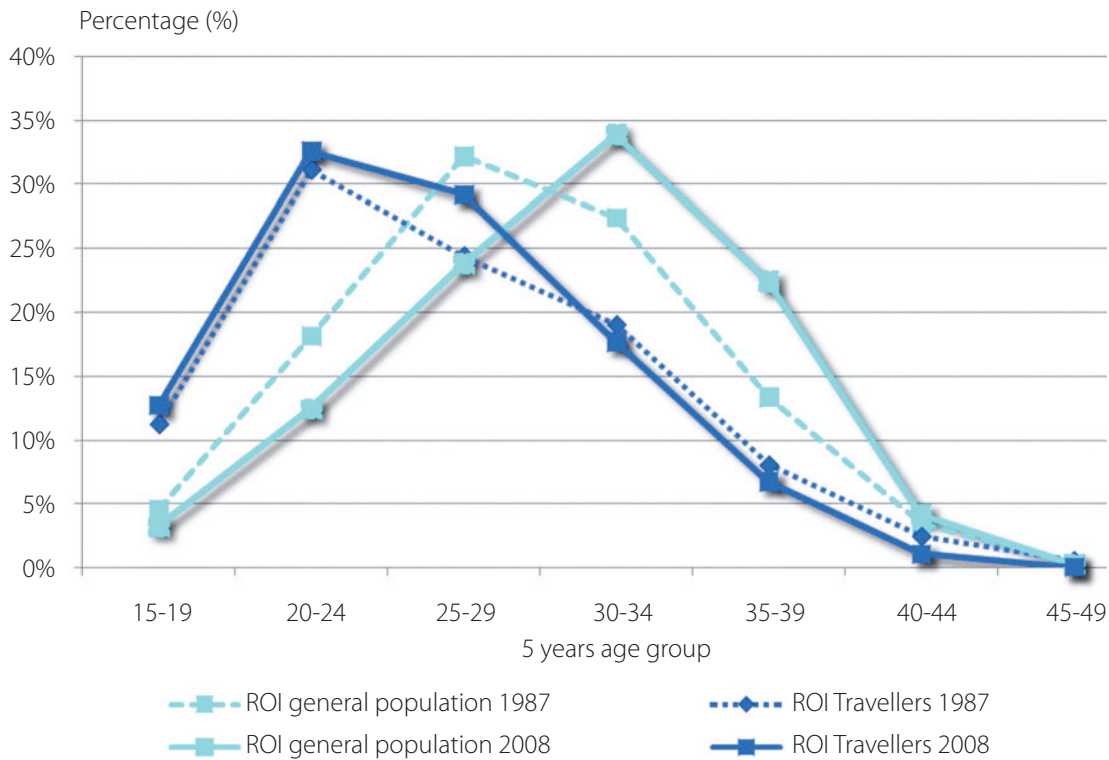
Table 5: Age distribution of Traveller mothers compared to general population in IOI

Age group (years)	Traveller mothers (%) n=479	Republic of Ireland general population (%) n=75,065	Northern Ireland general population (%) n=25,631
15-19	12.7	3.2	5.6
20-24	32.6	12.4	16.6
25-29	29.2	23.8	28.6
30-34	17.7	33.9	29.2
35-39	6.7	22.4	16.7
40-44	1.0	4.1	3.2
45-49	0	0.2	0.1

Figure 3: Distribution of maternal age by 5-years age group: IOI Travellers, ROI general population and NI general population



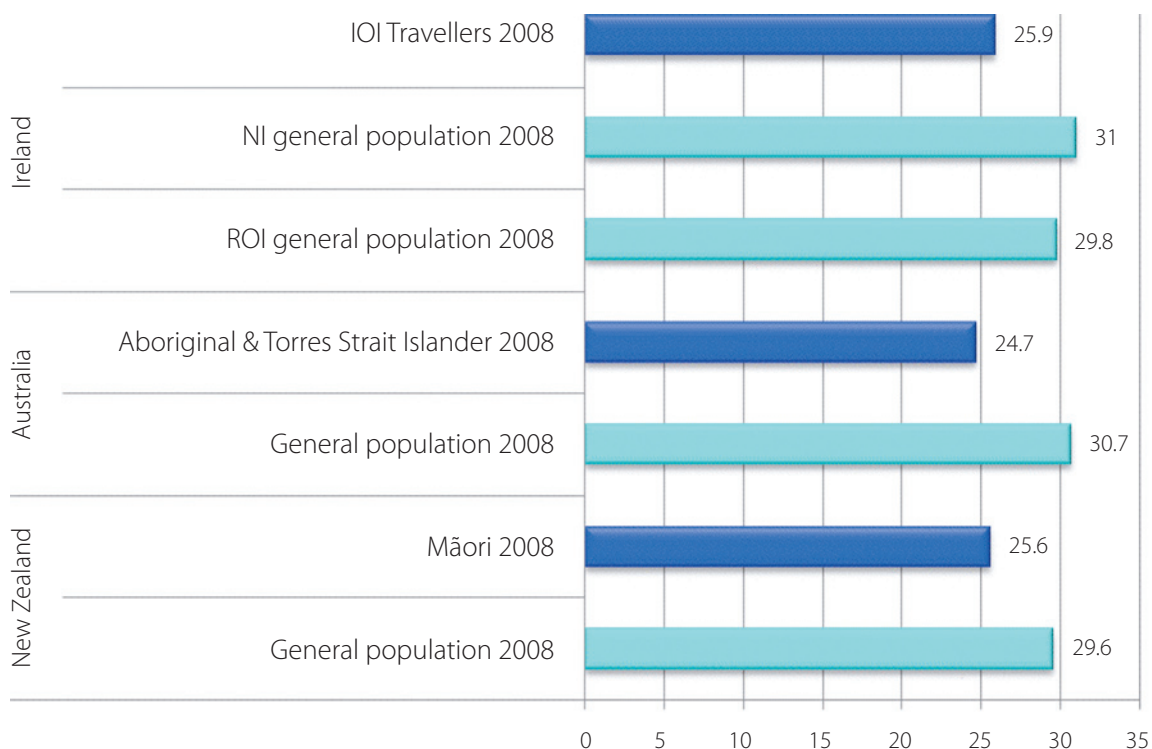
Figure 4: Distribution of maternal age by 5-years age group for ROI Travellers and general population during 1987 and 2008



4.5.2 Maternal Age: Comparison with Other Minority Groups

The average age of Traveller mothers in IOI is 25.9 compared to 25.6 New Zealand's Maori (Statistics New Zealand, 2010), 24.7 in Australian's Aboriginal & Torres Strait Islanders (Australian Bureau of Statistics, 2008) and 20 years for the Hungarian Roma population (Janky, 2006; p138). The average maternal age of all minority groups is lower compared to the general population of each referenced country (Figure 5).

Figure 5: Average maternal age of IOI compared to other minority groups and in comparison to the general population of the country



Sources:

Australian Bureau of Statistics (2008) available at: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/web+pages/statistics?opendocument#from-banner=GT>

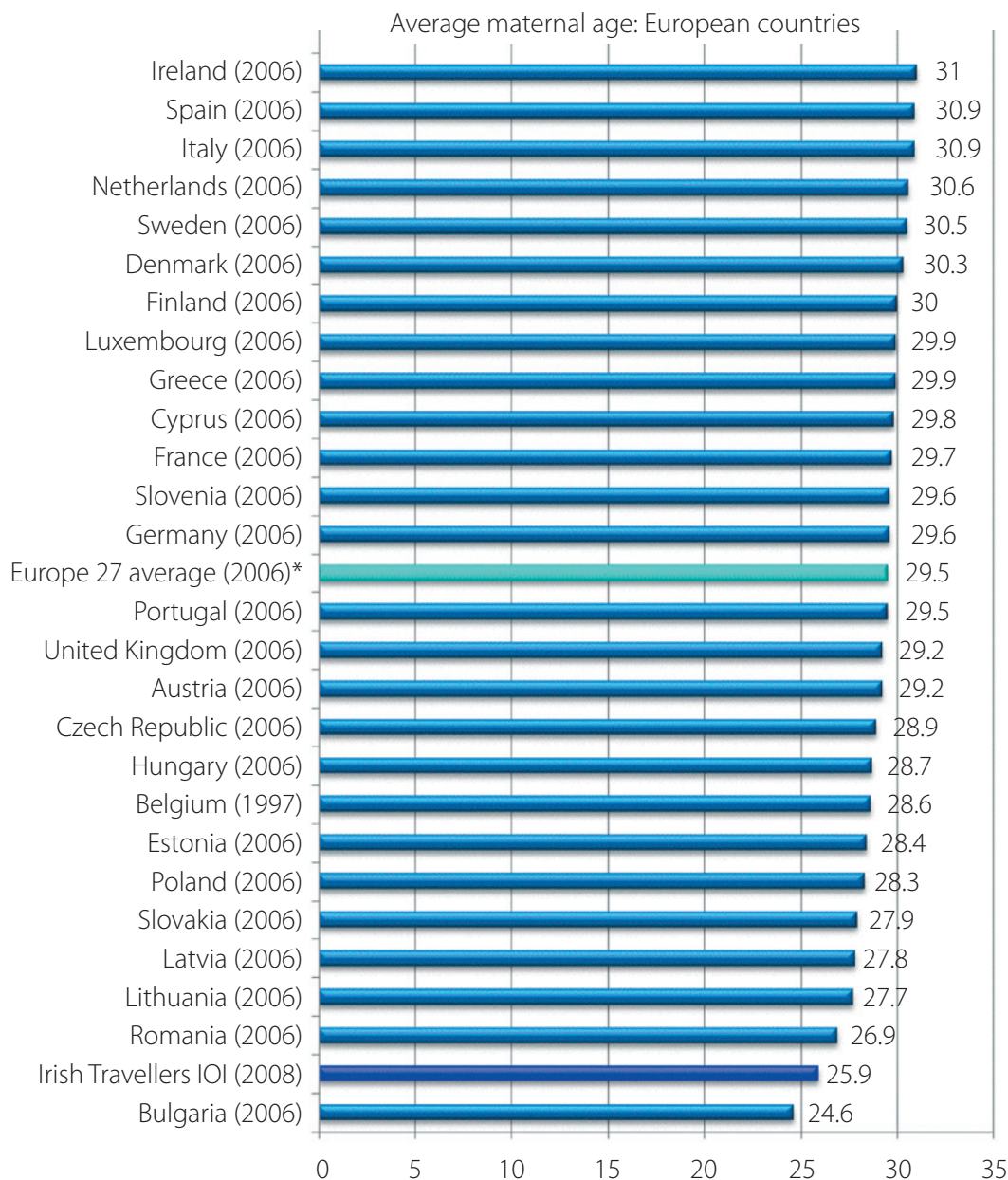
CSO (2008) available at: http://www.cso.ie/releasespublications/documents/vitalstats/2008/vstats_q42008.pdf

NISRA (2009) available at: http://www.nisra.gov.uk/archive/demography/publications/births_deaths/births_2009.pdf

4.5.3 Maternal Age: European Countries Average and World Average

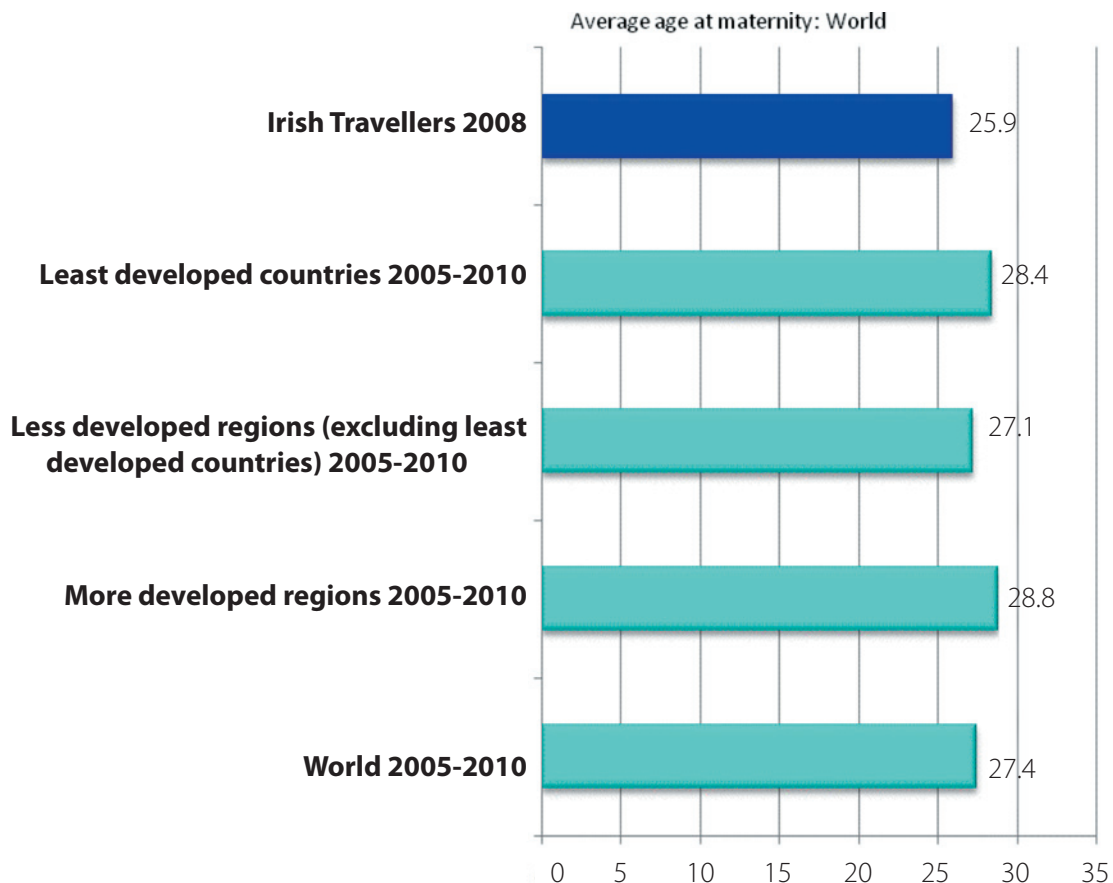
The younger average age of Traveller mothers was compared to the European countries average (Figure 6) and the world average (Figure 7). The average age of Traveller mother in Ireland was the second-youngest in Europe. They were second only to Bulgaria where the average mother age is 24.6 years.

Figure 6: Average age of mothers: European countries and IOI Travellers



Adapted from: Health Statistics, 2008 (Department of Health and Children, 2008, pg 39)- data source: EUROSTAT, Population Statistics, 2008.
http://www.dohc.ie/statistics/health_statistics_2008.html

Figure 7: Average age at maternity - world average



Adapted from: World Fertility Pattern 2009 (United Nations, 2010) Available from: <http://www.un.org/esa/population/publications/worldfertility2009/worldfertility2009.htm>

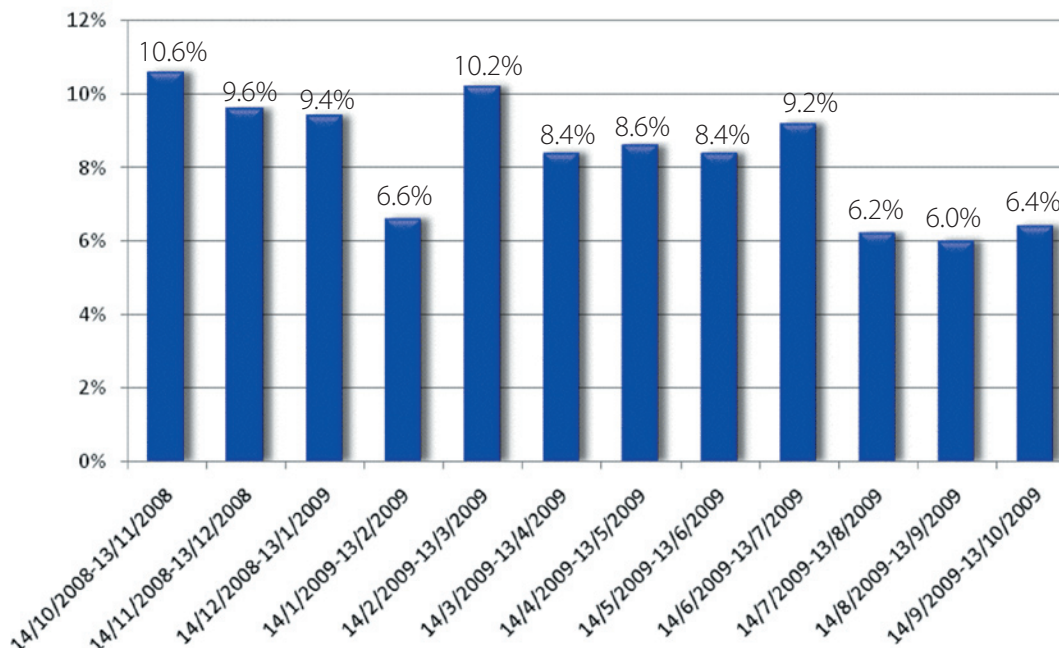
4.6 Distribution of Births by Month

As the birth cohort started on 14th October, 2008, the data presentation is based on mid-month to mid-month basis (e.g. 14th October, 2008 to 13th November, 2008).

The distribution of births was almost constant. However, there was a drop in the 4th and last 3 months in the cohort probably due to higher refusal rates (Figure 8); cross-check cannot be performed as no information was returned in the refusal forms.

Figure 8: Distribution of Traveller births by month of study

Percentage of births in cohort



4.7 Infant Mortality

Up to April 2010, there were 6 reported perinatal deaths and 1 infant death in ROI and NI.

4.8 Health Service Utilisation: Maternity Hospitals

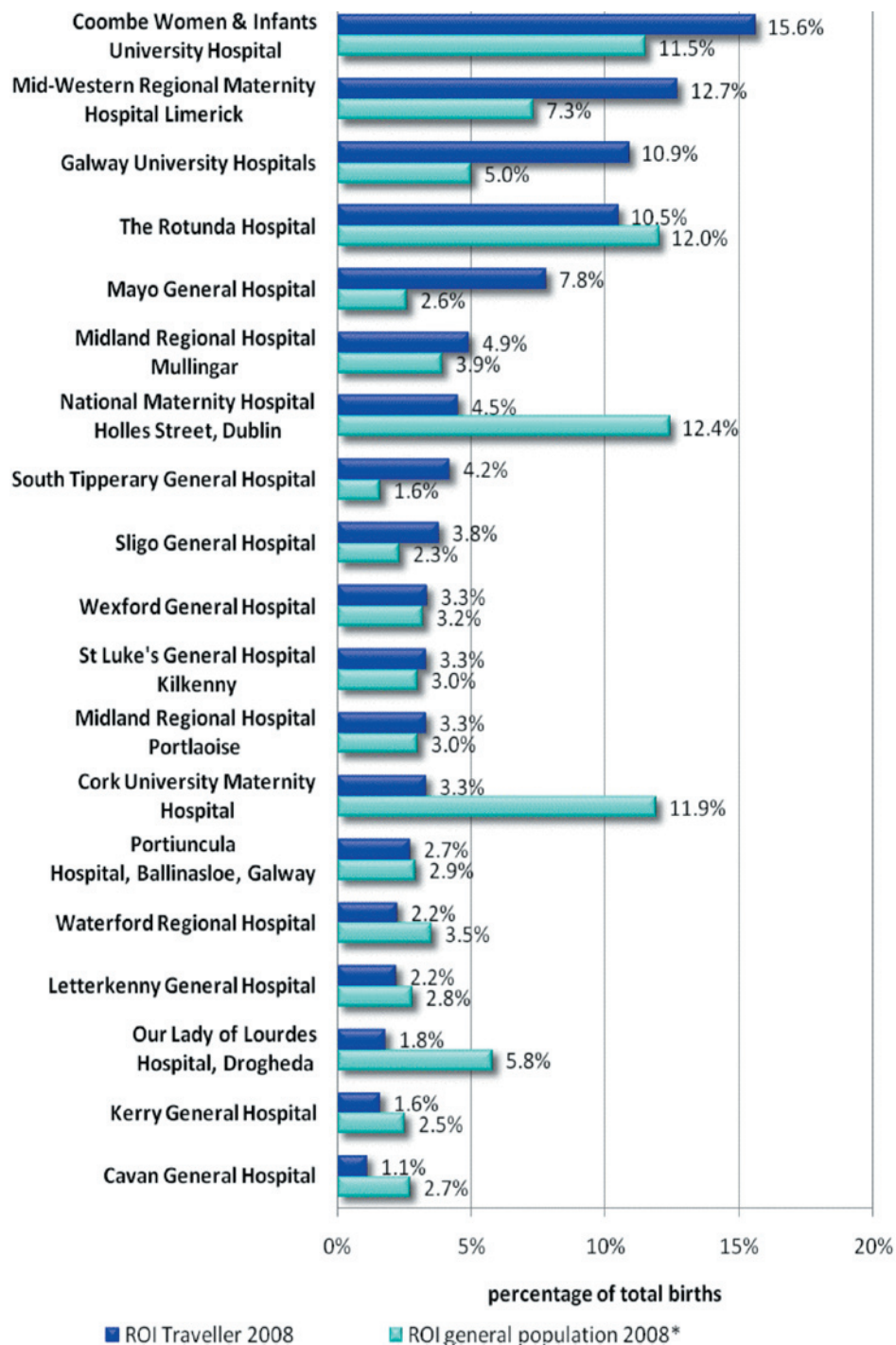
The birth cohort study attempted to capture the percentages of births occurring in each maternity hospital in ROI and NI. The breakdown by percentage of Traveller births and general population births according to maternity hospital is shown in Figures 9 and 10.

Only 30.6% of total Traveller births occur in the three Dublin maternity hospitals, as opposed to 35.9% of general population. 69.4% of Traveller births occur in other maternity units outside Dublin. Four major maternity units, namely the Coombe Women & Infants University Hospital; Mid-Western Regional Maternity Hospital Limerick; Galway University Hospitals and The Rotunda Hospital, Dublin account for almost 50% of all Traveller births in the cohort.

For Northern Ireland, the majority of Traveller births occur in the Belfast and Craigavon Area Hospital. This was 71% of all Traveller births in the cohort.

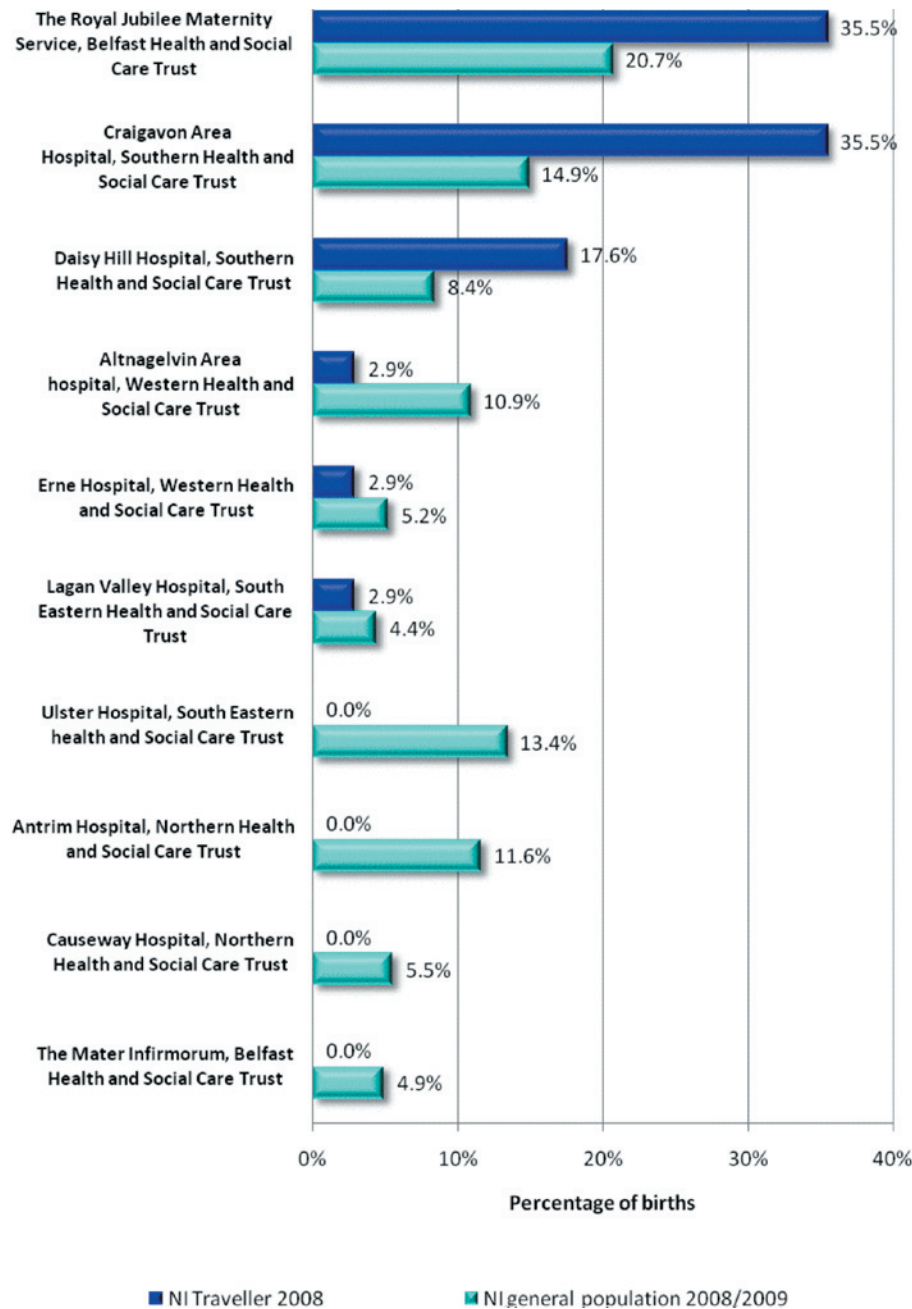
However, this analysis was limited to only the consented participants in the birth cohort study. As each maternity hospital has a dedicated catchment area, the number of Traveller births in each maternity hospital was also dependent on the ascertainment rate of the area. For areas with a low ascertainment rate or with a high refusal rate, then this might not be reflected in the volume of Traveller births for the particular maternity hospital.

Figure 9: Distribution of Traveller births recorded in the birth cohort study and the breakdown of recorded total live births in ROI (as percentage of total births nationally) in all maternity hospitals for 2008



Sources: Health Service Executive (2010) Data Provided by the Health Service Executive Performance Monitoring Unit.

Figure 10: Distribution of Traveller births recorded in the birth cohort study and the breakdown of recorded total live births in NI (as percentage of total births nationally) in all maternity units



Source: Department of Health, Social Services and Public Safety (2010), available at: http://www.dhsspsni.gov.uk/index/stats_research/stats-activity_stats-2/hospital_statistics.htm#hospital

5. Fertility Indicators

This section describes the annual crude birth rate, general fertility rate and total fertility rates for the Travellers. Comparisons with other groups are made when there is available data.

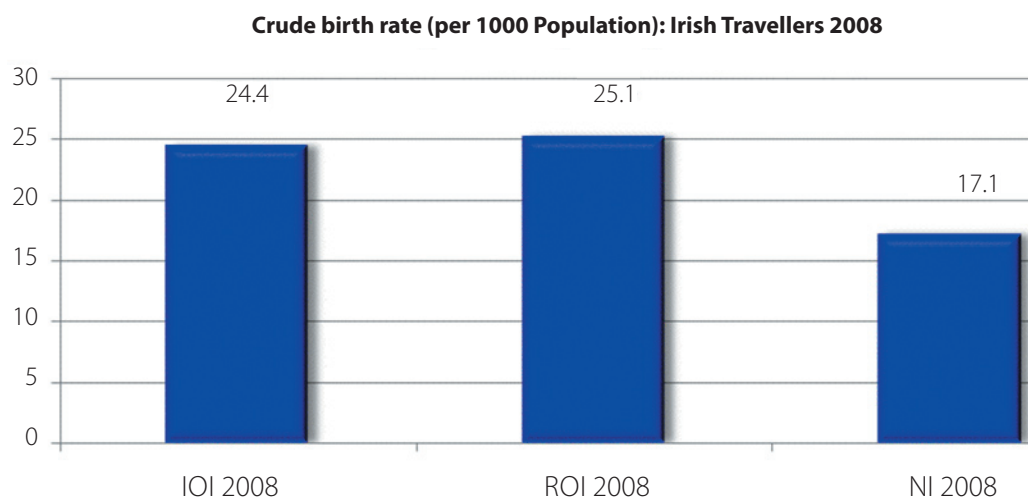
All calculations, including age-specific fertility rate, are included in appendix B and C.

5.1 Annual Crude Birth Rate

The annual crude birth rate is defined as 'the number of births actually occurring in a country in a given time period, divided by the population of the area as estimated at the middle of the particular time period. The rate is usually expressed as 1,000 per population' (Central Statistics Office, 2008).

The overall annual crude birth rate (CBR) for the island of Ireland in the Travelling community was 24.4 per 1,000 population; 25.1 per 1,000 population for ROI and 17.1 for NI (Figure 11).

Figure 11: Annual crude birth rate (per 1,000 population) for Travellers on IOI, ROI and NI

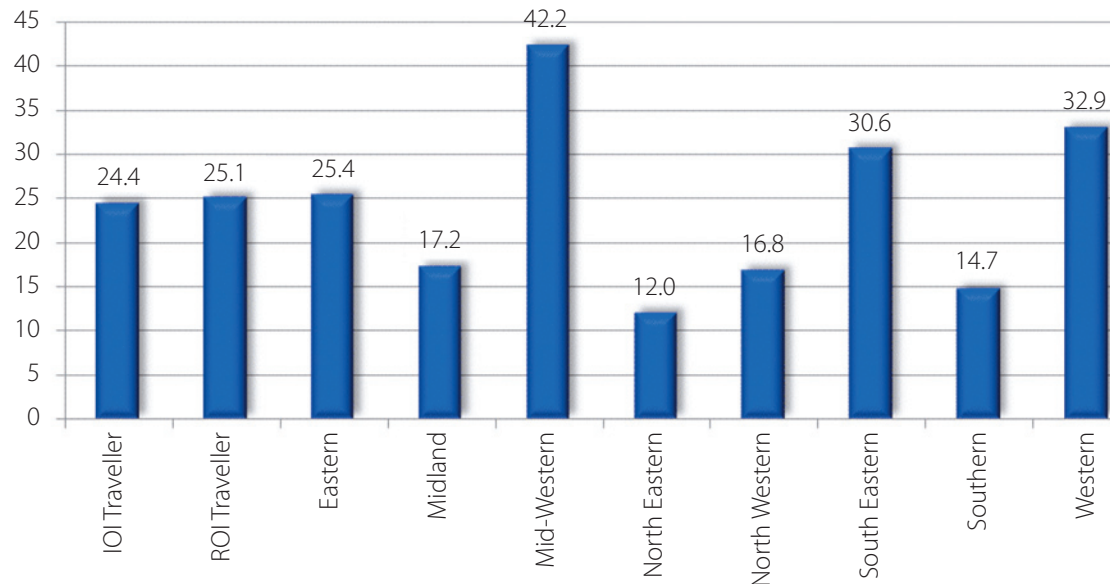


5.1.1 Crude Birth Rate: Traveller Health Units

Crude birth rate for each THU varied, with the Mid-Western THU having the highest crude birth rate at 42.2 per 1,000 population. Western, South Eastern and Eastern THUs showed CBR higher than the ROI Traveller average. The Midland, North Eastern, North Western and Southern crude birth rates were below the ROI Traveller average of 25.1 (Figure 12).

Figure 12: Crude birth rate (per 1,000 population) by Traveller Health Unit and in comparison with IOI and ROI Traveller average

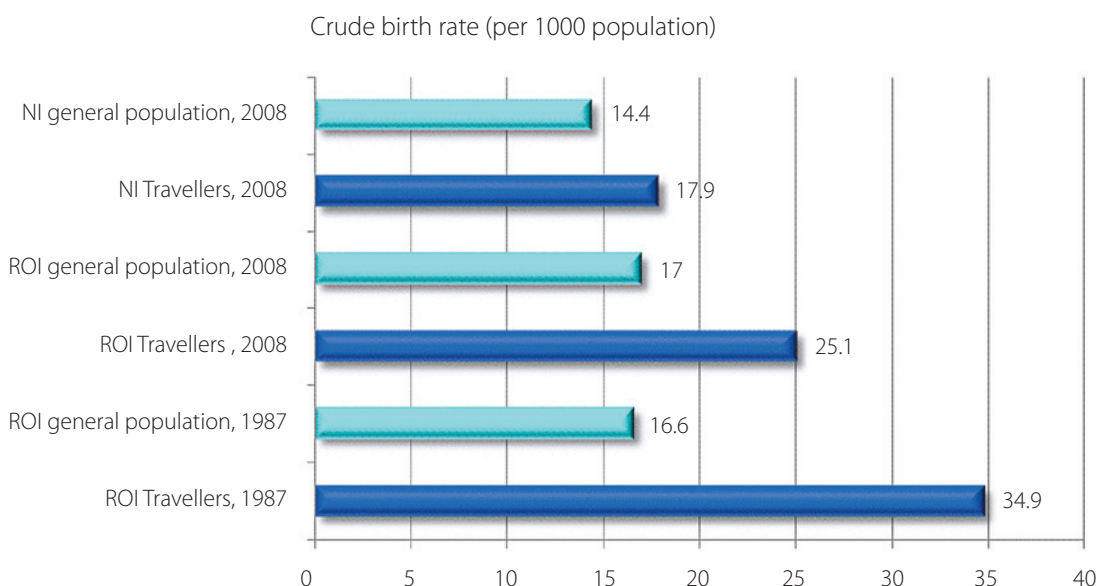
Crude birth rate (per 1000 population)



5.1.2 Annual Crude Birth Rate: Comparison with General Population

Travellers in ROI have a higher crude birth rate than in NI. Overall, CBR for Travellers in both regions is high compared to the CBR in the corresponding general population. The CBR for the general population in ROI was 17.0 per 1,000 population (Central Statistics Office, 2008) and 14.4 for Northern Ireland (Northern Ireland Statistics and Research Agency, 2008). However, compared to the Traveller Health Status Study: Vital statistics of Travelling people, 1987 (Barry *et al.*, 1989) the CBR of Travellers in ROI has fallen (from 34.9 per 1,000 population to 25.1 per 1,000 population) (Figure 13).

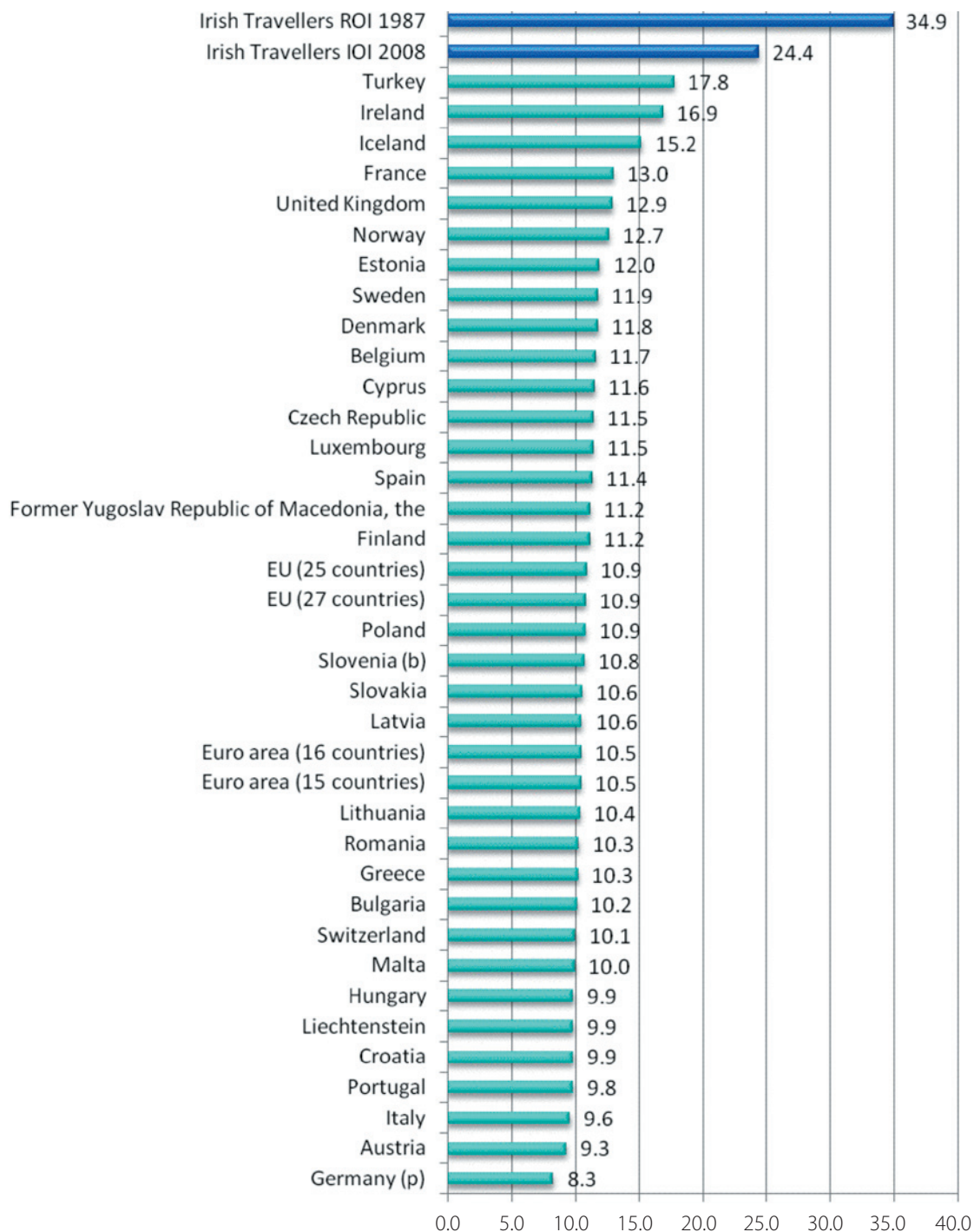
Figure 13: Crude birth rate of Travellers and general population in ROI and NI in 2008; crude birth rate of ROI Travellers and general population in 1987



5.1.3 Annual Crude Birth Rate: Comparison with European Countries

Figure 14 shows the CBR of Irish Travellers (IOI) compared to other European countries and European averages. The CBR of IOI Travellers is the higher than the CBR of any individual European country and of the European averages.

Figure 14: Crude birth rate (per 1,000 population): European countries (2008)



Source: EUROSTAT (2010) Available at: <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tps00112&plu gin=1>

(p)- Provisional

(b)- break in series

5.2 Fertility Rates

Definitions (Central Statistics Office, 2008):

1. The General Fertility Rate (GFR) is the ratio of the number of live births during a given period to the female population aged 15-49.
2. The Age-specific Fertility Rate is the ratio of the number of live births to women in a given age group relative to the number of women in that age group.
3. The Total Fertility Rate (TFR) is the average number of children that would be born per woman if all women lived to the end of their childbearing years and bore children according to Age-specific Fertility Rates for that area and period. This is an indication of replacement rate for a population. A rate of 2.1 is considered to be the replacement level for the population of developed countries.

5.2.1 General Fertility Rates

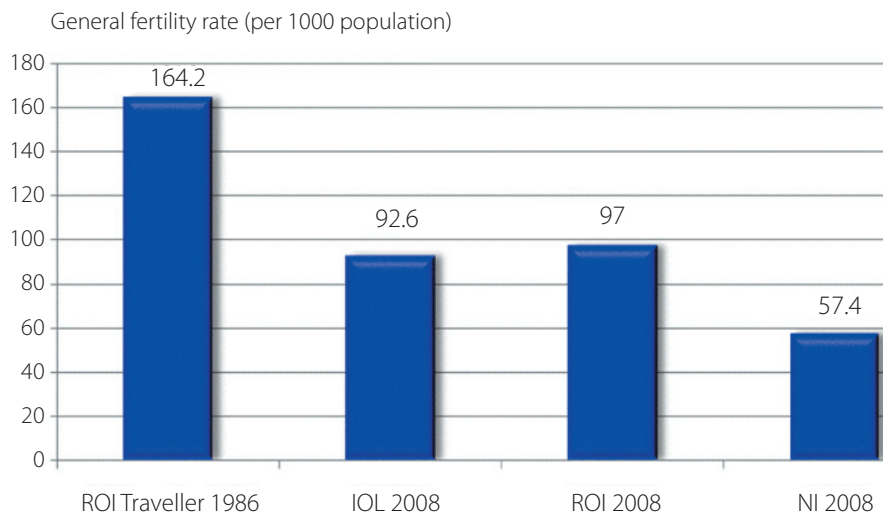
The GFR of Travellers in IOI has fallen. This was 92.6 per 1,000 population in IOI (Table 6); for ROI Travellers the rate was 97.0 per 1,000 population and for NI this was 57.4 per 1,000 population.

Table 6: General fertility rate for Travellers on IOI, ROI and NI in 2008

Indicators	Island of Ireland	Republic of Ireland	Northern Ireland
General fertility rates (per 1,000 female population age 15-49)	92.6	97.0	57.4

The GFR of the Travellers in ROI has dropped from 164.2 in 1986 to 97 in 2008 (Figure 15).

Figure 15: General fertility rate for Travellers on IOI, ROI and NI in 2008 compared to ROI Travellers in 1986

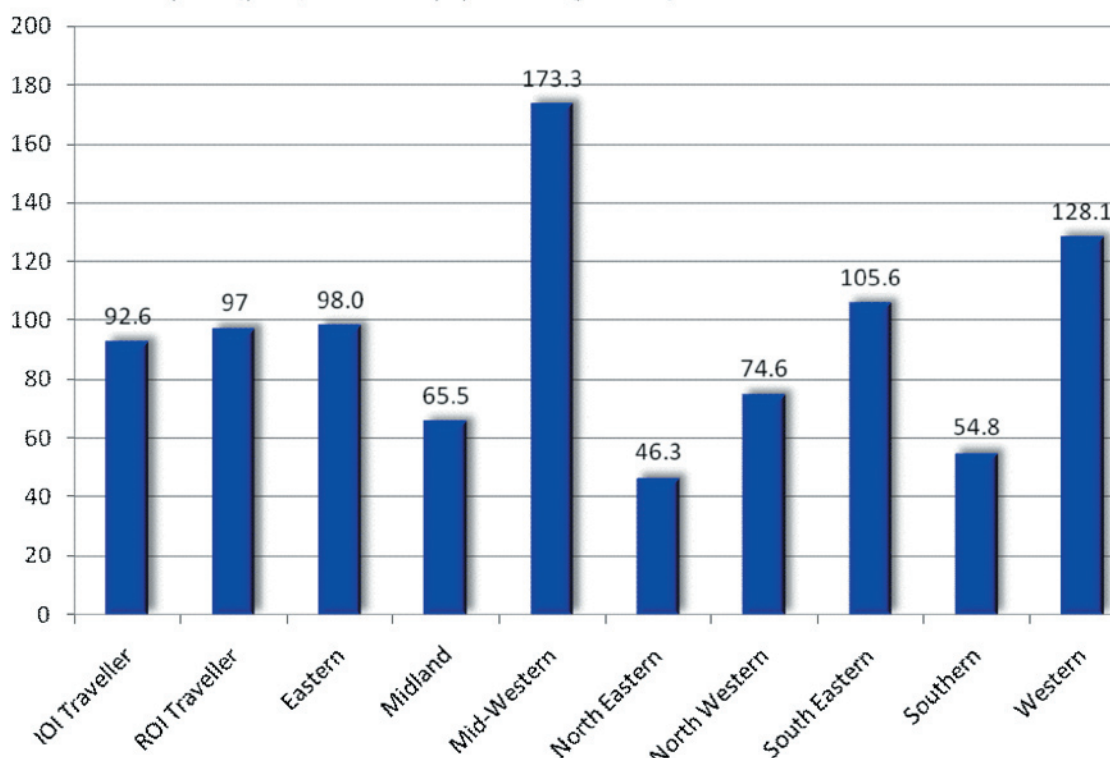


5.2.1.1 General Fertility Rate: Traveller Health Units

The Mid-Western THU showed the highest GFR at 173.3 per 1,000 female population age 15-49. The South Eastern, Western and Eastern THUs all have higher GFR than the ROI Traveller average. The GFR of the Midland, North Eastern, North Western and Southern THUs were below the ROI Traveller average (Figure 16).

Figure 16: General fertility rate by Traveller Health Units

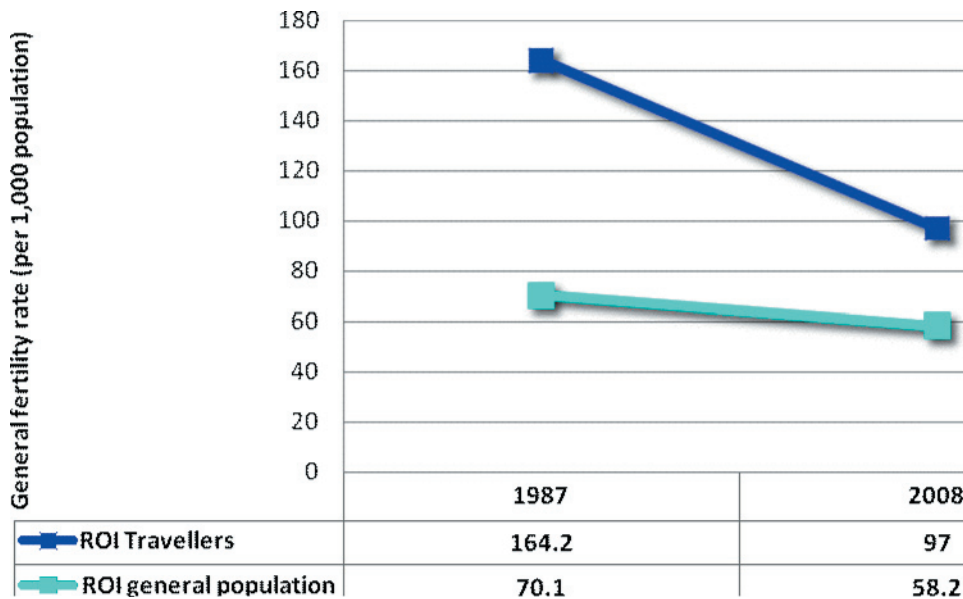
General fertility rate (per 1,000 female population age 15-49)



5.2.1.2 General Fertility Rate: Comparison ROI Travellers with ROI General Population

There has been a drop in the GFR of ROI Travellers and ROI general population since 1987. GFR for ROI Travellers dropped from 164.2 per 1,000 female population age 15-49 to 97, while the GFR for ROI general population dropped from 70.1 to 58.2 (Figure 17).

Figure 17: General fertility rate of ROI Travellers compared to ROI general population in 1987 and 2008.



2008 population estimate based on Population and migration estimate 2009 (CSO, 2009) available from: <http://www.cso.ie/releasespublications/documents/population/current/popmig.pdf>

5.2.2 Total Fertility Rates

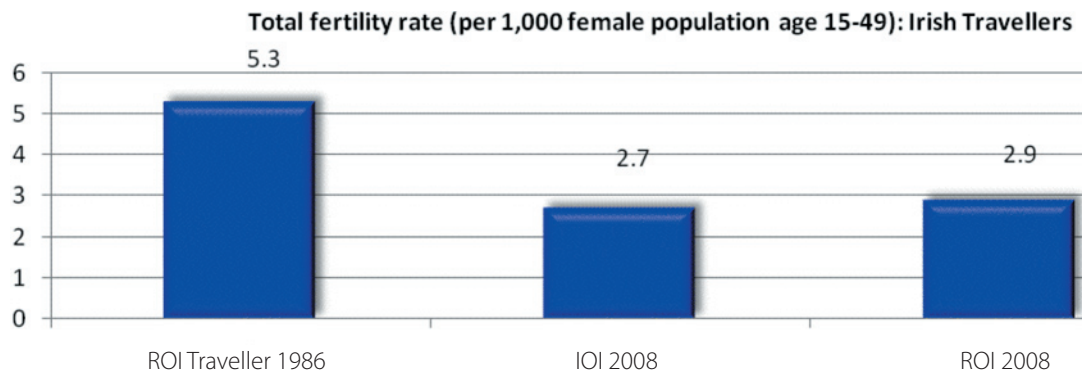
The TFR of Travellers in ROI was 5.3 per 1,000 female population age 15-49 in 1987. In 2008, the TFR for Travellers in ROI was 2.9 per 1,000 female population age 15-49. This was higher compared to the overall IOI figure of 2.7 per 1,000 female population age 15-49 (Table 7, Figure 18).

Table 7: Total fertility rate for Travellers on IOI, ROI and NI in 2008

Indicators	IOI	ROI	NI
Total fertility rate (per 1,000 female population, age 15-49)	2.7	2.9	NA

We were unable to calculate the total fertility rate for NI due to the small number of births.

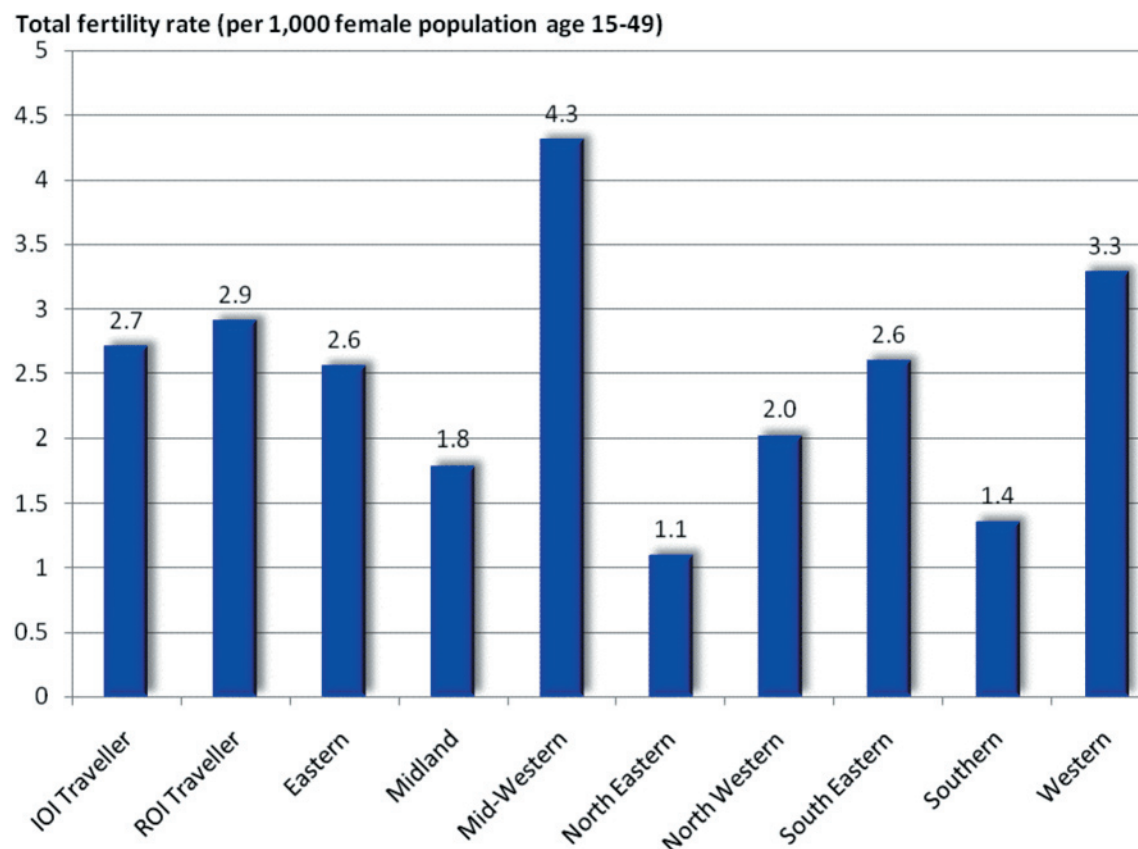
Figure 18: Total fertility rate of Travellers on IOI and ROI in 2008 compared to Travellers in ROI in 1986.



5.2.2.1 Total Fertility Rate: Traveller Health Units

The TFR for Mid-Western THU is the highest at 4.3 per 1,000 female population age 15-49, followed by the Western THU at 3.3. All the other THUs had TFR lower than the ROI Traveller average (Figure 19).

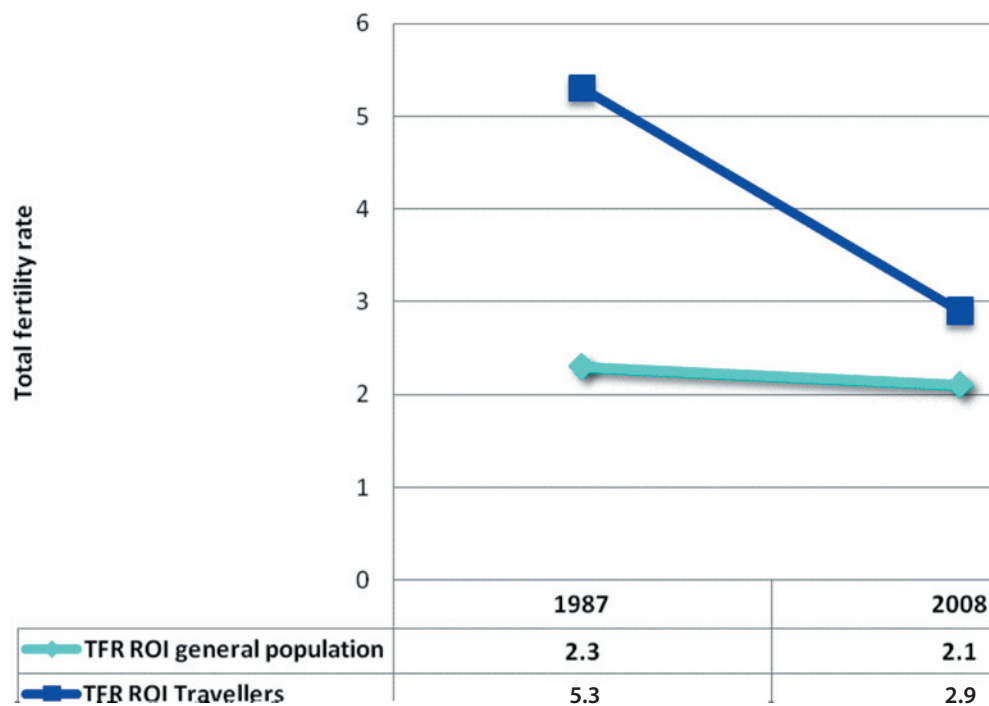
Figure 19: Total fertility rate by Traveller Health Units compared to IOI and ROI average



5.2.2.2 Total Fertility Rate: Comparison ROI Travellers with ROI General Population

Comparison was also made with the TFR of the general population in ROI for 2008 and 1987 (Figure 20). There was a greater fall in TFR of ROI Travellers over the period than in the general population (2.3 in 1986 to 2.1 in 2008).

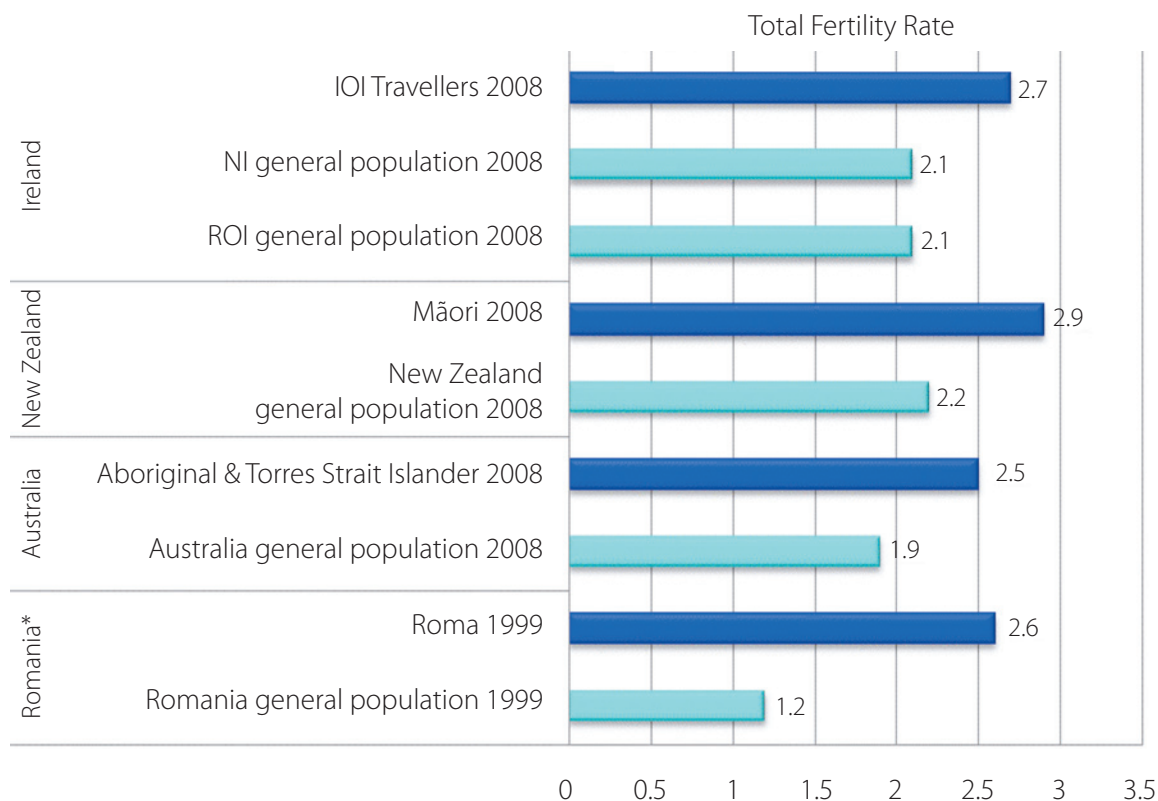
Figure 20: Total fertility rate for ROI Travellers compared to ROI general population in 1987 and 2008



5.2.2.3 Total Fertility Rate: Comparison with Other Minority Groups and Their Respective Population

The TFR of IOI Travellers was compared to the Australian Aboriginals, New Zealand Māori and the European Roma (Figure 21). All these minority groups have a TFR above 2.5 and each has a TFR higher than the relevant general population.

Figure 21: Total fertility rate of IOI Travellers, general population ROI and NI; other comparative ethnic groups and their respective countries



Sources:

Australian Bureau of Statistics (2008) available at: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/web+pages/statistics?opendocument#from-banner=GT>

CSO (2009) available at: http://www.cso.ie/releasespublications/documents/vitalstats/2008/vstats_q42008.pdf

NISRA (2009) available at: http://www.nisra.gov.uk/archive/demography/publications/births_deaths/births_2009.pdf

Statistics New Zealand (2010) Available at: http://search.stats.govt.nz/search?w=births&button.x=0&button.y=0&button=Search&w_pre=Population&af_pre=

*quoted from UNDP 2002 Avoiding the dependency trap, pg 26. Available at: <http://roma.undp.sk/>

5.2.2.4 Total Fertility Rate: European Countries and World Average

Irish Travellers have the highest TFR compared to the EU countries averages (Figure 22). When compared to the world averages, the Irish Travellers' TFR is above the average of 'less developed countries' (Figure 23). However, this needs careful interpretation as the United Nations' figure is an average of all countries.

Figure 22: Total fertility rate (per 1,000 female population age 15-49): European countries

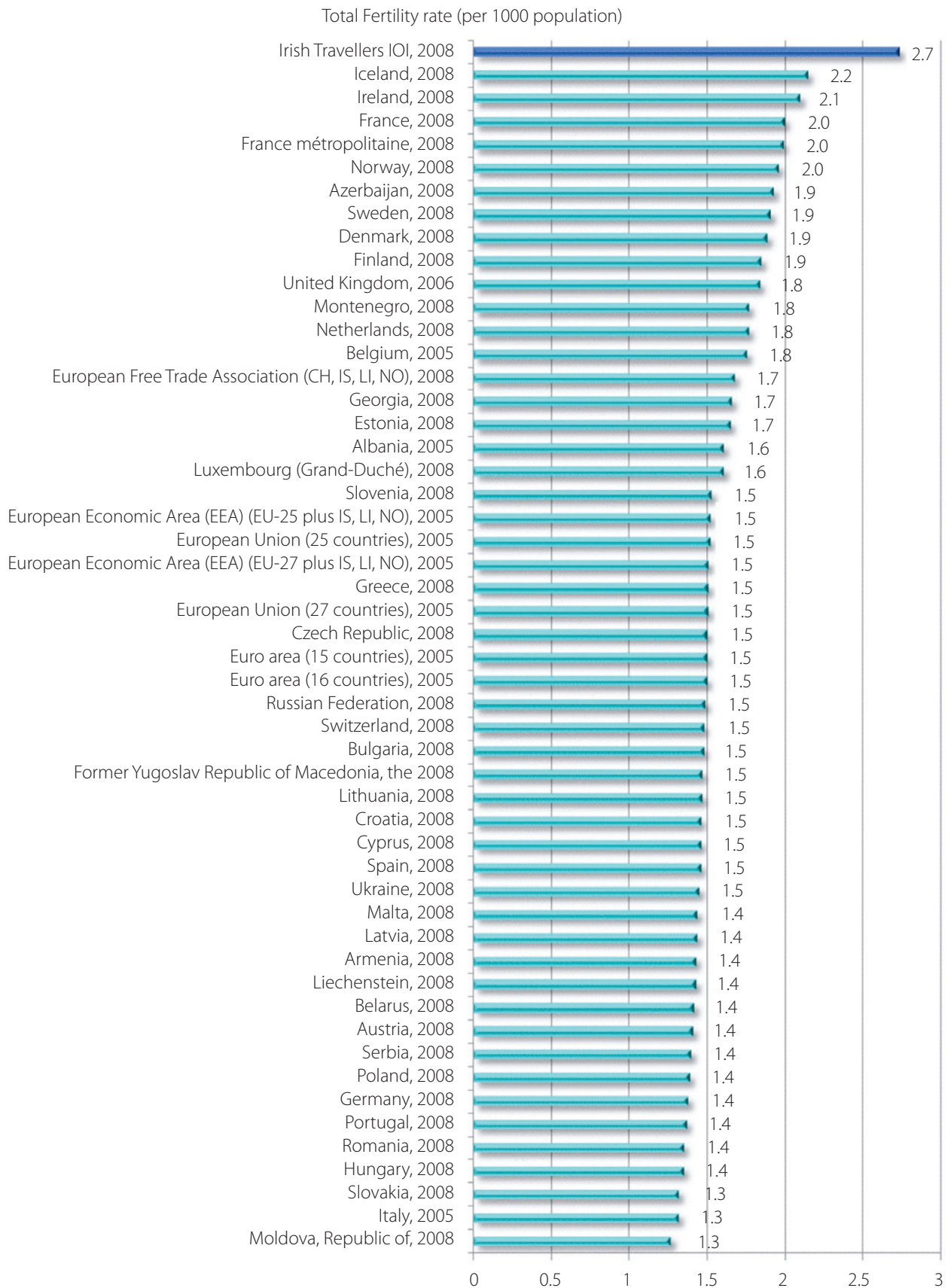
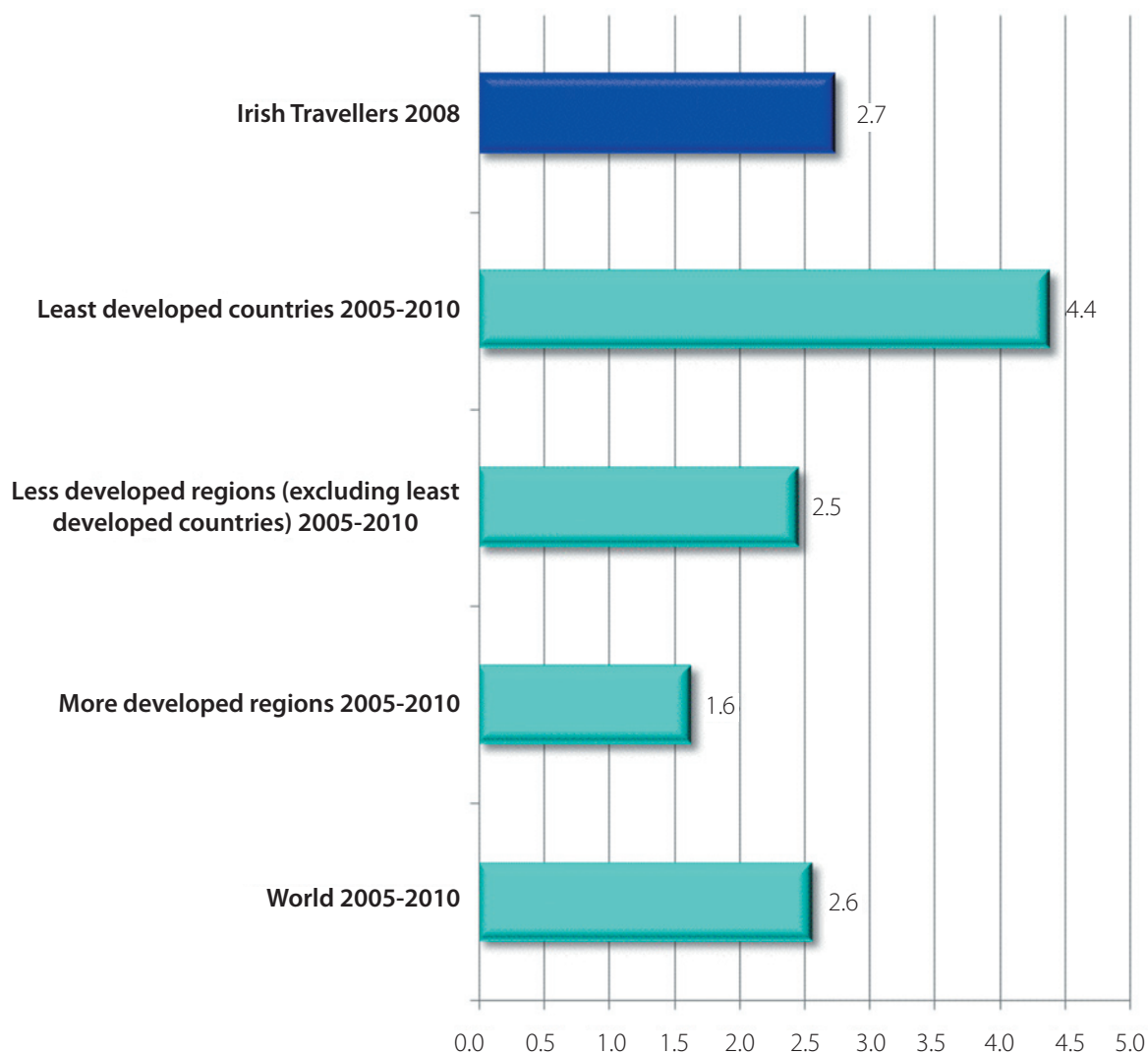


Figure 23: Total fertility rate: world average

Total fertility rate (per 1,000 female population age 15-49)



Source: World Fertility Pattern 2009 (United Nations, 2010) Available from: <http://www.un.org/esa/population/publications/worldfertility2009/worldfertility2009.htm>

6. Challenges

This section describes some of the major challenges faced by the study. These include:

1) Study Promotion

One of the biggest challenges faced by the study team was promoting the study to the participants. Initial study promotion was through the census where pregnant women were identified, then invited to enter the study with formal promotion and consent by the PHNs. A valuable lesson learnt from a particular LHO area was the need to engage and promote the study not just by the PHN but with reinforcement from the Traveller Health projects and the Community Health Workers. Engagement and promotion by the Community Health Workers, usually Travellers themselves, allowed greater explanation via 'oral tradition'.

For the PHNs, study promotion and consent were an issue due to time constraints. The PHNs were expected to promote the study opportunistically during their routine engagement with the mothers. Despite the PHNs' enthusiasm, this was time consuming for both sides as there were routine first visit procedures which needed to be carried out and at the same time issues faced by new mothers to be addressed. This was resolved by allowing the PHN to promote and consent the mothers on their subsequent visits.

2) Consenting Participants

The PHNs had the lead role in promoting and officially taking consent from the potential participants. Time constraints often prevented PHNs from playing their role effectively. In some areas, there were constant changes in PHNs for the areas. This was exacerbated in some areas when changing PHN personnel created more confusion and a slower building of trust. In order to ensure that PHNs followed up on all Traveller births, link-PHNs used local registries, e.g. Birth Notification or National Metabolic Screening results, to double-check for the mother's status.

In Northern Ireland, the main study coordinator played the central role in taking consent from participants.

Due to the ethical requirements in Northern Ireland whereby the consent could only be carried out by the main study coordinator, geographical size of the region and time were the limiting factors in approaching the potential participants. This further added to the challenges of tracing and approaching potential participants.

An innovative method developed by the main study coordinator and the Health Visitors was to organise coffee mornings or health check events for all new mothers and their babies. This included events such as maternal and child health sessions and social sessions with 'Toybox'. All mothers, regardless of whether they agreed to participate in the study or not, were invited to attend. During these events, the main study coordinator and Health Visitor opportunistically promoted the study to all mothers. This was a successful method whereby most mothers who attended would consent for the study while some who had initially refused changed their mind and offered their consents. In

some circumstances, it was more appropriate for the main study coordinator to accompany the Health Visitors to the potential participant's residence. Health Visitor knowledge proved valuable for this procedure as this allowed the main study coordinator to approach the potential mothers at the time of day where these potential participants would be available.

3) Refusals

Recruitment into a cohort is always difficult due to the commitment required of the participants. This is expected to be higher from a marginalised minority group who would be wary of outsiders. In addition, the need to carry a Parent-held Child Record can be intimidating for any parent. The study ethical requirement prohibited collection of any details of Traveller mothers who refused to participate in the study. Thus no comparison can be made as to the basic demographic characteristics of those who refused, for example maternal age. However, the PHNs recounted from their experience that those who refused tended to be younger mothers and those who felt too busy or stressed. The sources of stress varied from a lack of time or an ill child requiring the mother's attention. Another interesting related experience was that of organised mass refusals among women in the same site. This was described as a 'matriarch' system where if the leading woman refused to participate or did not agree with the study, all the women in the site would refuse too.

4) Participant Follow-up

Participant follow-up is a major issue in any cohort. This was more pronounced in this cohort. The PHNs provided the contact detail of the participant, for example home address, postal address and mobile telephone details during the consenting process. However, postal correspondence did not always yield the needed response. This was due to movement of Traveller mothers for example visiting family or having moved away from the site. Some sites have no exact postal address, code or postal service. Thus in such cases, PHNs contact is invaluable in reaching the participants.

Having a mobile telephone number as a means of contact did not always help the situation as most of these phones remained unanswered or possibly disconnected or replaced as the mother's circumstance changed. Experiences from the PHNs and Traveller projects confirmed the frequent change of mobile phones. Consequently, PHNs, especially Designated Traveller PHNs, remained an important source if contact need to be made with the participants. The designated Traveller PHN network was helpful if a mother had moved out of an area to another area, as the designated PHN in the new area might be able to trace these mothers based on local knowledge. Sometimes contact was lost if the Traveller mother left the area with no details of next destination. This was reported as not uncommon.

Successful collection of the Parent-held Child Record was also an issue faced by the study team. When a baby reached his/her first birthday, the study team sent out a congratulatory letter to the mother and request for the Parent-held Child Record to be returned to UCD. However, the return rate has been poor to date. Some of the PHNs related that such a record and the need to participate in the study might be of little priority to the mothers, in the larger scheme of things and hence their delay in taking any form

of action. Furthermore, there was a need to visit the participant which sometimes requires multiple visits. There was also confusions on the ground as what the participants need to do with the record. Furthermore, sometimes the mother may have misplaced the record. In such circumstances, the PHNs' help was of great value as they ensured that these records were filled and returned to UCD. PHNs also reported the need to cross-check the records prior to returning them to UCD as these may not be filled by other health professionals or have incomplete data. This needs acknowledgement as this process adds to the PHN's workload. Similar experiences were described in Northern Ireland.

Besides requesting the PHNs to assist the mothers in returning the Parent-held Child Record, the Traveller Health Unit (THU), Traveller Health projects and TCHW were also asked to assist in this task.

5) Competing Agendas

During the course of the study, the birth cohort study had to compete with other studies involving Travellers. As the AITHS had a few components which were ongoing at the same time, this possibly distracted the attention of the study coordinators and even the participants from the birth cohort study. Furthermore, there were other studies which were competing for the attention of the participants and this led to some confusion in the community.

Other administrative issues within the health services challenged the working function of the PHNs and their support for the study. This included the economic downturn from the end of 2008 onwards which resulted in cutbacks within the health services. As a direct result, PHN travelling allowance was reduced and visiting frequencies were limited. In certain areas PHNs who have left posts or were on leave were not replaced, thus putting more pressure on other PHNs to cross-cover the workload. This not only limited the time available for study promotion but also follow up of participants. In addition, other urgent public health issues, e.g. Swine Flu vaccination programme for the general community and measles outbreak among the Travellers, resulted in PHNs being transferred to other services or to changes in job priority for them.

7. Discussion

The number of recorded births in the birth cohort study to date is close to the estimated births. The gender ratio in babies born to date is similar to that of the general population in ROI and NI. Traveller mothers are relatively younger than the general population in ROI and NI. Over the past 20 years, there has been a shift in average maternal age in ROI where Irish women are having children at an older age compared to their predecessors. This however has not really occurred amongst Travellers.

More Traveller births occur in maternity units outside of Dublin than in the general Irish population. Even within Dublin, there is a difference in the maternity hospitals that Traveller mothers attend. This may be due to catchment area of the hospitals and concentration of Traveller families within that catchment area. Furthermore, there is an unequal distribution in births between geographical areas, with more births in the Mid-Western and Western THUs compared to others. This pattern was similar in Northern Ireland where the births are concentrated mainly in Belfast and Craigavon Area Hospitals.

The CBR and fertility rates amongst Travellers have dropped since 1987. There is no interim data on this drop. The drop in fertility rate is not unique to the Irish Traveller population. Fertility rates around the world have started to drop since the 1970s, first in developed countries, followed by developing countries (WHO, 2004). The World Fertility Report 2003 (WHO, 2004) contributed this to 'major behavioural transformation related to union formation, marriage and the use of contraception'. Other authors stressed the importance of factors such as socioeconomic and cultural change (Barros *et al.*, 2008; Menken and Rahman, 2006; Lutz and Qiang, 2002; The ESHRE Capri Workshop Group, 2001).

Other determinants of fertility for example, early family formation and fecundity were not recorded. From the birth cohort, we know Traveller women tend to marry young and this can be used as an indicator for early family formation. Fecundability can be linked to breastfeeding practices (Menken and Rahman, 2006). The ESHRE Capri Workshop Group (2001) defined fecundability as the probability of achieving a pregnancy within one menstrual cycle. In the case of the Travellers, as suggested in Technical Report 1, the reported breastfeeding uptake is low, which does not support the case of fecundability. The AITHS census report showed that 40.8% of Travellers in ROI and 50.4% in NI had used the contraceptive pill. This has a strong age pattern with women in the 30 to 44 years age group most likely to be on the contraceptive pill.

The rapid economic growth during the last 10 years has seen much socio-economic change and modernisation of the Irish State. However, there is no record of how this socioeconomic change has affected the Travellers. In order to make a valid comparison with the 1987 fertility rates, the comparative fertility-related socioeconomic indicators must be recorded similarly. However, this is not possible due to the difference in survey methods between the AITHS and the 1987 study. Another method to view this change is through the Traveller's own perception. The AITHS Consultative Study (see Technical Report 3: part A) suggested urbanisation of Travellers in certain areas. Furthermore, there has been recorded change in culture and lifestyle of Traveller women.

The Consultative Study describes various sociological changes that have occurred in the lives of Irish Travellers. This has been described as a community in 'transition'. This sociological 'transition' should not be confused with population demography transition.

Notestein (1957) proposed the theory of demography transition whereby all societies initially started off with high fertility and high mortality. During society development, mortality rates fell due to public health advances, while fertility rates remain high. This resulted in an explosion of population growth until at some point in time when the birth rates also started to decline, thus reaching a new equilibrium at low fertility and low mortality levels. However, this theory has not been able to fully explain some of the demographic changes occurring in the developing world. In order for this mortality decline, there has to be certain level of socio-economic development (Coale and Watkins, 1986). Menken and Rahman (2006) argue that there may not necessarily be a specific sequence to this or specific societal development, as has been experienced by some low- and middle-income countries.

Development of primary health care projects for Travellers may have an impact in increasing the sexual knowledge and health of Traveller women. However, this study did not include the evaluation of such projects. The use of contraception may contribute to the drop in the fertility rates of Traveller women, however it should be cautioned that there may be other factors which have not been investigated.

8. Conclusion

The current study demonstrated that Traveller births recorded in the birth cohort study are close to that estimated. The average age of Traveller mothers has not changed since 1987, however the average age of mothers in the general Irish population has increased. The difference in average maternal age is similar when compared to other minorities in Australia and New Zealand.

There has been a drop in the number of births to Travellers in 2008 when compared to 1987. The crude birth rate, general fertility and total fertility rates have all dropped among the Travellers in ROI. Comparison was not made for the Travellers in NI with regards to the 1987 study as the 1987 study only referenced to the Travellers in ROI. From this study, we have demonstrated that Travellers in NI have lower birth rate and general fertility rate compared to the Travellers in ROI. The total fertility rate of Travellers on the island of Ireland is still high compared to the general population, and still one of the highest in Europe.

The birth cohort study is currently ongoing and has many challenges that require the continued commitment and effort from all its multi-disciplinary team members.

Appendix A: Calculations for the Estimated Traveller Births

Estimate Based on the 2006 Census

In 2006, the Central Statistics Office (CSO) carried out the National Irish Population Census. For the first time, a specific ethnic identifier for the Traveller was included. The 2006 Census showed there was a total of 22,435 Travellers in the Republic of Ireland (CSO, 2007, pp38). The general Irish population at the time was 4,239,848. (CSO, 2007). There were 743 infants under one year old in the Traveller population (CSO, 2006, pp37).

For the All Ireland Traveller Health Study, the study team had initially estimated the population of the Travellers on the Island of Ireland to be 40,000 (cf Technical Report 1). The 2006 Census of 22,435 Travellers was only 56% of the estimated 40,000. By this convention, the under-1-year-old figure for the Traveller community should be factored up to give an estimated 1,324. This was the estimated number of births for a year.

Estimate Based on the 1986 Travellers' Health Status Study

In 1986, the Health Research Board commissioned the first Traveller health study, The Travellers' Health Status Study. The study had a census component which showed the population of the Travellers at that time was 15,888 in ROI. There were 544 live Traveller births recorded in the study during that year. The crude birth rate (per 1,000 population) calculated was 34.9 for Travellers and 16.6 for ROI. Based on the Department of Health and Children's 2005 Vital Statistics Report, the crude birth rate for the general population was 14.8 in 2005.

The 2005 crude birth rate was used as this was the most up-to-date data available when the initial calculation was carried out for the study proposal. Comparison of the crude birth rates of the general Irish population in 2005 and 1986 against the 1986 Traveller crude birth rate showed the crude birth rate for the Travellers was 2.1 times (2005) and 2.3 times (1986) that of the general population in Ireland (Table 8).

Table 8: Crude Birth Rate and ratio in 1986 and 2005 for the Traveller Health Status Study and Vital Statistics Report

Indicator	1986		2005	
	Travellers' Health Status Study	Vital Statistics Report (ROI)	Estimated for AITHS	Vital Statistics Report (ROI)
Crude Birth Rate (per 1,000 population)	34.9	16.6	31	14.8
Crude Birth Rate compared to 1986 Travellers' Health Status Study	1	2.3	1.1	2.1

For the AITHS, as previously mentioned, the study team estimated that there were 40,000 Travellers on the island of Ireland. The Irish national crude birth rate for 2005 was 14.8, which was 89% of the 1986 rate (16.6). By assuming that the Travellers too have had a similar percentage drop in their birth rate, then this would bring the estimated crude birth rate from 34.9 to 31. For an estimated total population of 40,000, this meant the estimated number of birth was projected to be 1,240 for the whole of Ireland.

Hence the estimated number of births for the study derived from the 2 sources was set at between 1,240 and 1,327.

Population Data from AITHS Census 2008

The All Ireland Traveller Health Study census provided another set of data which was utilised for population estimate. This included age-specific population count and number of pregnant women at the time of census.

All Ireland Traveller Health Study 2008 Census: number of pregnancies with potential live births

The number of pregnant women identified during the census should, after adjustment for miscarriage and stillbirths, give a general estimate of the potential number of births during the birth cohort study recruitment period.

670 families reported presence of a pregnant woman in the household during the AITHS census in ROI, and 42 in NI. In order to estimate the 'true' number of pregnancies, adjustment was made for under-ascertainment of families during the census and possible double counting (Table 9).

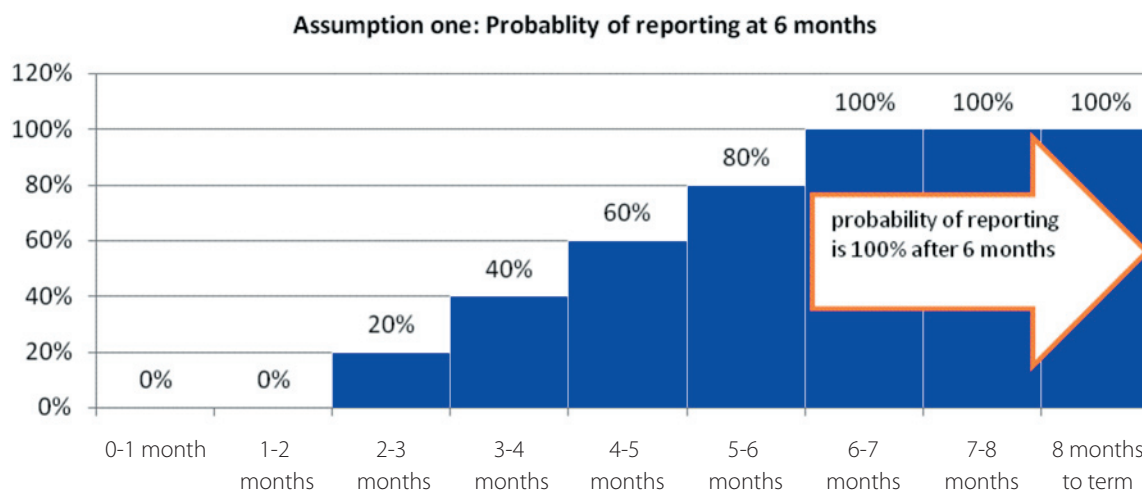
Table 9: Actual number of reported pregnancies during the Census and adjusted Census-reported estimate

Region	Census	Adjusted estimate
ROI	670	833
NI	42	45
Total	712	878

The self-reporting of pregnancy may vary from 2 months at the earliest to due date of 9 months (Figure 24). This reporting variation may depend on individual and cultural norms; some may not report the pregnancy until quite late into the pregnancy. There is no documented cultural norm for the declaration of pregnancy amongst Travellers. Some believe this may well be as late as 6 months into the pregnancy.

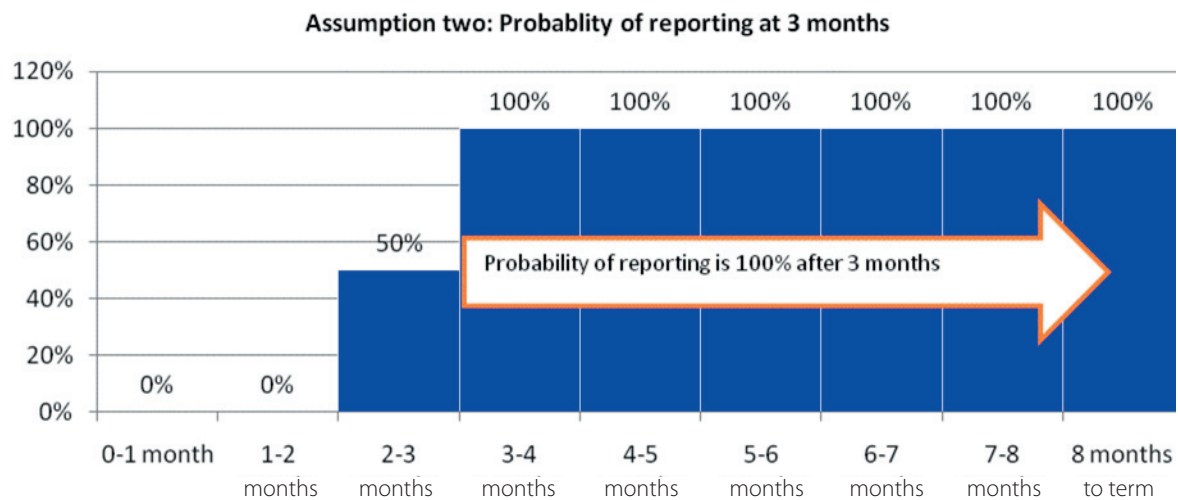
For the purpose of calculation, we first assume all pregnancies over 6 months at the time of census would be reported to us and that the probability of pregnancy reporting dropped for earlier months of pregnancy. We also assume that there is no reporting at 2 months or less. We then assume a linear drop between these two extremes. Figure 25 shows the probability of pregnancy reporting by month of pregnancy given these assumptions. For instance at 3 to 4 months we expect 40% of pregnancies to be reported to us and from 6 months onwards 100% to be reported. Births in the first 9 months of the birth cohort study can only arise from these women who were pregnant during the census. Averaging the monthly probability of reporting over the 9 month period ($100 + 100 + 100 + 80 + 60 + 40 + 20 + 0 + 0 = 500$) we obtain a monthly average of 55% ($500/9$). This means that 55% of pregnancies over next 9 months were reported to us at census; this relates to the adjusted estimate of 878 pregnancies that should have been reported to us (Table 9). This leads to 1,596 pregnancies over 9 months or 177 births per month. This gives rise to an estimated 2,128 potential births over the 12-month period.

Figure 25: Probability of reporting pregnancies at 6 months



We repeated this with the alternative assumption that all pregnancies were reported from 3 months onwards. This gives rise to the monthly probability of reported pregnancies as shown in Figure 26. Averaging the monthly probability over a 9-month period ($100 + 100 + 100 + 100 + 100 + 100 + 50 + 0 + 0 = 650$) we obtain a monthly average of 72.2%. This means that 72.2% of pregnancies over next 9 months were reported to us at census. Applying this to our adjusted estimate of 878 births reported to us (Table 9) leads us to 1,216 births over 9 months, or 135 births per month. This gave rise to 1,621 potential births over the 12-month period.

Figure 26: Probability of reporting pregnancies at 3 months



So far in the calculations it is assumed that all pregnancies resulted in live births. However, these are overestimated figures, as these include miscarriages and stillbirths. The stillbirth rate (per 1,000 total births) among Travellers was 19.5 (CI 12.6-26.4) in 1986 compared to 6.9 in the general Irish population (Barry, 1996).

Miscarriages must also be taken into account in this calculation. A conservative figure for miscarriage rate in all pregnancies is 15 to 20% (Royal College of Obstetricians and Gynaecologists, 2006), although this may be as high as 30% in early pregnancies (Wilcox *et al.*, 1988; Whittaker, 1983). Miscarriage rates may also vary with ethnic groups. The miscarriage rate of African-Americans is higher than the white-American (Price, 2006). Parry (2007) reported significantly higher reported miscarriages in Gypsies and Travellers (29%) compared to settled group (16%), although there was no specific miscarriage rate suggested. All the published figures were for reported clinical pregnancy not taking into account the unreported miscarriages in the community; this may be difficult to ascertain (McLaren and Shelley, 2002; Royal College of Obstetricians and Gynaecologists, 2006; Savitz, 2006).

To estimate births, we first remove the miscarriage loss based on published rates; 20% of the estimated pregnancies were removed to account for this. The stillbirth rate of 19.5 per 1000 births was then applied after the miscarriage rate. This results in the final estimated births range illustrated in Table 10.

Table 10: Estimated pregnancies from the AITHS census and estimated births, adjusted for miscarriage and stillbirth rate

Assumption: reported pregnancy by gestation month	Estimated pregnancies	Miscarriage rate (20% of all pregnancies)	Stillbirths (19.5 per 1,000 births)	Final estimated births
Reporting of pregnancies at 6 months	2,128	426	33	1,669
Reporting of pregnancies at 3 months	1,621	324	25	1,272

Therefore, based on reported pregnancies in the AITHS census, the birth estimate ranges from 1,272 to 1,669.

All Ireland Traveller Health Study 2008 Census: Under-1 to 3 Years Old Demography

Based on the 2008 AITHS data, the population of Travellers from under-1 year old to 3 years old was obtained (Table 11). As mentioned in the AITHS census, 9,056 Travellers families in ROI and 1,562 families in NI were identified. The response rate was 78% in ROI and 93% in NI. In ROI, the average family size of the 7,042 families was 4, while the average family size in NI was 2.5. To derive an overall estimate of true total Traveller population, the enumerated families (9,056 in ROI and 1,562 NI) was multiplied by the average family size. This derived the estimated population of Travellers at 36,224 in ROI and 3,905 in NI (Figure 27). The estimated under-1 to 3-year-old population was based on this calculation. The final total number of under-1 to 3-year-old for IOI is shown in Table 12.

Table 11: Numbers of under-1-year-old to 3-year-old for ROI and NI during census; and final estimated number

Area	Age group	Census	Estimated
ROI	Under-1 year old	508	837.5
	1 year old	734	1,210.0
	2 year old	789	1,300.7
	3 year old	695	1,145.7
NI	Under-1 year old	21	24.2
	1 year old	85	97.9
	2 year old	98	99.1
	3 year old	84	96.7

Figure 27: Population estimate and adjustment made for the AITHS census and the birth cohort study

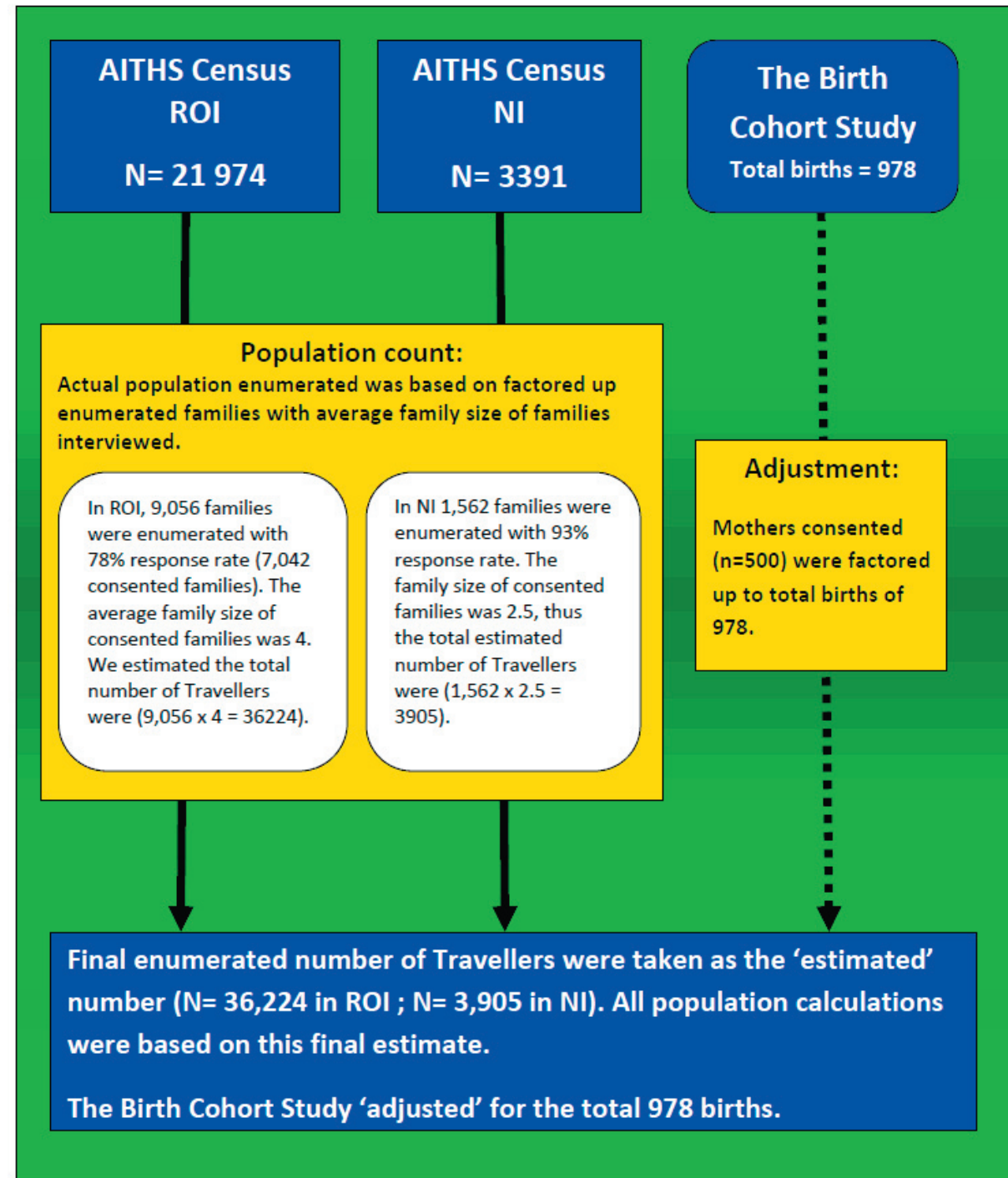


Table 12: Population estimate from the All Ireland Traveller Health Study 2008: ROI and NI

Age Group	Republic of Ireland (estimated)	Northern Ireland (estimated)	Total for island of Ireland (estimated, round up)
Under-1-year-old	837.5	24.2	862
1-year-old	1,210.0	97.9	1,308
2-year-old	1,300.7	99.1	1,400
3-year-old	1,145.7	96.7	1,242

Table 13: Population number of children from under 1 year old to 3 years old of Traveller children according to the 1986 Travellers' Health Status Study, 2006 national census and 2008 AITHS

Age Group	1986 Travellers' Health Study	2006 National Population Census	2008 AITHS (estimate)
Under-1-year-old	447	743	862
1-year-old	590	665	1,308
2-year-old	686	650	1,400
3-year-old	652	623	1,242

The AITHS census showed a larger number of Traveller population of under-1-year-old to 3-year-old compared to the 1986 Travellers' Health Status Study and the 2006 national population census (Table 13). The 1986 Travellers' Health Status Study and AITHS census both showed a decrease in the number of children from 3 years old to under-1-year-old. The AITHS census, however, showed a larger number in the under-1 to 3 years old population probably due to the better uptake of the study compared to the 1986 study. This was a reverse of the 2006 National census, which showed an increase in Traveller population of under a year old. We considered whether the smaller number of 862 in the AITHS census could be due to the under-reporting of under one year olds by the Traveller population (compared to the other age groups). The demography for the 1- and 2-year olds showed a population of approximately 1,200 to 1,400. The 3-year-old population showed a drop to 1,242. Taking this trend in the under-1-year old to 3-year-old demography from the 2008 AITHS census, assuming there was a constant mortality rate among this age group, the study estimated that there should be 800 to 1,400 Traveller births on the island of Ireland.

The study team had to review the estimated number of births based on these various resources. The range of the estimate varied from 1,000 to 1,400 births. Therefore, the study team decided that the 'corrected' estimated number of Traveller births was between 1,000 and 1,400 for the island of Ireland.

Appendix B: Calculation for Crude Birth Rate

The calculations for the annual crude birth rates are shown below:

Annual Crude Birth Rate: Island of Ireland

Total Traveller births: 978

Total Traveller population: 40,129

Annual Crude Birth Rate = $(978/40,129) \times 1,000 = 24.4$

Annual Crude Birth rate: Republic of Ireland

Total Traveller births: 911

Total Traveller population: 36,224

Annual Crude Birth Rate = $(911/36,224) \times 1,000 = 25.1$

Annual Crude Birth Rate: Northern Ireland

Total Traveller births: 67

Total Traveller population: 3,905

Annual Crude Birth Rate = $(67/3,905) \times 1,000 = 17.1$

Appendix C: Calculation for Fertility Rate

This section describes:

- The General, Age-specific and Total fertility Rates for Travellers on the island of Ireland (ROI and NI combined).
- The General, Age-specific and Total Fertility Rates for Travellers in the Republic of Ireland
- The General Fertility Rate of Travellers in Northern Ireland.

It was estimated that the AITHS census was successful in sampling 78% of the population in ROI and 93% in NI. Those who refused to consent were not included in the census. Women aged between 15-49 years old identified in the census were categorised into 5-year age groups (Table 14). As the AITHS census captured 78% of the census, it was appropriate that the total Traveller population was adjusted to make up to 100% of the estimated Traveller population in ROI. For NI, this was adjusted from 93%. This is with the assumption that the demography of those not captured was the same as those sampled in the census.

For crude birth rate by THU, a similar method was employed where the total number of births from the birth cohort study was used as the denominator while the population (as numerator) was taken and adjusted from the AITHS census.

Fertility Rates of Travellers on the island of Ireland:

For the calculation of the general, age-specific and total fertility rates of the Travellers on the island of Ireland, the population data from the AITHS census and the birth cohort study were combined.

From the population census, women in the 15-49 age groups were selected and adjusted according to the under-ascertainment from the census (78% for ROI and 93% for NI). This is illustrated in Tables 14 and 15.

Table 14: Population of Traveller women 15-49 years old according to 5-year age group from AITHS census and the population after adjustment made for under-ascertainment during AITHS census

Age Group (years)	AITHS census 2008	Estimated
Republic of Ireland		
15-19	1,203	1,983.1
20-24	1,090	1,796.9
25-29	985	1,623.8
30-34	776	1,279.2
35-39	705	1,162.2
40-44	526	867.1
45-49	412	679.2
Northern Ireland		
15-19	190	218.8
20-24	226	260.2
25-29	159	183.1
30-34	122	192.3
35-39	123	141.6
40-44	99	114.0
45-49	50	57.6
Total	6,666	10,559.2

Table 15: Summary of the Total (adjusted) Traveller women in 15-49 age groups for ROI and NI according to 5-year age group

Age Group (years)	ROI (estimated)	NI (estimated)	Total (estimated) census population
15-19	1,983.1	218.8	2,201.9
20-24	1,796.8	260.2	2,057.1
25-29	1,623.8	183.1	1,806.9
30-34	1,279.2	192.3	1,471.5
35-39	1,162.2	141.6	1,303.8
40-44	867.1	114.0	981.1
45-49	679.2	57.6	736.8
Total	9,391.5	1,167.7	10,559.2

From the birth cohort, the participants' ages were categorised and then adjusted for the refusals. This is illustrated in Table 16.

Table 16: Total consent and refusals in the birth cohort study (ROI and NI), and final total numbers of mothers in cohort after adjustment for refusals

Age group (consent) (years)	The birth cohort study	Total number of mothers for birth cohort adjusted for refusals (ROI +NI)
15-19	62	124.5
20-24	156	318.5
25-29	140	285.8
30-34	85	173.5
35-39	32	65.3
40-44	5	10.2
45-49	0	0
Missing	22	-
Refusals	464	-
Total	978	978

For general fertility and total fertility rate according to THU, the number of births from the birth cohort study was categorised according to their THU region. The THU population was taken from the AITHS census and factored up for estimated population in each THU.

General Fertility Rate for Travellers on Island of Ireland

The general fertility rate for the Travellers on the island of Ireland was 116.11. The calculation for this was derived from the total number of births and the total adjusted female Traveller population in the 15-49 age groups.

Total Traveller births on IOI: 978
 Total 15-49 years old female (adjusted): 10,559.17
 General Fertility Rate for Travellers on the island of Ireland= $(978/10,559.17) \times 1,000$
 = 92.62

Age-specific Fertility Rate and Total Fertility Rate for Travellers on the Island of Ireland

The age-specific fertility rate and the total fertility rate were derived from the breakdown of the female population age 15-49 into 5 years age group. Table 17 shows the adjusted rates for these.

Table 17: Total (adjusted) female population age 15-49 after adjustment for ROI and NI, total number of mothers in birth cohort study adjusted after refusals and age-specific fertility rate for the Travellers on the island of Ireland

Age group (years)	Total (adjusted) census population (ROI +NI) (a)	Total number of mothers for birth cohort adjusted for refusals (ROI +NI) (b)	Age-specific fertility rate (per 1,000 pop) (b/a x1,000)
15-19	2,201.9	124.5	56.6
20-24	2,057.1	318.5	154.8
25-29	1,806.9	285.8	158.2
30-34	1,471.5	173.5	117.9
35-39	1,303.8	65.3	50.1
40-44	981.2	10.2	10.4
45-49	736.7	0	0
Total	10,559.1	978	--

For the age-specific fertility rate for Travellers on the island of Ireland, the total number of mothers for birth cohort adjusted for refusals was divided by the total Traveller women according to the same 5-years age category. This is laid out in Tables 17, column 4.

For total fertility rate, the formula used was:

$$\begin{aligned}
 \text{Total Fertility Rate} &= (\text{Total of Age-specific Fertility Rate} \times 5) / 1,000 \\
 &= (548.05 \times 5) / 1,000 \\
 &= 2,740.25 / 1,000 \\
 &= 2.74
 \end{aligned}$$

Thus the total fertility rate of Travellers on the island of Ireland was 2.74 per 1,000 women.

Fertility Rates of Travellers in the Republic of Ireland

Total fertility rate of Irish Travellers from the 1986 Travellers' Health Status Study was 5.3 (Barry, 1996) (Table 18).

To calculate the fertility rates of the Traveller population for 2008, data were derived from the birth cohort study and the All Ireland Traveller Health Study (AITHS).

Table 18: General fertility rates, total fertility rates and age-specific fertility rates of the general Irish population in 1987 and Travellers in 1986

	General Female Population ROI 1987	1986 Traveller Health Study
General Fertility rate (per 1,000 female population)	70.1	164.2
Total Fertility rate	2.3	5.3
Age-specific Fertility Rate:		
15-19	16.0	78.9
20-24	74.9	246.9
25-29	146.8	274.9
30-34	133.8	250.0
35-39	69.1	148.0
40-44	20.8	53.1
45-49	1.2	11.1

A similar method of adjustment was used as per the previous section on fertility rates for the island of Ireland. To account for under-ascertainment, the original census data was factored up to arrive at an estimated number for each 5-year age group (Table 19).

Table 19: The birth cohort study: 5-year age distribution of Traveller women between age 15 and 49 from the AITHS census and the assumed total population for ROI

Age group (years)	AITHS census 2008	Total estimated population for Traveller females 15-49 years old adjusted for under-ascertainment
15-19	1,203	1,983.1
20-24	1,090	1,796.9
25-29	985	1,623.8
30-34	776	1,279.2
35-39	705	1,162.2
40-44	526	867.1
45-49	412	679.2
Total	5,697	9,391.5

From the birth cohort study, all consenting mothers were categorised according to the 5-year age groups (Table 20). These consenting mothers comprised 51.6% of the total mothers who gave birth during this period. The number of consenting mothers was adjusted to make up for the 911 of all births in ROI, with the assumptions made that the mothers who refused had the same age distribution as those mothers who consented.

Table 20: The birth cohort study: number of consenting mothers in the birth cohort and adjusted number of Traveller mothers by age group

Age group (years)	Numbers of participants who consented in the birth cohort study (ROI only)	Total number of mothers for birth cohort adjusted for refusals (ROI only)
15-19	57	115.1
20-24	146	294.9
25-29	135	272.7
30-34	81	163.6
35-39	27	54.5
40-44	5	10.1
45-49	0	0
Missing	21	-
Total Consent	466	-
Total Refusal	445	-
Total Cohort (consent, refusal)	911	911

General Fertility Rate: Republic of Ireland

The general fertility rate for ROI was derived from the total Traveller birth in 2008 against the total female population age 15-49 years. This is illustrated below:

$$\begin{aligned} \text{The General Fertility Rate for Travellers in ROI (2008)} &= (911/9,391.4681) \times 1,000 \\ &= 97.00 \end{aligned}$$

Age-specific and Total Fertility Rates: Republic of Ireland

For the age-specific fertility rates, the total estimated number of mothers for the birth cohort study (after being factored upwards for under-ascertainment) was divided by the total number of Traveller women in the same age group (Table 21, column 4).

Table 21: Total estimated female population by age group and total number of births to women in the birth cohort for 2008 among the Travellers and the calculated age-specific fertility rate

Age group (years)	Total estimated population for Traveller women age 15-49 (a)	Total adjusted number of mothers from birth cohort (b)	Age-specific fertility rates per 1,000 population (b/a x1,000)
15-19	1,983.1	115.1	58.1
20-24	1,796.9	294.9	164.1
25-29	1,623.8	272.7	167.9
30-34	1,279.2	163.6	127.9
35-39	1,162.2	54.5	46.9
40-44	867.1	10.1	11.6
45-49	679.2	0	0
Total	9,391.5	911	--

For the Total Fertility Rate, the formula below was used:

$$\begin{aligned}
 \text{Total Fertility Rate} &= (\text{Total of Age-specific Fertility rates} \times 5) / 1,000 \\
 &= (576.57 \times 5) / 1,000 \\
 &= 2.88
 \end{aligned}$$

The total fertility rate among the Travellers (ROI only) for 2008 was 2.88 /1,000 women.

Age-specific Fertility Rates: Traveller Health Units

The age-specific fertility rates for each THU were calculated using the above method. The result of this is laid out in Table 22.

Table 22: Age-specific fertility rate according to THUs

THU	5-years age group						
	15-19	20-24	25-29	30-34	35-39	40-44	45-49
Eastern	34.8	187.2	168.9	82.9	10.8	26.5	0.0
Midland	49.4	132.0	89.1	49.5	6.1	29.2	0.0
Mid-Western	132.1	288.2	261.9	112.3	66.4	0.0	0.0
North Eastern	42.8	69.4	61.2	29.8	14.1	0.0	0.0
North Western	39.4	99.0	114.9	104.0	44.4	0.0	0.0
South Eastern	91.9	160.1	136.8	70.9	59.0	0.0	0.0
Southern	49.7	126.1	78.7	15.6	0.0	0.0	0.0
Western	69.2	174.9	322.1	64.3	24.9	0.0	0.0

Fertility Rates: Northern Ireland

The calculation for age-specific fertility rates and total fertility rate were not carried out for NI due to the size of the data. The general fertility rate for NI is discussed below.

The AITHS census (2008) for Northern Ireland identified 3,905 Travellers in NI with a 93% ascertainment rate. Of these, 1,014 were women aged 15-49 years old. To adjust for under-ascertainment, the total 15-49 years old female population was estimated to be 1,167.7.

The general fertility rate for Travellers in Northern Ireland was 57.4. Calculation for this is as per below.

Calculation for General Fertility Rate in Northern Ireland:

Total Traveller Births: 67

Total population of female Travellers 15-49 years (AITHS census 2008): 1,014

Total population of female Travellers 15-49 years (adjusted for under-ascertainment): 1,167.7

General Fertility Rate for Travellers in Northern Ireland (2008) = $(67/1,167.7) \times 1,000$
= 57.4

