Universal Newborn Hearing Screening and Early Intervention Programme

Universal Newborn Hearing Screening and Early Intervention Programme (UNHSEIP)

Monitoring Report on Newborn Hearing Screening Service Provision

April 2012 – December 2012

National Screening Unit

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Executive Summary

Universal newborn hearing screening is the standard of care internationally, and has now been introduced in New Zealand. The early detection of hearing loss, and the application of appropriate medical and educational interventions, has been demonstrated to significantly improve the baby's long-term language skills and cognitive ability.

In August 2010 the national implementation of the Universal Hearing Screening and Early Intervention Programme (UNHSEIP) was completed. All 20 District Health Boards (DHBs) offer screening to the families and whānau of newborn babies.

The core goals of the programme, which are based on international best practice, are described as '1-3-6' goals:

1= babies to be screened by 1 month of age
3= audiology assessment completed by 3 months of age
6= initiation of appropriate medical, audiological and early intervention education services by 6 months of age.

This monitoring report covers the nine month period from 1 April 2012 to 31 December 2012. This report covers three quarters of data to synchronise the reporting against calendar years. This report completes almost three years of data available for UNHSEIP monitoring.

Tables 1 and 2 on pages 3-6 provide a summary of the screening and audiology information contained within this report.

Key Points from April 2012 to December 2012

- Compared with the number of babies born in this period, 94% of families and whānau nationally were recorded by DHBs as having been offered newborn hearing screening.
- Of the families who were offered screening, DHBs report that 1% declined to take up the offer.
- The NSU received consented newborn hearing screening data for 84% of babies born in this period.
- Almost all families who consented to screening did start the process (99.9%). These high rates were consistent across DHBs, ethnicities and decile groups. Similarly high rates of completion were found once babies started screening (98.5%), once again showing little difference across DHBs, ethnicity or decile ratings.
- In total 39,021 babies completed newborn hearing screening in this six month period, compared with the 46,957 live births. While these figures come from different data sets, this indicates that approximately 83% of babies born in this period completed screening.

- Of babies who completed screening, approximately 92% of babies completed by the target of one month of age (corrected age). This did show some variation by DHB, ranging from 61.5% to 100%, however most DHBs had rates of 88% and above. There were only small variations by ethnicity and virtually none by decile.
- Overall the referral rate to audiology continues to be low, in this period 1.7% (672 babies). This rate varied from 0.4% to 5% across DHBs. The referral rate for NICU/SCBU babies was higher at 6.4%, as might be expected.
- Of those babies that passed screening, 5.5% were identified for targeted follow-up. This showed some variation between DHBs ranging from 3% to 10% and was higher for babies from NICU/SCBU at 27.5%.
- For this period 7.7% of babies had a risk factor identified with the most common risk factor being Family History (36.9% of all risk factors) and Jaundice requiring phototherapy (accounting for 18.6% of risk factors).
- Of those babies referred to audiology, 57% are reported to have started an audiology assessment. This rate markedly between DHBs though numbers of referrals in some DHBs are very small.

  Of the 672 babies who were referred to audiology, information was recorded in the national database for just 381 of these babies. This does not mean that 43% of the babies have not been seen by audiology. The data is limited because some DHBs have not submitted audiology forms to the NSU, and some forms have yet to be entered into the national database due to missing information. The NSU continues to work with DHBs to improve the completeness of audiology data for future monitoring reports.
- Of those babies who completed audiological assessment, 78% did so within the target of three months of age. Variation between DHBs, ethnicity and decile can be seen but the numbers are too small to draw any strong conclusions.
- 42 babies (11.5% of those that completed an audiology assessment) had a permanent congenital hearing loss identified.
- A greater percentage of babies completing audiology were identified with a conductive or mixed hearing loss, 25.5% (93 babies).
- 135 babies in total were identified with a hearing loss. The ages at which the hearing loss was identified were: 48 by 4 weeks, 26 by 8 weeks, 35 by 12 weeks and the remaining 26 by over 12 weeks.

Table 1a Summary of newborn hearing screening indicators by DHB, April to December 2012

DHB of birth	Live births	Consent for screen	Started screen	Completed screening	Completed screening by 1 month of age	Pass	Referred to audiology	Passed with targeted follow-up	Consents to live births	Started screening to consented for screening	Completed screening to consents for screening	Completed screening by 1 month to completed	Referral rate to audiology	Targeted follow-up
	Number								Percent					
Northland	1,724	1,358	1,357	1,354	833	1,286	68	111	78.8	99.9	99.7	61.5	5.0	8.6
Waitemata	6,080	5,107	5,097	5,038	4,474	4,971	67	180	84.0	99.8	98.6	88.8	1.3	3.6
Auckland	5,044	3,663	3,662	3,638	3,455	3,564	74	195	72.6	100.0	99.3	95.0	2.0	5.5
Counties Manukau	6,672	4,236	4,236	3,802	3,431	3,718	84	232	63.5	100.0	89.8	90.2	2.0	6.2
Waikato	4,167	3,822	3,820	3,816	3,614	3,760	56	190	91.7	99.9	99.8	94.7	1.5	5.1
Lakes	1,205	1,093	1,092	1,091	1,033	1,069	22	49	90.7	99.9	99.8	94.7	2.0	4.6
Bay of Plenty	2,251	1,915	1,915	1,915	1,772	1,899	16	60	85.1	100.0	100.0	92.5	0.8	3.2
Tairawhiti	549	510	505	501	484	493	8	40	92.9	99.0	98.2	96.6	1.6	8.1
Taranaki	1,168	1,118	1,118	1,117	1,105	1,096	21	113	95.7	100.0	99.9	98.9	1.9	10.3
Hawke's Bay	1,718	1,443	1,442	1,440	1,384	1,407	33	97	84.0	99.9	99.8	96.1	2.3	6.9
Whanganui	655	578	577	573	554	569	4	21	88.2	99.8	99.1	96.7	0.7	3.7
Mid Central	1,641	1,227	1,226	1,226	688	1,218	8	83	74.8	99.9	99.9	56.1	0.7	6.8
Hutt Valley	1,527	1,503	1,497	1,494	1,487	1,477	17	76	98.4	99.6	99.4	99.5	1.1	5.1
Capital & Coast	2,901	2,825	2,825	2,821	2,751	2,775	46	219	97.4	100.0	99.9	97.5	1.6	7.9
Wairarapa	362	332	332	332	327	328	4	19	91.7	100.0	100.0	98.5	1.2	5.8
Nelson Marlborough	1,175	1,080	1,080	1,079	1,014	1,071	8	77	91.9	100.0	99.9	94.0	0.7	7.2
West Coast	293	250	249	246	231	245	1	9	85.3	99.6	98.4	93.9	0.4	3.7
Canterbury	4,571	4,459	4,459	4,454	4,254	4,387	67	155	97.5	100.0	99.9	95.5	1.5	3.5
South Canterbury	509	474	473	472	469	458	14	15	93.1	99.8	99.6	99.4	3.0	3.3
Southern	2,745	2,642	2,642	2,612	2,498	2,558	54	176	96.2	100.0	98.9	95.6	2.0	6.9
Total	**46,957**	**39,635**	**39,604**	**39,021**	**35,858**	**38,349**	**672**	**2,117**	**84.4**	**99.9**	**98.5**	**91.9**	**1.7**	**5.5**

Table 1b Summary of newborn hearing screening indicators by ethnicity and deprivation, April to December 2012

DHB of Birth		Consent for screen	Started screen	Completed screening	Completed screening by 1 month of age	Pass	Referred to audiology	Passed with targeted follow-up			Started screening to consented for screening	Completed screening to consents for screening	Completed screening by 1 month to completed	Referral rate to audiology	Targeted follow-up
		Number									Percent				
Ethnicity															
Māori		9,662	9,647	9,486	8,404	9,234	252	720			99.8	98.2	88.6	2.6	7.8
Pacific		3,833	3,827	3,640	3,288	3,549	91	185			99.8	95.0	90.3	2.4	5.2
Asian		5,461	5,460	5,376	5,053	5,320	56	160			100.0	98.4	94.0	1.0	3.0
European		19,732	19,725	19,591	18,254	19,334	257	999			100.0	99.3	93.2	1.3	5.2
Other ethnic groups		813	811	803	743	791	12	44			99.8	98.8	92.5	1.5	5.6
Not stated/Unspecified		134	134	125	116	121	4	9			100.0	93.3	92.8	3.0	7.4
Total		**39,635**	**39,604**	**39,021**	**35,858**	**38,349**	**672**	**2,117**			**99.9**	**98.5**	**91.9**	**1.7**	**5.5**
Deprivation															
Decile 1-2		5,907	5,906	5,858	5,576	5,797	61	268			100.0	99.2	95.2	1.0	4.6
Decile 3-4		6,345	6,344	6,298	5,835	6,213	85	299			100.0	99.3	92.6	1.3	4.8
Decile 5-6		7,622	7,617	7,553	6,972	7,432	121	395			99.9	99.1	92.3	1.6	5.3
Decile 7-8		9,407	9,394	9,301	8,497	9,136	165	536			99.9	98.9	91.4	1.8	5.9
Decile 9-10		10,272	10,261	9,930	8,905	9,693	237	614			99.9	96.7	89.7	2.3	6.3
Unknown		82	82	81	73	78	3	5			100.0	98.8	90.1	3.7	6.4
Total		**39,635**	**39,604**	**39,021**	**35,858**	**38,349**	**672**	**2,117**			**99.9**	**98.5**	**91.9**	**1.7**	**5.5**

Table 2a Summary of newborn hearing audiology indicators by DHB, April to December 2012

DHB of audiology	Commenced audiology	Completed audiology	Completed audiology in 3 months	Permanent congenital hearing loss	Conductive hearing loss		Completed audiology from commenced	Completed audiology in 3 months from completed audiology	Permanent congenital hearing loss from completed	Conductive hearing loss from completed
	Number						Percent			
Northland	67	67	46	5	22		100.0	68.7	7.5	32.8
Waitemata										
Auckland	59	58	52	1	19		98.3	89.7	1.7	32.8
Counties Manukau	33	17	6	0	0		51.5	35.3	0.0	0.0
Waikato	47	47	38	9	9		100.0	80.9	19.1	19.1
Lakes	16	16	14	5	0		100.0	87.5	31.3	0.0
Bay of Plenty	14	14	11	0	1		100.0	78.6	0.0	7.1
Tairawhiti	4	4	3	1	2		100.0	75.0	25.0	50.0
Taranaki	17	17	15	1	7		100.0	88.2	5.9	41.2
Hawke's Bay	30	30	27	3	12		100.0	90.0	10.0	40.0
Whanganui										
Mid Central	5	5	3	0	1		100.0	60.0	0.0	20.0
Hutt Valley	19	19	19	4	6		100.0	100.0	21.1	31.6
Capital & Coast	2	2	2	0	1		100.0	100.0	0.0	50.0
Wairarapa	1	1	1	1	0		100.0	100.0	100.0	0.0
Nelson Marlborough	11	11	9	4	2		100.0	81.8	36.4	18.2
West Coast										
Canterbury	6	6	6	1	3		100.0	100.0	16.7	50.0
South Canterbury	6	6	5	1	2		100.0	83.3	16.7	33.3
Southern	44	44	27	6	6		100.0	61.4	13.6	13.6
Total	**381**	**364**	**284**	**42**	**93**		**95.5**	**78.0**	**11.5**	**25.5**

Note: Waitemata, Whanganui and West Coast all contract other DHBs to undertake their audiology so have not data shown.

Table 2b Summary of newborn hearing audiology indicators by ethnicity and deprivation, April to December 2012

	Commenced audiology	Completed audiology	Completed audiology in 3 months	Permanent congenital hearing loss	Conductive hearing loss		Completed audiology from commenced	Completed audiology in 3 months from completed audiology	Permanent congenital hearing loss from completed	Conductive hearing loss from completed
	Number						Percent			
Ethnicity										
Māori	165	159	113	22	46		96.4	71.1	13.8	28.9
Pacific	32	30	26	1	9		93.8	86.7	3.3	30.0
Asian	32	27	22	3	8		84.4	81.5	11.1	29.6
European	143	139	116	15	29		97.2	83.5	10.8	20.9
Other ethnic groups	5	5	4	1	0		100.0	80.0	20.0	0.0
Not stated/Unspecified	4	4	3	0	1		100.0	75.0	0.0	25.0
Total	**381**	**364**	**284**	**42**	**93**		**95.5**	**78.0**	**11.5**	**25.5**
Deprivation										
Decile 1-2	32	29	23	5	0		90.6	79.3	17.2	0.0
Decile 3-4	49	46	38	9	12		93.9	82.6	19.6	26.1
Decile 5-6	73	72	61	5	17		98.6	84.7	6.9	23.6
Decile 7-8	91	88	71	10	26		96.7	80.7	11.4	29.5
Decile 9-10	133	126	90	13	37		94.7	71.4	10.3	29.4
Unknown	3	3	1	0	1		100.0	33.3	0.0	33.3
Total	**381**	**364**	**284**	**42**	**93**		**95.5**	**78.0**	**11.5**	**25.5**

1. Introduction

1.1. The Universal Newborn Hearing Screening and Early Intervention Programme

The early detection of hearing loss, and the application of appropriate medical and educational interventions, has been demonstrated to significantly improve the baby's long-term language skills and cognitive ability.

New Zealand's Universal Newborn Hearing Screening and Early Intervention Programme (UNHSEIP) was implemented over a three year period 2007 – 2010. The UNHSEIP is jointly overseen by two Government agencies, the Ministries of Health and Education. The Ministry of Health has responsibility for screening, audiological diagnosis of hearing loss and medical interventions, and the Ministry of Education has responsibility for early intervention services.

District Health Boards (DHBs) are the main providers of newborn hearing screening, follow-up audiology services, and medical interventions. Newborn hearing screening must be offered to the family/whānau of all eligible babies born in a DHB region, whether they are born in hospital or at home, within a framework of nationally consistent policies, standards and guidelines.

1.2. Programme Monitoring

The aim of the UNHSEIP is early identification of newborns with hearing loss, so that they can access timely and appropriate interventions, inequalities are reduced and the outcomes for these children, their families and whānau, communities and society are improved. The core goals of the UNHSEIP are described as "1-3-6" goals which are based on international benchmarks:

1. Babies to be screened by 1 month of age
3. Audiology assessment to be completed by 3 months of age
6. Initiation of appropriate medical and audiological services, and early intervention education services, by 6 months of age.

Monitoring is a core aspect of quality improvement activities, which are concerned with maximising the likelihood that the day-to-day operations of the screening programme will deliver the expected outcomes.

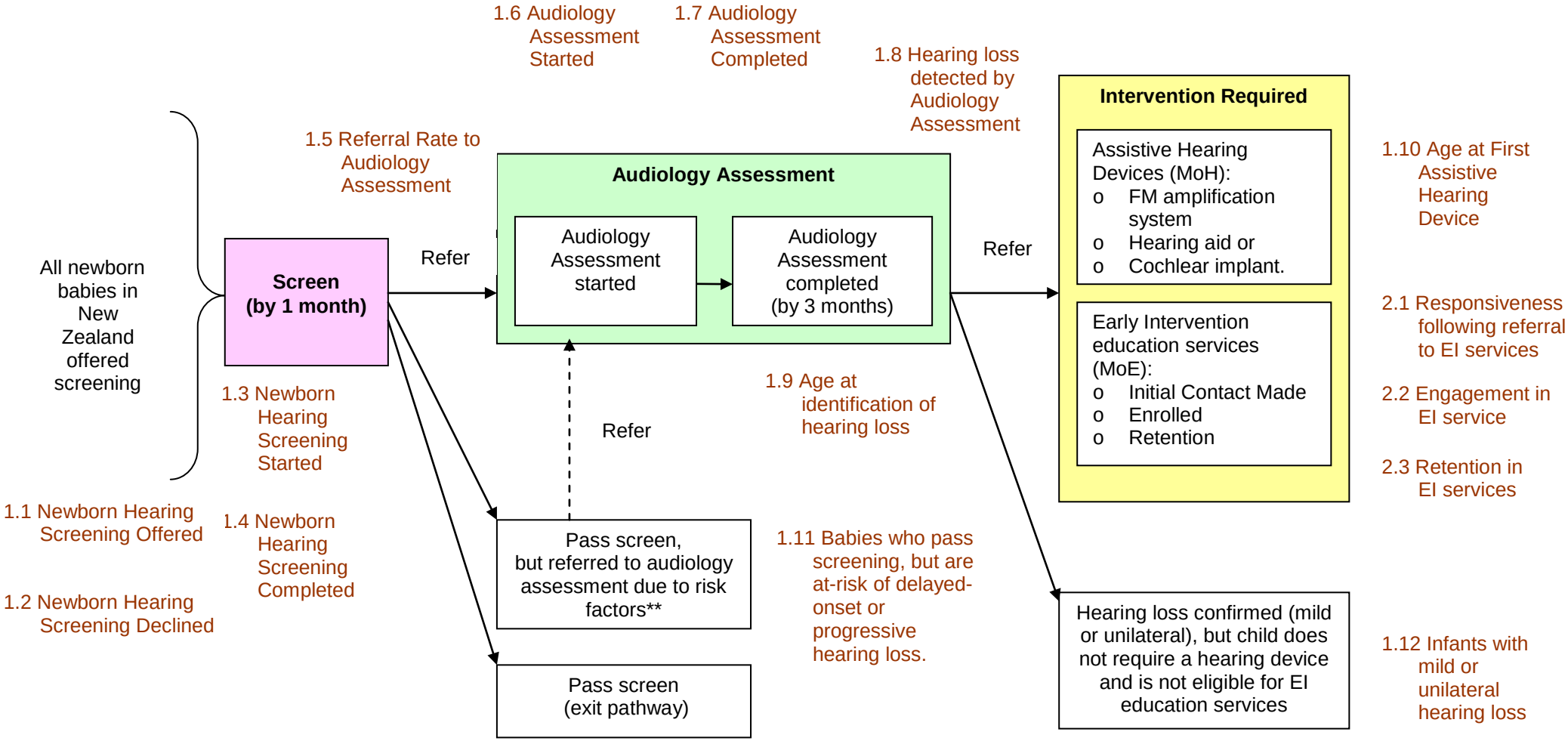
In 2007, a Monitoring Framework, centred around the Programme goals, was developed (http://www.nsu.govt.nz/health-professionals/3824.aspx). A Monitoring Framework is a plan for the routine, systematic collection and recording of information about aspects of the programme over time. The purpose is to assess whether progress is being made on achieving the programme goals.

Routine monitoring, based on newborn hearing screening and audiology data is reported to the Ministry by DHBs, on a quarterly basis.

This report, which is based on the data of babies who were screened during the six month period 1 April 2012 through to 31 December 2012, covers the following indicators:

- 1.1 Newborn Hearing Screening Offered
- 1.2 Newborn Hearing Screening Declined
- 1.3 Newborn Hearing Screening Started
- 1.4 Newborn Hearing Screening Completed
- 1.5 Referral Rate to Audiology Assessment
- 1.6 Audiology Assessment Started
- 1.7 Audiology Assessment Completed
- 1.8 Hearing Loss Detected by Audiology Assessment
- 1.9 Age at Identification of Hearing Loss
- 1.11 Babies who Pass Screening but are at risk of delayed onset or progressive hearing loss.

Figure 1 The UNHSEIP Screening Pathway and Indicators



**These babies passed screening, however it is recommended that they have "targeted follow-up" as they may be at-risk of delayed-onset or progressive hearing loss. While targeted follow-up is outside the primary screening pathway, it is recommended that these babies have at least one audiology assessment by the time they are 18 months of age.

2. Data

2.1. Data Collection Process

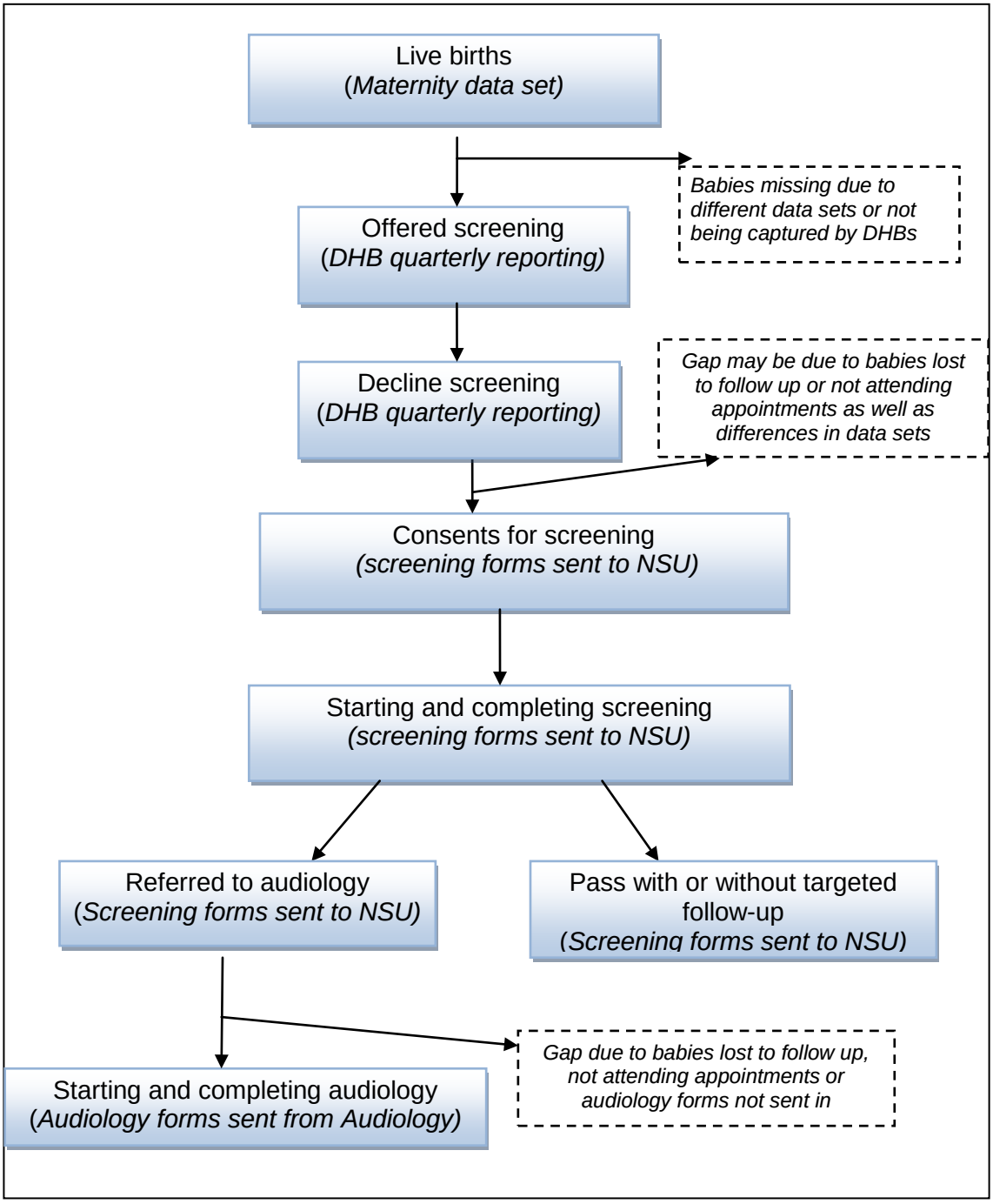
Newborn hearing screening and follow up audiology information is captured by the Ministry of Health's National Screening Unit (NSU) in two ways. Some DHBs collect and recorded this information on paper forms, which are regularly submitted NSU and the data is entered into the NSU's web-based application/database. An increasing number of DHBs enter their data directly into a database and extract the information for secure electronic transfer and uploading into the NSU's database.

The start date for entering newborn hearing screening information was for babies born from 1 April 2009 onwards, however the audiology form was not implemented until April/May 2010.

Data, for babies who started screening during the reporting period, is extracted from the NSU's web-based application via an Oracle package. Deprivation data is added to the screening data from the Ministry of Health's National Health Index database. Then the NSU systematically checks the data for missing values and discrepancies. There are over 30 business rules applied to ensure the data reported on is of the highest quality. The data extract is produced in a tabular format, which is then analysed against the monitoring indicators and presented as tables and/or charts.

At this time, additional information for monitoring is sourced from quarterly DHB contractual reporting. This information is used to monitor trends in offer and decline of newborn hearing screening, as only information from babies with consent is recorded in the national database.

It is important to note the data for live births, offers and consents are from separate data sources so are not directly comparable. They do however provide a picture as to the flow of babies into the screening programme, as represented in the diagram below. Key points at which data for babies may be missing and the contributing reasons are suggested.


Live births
(Maternity data set)
Babies missing due to different data sets or not being captured by DHBs
Offered screening
(DHB quarterly reporting)
Decline screening
(DHB quarterly reporting)
Gap may be due to babies lost to follow up or not attending appointments as well as differences in data sets
Consents for screening
(screening forms sent to NSU)
Starting and completing screening
(screening forms sent to NSU)
Referred to audiology
(Screening forms sent to NSU)
Pass with or without targeted follow-up
(Screening forms sent to NSU)
Gap due to babies lost to follow up, not attending appointments or audiology forms not sent in
Starting and completing audiology
(Audiology forms sent from Audiology)

2.2. Information Included in this Report

The information reported is from newborn hearing screening where the date of screening started was between 1 April 2012 and 31 December 2012. The information in this report relates to all 20 DHBs for which screening activity was recorded in the national database for this period.

Table 3 shows the timing of screening implementation for each DHB.

Table 3 DHBs starting date for UNHSEIP

DHB	Start date of implementation
Northland	April 2010
Waitemata	March 2010
Auckland	March 2010
Counties Manukau	March 2010
Waikato	July 2007
Lakes	March 2009
Bay of Plenty	March 2009
Tairawhiti	July 2007
Taranaki	April 2009
Hawke's Bay	July 2007
Whanganui	June 2009
Mid-Central	February 2010
Wairarapa	April 2010
Hutt Valley	July 2009
Capital & Coast	June 2009
Nelson Marlborough	March 2010
West Coast	December 2009
Canterbury	May 2009
South Canterbury	April 2009
Southern	August 2010

Audiology assessment

The audiology form was implemented in April/May 2010. The data is still limited but is beginning to provide useful information and trends are emerging now there is two years of data.

Early intervention education services

This report does not include information on the early intervention education service. Early intervention information is not included at this stage as it is best suited to annual reporting, as its goal of "initiation by 6 months of age" is not suited for shorter monitoring periods.

2.3. Ethnicity Reporting

Ethnicity data in this report is grouped according to a prioritised system. This is a common method of ethnicity reporting across the health sector. Prioritised ethnic groups involve each person being allocated to a single ethnic group, based on the ethnicities they have identified with, in the prioritised order of Māori, Pacific, Asian, European and Other. For example, if someone identifies as being European and Māori, under the prioritised ethnic group method, they are classified as Māori for the purpose of the analysis.

The group of prioritised 'Other' effectively refers to non-Māori, non-Pacific, non-Asian, non-European people. The aim of prioritisation is to ensure that where some need exists to assign people to a single ethnic group, ethnic groups of policy importance, or of small size, are not overwhelmed by the European ethnicity.

People may identify with as many ethnic groups as they choose. Within this population of babies, the maximum number of ethnicities recorded (five) was recorded for 12 babies. Four ethnicities were recorded for 90 babies and three ethnicities were recorded for 3% of babies (n=984). Two ethnicities were recorded for 19% of babies (n=7444) and the remaining 78% of babies had only one ethnicity recorded.

2.4. Deprivation Index

The deprivation index is the average level of deprivation of people living in an area at a particular point in time, relative to the whole of New Zealand. Deprivation refers to areas (based on New Zealand Census meshblocks) rather than individuals. Nine indicators are combined to give the deprivation index. The indicators reflect aspects of material and social deprivation, and the nine indicators are:

- income derived from benefits
- unemployment
- low income earning
- access to car
- access to telephone
- sole-parent families
- lack of formal educational qualifications
- level of home ownership
- living space within a home.

In the deprivation index system used by the health sector, areas classified as Decile 1-2 have the least deprivation and areas classified as Decile 9-10 have the most deprivation. This is opposite to some other systems of classification such as that used by education, where level 10 is the least disadvantaged and level 1 the most disadvantaged.

2.5. Known Data Quality Issues in this Report

The following data quality issues should be considered when interpreting the data presented in this publication.

Gestational age

Where gestational age was not recorded, a gestational age of 40 weeks was allocated (1% of records, n=399). This is an improvement on the previous reports and has continued to drop over time. DHBs will continue to be encouraged to include the correct gestational age on the data forms, as this is an important field. For babies born at less than full term, corrected age is calculated for the reporting of screening completed by one month of age and audiology completed by three months.

Accuracy of reporting

Where hand written screening forms are used, manual data entry occurs directly into the national database. Information is also imported into the database from DHBs electronically. The potential for errors in data entry is minimised by a two step data checking process one at data entry and the other during data processing. An example of this is that a birth date of 16 July 1980 would not be allowed. Each record must contain a value in eleven mandatory fields to be included in reporting. These fields are:

- valid NHI number
- consent = yes
- valid birth date
- screening protocol
- DHB of birth
- ethnicity
- screening outcome
- DHB of screening test 1
- DHB audiology test (if referred)
- test Method 1.

All newborn hearing screening providers are responsible for maintaining a high quality of data. Although the National Screening Unit monitors the quality of the information, newborn hearing screening providers are also expected to have quality control mechanisms in place. During the data entry process, quality issues, such as missing information, were raised with DHBs, and data quality continues to improve.

Audiology data

Limitations still exist with audiology data. While all DHBs have submitted some information there it is still unclear if this is the complete audiology information for this period. There is also some information that is unable to be entered into the national database due to missing information. This report includes audiology information on 381 of the 672 babies that were referred for audiology assessment.

Denominator

For the purpose of this report, birth data is sourced from the National Maternity Database. This data base combines information from live birth registrations from the Births, Deaths and Marriages Register along with hospital discharge information and Lead Maternity Carer claims. This provides a much more complete data set as registrations of births often take a long time.

Reporting by DHB

The DHB of a baby's birth is used as the parameter for data extraction from the newborn hearing database as this DHB is responsible for ensuring screening is completed. The maternity data set denominator is based on the babies domiciled DHB not the DHB where the baby is born. This means that when looking at tables comparing live births to data by tables reported as DHB of birth there can be some differences.

For audiology it is the DHB where the audiology takes place that reports this information, often, but not always the same as the DHB the baby was born in. All tables in the first section of this report refer to DHB of birth unless otherwise stated. DHB of audiology is used to report against the audiology indicators.

3. Monitoring Indicators

1.1 Newborn hearing screening offered
Description The proportion of parents / guardians of eligible newborns offered newborn hearing screening.
Relevant outcome The UNHSEIP has a principle of "universality": that all parents / guardians of eligible newborns should be offered newborn hearing screening. A high screen offered rate should result in high screening uptake rate.
methodology ***Indicator 1.1*** Numerator: Number of eligible newborns offered screening. Denominator: Number of eligible live births.
notes • It is recognised that newborn hearing screening programmes do not usually achieve high coverage in the early stages of implementation. Additionally, programmes often have a phased implementation such as screening of hospital births occurring first, followed by implementation in the community. As a result, a percentage outcome target was not set at this stage of the programme. • The UNHSEIP will regularly review coverage data for this indicator. If the goal of "All" is not being achieved, then the UNHSEIP will work collaboratively with DHBs and negotiate targets in order to improve coverage.

3.1. Offer of Newborn Hearing Screening

At this time, the offer of newborn hearing screening is reported through DHB contractual reporting to the Ministry. This is because only babies with informed consent for screening can be recorded on the national database – families who do not consent, and those who are not offered screening, are not recorded in the national database. In the future, if a coordinated electronic system for maternity and newborn notes is in place, the offer of screening will be able to be nationally recorded.

From the offer of screening reported in DHB quarterly reports for this time 94.4% of live births were offered screening. Two DHBs did not provide data for this full period so are excluded from the table below (Bay of Plenty and Hawkes Bay). This is a slight increase from the 92.7 % in the previous reporting period but with the missing data it is unclear if this will be a consistent trend.

Across the DHBs the proportion of offers of screening to live births was generally between 80% and 100%. The low rates for Counties Manukau, Waitemata are offset by the greater than 100% rate for Auckland (see discussion below).

There was some fluctuation in percentages against the last report. Northland and the Auckland regional DHBs and MidCentral had a higher percentage offered than in the previous report. The percentage offered for West Coast had dropped last report but has increased again for this report and Nelson Marlborough has a decrease shown in this reporting period

Table 4 Offer of screening by DHB, April to December 2012

DHB	Live births	Offered screening	Percentage offered
Northland	1,724	1,679	97.4
Waitemata	6,080	4,906	80.7
Auckland	5,044	6,194	122.8
Counties Manukau	6,672	4,968	74.5
Waikato	4,167	4,046	97.1
Lakes	1,205	1,218	101.1
Bay of Plenty	2,251	-	-
Tairawhiti	549	531	96.7
Taranaki	1,168	1,192	102.1
Hawke's Bay	1,718	-	-
Whanganui	655	646	98.6
Mid Central	1,641	1,546	94.2
Hutt Valley	1,527	1,519	99.5
Capital & Coast	2,901	2,909	100.3
Wairarapa	362	357	98.6
Nelson Marlborough	1,175	971	82.6
West Coast	293	237	80.9
Canterbury	4,571	4,514	98.8
South Canterbury	509	491	96.5
Southern	2,745	2,657	96.8
Total	**46,957 (42,957)***	**40,574**	94.4

*Percentage offered uses the total excluding live births for Bay of Plenty and Mid Central

Challenges in reporting on the offer of newborn hearing screening

The number of babies offered screening within a reporting period can be greater than the number of live births attributed to the DHB, leading to the percentage offered being more than 100%. One contributing factor is that live births are reported based on the baby's DHB of residence, and sometimes babies may be offered screening at a different DHB. So looking at the table above a baby may be born in Auckland DHB and offered screening there but the domicile of the family is in Waitemata. When the three DHBs are combined the rate of offers to live births is 90.3%. The local over (and under) proportions should balance out at regional and national levels.

Another issue for periodic reporting is that babies offered screening may have been born outside of the reporting period. For example a baby born in September may be offered screening in October, but this birth will not be included in the denominator.

3.2. Consent for Newborn Hearing Screening

Monitoring the proportion of families and whanau consenting to newborn hearing screening is one of the indicators towards identifying coverage. This indicator is not here by individual DHBs as the issues reported above that relate to offer are also relevant for consent. That is babies consenting to screening in one DHB might have their birth listed against another DHB based on their place of domicile. It is useful nationally to track this percentage over time.

A small number of babies who were offered declined screening (see section below). It is not clear to what extent the remaining difference is the result of different data sets or is a genuine result of families not completing the consent process. It is likely that because offer and consent do not always occur at the same time, some families may be lost to follow up, unable to be contacted after leaving hospital or decide not to proceed with the screening. These factors may help to explain why just 84% of live births consent to screening.

Table 5 shows that a higher proportion of babies from Asian and European ethnic groups appear to gain consent for screening as compared to Māori and Pacific babies, this is consistent with previous reports.

Table 5 Consents for screening compared with live births, by ethnicity, April to December 2012

	Live births	Consents	Difference	Percent
	N	N	N	%
Māori	12477	9,662	2,815	77.4
Pacific	5212	3,833	1,379	73.5
Asian	6678	5,461	1,217	81.8
European	21694	19,732	1,962	91.0
Not Stated/Unspecified/Other	896	947	-51	-
Total	**46957**	**39,635**	**7,322**	**84.4**

Table 6 does not show any strong trend from Decile 1- 10 with regards to the proportion of babies who consent compared to live births. Given this babies in deciles 3-4 and 9-10 appear to have lower rates of consent, this is a consistent trend across a number of reports.

Table 6 Consents for screening compared with live births, by deprivation, April to December 2012

	Live births	Consents	Difference	Percent
	N	N	N	%
Decile 1-2	6,758	5,907	851	87.4
Decile 3-4	7,659	6,345	1,314	82.8
Decile 5-6	8,815	7,622	1,193	86.5
Decile 7-8	10,617	9,407	1,210	88.6
Decile 9-10	13,069	10,272	2,797	78.6
Unknown	39	82	-43	-
Total	**46,957**	**39,635**	**7,322**	**84.4**

1.2 Newborn hearing screen declined

Description

The proportion of newborns whose parents / guardian decline screening.

Relevant outcome

The proportion of newborns whose parents / guardian decline screening is expected to be very low and in keeping with international programmes.

No percentage outcome target at this stage of the programme (see rationale section).

Rationale

Parents / guardians have the same right to accept or decline hearing screening or any follow-up care for their newborn as for any other screening or evaluation procedures or intervention.

A high decline rate (eg, for an individual DHB, for the programme relative to international figures or for particular ethnic groups) would warrant further investigation and consideration of outcome targets.

methodology

Indicator 1.2

Numerator:	Number of eligible newborns whose parents/guardian declined newborn hearing screening.
Denominator:	Number of eligible newborns whose parents/guardian were offered screening.

Notes

There are some limitations to the decline data that will be available, due to privacy concerns. For this reason, only babies with informed consent are included in the database. The UNHSEIP receives data on the number of declines through DHB contractual reporting.

3.3. Newborn Hearing Screening Declined

At this time, the decline of newborn hearing screening is reported through DHB contractual reporting to the Ministry. This is because only babies with informed consent for screening can be recorded on the national database – families who decline, and those who are not offered screening, are not recorded in the national database. In the future, if a coordinated electronic system for maternity and newborn notes is in place, the decline of screening will be able to be nationally recorded.

Table 7 is sourced from DHB quarterly reports, not from the national database extract. Across all the DHBs, the overall decline rate was 1% of those offered screening. When looking at individual DHB information, it is important to take into account that when an area has a small number of live births, the percentage of declines may look disproportionate. The decline rates were highest in Northland at around 5.5%, this has been consistent for the past three reports but is slowly lowering with each reporting period (down from 7% last period)

Table 7 Decline of screening by DHB, April to December 2012

DHB	Offered screening	Declined screening	Percentage declined
Northland	1,679	92	5.5
Waitemata	4,906	15	0.3
Auckland	6,194	80	1.3
Counties Manukau	4,968	18	0.4
Waikato	4,046	44	1.1
Lakes	1,218	12	1.0
Bay of Plenty	-	-	-
Tairawhiti	531	4	0.8
Taranaki	1,192	9	0.8
Hawkes Bay	-	-	-
Whanganui	646	6	0.9
MidCentral	1,546	5	0.3
Hutt Valley	1,512	5	0.3
Capital & Coast	2,909	14	0.5
Wairarapa	357	1	0.3
Nelson Marlborough	971	12	1.2
West Coast	237	6	2.5
Canterbury	4,514	48	1.1
South Canterbury	491	2	0.4
Southern	2,657	29	1.1
Total	**40,574**	**404**	**1.0**

1.3 Newborn hearing screening started

Description

The proportion of the eligible newborns whose parents / guardian consented to newborn hearing screening that start screening.

Relevant outcome

All eligible newborns (whose parents / guardian consent to newborn hearing screening) start screening.

RATIONALE

For ongoing service and programme development it is important to compare consent for screening numbers, with screening started coverage and screening completed coverage, particularly from an inequalities perspective.

International programmes generally have a >95% screen completed target for all eligible births. As many of these programmes are achieving their targets after initial implementation (see screen completed indicator), a high screen started figure should be achievable once the UNHSEIP is fully implemented.

At this stage of programme implementation, a specific outcome target has not been set. However, if regular reviews of data for this indicator reveal issues with progression through the screening pathway from consent to screening started to screening completed, particularly from an inequalities perspective, then further investigation, working with DHBs and consideration of outcome targets would be necessary.

Methodology

Indicator 1.3

Numerator: Number of eligible newborns that started newborn hearing screening.

Denominator: Number of eligible newborns born whose parents / guardian consented to newborn hearing screening.

3.4. Newborn Hearing Screening Started

Monitoring the proportion of babies who actually start screening when their family and whānau has consented is important to identify potential gaps in systems and processes. Started screening is when there is a valid date for the first screening test, and there is a valid screening outcome for at least one ear. For the remainder of the report information presented is for babies who have started screening.

As with other reporting periods a high proportion of babies who have consent to screening commence screening (99.9%). This high proportion is consistent across DHBs, as shown in Table 8.

Factors such as whether the baby is admitted to NICU/SCBU, ethnicity and deprivation status could influence participation in newborn hearing screening. The information presented in Tables 8-10 indicates that none of these factors are influential at this time.

Table 8 Newborn hearing screening started compared with consents to screening by DHB, April to December 2012

	Well Baby			NICU/SCBU			Total		
DHB of birth	**Consented to screening**	**Started screening**	**% of consents that started**	**Consented to screening**	**Started screening**	**% of consents that started**	**Consented to screening**	**Started screening**	**% of consents that started**
Northland	1,256	1,255	99.9	102	102	100.0	1,358	1,357	99.9
Waitemata	4,877	4,867	99.8	230	230	100.0	5,107	5,097	99.8
Auckland	3,373	3,372	100.0	290	290	100.0	3,663	3,662	100.0
Counties Manukau	4,026	4,026	100.0	210	210	100.0	4,236	4,236	100.0
Waikato	3,567	3,565	99.9	255	255	100.0	3,822	3,820	99.9
Lakes	1,036	1,035	99.9	57	57	100.0	1,093	1,092	99.9
Bay of Plenty	1,806	1,806	100.0	109	109	100.0	1,915	1,915	100.0
Tairawhiti	492	487	99.0	18	18	100.0	510	505	99.0
Taranaki	1,005	1,005	100.0	113	113	100.0	1,118	1,118	100.0
Hawke's Bay	1,338	1,338	100.0	105	104	99.0	1,443	1,442	99.9
Whanganui	551	550	99.8	27	27	100.0	578	577	99.8
Mid Central	1,102	1,101	99.9	125	125	100.0	1,227	1,226	99.9
Hutt Valley	1,392	1,387	99.6	111	110	99.1	1,503	1,497	99.6
Capital & Coast	2,554	2,554	100.0	271	271	100.0	2,825	2,825	100.0
Wairarapa	317	317	100.0	15	15	100.0	332	332	100.0
Nelson Marlborough	1,042	1,042	100.0	38	38	100.0	1,080	1,080	100.0
West Coast	247	246	99.6	3	3	100.0	250	249	99.6
Canterbury	4,081	4,081	100.0	378	378	100.0	4,459	4,459	100.0
South Canterbury	471	471	100.0	3	2	66.7	474	473	99.8
Southern	2,393	2,393	100.0	249	249	100.0	2,642	2,642	100.0
Total	**36,926**	**36,898**	**99.9**	**2,709**	**2,706**	**99.9**	**39,635**	**39,604**	**99.9**

Table 9 Newborn hearing screening started compared with consents to screening by ethnicity, April to December 2012

	Well Baby			NICU/SCBU			Total		
Ethnicity	**Consented to screening**	**Started screening**	**% of consents that started**	**Consented to screening**	**Started screening**	**% of consents that started**	**Consented to screening**	**Started screening**	**% of consents that started**
Māori	8,890	8,876	99.8	772	771	99.9	9,662	9,647	99.8
Pacific	3,592	3,586	99.8	241	241	100.0	3,833	3,827	99.8
Asian	5,174	5,173	100.0	287	287	100.0	5,461	5,460	100.0
European	18,400	18,395	100.0	1,332	1,330	99.8	19,732	19,725	100.0
Other ethnic groups	747	745	99.7	66	66	100.0	813	811	99.8
Not stated/Unspecified	123	123	100.0	11	11	100.0	134	134	100.0
Total	**36,926**	**36,898**	**99.9**	**2,709**	**2,706**	**99.9**	**39,635**	**39,604**	**99.9**

Table 10 Newborn hearing screening started compared with consents to screening by deprivation, April to December 2012

	Well Baby			NICU/SCBU			Total		
Decile	**Consented to screening**	**Started Screening**	**% of consents that started**	**Consented to screening**	**Started Screening**	**% of consents that started**	**Consented to screening**	**Started Screening**	**% of consents that started**
Decile 1-2	5,518	5,517	100.0	389	389	100.0	5,907	5,906	100.0
Decile 3-4	5,938	5,937	100.0	407	407	100.0	6,345	6,344	100.0
Decile 5-6	7,093	7,089	99.9	529	528	99.8	7,622	7,617	99.9
Decile 7-8	8,756	8,743	99.9	651	651	100.0	9,407	9,394	99.9
Decile 9-10	9,546	9,537	99.9	726	724	99.7	10,272	10,261	99.9
Unknown	75	75	100.0	7	7	100.0	82	82	100.0
Total	**36,926**	**36,898**	**99.9**	**2,709**	**2,706**	**99.9**	**39,635**	**39,604**	**99.9**

1.4 Newborn hearing screening completed

Description

1. The proportion of eligible newborns that complete the UNHS screening protocol.
2. The proportion of eligible newborns that complete the UNHS screening protocol by 1 month of age.

Relevant Outcome

A core goal of the programme is that eligible newborns, whose parents/guardians consented, should complete newborn screening by 1 month of age.

Rationale

"Newborns to be screened by 1 month of age" is a core goal of the UNHSEIP ie: the 1 part of the 1-3-6 goals.

Although the international targets are usually >95% of all newborns screened by 1 month of age, many are achieving above this:

- >95% coverage should be obtainable where screening occurs in a hospital environment
- >95% for community screening may depend on factors such as the timeliness of notification of birth, but should be achievable in the longer-term.

This indicator will be closely monitored and further investigation will be required if progression towards the goal is not occurring.

Methodology

Indicator 1.4a

Numerator: Number of eligible newborns that complete newborn hearing screening.

Denominator: Number of eligible newborns who began newborn hearing screening.

Indicator 1.4b

Numerator: Number of eligible newborns that complete newborn hearing screening by 1 month of age.

Denominator: Number of eligible newborns who complete newborn hearing screening.

3.5. Newborn Hearing Screening Completed

Monitoring the proportion of babies who complete screening when it has been started is important in identifying potential gaps in systems and processes. For example, if high proportions of babies start screening but do not complete the process, protocols for following-up families and offering outpatient appointments may need to be strengthened, or transfer between DHBs may be an issue. One of the core goals of the programme is for newborn hearing screening to be completed by the time the baby is one month of age (four weeks corrected age).

Indicator 1.4 refers to eligible newborns, this ideally is represented by births. but as identified in the section on data issues live births come from a different data source than the newborn database so direct comparisons are difficult. Therefore this indicator uses babies that started screening as a marker for eligibility and reporting by DHB. An estimate of program coverage for all babies based on live birth data is provided below to give an approximate national picture.

Program coverage

In total 39,021 babies completed newborn hearing screening in this six month period, compared with the 46,957 live births. While these figures come from different data sets, this indicates that approximately 83% of babies born in this period completed screening.

Overall, 98.5% of babies who started screening completed, and 91.9% of those babies who had completed screening did so by the time they were one month of age, these rates are both slightly lower than the previous report. The high proportion of completion overall is consistent across DHBs, as shown in Figure 2 and Table 11. There is more variation in the data for completion by one month. With the exception of Northland (61.5%) and MidCentral (56.1%), the remaining DHBs had completion rates at one month of 88% or more as shown in Table 12. The two DHBs with the lowest rates also had lower rates last reporting period. The largest change between this report and the previous one is for MidCentral (70.9% in the previous report)

This information can be seen in greater detail in Tables 11 and 12. Once again almost all screening started in NICU/SCBU was completed.

Figure 3 shows the spread of screening times for all those who completed screening. The data shows screening times up to 56 days (8 weeks). The remaining 1058 babies were screened between 8 weeks and 44 weeks, however the numbers are too small to be included in Figure 3. The majority of these were completed by 14 weeks (90 babies took over 14 weeks to complete screening).

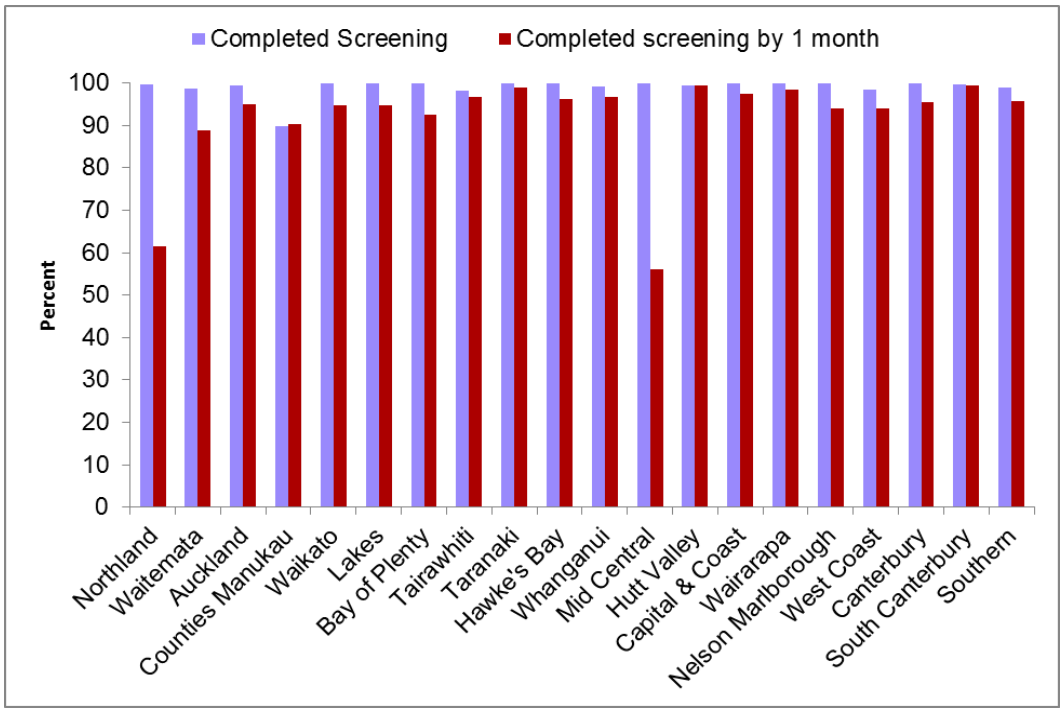


Figure 2 **Proportion of babies who complete screening after starting, and the proportion of those who completed screening by the time they were one month of age, by DHB, April to December 2012**

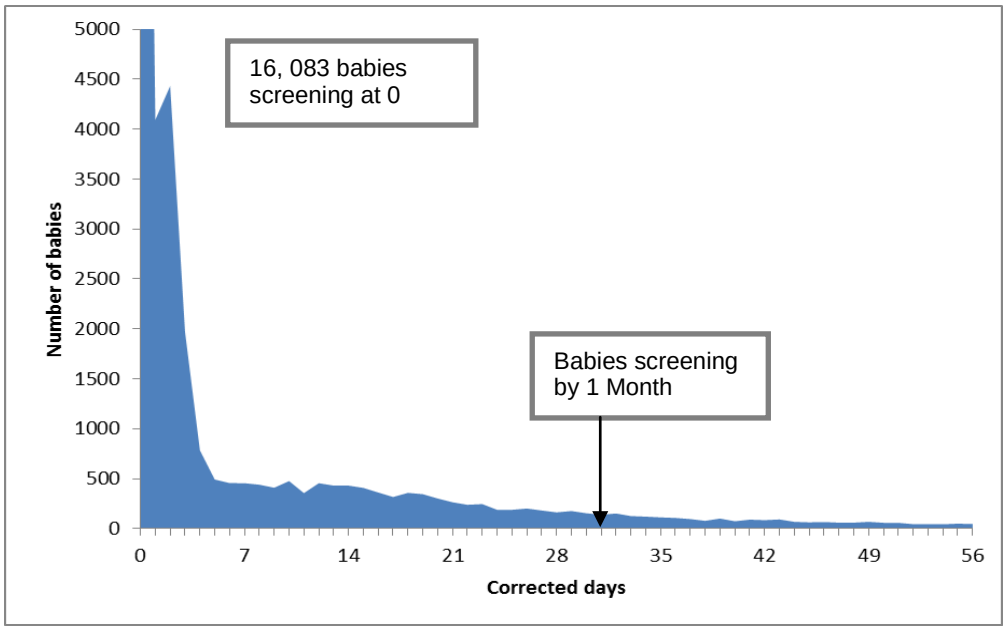


Figure 3 **Spread of screening completion times in days, April to December 2012**

Note that many of the babies screened at day 0 is not screening on the day they were born but is due to the use of corrected date of birth to calculate this indicator using gestational age of the baby.

Table 11 Newborn hearing screening completed compared with started by DHB, April to December 2012

DHB of birth	Well Baby			NICU/SCBU			Total		
	Started screening	Completed screening	% Started that completed	Started screening	Completed screening	% Started that completed	Started screening	Completed screening	% Started that completed
Northland	1,255	1,252	99.8	102	102	100.0	1,357	1,354	99.8
Waitemata	4,867	4,809	98.8	230	229	99.6	5,097	5,038	98.8
Auckland	3,372	3,348	99.3	290	290	100.0	3,662	3,638	99.3
Counties Manukau	4,026	3,594	89.3	210	208	99.0	4,236	3,802	89.8
Waikato	3,565	3,561	99.9	255	255	100.0	3,820	3,816	99.9
Lakes	1,035	1,034	99.9	57	57	100.0	1,092	1,091	99.9
Bay of Plenty	1,806	1,806	100.0	109	109	100.0	1,915	1,915	100.0
Tairawhiti	487	483	99.2	18	18	100.0	505	501	99.2
Taranaki	1,005	1,004	99.9	113	113	100.0	1,118	1,117	99.9
Hawke's Bay	1,338	1,336	99.9	104	104	100.0	1,442	1,440	99.9
Whanganui	550	546	99.3	27	27	100.0	577	573	99.3
Mid Central	1,101	1,101	100.0	125	125	100.0	1,226	1,226	100.0
Hutt Valley	1,387	1,384	99.8	110	110	100.0	1,497	1,494	99.8
Capital & Coast	2,554	2,550	99.8	271	271	100.0	2,825	2,821	99.9
Wairarapa	317	317	100.0	15	15	100.0	332	332	100.0
Nelson Marlborough	1,042	1,041	99.9	38	38	100.0	1,080	1,079	99.9
West Coast	246	243	98.8	3	3	100.0	249	246	98.8
Canterbury	4,081	4,076	99.9	378	378	100.0	4,459	4,454	99.9
South Canterbury	471	470	99.8	2	2	100.0	473	472	99.8
Southern	2,393	2,364	98.8	249	248	99.6	2,642	2,612	98.9
Total	**36,898**	**36,319**	**98.4**	**2,706**	**2,702**	**99.9**	**39,604**	**39,021**	**98.5**

Table 12 Newborn hearing screening completed by one month of age by DHB, April to December 2012

	Well Baby			NICU/SCBU			Total		
DHB of birth	**Completed screening**	**Completed screening by 1 month of age**	**% Completed that completed by 1 month of age**	**Completed screening**	**Completed screening by 1 month of age**	**% Completed that completed by 1 month of age**	**Completed screening**	**Completed screening by 1 month of age**	**% Completed that completed by 1 month of age**
Northland	1,252	744	59.4	102	89	87.3	1,354	833	61.5
Waitemata	4,809	4,249	88.4	229	225	98.3	5,038	4,474	88.8
Auckland	3,348	3,170	94.7	290	285	98.3	3,638	3,455	95.0
Counties Manukau	3,594	3,232	89.9	208	199	95.7	3,802	3,431	90.2
Waikato	3,561	3,361	94.4	255	253	99.2	3,816	3,614	94.7
Lakes	1,034	977	94.5	57	56	98.2	1,091	1,033	94.7
Bay of Plenty	1,806	1,666	92.2	109	106	97.2	1,915	1,772	92.5
Tairawhiti	483	466	96.5	18	18	100.0	501	484	96.6
Taranaki	1,004	993	98.9	113	112	99.1	1,117	1,105	98.9
Hawke's Bay	1,336	1,282	96.0	104	102	98.1	1,440	1,384	96.1
Whanganui	546	528	96.7	27	26	96.3	573	554	96.7
Mid Central	1,101	571	51.9	125	117	93.6	1,226	688	56.1
Hutt Valley	1,384	1,377	99.5	110	110	100.0	1,494	1,487	99.5
Capital & Coast	2,550	2,485	97.5	271	266	98.2	2,821	2,751	97.5
Wairarapa	317	312	98.4	15	15	100.0	332	327	98.5
Nelson Marlborough	1,041	978	93.9	38	36	94.7	1,079	1,014	94.0
West Coast	243	228	93.8	3	3	100.0	246	231	93.9
Canterbury	4,076	3,883	95.3	378	371	98.1	4,454	4,254	95.5
South Canterbury	470	467	99.4	2	2	100.0	472	469	99.4
Southern	2,364	2,254	95.3	248	244	98.4	2,612	2,498	95.6
Total	**36,319**	**33,223**	**91.5**	**2,702**	**2,635**	**97.5**	**39,021**	**35,858**	**91.9**

Factors such as ethnicity and deprivation status may influence completion rates, and/or the time taken for the completion for newborn hearing screening. The information presented in Tables 13-14 shows only small difference in overall completion rates by these parameters. Completion rates by 1 month vary a little between Māori, Pacific babies. Babies from decile 9-10 were slightly less likely to complete within a month, this trend is consistent over a number of reports, however the actual difference is relatively small.

Table 13 Newborn hearing screening completed by ethnicity, April to December 2012

Ethnicity	Started screening	Completed screening	Completed screening by 1 month of age	% started that completed screening	% completed that completed by 1 month of age
Māori	9,647	9,486	8,404	98.3	88.6
Pacific	3,827	3,640	3,288	95.1	90.3
Asian	5,460	5,376	5,053	98.5	94.0
European	19,725	19,591	18,254	99.3	93.2
Other ethnic groups	811	803	743	99.0	92.5
Not stated/Unspecified	134	125	116	93.3	92.8
Total	**39,604**	**39,021**	**35,858**	**98.5**	**91.9**

Table 14 Newborn hearing screening completed by deprivation, April to December 2012

Decile	Started screening	Completed screening	Completed screening by 1 month of age	% started that completed screening	% completed that completed by 1 month of
Decile 1-2	5,906	5,858	5,576	99.2	95.2
Decile 3-4	6,344	6,298	5,835	99.3	92.6
Decile 5-6	7,617	7,553	6,972	99.2	92.3
Decile 7-8	9,394	9,301	8,497	99.0	91.4
Decile 9-10	10,261	9,930	8,905	96.8	89.7
Unknown	82	81	73	98.8	90.1
Total	**39,604**	**39,021**	**35,858**	**98.5**	**91.9**

1.5 Referral rate to audiology assessment

Description

The proportion of newborns that do not pass the hearing screening process and are referred for audiology assessment.

Relevant Outcome

Less than 4% of eligible newborns screened in the UNHSEIP will be referred for audiology assessment.

Rationale

An unnecessarily high number of newborns being referred to audiology assessment could lead to potential strain on audiological capacity and parental anxiety issues. Conversely, if the referral rate is too low, newborns with a hearing loss may be being missed. High or low referral rates may indicate that further training of screeners or investigation is needed.

Internationally, the referral targets for audiology assessment are generally 4% or less. In keeping with international experience, it is anticipated that referral rates will be higher in the initial stages of implementation and decrease as the programme becomes established.

Subsequent reviews of the data and Monitoring Framework will revisit this indicator with respect to improving referral rates and consideration of outcome targets for DHBs.

Methodology

Indicator 1.5

Numerator:	Number of eligible newborns who complete screening with a referral to audiology assessment (i.e. do not pass screen).
Denominator:	The number of eligible newborns who complete screening.

3.6. Referral to Audiology

The maximum referral rate for audiology assessment from newborn hearing screening has been set at 4%, based on international literature. This is generally thought to be quite a high level, and rates of 1-2% are commonly reported by international screening programmes. The average rate of referral to audiology in this period was 1.7% as detailed by DHB in Table 15 below. This is very similar to the last reporting period (1.5% referred).

All DHBs this period had referrals, though for some the actual number was under five for West Coast, Whanganui and Wairarapa. It is not possible to draw any strong inferences due to the small difference in percentages and small actual number of referrals in many DHBs, as noted above. Northland continues to have the highest rates of referral but at 5% is fairly similar to the last report (4.5%).

Admission to NICU/SCBU (for 48 hours or more) resulted in a higher proportion of referrals to audiology, at an average of 6.4% as show in Table 15, very similar to the last two periods. More detail on referrals to audiology by ethnicity and deprivation status are presented in Tables 16-17. The information indicates that none of these factors have a significant impact at this time though referral rates are slightly higher for Māori, Pacific and babies in Decile 9-10, a trend that has been consistent, but not strong, for a number of reports.

Table 15 Referral to audiology by DHB, April to December 2012

	Well Baby			NICU/SCBU			Total		
DHB of Birth	**Number completed screening**	**Number referred to audiology**	**% completed screening that were referred**	**Number completed screening**	**Number referred to audiology**	**% Completed screening that were referred**	**Number completed screening**	**Number referred to audiology**	**% completed screening that were referred**
Northland	1,252	56	4.5	102	12	11.8	1,354	68	5.0
Waitemata	4,809	46	1.0	229	21	9.2	5,038	67	1.3
Auckland	3,348	59	1.8	290	15	5.2	3,638	74	2.0
Counties Manukau	3,594	69	1.9	208	15	7.2	3,802	84	2.2
Waikato	3,561	47	1.3	255	9	3.5	3,816	56	1.5
Lakes	1,034	20	1.9	57	2	3.5	1,091	22	2.0
Bay of Plenty	1,806	11	0.6	109	5	4.6	1,915	16	0.8
Tairawhiti	483	7	1.4	18	1	5.6	501	8	1.6
Taranaki	1,004	12	1.2	113	9	8.0	1,117	21	1.9
Hawke's Bay	1,336	24	1.8	104	9	8.7	1,440	33	2.3
Whanganui	546	1	0.2	27	3	11.1	573	4	0.7
Mid Central	1,101	4	0.4	125	4	3.2	1,226	8	0.7
Hutt Valley	1,384	12	0.9	110	5	4.5	1,494	17	1.1
Capital & Coast	2,550	26	1.0	271	20	7.4	2,821	46	1.6
Wairarapa	317	4	1.3	15	0	0.0	332	4	1.2
Nelson Marlborough	1,041	6	0.6	38	2	5.3	1,079	8	0.7
West Coast	243	1	0.4	3	0	0.0	246	1	0.4
Canterbury	4,076	47	1.2	378	20	5.3	4,454	67	1.5
South Canterbury	470	14	3.0	2	0	0.0	472	14	3.0
Southern	2,364	32	1.4	248	22	8.9	2,612	54	2.1
Total	**36,319**	**498**	**1.4**	**2,702**	**174**	**6.4**	**39,021**	**672**	**1.7**

Table 16 Referral to audiology by ethnicity, April to December 2012

Ethnicity	Number completed screening	Number referred to audiology	% Completed screening that were referred
Māori	9,486	252	2.7
Pacific	3,640	91	2.5
Asian	5,376	56	1.0
European	19,591	257	1.3
Other ethnic groups	803	12	1.5
Not stated/Unspecified	125	4	3.2
Total	**39,021**	**672**	**1.7**

Table 17 Referral to audiology by deprivation, April to December 2012

Decile	Number completed screening	Number referred to audiology	% Completed screening that were referred
Decile 1-2	5,858	61	1.0
Decile 3-4	6,298	85	1.3
Decile 5-6	7,553	121	1.6
Decile 7-8	9,301	165	1.8
Decile 9-10	9,930	237	2.4
Unknown	81	3	3.7
Total	**39,021**	**672**	**1.7**

1.11 Newborns at-risk of delayed-onset or progressive hearing loss

Description

The proportion of newborns that pass screening, but have risk factors for developing late-onset or progressive hearing loss.

Relevant Outcome

Eligible newborns that passed newborn screening with risk factors for developing late-onset or progressive hearing loss should be followed up as per UNHSEIP recommendations. Although this subset of children do no form part of the primary target group for the UNHSEIP, it is important to monitor the number being referred to audiology assessment services.

Rationale

There are a number of risk factors for developing late-onset or progressive hearing loss eg, family history of permanent childhood hearing loss; in-utero infections such as Cytomegalovirus (CMV) and Rubella; and certain syndromes (Joint Committee on Infant Hearing, 2007).

Children who pass newborn hearing screening but who have certain risk factors require follow-up to detect any subsequent development of hearing loss. International programmes generally monitor follow-up of these children.

Methodology

Indicator 1.11

Numerator:	Number of eligible newborns who passed screening, but have risk factors for developing late-onset or progressive hearing loss.
Denominator:	Number of eligible newborns who passed screening (as part of the UNHSEIP).

3.7. Targeted Follow-up

An average of 5.5% of babies who passed screening were flagged for targeted follow-up due to the presence of one or more risk factors for delayed onset/progressive hearing loss. This indicator is calculated based on the screening outcome recorded as “Pass targeted follow-up required” on the Newborn Hearing Screening data form. This is virtually the same percentage as the last two reporting periods.

Table 18 below indicates that the proportion of babies flagged for targeted follow-up varies between DHBs. The highest proportion of targeted follow-up is seen in Taranaki (10.3%) and Northland (8.6%), these two DHBs had the highest rates in the previous report also. Tairawhiti and Capital & Coast also had rates around 8%, an increase from 4.6% last report for Capital & Coast. The only notable decrease was for Whanganui 3.7% compared to 7.3% in the last report.

As would be expected, admission to NICU/SCBU (for 48 hours or more) resulted in a higher proportion of babies for targeted follow-up (27.5%).

More detail on targeted follow-up by ethnicity and deprivation status are presented in Tables 19-20. The information indicates that these factors do not appear to be influencing targeted follow-up rates at this time though some trends are remaining consistent. For targeted follow up the rates are a little higher for Māori babies and slightly lower for Asian babies, a trend similar to previous reports although small. There is a slight increase in the percentage flagged for targeted follow up as the decile rating increases but the change is less than two percentage points across the whole table.

Table 18 Proportion of targeted follow-up by DHB, April to December 2012

	Well Baby			NICU/SCBU			Total		
DHB of birth	**Passed screening**	**Passed targeted follow-up required**	**Targeted follow-up proportion**	**Passed screening**	**Passed targeted follow-up required**	**Targeted follow-up proportion**	**Passed screening**	**Passed targeted follow-up required**	**Targeted follow-up proportion**
Northland	1,196	75	6.3	90	36	40.0	1,286	111	8.6
Waitemata	4,763	134	2.8	208	46	22.1	4,971	180	3.6
Auckland	3,289	88	2.7	275	107	38.9	3,564	195	5.5
Counties Manukau	3,525	164	4.7	193	68	35.2	3,718	232	6.2
Waikato	3,514	116	3.3	246	74	30.1	3,760	190	5.1
Lakes	1,014	37	3.6	55	12	21.8	1,069	49	4.6
Bay of Plenty	1,795	37	2.1	104	23	22.1	1,899	60	3.2
Tairawhiti	476	37	7.8	17	3	17.6	493	40	8.1
Taranaki	992	71	7.2	104	42	40.4	1,096	113	10.3
Hawke's Bay	1,312	81	6.2	95	16	16.8	1,407	97	6.9
Whanganui	545	18	3.3	24	3	12.5	569	21	3.7
Mid Central	1,097	61	5.6	121	22	18.2	1,218	83	6.8
Hutt Valley	1,372	55	4.0	105	21	20.0	1,477	76	5.1
Capital & Coast	2,524	127	5.0	251	92	36.7	2,775	219	7.9
Wairarapa	313	15	4.8	15	4	26.7	328	19	5.8
Nelson Marlborough	1,035	60	5.8	36	17	47.2	1,071	77	7.2
West Coast	242	8	3.3	3	1	33.3	245	9	3.7
Canterbury	4,029	112	2.8	358	43	12.0	4,387	155	3.5
South Canterbury	456	13	2.9	2	2	100.0	458	15	3.3
Southern	2,332	114	4.9	226	62	27.4	2,558	176	6.9
Total	**35,821**	**1,423**	**4.0**	**2,528**	**694**	**27.5**	**38,349**	**2,117**	**5.5**

Table 19 Proportion of targeted follow-up by ethnicity, April to December 2012

Ethnicity	Passed screening	Passed - targeted follow-up required	Targeted follow-up proportion
Māori	9,234	720	7.8
Pacific	3,549	185	5.2
Asian	5,320	160	3.0
European	19,334	999	5.2
Other ethnic groups	791	44	5.6
Not stated/Unspecified	121	9	7.4
Total	**38,349**	**2,117**	**5.5**

Table 20 Proportion of targeted follow-up by deprivation, April to December 2012

Decile	Passed screening	Passed - targeted follow-up required	Targeted follow-up proportion
Decile 1-2	5,797	268	4.6
Decile 3-4	6,213	299	4.8
Decile 5-6	7,432	395	5.3
Decile 7-8	9,136	536	5.9
Decile 9-10	9,693	614	6.3
Unknown	78	5	6.4
Total	**38,349**	**2,117**	**5.5**

3.8. Risk Factors

For the period of this report 2962 (7.6%) of babies that completed screening had at least one risk factor recorded, this is slightly more than the last report (6.9%) but has settled over the past few reports to sit around under 8%. From the tables above 2,117 (5.5%) of all babies had a screening outcome of “Pass Targeted follow-up required”. This was also the same as the previous two reports.

The difference in these two figures above is explained in part because the risk factor of “jaundice phototherapy” does not require targeted follow-up, but this does not account for the complete difference. It is understood that in some areas clinicians are involved in assessing screening information, and making recommendations on whether targeted follow-up was necessary.

The most frequently reported risk factor was “Family History” (36.9%) followed by “Jaundice Requiring Phototherapy” (18.6%) during this reporting period, this is the same two risk factors that were highest in the last three periods. For all babies who started screening these two risk factors accounted for 3.5% and 1.8% of all babies starting screening.

Since the decision to include second degree relatives under “Family History” in August 2010 the proportion of babies in this category has increased as was expected. Prior to the change the rate sat at around 25% for this period it is 36.9%. This is similar to the last report.

The policy change also clarified the interpretation of ventilation, craniofacial anomalies and TORCHS, and the proportion of these risk factors remains lower as was expected.

- Ventilation initially decreased from 18% to around 10% where apart from one period where it dropped to just 5.9% it has stayed for the past few reports (10.7% for this period).
- Craniofacial anomalies initially decreased from 13% to 7.3% and now remains steady around 5% (4.6% in this report).
- TORCH/S with remains lower after an initial decrease from 11% it has stayed around the 3-4% mark and is just slight lower this period at 2.5%.
- The recording of “other” as a risk factors continues to drop each period from almost a quarter of babies (23%) initially recorded as other down to just 4% this period.

Table 21 Frequency of risk factors, April to December 2012

Risk factor	Number of babies	Of those babies with a risk factor the proportion for each risk factor	Of those babies who started screening the proportion for each risk factor
Family History	1,377	36.9	3.5
Jaundice Requiring Phototherapy	696	18.6	1.8
Nicu more than 5 days	463	12.4	1.2
Ventilation	399	10.7	1.0
Cranio-facial Anomalies	173	4.6	0.4
Other	151	4.0	0.4
Head Trauma	132	3.5	0.3
TORCH/S	93	2.5	0.2
Bacterial/Viral Meningitis	71	1.9	0.2
Syndrome	68	1.8	0.2
Jaundice Transfusion Level	59	1.6	0.1

Of the 2962 babies with one or more risk factors recorded, 82% had just one risk factor, 13% had two, 4% had three, just under 1% of babies had four and only four babies had the maximum of five risk factors.

1.6 Audiology assessment started

Description

The average time from completing screening to commencing audiology assessment.

The proportion of eligible newborns that are referred from screening who commence audiology assessment.

Relevant Outcome

"Audiology assessment is completed by 3 months of age" is a core goal of the UNHSEIP ie: the 3 part of the 1-3-6 goals. Eligible newborns that *do not pass* hearing screening should have the audiology assessment completed by 3 months of age.

Rationale

The UNHSEIP has the core goals of screening completed by 1 month of age and audiology assessment completed by 3 months of age.

This indicator will monitor the time period between the two stages. Prolonged delays, or inequalities amongst groups, in this indicator would warrant investigation.

Methodology

Indicator 1.6a

Average time (in days) from when screening was completed for newborns to when audiology assessment commences[1].

Indicator 1.6b

Numerator:	Number of eligible newborns who start audiology assessment.
Denominator:	Number of eligible newborns who were referred from screening for audiology assessment.

[1] It is expected that this average time should be approximately 4 weeks.

3.9. Audiology Assessment Started

Data in this section is for babies who were referred from screening to audiology (did not pass screening). As per Table 16, 672 babies did not pass screening and were referred to audiology; however audiology information was provided to the NSU and therefore available for just 381 of these babies. This does not necessarily mean that only 57% of referred babies were seen by audiology, but it does mean that DHB audiologists must be encouraged to complete and submit the audiology forms. The percentage of records received by the screening unit was increasing with each reporting period but appears to have steadied around 60% (62% last period).

The incomplete nature of this audiology information contributes to the variable rates of audiology assessment started between the DHBs. Also in many cases the actual numbers are small and statistical comparisons are not valid or useful.

There were referrals from all DHBs this period. For Waitemata, Whanganui and West Coast DHBs there is an arrangement with other DHBs to undertake their audiology screening so they will not have data reported in the audiology tables.

Table 22 below shows where babies who had an initial screening test had their audiology test was performed. The data in the table is based on the 381 babies who started audiology. It can be seen that the majority of audiology tests are undertaken in the same DHB as the initial screening.

For this indicator, the DHB of birth has been used so that DHBs are able to track their referrals. For the other audiology indicators, DHB of audiology has been used, as the responsibility of completing audiology rests with the DHB carrying out the audiology assessments.

Table 22 Comparison of DHB of screening with DHB of Audiology assessment, April to December 2012

DHB of initial screening	Number of babies	DHB of audiology test	Number of babies
Northland	64	Nelson Marlborough	1
		Northland	63
Waitemata	6	Auckland	6
Auckland	57	Northland	2
		Counties Manukau	2
		Auckland	53
Counties Manukau	34	Counties Manukau	31
		Waikato	1
		Northland	2
Waikato	46	Waikato	46
Lakes	16	Lakes	16
Bay of Plenty	12	Bay of Plenty	12
Tairawhiti	4	Tairawhiti	4
Taranaki	18	Taranaki	17
		Bay of Plenty	1
Hawke's Bay	30	Hawke's Bay	30
Mid Central	5	Mid Central	5
Hutt Valley	14	Hutt Valley	14
Capital & Coast	4	Capital & Coast	2
		Hutt Valley	2
Wairarapa	4	Wairarapa	1
		Hutt Valley	3
Nelson Marlborough	10	Nelson Marlborough	10
Canterbury	7	Southern	1
		Canterbury	6
South Canterbury	6	South Canterbury	6
Southern	44	Southern	43
		Bay of Plenty	1
Total	**381**		**381**

Note: based on audiology commenced data

Table 23 below outlines those babies that were referred for audiology and those that commenced. Tables 24 and 25 show the information by ethnicity and decile. In this period 66% of babies categorised as Māori that were referred to audiology were recorded as starting their assessment. This was the highest proportion amongst the ethnicities recorded. European and Asian babies had a recorded rate of referred babies starting audiology of 56 to 57% but for pacific babies the rate was just 35% which is much lower. There is no consistent trend by decile though the lowest and highest decile groups appear to have the lowest percentages of referrals that began audiology.

Table 23 Commenced audiology assessment by DHB, April to December 2012

	Well Baby			NICU/SCBU			Total		
DHB of birth	**Refer for audiology**	**Commenced audiology assessment**	**% Commenced audiology assessment to refer for audiology**	**Refer for audiology**	**Commenced audiology assessment**	**Commenced audiology assessment to refer for audiology**	**Refer for audiology**	**Commenced audiology assessment**	**% Commenced audiology assessment to refer for audiology**
Northland	56	53	94.6	12	10	83.3	68	63	92.6
Waitemata	46	3	6.5	21	3	14.3	67	6	9.0
Auckland	59	46	78.0	15	11	73.3	74	57	77.0
Counties Manukau	69	32	46.4	15	4	26.7	84	36	42.9
Waikato	47	38	80.9	9	8	88.9	56	46	82.1
Lakes	20	16	80.0	2	1	50.0	22	17	77.3
Bay of Plenty	11	7	63.6	5	3	60.0	16	10	62.5
Tairawhiti	7	3	42.9	1	1	100.0	8	4	50.0
Taranaki	12	10	83.3	9	8	88.9	21	18	85.7
Hawke's Bay	24	20	83.3	9	5	55.6	33	25	75.8
Whanganui	1	0	0.0	3	1	33.3	4	1	25.0
Mid Central	4	3	75.0	4	3	75.0	8	6	75.0
Hutt Valley	12	9	75.0	5	2	40.0	17	11	64.7
Capital & Coast	26	6	23.1	20	6	30.0	46	12	26.1
Wairarapa	4	4	100.0	0	0	-	4	4	100.0
Nelson	6	6	100.0	2	2	100.0	8	8	100.0
West Coast	1	0	0.0	0	0	-	1	0	0.0
Canterbury	47	6	12.8	20	1	5.0	67	7	10.4
South Canterbury	14	6	42.9	0	0	-	14	6	42.9
Southern	32	27	84.4	22	17	77.3	54	44	81.5
Total	**498**	**295**	**59.2**	**174**	**86**	**49.4**	**672**	**381**	**56.7**

Table 24 Commenced audiology assessment by ethnicity, April to December 2012

Ethnicity	Refer for audiology	Commenced audiology assessment	% Commenced audiology assessment to refer for audiology
Māori	252	165	65.5
Pacific	91	32	35.2
Asian	56	32	57.1
European	257	143	55.6
Other ethnic groups	12	5	41.7
Not stated/Unspecified	4	4	100.0
Total	**672**	**381**	**56.7**

Table 25 Commenced audiology assessment by decile, April to December 2012

Decile	Refer for audiology	Commenced audiology assessment	% Commenced audiology assessment to refer for audiology
Decile 1-2	61	32	52.5
Decile 3-4	85	49	57.6
Decile 5-6	121	73	60.3
Decile 7-8	165	91	55.2
Decile 9-10	237	133	56.1
Unknown	3	3	100.0
Total	**672**	**381**	**56.7**

1.7 Audiology assessment completed

Description

1. The proportion of eligible newborns that are referred from screening who complete the audiology assessment.
2. The number of eligible newborns that are referred from screening who complete the audiology assessment by 3 months of age.

Relevant Outcome

Eligible newborns that do not pass hearing screening should have the initial audiological assessment completed by 3 months of age.

Rationale

The audiology assessment by 3 months of age is a core goal for the UNHSEIP (ie the 3 in the 1-3-6 goals) and is based on international benchmarks.

There is, however, some variation with regards to international benchmarks as to whether the 3 months refers to audiology assessment *completed* or *started*. After discussion by the Monitoring, Policy and Indicators working group it was agreed that that completion of audiology assessment by 3 months of age should be the desired outcome.

Providers should strive to complete the audiology assessment by 3 months of age for all newborns requiring this service.

DHB and programme performance data for this indicator will be regularly reviewed, particularly from an inequalities perspective. The programme will work collaboratively with DHBs to improve performance as well as negotiating specific percentage targets if required.

Methodology

Quantitative indicator 1.7a

Numerator:	Number of eligible newborns who complete audiology assessment.
Denominator:	Number of eligible newborns who commence audiology assessment.

Quantitative indicator 1.7b

Numerator:	Number of eligible newborns who complete audiology assessment by 3 months of age.
Denominator:	Number of eligible newborns who complete audiology assessment.

3.10. Audiology Assessment Completed

The number of audiology assessments completed and started is almost the same, as shown in Table 26. This is because generally audiology forms are sent to the NSU only when the audiology assessment is complete.

Audiologists are being encouraged to send in both initial and completed assessment forms if the assessment is not completed on the same day, however this appears not to be occurring for many DHBs. Electronic reporting separates out started from completed which means this indicator accuracy will improve as more DHBs move to electronic reporting.

As shown in Table 27, data on audiology assessment completion by three months is variable but overall has increased from 67% of babies last period to 85.9% for this period.

Percentages are particularly low for Counties Manukau, Hawkes Bay and Northland, although with small numbers in many DHBs it is not useful to make any comparisons. Figure 4 below shows the percentage of babies who completed audiology (from starting audiology) and the percent of those completing did so by 3 months.

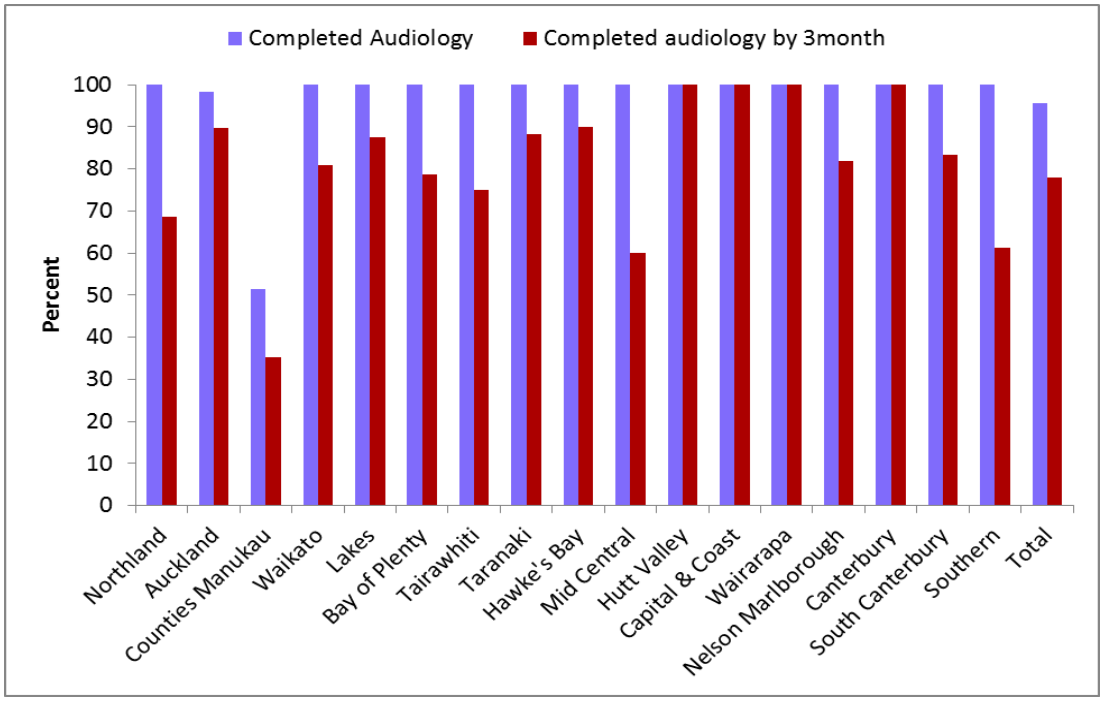


Figure 4 **Proportion of babies who completed audiology (from started), and the proportion who had completed audiology by the time they were three months of age, by DHB of audiology, April to December 2012**

Figure 5 shows the range of completion times for babies who underwent audiology assessment. There were 22 babies who took longer than the 22 weeks shown in the graph below.

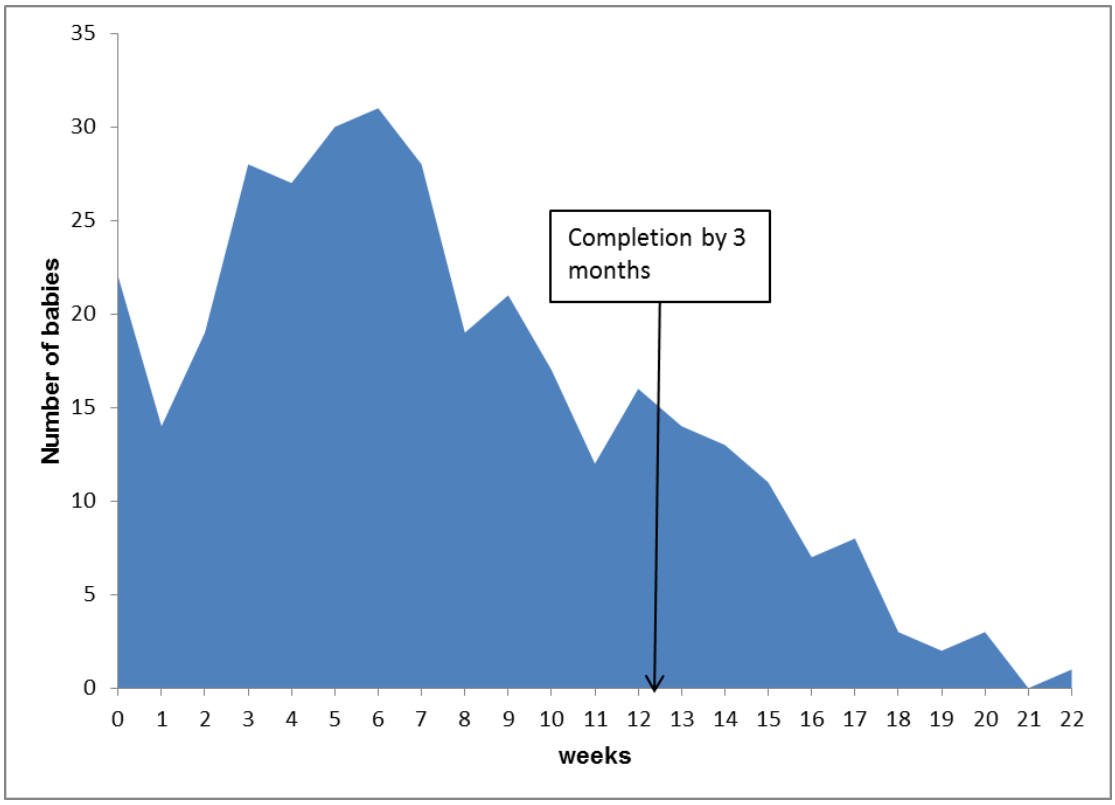


Figure 5 Audiology completion times, April to December 2012

Table 26 Audiology completed by DHB, April to December 2012

	Well Baby			NICU/SCBU			Total		
DHB of Audiology	**Audiology commenced**	**Audiology completed**	**% Completed that commenced**	**Audiology commenced**	**Audiology completed**	**% Completed that commenced**	**Audiology commenced**	**Audiology completed**	**% Completed that commenced**
Northland	55	55	100.0	12	12	100.0	67	67	100.0
Waitemata									
Auckland	46	45	97.8	13	13	100.0	59	58	98.3
Counties Manukau	29	17	58.6	4	0	0.0	33	17	51.5
Waikato	38	38	100.0	9	9	*	47	47	100.0
Lakes	16	16	100.0	0	0	-	16	16	100.0
Bay of Plenty	10	10	100.0	4	4	*	14	14	100.0
Tairawhiti	3	3	*	1	1	*	4	4	*
Taranaki	9	9	*	8	8	*	17	17	100.0
Hawke's Bay	22	22	100.0	8	8	100.0	30	30	100.0
Whanganui									
Mid Central	2	2	*	3	3	*	5	5	*
Hutt Valley	16	16	100.0	3	3	*	19	19	100.0
Capital & Coast	2	2	*	0	0	-	2	2	*
Wairarapa	1	1	*	0	0	-	1	1	*
Nelson Marlborough	7	7	*	4	4	*	11	11	100.0
West Coast									
Canterbury	6	6	*	0	0	-	6	6	*
South Canterbury	6	6	*	0	0	-	6	6	*
Southern	27	27	100.0	17	17	100.0	44	44	100.0
Total	**295**	**282**	**95.6**	**86**	**82**	**95.3**	**381**	**364**	**95.5**

Note: Percentages are not shown for numbers fewer than 10 due to the potential for large fluctuations

Table 27 Audiology completed by three months of age by DHB, April to December 2012

	Well Baby			NICU/SCBU			Total		
DHB of Audiology	**Audiology completed**	**Completed audiology by 3 months of age**	**% of completed by 3 months of age**	**Audiology completed**	**Completed audiology by 3 months of age**	**% of completed by 3 months of age**	**Audiology completed**	**Completed audiology by 3 months of age**	**% of completed by 3 months of age**
Northland	55	35	63.6	12	11	91.7	67	46	68.7
Waitemata									
Auckland	45	39	86.7	13	13	100.0	58	52	89.7
Counties Manukau	17	6	35.3	0	0	-	17	6	35.3
Waikato	38	29	76.3	9	9	*	47	38	80.9
Lakes	16	14	87.5	0	0	-	16	14	87.5
Bay of Plenty	10	7	70.0	4	4	*	14	11	78.6
Tairawhiti	3	2	*	1	1	*	4	3	*
Taranaki	9	7	*	8	8	*	17	15	88.2
Hawke's Bay	22	19	86.4	8	8	*	30	27	90.0
Whanganui									
Mid Central	2	1	*	3	2	*	5	3	*
Hutt Valley	16	16	100.0	3	3	*	19	19	100.0
Capital & Coast	2	2	*	0	0	-	2	2	*
Wairarapa	1	1	*	0	0	-	1	1	*
Nelson	7	5	*	4	4	*	11	9	81.8
West Coast									
Canterbury	6	6	*	0	0	-	6	6	*
South Canterbury	6	5	*	0	0	-	6	5	*
Southern	27	16	59.3	17	11	64.7	44	27	61.4
Total	**282**	**210**	**74.5**	**82**	**74**	**90.2**	**364**	**284**	**78.0**

Note: Percentages are not shown for numbers fewer than 10 due to the potential for large fluctuations

Factors such as ethnicity and deprivation may influence completion rates, and/or the time taken for the completion for newborn hearing screening. The information presented in Tables 28 and 29 indicates some difference by ethnicity and decile, specifically the percentage of Pacific and Māori babies that complete by three months and those in decile groups 9-10 appears to be lower than for others. This trend is consistent across a number of reports but with small numbers it is not possible to say if it is significant.

Table 28 Audiology screening completed by ethnicity, April to December 2012

Ethnicity	Audiology commenced	Audiology completed	Completed audiology by 3 months of age	% Completed that commenced	% commenced that completed by 3 month of age
Māori	165	159	113	96.4	71.1
Pacific	32	30	26	93.8	86.7
Asian	32	27	22	84.4	81.5
European	143	139	116	97.2	83.5
Other ethnic groups	5	5	4	100.0	80.0
Not stated/Unspecified	4	4	3	100.0	75.0
Total	**381**	**364**	**284**	**95.5**	**78.0**

Table 29 Audiology screening completed by deprivation, April to December 2012

Decile	Audiology commenced	Audiology completed	Completed audiology by 3 months of age	% Completed that commenced	% commenced that completed by 3 month of age
Decile 1-2	32	29	23	90.6	79.3
Decile 3-4	49	46	38	93.9	82.6
Decile 5-6	73	72	61	98.6	84.7
Decile 7-8	91	88	71	96.7	80.7
Decile 9-10	133	126	90	94.7	71.4
unknown	3	3	1	100.0	33.3
Total	**381**	**364**	**284**	**95.5**	**78.0**

1.8 Hearing loss detected by audiology assessment

Description

This indicator reports the numbers/rate for permanent childhood hearing loss and classifies the loss into several categories (ie by severity and type of hearing loss).

Relevant Outcome

No minimum hearing loss detection outcome target for UNHSEIP at present (see rationale section). To be reviewed with subsequent reviews of Monitoring Framework.

Rationale

New Zealand Deafness Notification data on childhood hearing loss suggests that New Zealand's incidence of hearing loss is similar to international reports. However, there are some limitations to the data and the true extent of congenital hearing loss in New Zealand is currently unknown.

The New Zealand Deafness Notification data also suggests that Māori children are disproportionately represented in deafness notifications and are more likely to have mild hearing losses than other ethnic groups. Again, there are some uncertainties regarding these data.

Collecting detailed data on hearing loss will enable more accurate analyses, including assessing if there are inequalities in hearing loss with regards to ethnicity or deprivation status.

Most international programmes do not have a minimum detection of hearing loss rate. The potential requirement for a minimum detection rate will be revisited with subsequent reviews of the Monitoring Framework.

Methodology

Indicator 1.8

Numerator: Number of eligible newborns who had permanent childhood hearing loss confirmed by audiology assessment (and were referred through the UNHSEIP).

Denominator: Number of eligible newborns who completed audiology assessment (and were referred through the UNHSEIP).

3.11. Permanent Congenital Hearing Loss Detected By Audiology Assessment

For this indicator, permanent congenital hearing loss is defined by an audiology outcome of either 'Auditory Neuropathy', Mixed or 'Sensorineural' in at least one ear. Table 30 below summaries the results for the 42 babies identified within this indicator.

Table 30 Audiology test results by DHB, April to December 2012

DHB of audiology	Right test result	Left test result	Number of babies
Northland	Conductive Temporary	Sensorineural	1
	Normal	Sensorineural	1
	Not Yet Determined	Mixed	1
	Sensorineural	Normal	1
	Sensorineural	Sensorineural	1
Auckland	Sensorineural	Sensorineural	1
Waikato	Mixed	Mixed	2
	Normal	Sensorineural	1
	Not Yet Determined	Sensorineural	1
	Sensorineural	Mixed	1
	Sensorineural	Normal	1
	Sensorineural	Sensorineural	3
Lakes	Conductive Temporary	Mixed	1
	Normal	Mixed	1
	Sensorineural	Mixed	1
	Sensorineural	Sensorineural	2
Tairawhiti	Sensorineural	Normal	1
Taranaki	Conductive Temporary	Mixed	1
Hawke's Bay	Mixed	Mixed	1
	Normal	Sensorineural	1
	Sensorineural	Sensorineural	1
Hutt Valley	Auditory Neuropathy	Auditory Neuropathy	1
	Conductive Temporary	Sensorineural	1
	Sensorineural	Sensorineural	2
Wairarapa	Normal	Mixed	1
Nelson Marlborough	Sensorineural	Normal	1
	Sensorineural	Sensorineural	3
Canterbury	Sensorineural	Sensorineural	1
South Canterbury	Sensorineural	Sensorineural	1
Southern	Normal	Mixed	1
	Normal	Sensorineural	1
	Sensorineural	Normal	1
	Sensorineural	Not Yet Determined	1
	Sensorineural	Sensorineural	2
Total			42

Table 31 below indicates that 11.5% of babies that completed an audiology assessment had a permanent congenital hearing loss detected. This is similar to the previous report.

Tables 32 and 33 outline the data by ethnicity and decile but again due to small numbers these tables are included for background information only.

Table 31 Permanent congenital hearing loss by DHB, April to December 2012

	Well Baby			NICU/SCBU			Total		
DHB of Audiology	**Completed audiology**	**Permanent congenital hearing loss**	**% Permanent hearing loss to completed audiology**	**Completed audiology**	**Permanent congenital hearing loss**	**% Permanent hearing loss to completed audiology**	**Completed audiology**	**Permanent congenital hearing loss**	**% Permanent hearing loss to completed audiology**
Northland	55	4	7.3	12	1	8.3	67	5	7.4
Waitemata									
Auckland	45	1	2.2	13	0	0.0	58	1	1.7
Counties Manukau	17	0	0.0	0	0	.	17	0	0.0
Waikato	38	8	21.1	9	1	*	47	9	19.1
Lakes	16	5	31.3	.	.	.	16	5	31.3
Bay of Plenty	10	0	0.0	4	0	*	14	0	0.0
Tairawhiti	3	1	*	1	0	*	4	1	*
Taranaki	9	1	*	8	0	*	17	1	5.9
Hawke's Bay	22	2	9.1	8	1	*	30	3	10.0
Whanganui									
Mid Central	2	0	*	3	0	*	5	0	*
Hutt Valley	16	4	25.0	3	0	*	19	4	21.1
Capital & Coast	2	0	*	0	0	-	2	0	*
Wairarapa	1	1	*	0	0	-	1	1	*
Nelson Marlborough	7	3	*	4	1	*	11	4	36.4
West Coast									
Canterbury	6	1	*	0	0	-	6	1	*
South Canterbury	6	1	*	0	0	-	6	1	*
Southern	27	5	18.5	17	1	5.9	44	6	13.6
Total	**282**	**37**	**13.1**	**82**	**5**	**6.1**	**364**	**42**	**11.5**

Note: Percentages are not shown for numbers fewer than 10 due to the potential for large fluctuations

Table 32 Permanent congenital hearing loss by ethnicity, April to December 2012

Ethnicity	Completed audiology	Permanent congenital hearing loss	% Permanent hearing loss to completed audiology
Māori	159	22	**13.8**
Pacific	30	1	**3.3**
Asian	27	3	**11.1**
European	139	15	**10.8**
Other ethnic groups	5	1	**20.0**
Not stated/Unspecified	4	0	**0.0**
Total	**364**	**42**	**11.5**

Table 33 Permanent congenital hearing loss by deprivation, April to December 2012

Decile	Completed audiology	Permanent congenital hearing loss	% Permanent hearing loss to completed audiology
Decile 1-2	29	5	17.2
Decile 3-4	46	9	19.6
Decile 5-6	72	5	6.9
Decile 7-8	88	10	11.4
Decile 9-10	126	13	10.3
Unknown	3	0	0.0
Total	**364**	**42**	**11.5**

3.12. Newborns with Conductive Hearing Loss

This indicator has been used to capture all the hearing loss outcomes from audiology which were not ‘Auditory Neuropathy’, ‘Mixed’ or ‘Sensorineural’ in at least one ear. At this stage of reporting audiology, all information will be presented, however over time, some amalgamation of categories may be recommended. Table 34 summarises the audiology results for these 93 babies.

Table 34 Audiology test results by DHB of audiology, April to December 2012

DHB of audiology	Right test result	Left test result	Number of babies
Northland	Conductive Temporary	Conductive Permanent	1
	Conductive Temporary	Conductive Temporary	13
	Conductive Temporary	Normal	5
	Normal	Conductive Temporary	3
Auckland	Conductive Permanent	Normal	2
	Conductive Temporary	Conductive Temporary	8
	Conductive Temporary	Normal	7
	Normal	Conductive Temporary	2
Waikato	Conductive Temporary	Conductive Temporary	7
	Conductive Temporary	Normal	1
	Normal	Conductive Permanent	1
Bay of Plenty	Conductive Temporary	Normal	1
Tairawhiti	Conductive Temporary	Conductive Temporary	1
	Conductive Temporary	Normal	1
Taranaki	Conductive Temporary	Conductive Temporary	3
	Conductive Temporary	Normal	2
	Normal	Conductive Temporary	2
Hawke's Bay	Conductive Temporary	Conductive Temporary	5
	Conductive Temporary	Normal	5
	Normal	Conductive Temporary	2
Mid Central	Conductive Temporary	Conductive Temporary	1
Hutt Valley	Conductive Temporary	Conductive Temporary	5
	Normal	Conductive Temporary	1
Capital & Coast	Conductive Temporary	Normal	1
Nelson Marlborough	Conductive Temporary	Normal	2
Canterbury	Conductive Permanent	Normal	1
	Normal	Conductive Temporary	2
South Canterbury	Conductive Temporary	Conductive Temporary	1
	Conductive Temporary	Normal	1
Southern	Conductive Temporary	Conductive Temporary	4
	Conductive Temporary	Normal	2
Total			**93**

Table 35 identifies that 25.9% of babies that completed audiology assessment had some kind of hearing loss, excluding sensorineural, mixed and auditory neuropathy. As with other data in the audiology section of this report numbers are too small to make meaningful comparisons between DHBs.

Some differences do appear in the percentages of babies identified with a mild hearing loss by ethnicity and decile among those completing audiology.

Table 35 Conductive hearing loss by DHB, April to December 2012

	Well Baby			NICU/SCBU			Total		
DHB of Audiology	**Completed audiology**	**Conductive hearing Loss**	**% Conductive hearing loss to completed audiology**	**Completed audiology**	**Conductive hearing Loss**	**% Conductive hearing loss to completed audiology**	**Completed audiology**	**Conductive hearing Loss**	**% Conductive hearing loss to completed audiology**
Northland	55	20	36.4	12	2	16.7	67	22	32.4
Waitemata									
Auckland	45	15	33.3	13	4	30.8	58	19	32.8
Counties Manukau	17	0	0.0	0	0	-	17	0	0.0
Waikato	38	7	18.4	9	2	*	47	9	19.1
Lakes	16	0	0.0	0	0	-	16	0	0.0
Bay of Plenty	10	0	0.0	4	1	*	14	1	7.1
Tairawhiti	3	1	*	1	1	*	4	2	*
Taranaki	9	2	*	8	5	*	17	7	41.2
Hawke's Bay	22	8	36.4	8	4	*	30	12	40.0
Whanganui									
Mid Central	2	0	*	3	1	*	5	1	*
Hutt Valley	16	5	31.3	3	1	*	19	6	31.6
Capital & Coast	2	1	*	0	0	-	2	1	*
Wairarapa	1	0	*	0	0	-	1	0	*
Nelson Marlborough	7	1	*	4	1	*	11	2	18.2
West Coast									
Canterbury	6	3	*	0	0	-	6	3	*
South Canterbury	6	2	*	0	0	-	6	2	*
Southern	27	4	14.8	17	2	11.8	44	6	13.6
Total	**282**	**69**	**24.5**	**82**	**24**	**29.3**	**364**	**93**	**25.5**

Note: Percentages are not shown for numbers fewer than 10 due to the potential for large fluctuations

Table 36 Conductive hearing loss by ethnicity, April to December 2012

Ethnicity	Completed audiology	Conductive hearing Loss	% Conductive hearing loss to completed audiology
Māori	159	46	28.9
Pacific	30	9	30.0
Asian	27	8	29.6
European	139	29	20.9
Other ethnic groups	5	0	0.0
Not stated/Unspecified	4	1	25.0
Total	**364**	**93**	**25.5**

Table 37 Conductive hearing loss by deprivation, April to December 2012

Decile	Completed audiology	Conductive hearing Loss	% Conductive hearing loss to completed audiology
Decile 1-2	29	0	0.0
Decile 3-4	46	12	26.1
Decile 5-6	72	17	23.6
Decile 7-8	88	26	29.5
Decile 9-10	126	37	29.4
Unknown	3	1	33.3
Total	**364**	**93**	**25.5**

1.9 Age at identification of hearing loss

Description

The average age at which hearing loss is confirmed by audiology assessment.

Relevant Outcome

The relevant outcome is the UNHSEIP aim of lowering the age at which hearing loss is detected to 3 months of age or less.

Rationale

With newborn hearing screening, the internationally recommended age for the diagnosis of hearing loss is three months, with intervention commencing by six months.

While New Zealand's incidence of hearing loss is likely to be similar to international reports, New Zealand Deafness Notification data (National Audiology Centre, 2005; 2007) showed that the age of identification has been late, particularly when compared with countries that have introduced newborn hearing screening programmes.

Data from the 2004 New Zealand Deafness Notification Database indicated that only 6% of babies with hearing loss are identified by six months of age, and that the average age of detection was nearly four years of age (National Audiology Centre, 2005). There is also evidence of inequalities with the identification of hearing loss in Māori and Pacific children occurring even later.

This indicator will assess if the UNHSEIP is achieving its aim of lowering the age at which hearing loss is detected to 3 months of age or less.

Methodology

Indicator 1.9

Average age of eligible newborns (in weeks) at which hearing loss was confirmed by audiology assessment.

3.13. Age at Identification of Hearing Loss

The aim of the UNHSEIP is to have hearing loss detected by the time the baby is three months of age. As was seen in Table 27, around 78% of those babies that completed audiology in this period had their audiology assessment completed by three months of age. Table 38 below identifies how the age of identification is spread across months, based on the corrected age of the baby.

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Table 38 Count of average age at identification of hearing loss by DHB, April to December 2012

	Well baby				NICU/SCBU				All babies				Total
DHB of audiology	Up to 4 weeks	Over 4 and up to 8 weeks	Over 8 and up to 12 weeks	Over 12 weeks	Up to 4 weeks	Over 4 and up to 8 weeks	Over 8 and up to 12 weeks	Over 12 weeks	Up to 4 weeks	Over 4 and up to 8 weeks	Over 8 and up to 12 weeks	Over 12 weeks	
Northland	1	2	0	0	8	6	3	7	9	8	3	7	27
Auckland	1	1	2	0	8	1	5	2	9	2	7	2	20
Waikato	2	0	1	0	4	3	3	5	6	3	4	5	18
Lakes	0	0	0	0	2	1	2	0	2	1	2	0	5
Bay of Plenty	0	0	1	0	0	0	0	0	0	0	1	0	1
Tairawhiti	0	1	0	0	0	1	0	1	0	2	0	1	3
Taranaki	2	1	2	0	2	0	0	1	4	1	2	1	8
Hawke's Bay	2	0	3	0	4	3	2	1	6	3	5	1	15
Mid Central	0	1	0	0	0	0	0	0	0	1	0	0	1
Hutt Valley	1	0	0	0	2	1	6	0	3	1	6	0	10
Capital & Coast	0	0	0	0	0	0	1	0	0	0	1	0	1
Wairarapa	0	0	0	0	1	0	0	0	1	0	0	0	1
Nelson Marlborough	1	0	1	0	3	0	0	1	4	0	1	1	6
Canterbury	0	0	0	0	2	2	0	0	2	2	0	0	4
South Canterbury	0	0	0	0	1	0	1	1	1	0	1	1	3
Southern	0	0	1	2	1	2	1	5	1	2	2	7	12
Total	**10**	**6**	**11**	**2**	**38**	**20**	**24**	**24**	**48**	**26**	**35**	**26**	**135**

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4. Comparison of key indicators across varying periods from April to December 2012

The current report covers a nine month period. This is different to the usual six monthly reporting and has been undertaken to bring reporting into line with a calendar year for the following six monthly reports.

The table provided below enables readers to compare both the previous and next reports across some key indicators but identify the results in six month periods. The table below contains data for:

- April to December 2012 (this reporting period of nine months)
- April to September 2012 – which provides comparative data against the previous six month reporting period which was from October 2011 to March 2012), and
- July to December 2012 – which will provide data against which to compare the next six monthly report which will be for the reporting period January to June 2013

Indicator (Table no)	**April to Dec 2012**	**April to Sept 2012**	**July to Dec 2012**
No of babies consented to screening	39,635	27,660	25,726
	Percent		
Offers to live births	98.1	96.0	98.1
Declined screening from those offered	1.0	1.5	0.9
Completed screening to live births	86.1	89.2	84.1
Started screening from consented to screening	99.9	99.9	99.9
Completed screening from started	98.5	98.2	98.7
Completed screening by 1 month from completed screening	91.9	91.9	92.1
Referral rate to Audiology from completed screening	1.7	1.8	1.8
Percent of referrals that started audiology	56.7	57.8	53.4

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Indicator	April to Dec 2012	April to Sept 2012	July to Dec 2012
	Percent		
Completed audiology from commenced audiology	95.5	95.5	95.4
Completed audiology in 3 months from completed audiology	78.0	81.8	74.3
Permanent congenital hearing loss from completed audiology	11.5	9.1	12.6
Conductive hearing loss from completed audiology	25.5	29.1	22.6
Passed Screening and had targeted follow up identified	5.5	5.6	5.6
Risk factor identified	7.7	7.4	7.7
Risk factor - Family History	36.9	37.8	36.9
Risk factor - Jaundice Phototherapy	18.6	17.2	19.4
Risk factor - Ventilation	10.7	10.8	10.5
Risk factor - NICU from than 5 days	12.4	12.3	12.0

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5. Indicators not yet included in monitoring

Comment: this will be possible to report in the future, but the data is not yet available

1.10 Age at first assistive hearing device
Description The age at which the first assistive hearing device[2] is fitted.
Relevant Outcome No outcome target for the programme at present (see rationale section).
Rationale "Initiation of appropriate medical and audiological services; and Early Intervention education services by 6 months of age" is a core goal of UNHSEIP: ie the 6 part of the 1-3-6 goals. It is common for international programmes to monitor factors around hearing aid fitting, cochlear implants and follow-up. This indicator will be reviewed as data are collected, as well as, consideration of other potential medical indicators and the introduction of specific age/percentage outcome targets.
Methodology ***Indicator 1.10a – All Devices*** Average age of eligible children at which the first assistive hearing device was fitted. ***Indicator 1.10b – Hearing Aids*** Average age of eligible children at which a hearing aid was first fitted. ***Indicator 1.10c – Cochlear Implants*** Average age of eligible children at which a cochlear implant was first fitted[3].

[2] An assistive hearing device includes: hearing aids, cochlear implants, or FM amplification systems.

[3] It is expected that the average age for cochlear implants (Indicator 10c) would be much later than the average age for hearing devices (Indicator 10b).

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1.12 Newborns with mild or unilateral hearing loss
Description The number of newborns with confirmed mild or unilateral hearing loss by audiology assessment.
Relevant Outcome Eligible newborns with hearing loss detected through the UNHSEIP, but who do not require medical intervention or who are not eligible for Early Intervention education services (ie children with mild or unilateral hearing loss), need to be followed-up in the long-term.
rationale The UNHESIP needs to monitor the number of children who have had hearing loss confirmed by audiology assessment, but who did not require immediate medical intervention and who did not meet the eligibility criteria for Early Intervention services (ie children with mild or unilateral hearing loss).
Methodology ***Indicator 1.12*** Numerator: Number of newborns who had hearing loss confirmed by audiology assessment, but did not require medical intervention or meet the eligibility criteria for Early Intervention services. Denominator: Number of newborns who completed audiology assessment (and were referred through the UNHSEIP).

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5.1. Indicators for the Early Intervention Education Service

This section outlines the draft Early Intervention education service measures, developed by Group Special Education from the Ministry of Education.

2.1 Responsiveness following referral to EI education services

Description

The time taken for the Early Intervention education service to attempt to contact the families and whānau of children eligible for, and referred to, the service following diagnosis through Universal Newborn Hearing Screening (UNHS).

Relevant Outcome (Target)

Early Intervention staff will attempt to contact 95% of families and whānau of children eligible for, and referred to, the Early Intervention education service following diagnosis through UNHS within two full working days of receipt of referral at a district MoE Special Education office.

Rationale

The MoE Special Education Service Model for children with hearing loss diagnosed following newborn hearing screening states that two working days is the desired protocol.

The target is worded as “attempt to contact” as despite the best efforts of staff, a family or whānau may be away from their usual place of residence or not answering their phone during these first 2 days. It is important that the efforts of staff to follow the protocol is measured, not the availability of families and whānau.

Two working days has been chosen rather than one to reduce the impact of factors beyond the control of staff on the indicator, for example, sickness, attendance at professional development events and the considerable out-of-office time involved in delivering a home and school-based service over a sometimes large geographic area.

Some families and whānau do not have access to telephones, cellphones, fax or email. Nationally, 2% of families and whānau do not have access to telecommunications. In some districts this is higher, for example, 4.9% of families and whānau in the Far North and 4% of families and whānau in Gisborne. In these instances, Early Intervention staff will attempt to contact families and whānau by letter or by visiting the home.

Methodology

Indicator 2.1

Numerator: Number of families and whānau of children eligible for, and referred to, the Early Intervention education service (through

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UNHS) who staff attempt to contact within two full working days of receipt of referral at a district MoE Special Education office.

Denominator: Number of families and whānau of children eligible for, and referred to, the Early Intervention education service (through UNHS).

Notes:

- Staff are required to record and date the attempts made to contact the families and whānau of children referred following diagnosis from the screening programme. This information is recorded in the individual child's file and on the district UNHSEIP data sheet.
- This data will be broken down by ethnicity to allow progress toward reducing inequalities to be assessed.
- When the target is not met, staff will be asked to report the reasons why. This information will be used to inform the refinement of the Monitoring Framework and inform service delivery protocols and practices.

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2.2 Engagement in EI education service

DESCRIPTION

The time taken for children eligible for, and referred to, the Early Intervention education service following diagnosis (through UNHS) to be enrolled in Early Intervention education services.

RELEVANT OUTCOMES (TARGETS)

Outcome One - 90% of children referred to, and eligible for, the Early Intervention education service will have begun receiving a service by one month following the receipt of the referral in a district MoE Special Education office.

Outcome Two - 90% of children referred to the Early Intervention education service by 5 months of age, and eligible for a service, will have begun receiving a service by 6 months of age.

RATIONALE

The MoE Special Education Service Model for children with hearing loss diagnosed following newborn hearing screening states that on contacting the family or whānau, staff offer to visit them at home or to meet them at the information sharing appointment, depending on parental preference. Initial informed consent is then obtained from the family or whānau. Once consent is given, the family or whānau are considered to be in receipt of Early Intervention services.

A benchmark of 90% aligns with the JCIH 2007 Position Statement recommendation that 90% of infants who qualify for Part C have an IFSP (Individualized Family Service Plan) signed by their parents by 6 months of age.

Outcome one measures the timeliness with which all children diagnosed following screening are engaged in Early Intervention education services.

Outcome two is in accordance with the international standard of screening by 1 month of age, diagnosis by 3 months and intervention by 6 months. This allows us to compare our programme with overseas programmes which report on their success or otherwise of meeting the 1-3-6 standard.

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METHODOLOGY

Indicator 2.2a

Numerator: Number of children eligible for, and referred to, the Early Intervention education service who began receiving a service by one month following receipt of the referral at a district MoE Special Education office.

Denominator: Number of children eligible for, and referred to, the Early Intervention education service following diagnosis through UNHS.

Indicator 2.2b

Numerator: Number of children under 5 months of age who were eligible for, and referred to, the Early Intervention education service who began receiving a service by 6 months of age.

Denominator: Number of children under 5 months of age eligible for, and referred to, the Early Intervention education service following diagnosis through UNHS.

NOTE:

This data would be broken down by ethnicity to allow progress toward reducing inequalities to be assessed.

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2.3 Retention of children in the EI education service through the early childhood years

Description

The percentage of children referred to, and eligible for, the Early Intervention education service following UNHS who are still receiving a service at 3 years and at school entry.

Relevant Outcome

The percentage of children referred to, and eligible for, the Early Intervention education service following UNHS will still be receiving a service at 3 years and at school entry.

Rationale

This measure provides information about the percentage of children who enter the Early Intervention service following diagnosis who remain in the service through the foundation stage of communication development, birth to three years, and through to school entry.

Methodology

Indicator 2.3a

Numerator: Number of children referred to, and eligible for, the Early Intervention education service (through UNHS) still receiving a service at 3 years of age.

Denominator: Number of families and whānau of children eligible for, and referred to, the Early Intervention education service (through UNHS).

Indicator 2.3b

Numerator: Number of children referred to, and eligible for, the Early Intervention education service (through UNHS) still receiving a service at school entry.

Denominator: Number of families and whānau of children eligible for, and referred to, the Early Intervention education service (through UNHS).

NOTES:

Measuring this indicator presents a challenge to the MoE Special Education given its current information system. This system was set up to report on particular aspects of service delivery required by the organisation, and the above measure is different to those supported by current systems. MoE Special Education will investigate how this might be achieved, and if necessary, the wording of the retention measure may need to be altered to reflect the information we are able to retrieve from our information systems.

As the Early Intervention education service is a national service, families and

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whānau moving within New Zealand are able to continue receiving service.

Most current families and whānau of children with hearing loss remain involved with the service throughout the early childhood and school years.

Interpretation of the data highlighted by this measure needs to be done so in a considered way. The reasons for withdrawal will be noted. For example, families and whānau may withdraw from the service because they are emigrating or because their child has age-appropriate development.

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