# Summary Vision Screening Data: Austria

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## Contents

1. Glossary of Terms iii
2. Abbreviations vi
3. Population and Healthcare Overview 1
4. Vision Screening Commissioning and Guidance 3
5. Screening programme 4
   5.1 Vision screening - Preterm babies 4
   5.2 Vision screening - Birth to 3 months 4
   5.3 Vision screening - 3 months to 36 months 4
   5.4 Vision screening - 36 months to 7 years 4
6. Automated Screening 9
7. Provision for Visually Impaired 10
8. Knowledge of existing screening programme 11
   8.1 Prevalence/Diagnosis 11
   8.2 Coverage 11
   8.3 Treatment success 11
   8.4 Screening evaluation 11
9. Costs of vision screening in children 12
   9.1 Cost of vision screening 12
   9.2 Cost of treatment for amblyopia 12
   9.3 Cost of Treatment for strabismus 12
   9.4 Cost of treatment for cataract 12
10. References 13

## 1. Glossary of Terms

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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%. |
| **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 achild 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.<br><br>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 and90 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

**CSA** - Consilium Strabologicum Austriacum

**GDP** – Gross Domestic Product

**HTA** – Health Technology Assessment

**NICU** – Neonatal-intensive care unit

**PPP** – Purchasing Power Parity

**WHO** – Word Health Organisation

## 3. Population and Healthcare Overview

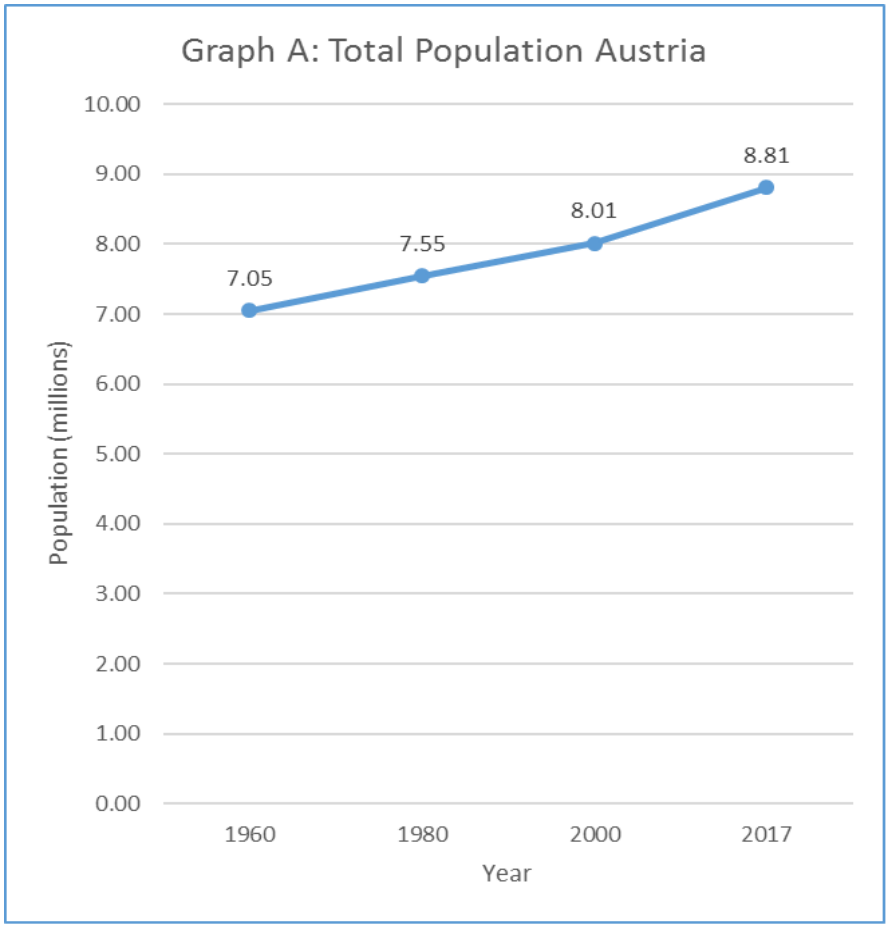
The population of Austria is 8,809,202 (World Bank, 2018a) and birth rate is estimated at 10 births/1,000 population in 2016 (World Bank, 2018b). The change in population and birth rate from 1960 to 2017 is shown in Figure 1, graphs A and B respectively.

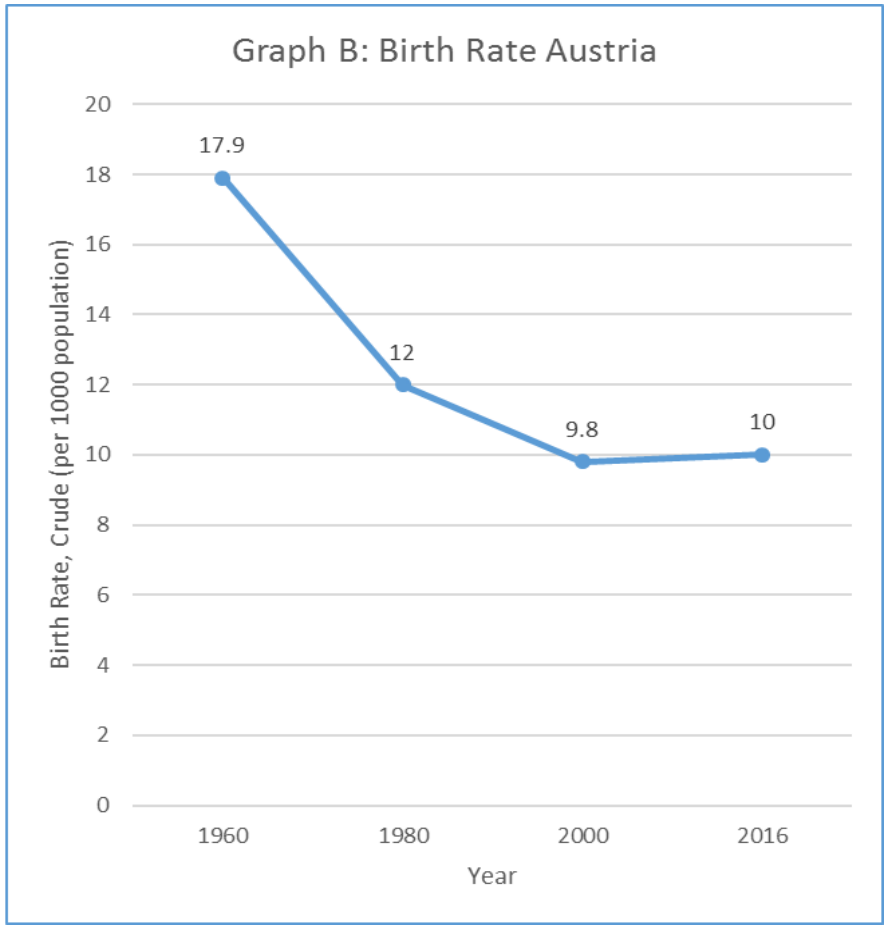
Austria has a reported population density of 106.75 people per square kilometre in 2017 and this has risen from 85.81 people per square kilometre in 1961 (World Bank, 2018c). Infant mortality in 2017 was estimated at 2.9 deaths/1,000 live births in total (World Bank, 2018d).

The average life expectancy in Austria is estimated at 81.9 years (World Bank, 2018e), with a death rate of 9.2 deaths/1,000 population in 2016 (World Bank, 2018f). Austria has a gross national income per capita (PPP int. $, 2013) of $43,000 (WHO, 2016). The estimated total expenditure on health per capita in 2014 was $5,039 (Intl $) and the total expenditure on health in 2014 as percentage of GDP was 11.2% (WHO, 2016).

Summary Vision Screening Data: Austria

*Figure 1: Change in the Total Population and Birth Rate in Austria between 1960 and 2017*




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

## 4. Vision Screening Commissioning and Guidance

Vision screening in Austria, is organised nationally, with nine regions individually organising kindergarten projects. The nine regions are Burgenland, Carinthia, Lower Austria, Upper Austria, Salzburg, Styria, Tyrol, Vorarlberg and Vienna. These kindergarten projects include vision screening by photorefractors, which are organised by the kindergarden itself, the federal government, or photoscreener distributers.

In Austria, each pregnant woman is given a mother-child health passport. This allows the doctor to enter all important examinations up to the age of 5-years. This procedure is the same in all 9 regions, although the execution of the recommended screening examinations might differ as these are only recommendations, not guidelines.

The national vision screening programme is embedded into a general preventative child health care screening system. Ophthalmologists, paediatricians, general practitioners (GP) and opticians conduct vision screening. There are 1355 paediatricians, 926 ophthalmologists, 14,130 GPs within Austria, it is unknown how many opticians there are. No other general health professionals have been identified who currently do not perform vision screening but could do so with additional training. There is no specific training available. Vision screening takes place within hospitals or in the offices of an ophthalmologist, paediatrician or GP.

Vision screening is funded either privately or throug, the mother child pass programe which provides health care funded two-thirds from federal funds and one-third from social security funds. Additional projects are funded by non-profit organisations, the federal government, or the distributers of photoscreeners.

The content and any reviews of the vision screening programme are decided upon by a Mother-Child-Passport Programme expert group. These revisions are undertaken by the Ministry of Health according to actual data, reviews and Health Technology Assessments (HTAs). The vision screening programme was implemented nationally in 1974 as part of general screening. This was updated in 1987 with the addition of ophthalmic examinations.

There are no specific guidelines for vision screening, but there are some “low-level” recommendations from the Consilium Strabologicum Austriacum (CSA), a team of specialists from the Austrian Ophthalmological Association. There are methods for quality monitoring imposed by the government determined according to actual data collected, reviews of literature, HTAs and expert opinion.

There is no research carried out in Austria regarding the vision screening programme. However, there have been cost-effectiveness analyses about the vision screening programme, but this is for local/regional projects only; there is no information available about these analyses.

## 5. Screening programme

In Austria, anomalies of the eye, amblyopia and pathologies are screened for by vision screening. 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 are screened by ophthalmologists using retinal examination (indirect ophthalmoscopy). This is conducted within departments of neonatology at children hospitals. The number of abnormal or inconclusive test results before referral for further diagnostic examination are not specified, this is at the discretion of the screener. Referral criteria for preterm babies is based on literature, there are no specified guidelines.

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

Screening takes place at ages 1 week and then again between 4 to 7 weeks. Vision screening is conducted at the offices of either a paediatrician or GP, or in hospitals. The Bruckner red reflex fundus test and eye inspection are recommended for well, healthy babies up to the age of 3 months; however, some clinicians use only a flashlight. Any abnormality in visual behaviour, including red reflex, strabismus, or the anatomy of the eye will result in the child being referred. The number of abnormal test results that necessitate a baby being referred is not defined, it is entirely dependent upon the clinician; the same is true for inconclusive tests, it is at the discretion of the clinician.

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

Children aged between 3 and 36 months of age are screened four times by a paediatrician, or GP at either the paediatricians office or hospital. Children are tested between 3 and 5 months of age, then again between 7 to 9 months, 10 to 14 months. Children aged 24 month are screened by an ophthalmologist. The tests conducted include eye inspection, red reflex, fixation, eye motility, retinal examination, pursuit movements, cover test and they are also screened for risk factors using automated devices (see Section 7). The referral criteria are stated as any abnormality in visual behaviour, red reflex, strabismus, or the anatomy of the eye.

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

Paediatricians, GPs, ophthalmologists, orthoptists, or opticians conduct vision screening in either the paediatricians office, hospital, or at school. The sequence of vision screening in children aged between 36 months and 7 years is at 34-38 months, then again at 46 to 50

months, and again between 58 and 62 months. The recommended tests conducted at this age include visual acuity measurement, stereopsis and accommodation. Visual acuity is measured from the age of 3 years by a paediatricians, GP or ophthalmologist. Lea symbols are recommended as the optotype chart to be used during this visual acuity measurement, but there are no specific guidelines, and therefore some clinicians may use different visual acuity test. Children are referred immediately after an abnormal test, although there is no defined protocol for how many inconclusive tests determine a referral. Referral criteria is stated as any abnormality in visual behaviour, red reflex, strabismus, or the anatomy of the eye.

Summary Vision Screening Data: Austria

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

| **Table 1** | **Paediatrician** | **Ophthalmologist** | **Orthoptist** | **GP** | **Optician** |
|---|---|---|---|---|---|
| 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** | **Eye inspection** | **Red reflex testing** | **Fixation** | **Eye motility** | **Retinal examination** | **Pursuit movements** | **Cover test** | **Autorefraction** | **Visual acuity measurement** |
|---|---|---|---|---|---|---|---|---|---|
| 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** | **Hospital** | **Paediatrician office** | **School** |
|---|---|---|---|
| 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.

In the nine regions where kindergarten projects are funded, automated vision screening devices are utilised, specifically, the PlusOptix device. Handheld automated devices are being more frequently utilised by ophthalmologists from the age of one year , paediatricans and opticans use these at older ages. There are no clear criteria or offical recommendations in terms of utilisation, age of testing or frequency of the automated screening.

Each PlusOptix device costs approximately 9000 Euros and there are no maintenance costs due to it being computer adapted. The device should be replaced every 5 years, depending on new developments.

## 7. Provision for Visually Impaired

There are three schools in Austria for severely visually impaired or blind children. Children with less severe visual impairment are integrated into the mainstream educational system – it is not clear if these children receive special support. Depending on the type of school, the overall costs are estimated at between 8,000 to 10,000 Euro per child, and technical equipment costing between 15,000 to 20,000 Euro.

The decision as to which children attend the visually impaired shools, and which children are integrated into mainstream education is made by the director of the schools. There is no structred assessment to inform this decision.

## 8. Knowledge of existing screening programme

### *8.1 Prevalence/Diagnosis*

The prevalence of treated or untreated amblyopia by the age of 7 is unknown. The prevalence of persistent amblyopia in Austria is also unknown. The prevalence of strabismus and the incidence of the four types of amblyopia (strabismic, refractive, combined-mechanism and deprivation) are unknown.

### *8.2 Coverage*

All children are offered vision screening; this is obligatory within the first 12 months of life and optional until 6 years of age. Children are invited via the mother-child-passport programme, which is a specific information service for parents and children. This system sends letters to parents of children within defined age groups, containing information about screening and an invitation to attend a physician clinic within 2 weeks.

There is no data collected regarding the attendance rate of vision screening before the age of 7 years, or the coverage of visual acuity measurements as part of vision screening before the age of 7 years. It is estimated that more than 90% of children receive vision screening before the age of 7 years, however, the exact data is not accessible.

The percentage of compliance with referral after an abnormal screening test result is unknown and it is unknown if there is registration or documentation of noncompliance with referral after an abnormal screening test result.

### *8.3 Treatment success*

Glasses are only prescribed for children under the age of 7 years by an ophthalmologist. All eligible children with vision disorders are offered treatment. This includes glasses for refractive error, occlusion therapy, atropine, cataract or glaucoma operations.

The percentage of children treated for congenital eye disorders, strabismus and/or amblyopia is unknown. It is also not known how many patients are treated for congenital cataract, amblyopia and strabismus per year by orthoptists and/or ophthalmologists.

### *8.4 Screening evaluation*

The percentage of false negatives and false positives from vision screening is unknown. The positive predictive value, sensitivity of vision and specificity of vision screening are all unknown.

## 9. Costs of vision screening in children

In Austria, vision screening is free of charge for parents and there is a financial reward for parents whose children attend the vision screening appointment. There is also a penalty for parents when children do not attend the vision screening.

The amount of childcare allowance (KBG) is linked to the correct implementation and proof of the first ten Mother-Child-Pass examinations to the health insurance.

Births from March 1, 2017: If only one examination is not carried out or not proven in time, the child care allowance will be deducted in principle 1,300 Euros. If both parents receive childcare allowance, deduction of € 1,300 will be made to each parent. Proof of the first six examinations must already be made during the application process. The proof of the further four investigations must be made by the 15th month of life.

Births until February 28, 2017: Failure to perform an examination (or multiple examinations), late examinations, or failure to provide proof of examinations to the health insurer will result in a halving of the childcare allowance. This depends on the type of benefit selected from 25, 17, 13, or 10 months of life, or to a reduction of the income-related KBG amounting to 16.50 Euro per day from 10 months of age.

It is difficult for the country representative to estimate the costs because there is no structured procedure for these conditions in terms of frequency including which the children are seen, prices of operations (regional differences) and days at hospitals.

### *9.1 Cost of vision screening*

The costs of vision screening are not known.

### *9.2 Cost of treatment for amblyopia*

Treatment of typical patients with refractive amblyopia and strabismic amblyopia, including follow-up, is estimated at 500 Euros. No further information is provided.

### *9.3 Cost of Treatment for strabismus*

The estimated costs for strabismus surgery, including follow-up, is estimated at 2,500 Euros. No further information is provided.

### *9.4 Cost of treatment for cataract*

The costs for congenital cataract surgery, including follow-up of deprivation amblyopia, is estimated at 5,000 Euros. No further information is provided.

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