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## Summary Vision Screening Data: Poland

### Produced as part of Work Package 3

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Disclaimer: This is a summary report representing the responses from a country representative working within eye care services of the country reported. This report does not represent conclusions made by the authors, and is the product of professional research conducted for the EUSCREEN study. It is not meant to represent the position or opinions of the EUSCREEN study or its Partners. The information cannot be fully verified by the authors and represent only the information supplied by the country representatives.

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## 1 Glossary of Terms: Vision 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 invited for screening that are tested and receive a result:</p> <ul style="list-style-type: none"> <li>• Invited for screening includes all those that are offered the screening test.</li> <li>• Tested and receive a result could be a “pass” or “referral to diagnostic assessment”.</li> </ul> <p>Attendance rate provides information on the willingness of families to participate in screening.</p>
<b>Compliance with referral (percentage)</b>	<p>The percentage of those who are referred from screening to a diagnostic assessment that actually attend the 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 eligible for screening that are tested and receive a result:</p> <ul style="list-style-type: none"> <li>• Eligible for screening includes those within the population that are covered under the screening or health care programme.</li> <li>• Tested and receive a result could be a “pass” or “refer to diagnostic assessment”.</li> </ul> <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>False negatives</b>	The percentage of children with a visual deficit (defined by the target condition) that receive a result of “pass” during screening.

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	Example: If 100 children with visual deficit are screened, and 1 child passes the screening, the percentage of false negatives is 1%.
<b>False positives</b>	The percentage of children with normal vision that are referred from screening to a diagnostic assessment.
<b>Guidelines</b>	Recommendations or instructions provided by an authoritative body on the practice of screening in the country or region.
<b>Vision screening professional</b>	A person qualified to perform vision screening, according to the practice in the 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 or poor cooperation of the child.
<b>Invited for screening</b>	Infants/children and their families who are offered screening.
<b>Outcome of vision screening</b>	An indication of the effectiveness or performance of screening, such as a measurement of coverage rate, referral rate, number of children detected, etc.
<b>Untreated amblyopia</b>	Those children who have not received treatment for amblyopia due to missed screening or missed follow-up appointment.
<b>Persistent amblyopia</b>	Amblyopia that is missed by screening, or present after the child has received treatment.
<b>Positive predictive value</b>	<p>The percentage of children referred from screening who have a confirmed vision loss.</p> <p>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%.</p>
<b>Prevalence</b>	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.
<b>Programme</b>	An organised 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 a child should be re-tested or seen for a diagnostic assessment.
<b>Risk babies / Babies at-risk</b>	<p>All infants that are considered to be at-risk or have risk-factors for vision defects/ophthalmic pathology according to the screening programme.</p> <p>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.</p>
<b>Sensitivity</b>	<p>The percentage of children with visual defects that are identified via the screening programme.</p> <p>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%.</p>
<b>Specificity</b>	<p>The percentage of children with normal vision that pass the screening.</p> <p>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%.</p>
<b>Target condition</b>	The visual defect you are aiming to detect via the screening programme.
<b>Well, healthy babies</b>	Infants who are <i>not</i> admitted into the NICU or born prematurely (born after a gestation period of less than 37 weeks).



## **2 Abbreviations**

**GDP** Gross Domestic Product

**GP** General Practitioners

**NICU** Neonatal-intensive care unit

**PPP** Purchasing Power Parity

**ROP** Retinopathy of Prematurity

**VA** Visual Acuity

**WHO** World Health Organisation



### **3 Population and Healthcare Overview**

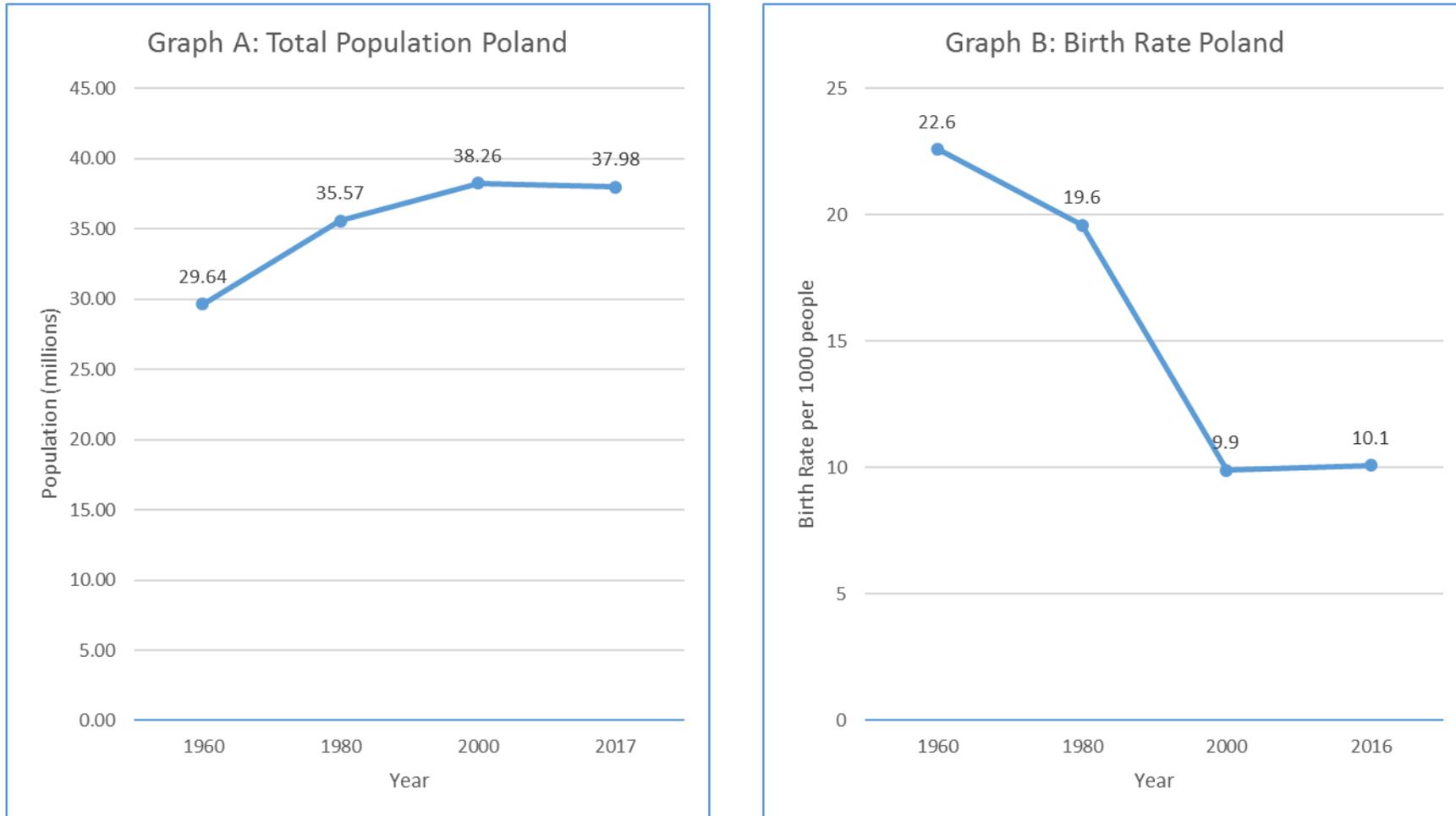
The population of Poland is 37,975,841 (World Bank, 2018a) and birth rate is estimated at 10.1 births/1,000 population in 2016 (World Bank, 2018b). The change in population and birth rate from 1960 to 2017 is shown in Figure 1, graphs A and B respectively.

Poland has a reported population density of 124 people per square kilometre in 2017 and this has risen from 98 people per square kilometre in 1961 (World Bank, 2018c). In terms of healthcare facilities, the total density of hospitals in 2013 was 0.94 per 100,000 population (WHO, 2016a). Infant mortality in 2017 is estimated at 4 deaths/1,000 live births in total (World Bank, 2018d).

The average life expectancy in Poland is estimated at 77.5 years (World Bank, 2018e), with a death rate of 10.2 deaths/1,000 population in 2016 (World Bank, 2018f). Poland has a gross national income per capita (PPP int. \$, 2013) of \$22,000 (WHO, 2016b). The estimated total expenditure on health per capita in 2014 was \$1,570 (Intl \$) and the total expenditure on health in 2014 as percentage of GDP was 6.3% (WHO, 2016b).



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



Source: Information sourced from World Bank (2018)



#### **4 Vision Screening Commissioning and Guidance**

Vision screening is organised nationally in Poland, there are no regional differences. The vision screening programme is not embedded into a general preventative child healthcare screening system. The content of the vision screening programme is decided upon by the Ministry of Health, and implemented nationally. The programme started in 1980's and has not been changed since its implementation.

Vision screening is conducted by General Practitioners (GP), ophthalmologists, paediatricians and nurses, of which there are approximately 850 per million population. No other general health professionals have been identified who could screen with additional training. There is no specific training to perform vision screening. Vision screening is performed during vaccination visits. Invitations are sent by the local GPs office; there is no central database.

There are national general health screening guidelines for vision screening and the programme is reviewed once every several years. Any revisions would be implemented by the Ministry of Health and funded by state health insurance. Any revisions to the vision screening programme are conducted through consultations between the Ministry of Health and ophthalmology consultants.

There are no methods for quality monitoring imposed by the government. There has been no research concerning the vision screening programme carried out in Poland. There has also been no cost-effectiveness or any other studies into the effectiveness of the vision screening programme.



## **5 Screening programme**

The target conditions screened for are retinopathy of prematurity (ROP), congenital eye disorders, reduced visual acuity and strabismus. 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 up to the age of 3 months are screened by an ophthalmologist in outpatient clinics or within hospitals using eye inspection and retinal examinations. This occurs four weeks after birth; follow-ups are conducted at 2 to 4 week intervals depending on a diagnosis of ROP.

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

Well, healthy babies up to the age of 3 months are screened by either a paediatrician or a GP. This is conducted at either 1 or 3 months of age, in a child healthcare centre using a fundus red reflex examination, fixation and pupillary reflexes. Referral is made if any suspected abnormality is identified, babies are referred for further diagnostic examination after one abnormal or one inconclusive test result.

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

Children aged 3 to 36 months are screened by either a paediatrician or a GP. This is conducted in the GPs office by both professionals. At the age of 1 to 3 months, fixation is conducted and at the age of 36 months, the Hirschberg test is conducted. Referral is made if any suspected abnormality is identified, children are referred for further diagnostic examination after one abnormal or inconclusive test result.

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

Children aged 3 to 7 years are screened by a paediatrician, GP or nurse. This is conducted in a GPs office, where visual acuity (VA) and Hirschberg test are conducted. Colour vision is assessed after the age of 7 years. VA and Hirschberg test are assessed at 3, 4, 5, 6 and 7 years of age.

At the age of 3 years, the GP or paediatrician will conduct the VA assessment, at the age of 7 years, the nurse, GP, or paediatrician will conduct the screening. The optotype charts used for VA measurement are numbers or pictures. These are crowded linear tests or uncrowded single optotypes for pre-schoolers. From the age of 7 years the Snellen chart is used.

At the age of 3 years, one line of VA difference, or strabismus are referral criteria for further diagnostic examination by an ophthalmologist. Children are referred after one abnormal or inconclusive test result.

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

<b>Table 1</b>	<b>Paediatrician</b>	<b>Nurse</b>	<b>Ophthalmologist</b>	<b>GP</b>
Preterm babies	x	x	✓	x
0 to 3 months	✓	x	x	✓
3 to 36 months	✓	x	x	✓
3 to 7 years	✓	✓	x	✓

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

<b>Table 2</b>	<b>Eye inspection</b>	<b>Red reflex</b>	<b>Fixation</b>	<b>Pupillary reflexes</b>	<b>Retinal examination</b>	<b>Hirschberg</b>	<b>Visual acuity</b>	<b>Colour vision</b>
Preterm babies	✓	×	×	×	✓	×	×	×
0 to 3 months	×	✓	✓	✓	×	×	×	×
3 to 36 months	×	×	✓	×	×	✓	×	×
3 to 7 years	×	×	×	×	×	✓	✓	✓

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

<b>Table 3</b>	<b>Child Health Care Centre</b>	<b>Hospital</b>	<b>Outpatient Clinic</b>	<b>GP office</b>	<b>Paediatrician office</b>
Preterm babies	×	✓	✓	×	×
0 to 3 months	✓	×	×	×	×
3 to 36 months	×	×	×	✓	×
3 to 7 years	×	×	×	✓	×



## **6 Automated Screening**

Automated vision screening is carried out using handheld, portable devices designed to detect presence of refractive error in infants and young children. 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 Poland, automated screening is not part of standard vision screening and therefore is not regularly conducted. However, if it is conducted, the Retinomax autorefractor is used. This device costs approximately 36,000PLN (8,420 Euros), the maintenance costs and the replacement date is unknown. It is not mandatory for a paediatrician to have this equipment and they are not required to pay for it. If autorefraction is carried out, it is conducted in conjunction with a VA assessment. There is no comparative data between areas that use autorefraction and areas that do not. These devices are only used on children aged 7-14 years and there are no specified risk factors for referral. If a child passes the VA test, but fails the autorefraction, they are not referred. This test would be used in collaboration with a VA assessment. There is no comparative data between areas that do and do not conduct automated screening.



## **7 Provision for Visually Impaired**

There are 14 schools in Poland for blind or severely visually impaired children. These are mainly located in cities like Warsaw, Cracow, Bydgoszcz, Chorzow, Dabrowa Gornicza. It is estimated that more than 500,000 people have severe visual impairment in Poland, with the number of school attenders at about 4,745. The costs, per child, of these schools is not known. Visually impaired children who attend mainstream primary school are offered support such as magnifying glasses, and 30% of any costs are covered by the National Health Administration; the rest is paid for by parents.



## **8 Knowledge of existing screening programme**

### *8.1 Prevalence/Diagnosis*

The prevalence of treated or untreated amblyopia in Poland, by the age of 7 years, is estimated as 3%, with prevalence of persistent amblyopia (missed by screening or failed treatment) estimated as 1% by the age of 7 years. The prevalence of strabismus, by the age of 7 years, is estimated as 5%. From all cases of amblyopia it is estimated that the distribution of strabismic amblyopia is 30%, refractive amblyopia 40%, combined mechanism amblyopia 20% and deprivation amblyopia 10%.

### *8.2 Coverage*

It is approximated that 99% of children are invited for vision screening; invitations are sent out in the form of a letter with a vaccination invitation by the GP. Approximately 0.5% of children in Poland do not attend obligatory vaccination visits (according to the report of The Supreme Chamber of Control, 2017), data from 29.5% of attenders do not contain visual acuity measurements. The attendance of vision screening before the age of 7 years is estimated as 70%. The percentage of compliance with referral after an abnormal screening test result is estimated at 95%.

### *8.3 Screening evaluation*

Estimations concerning the screening evaluation in Poland are based on the percentage of prescribed treatment from referred children in the Podlasie region. The percentage of false negatives for vision screening, after the screening has been completed is estimated as 2%. The percentage of false positives for vision screening is low and estimated by the country representative as 0.5%. The positive predictive value of a refer results after vision screening is estimated as 98%. The sensitivity and specificity of vision screening is not known.

### *8.4 Treatment success*

The percentage of infants treated for congenital eye disorders is estimated as 0.1%. The percentage of children treated for strabismus after being screened before the age of 7 years is estimated as 4%. The percentage of all children treated for strabismus before the age of 7 years is estimated as 3.5%. The percentage of children treated for amblyopia, after being screened before the age of 7 years is estimated as 2%.

The number of patients treated by ophthalmologists for congenital cataracts is estimated as 90 per year, the number of patients treated by ophthalmologists for amblyopia is estimated as 7,500 per year and the number of patients treated for strabismus by ophthalmologists and orthoptists is estimated as 1,316 per year. All eligible children are offered treatment. Ophthalmologists are the only professional to prescribe glasses for children under the age of 7 years. Other treatments include patching and cataract surgery as appropriate.

No information has been provided on sample sizes and no relevant sources have been provided concerning the percentages reported in this section.



## **9 Costs of vision screening in children**

### *9.1 Cost of vision screening*

The salary costs, per year, for vision screening professionals in Poland has not been reported. The salary costs per hour for vision screening professionals is estimated at 19 PLN (4.5 Euros, 20/12/2018). The costs to train general preventative child healthcare screening professionals, from leaving secondary education to qualification has not been reported. The screening costs per year for vision screening and the screening costs per child for vision screening are not known.

### *9.2 Cost of treatment for amblyopia*

The estimated costs for treatment of typical patients with refractive amblyopia and/or strabismic amblyopia are not known.

### *9.3 Cost of Treatment for strabismus*

The estimated costs for strabismus surgery, including follow-up, are 2,515 PLN (587 Euros, 20/12/2018) per patient. Each patient requires 2 visits.

### *9.4 Cost of treatment for cataract*

The estimated costs for congenital cataract surgery, including follow-up of deprivation amblyopia, are approximately 2,980 PLN (695 Euros, 20/12/2018) per patient.



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