MINISTRY OF HEALTH
MANATŪ HAUORA

newzealand.govt.nz

Universal Newborn Hearing Screening and Early Intervention Programme (UNHSEIP)

Monitoring Report

July – December 2013

National Screening Unit

Copyright

The copyright owner of this publication is the Ministry of Health, which is part of the New Zealand Crown. The Ministry of Health permits the reproduction of material from this publication without prior notification, provided that all the following conditions are met:

- the content is not distorted or changed
- the information is not sold
- the material is not used to promote or endorse any product or service
- the material is not used in an inappropriate or misleading context having regard to the nature of the material
- any relevant disclaimers, qualifications or caveats included in the publication are reproduced
- the New Zealand Ministry of Health is acknowledged as the source.

Disclaimer

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

Many people have assisted in the production of this report. In particular, we would like to acknowledge those who have collected this information at the DHBs, those who have entered the data, and those who have facilitated the analysis of the data.

Citation: Ministry of Health. 2014. Universal Newborn Hearing and Early Intervention Programme: Monitoring Report July to December 2013. Wellington: Ministry of Health.

Published in April 2015
by the Ministry of Health
PO Box 5013, Wellington 6145, New Zealand

ISBN 978-0478-42849-0 (online)
HP 5926

This document is available at www.nsu.govt.nz

Contents

List of Figures and Tables

Figures

Tables

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 July 2013 to 31 December 2013. Audiology data for these babies up to the end of June 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 July 2013 to December 2013

- From the offer of screening reported in DHB volume reports for this time 95.4% of live births were offered screening.
- Of the families who were offered screening, DHBs report that 0.9% declined to take up the offer.
- The NSU received newborn hearing screening data for 88.4% 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 (99.1%), once again showing minimal differences across DHBs, ethnicity or decile ratings.
- In total 26,155 babies completed newborn hearing screening in this six month period, compared with the 29,877 live births. While these figures come from different data sets, this indicates that approximately 87.5% of babies born in this period completed screening.
- Of babies who completed screening, approximately 92.8% 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. The main difference being between Māori babies (88.6%) and Asian babies (around 96.1%). There were only small variations by decile.

- The overall referral rate to audiology for this period was 2.1% (538 babies). This rate varied from 0% to 4.8% across DHBs. The referral rate for NICU/SCBU babies was 6.6%.
- Of those babies that passed screening, 4.8% 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 24.3%.
- For this period 8% of babies had a risk factor identified, with the most common risk factor being Family History (33.6% of all risk factors identified) and Jaundice Requiring Phototherapy (23.6%).
- Of those babies referred to audiology, 89% were reported to have started an audiology assessment and a further 3% of those referred have been closed due to 'did not attend' (DNA), decline or moving. This means that at the national level there is information for 92% of babies referred to audiology, which is the highest proportion of audiology data achieved to date.
- Of those babies who started audiological assessment, 77.7% had completed their assessment six months after the reporting period ended. Of those that completed 82.8% 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.
- 39 babies (11% of those that completed an audiology assessment) had a permanent congenital hearing loss identified, 25 of which were bilateral losses.
- A greater percentage of babies completing audiology were identified with a conductive hearing loss, 31% (114 babies).
- 153 babies in total were identified with some type of hearing loss. The ages at which the hearing loss was identified were: 47 by 4 weeks, 51 by 8 weeks, 31 by 12 weeks and the remaining 24 by over 12 weeks.

Table 1a Summary of newborn hearing screening indicators by DHB, July to December 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	1055	866	866	848	374	807	41	61	82.1	100.0	97.9	44.1	4.8	7.6
Waitemata	3928	3511	3496	3444	3084	3390	54	135	89.4	99.6	98.1	89.5	1.6	4.0
Auckland	3242	2995	2995	2982	2901	2899	83	127	92.4	100.0	99.6	97.3	2.8	4.4
Counties Manukau	4076	2751	2751	2684	2543	2602	82	130	67.5	100.0	97.6	94.7	3.1	5.0
Waikato	2677	2484	2484	2483	2356	2436	47	106	92.8	100.0	100.0	94.9	1.9	4.4
Lakes	714	704	704	703	655	691	12	43	98.6	100.0	99.9	93.2	1.7	6.2
Bay of Plenty	1374	1218	1216	1203	1131	1184	19	44	88.6	99.8	98.8	94.0	1.6	3.7
Tairawhiti	364	343	342	339	330	332	7	15	94.2	99.7	98.8	97.3	2.1	4.5
Taranaki	787	735	735	735	732	728	7	41	93.4	100.0	100.0	99.6	1.0	5.6
Hawke's Bay	1144	672	665	642	456	615	27	61	58.7	99.0	95.5	71.0	4.2	9.9
Whanganui	415	384	384	384	379	381	3	18	92.5	100.0	100.0	98.7	0.8	4.7
Mid Central	1064	987	984	972	857	966	6	55	92.8	99.7	98.5	88.2	0.6	5.7
Hutt Valley	986	985	985	980	970	956	24	33	99.9	100.0	99.5	99.0	2.4	3.5
Capital & Coast	1788	1817	1816	1815	1769	1768	47	119	101.6	99.9	99.9	97.5	2.6	6.7
Wairarapa	241	235	235	234	230	231	3	8	97.5	100.0	99.6	98.3	1.3	3.5
Nelson Marlborough	798	706	706	704	670	697	7	41	88.5	100.0	99.7	95.2	1.0	5.9
West Coast	184	155	155	151	133	151	0	7	84.2	100.0	97.4	88.1	0.0	4.6
Canterbury	2953	2888	2888	2883	2789	2844	39	98	97.8	100.0	99.8	96.7	1.4	3.4
South Canterbury	310	285	285	284	282	275	9	8	91.9	100.0	99.6	99.3	3.2	2.9
Southern	1777	1701	1701	1685	1635	1664	21	75	95.7	100.0	99.1	97.0	1.2	4.5
Total	**29,877**	**26,422**	**26,393**	**26,155**	**24,276**	**25,617**	**538**	**1225**	**88.4**	**99.9**	**99.0**	**92.8**	**2.1**	**4.8**

Table 1b Summary of newborn hearing screening indicators by ethnicity and deprivation, July to December 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	6346	6336	6241	5529	6087	154	392		99.8	98.3	88.6	2.5	6.4
Pacific	2544	2538	2493	2312	2401	92	108		99.8	98.0	92.7	3.7	4.5
Asian	3876	3876	3851	3699	3776	75	88		100.0	99.4	96.1	1.9	2.3
European	13,029	13,019	12,953	12,168	12,751	202	612		99.9	99.4	93.9	1.6	4.8
Other ethnic groups	566	563	557	511	543	14	20		99.5	98.4	91.7	2.5	3.7
Not stated/Unspecified	61	61	60	57	59	1	5		100.0	98.4	95.0	1.7	8.5
Total	**26,422**	**26,393**	**26,155**	**24,276**	**25,617**	**538**	**1225**		**99.9**	**99.0**	**92.8**	**2.1**	**4.8**
Deprivation													
Decile 1-2	3864	3864	3850	3690	3777	73	163		100.0	99.6	95.8	1.9	4.3
Decile 3-4	4322	4317	4294	4030	4225	69	156		99.9	99.4	93.9	1.6	3.7
Decile 5-6	5267	5265	5216	4902	5135	81	220		100.0	99.0	94.0	1.6	4.3
Decile 7-8	6283	6274	6226	5707	6105	121	316		99.9	99.1	91.7	1.9	5.2
Decile 9-10	6652	6639	6535	5916	6341	194	368		99.8	98.2	90.5	3.0	5.8
Unknown	34	34	34	31	34	0	2		100.0	100.0	91.2	0.0	5.9
Total	**26,422**	**26,393**	**26,155**	**24,276**	**25,617**	**538**	**1225**		**99.9**	**99.0**	**92.8**	**2.1**	**4.8**

Table 2a Summary of newborn hearing audiology indicators by DHB, July to December 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	44	27	17	0	12	61.4	63.0	0.0	44.4
Waitemata									
Auckland	112	108	105	10	24	96.4	97.2	9.3	22.2
Counties Manukau	76	38	16	2	6	50.0	42.1	5.3	15.8
Waikato	36	19	15	3	6	52.8	78.9	15.8	31.6
Lakes	11	8	7	0	1	72.7	87.5	0.0	12.5
Bay of Plenty	19	11	10	2	4	57.9	90.9	18.2	36.4
Tairawhiti	4	3	2	2		75.0	66.7	66.7	0.0
Taranaki	8	6	6	1	4	75.0	100.0	16.7	66.7
Hawke's Bay	23	15	10	0	5	65.2	66.7	0.0	33.3
Whanganui									
Mid Central	7	7	7		7	100.0	100.0	0.0	100.0
Hutt Valley	28	27	27	7	11	96.4	100.0	25.9	40.7
Capital & Coast	38	36	35	4	16	94.7	97.2	11.1	44.4
Wairarapa									
Nelson Marlborough	8	7	7	1		87.5	100.0	14.3	0.0
West Coast									
Canterbury	41	38	23	4	16	92.7	60.5	10.5	42.1
South Canterbury	5	5	5	1		100.0	100.0	20.0	0.0
Southern	19	17	16	2	2	89.5	94.1	11.8	11.8
Total	**479**	**372**	**308**	**39**	**114**	**77.7**	**82.8**	**10.5**	**30.6**

Note: Waitemata, Whanganui and West Coast all contract other DHBs to undertake their audiology.

Table 2b Summary of newborn hearing audiology indicators by ethnicity and deprivation, July to December 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	126	83	65	9	34	65.9	78.3	10.8	41.0
Pacific	81	55	44	8	18	67.9	80.0	14.5	32.7
Asian	67	63	58	5	12	94.0	92.1	7.9	19.0
European	190	159	131	16	47	83.7	82.4	10.1	29.6
Other ethnic groups	14	12	10	1	3	80.0	83.3	8.3	25.0
Not stated/Unspecified	1	0	0	0	0	-	-	-	-
Total	**479**	**372**	**308**	**39**	**114**	**77.7**	**82.8**	**10.5**	**30.6**
Deprivation									
Decile 1-2	65	50	40	4	20	76.9	80.0	8.0	40.0
Decile 3-4	60	52	44	8	6	86.7	84.6	15.4	11.5
Decile 5-6	69	60	51	7	15	87.0	85.0	11.7	25.0
Decile 7-8	111	92	84	10	32	82.9	91.3	10.9	34.8
Decile 9-10	174	118	89	10	41	67.8	75.4	8.5	34.7
Total	**479**	**372**	**308**	**39**	**114**	**77.7**	**82.8**	**10.5**	**30.6**

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.

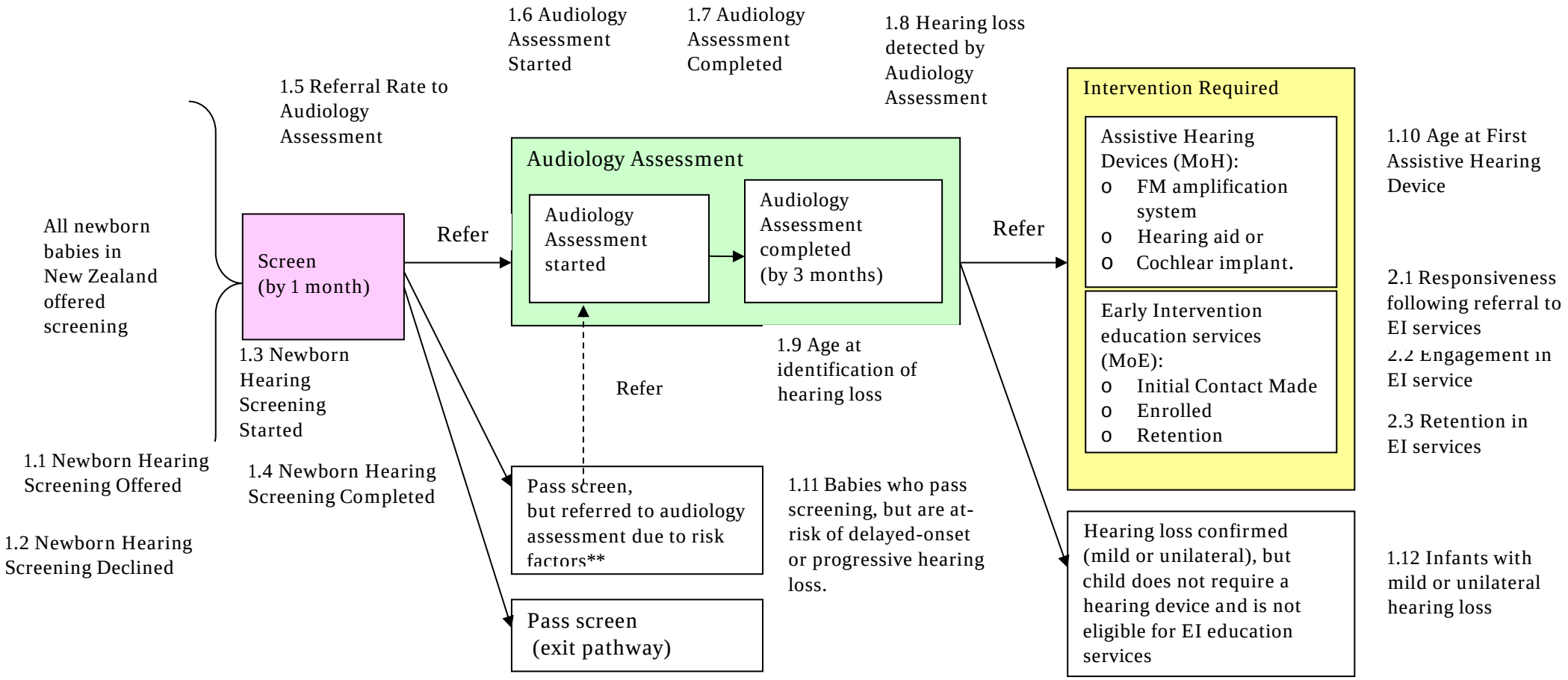
In 2007, a Monitoring Framework, centred around the Programme goals, was developed (http://www.nsu.govt.nz/health-professionals/3824.aspx). A Monitoring Framework is a plan for the routine, systematic collection and recording of information about aspects of the programme over time. The purpose is to 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 July 2013 through to 31 December 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

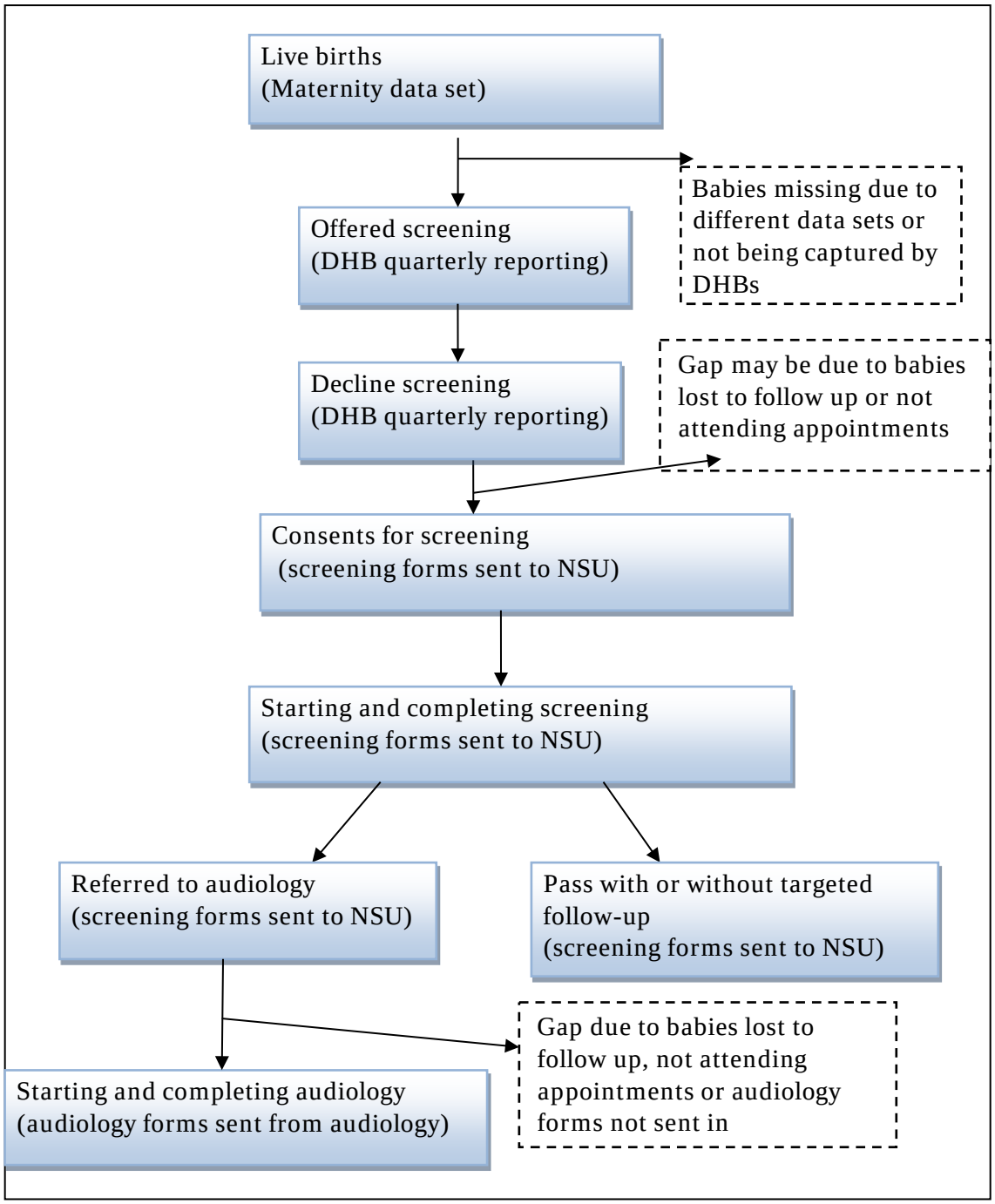
Newborn hearing screening and follow up audiology information is captured by the Ministry of Health's National Screening Unit (NSU) in two ways. Some DHBs collect and recorded this information on paper forms, which are regularly submitted NSU and the data is entered into the NSU's database. An increasing number of DHBs submit their data electronically which is then uploaded 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 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 general comparison as represented in the diagram below. Key points at which data for babies may be missing and the possible contributing reasons are provided.


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 July 2013 and 31 December 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 data form was implemented in April/May 2010. The data 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 as this is not captured within the NSU database. The data for early intervention also suits an annual report due to the goal of initiation of early intervention education services by 6 months of age.

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 five babies. Four ethnicities were recorded for 67 babies and three ethnicities were recorded for 3% of babies (n=757). Two ethnicities were recorded for 20% of babies (n=5164) and the remaining 77% 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=226). 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. 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 provided to the NSU, manual data entry occurs directly into the national database. Data 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 NSU 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, are 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 479 of the 538 babies that were referred for audiology assessment. A further 16 babies were identified as 'Did not attend' (DNA), declined or moved.

For this report, completed audiology has been described as a valid result in both ears for any baby starting audiology. This is an additional description compared with previous reports, where completion was based on the completed audiology date field in the database. While this date is an accurate reflection of completion for most records, it is not for those babies who have more than one audiology appointment and have one or more "not yet determined" result at the time of data extraction. These babies are still progressing through audiology, and the additional description enables them to be identified.

Denominator

For the purpose of this report, births are sourced from the National Maternity Database. This database combines information from live birth registrations from the Births, Deaths and Marriages (BDM) Register along with hospital discharge information and Lead Maternity Carer claims. This provides a much more complete data set than just the BDM Register 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 dataset denominator is based on the babies domiciled DHB not the DHB where the baby is born. There can therefore be some variation.

For audiology the data is reported as the DHB where the audiology takes place. This is 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 describes this flow for babies who started audiology.

Hawke's Bay DHB

Between July and December 2013 lower levels of screening of newborn babies was performed by Hawke's Bay DHB, with 642 babies being screened (compared with almost 1100 in historical reporting periods). During this time the newborn hearing screening service was being re-established and a new screening team trained. Families of babies who were not screened as a newborn during this time were offered screening at extra outpatient clinics.

While the Hawke's Bay DHB data are included in this report for completeness of reporting, statistical comparisons across periods cannot be made.

3. Monitoring Indicators

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

3.1. Offer of Newborn Hearing Screening

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

From the offer of screening reported in DHB quarterly reports for this time 95.4% of live births were offered screening. This is a slight decrease from the 97.5 % in the previous reporting period.

Across the DHBs the proportion of offers of screening to live births was generally between 79% to over 100%. The low rates for Counties Manukau DHB and Waitemata DHB are offset by the greater than 100% rate for Auckland DHB (see discussion below).

Table 4 Offer of screening by DHB, July to December 2013

DHB	Live births	Offered screening	Percentage offered
Northland	1,055	1003	95.1
Waitemata	3,928	3391	86.3
Auckland	3,242	3977	122.7
Counties Manukau	4,076	3220	79.0
Waikato	2,677	2521	94.2
Lakes	714	713	99.9
Bay of Plenty	1,374	1150	83.7
Tairawhiti	364	347	95.3
Taranaki	787	744	94.5
Hawke's Bay	1,144	980	85.7
Whanganui	415	438	105.5
Mid Central	1,064	1088	102.3
Hutt Valley	986	1001	101.5
Capital & Coast	1,788	1857	103.9
Wairarapa	241	259	107.5
Nelson Marlborough	798	708	88.7
West Coast	184	163	88.6
Canterbury	2,953	2953	100.0
South Canterbury	310	297	95.8
Southern	1,777	1690	95.1
Total	**29,877**	**28,500**	**95.4**

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 DHB. When the three Auckland region DHBs are combined the rate of offers to live births is 94%. 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, July to December 2013

	Live births	Consents	Difference	Percent
Ethnicity	**N**	**N**	**N**	**%**
Māori	7,852	6,346	1,506	80.8
Pacific	3,261	2,544	717	78.0
Asian	4,255	3,876	379	91.1
European	13,876	13,029	847	93.9
Not Stated/Unspecified/Other	633	627	6	99.1
Total	**29,877**	**26,422**	**3,455**	**88.4**

Table 6 does not show any strong trend from Decile 1- 10 with regards to the proportion of babies who consent compared to live births. 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, July to December 2013

	Live births	Consents	Difference	Percent
Deprivation	**N**	**N**	**N**	**%**
Decile 1-2	4338	3864	474	89.1
Decile 3-4	4783	4322	461	90.4
Decile 5-6	5855	5267	588	90.0
Decile 7-8	6704	6283	421	93.7
Decile 9-10	8171	6652	1519	81.4
Unknown	26	34	-8	-
Total	**29,877**	**26,422**	**3455**	**88.4**

1.2 Newborn hearing screen declined

Description

The proportion of newborns whose parents / guardian decline screening.

Relevant outcome

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

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

Rationale

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

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

Methodology

Indicator 1.2

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

Notes

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

3.3. Newborn Hearing Screening Declined

At this time, the decline of newborn hearing screening is reported through DHB contractual reporting to the NSU. 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 DHB at 3.6%; this has been consistent for past reports but the percentage is decreasing with each reporting period.

Table 7 Decline of screening by DHB, July to December 2013

DHB	Offered screening	Declined screening	Percentage declined
Northland	1003	36	3.6
Waitemata	3391	20	0.6
Auckland	3977	33	0.8
Counties Manukau	3220	9	0.3
Waikato	2521	19	0.8
Lakes	713	4	0.6
Bay of Plenty	1150	34	3.0
Tairawhiti	347	0	0.0
Taranaki	744	3	0.4
Hawkes Bay	980	14	1.4
Whanganui	438	0	0.0
MidCentral	1088	7	0.6
Hutt Valley	1001	9	0.9
Capital & Coast	1857	10	0.5
Wairarapa	259	3	1.2
Nelson Marlborough	708	9	1.3
West Coast	163	2	1.2
Canterbury	2953	35	1.2
South Canterbury	297	3	1.0
Southern	1690	15	0.9
Total	**28,500**	**265**	**0.9**

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, July to December 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	772	772	100.0	94	94	100.0	866	866	100.0
Waitemata	3328	3314	99.6	183	182	99.5	3511	3496	99.6
Auckland	2768	2768	100.0	227	227	100.0	2995	2995	100.0
Counties Manukau	2595	2595	100.0	156	156	100.0	2751	2751	100.0
Waikato	2291	2291	100.0	193	193	100.0	2484	2484	100.0
Lakes	635	635	100.0	69	69	100.0	704	704	100.0
Bay of Plenty	1104	1102	99.8	114	114	100.0	1218	1216	99.8
Tairawhiti	317	317	100.0	26	25	96.2	343	342	99.7
Taranaki	669	669	100.0	66	66	100.0	735	735	100.0
Hawke's Bay	606	599	98.8	66	66	100.0	672	665	99.0
Whanganui	352	352	100.0	32	32	100.0	384	384	100.0
Mid Central	868	865	99.7	119	119	100.0	987	984	99.7
Hutt Valley	870	870	100.0	115	115	100.0	985	985	100.0
Capital & Coast	1606	1605	99.9	211	211	100.0	1817	1816	99.9
Wairarapa	225	225	100.0	10	10	100.0	235	235	100.0
Nelson Marlborough	676	676	100.0	30	30	100.0	706	706	100.0
West Coast	153	153	100.0	2	2	100.0	155	155	100.0
Canterbury	2623	2623	100.0	265	265	100.0	2888	2888	100.0
South Canterbury	281	281	100.0	4	4	100.0	285	285	100.0
Southern	1563	1563	100.0	138	138	100.0	1701	1701	100.0
Total	**24,302**	**24,275**	**99.9**	**2120**	**2118**	**99.9**	**26,422**	**26,393**	**99.9**

Table 9 Newborn hearing screening started compared with consents to screening by ethnicity, July to December 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	5730	5721	99.8	616	615	99.8	6346	6336	99.8
Pacific	2370	2364	99.7	174	174	100.0	2544	2538	99.8
Asian	3635	3635	100.0	241	241	100.0	3876	3876	100.0
European	11,990	11,981	99.9	1039	1038	99.9	13,029	13,019	99.9
Other ethnic groups	522	519	99.4	44	44	100.0	566	563	99.5
Not stated/Unspecified	55	55	100.0	6	6	100.0	61	61	100.0
Total	**24,302**	**24,275**	**99.9**	**2120**	**2118**	**99.9**	**26,422**	**26,393**	**99.9**

Table 10 Newborn hearing screening started compared with consents to screening by deprivation, July to December 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	3582	3582	100.0	282	282	100.0	3864	3864	100.0
Decile 3-4	4020	4015	99.9	302	302	100.0	4322	4317	99.9
Decile 5-6	4848	4846	100.0	419	419	100.0	5267	5265	100.0
Decile 7-8	5778	5770	99.9	505	504	99.8	6283	6274	99.9
Decile 9-10	6045	6033	99.8	607	606	99.8	6652	6639	99.8
Unknown	29	29	100.0	5	5	100.0	34	34	100.0
Total	**24,302**	**24,275**	**99.9**	**2120**	**2118**	**99.9**	**26,422**	**26,393**	**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 26,155 babies completed newborn hearing screening in this six month period, compared with the 29,877 live births. While these figures come from different data sets, this indicates that approximately 87.5% of babies born in this period completed screening.

Completed screening after starting

Overall, 99.1% of babies who started screening completed, and 92.8% 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 a little higher proportion of babies completing by one month (89.4% 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 DHB (44.1%) and Hawke's Bay DHB (71%) the remaining DHBs had completion rates at one month of 88% or more, as shown in Table 12. Northland DHB has consistently has the lowest rates for this indicator.

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 539 babies (2% of screened babies) were largely screened between 8 weeks and 52 weeks, with the 6 babies taking longer than 52 weeks, however the numbers are too small to be included in Figure 3. The majority of these screens were completed by 14 weeks (46 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, July to December 2013**

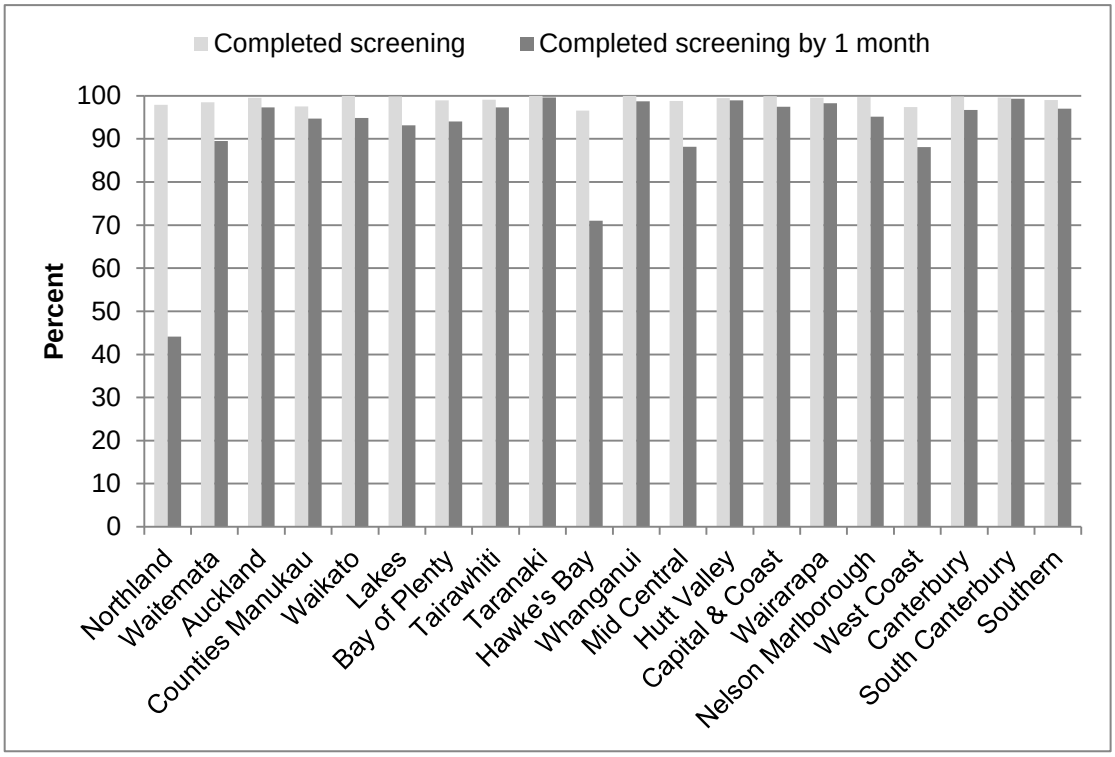
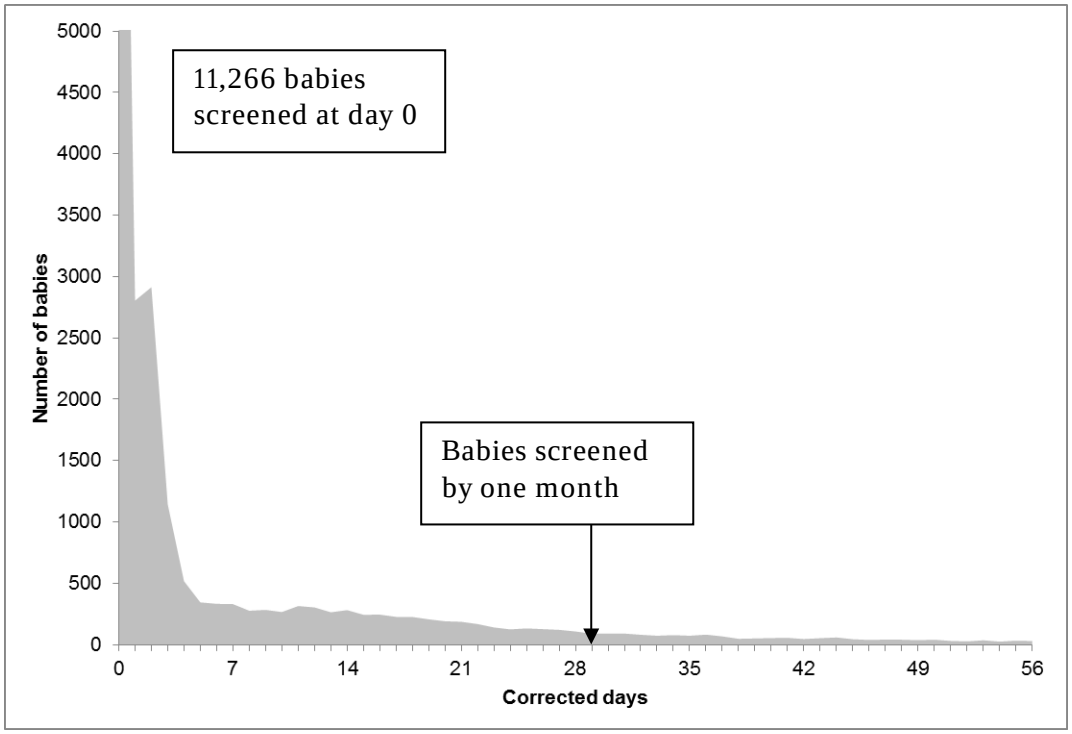


Figure 3 **Spread of screening completion times in days, July to December 2013**



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, July to December 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	772	754	97.7	94	94	100.0	866	848	97.9
Waitemata	3314	3262	98.4	182	182	100.0	3496	3444	98.5
Auckland	2768	2755	99.5	227	227	100.0	2995	2982	99.6
Counties Manukau	2595	2529	97.5	156	155	99.4	2751	2684	97.6
Waikato	2291	2290	100.0	193	193	100.0	2484	2483	100.0
Lakes	635	634	99.8	69	69	100.0	704	703	99.9
Bay of Plenty	1102	1089	98.8	114	114	100.0	1216	1203	98.9
Tairawhiti	317	314	99.1	25	25	100.0	342	339	99.1
Taranaki	669	669	100.0	66	66	100.0	735	735	100.0
Hawke's Bay	599	577	96.3	66	65	98.5	665	642	96.5
Whanganui	352	352	100.0	32	32	100.0	384	384	100.0
Mid Central	865	854	98.7	119	118	99.2	984	972	98.8
Hutt Valley	870	866	99.5	115	114	99.1	985	980	99.5
Capital & Coast	1605	1604	99.9	211	211	100.0	1816	1815	99.9
Wairarapa	225	224	99.6	10	10	100.0	235	234	99.6
Nelson Marlborough	676	674	99.7	30	30	100.0	706	704	99.7
West Coast	153	149	97.4	2	2	100.0	155	151	97.4
Canterbury	2623	2619	99.8	265	264	99.6	2888	2883	99.8
South Canterbury	281	280	99.6	4	4	100.0	285	284	99.6
Southern	1563	1547	99.0	138	138	100.0	1701	1685	99.1
Total	**24,275**	**24,042**	**99.0**	**2118**	**2113**	**99.8**	**26,393**	**26,155**	**99.1**

Table 12 Newborn hearing screening completed by one month of age by DHB, July to December 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	754	308	40.8	94	66	70.2	848	374	44.1
Waitemata	3262	2906	89.1	182	178	97.8	3444	3084	89.5
Auckland	2755	2681	97.3	227	220	96.9	2982	2901	97.3
Counties Manukau	2529	2391	94.5	155	152	98.1	2684	2543	94.7
Waikato	2290	2166	94.6	193	190	98.4	2483	2356	94.9
Lakes	634	591	93.2	69	64	92.8	703	655	93.2
Bay of Plenty	1089	1019	93.6	114	112	98.2	1203	1131	94.0
Tairawhiti	314	306	97.5	25	24	96.0	339	330	97.3
Taranaki	669	666	99.6	66	66	100.0	735	732	99.6
Hawke's Bay	577	405	70.2	65	51	78.5	642	456	71.0
Whanganui	352	348	98.9	32	31	96.9	384	379	98.7
Mid Central	854	747	87.5	118	110	93.2	972	857	88.2
Hutt Valley	866	858	99.1	114	112	98.2	980	970	99.0
Capital & Coast	1604	1562	97.4	211	207	98.1	1815	1769	97.5
Wairarapa	224	221	98.7	10	9	90.0	234	230	98.3
Nelson Marlborough	674	641	95.1	30	29	96.7	704	670	95.2
West Coast	149	131	87.9	2	2	100.0	151	133	88.1
Canterbury	2619	2527	96.5	264	262	99.2	2883	2789	96.7
South Canterbury	280	278	99.3	4	4	100.0	284	282	99.3
Southern	1547	1499	96.9	138	136	98.6	1685	1635	97.0
Total	**24,042**	**22,251**	**92.6**	**2113**	**2025**	**95.8**	**26,155**	**24,276**	**92.8**

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 Maori babies. When looking at the data by decile, there are higher completion rates in deciles 1-6 compared to deciles 7-10.

Table 13 Newborn hearing screening completed by ethnicity, July to December 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	6336	6241	5529	98.5	88.6
Pacific	2538	2493	2312	98.2	92.7
Asian	3876	3851	300699	99.4	96.1
European	13,019	12,953	12,168	99.5	93.9
Other ethnic groups	563	557	511	98.9	91.7
Not stated/Unspecified	61	60	57	98.4	95.0
Total	**26,393**	**26,155**	**24,276**	**99.1**	**92.8**

Table 14 Newborn hearing screening completed by deprivation, July to December 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	3864	3850	3690	99.6	95.8
Decile 3-4	4317	4294	4030	99.5	93.9
Decile 5-6	5265	5216	4902	99.1	94.0
Decile 7-8	6274	6226	5707	99.2	91.7
Decile 9-10	6639	6535	5916	98.4	90.5
Unknown	34	34	31	100.0	91.2
Total	**26,393**	**26,155**	**24,276**	**99.1**	**92.8**

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 2.1% as detailed by DHBs in Table 15 below. This rate has sat around 1.7% for the last few years and has just risen slightly in this reporting period.

All DHBs, with the exception of West Coast, had referrals to audiology for this period. The Northland DHB referral rate was back up to 4.8% after dropping to 2.9% last period. All other DHBs, except Hawke's Bay at 4.2%, have rates between 0% and 3.2%.

Admission to NICU/SCBU (for 48 hours or more) resulted in a higher proportion of referrals to audiology, at an average of 6.6% as show in Table 15, very similar to the last few 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, July to December 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	754	31	4.1	94	10	10.6	848	41	4.8
Waitemata	3262	49	1.5	182	5	2.7	3444	54	1.6
Auckland	2755	61	2.2	227	22	9.7	2982	83	2.8
Counties Manukau	2529	67	2.6	155	15	9.7	2684	82	3.1
Waikato	2290	40	1.7	193	7	3.6	2483	47	1.9
Lakes	634	8	1.3	69	4	5.8	703	12	1.7
Bay of Plenty	1089	10	0.9	114	9	7.9	1203	19	1.6
Tairawhiti	314	7	2.2	25	0	0.0	339	7	2.1
Taranaki	669	6	0.9	66	1	1.5	735	7	1.0
Hawke's Bay	577	20	3.5	65	7	10.8	642	27	4.2
Whanganui	352	0	0.0	32	3	9.4	384	3	0.8
Mid Central	854	3	0.4	118	3	2.5	972	6	0.6
Hutt Valley	866	18	2.1	114	6	5.3	980	24	2.4
Capital & Coast	1604	25	1.6	211	22	10.4	1815	47	2.6
Wairarapa	224	2	0.9	10	1	10.0	234	3	1.3
Nelson Marlborough	674	4	0.6	30	3	10.0	704	7	1.0
West Coast	149	0	0.0	2	0	0.0	151	0	0.0
Canterbury	2619	28	1.1	264	11	4.2	2883	39	1.4
South Canterbury	280	7	2.5	4	2	50.0	284	9	3.2
Southern	1547	12	0.8	138	9	6.5	1685	21	1.2
Total	**24,042**	**398**	**1.7**	**2113**	**140**	**6.6**	**26,155**	**538**	**2.1**

Table 16 Referral to audiology by ethnicity, July to December 2013

Ethnicity	Number completed screening	Number referred to audiology	% Completed screening that were referred
Māori	6241	154	2.5
Pacific	2493	92	3.7
Asian	3851	75	1.9
European	12,953	202	1.6
Other ethnic groups	557	14	2.5
Not stated/Unspecified	60	1	1.7
Total	**26,155**	**538**	**2.1**

Table 17 Referral to audiology by deprivation, July to December 2013

Deprivation	Number completed screening	Number referred to audiology	% Completed screening that were referred
Decile 1-2	3850	73	1.9
Decile 3-4	4294	69	1.6
Decile 5-6	5216	81	1.6
Decile 7-8	6226	121	1.9
Decile 9-10	6535	194	3.0
Unknown	34	0	0.0
Total	**26,155**	**538**	**2.1**

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 4.8% 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 UNHSEIP data form. This is virtually the same percentage as the last few 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 Hawke's Bay DHB (9.9%) and Northland DHB (7.6%), Northland DHB consistently has higher rates than other DHBs.

As would be expected, admission to NICU/SCBU (for 48 hours or more) resulted in a higher proportion of babies for targeted follow-up (24.3%).

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. 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, July to December 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	723	28	3.9	84	33	39.3	807	61	7.6
Waitemata	3213	91	2.8	177	44	24.9	3390	135	4.0
Auckland	2694	54	2.0	205	73	35.6	2899	127	4.4
Counties Manukau	2462	87	3.5	140	43	30.7	2602	130	5.0
Waikato	2250	61	2.7	186	45	24.2	2436	106	4.4
Lakes	626	30	4.8	65	13	20.0	691	43	6.2
Bay of Plenty	1079	25	2.3	105	19	18.1	1184	44	3.7
Tairawhiti	307	12	3.9	25	3	12.0	332	15	4.5
Taranaki	663	22	3.3	65	19	29.2	728	41	5.6
Hawke's Bay	557	41	7.4	58	20	34.5	615	61	9.9
Whanganui	352	13	3.7	29	5	17.2	381	18	4.7
Mid Central	851	42	4.9	115	13	11.3	966	55	5.7
Hutt Valley	848	20	2.4	108	13	12.0	956	33	3.5
Capital & Coast	1579	58	3.7	189	61	32.3	1768	119	6.7
Wairarapa	222	5	2.3	9	3	33.3	231	8	3.5
Nelson Marlborough	670	34	5.1	27	7	25.9	697	41	5.9
West Coast	149	7	4.7	2	0	0.0	151	7	4.6
Canterbury	2591	61	2.4	253	37	14.6	2844	98	3.4
South Canterbury	273	7	2.6	2	1	50.0	275	8	2.9
Southern	1535	47	3.1	129	28	21.7	1664	75	4.5
Total	**23,644**	**745**	**3.2**	**1973**	**480**	**24.3**	**25,617**	**1225**	**4.8**

Table 19 Proportion of targeted follow-up by ethnicity, July to December 2013

Ethnicity	Passed screening	Passed -targeted follow-up required	Targeted follow-up proportion
Māori	6087	392	6.4
Pacific	2401	108	4.5
Asian	3776	88	2.3
European	12,751	612	4.8
Other ethnic groups	543	20	3.7
Not stated/Unspecified	59	5	8.5
Total	**25,617**	**1225**	**4.8**

Table 20 Proportion of targeted follow-up by deprivation, July to December 2013

Deprivation	Passed screening	Passed -targeted follow-up required	Targeted follow-up proportion
Decile 1-2	3777	163	4.3
Decile 3-4	4225	156	3.7
Decile 5-6	5135	220	4.3
Decile 7-8	6105	316	5.2
Decile 9-10	6341	368	5.8
Unknown	34	2	5.9
Total	**25,617**	**1225**	**4.8**

3.8. Risk Factors

For the period of this report, 2121 (8%) 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 around 8%. From the tables above, 1,225 (4.7%) 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" (33.6%) followed by "Jaundice Requiring Phototherapy" (23.6%) during this reporting period, this is the same two risk factors that has consistently had the highest rates. These two risk factors accounted for 3.3% and 2.3% 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% it now sits closer to 34%.

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 (9.4% for this period).
- Craniofacial anomalies initially decreased from 13% to 7.3% and now remains steady around 5-6% (a little higher at 7.1% in this report).
- TORCH/S with remains lower after an initial decrease from 11% it has stayed around the 3-4% mark 2.9% 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 3-4%.

Table 21 Frequency of risk factors, July to December 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	869	33.6	3.3
Jaundice Requiring Phototherapy	610	23.6	2.3
Nicu more than 5 days	267	10.3	1.0
Ventilation	244	9.4	0.9
Cranio-facial Anomalies	183	7.1	0.7
Head Trauma	87	3.4	0.3
Other	82	3.2	0.3
TORCH/S	76	2.9	0.3
Bacterial/Viral Meningitis	57	2.2	0.2
Syndrome	41	1.6	0.2
Jaundice Transfusion Level	39	1.5	0.1
Jaundice Any Level	32	1.2	0.1

Of the 2121 babies with one or more risk factors recorded, 84% had one risk factor, 11% had two, 4% had three, just under 1% of babies had four and only eight 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, 538 babies did not pass screening and were referred to audiology; and audiology information was provided to the NSU for 479 of these babies. The proportion of babies for which we have audiology data has increased from around 57% in previous reports up to 76% in the last reporting period and now sitting at 89% for this reporting period. This is due to a much larger proportion of audiology data being sent to the NSU. The NSU continues to work with DHBs to improve the completeness of audiology data for future monitoring reports. For this period we also know that a further 3% of babies referred to audiology do not have a result due to 'did not attend' (DNA), decline or moved.

There were referrals from all DHBs this period except West Coast. 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 identify where babies who are domiciled within their DHB receive other screening and audiology services. The data in the table is based on the 479 babies who started audiology. To understand how many babies for instance had audiology tests in Auckland DHB, the 112 babies (see table 26) is made up of 68 babies domiciled in Auckland, 40 domiciled in Waitemata DHB, two in Whanganui DHB, one in Counties Manukau DHB and one in Hutt Valley DHB.

Table 22 Comparison for DHB of domicile with initial screen and audiology test for babies who commenced audiology, July to December 2013

DHB of birth*	No.	DHB of initial screening	No.	DHB of audiology test	No.
Northland	41	Northland	41	Northland	41
Waitemata	41	Waitemata	32	Northland	1
		Auckland	8	Auckland	40
		Northland	1		
Auckland	70	Auckland	65	Auckland	67
		Counties Manukau	1	Counties Manukau	1
		Waitemata	2	Northland	2
		Northland	2		
Counties Manukau	78	Counties Manukau	62	Counties Manukau	75
		Auckland	16	Waitemata	1
				Capital & Coast	1
				Auckland	1
Waikato	35	Waikato	34	Lakes	1
		Auckland	1	Waikato	33
				Bay of Plenty	1

DHB of birth*	No.	DHB of initial screening	No.	DHB of audiology test	No.
Lakes	11	Lakes	11	Lakes	10
				Waikato	1
Bay of Plenty	18	Bay of Plenty	16	Bay of Plenty	18
		Auckland	2		
Tairawhiti	7	Tairawhiti	7	Tairawhiti	4
				Waikato	2
				Hawkes Bay	1
Taranaki	7	Taranaki	7	Taranaki	7
Hawke's Bay	19	Hawke's Bay	19	Hawke's Bay	19
Whanganui	3	Whanganui	2	Auckland	2
		Capital & Coast	1	Taranaki	1
Mid Central	6	Mid Central	6	Mid Central	6
Hutt Valley	22	Hutt Valley	22	Hutt Valley	20
				Auckland	1
				Canterbury	1
Capital & Coast	47	Capital & Coast	36	Capital & Coast	37
		Hutt Valley	4	Hutt Valley	5
		Hawkes Bay	2	Hawkes Bay	3
		Mid Central	1	Mid Central	1
		Nelson Marlborough	1	Nelson Marlborough	1
		Whanganui	1		
		Auckland	2		
Wairarapa	3	Wairarapa	3	Hutt Valley	3
Nelson Marlborough	6	Nelson Marlborough	6	Taranaki	6
Canterbury	38	Canterbury	38	Canterbury	38
South Canterbury	7	South Canterbury	5	South Canterbury	5
		Canterbury	2	Canterbury	2
Southern	20	Southern	19	Southern	19
		Canterbury	1	Nelson Marlborough	1
		Total	479		479

*DHB of birth refers to the address where the baby was born

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.

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.

In Northland DHB, all babies referred to audiology did start their audiology assessment. This was also the case for Tairawhiti, Taranaki, Mid Central, Hutt Valley, Capital and Coast and Wairarapa DHBs. The lowest rates of starting were seen in Hawke's Bay (70%), Waikato (75%) and Waitemata (76%) DHBs.

Now that more data is available, the results by ethnicity are not so clear. When there was less data available, Maori babies appeared to be most likely to start audiology following referral. In the last report (and this report) Maori babies referred to audiology are least likely to start (82%) compared to 94% for European babies.

The differences by decile are less clear with the lowest rates of beginning audiology following referral in deciles 5-6.

Table 23 Commenced audiology assessment by DHB, July to December 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	31	31	100.0	10	10	100.0	41	41	100.0
Waitemata	49	37	75.5	5	4	-	54	41	75.9
Auckland	61	50	82.0	22	20	90.9	83	70	84.3
Counties Manukau	67	64	95.5	15	14	93.3	82	78	95.1
Waikato	40	29	72.5	7	6	-	47	35	74.5
Lakes	8	7	-	4	4	-	12	11	91.7
Bay of Plenty	10	9	90.0	9	9	-	19	18	94.7
Tairawhiti	7	7	-	0	0	.	7	7	-
Taranaki	6	6	-	1	1	-	7	7	-
Hawke's Bay	20	15	75.0	7	4	-	27	19	70.4
Whanganui	0	0	.	3	3	-	3	3	-
Mid Central	3	3	-	3	3	-	6	6	-
Hutt Valley	18	16	88.9	6	6	-	24	22	91.7
Capital & Coast	25	25	100.0	22	22	100.0	47	47	100.0
Wairarapa	2	2	-	1	1	-	3	3	-
Nelson Marlborough	4	4	-	3	2	-	7	6	-
West Coast	0	0	-	0	0	-	0	0	-
Canterbury	28	27	96.4	11	11	100.0	39	38	97.4
South Canterbury	7	5	-	2	2	-	9	7	-
Southern	12	11	91.7	9	9	-	21	20	95.2
Total	**398**	**348**	**87.4**	**140**	**131**	**93.6**	**538**	**479**	**89.0**

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

Table 24 Commenced audiology assessment by ethnicity, July to December 2013

Ethnicity	Refer for audiology	Commenced audiology assessment	% Commenced audiology assessment to refer for audiology
Māori	154	126	81.8
Pacific	92	81	88.0
Asian	75	67	89.3
European	202	190	94.1
Other ethnic groups	14	14	100.0
Not stated/Unspecified	1	1	-
Total	**538**	**479**	**89.0**

Table 25 Commenced audiology assessment by decile, July to December 2013

Deprivation	Refer for audiology	Commenced audiology assessment	% Commenced audiology assessment to refer for audiology
Decile 1-2	73	65	89.0
Decile 3-4	69	60	87.0
Decile 5-6	81	69	85.2
Decile 7-8	121	111	91.7
Decile 9-10	194	174	89.7
Unknown	0	0	-
Total	**538**	**479**	**89.0**

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 complete 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

This section identifies audiology assessments completed as those that have a valid diagnosis in both ears. This means that the percentage of audiology assessments completed in this report is less than in previous reporting periods. This is explained in more detail in the data issues section 2.4.

Audiologists are encouraged to send in both initial and completed assessment forms if the assessment is not completed on the same day.

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.

Percentages of completions to commencing nationally was 78%. Rates were lowest in Counties Manukau (50%) and Waikato (53%) DHBs. Five DHBs had numbers too low to report a valid rate. Completion rates at three months, for those that completed, were 83% nationally; the lowest rates were seen for Counties Manukau DHB (42%), Canterbury DHB (61%) and Northland DHB (63%) for those DHBs with sufficient numbers to report.

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 three 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, July to December 2013

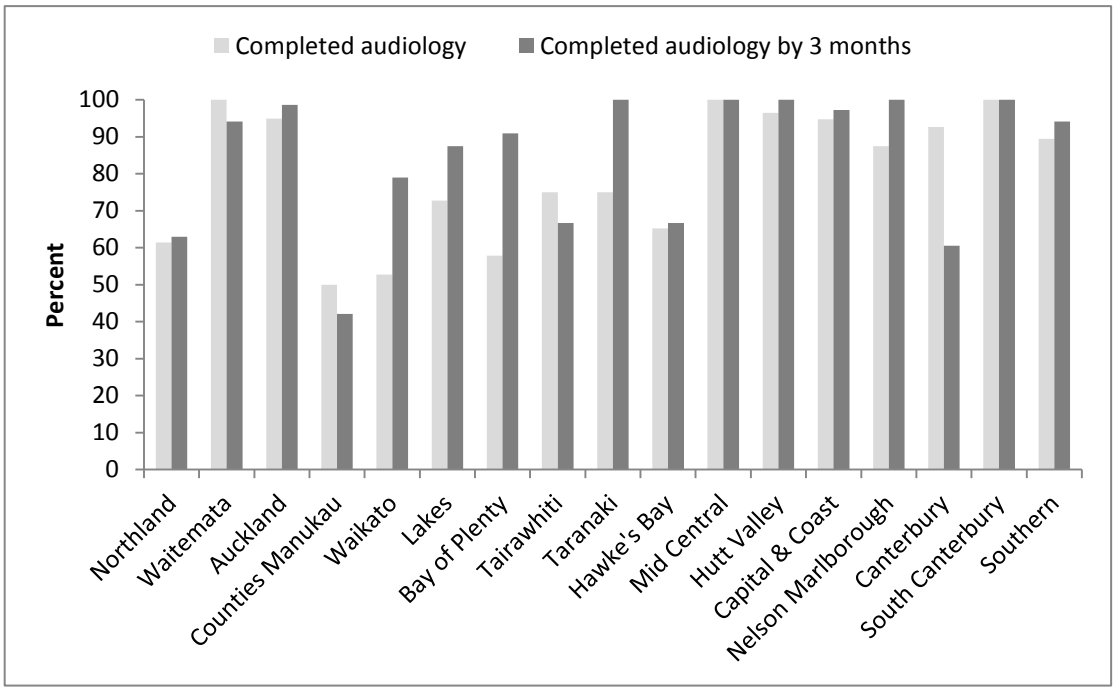


Figure 5 shows the range of completion times for babies who underwent audiology assessment. There were 11 babies out of the 372 that completed audiology who took longer than the 22 weeks shown in the graph below.

Figure 5 Audiology completion times, July to December 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.

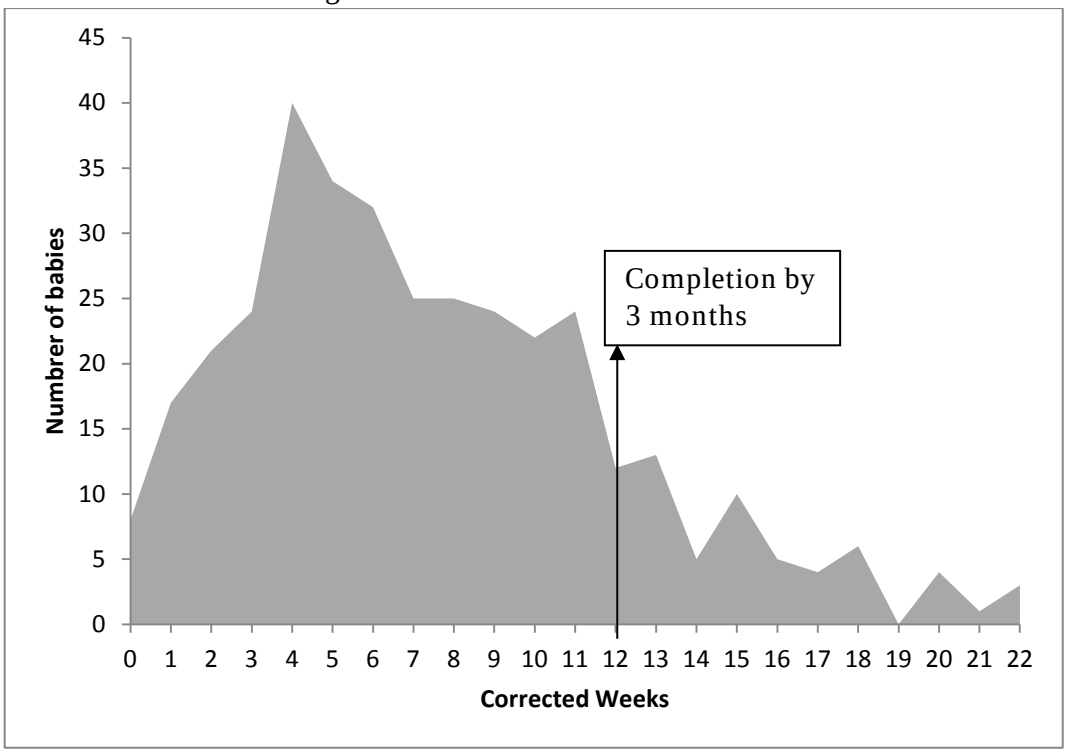


Table 26 Audiology completed by DHB, July to December 2013

	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	32	17	53.1	12	10	83.3	44	27	61.4
Waitemata									
Auckland	89	85	95.5	23	23	100.0	112	108	96.4
Counties Manukau	62	34	54.8	14	4	28.6	76	38	50.0
Waikato	29	16	55.2	7	3	-	36	19	52.8
Lakes	8	5	-	3	3	-	11	8	72.7
Bay of Plenty	10	6	60.0	9	5	-	19	11	57.9
Tairawhiti	4	3	-	0	-	-	4	3	-
Taranaki	6	5	-	2	1	-	8	6	-
Hawke's Bay	16	10	62.5	7	5	71.4	23	15	65.2
Whanganui									
Mid Central	4	4	-	3	3	-	7	7	-
Hutt Valley	16	16	100.0	12	11	91.7	28	27	96.4
Capital & Coast	24	24	100.0	14	12	85.7	38	36	94.7
Wairarapa									
Nelson Marlborough	4	4	-	4	3	-	8	7	-
West Coast									
Canterbury	29	27	93.1	12	11	91.7	41	38	92.7
South Canterbury	4	4	-	1	1	-	5	5	-
Southern	11	10	90.9	8	7	-	19	17	89.5
Total	**348**	**270**	77.6	**131**	**102**	77.9	**479**	**372**	**77.7**

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, July to December 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	17	8	47.1	10	9	90.0	27	17	63.0
Waitemata									
Auckland	85	82	96.4	23	23	100.0	108	105	97.2
Counties Manukau	34	16	47.1	4	0	-	38	16	42.1
Waikato	16	12	75.0	3	3	-	19	15	78.9
Lakes	5	4	-	3	3	-	8	7	-
Bay of Plenty	6	5	-	5	5	-	11	10	90.9
Tairawhiti	3	2	--				3	2	-
Taranaki	5	5	-	1	1	-	6	6	-
Hawke's Bay	10	6	60.0	5	4	-	15	10	66.7
Whanganui									
Mid Central	4	4	-	3	3	-	7	7	-
Hutt Valley	16	16	100.0	11	11	100.0	27	27	100.0
Capital & Coast	24	23	95.8	12	12	100.0	36	35	97.2
Wairarapa									
Nelson Marlborough	4	4	-	3	3	-	7	7	-
West Coast									
Canterbury	27	15	55.6	11	8	72.7	38	23	60.5
South Canterbury	4	4	-	1	1	-	5	5	-
Southern	10	10	100.0	7	6	-	17	16	94.1
Total	**270**	**216**	**80.0**	**102**	**92**	**90.2**	**372**	**308**	**82.8**

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

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

Table 28 Audiology screening completed by ethnicity, July to December 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	126	83	65	65.9	78.3
Pacific	81	55	44	67.9	80.0
Asian	67	63	58	94.0	92.1
European	190	159	131	83.7	82.4
Other ethnic groups/ not stated	15	12	10	80.0	83.3
Total	**479**	**372**	**308**	**77.7**	**82.8**

Table 29 Audiology screening completed by deprivation, July to December 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	65	50	40	76.9	80.0
Decile 3-4	60	52	44	86.7	84.6
Decile 5-6	69	60	51	87.0	85.0
Decile 7-8	111	92	84	82.9	91.3
Decile 9-10	174	118	89	67.8	75.4
Total	**479**	**372**	**308**	**77.7**	**82.8**

1.8 Hearing loss detected by audiology assessment

Description

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

Relevant Outcome

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

Rationale

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

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

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

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

Methodology

Indicator 1.8

Numerator:	Number of eligible newborns who had permanent childhood 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. For this report Conductive Temporary has also been included as a permanent congenital hearing loss. Table 30 below summaries the results for the 39 babies identified within this indicator.

Table 30 Audiology test results by DHB, July to December 2013

DHB of audiology	Right test result	Left test result	Number of babies
Auckland	Normal	Sensorineural	3
Auckland	Mixed	Conductive Temporary	1
Auckland	Conductive Temporary	Mixed	1
Auckland	Sensorineural	Normal	2
Auckland	Normal	Conductive Permanent	1
Auckland	Sensorineural	Sensorineural	2
Counties Manukau	Normal	Conductive Permanent	1
Counties Manukau	Conductive Permanent	Normal	1
Waikato	Sensorineural	Sensorineural	3
Bay of Plenty	Auditory Neuropathy	Auditory Neuropathy	1
Bay of Plenty	Normal	Sensorineural	1
Tairawhiti	Normal	Sensorineural	1
Tairawhiti	Sensorineural	Sensorineural	1
Taranaki	Sensorineural	Sensorineural	1
Hutt Valley	Sensorineural	Sensorineural	5
Hutt Valley	Mixed	Sensorineural	1
Hutt Valley	Auditory Neuropathy	Auditory Neuropathy	1
Capital & Coast	Sensorineural	Sensorineural	2
Capital & Coast	Sensorineural	Normal	2
Nelson Marlborough	Sensorineural	Sensorineural	1
Canterbury	Sensorineural	Sensorineural	3
Canterbury	Mixed	Mixed	1
South Canterbury	Normal	Sensorineural	1
Southern	Sensorineural	Sensorineural	1
Southern	Sensorineural	Normal	1
Total			**39**

Table 31 below indicates that 10.5% of babies that completed an audiology assessment had a permanent congenital hearing loss detected. This is similar to the previous report. Twenty five of these babies (69%) had a bilateral hearing loss (including two temporary conductive hearing losses).

In addition to the table above, six babies were identified with a hearing loss in one ear but no final diagnosis in the second ear, four were identified with as sensorineural, one with mixed and one with auditory neuropathy.

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, July to December 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	17	0	0.0	10	0	0.0	27	0	0.0
Waitemata	85	8	9.4	23	2	8.7	108	10	9.3
Auckland									
Counties Manukau	34	1	2.9	4	1	-	38	2	5.3
Waikato	16	3	18.8	3	0	-	19	3	15.8
Lakes	5	0	-	3	0	-	8	0	-
Bay of Plenty	6	1	-	5	1	-	11	2	18.2
Tairawhiti	3	2	-	0	0	-	3	2	-
Taranaki	5	1	-	1	0	-	6	1	-
Hawke's Bay	10	0	0.0	5	0	-	15	0	0.0
Whanganui									
Mid Central	4	0	-	3	0	-	7	0	-
Hutt Valley	16	6	37.5	11	1	9.1	27	7	25.9
Capital & Coast	24	3	12.5	12	1	8.3	36	4	11.1
Wairarapa									
Nelson Marlborough	4	0	-	3	1	-	7	1	-
West Coast									
Canterbury	27	3	11.1	11	1	9.1	38	4	10.5
South Canterbury	4	0	-	1	1	-	5	1	-
Southern	10	2	20.0	7	0	-	17	2	11.8
Total	**270**	**30**	**11.1**	**102**	**9**	**8.8**	**372**	**39**	**10.5**

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

Table 32 Permanent congenital hearing loss by ethnicity, July to December 2013

Ethnicity	Completed audiology	Permanent congenital hearing loss	% Permanent hearing loss to completed audiology
Māori	83	9	10.8
Pacific	55	8	14.5
Asian	63	5	7.9
European	159	16	10.1
Other ethnic groups	12	1	8.3
Total	**372**	**39**	**10.5**

Table 33 Permanent congenital hearing loss by deprivation, July to December 2013

Deprivation	Completed audiology	Permanent congenital hearing loss	% Permanent hearing loss to completed audiology
Decile 1-2	50	4	8.0
Decile 3-4	52	8	15.4
Decile 5-6	60	7	11.7
Decile 7-8	92	10	10.9
Decile 9-10	118	10	8.5
Total	**372**	**39**	**10.5**

3.12. Newborns with Temporary Conductive Hearing Loss

This indicator has been used to capture all the hearing loss outcomes from audiology which were temporary conductive hearing loss in at least one ear. Table 34 summarises the audiology results for these 114 babies.

Table 34 Audiology test results by DHB of audiology, July to December 2013

DHB of audiology	Right test result	Left test result	Number of babies
Northland	Conductive Temporary	Conductive Temporary	11
Northland	Conductive Temporary	Normal	1
Auckland	Normal	Conductive Temporary	7
Auckland	Conductive Temporary	Conductive Temporary	10
Auckland	Conductive Temporary	Normal	7
Counties Manukau	Conductive Temporary	Conductive Temporary	3
Counties Manukau	Conductive Temporary	Normal	2
Counties Manukau	Normal	Conductive Temporary	1
Waikato	Conductive Temporary	Conductive Temporary	6
Lakes	Normal	Conductive Temporary	1
Bay of Plenty	Conductive Temporary	Conductive Temporary	2
Bay of Plenty	Conductive Temporary	Normal	1
Bay of Plenty	Normal	Conductive Temporary	1
Taranaki	Conductive Temporary	Conductive Temporary	2
Taranaki	Conductive Temporary	Normal	1
Taranaki	Normal	Conductive Temporary	1
Hawke's Bay	Conductive Temporary	Conductive Temporary	4
Hawke's Bay	Normal	Conductive Temporary	1
Mid Central	Conductive Temporary	Conductive Temporary	6
Mid Central	Normal	Conductive Temporary	1
Hutt Valley	Conductive Temporary	Conductive Temporary	6
Hutt Valley	Conductive Temporary	Normal	4
Hutt Valley	Normal	Conductive Temporary	1
Capital & Coast	Conductive Temporary	Conductive Temporary	7
Capital & Coast	Conductive Temporary	Normal	6
Capital & Coast	Normal	Conductive Temporary	3
Canterbury	Conductive Temporary	Conductive Temporary	8
Canterbury	Conductive Temporary	Normal	4
Canterbury	Normal	Conductive Temporary	4
Southern	Conductive Temporary	Conductive Temporary	1
Southern	Conductive Temporary	Normal	1
Total			**114**

Table 35 identifies that 30.6% 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 are not reliable enough to make any strong statements.

Table 35 Conductive hearing loss by DHB, July to December 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	17	8	47.1	10	4	40.0	27	12	44.4
Waitemata	85	17	20.0	23	9	39.1	108	24	22.2
Auckland									
Counties Manukau	34	4	11.8	4	2	-	38	6	15.8
Waikato	16	3	18.8	3	3	-	19	6	31.6
Lakes	5	1	-	3	0	-	8	1	-
Bay of Plenty	6	3	-	5	1	-	11	4	36.4
Tairawhiti	3	0	-	0	0	-	3	0	-
Taranaki	5	3	-	1	1	-	6	4	-
Hawke's Bay	10	3	30.0	5	2	-	15	5	33.3
Whanganui									
Mid Central	4	4	-	3	3	-	7	7	-
Hutt Valley	16	5	31.3	11	6	54.5	27	11	40.7
Capital & Coast	24	10	41.7	12	6	50.0	36	16	44.4
Wairarapa									
Nelson Marlborough	4	0	-	3	0	-	7	0	-
West Coast									
Canterbury	27	11	40.7	11	5	45.5	38	16	42.1
South Canterbury	4	0	-	1	0	-	5	0	-
Southern	10	0	0.0	7	2	-	17	2	11.8
Total	**270**	**72**	**26.7**	**102**	**44**	**43.1**	**372**	**114**	**30.6**

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

Table 36 Conductive hearing loss by ethnicity, July to December 2013

Ethnicity	Completed audiology	Conductive hearing Loss	% Conductive hearing loss to completed audiology
Māori	83	34	41.0
Pacific	55	18	32.7
Asian	63	12	19.0
European	159	47	29.6
Other ethnic groups	12	3	25.0
Total	**372**	**114**	**30.6**

Table 37 Conductive hearing loss by deprivation, July to December 2013

Deprivation	Completed audiology	Conductive hearing Loss	% Conductive hearing loss to completed audiology
Decile 1-2	50	20	40.0
Decile 3-4	52	6	11.5
Decile 5-6	60	15	25.0
Decile 7-8	92	32	34.8
Decile 9-10	118	41	34.7
Total	**372**	**114**	**30.6**

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 82.8% 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 21 of the 25 (84%) completed audiology within three months. Eight of these babies completed within four weeks, 10 within 8 weeks and three within 12 weeks.

Table 38 Count of average age at identification of hearing loss by DHB, July to December 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	0	1	3	4	0	0	4	0	0	1	7	4	12
Auckland	6	11	6	2	5	3	1	0	11	14	7	2	34
Counties Manukau	0	3	1	1	0	1	0	2	0	4	1	3	8
Waikato	0	0	2	4	1	1	1	0	1	1	3	4	9
Lakes	0	1	0	0	0	0	0	0	0	1	0	0	1
Bay of Plenty	0	3	0	1	0	0	2	0	0	3	2	1	6
Tairawhiti	0	1	0	1	0	0	0	0	0	1	0	1	2
Taranaki	1	3	0	0	0	1	0	0	1	4	0	0	5
Hawke's Bay	0	0	1	2	1	0	1	0	1	0	2	2	5
Mid Central	2	1	1	0	0	2	1	0	2	3	2	0	7
Hutt Valley	3	6	2	0	5	2	0	0	8	8	2	0	18
Capital & Coast	6	5	1	1	5	0	2	0	11	5	3	1	20
Nelson Marlborough	0	0	0	0	1	0	0	0	1	0	0	0	1
Canterbury	4	5	0	5	3	1	1	1	7	6	1	6	20
South Canterbury	0	0	0	0	1	0	0	0	1	0	0	0	1
Southern	1	0	1	0	2	0	0	0	3	0	1	0	4
Total	**23**	**40**	**18**	**21**	**24**	**11**	**13**	**3**	**47**	**51**	**31**	**24**	**153**

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 (MoE).

2.1 Responsiveness following referral to EI education services

Description

The time taken for the Early Intervention education service to attempt to contact the families and whānau of children eligible for, and referred to, the service following diagnosis through the UNHSEIP.

Relevant Outcome (Target)

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

Rationale

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

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

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

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

Methodology

Indicator 2.1

Numerator:	Number of families and whānau of children eligible for, and referred to, the Early Intervention education service (through UNHSEIP) who staff attempt to contact within two full working days of receipt of referral at a district MoE Special Education office.
Denominator:	Number of families and whānau of children eligible for, and referred to, the Early Intervention education service (through UNHSEIP).

Notes:

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

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 UNHSEIP) 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.

Methodoloy

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 UNHSEIP 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 UNHSEIP 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 UNHSEIP) still receiving a service at 3 years of age.

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

Indicator 2.3b

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

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

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

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

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