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Universal Newborn Hearing Screening and Early Intervention Programme (UNHSEIP)

Monitoring Report

January – June 2013

National Screening Unit

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This publication reports on information provided to the Ministry of Health by district health boards. Its purpose is to inform discussion and assist the ongoing development of the Universal Newborn Hearing and Early Intervention Programme. All care has been taken in the production of this report, and the data was deemed to be accurate at the time of publication. However, the data may be subject to updates over time as further information is received. Before quoting or using this information, it is advisable to check the current status with the Ministry of Health.

Acknowledgements

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Executive Summary

Universal newborn hearing screening is the standard of care internationally, and 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 babies screened in the six month period from 1 January 2013 to 30 June 2013. Audiology data for these babies up to the end of January 2014 is captured in this report.

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

Key Points from January 2013 to June 2013

- From the offer of screening reported in DHB volume reports for this time 97.5% of live births were offered 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 90% of babies born in this period.
- Almost all families who consented to screening did start the screening 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 (99.2%), once again showing minimal differences across DHBs, ethnicity or decile ratings.
- In total 26,150 babies completed newborn hearing screening in this six month period, compared with the 29,366 live births. While these figures come from different data sets, this indicates that approximately 89% of babies born in this period completed screening.
- Of babies who completed screening, approximately 90% of babies completed by the target of one month of age (corrected age). This did show some variation by DHB, ranging from 44% to almost 100%. There was some

difference in completion by one month rates between Māori babies (83.6%) and Asian and European babies (around 92%). There were only small variations by decile.

- The overall referral rate to audiology for this period was 1.7% (452 babies). This rate varied from 0% to 6% across DHBs. The referral rate for NICU/SCBU babies was higher at 6.8%, as might be expected.
- Of those babies that passed screening, 4.9% 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 25.4%.
- For this period 7.7% of babies had a risk factor identified, with the most common risk factor being Family History (33.8% of all risk factors identified) and Jaundice Requiring Phototherapy (21.5%).
- Of those babies referred to audiology, 75.7% were reported to have started an audiology assessment. This is significantly higher proportion than in previous reports and is believed to be related to better data transfer methods. This does not mean that 24% of the babies have not been seen by audiology, and the NSU continues to work with DHBs to improve the completeness of audiology data for future monitoring reports. The referral rate varied between DHBs though numbers of referrals in some DHBs are very small.
- Of those babies who started audiological assessment, 89% had completed their assessment (six months after the reporting period ended). 80% of those that completed did so within the target of three months of age. Variation between DHBs, ethnicity and decile can be seen but the numbers in many DHBs are too small to draw any strong conclusions.
- 30 babies (10% of those that completed an audiology assessment) had a permanent congenital hearing loss identified, 17 of which were bilateral losses.
- A greater percentage of babies completing audiology were identified with a conductive hearing loss, 24% (74 babies).
- 104 babies in total were identified with a hearing loss. The ages at which the hearing loss was identified were: 27 by 4 weeks, 27 by 8 weeks, 25 by 12 weeks and the remaining 25 by over 12 weeks.
- For this reporting period, very limited newborn hearing screening was carried out in Hawke's Bay DHB due to the impacts of the screening incident. While the information for the babies screened is included in this report for completeness, statistical comparisons should not be made.

Table 1a Summary of newborn hearing screening indicators by DHB, January to June 2013

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	1067	867	867	851	377	828	23	63	81.3	100.0	98.2	44.3	2.7	7.6
Waitemata	3791	3361	3357	3336	2884	3297	39	97	88.7	99.9	99.3	86.5	1.2	2.9
Auckland	3076	2936	2936	2919	2752	2864	55	126	95.4	100.0	99.4	94.3	1.9	4.4
Counties Manukau	4161	3349	3349	3253	2930	3160	93	176	80.5	100.0	97.1	90.1	2.9	5.6
Waikato	2573	2499	2497	2494	2304	2455	39	113	97.1	99.9	99.8	92.4	1.6	4.6
Lakes	708	762	762	762	589	737	25	53	107.6	100.0	100.0	77.3	3.3	7.2
Bay of Plenty	1404	1,235	1233	1229	1074	1215	14	57	88.0	99.8	99.5	87.4	1.1	4.7
Tairawhiti	352	348	347	347	341	345	2	25	98.9	99.7	99.7	98.3	0.6	7.2
Taranaki	752	720	720	720	712	713	7	63	95.7	100.0	100.0	98.9	1.0	8.8
Hawke's Bay	1027	67	67	67	42	63	4	6	6.5	100.0	100.0	62.7	6.0	9.5
Whanganui	415	363	360	357	339	354	3	10	87.5	99.2	98.3	95.0	0.8	2.8
Mid Central	1044	938	935	926	556	917	9	46	89.8	99.7	98.7	60.0	1.0	5.0
Hutt Valley	943	928	927	926	892	910	16	41	98.4	99.9	99.8	96.3	1.7	4.5
Capital & Coast	1878	1919	1918	1917	1854	1869	48	118	102.2	99.9	99.9	96.7	2.5	6.3
Wairarapa	235	234	234	234	226	234	0	15	99.6	100.0	100.0	96.6	0.0	6.4
Nelson Marlborough	766	793	793	792	705	788	4	36	103.5	100.0	99.9	89.0	0.5	4.6
West Coast	197	154	154	153	144	152	1	11	78.2	100.0	99.4	94.1	0.7	7.2
Canterbury	2932	2882	2882	2880	2760	2840	40	110	98.3	100.0	99.9	95.8	1.4	3.9
South Canterbury	336	298	298	297	296	293	4	8	88.7	100.0	99.7	99.7	1.3	2.7
Southern	1709	1710	1710	1690	1614	1664	26	82	100.1	100.0	98.8	95.5	1.5	4.9
Total	**29,366**	**26,363**	**26,346**	**26,150**	**23,391**	**25,698**	**452**	**1,256**	**89.8**	**99.9**	**99.2**	**89.4**	**1.7**	**4.9**

Table 1b Summary of newborn hearing screening indicators by ethnicity and deprivation, January to June 2013

	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
Ethnicity	Number								Percent				
Māori	6160	6154	6086	5086	5935	151	425		99.9	98.8	83.6	2.5	7.2
Pacific	2706	2704	2649	2334	2566	83	122		99.9	97.9	88.1	3.1	4.8
Asian	3842	3841	3830	3539	3779	51	101		100.0	99.7	92.4	1.3	2.7
European	13,054	13,046	12,986	11,888	12,832	154	578		99.9	99.5	91.5	1.2	4.5
Other ethnic groups	531	531	530	480	519	11	22		100.0	99.8	90.6	2.1	4.2
Not stated/Unspecified	70	70	69	64	67	2	8		100.0	98.6	92.8	2.9	11.9
Total	**26,363**	**26,346**	**26,150**	**23,391**	**25,698**	**452**	**1256**		**99.9**	**99.2**	**89.4**	**1.7**	**4.9**
Deprivation													
Decile 1-2	3968	3967	3956	3708	3906	50	157		100.0	99.7	93.7	1.3	4.0
Decile 3-4	4402	4400	4381	4027	4335	46	184		100.0	99.5	91.9	1.0	4.2
Decile 5-6	4998	4995	4968	4470	4889	79	217		99.9	99.4	90.0	1.6	4.4
Decile 7-8	6202	6195	6155	5416	6061	94	291		99.9	99.2	88.0	1.5	4.8
Decile 9-10	6744	6740	6641	5726	6459	182	404		99.9	98.5	86.2	2.7	6.3
Unknown	49	49	49	44	48	1	3		100.0	100.0	89.8	2.0	6.3
Total	**26,363**	**26,346**	**26,150**	**23,391**	**25,698**	**452**	**1256**		**99.9**	**99.2**	**89.4**	**1.7**	**4.9**

Table 2a Summary of newborn hearing audiology indicators by DHB, January to June 2013

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		19	19	13	0	5		100.0	68.4	0.0	26.3
Waitemata											
Auckland		71	70	63	8	16		98.6	90.0	11.4	22.9
Counties Manukau		62	27	20	1	3		43.5	74.1	3.7	11.1
Waikato		31	31	22	4	3		100.0	71.0	12.9	9.7
Lakes		18	18	15	2	3		100.0	83.3	11.1	16.7
Bay of Plenty		14	14	11	1	5		100.0	78.6	7.1	35.7
Tairawhiti		3	3	1	0	1		100.0	33.3	0.0	33.3
Taranaki		6	6	5	1	2		100.0	83.3	16.7	33.3
Hawke's Bay		2	2	1	0	0		100.0	50.0	0.0	0.0
Whanganui											
Mid Central		11	11	8	1	7		100.0	72.7	9.1	63.6
Hutt Valley		14	14	14	0	6		100.0	100.0	0.0	42.9
Capital & Coast		35	35	31	5	10		100.0	88.6	14.3	28.6
Wairarapa											
Nelson Marlborough		2	2	2	2	0		100.0	100.0	100.0	0.0
West Coast											
Canterbury		29	27	17	3	7		93.1	63.0	11.1	25.9
South Canterbury		4	4	4	1	0		100.0	100.0	25.0	0.0
Southern		21	21	17	1	6		100.0	81.0	4.8	28.6
Total		**342**	**304**	**244**	**30**	**74**		**88.9**	**80.3**	**9.9**	**24.3**

Note: Waitemata, Whanganui and West Coast all contract other DHBs to undertake their audiology and Wairarapa had no babies referred to audiology this reporting period.

Table 2b Summary of newborn hearing audiology indicators by ethnicity and deprivation, January to June 2013

	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	109	97	72	9	23	89.0	74.2	9.3	23.7
Pacific	55	40	31	3	10	72.7	77.5	7.5	25.0
Asian	46	42	36	5	9	91.3	85.7	11.9	21.4
European	124	117	98	12	32	94.4	83.8	10.3	27.4
Other ethnic groups	7	7	6	1	0	100.0	85.7	14.3	0.0
Not stated/Unspecified	1	1	1	0	0	100.0	100.0	0.0	0.0
Total	**342**	**304**	**244**	**30**	**74**	**88.9**	**80.3**	**9.9**	**24.3**
Deprivation									
Decile 1-2	42	38	33	3	6	90.5	86.8	7.9	15.8
Decile 3-4	40	36	31	3	11	90.0	86.1	8.3	30.6
Decile 5-6	61	59	50	8	14	96.7	84.7	13.6	23.7
Decile 7-8	70	68	53	5	19	97.1	77.9	7.4	27.9
Decile 9-10	128	102	76	11	24	79.7	74.5	10.8	23.5
Unknown	1	1	1	0	0	100.0	100.0	0.0	0.0
Total	**342**	**304**	**244**	**30**	**74**	**88.9**	**80.3**	**9.9**	**24.3**

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 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

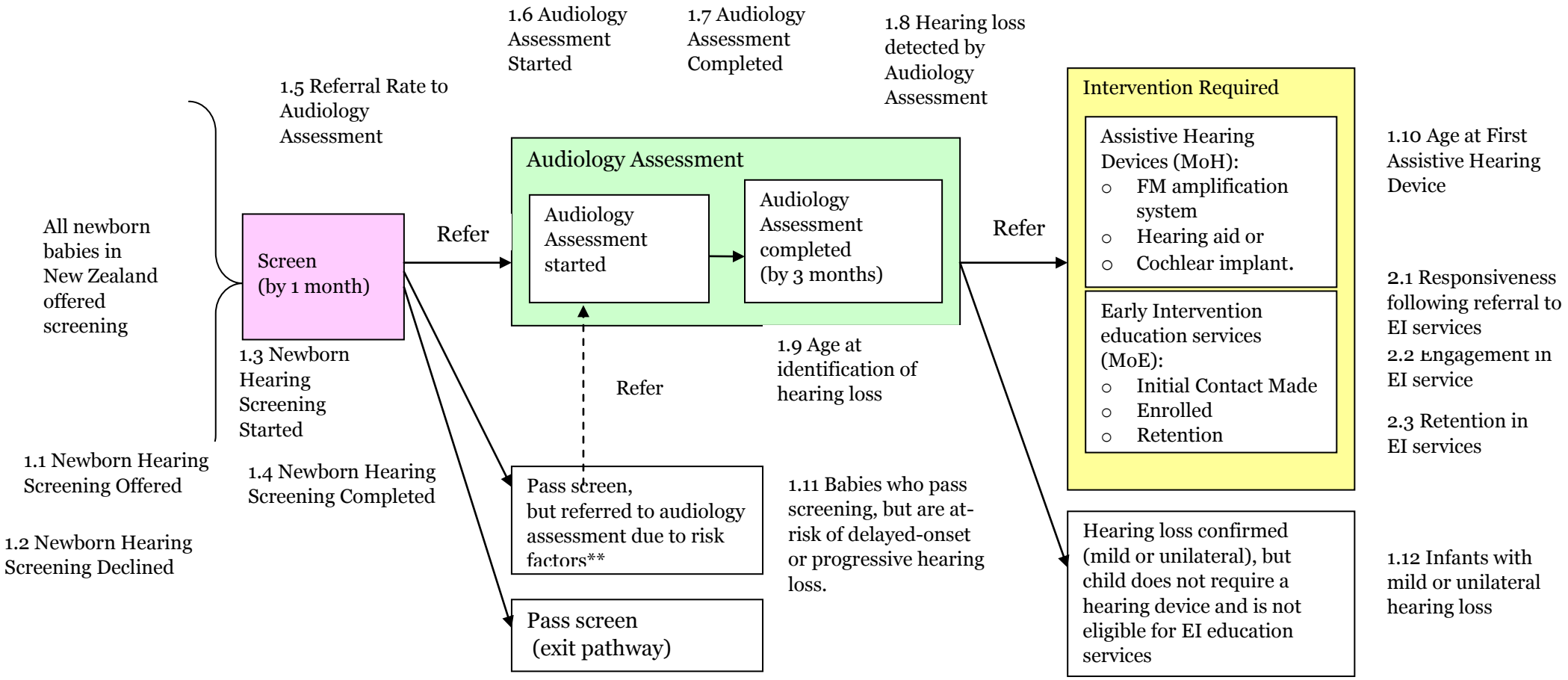
Framework is a plan for the routine, systematic collection and recording of information about aspects of the programme over time. The purpose is to assess whether progress is being made on achieving the programme goals.

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 January 2013 through to 3 June 2013, 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

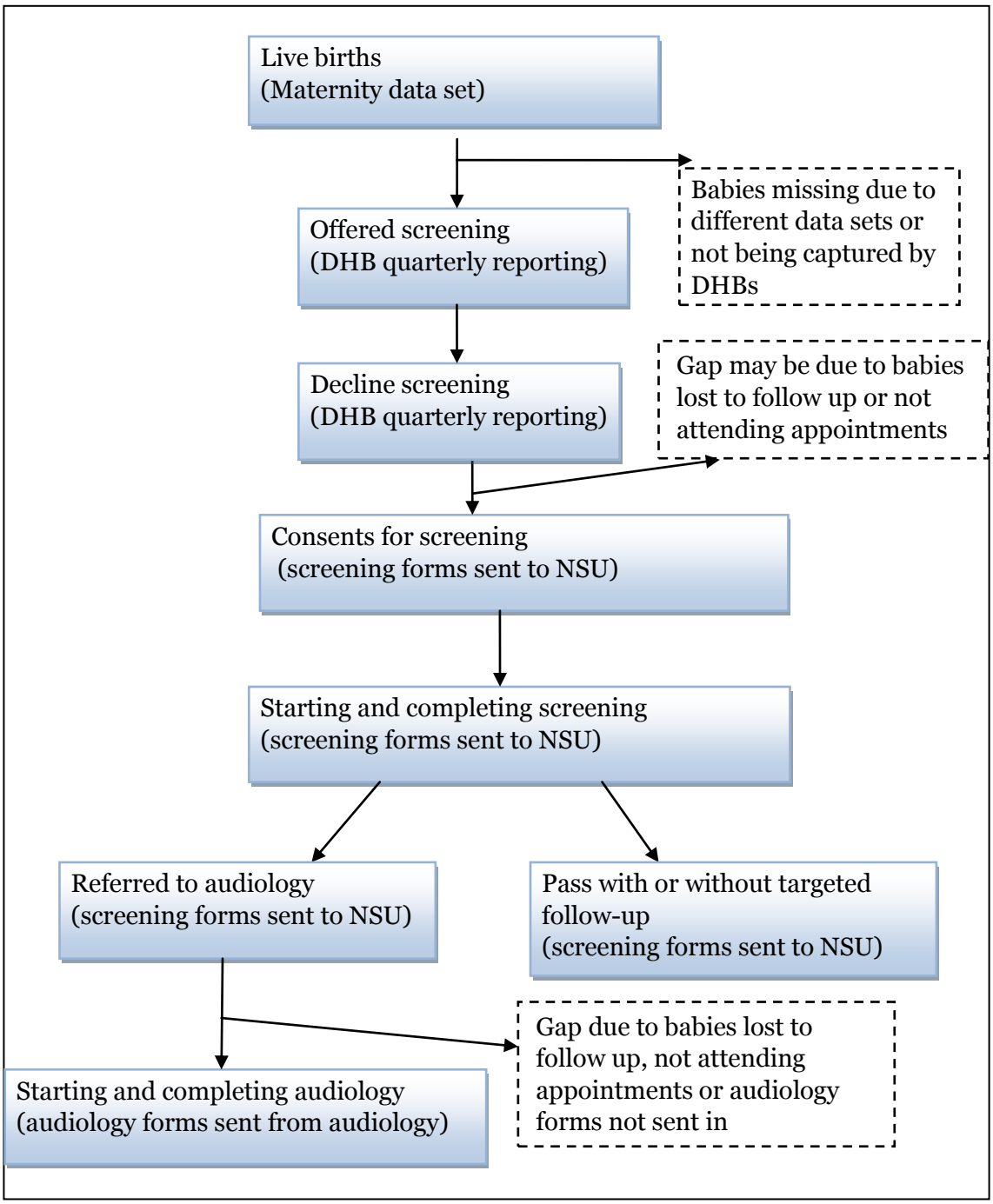
Newborn hearing screening and follow up audiology information is captured by the Ministry of Health's National Screening Unit (NSU) in two ways. Some DHBs collect and recorded this information on paper forms, which are regularly submitted NSU and the data is entered into the NSU's web-based application/database. 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.

Collection of data at the national level for babies having newborn hearing screening began from 1 April 2009 onwards, audiology data collection began a year later in 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
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)

Information Included in this Report

The information reported is from newborn hearing screening where the date of screening started was between 1 January 2013 and 30 June 2013. 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.

2.2. 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 nine babies. Four ethnicities were recorded for 62 babies and three ethnicities were recorded for 3% of babies (n=702). Two ethnicities were recorded for 19% of babies (n=5041) and the remaining 78% of babies had only one ethnicity recorded.

2.3. 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.

2.4. 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=317). This figure has dropped over time but is settling now at around 1 percent. 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 and the NSU continues to work with DHBs to improve the completeness of audiology data for future monitoring reports. This report includes audiology information on 342 of the 452 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. As an example babies born in Waitemata generally have their audiology undertaken in Auckland, their audiology information is therefore reported under Auckland DHB. Table 22 on page 45 describes this flow for babies who started audiology.

Hawke's Bay DHB

Between January and June 2013 only limited screening of newborn babies was performed by Hawkes Bay DHB, with 67 babies being screened (compared with almost 1500 for the pervious reporting period). This was due to staffing challenges as a result of the screening incident. For more information refer to the report; *Quality improvement review of a screening event in the Universal Newborn Hearing Screening and Early Intervention Programme,* December 2013, available atwww.nsu.govt.nz/health-professionals/4627.aspx.

Newborn hearing screening recommenced from July 2013, and also additional resources were devoted to screening the cohort born January-June 2013. It is anticipated that the next monitoring report will include the babies born in January-June 2013 in addition to those born in July-December 2013.

The small number of babies screened from Hawke's Bay were included in this report for completeness of reporting, however statistical comparisons should not be made.

3. Monitoring Indicators

1.1 Newborn hearing screening offered
1.2

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 97.5% of live births were offered screening. One DHB did not provide data for this full period so are excluded from the table below (Hawkes Bay). This is a slight increase from the 94 % in the previous reporting period.

Across the DHBs the proportion of offers of screening to live births was generally between 81% and 100%. The low rates for Counties Manukau, Waitemata are offset by the greater than 100% rate for Auckland (see discussion below).

Table 4 Offer of screening by DHB, January to June 2013

DHB	Live births	Offered screening	Percentage offered
Northland	1067	995	93.3
Waitemata	3791	3361	88.7
Auckland	3076	3953	128.5
Counties Manukau	4161	3377	81.2
Waikato	2573	2598	101.0
Lakes	708	765	108.1
Bay of Plenty	1404	1139	81.1
Tairawhiti	352	327	92.9
Taranaki	752	755	100.4
Hawke's Bay	1027	-	-
Whanganui	415	397	95.7
Mid Central	1044	1015	97.2
Hutt Valley	943	938	99.5
Capital & Coast	1878	1886	100.4
Wairarapa	235	232	98.7
Nelson Marlborough	766	827	108.0
West Coast	197	160	81.2
Canterbury	2932	2911	99.3
South Canterbury	336	308	91.7
Southern	1709	1689	98.8
Total	**29,366 (28,339*)**	**27,633**	**97.5**

*Percentage offered uses the total live births excluding Hawkes Bay

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 97%. 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 contributing to monitoring of programme participation. This indicator is not reported by individual DHBs as the issues discussed 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 families who were offered screening declined (see section 3.3 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 around 90% 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, January to June 2013

	Live births	Consents	Difference	Percent
Ethnicity	**N**	**N**	**N**	**%**
Māori	7658	6160	1498	80.4
Pacific	3157	2706	451	85.7
Asian	4068	3842	226	94.4
European	13878	13,054	824	94.1
Not Stated/Unspecified/Other	605	601	4	99.3
Total	**29,366**	**26,363**	**3,003**	**89.8**

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. However lower consent rates for babies in deciles 9-10 is a consistent trend across a number of reports.

Table 6 Consents for screening compared with live births, by deprivation, January to June 2013

	Live births	Consents	Difference	Percent
Deprivation	**N**	**N**	**N**	**%**
Decile 1-2	4325	3968	357	91.7
Decile 3-4	4893	4402	491	90.0
Decile 5-6	5549	4998	551	90.1
Decile 7-8	6699	6202	497	92.6
Decile 9-10	7878	6744	1134	85.6
Unknown	22	49	-27	-
Total	**29,366**	**26,363**	**3003**	**89.8**

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 4.5%; this has been consistent for the past three reports but is slowly decreasing with each reporting period.

Table 7 Decline of screening by DHB, January to June 2013

DHB	Offered screening	Declined screening	Percentage declined
Northland	995	45	4.5
Waitemata	3361	10	0.3
Auckland	3953	36	0.9
Counties Manukau	3377	21	0.6
Waikato	2598	17	0.7
Lakes	765	4	0.5
Bay of Plenty	1139	39	3.4
Tairawhiti	327	3	0.9
Taranaki	755	3	0.4
Hawkes Bay	-	-	-
Whanganui	397	5	1.3
MidCentral	1015	6	0.6
Hutt Valley	938	5	0.5
Capital & Coast	1886	7	0.4
Wairarapa	232	1	0.4
Nelson Marlborough	827	16	1.9
West Coast	160	2	1.3
Canterbury	2911	25	0.9
South Canterbury	308	4	1.3
Southern	1689	21	1.2
Total	**27,633**	**270**	**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, January to June 2013

	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	789	789	100.0	78	78	100.0	867	867	100.0
Waitemata	3210	3206	99.9	151	151	100.0	3361	3357	99.9
Auckland	2712	2712	100.0	224	224	100.0	2936	2936	100.0
Counties Manukau	3164	3164	100.0	185	185	100.0	3349	3349	100.0
Waikato	2311	2309	99.9	188	188	100.0	2499	2497	99.9
Lakes	701	701	100.0	61	61	100.0	762	762	100.0
Bay of Plenty	1124	1122	99.8	111	111	100.0	1235	1233	99.8
Tairawhiti	317	316	99.7	31	31	100.0	348	347	99.7
Taranaki	654	654	100.0	66	66	100.0	720	720	100.0
Hawke's Bay	61	61	100.0	6	6	100.0	67	67	100.0
Whanganui	347	344	99.1	16	16	100.0	363	360	99.2
Mid Central	835	833	99.8	103	102	99.0	938	935	99.7
Hutt Valley	828	827	99.9	100	100	100.0	928	927	99.9
Capital & Coast	1721	1721	100.0	198	197	99.5	1919	1918	99.9
Wairarapa	228	228	100.0	6	6	100.0	234	234	100.0
Nelson Marlborough	761	761	100.0	32	32	100.0	793	793	100.0
West Coast	150	150	100.0	4	4	100.0	154	154	100.0
Canterbury	2627	2627	100.0	255	255	100.0	2882	2882	100.0
South Canterbury	294	294	100.0	4	4	100.0	298	298	100.0
Southern	1572	1572	100.0	138	138	100.0	1710	1710	100.0
Total	**24,406**	**24,391**	**99.9**	**1957**	**1955**	**99.9**	**26,363**	**26,346**	**99.9**

Table 9 Newborn hearing screening started compared with consents to screening by ethnicity, January to June 2013

	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	5636	5630	99.9	524	524	100.0	6160	6154	99.9
Pacific	2503	2501	99.9	203	203	100.0	2706	2704	99.9
Asian	3609	3608	100.0	233	233	100.0	3842	3841	100.0
European	12,103	12,097	100.0	951	949	99.8	13,054	13,046	99.9
Other ethnic groups	489	489	100.0	42	42	100.0	531	531	100.0
Not stated/Unspecified	66	66	100.0	4	4	100.0	70	70	100.0
Total	**24,406**	**24,391**	**99.9**	**1957**	**1955**	**99.9**	**26,363**	**26,346**	**99.9**

Table 10 Newborn hearing screening started compared with consents to screening by deprivation, January to June 2013

	Well Baby			NICU/SCBU			Total		
Deprivation	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	3709	3708	100.0	259	259	100.0	3968	3967	100.0
Decile 3-4	4084	4082	100.0	318	318	100.0	4402	4400	100.0
Decile 5-6	4659	4657	100.0	339	338	99.7	4998	4995	99.9
Decile 7-8	5738	5732	99.9	464	463	99.8	6202	6195	99.9
Decile 9-10	6176	6172	99.9	568	568	100.0	6744	6740	99.9
Unknown	40	40	100.0	9	9	100.0	49	49	100.0
Total	**24,406**	**24,391**	**99.9**	**1957**	**1955**	**99.9**	**26,363**	**26,346**	**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).

An estimate of programme coverage for all babies based on live birth data is also provided below to give a national picture of coverage.

Programme coverage

In total 26,150 babies completed newborn hearing screening in this six month period, compared with the 29,366 live births. While these figures come from different data sets, this indicates that approximately 89% of babies born in this period completed screening.

Completed screening after starting

Overall, 99.2% of babies who started screening completed, and 89.4% of those babies who had completed screening did so by the time they were one month of age. The proportion of babies completing is very similar to the last report and just marginally lower proportion of babies completing by one month (91.9% last period). 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 (44.3%) and MidCentral (60%) the remaining DHBs had completion rates at one month of 77% or more, as shown in Table 12. The two DHBs with the lowest rates also had lower rates in the last reporting period.

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 940 babies (3.6% of screened babies) were screened between 8 weeks and 54 weeks, however the numbers are too small to be included in Figure 3. The majority of these were completed by 14 weeks (151 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, January to June 2013**

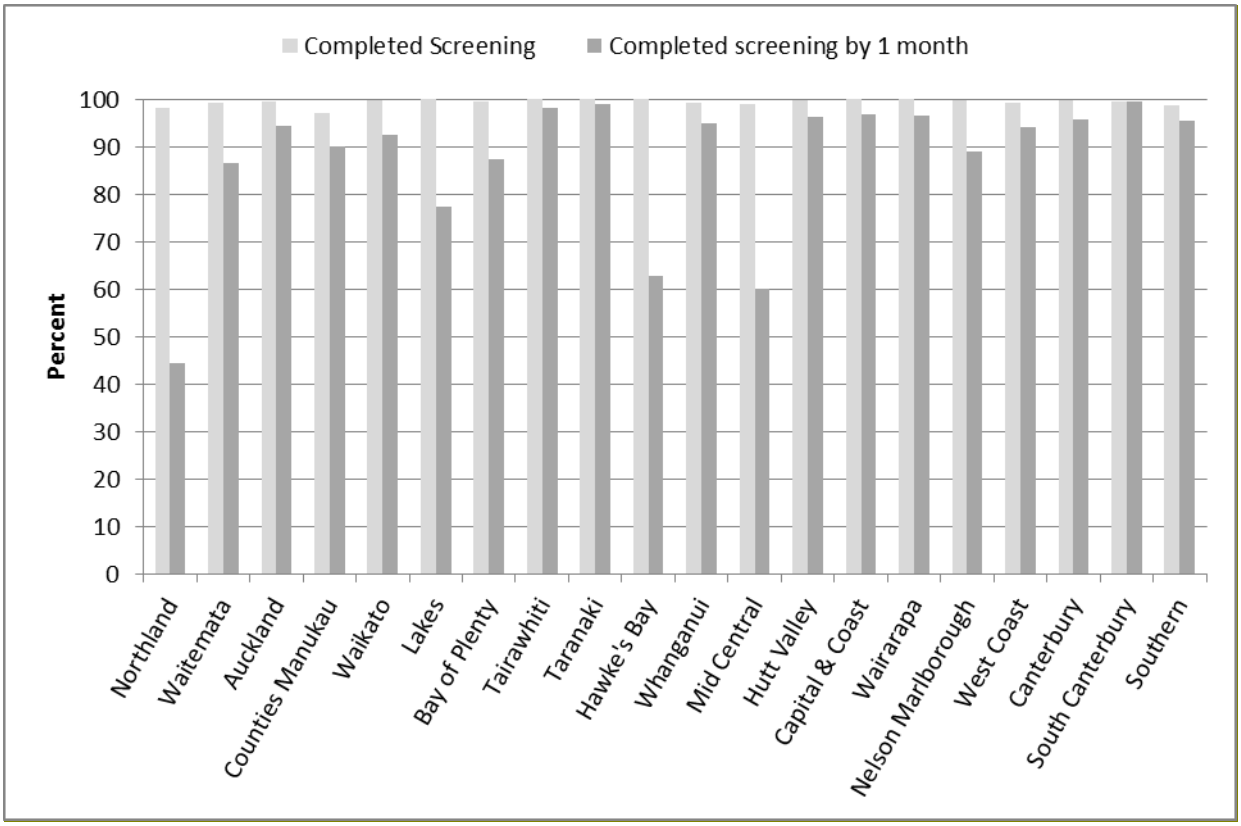
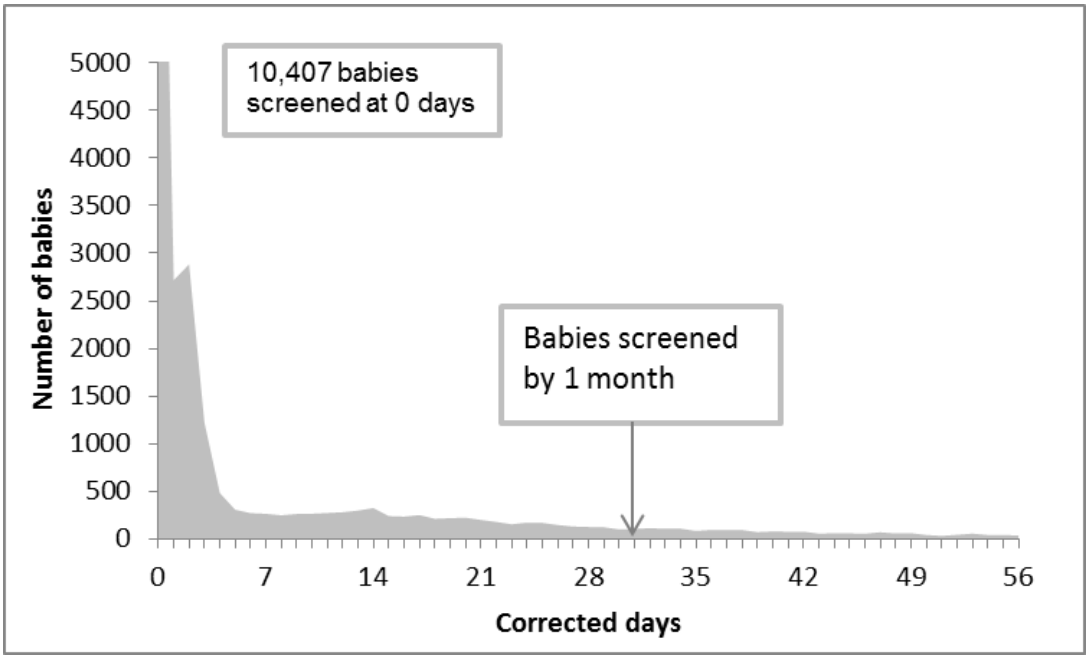


Figure 3 **Spread of screening completion times in days, January to June 2013**



Note that many of the babies screened at day 0 are not actually screened on the day they were born; this is due to the use of corrected date of birth to calculate this indicator.

Table 11 Newborn hearing screening completed compared with started by DHB, January to June 2013

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	789	773	98.0	78	78	100.0	867	851	98.2
Waitemata	3206	3185	99.3	151	151	100.0	3357	3336	99.4
Auckland	2712	2695	99.4	224	224	100.0	2936	2919	99.4
Counties Manukau	3164	3069	97.0	185	184	99.5	3349	3253	97.1
Waikato	2309	2307	99.9	188	187	99.5	2497	2494	99.9
Lakes	701	701	100.0	61	61	100.0	762	762	100.0
Bay of Plenty	1122	1118	99.6	111	111	100.0	1233	1229	99.7
Tairawhiti	316	316	100.0	31	31	100.0	347	347	100.0
Taranaki	654	654	100.0	66	66	100.0	720	720	100.0
Hawke's Bay	61	61	100.0	6	6	100.0	67	67	100.0
Whanganui	344	341	99.1	16	16	100.0	360	357	99.2
Mid Central	833	824	98.9	102	102	100.0	935	926	99.0
Hutt Valley	827	826	99.9	100	100	100.0	927	926	99.9
Capital & Coast	1721	1721	100.0	197	196	99.5	1918	1917	99.9
Wairarapa	228	228	100.0	6	6	100.0	234	234	100.0
Nelson Marlborough	761	760	99.9	32	32	100.0	793	792	99.9
West Coast	150	149	99.3	4	4	100.0	154	153	99.4
Canterbury	2627	2625	99.9	255	255	100.0	2882	2880	99.9
South Canterbury	294	293	99.7	4	4	100.0	298	297	99.7
Southern	1572	1,552	98.7	138	138	100.0	1710	1690	98.8
Total	**24,391**	**24,198**	**99.2**	**1955**	**1952**	**99.8**	**26,346**	**26,150**	**99.3**

Table 12 Newborn hearing screening completed by one month of age by DHB, January to June 2013

	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	773	318	41.1	78	59	75.6	851	377	44.3
Waitemata	3185	2740	86.0	151	144	95.4	3336	2884	86.5
Auckland	2695	2537	94.1	224	215	96.0	2919	2752	94.3
Counties Manukau	3069	2751	89.6	184	179	97.3	3253	2930	90.1
Waikato	2307	2125	92.1	187	179	95.7	2494	2304	92.4
Lakes	701	533	76.0	61	56	91.8	762	589	77.3
Bay of Plenty	1118	968	86.6	111	106	95.5	1229	1074	87.4
Tairawhiti	316	310	98.1	31	31	100.0	347	341	98.3
Taranaki	654	646	98.8	66	66	100.0	720	712	98.9
Hawke's Bay	61	39	63.9	6	3	50.0	67	42	62.7
Whanganui	341	323	94.7	16	16	100.0	357	339	95.0
Mid Central	824	459	55.7	102	97	95.1	926	556	60.0
Hutt Valley	826	795	96.2	100	97	97.0	926	892	96.3
Capital & Coast	1721	1665	96.7	196	189	96.4	1917	1854	96.7
Wairarapa	228	221	96.9	6	5	83.3	234	226	96.6
Nelson Marlborough	760	676	88.9	32	29	90.6	792	705	89.0
West Coast	149	140	94.0	4	4	100.0	153	144	94.1
Canterbury	2625	2507	95.5	255	253	99.2	2880	2760	95.8
South Canterbury	293	292	99.7	4	4	100.0	297	296	99.7
Southern	1552	1482	95.5	138	132	95.7	1690	1614	95.5
Total	**24,198**	**21,527**	**89.0**	**1952**	**1864**	**95.5**	**26,150**	**23,391**	**89.4**

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 some difference in overall completion rates by these parameters.

Completion rates by 1 month are lowest for Māori and Pacific babies. When looking at the data by decile, there is a steady trend evident between the highest completion rates in deciles 1-2 to the lowest in 9-10.

Table 13 Newborn hearing screening completed by ethnicity, January to June 2013

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	6154	6086	5086	98.9	83.6
Pacific	2704	2649	2334	98.0	88.1
Asian	3841	3830	3539	99.7	92.4
European	13,046	12,986	11,888	99.5	91.5
Other ethnic groups	531	530	480	99.8	90.6
Not stated/Unspecified	70	69	64	98.6	92.8
Total	**26,346**	**26,150**	**23,391**	**99.3**	**89.4**

Table 14 Newborn hearing screening completed by deprivation, January to June 2013

Deprivation	Started screening	Completed screening	Completed screening by 1 month of age	% started that completed screening	% completed that completed by 1 month of age
Decile 1-2	3967	3956	3708	99.7	93.7
Decile 3-4	4400	4381	4027	99.6	91.9
Decile 5-6	4995	4968	4470	99.5	90.0
Decile 7-8	6195	6155	5416	99.4	88.0
Decile 9-10	6740	6641	5726	98.5	86.2
Unknown	49	49	44	100.0	89.8
Total	**26,346**	**26,150**	**23,391**	**99.3**	**89.4**

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, based on international literature is 4%,. 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 rate has been very consistent for the past three reporting periods.

All DHBs, with the exception of Wairarapa, had referrals to audiology for this period. Northland which in previous reports has had the highest rates of referral (around 5%) in this report had a referral rate of 2.9%. All DHBs have rates between 0% and 3.3%. The exception of 6% for Hawkes Bay is not comparable this period due to the limited screening that occurred.

Admission to NICU/SCBU (for 48 hours or more) resulted in a higher proportion of referrals to audiology, at an average of 6.8% as show in Table 15, very similar to the last two periods. More detail on referrals to audiology by ethnicity and deprivation status is 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, trends that has been consistent, but not strong, for a number of reports.

Table 15 Referral to audiology by DHB, January to June 2013

	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	773	18	2.3	78	5	6.4	851	23	2.7
Waitemata	3185	36	1.1	151	3	2.0	3336	39	1.2
Auckland	2695	37	1.4	224	18	8.0	2919	55	1.9
Counties Manukau	3069	72	2.3	184	21	11.4	3253	93	2.9
Waikato	2307	25	1.1	187	14	7.5	2494	39	1.6
Lakes	701	16	2.3	61	9	14.8	762	25	3.3
Bay of Plenty	1118	9	0.8	111	5	4.5	1229	14	1.1
Tairawhiti	316	2	0.6	31	0	0.0	347	2	0.6
Taranaki	654	6	0.9	66	1	1.5	720	7	1.0
Hawke's Bay	61	1	1.6	6	3	50.0	67	4	6.0
Whanganui	341	3	0.9	16	0	0.0	357	3	0.8
Mid Central	824	4	0.5	102	5	4.9	926	9	1.0
Hutt Valley	826	11	1.3	100	5	5.0	926	16	1.7
Capital & Coast	1721	29	1.7	196	19	9.7	1917	48	2.5
Wairarapa	228	0	0.0	6	0	0.0	234	0	0.0
Nelson Marlborough	760	2	0.3	32	2	6.3	792	4	0.5
West Coast	149	1	0.7	4	0	0.0	153	1	0.7
Canterbury	2625	28	1.1	255	12	4.7	2880	40	1.4
South Canterbury	293	4	1.4	4	0	0.0	297	4	1.3
Southern	1552	15	1.0	138	11	8.0	1690	26	1.5
Total	**24,198**	**319**	**1.3**	**1,952**	**133**	**6.8**	**26,150**	**452**	**1.7**

Table 16 Referral to audiology by ethnicity, January to June 2013

Ethnicity	Number completed screening	Number referred to audiology	% Completed screening that were referred
Māori	6086	151	2.5
Pacific	2649	83	3.1
Asian	3830	51	1.3
European	12,986	154	1.2
Other ethnic groups	530	11	2.1
Not stated/Unspecified	69	2	2.9
Total	**26,150**	**452**	**1.7**

Table 17 Referral to audiology by deprivation, January to June 2013

Deprivation	Number completed screening	Number referred to audiology	% Completed screening that were referred
Decile 1-2	3956	50	1.3
Decile 3-4	4381	46	1.0
Decile 5-6	4968	79	1.6
Decile 7-8	6155	94	1.5
Decile 9-10	6641	182	2.7
Unknown	49	1	2.0
Total	**26,150**	**452**	**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 4.9% 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 (8.8%) and Northland (7.6%), these two DHBs had the highest rates in the previous report also. Lakes, West Coast and Tairawhiti also had rates around 7%.

As would be expected, admission to NICU/SCBU (for 48 hours or more) resulted in a higher proportion of babies for targeted follow-up (25.4%).

More detail on targeted follow-up by ethnicity and deprivation status is 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 just over two percentage points across the whole table.

Table 18 Proportion of targeted follow-up by DHB, January to June 2013

	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	755	39	5.2	73	24	32.9	828	63	7.6
Waitemata	3149	72	2.3	148	25	16.9	3297	97	2.9
Auckland	2658	58	2.2	206	68	33.0	2864	126	4.4
Counties Manukau	2997	129	4.3	163	47	28.8	3160	176	5.6
Waikato	2282	69	3.0	173	44	25.4	2455	113	4.6
Lakes	685	41	6.0	52	12	23.1	737	53	7.2
Bay of Plenty	1109	36	3.2	106	21	19.8	1215	57	4.7
Tairawhiti	314	19	6.1	31	6	19.4	345	25	7.2
Taranaki	648	29	4.5	65	34	52.3	713	63	8.8
Hawke's Bay	60	5	8.3	3	1	33.3	63	6	9.5
Whanganui	338	5	1.5	16	5	31.3	354	10	2.8
Mid Central	820	31	3.8	97	15	15.5	917	46	5.0
Hutt Valley	815	22	2.7	95	19	20.0	910	41	4.5
Capital & Coast	1692	59	3.5	177	59	33.3	1869	118	6.3
Wairarapa	228	13	5.7	6	2	33.3	234	15	6.4
Nelson Marlborough	758	24	3.2	30	12	40.0	788	36	4.6
West Coast	148	9	6.1	4	2	50.0	152	11	7.2
Canterbury	2597	81	3.1	243	29	11.9	2840	110	3.9
South Canterbury	289	8	2.8	4	0	0.0	293	8	2.7
Southern	1537	45	2.9	127	37	29.1	1664	82	4.9
Total	**23,879**	**794**	**3.3**	**1819**	**462**	**25.4**	**25,698**	**1256**	**4.9**

Table 19 Proportion of targeted follow-up by ethnicity, January to June 2013

Ethnicity	Passed screening	Passed -targeted follow-up required	Targeted follow-up proportion
Māori	5935	425	7.2
Pacific	2566	122	4.8
Asian	3779	101	2.7
European	12,832	578	4.5
Other ethnic groups	519	22	4.2
Not stated/Unspecified	67	8	11.9
Total	**25,698**	**1256**	**4.9**

Table 20 Proportion of targeted follow-up by deprivation, January to June 2013

Deprivation	Passed screening	Passed -targeted follow-up required	Targeted follow-up proportion
Decile 1-2	3906	157	4.0
Decile 3-4	4335	184	4.2
Decile 5-6	4889	217	4.4
Decile 7-8	6061	291	4.8
Decile 9-10	6459	404	6.3
Unknown	48	3	6.3
Total	**25,698**	**1256**	**4.9**

3.8. Risk Factors

For the period of this report 2008 (7.7%) of babies that completed screening had at least one risk factor recorded, this is similar to the previous report and the rate appears to have settled just under 8%. From the tables above 1,256 (4.9%) of all babies had a screening outcome of "Pass Targeted follow-up required". This was also similar to 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" (33.8%) followed by "Jaundice Requiring Phototherapy" (21.5%) during this reporting period, this is the same two risk factors that has consistently had the highest rates. These two risk factors accounted for 3.2% and 2% respectively of all babies who 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 33.8%. This is similar to previous reports.

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 (9.8% for this period).
- Craniofacial anomalies initially decreased from 13% to 7.3% and now remains steady around 5-6% (6% in this report).
- TORCH/S with remains lower after an initial decrease from 11% it has stayed around the 3-4% mark 3% this period.
- The recording of "other" as a risk factor- continues to drop each period from almost a quarter of babies (23%) initially recorded as 'other' and it now sits at around 4%.

Table 21 Frequency of risk factors, January to June 2013

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	845	33.8	3.2
Jaundice Requiring Phototherapy	539	21.5	2.0
NICU more than 5 days	326	13.0	1.2
Ventilation	246	9.8	0.9
Cranio-facial Anomalies	149	6.0	0.6
Other	100	4.0	0.4
Head Trauma	80	3.2	0.3
TORCH/S	75	3.0	0.3
Bacterial/Viral Meningitis	52	2.1	0.2
Syndrome	43	1.7	0.2
Jaundice Transfusion Level	26	1.0	0.1

Of the 2008 babies with one or more risk factors recorded, 83% had just one risk factor, 12% had two, 4% had three, just under 1% of babies had four and only ten 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, 452 babies did not pass screening and were referred to audiology; and audiology information was provided to the NSU for 342 of these babies. The proportion of babies for which we have audiology data has increased from around 57% in the last reporting period to 76% in this reporting period. This is due to a much larger proportion of audiology data being sent to the NSU in this period. The NSU continues to work with DHBs to improve the completeness of audiology data for future monitoring reports.

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

Table 22 below shows how babies might be born in one DHB, have their initial screening in a different DHB and possibly even their audiology in another DHB. This is included so that DHBs are able to have an idea of where babies who are domiciled within their DHB receive other screening and audiology services. The data in the table is based on the 342 babies who started audiology. To understand how many babies for instance had audiology tests in Auckland DHB, the 71 babies (see table 26) is made up of 44 babies domiciled in Auckland, 26 domiciled in Waitemata and one domiciled in Taranaki (see table 22 below).

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 for DHB of domicile with initial screen and audiology test for babies who commenced audiology, January to June 2013

DHB of domicile*	No.	DHB of initial screening	No.	DHB of audiology test	No.
Northland	18	Northland	18	Northland	18
Waitemata	28	Waitemata	22	Tairawhiti	1
		Auckland	5	Auckland	26
		Counties Manukau	1	Counties Manukau	1
Auckland	47	Auckland	39	Auckland	44
		Counties Manukau	2	Counties Manukau	2
		Waitemata	5	Northland	1
		Northland	1		
Counties Manukau	61	Counties Manukau	55	Counties Manukau	59
		Auckland	5	Waikato	2
		Waikato	1		
Waikato	34	Waikato	31	Lakes	2
		Auckland	1	Waikato	29
		Lakes	1	Bay of Plenty	3
		Bay of Plenty	1		
Lakes	17	Lakes	14	Lakes	16
		Auckland	1	Mid Central	1
		Mid Central	1		
Bay of Plenty	11	Bay of Plenty	11	Bay of Plenty	11
Tairawhiti	2	Tairawhiti	2	Tairawhiti	2
Taranaki	6	Taranaki	6	Taranaki	5
				Auckland	1
Hawke's Bay	2	Hawke's Bay	2	Hawke's Bay	2
Mid Central	9	Mid Central	9	Mid Central	9
Hutt Valley	13	Hutt Valley	13	Hutt Valley	12
				Capital & Coast	1
Capital & Coast	37	Capital & Coast	35	Capital & Coast	34
		Hutt Valley	2	Hutt Valley	2
				Mid Central	1
Nelson Marlborough	3	Nelson Marlborough	3	Taranaki	1
			.	Nelson Marlborough	2
West Coast	1	West Coast	1	Canterbury	1
Canterbury	28	Canterbury	27	Canterbury	27
		South Canterbury	1	South Canterbury	1
South Canterbury	3	South Canterbury	3	South Canterbury	3
Southern	22	Southern	22	Southern	21
				Canterbury	1
		Total	**342**		**342**

*DHB of domicile refers to the address where the baby lives

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.

Now that more data is available, the results by ethnicity show quite a different picture from the previous report which identified Maori babies as most likely to start audiology following referral. For this report, European and Asian babies referred to audiology have a recorded rate of starting audiology of 81 to 90% respectively, but for Pacific babies the rate is just 66% and Maori 72%. Looking at the data by decile, babies in deciles 5-10 appear to have lower rates for beginning audiology assessment, particularly decile 10.

Table 23 Commenced audiology assessment by DHB, January to June 2013

	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	18	14	77.8	5	4	*	23	18	78.3
Waitemata	36	25	69.4	3	3	*	39	28	71.8
Auckland	37	29	78.4	18	18	100.0	55	47	85.5
Counties Manukau	72	50	69.4	21	11	52.4	93	61	65.6
Waikato	25	21	84.0	14	13	92.9	39	34	87.2
Lakes	16	11	68.8	9	6	*	25	17	68.0
Bay of Plenty	9	7	*	5	4	*	14	11	78.6
Tairawhiti	2	2	*	0	0	-	2	2	*
Taranaki	6	5	*	1	1	*	7	6	*
Hawke's Bay	1	0	*	3	2	*	4	2	*
Whanganui	3	0	*	0	0	-	3	0	*
Mid Central	4	4	*	5	5	*	9	9	*
Hutt Valley	11	10	90.9	5	3	*	16	13	81.3
Capital & Coast	29	24	82.8	19	13	68.4	48	37	77.1
Wairarapa	0	0	-	0	0	-	0	0	-
Nelson Marlborough	2	2	*	2	1	*	4	3	*
West Coast	1	1	*	0	0	-	1	1	*
Canterbury	28	19	67.9	12	9	75.0	40	28	70.0
South Canterbury	4	3	*	0	0	-	4	3	*
Southern	15	14	93.3	11	8	72.7	26	22	84.6
Total	**319**	**241**	**75.5**	**133**	**101**	**75.9**	**452**	**342**	**75.7**

Table 24 Commenced audiology assessment by ethnicity, January to June 2013

Ethnicity	Refer for audiology	Commenced audiology assessment	% Commenced audiology assessment to refer for audiology
Māori	151	109	72.2
Pacific	83	55	66.3
Asian	51	46	90.2
European	154	124	80.5
Other ethnic groups	11	7	63.6
Not stated/Unspecified	2	1	50.0
Total	**452**	**342**	**75.7**

Table 25 Commenced audiology assessment by decile, January to June 2013

Deprivation	Refer for audiology	Commenced audiology assessment	% Commenced audiology assessment to refer for audiology
Decile 1-2	50	42	84.0
Decile 3-4	46	40	87.0
Decile 5-6	79	61	77.2
Decile 7-8	94	70	74.5
Decile 9-10	182	128	70.3
Unknown	1	1	-
Total	**452**	**342**	**75.7**

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. Electronic reporting separates out started from completed which means this indicator accuracy will improve as more DHBs move to electronic reporting.

The audiology data for this period is the most complete there has been to date, this means that caution is needed in comparing with previous periods. For example as we have received more forms on starting audiology rather than just on completion, the completion rate has dropped.

Percentages of completions to commencing are low for Counties Manukau (43.5%) but sits at 93% or higher for all other DHBs. Completion rates at 3 months for those that completed were 80% nationally; the lowest rates were seen for Canterbury (63%) and Northland (68%).

Figure 4 below shows the percentage of babies who completed audiology assessment (from starting audiology) and the percent of those completing who did so by 3 months.

Figure 4 **Proportion of babies who completed audiology (from started), and the proportion who completed audiology by the time they were three months of age, by DHB of audiology, January to June 2013**

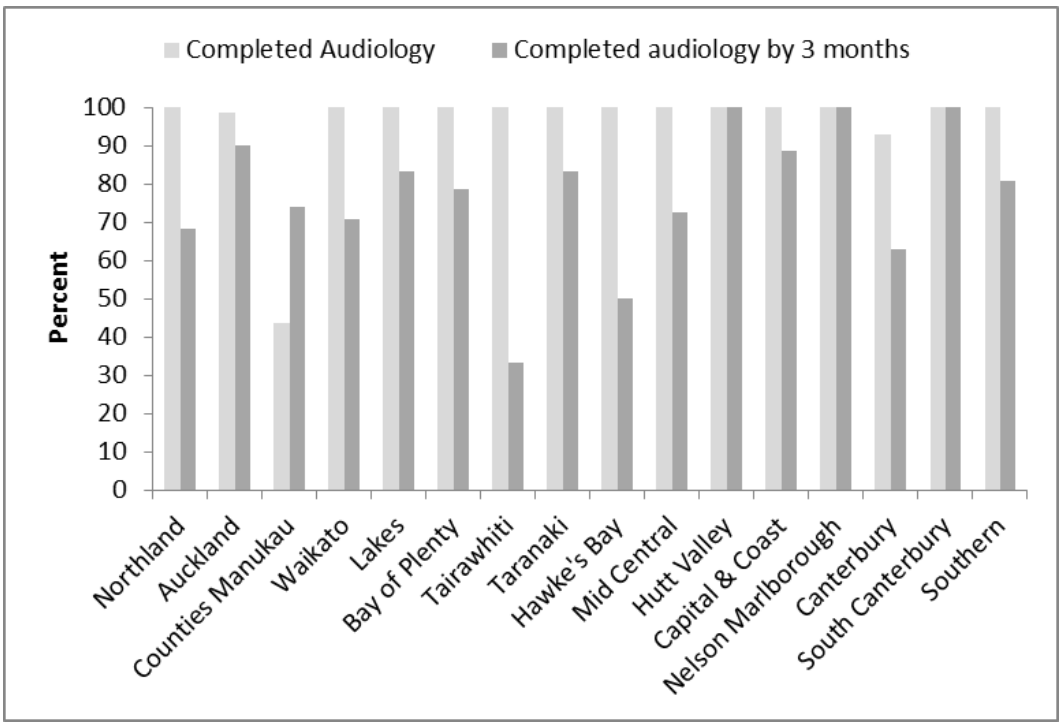
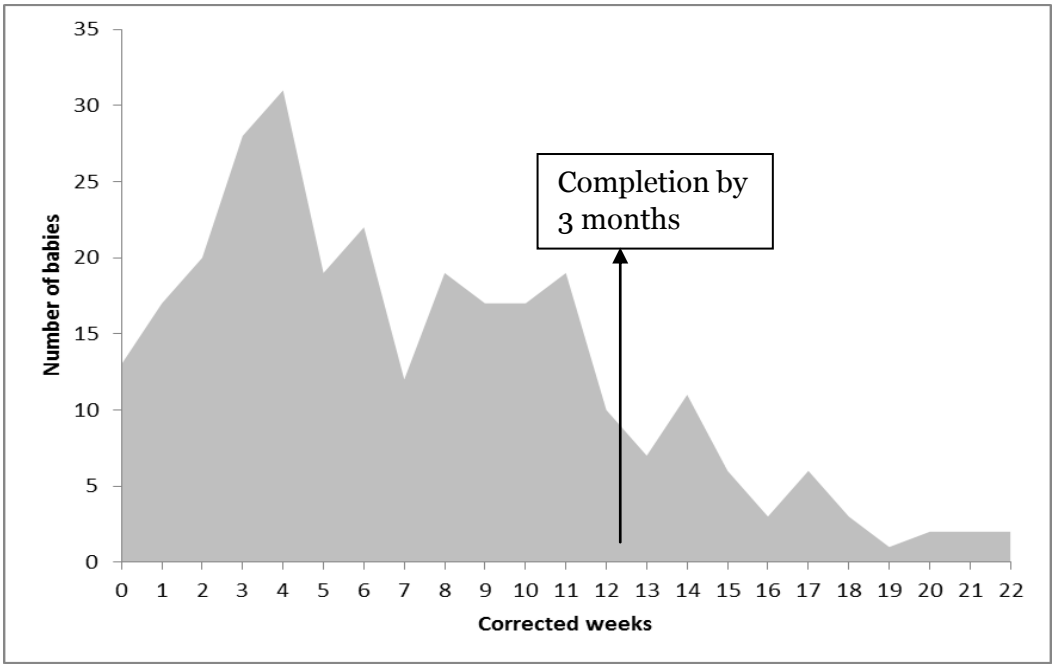


Figure 5 shows the range of completion times for babies who underwent audiology assessment. There were 17 babies out of the 304 that completed audiology who took longer than the 22 weeks shown in the graph below.

Figure 5 **Audiology completion times, January to June 2013**



Note that many of the babies who had audiology in week 0 are likely to be due to the corrected birth data being used for this indicator.

Table 26 Audiology completed by DHB, January to June 2013

	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	14	14	100.0	5	5	*	19	19	100.0
Waitemata									
Auckland	52	51	98.1	19	19	100.0	71	70	98.6
Counties Manukau	50	24	48.0	12	3	25.0	62	27	43.5
Waikato	22	22	100.0	9	9	*	31	31	100.0
Lakes	12	12	100.0	6	6	*	18	18	100.0
Bay of Plenty	7	7	*	7	7	*	14	14	100.0
Tairawhiti	3	3	*	0	0	-	3	3	*
Taranaki	4	4	*	2	2	*	6	6	*
Hawke's Bay	0	0	-	2	2	*	2	2	*
Whanganui									
Mid Central	4	4	*	7	7	100.0	11	11	100.0
Hutt Valley	10	10	100.0	4	4	100.0	14	14	100.0
Capital & Coast	24	24	100.0	11	11	100.0	35	35	100.0
Wairarapa									
Nelson Marlborough	2	2	*	0	0	-	2	2	*
West Coast									
Canterbury	20	18	90.0	9	9	*	29	27	93.1
South Canterbury	4	4	*	0	0	-	4	4	*
Southern	13	13	100.0	8	8	*	21	21	100.0
Total	**241**	**212**	**88.0**	**101**	**92**	**91.1**	**342**	**304**	**88.9**

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, January to June 2013

	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	14	9	64.3	5	4	*	19	13	68.4
Waitemata									
Auckland	51	46	90.2	19	17	89.5	70	63	90.0
Counties Manukau	24	18	75.0	3	2	*	27	20	74.1
Waikato	22	14	63.6	9	8	*	31	22	71.0
Lakes	12	10	83.3	6	5	*	18	15	83.3
Bay of Plenty	7	5	*	7	6	*	14	11	78.6
Tairawhiti	3	1	*	0	0	-	3	1	*
Taranaki	4	3	*	2	2	*	6	5	*
Hawke's Bay	0	0	-	2	1	*	2	1	*
Whanganui									
Mid Central	4	3	*	7	5	*	11	8	72.7
Hutt Valley	10	10	100.0	4	4	*	14	14	100.0
Capital & Coast	24	21	87.5	11	10	90.9	35	31	88.6
Wairarapa									
Nelson Marlborough	2	2	*	0	0	-	2	2	*
West Coast									
Canterbury	18	10	55.6	9	7	*	27	17	63.0
South Canterbury	4	4	*	0	0	-	4	4	*
Southern	13	9	69.2	8	8	*	21	17	81.0
Total	**212**	**165**	**77.8**	**92**	**79**	**85.9**	**304**	**244**	**80.3**

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 7-10 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, January to June 2013

Ethnicity	Audiology commenced	Audiology completed	Completed audiology by 3 months of age	% Completed that commenced	% Commenced that completed by 3 month of age
Māori	109	97	72	89.0	74.2
Pacific	55	40	31	72.7	77.5
Asian	46	42	36	91.3	85.7
European	124	117	98	94.4	83.8
Other ethnic groups	7	7	6	-	-
Not stated/Unspecified	1	1	1	-	-
Total	**342**	**304**	**244**	**88.9**	**80.3**

Table 29 Audiology screening completed by deprivation, January to June 2013

Deprivation	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	42	38	33	90.5	86.8
Decile 3-4	40	36	31	90.0	86.1
Decile 5-6	61	59	50	96.7	84.7
Decile 7-8	70	68	53	97.1	77.9
Decile 9-10	128	102	76	79.7	74.5
Unknown	1	1	1	-	-
Total	**342**	**304**	**244**	**88.9**	**80.3**

1.7 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 congenital 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 30 babies identified within this indicator.

Table 30 Audiology test results by DHB, January to June 2013

DHB of audiology	Right test result	Left test result	Number of babies
Auckland	Normal	Sensorineural	2
	Sensorineural	Normal	5
	Sensorineural	Sensorineural	1
Counties Manukau	Sensorineural	Normal	1
Waikato	Sensorineural	Sensorineural	4
Lakes	Mixed	Normal	1
	Sensorineural	Sensorineural	1
Bay of Plenty	Sensorineural	Sensorineural	1
Taranaki	Sensorineural	Sensorineural	1
Mid Central	Sensorineural	Sensorineural	1
Capital & Coast	Mixed	Sensorineural	1
	Sensorineural	Normal	1
	Sensorineural	Sensorineural	3
Nelson Marlborough	Normal	Sensorineural	1
	Sensorineural	Sensorineural	1
Canterbury	Mixed	Mixed	1
	Normal	Sensorineural	1
	Sensorineural	Sensorineural	1
South Canterbury	Auditory Neuropathy	Auditory Neuropathy	1
Southern	Sensorineural	Not Yet Determined	1
Total			**30**

Table 31 below indicates that 9.9% of babies that completed an audiology assessment had a permanent congenital hearing loss detected. This is similar to the previous report. Seventeen of these babies (56.7%) had a bilateral hearing loss.

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, January to June 2013

	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	14	0	0.0	5	0	*	19	0	0.0
Waitemata									
Auckland	51	5	9.8	19	3	15.8	70	8	11.4
Counties Manukau	24	0	0.0	3	1	*	27	1	3.7
Waikato	22	3	13.6	9	1	*	31	4	12.9
Lakes	12	2	16.7	6	0	*	18	2	11.1
Bay of Plenty	7	1	*	7	0	*	14	1	7.1
Tairawhiti	3	0	*	0	0	*	3	0	*
Taranaki	4	1	*	2	0	*	6	1	*
Hawke's Bay	0	0	-	2	0	*	2	0	*
Whanganui									
Mid Central	4	1	*	7	0	*	11	1	9.1
Hutt Valley	10	0	0.0	4	0	*	14	0	0.0
Capital & Coast	24	4	16.7	11	1	9.1	35	5	14.3
Wairarapa									
Nelson Marlborough	2	2	*	0	0	-	2	2	*
West Coast									
Canterbury	18	3	16.7	9	0	*	27	3	11.1
South Canterbury	4	1	*	0	0	-	4	1	*
Southern	13	0	0.0	8	1	*	21	1	4.8
Total	**212**	**23**	**10.8**	**92**	**7**	**7.6**	**304**	**30**	**9.9**

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, January to June 2013

Ethnicity	Completed audiology	Permanent congenital hearing loss	% Permanent hearing loss to completed audiology
Māori	97	9	9.3
Pacific	40	3	7.5
Asian	42	5	11.9
European	117	12	10.3
Other ethnic groups	7	1	14.3
Not stated/Unspecified	1	0	0.0
Total	**304**	**30**	**9.9**

Table 33 Permanent congenital hearing loss by deprivation, January to June 2013

Deprivation	Completed audiology	Permanent congenital hearing loss	% Permanent hearing loss to completed audiology
Decile 1-2	38	3	7.9
Decile 3-4	36	3	8.3
Decile 5-6	59	8	13.6
Decile 7-8	68	5	7.4
Decile 9-10	102	11	10.8
Unknown	1	0	0.0
Total	**304**	**30**	**9.9**

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 74 babies.

Table 34 Audiology test results by DHB of audiology, January to June 2013

DHB of audiology	Right test result	Left test result	Number of babies
Northland	Conductive Temporary	Conductive Temporary	4
	Conductive Temporary	Normal	1
Auckland	Conductive Permanent	Conductive Permanent	1
	Conductive Temporary	Conductive Temporary	9
	Conductive Temporary	Normal	3
	Normal	Conductive Temporary	3
Counties Manukau	Conductive Temporary	Conductive Temporary	1
	Conductive Temporary	Not Yet Determined	2
Waikato	Conductive Temporary	Conductive Temporary	1
	Normal	Conductive Permanent	1
	Normal	Conductive Temporary	1
Lakes	Conductive Temporary	Conductive Temporary	1
	Normal	Conductive Temporary	2
Bay of Plenty	Conductive Temporary	Conductive Temporary	3
	Normal	Conductive Permanent	1
	Normal	Conductive Temporary	1
Tairawhiti	Normal	Conductive Temporary	1
Taranaki	Conductive Temporary	Conductive Temporary	2
Mid Central	Conductive Temporary	Conductive Temporary	6
	Conductive Temporary	Normal	1
Hutt Valley	Conductive Temporary	Conductive Temporary	3
	Conductive Temporary	Normal	2
	Normal	Conductive Temporary	1
Capital & Coast	Conductive Permanent	Normal	1
	Conductive Temporary	Conductive Temporary	5
	Conductive Temporary	Normal	2
	Conductive Temporary	Not Yet Determined	1
	Normal	Conductive Temporary	1
Canterbury	Conductive Temporary	Conductive Temporary	6
	Normal	Conductive Temporary	1
Southern	Conductive Temporary	Conductive Temporary	3
	Conductive Temporary	Normal	2
	Normal	Conductive Temporary	1
Total			**74**

Table 35 identifies that 24.3% 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 but with small numbers they not reliable enough to make any strong statements.

Table 35 Conductive hearing loss by DHB, January to June 2013

	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	14	3	21.4	5	2	*	19	5	26.3
Waitemata									
Auckland	51	10	19.6	19	6	31.6	70	16	22.9
Counties Manukau	24	2	8.3	3	1	*	27	3	11.1
Waikato	22	2	9.1	9	1	*	31	3	9.7
Lakes	12	2	16.7	6	1	*	18	3	16.7
Bay of Plenty	7	3	*	7	2	*	14	5	35.7
Tairawhiti	3	1	*	0	0	*	3	1	*
Taranaki	4	0	*	2	2	*	6	2	*
Hawke's Bay	0	0	-	2	0	*	2	0	*
Whanganui									
Mid Central	4	3	*	7	4	*	11	7	63.6
Hutt Valley	10	4	40.0	4	2	*	14	6	42.9
Capital & Coast	24	6	25.0	11	4	36.4	35	10	28.6
Wairarapa									
Nelson Marlborough	2	0	*	0	0	-	2	0	*
West Coast									
Canterbury	18	4	22.2	9	3	*	27	7	25.9
South Canterbury	4	0	*	0	0	-	4	0	*
Southern	13	4	30.8	8	2	*	21	6	28.6
Total	**212**	**44**	**20.8**	**92**	**30**	**32.6**	**304**	**74**	**24.3**

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

Table 36 Conductive hearing loss by ethnicity, January to June 2013

Ethnicity	Completed audiology	Conductive hearing Loss	% Conductive hearing loss to completed audiology
Māori	97	23	23.7
Pacific	40	10	25.0
Asian	42	9	21.4
European	117	32	27.4
Other ethnic groups	7	0	-
Not stated/Unspecified	1	0	-
Total	**304**	**74**	**24.3**

Table 37 Conductive hearing loss by deprivation, January to June 2013

Deprivation	Completed audiology	Conductive hearing Loss	% Conductive hearing loss to completed audiology
Decile 1-2	38	6	15.8
Decile 3-4	36	11	30.6
Decile 5-6	59	14	23.7
Decile 7-8	68	19	27.9
Decile 9-10	102	24	23.5
Unknown	1	0	-
Total	**304**	**74**	**24.3**

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.

Of the babies that had a bilateral permanent congenital hearing loss 13 of the 17 (76%) completed audiology within three months. Four of these babies completed within 4 weeks, six within 8 weeks and three within 12 weeks.

Table 38 Count of average age at identification of hearing loss by DHB, January to June 2013

	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	1	0	0	1	1	1	0	2	2	1	0	5
Auckland	3	3	0	3	2	4	4	5	5	7	4	8	24
Counties Manukau	1	0	1	0	0	0	1	1	1	0	2	1	4
Waikato	1	1	0	0	1	1	1	2	2	2	1	2	7
Lakes	0	0	1	0	0	4	0	0	0	4	1	0	5
Bay of Plenty	1	0	0	1	0	2	2	0	1	2	2	1	6
Tairawhiti	0	0	0	0	0	0	0	1	0	0	0	1	1
Taranaki	1	0	0	1	1	0	0	0	2	0	0	1	3
Mid Central	2	0	2	0	0	2	1	1	2	2	3	1	8
Hutt Valley	1	1	0	0	1	1	0	2	2	2	0	2	6
Capital & Coast	2	1	0	2	4	1	3	2	6	2	3	4	15
Nelson Marlborough	0	0	0	0	2	0	0	0	2	0	0	0	2
Canterbury	0	1	2	0	0	0	4	3	0	1	6	3	10
South Canterbury	0	0	0	0	0	0	0	1	0	0	0	1	1
Southern	1	2	0	0	1	1	2	0	2	3	2	0	7
Total	**14**	**10**	**6**	**7**	**13**	**17**	**19**	**18**	**27**	**27**	**25**	**25**	**104**

4. Indicators not yet included in monitoring

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).

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).

4.1. 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 whā nau 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 whā nau 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 whā nau 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 whā nau.

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

Methodology

Indicator 2.1

Numerator: Number of families and whā nau of children eligible for, and

referred to, the Early Intervention education service (through 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 whā nau 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 whā nau 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.

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.

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.

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 whā nau 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 whā nau 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 whā nau 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.