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Summary Vision Screening Data: Malta

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

AS Automated Screening

BT Bagolini Test

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

PCT Prism Cover Test

PM Pursuit Movements

PPP Purchasing Power Parity

PR Pupillary Reflexes

RE Retinal Examination

Ret Retinoscopy

ROP Retinopathy of Prematurity

RR Red Reflex Testing

VA Visual Acuity

WHO World Health Organisation

WT Worth Test

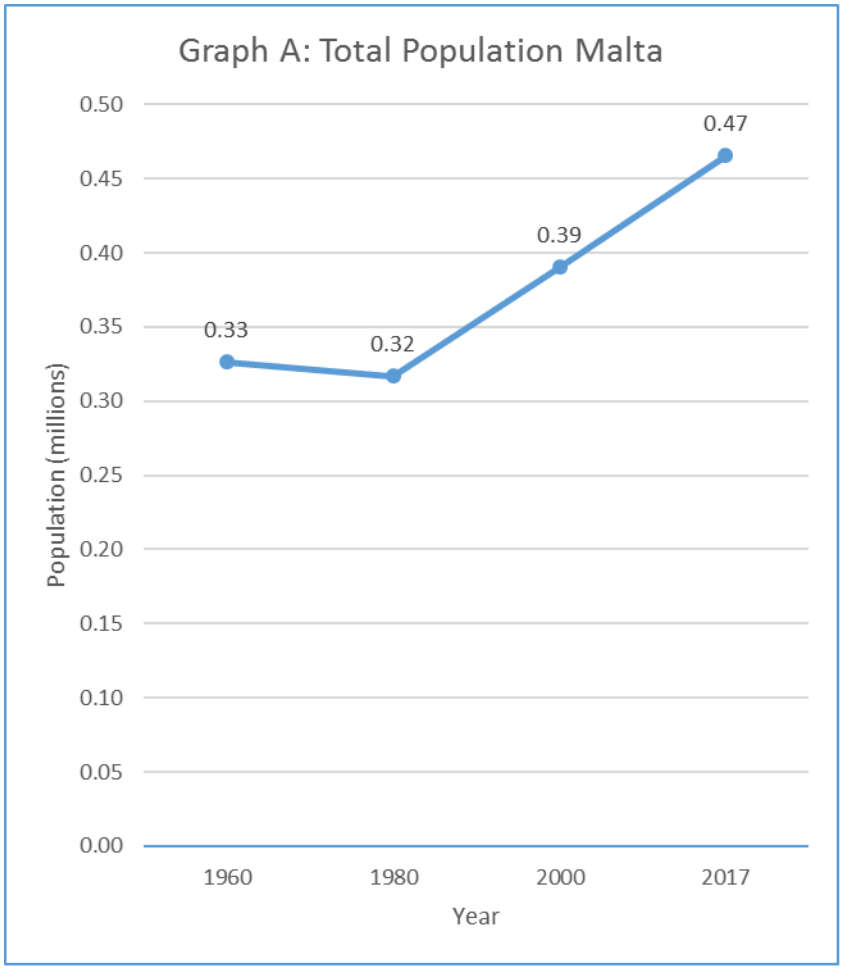
3 Population and Healthcare Overview

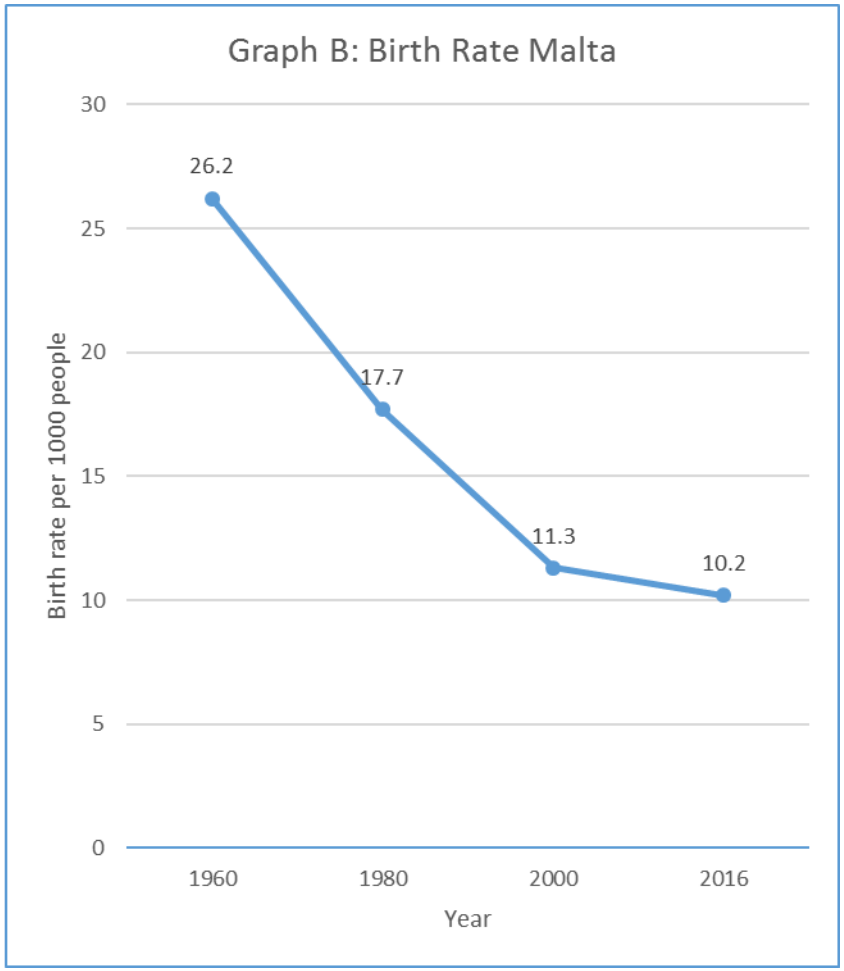
The population of Malta is 465,292 (World Bank, 2018a) and birth rate is estimated at 10.2 births/1,000 population in 2016 (World Bank, 2018b). The change in population and birth rate from 1960 to 2017 is shown in Figure 1, graphs A and B respectively.

Malta has a reported population density of 1,454 people per square kilometre in 2017 and this has risen from 1,016 people per square kilometre in 1961 (World Bank, 2018c). In terms of healthcare facilities, the total density of hospitals in 2013 was 0.93 per 100,000 population (WHO, 2016a). Infant mortality in 2017 is estimated at 2.9 deaths/1,000 live births in total (World Bank, 2018d).

The average life expectancy in Malta is estimated at 82.5 years (World Bank, 2018e), with a death rate of 5.6 deaths/1,000 population in 2016 (World Bank, 2018f). Malta has a gross national income per capita (PPP int. $, 2013) of $28,000 (WHO, 2016b). The estimated total expenditure on health per capita in 2014 was $3,072 (Intl $) and the total expenditure on health in 2014 as percentage of GDP was 9.8% (WHO, 2016b).

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





Source: Information sourced from World Bank (2018)

4 Vision Screening Commissioning and Guidance

In Malta, vision screening is organised nationally, with no differences between regions. Vision screening is funded by the state and is embedded into a general preventative child healthcare screening system. The content of the vision screening programme is decided upon by orthoptists. The vision screening programme commenced nationally in 1989 and has been changed since its implementation. Specifically, in 1992 nurses were trained to perform all vision screening tests. In 2014, the screening age of school children was changed from 7 years to 5 years. Cover test and ocular motility have also been added, but the date of this change is unknown. Review of the vision screening programme is funded by the Department of Health and take place through learning sessions and conducted by the principal general practitioner (GP) in charge of the screening programme. The guidelines were last revised five years ago.

Vision screening in Malta is conducted by nurses and GPs, of which there are approximately 10 per million population. Ophthalmologists and paediatricians screen babies in neonatal paediatric intensive care unit only. No other general healthcare professionals have been identified that do not screen, but could do so with additional training. There is specific in-service training in vision screening which lasts between 3 to 4 hours, but this is not accredited or certified. School nurses receive training periodically by the head of orthoptics. This training consists of both theory and practical sessions.

There are no methods for quality monitoring imposed by the government and no research has been conducted concerning the vision screening programme in Malta.

5 Screening programme

In Malta, the target conditions screened for are retinopathy of prematurity (ROP), congenital eye disorders and reduced visual acuity. 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 an ophthalmologist at 1 month of age in a hospital, or at an out-patient clinic if they have been discharged. The tests conducted at this age include eye inspection and retinal examination.

5.2 Vision screening - Birth to 3 months

Well, healthy babies up to the age of 3 months are screened by a paediatrician in a child healthcare centre. The tests conducted at this age include eye inspection, fixation, red reflex testing and eye motility. These tests are performed at the post-natal visit at 6 weeks. Babies are referred after one abnormal test.

5.3 Vision screening - 3 months to 36 months

Children aged 3 to 36 months are screened by a nurse or a GP in a child healthcare centre. This is conducted at 2 months, 8 months and 18 months of age. The tests conducted at this age include eye inspection, fixation, red reflex testing, eye motility, Hirschberg test, retinal examination, pursuit movements, cover test and alternating cover test. Infants are referred after one abnormal or two inconclusive tests.

5.4 Vision screening - 36 months to 7 years

Between 36 months and 7 years of age children are screened three times by either a GP or a nurse in schools at 3 years, 5 years and 7 years of age. The tests conducted are fixation, eye motility, pursuit movements, cover test, alternating cover test, stereopsis (Lang Stereotest), colour vision and visual acuity measurement. Children are referred after one abnormal or two inconclusive tests. The optotypes used are Snellen charts and Sheridan-Gardiner single test cards. At 3 years the single-optotype letters are used. The referral criteria are:

- At 3 years of age: Vision less than 6/9 (0.67 decimal, 0.2 logMAR), suspected or manifest strabismus, ocular motility problem or failure of Lang test.
- At 7 years of age: Vision less than 6/6 Snellen (1.0 decimal, 0.00 logMAR) in one or both eyes, failed stereotest, or manifest strabismus

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

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

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

Table 3: Location of vision screening for each age group

Table 3	**Hospital**	**Child Healthcare Centre**	**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 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 conducted in Malta.

7 Provision for Visually Impaired

In Malta, there is one school for blind or severely visually impaired children; there are approximately 50 spaces available for children to attend. The costs per child for these schools is t not known. There is special support for visually impaired children who attend regular mainstream primary school, including financial support from social services and non-government organisations as well as visits by a specialised teacher.

8 Knowledge of existing screening programme

8.1 Prevalence/Diagnosis

There is only data concerning a rough estimation based on professional opinion, of the prevalence of strabismus at 2 years of age, which is 2.5-3.0%.

8.2 Coverage

Children are invited for vision screening by their school health service; approximately 3,000 children per year. It is estimated that greater than 75% of children are invited for screening and that the attendance rate is greater than 90%.

8.3 Screening evaluation

No data available.

8.4 Treatment success

Optometrists and orthoptists are the only professionals that prescribe glasses for children under the age of 7 years in Malta. Other treatment options available include patching and cataract surgery (if appropriate). All eligible children are offered treatment. There is no other data available.

9 Costs of vision screening in children

9.1 Cost of vision screening

The salary costs, per year, for vision screening professionals is estimated at between 23,000-30,000 Euros. The salary costs per hour for vision screening are estimated at between 12-15 Euros per hour. It is not known how much it costs to train general preventative child healthcare screening professionals, between leaving secondary education and qualification. The total vision screening costs per year, or per child per year, are not known.

9.2 Cost of treatment for amblyopia

The estimated costs for treatment of typical patients, with refractive amblyopia and strabismic amblyopia (including follow up) are 200 Euros for glasses, 4 visits in the first year, 2 visits the next year and then a visit every year after 8 years of age (25 Euros per visit). There is not further data available.

9.3 Cost of Treatment for strabismus

No data available.

9.4 Cost of treatment for cataract

No data available.

10 References

The World Bank (2018a). Population, total | Data. [online] Available at: https://data.worldbank.org/indicator/SP.POP.TOTL?locations=MT [Accessed 11 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=MT [Accessed 11 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=MT [Accessed 211 December 2018].

The World Bank. (2018d). Mortality rate, infant (per 1,000 live births) | Data. [online] Available at: https://data.worldbank.org/indicator/SP.DYN.IMRT.IN?locations=MT [Accessed 11 December 2018].

The World Bank. (2018e). Life expectancy at birth, total (years) | Data. [online] Available at: https://data.worldbank.org/indicator/SP.DYN.LE00.IN?locations=MT [Accessed 11 December 2018].

The World Bank. (2018f). Death rate, crude (per 1,000 people) | Data. [online] Available at: https://data.worldbank.org/indicator/SP.DYN.CDRT.IN?locations=MT [Accessed 11 December 2018].

World Health Organisation (WHO). 2016a. Health Infrastructure - Data by country. [ONLINE] Available at: http://apps.who.int/gho/data/view.main.30000. [Accessed 11 December 2018].

World Health Organisation (WHO). 2016b. Countries, Malta. [ONLINE] Available at: http://www.who.int/countries/mlt/en/. [Accessed 11 December 2018].