# Summary Vision Screening Data: Faroe Islands

# Produced as part of Work Package 3

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## Contents

## 1 Glossary of Terms: Vision Screening

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| **Abnormal test result** | 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." |
| **Attendance rate** | The proportion of all those invited for screening that are tested and receive a result:<br><br>• Invited for screening includes all those that are offered the screening test.<br>• Tested and receive a result could be a "pass" or "referral to diagnostic assessment".<br><br>Attendance rate provides information on the willingness of families to participate in screening. |
| **Compliance with referral (percentage)** | The percentage of those who are referred from screening to a diagnostic assessment that actually attend the diagnostic assessment.<br><br>Percentage of compliance provides information on the willingness of families to attend the diagnostic assessment after referral from screening. |
| **Coverage** | The proportion of those eligible for screening that are tested and receive a result:<br><br>• Eligible for screening includes those within the population that are covered under the screening or health care programme.<br>• Tested and receive a result could be a "pass" or "refer to diagnostic assessment".<br><br>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. |
| **False negatives** | The percentage of children with a visual deficit (defined by the target condition) that receive a result of "pass" during screening.<br><br>Example: If 100 children with visual deficit are screened, and 1 child passes the screening, the percentage of false negatives is 1%. |

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| **False positives** | The percentage of children with normal vision that are referred from screening to a diagnostic assessment. |
| **Guidelines** | Recommendations or instructions provided by an authoritative body on the practice of screening in the country or region. |
| **Vision screening professional** | A person qualified to perform vision screening, according to the practice in the country or region. |
| **Inconclusive test result** | A test result where a normal "pass" response could not be detected due to poor test conditions or poor cooperation of the child. |
| **Invited for screening** | Infants/children and their families who are offered screening. |
| **Outcome of vision screening** | An indication of the effectiveness or performance of screening, such as a measurement of coverage rate, referral rate, number of children detected, etc. |
| **Untreated amblyopia** | Those children who have not received treatment for amblyopia due to missed screening or missed follow-up appointment. |
| **Persistent amblyopia** | Amblyopia that is missed by screening, or present after the child has received treatment. |
| **Positive predictive value** | The percentage of children referred from screening who have a confirmed vision loss.<br><br>For example, if 100 babies are referred from screening for diagnostic assessment and 10 have normal vision and 90 have a confirmed visual defect, the positive predictive value would be 90%. |
| **Prevalence** | The percentage or number of individuals with a specific disease or condition. Prevalence can either be expressed as a percentage or as a number out of 1000 individuals within the same demographic. |
| **Programme** | An organised system for screening, which could be based nationally, regionally or locally. |
| **Protocol** | 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. |
| **Quality assurance** | A method for checking and ensuring that screening is functioning adequately and meeting set goals and benchmarks. |
| **Referral criteria** | A pre-determined cut-off boundary for when a child should be re-tested or seen for a diagnostic assessment. |
| **Risk babies / Babies at-risk** | All infants that are considered to be at-risk or have risk-factors for vision defects/ophthalmic pathology according to the screening programme. |

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| | Two common risk factors are admission to the neonatal-intensive care unit (NICU) or born prematurely. However, other risk factors for visual defects may also be indicated in the screening programme. |
| **Sensitivity** | The percentage of children with visual defects that are identified via the screening programme.<br><br>For example, if 100 babies with visual defects are tested, and 98 of these babies are referred for diagnostic assessment and 2 pass the screening, the sensitivity is 98%. |
| **Specificity** | The percentage of children with normal vision that pass the screening.<br><br>For example, if 100 babies with normal vision are tested, and 10 of these babies are referred for diagnostic assessment and 90 pass the screening, the specificity is 90%. |
| **Target condition** | The visual defect you are aiming to detect via the screening programme. |
| **Well, healthy babies** | Infants who are *not* admitted into the NICU or born prematurely (born after a gestation period of less than 37 weeks). |

## 2 Abbreviations

**ACT** Alternating Cover Test

**AR** Autorefraction

**AS** Automated Screening

**CT** Cover Test

**CV** Colour Vision

**EI** Eye Inspection

**EM** Eye Motility

**Fix** Fixation

**GDP** Gross Domestic Product

**GP** General Practitioner

**Hir** Hirschberg test

**Kr** Danish Krone

**NICU** Neonatal-intensive care unit

**PM** Pursuit Movements

**PPP** Purchasing Power Parity

**PR** Pupillary Reflexes

**RE** Retinal Examination

**ROP** Retinopathy of Prematurity

**RR** Red Reflex Testing

**SV** Stereopsis

**VA** Visual Acuity

**WHO** World Health Organisation

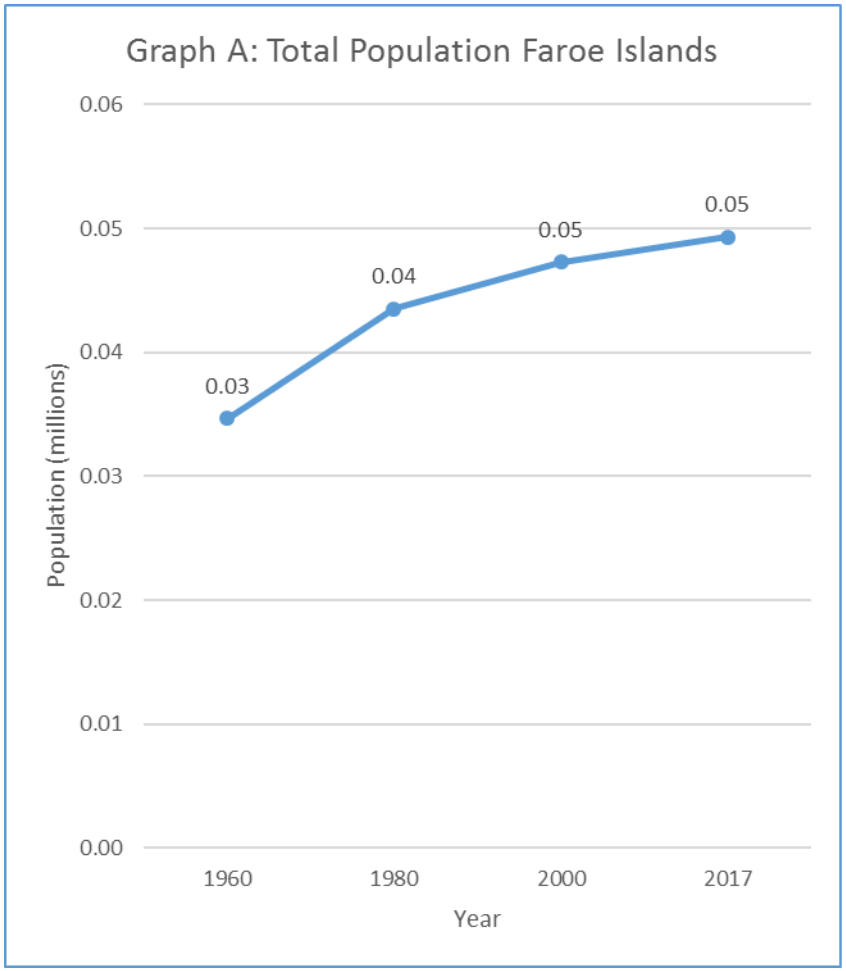
## 3 Population and Healthcare Overview

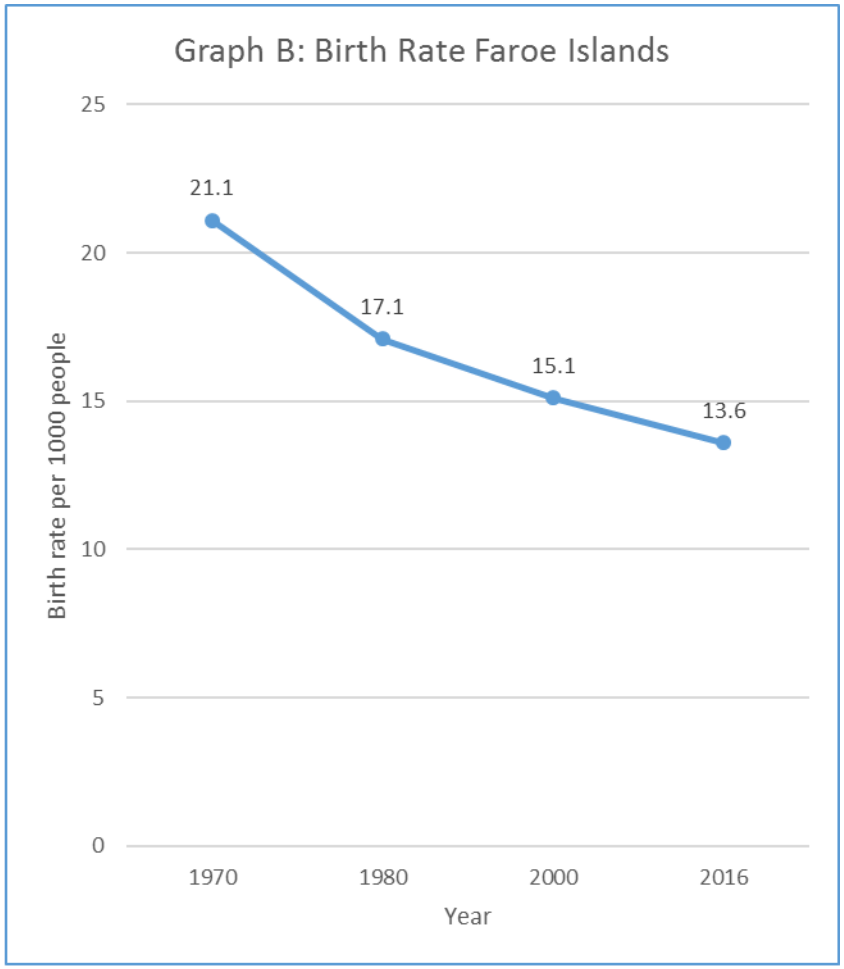
The population of the Faroe Islands is estimated at 49,290 (World Bank, 2018a) and a birth rate estimated at 13.6 births/1,000 population in 2016 (World Bank, 2018b). The change in population and birth rate from 1960 to 2017 is shown in Figure 1, graphs A and B respectively.

The Faroe Islands has an estimated population density of 35 people per square kilometre in 2017 and this has risen from 25 people per square kilometre in 1961 (World Bank, 2018c).

The average life expectancy in the Faroe Islands is estimated at 82 years (World Bank, 2018d), with a death rate of 7.6 deaths/1,000 population in 2016 (World Bank, 2018e).

*Figure 1: Total Population and Birth Rate in Faroe Islands*




*Source: Information sourced from World Bank (2018)*

## 4 Vision Screening Commissioning and Guidance

Vision screening in the Faroe Islands has been implemented for at least forty years. It is organised nationally and is conducted in all areas, with no regional variation. The ministry of health, combined with expert advice from professionals, decide upon the content of the vision screening programme. The vision screening programme is funded by the state and is embedded into the general preventative child healthcare screening system.

Vision screening is conducted by specialist nurses and general practitioners (GP). At present, there are 34 GPs and 31 specialist nurses that perform vision screening for the entire population. All GPs and specialist nurses carry out vision screening and the training is provided within the general training for the respective professions (GP, specialist nurse). There are nurses that do not screen, but could with additional training. Training is regularly updated, monitored and revalidated by the regulations for the health ministry in the Faroe Islands, however, the vision screening training provided is not accredited or certified as it is part of their general education.

Vision screening takes place by the GP at their clinic. The specialist nurse performs vision screening at either the nurse centre, school, kindergarten or the homes of the families. Since its implementation, the vision screening programme has been changed to begin at earlier ages (in infants aged 9 months old), the timing of this change is not documented.

It is unknown how often the vision screening programme is reviewed, but any revisions are decided by expert panels within the health ministry, and are funded by taxes. No methods for quality monitoring of vision screening are imposed by the government and there is no research or cost-effective analysis concerning the vision screening programme.

## 5 Screening programme

The target conditions for preterm and healthy babies up to the age of 3 months are anatomical defects. The target conditions for children aged 3 months to 36 months, are strabismus and any condition affecting visual development. The target condition screened for by GPs and nurses in children aged 3 to 7 years of age is reduced visual acuity. If any child, no matter what age, has strabismus then they are referred for further diagnostic examination. If there is any doubt about the visual acuity of the child, they are referred. Vision screening is not repeated unless the child is not cooperating.

The health care professionals delivering vision screening, venue for screening and tests used vary depending on the age of the child as shown in Tables 1, 2 and 3 respectively. Specific details of the screening offered within each age group are described more fully in sections 5.1 to 5.4 below.

### *5.1 Vision screening - Preterm babies*

Preterm babies born after 32 weeks with a normal weight are screened by a GP, and preterm babies born under 32 weeks or weighing <1500 grams, are screened at hospital by an ophthalmologist. The screening includes ophthalmoscopy and slitlamp examination. All the other babies are examined by the pediatrician when born. When the babies are ready to go home they continue health screening, including vision screening, by the GP at the GP clinic. Eye inspection, fixation, red reflex testing and pursuit movements are performed on preterm babies up to the age of 3 months old.

### *5.2* Vision screening - Birth to 3 months

The vision screening tests conducted on well, healthy babies up to the age of 3 months include eye inspection, fixation, red reflex testing and pursuit movements. All of which are carried out at the hospital or GP clinic at 5 weeks of age by a GP or specialist nurse, with the exception of red reflex testing which is performed only by the GP. If there are problems with the reflex or anatomy of the eye, the child is referred to an ophthalmologist immediately.

### *5.3 Vision screening - 3 months to 36 months*

The vision screening is performed five times between the age of 3 to 36 months; at 5 months, 9 to 10 months, 1 year, 2 years and 3 years of age. At 5 months of age the GP will carry out an eye inspection, fixation, red reflex testing, pursuit movements and Hirschberg test. This is followed by fixation, pursuit movements and Hirschberg test repeated at 9 to 10 months by a specialist nurse. At 1, 2 and 3 years the GP performs an eye inspection, fixation, red reflex testing, pursuit movements and Hirschberg test.

### *5.4 Vision screening - 36 months to 7 years*

Vision screening is performed four times within this age group, conducted by the GP at ages 3 to 4 and 4 to 5 years old, and then by a specialist nurse at 6 to 7 and 7 to 8 years old. The eye screening tests used within this age category are listed as Hirschberg, visual acuity, stereopsis (Stereo Fly Test) and colour vision testing.

The visual acuity is tested using a Snellen or E chart (linear, crowded), ranging from 6/60 to 6/3 Snellen (1.0 to -0.3 logMAR, 0.1 to 2.0 decimal). The type of chart used is determined by the professional performing the test, some GPs/specialist nurses have Snellen charts and others have E charts. The directions from the health ministery allow both type of charts to be used. After the age of 7-8 years testing is at variable intervals, ranging from 1 to 3 years between tests.

Children are referred if the test is abnormal or inconclusive. If the vision test is abnormal, the children are referred to the ophthalmologist. If the vision test is inconclusive, the test is repeated within 1 month for children younger than 6 years, and within 1 to 3 months for older children.

All children in this age range are referred if they have a visual acuity of less than 6/9 Snellen (0.2 logMAR, 0.67 decimal) in one or both eyes. All ages are referred if there is evidence of strabismus.

**Table 1:** Healthcare professionals who conduct vision screening in each age group

| **Table 1.** | **Specialist nurse** | **Ophthalmologist** | **GP** | **Paediatrician** |
|---|---|---|---|---|
| Preterm babies | × | ✓ | ✓ | ✓ |
| 0 to 3 months | ✓ | × | ✓ | × |
| 3 to 36 months | ✓ | × | ✓ | × |
| 3 to 7 years | ✓ | × | ✓ | × |

**Table 2:** Vision screening tests used in vision screening for each age group

| **Table 2.** | **Hospital** | **GP clinic** | **Kindergarten** | **School** |
|---|---|---|---|---|
| Preterm babies | ✓ | ✓ | × | × |
| 0 to 3 months | ✓ | ✓ | × | × |
| 3 to 36 months | × | ✓ | × | × |
| 3 to 7 years | × | ✓ | ✓ | ✓ |

**Table 3:** Location of vision screening for each age group

| Table 3. | Eye inspection | Fixation | Red reflex | Hirschberg | Pursuit movements | Visual acuity | Stereopsis | Colour vision |
|---|---|---|---|---|---|---|---|---|
| Preterm babies | ✓ | ✓ | ✓ | × | ✓ | × | × | × |
| 0 to 3 months | ✓ | ✓ | ✓ | × | ✓ | × | × | × |
| 3 to 36 months | ✓ | ✓ | ✓ | ✓ | ✓ | × | × | × |
| 3 to 7 years | × | × | × | ✓ | × | ✓ | ✓ | ✓ |

## 6 Automated Screening

Automated vision screening is achieved using handheld, portable devices designed to detect presence of refractive error in infants from 6 months of age. It provides objective results and is used to detect amblyopic risk factors. This differs from other methods used to screen children for amblyopia which focus on detection of the actual condition and the resulting visual loss. No automated vision screening is used in the Faroe Islands.

## 7 Provision for Visually Impaired

There are no schools in the Faroe Islands for blind or severely visually impaired children. Mainstream schools provide aids, tools and extra help from the teacher for these children.

## 8 Diagnostic Outcomes

In the Faroe Islands, a specialist nurse has compiled a report for schoolchildren from the academic year 2016/2017 – it is not clear if this is national or regional data. However, based on this report, the prevalence, coverage, treatment success and evaluation of screening have been estimated; these are detailed in section 8.1 to 8.4.

### *8.1 Prevalence/Diagnosis*

The prevalence of treated or untreated amblyopia, by age 7, is estimated at 2.1%. There is no information on the prevalence of persistent amblyopia (missed by screening or failed treatment), or strabismus by age 7. The incidence (observed cases) of the four types of amblyopia are 1.2% for deprivation amblyopia, 0.3% for strabismic amblyopia, 1.0% for refractive amblyopia and 0.3% for combined mechanism amblyopia. The estimated distribution of amblyopia cases seen is, strabismic amblyopia 10%, refractive amblyopia 36%, combined-mechanism amblyopia 10% and deprivation amblyopia 44%. Retinoblastoma and glaucoma are reported as being very rare in the Faroe Islands, with 1 or 2 cases of infant cataract per year. There are a few other cases of congenital eye disorders per year, but no specific data are available.

### *8.2 Coverage*

All children are invited for vision screening and almost 100% of these children attend for all ages of vision screening up to the age of 7 years old. Based on the 2016 to 2017 report, 6,329 children underwent a health examination (which includes vision screening) out of 7,146 possible school children. Therefore, 73 % of the schoolchildren were examined in 2016/2017.

### *8.3 Screening evaluation*

The percentage of false negatives is unknown, however, it is stated that this is seen some times and a rough estimate of 1 out of 50 children are given a pass at screening (i.e. 2%). The percentage of false positives in described as a more common occurrence, again without any specific percentages, a rough estimate of 1 out of 10 children screened. The positive predictive value (PPV) of a refer result, after vision screening is estimated at 80%. However, the sensitivity and specificity of vision screening is the Faroe Islands is unknown.

### *8.4 Treatment success*

There is no data regarding the percentage of children treated for strabismus after screening before the age of 7. There is no information on the percentage of compliance with referral after an abnormal screening results. No data is available concerning how many patients are treated for congenital cataract, amblyopia or strabismus per year. Subsequent to referral

from vision screening, ophthalmologists prescribe glasses and/or patches for children up to the age of 7 years. All eligible children with vision disorders are offered treatment.

## 9 Costs of vision screening in children

No specific data is available on the specific costs of vision screening in the Faroe Islands. All screening costs are facilitated through the tax system and free of charge to parents.

### *9.1 Cost of vision screening*

The salary for a GP varies and is dependent upon how many patients the GP serves and how much the GP works. For vision screening, the GP receives 140 Danish Krones (Kr.) which is approximately 18.75 Euros* plus his/her normal salary. The total salary for a year is around 600,000 to 1,200,000 kr. (80,400 to 160,800 Euros*). The specialist nurse has a salary between 324,000-384,000 kr. (43,400 to 51,500 Euros*) per year.

### *9.2 Cost of treatment for amblyopia*

The costs for treatment of typical patients, with refractive amblyopia and strabismus amblyopia, including follow up are covered by taxes. The specific costs of this are not available. The parents are required to pay for any glasses or patches that might be required, but they get partly refunded by the health insurance providers. The number of follow-ups is dependent upon the age and severity of impairment.

### *9.3 Cost of Treatment for strabismus*

Strabismus surgery, including follow-up, are covered by taxes, the specific costs of this are not available. However, glasses and patches are paid for, in part, by the parents.

### *9.4 Cost of treatment for cataract*

The estimated costs for congenital cataract surgery, glasses, patching and follow-up of deprivation amblyopia are not available.

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* Currency conversion to Euros taken on 5/12/18

## 10 References

The World Bank (2018a). Population, total | Data. [online] Available at: https://data.worldbank.org/indicator/SP.POP.TOTL?locations=FO [Accessed 05 December 2018].

The World Bank. (2018b). Birth rate, crude (per 1,000 people) | Data. [online] Available at: https://data.worldbank.org/indicator/SP.DYN.CBRT.IN?locations=FO [Accessed 05 December 2018].

The World Bank. (2018c). Population density (people per sq. km of land area) | Data. [online] Available at: https://data.worldbank.org/indicator/EN.POP.DNST?locations=FO [Accessed 05 December 2018].

The World Bank. (2018d). Life expectancy at birth, total (years) | Data. [online] Available at: https://data.worldbank.org/indicator/SP.DYN.LE00.IN?locations=FO [Accessed 05 December 2018].

The World Bank. (2018e). Death rate, crude (per 1,000 people) | Data. [online] Available at: https://data.worldbank.org/indicator/SP.DYN.CDRT.IN?locations=FO [Accessed 05 December 2018].