



## **Summary: Hearing Screening**

### **Kosovo**

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## 1. Glossary of Terms: Hearing Screening

<b>Abnormal test result</b>	A test result where a normal “pass” response could not be detected under good conditions. The result on screening equipment may indicate “no response,” “fail,” or “refer.”
<b>Attendance rate</b>	<p>The proportion of all those <u>invited for screening</u> that are <u>tested and receive a result</u>,</p> <ul style="list-style-type: none"> <li>• <u>Invited for screening</u> includes all those that are offered the screening test.</li> <li>• <u>Tested and receive a result</u> could be a “pass” or “fail”.</li> </ul> <p>Attendance rate provides information on the willingness of families to participate in screening.</p>
<b>Attendance rate in first year of life</b>	<p>See definition of <b>Attendance rate</b>.</p> <p>The calculation cut-off is after <u>one year of life</u>.</p>
<b>Compliance with referral (percentage)</b>	<p>The percentage of those who are <u>referred from screening</u> to a diagnostic assessment that actually <u>attend</u> the first diagnostic assessment.</p> <p>Percentage of compliance provides information on the willingness of families to attend the diagnostic assessment after referral from screening.</p>
<b>Coverage</b>	<p>The proportion of those <u>eligible for screening</u> that are <u>tested and receive a result</u> within a <u>specific time</u>.</p> <ul style="list-style-type: none"> <li>• <u>Eligible for screening</u> includes those within the population that are covered under the screening or health care program.</li> <li>• <u>Tested and receive a result</u> could be a “pass” or “refer to diagnostic assessment”.</li> <li>• <u>Specific time</u> can be defined, such as 1 month after birth, 3 months after birth, etc.</li> </ul> <p>Coverage provides information on the overall effectiveness and timeliness of a complete screening programme.</p> <p>Factors such as being offered screening, willingness to participate, missed screening, ability to complete the screen, and ability to document the screening results will influence the coverage.</p>
<b>Coverage in first year of life</b>	<p>See definition of <b>Coverage</b>.</p> <p>The <u>specific time</u> is pre-defined as within the first year of life.</p> <p>In other words, the coverage is the proportion of those eligible for screening that complete the screening sequence to a final result within the first year of life.</p>
<b>False negatives</b>	The percentage of <u>infants/children with a hearing loss</u> (defined by the target condition) that <u>receive a result of “pass”</u> during screening.



	Example: If 100 infants with hearing loss are screened, and 1 infant passes the screening, the percentage of false negatives is 1%.
<b>False positives</b>	<p>The percentage of <u>infants/children with normal hearing</u> that <u>receive a result of “fail”</u> from the final screening test.</p> <p>Example: If 100 infants with normal hearing are screened, and 3 infants fail the screening and are referred for diagnostic assessment, the percentage of false positives is 3%.</p>
<b>Guidelines</b>	Recommendations or instructions provided by an authoritative body on the practice of screening in the country or region.
<b>Hearing screening professional</b>	A person qualified to perform hearing screening, according to the practice in your country or region.
<b>Inconclusive test result</b>	A test result where a normal “pass” response could not be detected due to poor test conditions.
<b>Invited for screening</b>	Offered screening.
<b>Outcome of hearing screening</b>	An indication of the effectiveness or performance of screening, such as a measurement of coverage rate, referral rate, number of infants detected, etc.
<b>Permanent hearing loss</b>	<p>A hearing impairment that is <i>not</i> due to a temporary or transient condition such as middle ear fluid.</p> <p>Permanent hearing loss can be either sensorineural or permanent conductive.</p>
<b>Positive predictive value</b>	<p>The percentage of infants/children referred from screening who have a confirmed <u>hearing loss</u>, as described by your protocol or guideline and indicated in the <b>Target Condition</b> (see definition).</p> <p>For example, if 100 babies are referred from screening for diagnostic assessment and 90 have normal hearing while 10 have a confirmed hearing loss, the positive predictive value would be 10%.</p>
<b>Preschool or (pre)school children</b>	All children between 3-6 years of age.
<b>Preschool or (pre)school screening</b>	<p>Screening that takes place during the time children are between 3-6 years of age.</p> <p>This refers to <i>any</i> hearing screening during this age. The location of the screening is irrelevant to the definition.</p>



<b>Prevalence</b>	The number or percentage of individuals with a specific disease or condition. Prevalence can either be expressed as a percentage, proportion, or as the value per 1000 individuals within the same demographic.
<b>Programme</b>	An organized system for screening, which could be based nationally, regionally or locally.
<b>Protocol</b>	Documented procedure or sequence for screening, which could include which tests are performed, when tests are performed, procedures for passing and referring, and so forth.
<b>Quality assurance</b>	A method for checking and ensuring that screening is functioning adequately and meeting set goals and benchmarks.
<b>Referral criteria</b>	A pre-determined cut-off boundary for when an infant/child should be re-tested or seen for a diagnostic assessment.  For example, referral criteria may be “no response” at 35 dB nHL.
<b>Risk babies / Babies at-risk</b>	All infants that are considered to be at-risk or have risk-factors for hearing loss according to the screening programme.  Two common risk factors are admission to the neonatal-intensive care unit (NICU) or born prematurely. However, other risk factors for hearing loss may also be indicated in the screening programme.
<b>Sensitivity</b>	The percentage of infants/children with hearing loss that are identified via the screening program.  For example, if 100 babies with hearing loss are tested, and 98 of these babies are referred for diagnostic assessment while 2 pass the screening, the sensitivity is 98%.
<b>Specificity</b>	The percentage of infants/children with normal hearing that pass the screening.  For example, if 100 babies with normal hearing are tested, and 10 of these babies are referred for diagnostic assessment and 90 pass the screening, the specificity is 90%.
<b>Target condition</b>	The hearing loss condition you are aiming to detect via your screening programme. This includes: <ul style="list-style-type: none"> <li>• The <u>laterality of the condition</u>, whether the program aims to detect both unilateral and bilateral hearing loss or just bilateral hearing loss.</li> <li>• The <u>severity of the condition</u>, whether the program aims to detect hearing loss <math>\geq 30</math> dB HL, <math>\geq 35</math> dB HL, <math>\geq 40</math> dB HL or <math>\geq 45</math> dB HL</li> </ul>
<b>Well, healthy babies</b>	Infants who are <i>not</i> admitted into the NICU or born prematurely.  Well, healthy babies may or may not have additional risk factors for hearing loss, according to the procedures indicated in the specific screening programme.



## **2. Abbreviations**

ABR – auditory brainstem response

aABR – automatic auditory brainstem response

ANSD – auditory neuropathy spectrum disorder

ASSR – auditory steady-state response

CI – cochlear implant

CMV – cytomegalovirus

dB HL – decibel hearing level

dB nHL – decibel normalized hearing level

dB SNR – decibel signal-to-noise ratio

DPOAE – distortion product otoacoustic emissions

HA – hearing aid

NICU – neonatal intensive care unit

OAE – otoacoustic emissions

TEOAE – transient-evoked otoacoustic emissions

UNHS – universal newborn hearing screening



### 3. Background

In Kosovo, there are no childhood hearing screening programmes. The following report contains information with regards to childhood hearing screening in the entire country of Kosovo.

#### 3.1. General

Kosovo has a total area of 10 905 km<sup>2</sup> with a population of 1 783 531 million in 2016 (Kosovo Agency for Statistics, 2018).

In Kosovo, all births are registered in the civil state office where the baby is born. The number of live births in Kosovo in 2016 was 23 416 (Kosovo Agency for Statistics, 2018).

The World Bank income classification categorizes Kosovo as an lower middle-income country (The World Bank, 2018). The gross domestic product (GDP) was €3386 per capita in 2016 (Kosovo Agency for Statistics, 2018).

Data for Kosovo are not available from the World Health Organization (WHO) Global Health Expenditure Database (2018); however, health expenditure for Kosovo in 2015 was 164.8 million euros, which equates to approximately €92 per capita (Kosovo Agency for Statistics, 2018).

Data on infant mortality rate for Kosovo are not published by the United Nations Statistics Division (2016); however, data from the Kosovo Agency for Statistics (2018) indicate that 238 infants died in 2015, and as 24 594 born that year, an infant mortality rate can be estimated to be 9.4 per 1000 live births.

#### 3.2. Neonatal hearing screening

In Kosovo, there is no neonatal hearing screening programme. Parents may seek out hearing screening services from private clinics, and payment would then also be provided by the parents for this service. It may be recommended to parents to seek private services if their child is at risk for hearing loss; however, it is not obligatory for parents to have their child's hearing screened.

Neonatal hearing screening is not embedded in the Preventive Child Health Care screening system. As indicated, any screening performed would be funded directly by the parents.

National guidelines or a national screening protocol are not yet available in Kosovo.

#### 3.3. Preschool hearing screening

There is no preschool hearing screening programme in Kosovo. A teacher may recommend to a parent to have their child's hearing screened if they notice a potential problem; however, the parents must seek out these services privately and pay out-of-pocket.





## **4. Guidelines & Quality Control**

National guidelines for hearing screening do not exist in Kosovo.

A hearing screening programme has not yet been implemented. A project for neonatal hearing screening was submitted to the Ministry of Health by the University Clinical Center of Kosovo and is awaiting approval.

Quality assurance of hearing screening programmes is not imposed by the government. Information on cases of hearing loss is collected locally by the Audiology Department at the University Clinical Center of Kosovo (tertiary centre); however, the government does not yet collect screening data or publish reports.



## **5. Process: Screening, Diagnosis, Intervention**

### **5.1. Neonatal hearing screening**

At the request of parents, well-babies and at-risk babies are screened in private clinics. There are two private clinics that perform hearing screening.

In 2016, 99.7% of births took place in a maternity hospital, where the average length of stay after delivery is estimated to be 3-5 days. It is roughly estimated that home deliveries account for the other 0.3% of births (Kosovo Agency of Statistics, 2017).

Parents/caregivers of well and at-risk babies are not invited to participate in neonatal hearing screening, but may be recommended to have their child's hearing screened privately depending on the presence of a risk factor.

There is no age by which hearing should be screened.

At-risk infants are defined as those with a positive family history of hearing loss, who were admitted to the NICU, born prematurely (less than 37 weeks), with a birth weight <1000 g, with multiple malformations, or with meningitis.

Data on the prevalence of CMV or meningitis are not available in Kosovo.

There is no target condition for screening well- or at-risk babies.

### **5.2. Neonatal diagnostic assessment**

For infants that are screened and referred to the Audiology department in the public hospital, ABR is performed. ABRs are performed after 6 months of age.

### **5.3. Preschool hearing screening**

There is no preschool hearing screening in Kosovo.

### **5.4. Intervention approach**

In Kosovo, treatment options available include grommets, hearing aids, bone conductive devices, and cochlear implants. Infants are fitted with hearing aids and cochlear implants from 1-2 years of age or older. Because of the lack of universal screening, most hearing aid fittings are on children age 3-4 years. For cochlear implantation, it is preferred that children are under 2 years of age in order to gain optimal development; however, children are implanted up to the age of 5 years.

There are no official criteria for hearing aid fittings; however, it is preferred that children have a bilateral hearing loss of at least 30 dB HL in the better ear. Hearing aids for unilateral hearing loss are often refused by parents due to an associated social stigma with hearing aids.



## 6. Protocols

Hearing screening protocols are described for neonatal hearing screening (well and at-risk) as well as for preschool hearing screening when applicable.

- The Test performed is the screening technique used
- The Age of the child is indicated in hours, days, months or years
- Referral criteria may be the lack of an OAE response at specified frequencies, a response-waveform repeatability constant, the absence of an aABR response at a specified intensity, or an absent behavioural response at a specified intensity. Referral criteria may be defined within a protocol or limited based on the device used.
- The Device is the screening device used.
- Unilateral Referrals indicates whether children are referred if only one ear fails screening.
- The Location is where the screening takes place

### 6.1. Neonatal hearing screening (well)

There is no official protocol for screening well babies. Screening at private clinics is done with OAEs.

### 6.2. Neonatal hearing screening (at-risk)

There is no official protocol for screening at-risk babies. Screening at private clinics is done with OAEs.

### 6.3. Preschool hearing screening

There is no preschool hearing screening programme in Kosovo.



## **7. Professionals**

### **7.1. Neonatal hearing screening (well)**

There are two private clinics that perform neonatal hearing screening. At these two clinics, ENT physicians perform the test.

There is no specific training for hearing screening staff. Previously, one ENT physician and one nurse were sent abroad to participate in a 3-month course on neonatal hearing screening.

### **7.2. Neonatal hearing screening (at-risk)**

There are two private clinics that perform neonatal hearing screening. At these two clinics, ENT physicians perform the test. (see 7.1 for training details).

### **7.3. Preschool hearing screening**

Not applicable.



## **8. Results: Neonatal Hearing Screening**

### **8.1. Coverage and attendance rates**

There is no neonatal hearing screening programme in Kosovo. The two private clinics that conduct neonatal hearing screening have very few infants. Data collected from one private clinic show that a total of 29 children were screened in 2017. A total of 215 babies were screened across 5 years.

### **8.2. Referral rates**

There are no data regarding referral rates. However, the Audiology department performed approximately 200 ABRs in the previous four years.

### **8.3. Diagnostic assessment attendance**

There are no data regarding attendance or compliance rates.

### **8.4. Prevalence / Diagnosis**

Data are unavailable regarding the prevalence of neonatal hearing loss in Kosovo.

Some data collected in the Audiology department show that 6% of preschool-age children referred to the Audiology department with suspicion of hearing loss are confirmed with permanent bilateral hearing loss.

Approximately 30% of the cases with permanent bilateral hearing loss had a loss of > 80 dB HL. Data from the last 4 years show that a total of 18 children were identified with unilateral hearing loss.

Data are unavailable regarding the prevalence of auditory neuropathy in Kosovo.

### **8.5. Treatment success**

In Kosovo, it is unknown how many children per year are fitted with hearing aids or cochlear implants.

### **8.6. Screening evaluation**

There is no neonatal hearing screening programme in Kosovo; however, from the data from one private clinic, out of the 215 babies screened over 5 years, the false positive rate was roughly estimated to be 15%.



## **9. Results: Preschool Hearing Screening**

### **9.1. Coverage and attendance rates**

Not applicable.

### **9.2. Referral rates**

Not applicable.

### **9.3. Diagnostic assessment attendance**

Not applicable.

### **9.4. Screening evaluation**

Not applicable.

## 10. Costs: Neonatal Hearing Screening

As indicated, there is no neonatal hearing screening programme in Kosovo. If parents are interested in having their child's hearing screened, they must pay privately for screening at a private clinic.

A cost analysis of neonatal hearing screening in Kosovo has not been completed.

### 10.1. Screening costs

Not applicable, as there is no hearing screening programme in Kosovo. However, hearing screening at a private clinic would cost €25-30.

### 10.2. Equipment costs

The cost of an OAE device is approximately €5000 to €7500. An ABR device is €7500 to €12000.

Maintenance costs are unknown and there is no regulation for replacement.

The cost for disposables are unknown.

### 10.3. Staff costs

There are two ENT physicians that screen for hearing loss.

The average monthly salary for an ENT physician is €650. This equates to €7800 annually.

The cost for training hearing screening professionals is not indicated.

### 10.4. Diagnostic costs

The total cost of diagnostic confirmation is not indicated.

### 10.5. Amplification costs

In the Kosovo, all children with hearing loss are treated, except for children of parents who refuse cochlear implant for their children.

The costs for a hearing aid is approximately €600 to €800, and the yearly cost of batteries is approximately €80 to €100. Consultation visits cost €10-20 each, and reduce after the first year. In the second year, children may visit the audiology department every 3 to 6 months, depending on the severity and progress of the child. A pair of ear molds cost €50 and are replaced according to need. Speech therapy is available in private clinics only and cost between €150 to €300 per month.

For cochlear implants, the government covers the cost of the surgery, implant, and hospital costs. These costs were not indicated.

Device maintenance costs are not covered by the government and paid by parents. could include a coil cable (around €120), replacement antenna coil (€120), and dry tablets (€50 per year). Replacement of the speech processor costs approximately €9000 to €10 000. Batteries are also an expense paid by parents.

### 10.6. Social costs



There is 1 school in Kosovo for deaf children, including primary and secondary education. It is unknown how many children attend one of these special schools.

In mainstream schools, extra support from assistants or teachers can be provided to children with hearing impairment.

Costs for education through the public system are covered by the government. Private schools cost €2500 to €5000 per year.





## **11. Costs: Preschool Hearing Screening**

### **11.1. Screening costs**

Not applicable.

### **11.2. Equipment costs**

Not applicable.

### **11.3. Staff costs**

Not applicable.



## 12. References

- Kosovo Agency for Statistics. (2018). *ask*. Retrieved from askdata: <http://askdata.rks-gov.net/PXWeb/pxweb/en/askdata/?rxid=025febc3-bab0-46f6-a44c-5f7a7278ee2e>
- Kosovo Agency of Statistics. (2017). *Seria 5: Statistikat Sociale - Statistikat e Lindjeve 2016*. Agjencia e Statistikave të Kosovës. Retrieved from ask: <http://ask.rks-gov.net/media/3359/statistikat-e-lindjeve-2016.pdf>
- The World Bank. (2018). *World Bank GNI per capita Operational Guidelines & Analytical Classifications*. The World Bank.
- United Nations Statistics Division. (2016). *Demographic Yearbook – 2016*. Department of Economic and Social Affairs. New York: United Nations.
- World Health Organization (WHO). (2018). *Global Health Expenditure Database*. Retrieved from NHA Indicators: <http://apps.who.int/nha/database/DataExplorerRegime.aspx>