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Summary Vision Screening Data: Greece

Produced as part of Work Package 3

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Contents

1 Glossary of Terms: Vision Screening

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: • Invited for screening includes all those that are offered the screening test. • Tested and receive a result could be a "pass" or "referral to diagnostic assessment". 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. 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: • Eligible for screening includes those within the population that are covered under the screening or health care programme. • Tested and receive a result could be a "pass" or "refer to diagnostic assessment". 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. 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. 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.

	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. 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. 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

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

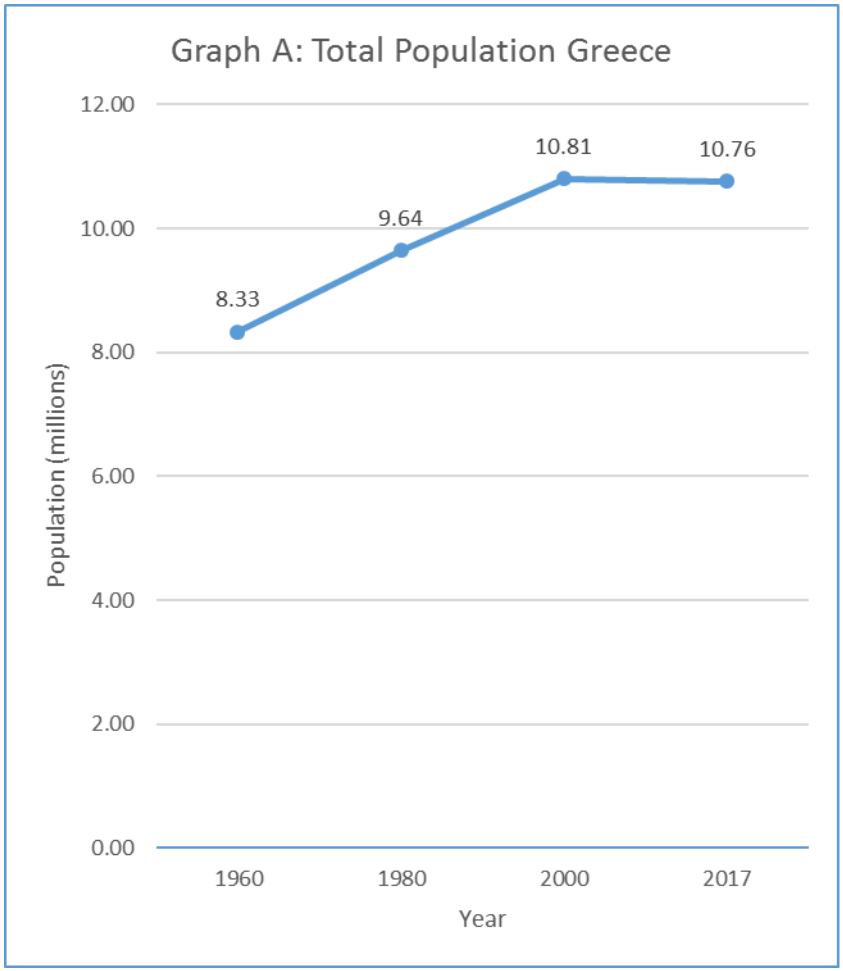
3 Population and Healthcare Overview

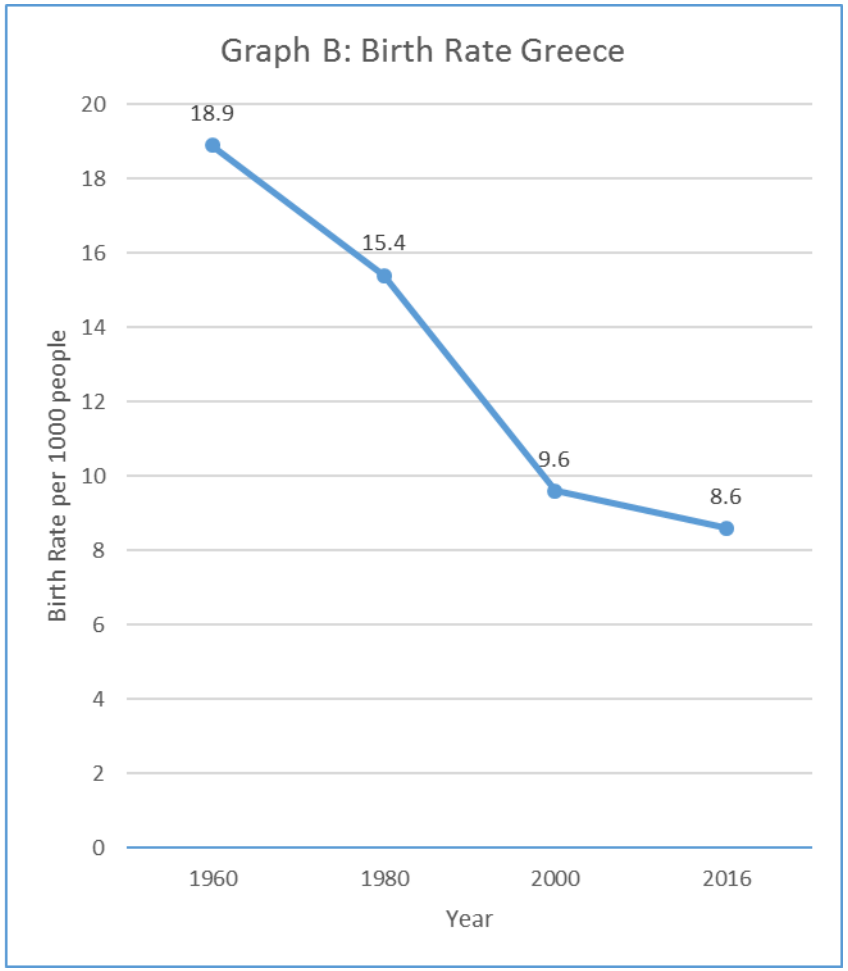
The population of Greece is 10,760,421 (World Bank, 2018a) and a birth rate estimated at 8.6 births/1,000 population in 2016 (World Bank, 2018b). The change in population and birth rate from 1960 to 2017 is shown in Figure 1, graphs A and B respectively.

Greece has a reported population density of 84 people per square kilometre in 2017 and this has risen from 65 people per square kilometre in 1961 (World Bank, 2018c). Infant mortality in 2017 is estimated at 4.3 deaths/1,000 live births in total (World Bank, 2018d).

The average life expectancy in Greece is estimated at 81 years (World Bank, 2018e), with a death rate of 11 deaths/1,000 population in 2016 (World Bank, 2018f). Greece has a gross national income per capita (PPP int. $, 2013) of $25,000 (WHO, 2016). The estimated total expenditure on health per capita in 2014) was $2,098 (Intl $) and the total expenditure on health in 2014 as percentage of GDP was 8.1% (WHO, 2016).

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





Source: Information sourced from World Bank (2018)

4 Vision Screening Commissioning and Guidance

Vision screening in Greece is organised nationally, however, there is no specific programme, only guidelines that have been available since 2015. These guidelines were released by the Institute of Child Health, but were only accepted as national guidelines in 2018. Vision screening is not embedded into a general preventative child healthcare screening system. There are no regional differences. To date (October 2018) there have been no revisions of the guidelines.

Vision screening is free in public hospitals and primary care units, however, parents can opt to pay for screening in private practices. Vision screening is delivered by ophthalmologists, some paediatricians and general practitioners (GP) in public hospitals, primary care units and private practices. It is not known how many vision screening professionals there are per million population, but there are many more paediatricians and GPs that could perform vision screening. Nurses in primary care, practice assistants and nursery teachers have been identified as professionals that who do not currently screen, but could do so with additional training. Currently, there is no specific training for vision screeners available. There are no methods for quality monitoring imposed by the government and there has been no research carried out concerning vision screening in Greece.

5 Screening programme

The target conditions screened for are retinopathy of prematurity, congenital eye disorders, reduced visual acuity and amblyopia. The health care professionals delivering vision screening, venue for screening and tests used vary depending on the age of the child. 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 either a hospital or a private clinic. The tests conducted at this age include eye inspection, fixation, red reflex testing, eye motility, Hirschberg test, retinal examination, pursuit movements and pupillary reflexes.

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 an ophthalmologist in a child healthcare centre, primary care unit or private clinic. Babies are screened three times: at birth, at 1 to 2 weeks and at 2 months of age. Parents choose the paediatrician or venue. The tests conducted at this age include eye inspection, fixation, red reflex testing, eye motility, Hirschberg test, retinal examination, pursuit movements and pupillary reflexes. Babies are referred for further diagnostic examination after one abnormal test result. Decisions about repeat screening or referral for diagnostic testing in those with inconclusive results or poor cooperation is at the discretion of the doctor.

5.3 Vision screening - 3 months to 36 months

Children aged 3 to 36 months are screened by either a paediatrician or an ophthalmologist in hospital, private clinic or primary care unit. Parents choose the paediatrician and venue. The tests conducted at this age include eye inspection, fixation, red reflex testing, eye motility, Hirschberg test, retinal examination, pursuit movements, pupillary reflexes, cover test, alternating cover test and colour vision. Children are referred for further diagnostic examination after one abnormal test result. Decisions about repeat screening or referral for diagnostic testing in those with inconclusive results or poor cooperation is at the discretion of the doctor.

5.4 Vision screening - 36 months to 7 years

Children aged 36 months up to 7 years are screened by either a paediatrician or an ophthalmologist and sometimes a GP in a hospital, primary care unit or private clinic. Parents choose the paediatrician and venue. The tests conducted at this age include eye inspection, fixation, red reflex testing, eye motility, Hirschberg test, retinal examination, pursuit movements, pupillary reflexes, cover test, alternating cover test, colour vision and visual

acuity measurement. Only paediatric ophthalmologists, and very rarely general ophthalmologists will test visual acuity in 3.5 year-olds. A full eye examination will be performed at the same time in an ophthalmology clinic. No acuity testing is regularly performed elsewhere. Children are referred for further diagnostic examination after one abnormal test result. Decisions about repeat screening or referral for diagnostic testing in those with inconclusive results or poor cooperation is at the discretion of the doctor.

In children above 3.5 years of age only a paediatric ophthalmologist will perform retinal examination and automated screening. Referral is necessary if they fail to pass the visual acuity screening or in the presence of abnormal examination (red reflex, motility, reflexes, cover test).

Visual acuity is measured for the first time between 3.5 and 5 years of age using Lea Symbols, or HOTV. Vision screening is repeated between the ages of 5 to 6 years and then again at 7 to 8 years, 9 years, 11 to 12 years, 14 to 15 years and 17 to 18 years using ETDRS, Snellen, Sloan, Lea Symbols or HOTV. Referral criteria:

- <0.2 LogMAR in one or both eyes (<6/9.5 Snellen, 0.63 decimal)
- 2 lines difference between the 2 eyes
- Inability of the examiner to evaluate visual acuity.

Visual acuity assessment is usually performed by general ophthalmologists, the majority of which use decimal non-log-scaled non-crowded visual acuity charts. A large proportion of paediatric ophthalmologists also use decimal non-log-scaled non-crowded visual acuity charts.

The recommendations published in 2015 recommend logMAR testing (crowded or uncrowded), but ophthalmologists do not always follow these recommendations. Only LEA symbols or HOTV are recommended for visual screening in children 3.5 to 5 years old. ETDRS, Snellen, Sloan, LEA numbers or HOTV are recommended for VA testing, in older children. The test used depends on clinician’s choice and the child's age.

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

Table 1	**Paediatrician**	**Ophthalmologist**	**GP**
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	EI	Fix	RR	EM	Hir	RE	PM	PR	CT	ACT	CV	VA
Preterm babies	✓	✓	✓	✓	✓	✓	✓	✓	×	×	×	×
0 to 3 months	✓	✓	✓	✓	✓	✓	✓	✓	×	×	×	×
3 to 36 months	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×
3 to 7 years	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Key: EI: Eye inspection; Fix: Fixation; RR: Red reflex testing; EM: Eye motility; Hir: Hirschberg; RE: Retinal examination; PM: Pursuit movements; PR: Pupillary reflexes; CT: Cover test; ACT: Alternating cover test; CV: Colour vision; VA: Visual acuity measurement

Table 3: Location of vision screening for each age group

Table 3	Hospital	Child Healthcare Centre	Primary Care Unit	Private Clinic
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 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 screening is used in Greece.

7 Provision for Visually Impaired

In Greece, there are 8 schools for blind or severely visually impaired children. The total number of children that attend these 8 schools is 124. The costs per child for these schools is not known. It is not known if there is special support for visually impaired children who attend regular mainstream primary school.

8 Knowledge of existing screening programme

8.1 Prevalence/Diagnosis

No data available.

8.2 Coverage

No data available.

8.3 Screening evaluation

No data available.

8.4 Treatment success

Only ophthalmologists prescribe glasses for children aged under 7 years. Other treatment options are decided upon by the ophthalmologist but may include patching and cataract surgery. It is not known if all eligible children are treated. No further data is available.

9 Costs of vision screening in children

9.1 Cost of vision screening

No data available.

9.2 Cost of treatment for amblyopia

No data available.

9.3 Cost of Treatment for strabismus

No data available.

9.4 Cost of treatment for cataract

No data available.

10 References

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