CONTENTS

PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	2,3
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	2,4
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	4
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	4
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	4,49
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	4
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	4,49
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	4
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	5
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	4
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	5-6
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	4,6,S40
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	5-6, S1,S9
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	4-5, 50-55
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	5-6, S40
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	5-6, 11, 54-55
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	N/A

PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	N/A
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	N/A
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	49
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	4
Study characteristics	17	Cite each included study and present its characteristics.	16-48, S1-S32
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	N/A
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	S1-S17
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	6-8, 9-11
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	8-9, S40
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	13
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	8-9
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	N/A
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	8-9, S40
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	11-15
	23b	Discuss any limitations of the evidence included in the review.	15
	23c	Discuss any limitations of the review processes used.	15
	23d	Discuss implications of the results for practice, policy, and future research.	11-13, 15
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	N/A
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	N/A
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	N/A
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	16
Competing interests	26	Declare any competing interests of review authors.	16

PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	16-48, S1-S39

SUPPLEMENTAL TABLES AND MATERIALS

Supplemental Table S1. Reports of the interpupillary distance (IPD) in different populations/regions.

First Author	Ref #	Year	Ethnicity/Region	Comments	Cohort size	Male	Female	Mean
EUROPE				M=F+2.3				
Becker	58	1861	Heidelberg, Germany	c/o Beselin	370	**60.1**	**57.5**	58.8
Pflüger	59	1875	Luzerne, Switzerland		214	**62.0**	**59.2**	61.4
Holmgren	60	1879	Upsala, Sweden		191	**62.6**	**61.5**	62.1
Beselin	61	1885	Heidelberg, Germany		8	63.1	**60.8**	61.95
Seggel	62	1904	German soldiers		5,000	**62.2**	59.8	61.0
Seggel	62	1904	Munich, Germany		700	**62.5**	**61.5**	62.0
Speidel	63	1905	Tubingen, Germany		472	**62.4**	60.1	61.25
Helmbold	64	1914	Germany		300	**65.2**	**62.1**	63.7
Helmbold	64	1914	Eastern Germany		225	**64.1**	**61.1**	62.6
Koegel	65	1914 1916	Belarus		296	**65.2**	62.9	64.05
Koegel	66	1914	East-Central Russia		300	**64.5**	62.2	63.35
Koegel	66	1914	Ukraine		300	**64.9**	62.6	63.75
Koegel	66	1914	Tatarstan, Russia	Tatars	300	**63.7**	61.4	62.55
Guenther	1	1933	Saxony, Germany		100	**65.8**	63.5	64.65
Bertelsen	67	1954	Copenhagen, Denmark		249	**62.06**	**59.85**	**60.81**
Kerwood	68	1954	Eastern England, UK		200	**64.3**	**60.6**	62.45
Babalola	69	1960	UK		40	**64.7**	62.4	63.55
Kisling	70	1966	Copenhagen, Denmark		102	**61.0**	58.7	59.85
Garrett	71	1971	France	Pilots	820	**62.3**	60.0	61.15
Bruckner	72	1986	Basel, Switzerland		11	**65.16**	62.86	62.83
Fledelius	37	1986	Hillerod, Denmark		203	**65.9**	**62.9**	64.4
Jonasson	73	1987	Iceland		555	61.85	59.55	**60.7**
Mon-Williams	12	1993	Scotland		20	62.15	59.85	**61.0**
Howarth	74	1999	Leicestershire, UK		41	**64.0**	**61.0**	62.5
Pointer	75	1999	Northampton, UK		900	**64.8**	**61.7**	63.3
Pointer	75	1999	Northampton, UK		900	**65.5**	**62.6**	64.1
Filipovic	76	2003	Croatia		200	64.15	61.85	**63.0**
Wilkinson	77	2003	Manchester, UK		95	**60.8**	**58.5**	59.7
Mommaerts	78	2008	Belgium		50	**60.6**	**59.4**	60.0
Pointer	9	2012	Northampton, UK		1,354	**65.3**	**62.3**	63.8
Garcia-Lazaro	79	2014	Valencia, Spain		38	64.3	61.9	**63.1**
Lupon-Bas	80	2014	Barcelona, Spain		5	63.15	60.85	**62.0**
Zilch	13	2014	Hamburg, Germany		15	67.25	64.95	**66.1**
Hakala	81	2016	Espoo, Finland		40	61.55	59.25	**60.4**
Mestre	14	2016	Marseille, France		20	**64.1**	61.78	62.95
Flament	82	2020	Paris, Montpellier, France		581	65.3	**63.0**	64.15
Knezi	83	2020	Serbia		90	**60.3**	**60.8**	60.5
Schuetz	17	2022	Giessen, Germany		18	62.25	59.95	**61.1**
Tsiogka	84	2023	Athens, Greece		400	62.15	59.85	**61.0**

DOWN SYNDROME				M=F-2.4				
Brushfield	85	1924	London, UK		84	**50**	**54**	52
Vontobel	54	1933	Zurich, Switzerland		10	49.5	51.9	**50.7**
Lowe	86	1949	London, UK		17	53.8	56.2	**55**
Kerwood	68	1954	Eastern England, UK		33	**54.6**	**55.4**	55.0
Kisling	70	1966	Denmark (South)		71	**54.2**	56.6	55.4
Missiroli	55	1970	Rome, Italy		15	**59.2**	61.6	60.4
Woodhouse	56	1994	Cardiff, Wales		8	48.8	51.2	**50**
Doyle	87	2016	Ulster, UK		7	**53.2**	55.6	54.4
INUIT (ESKIMO)								
Skeller	88	1954	Tasiilaq, S. Greenland		76	**60.26**	**58.67**	59.47
AFRICA – WEST								
				M=F+2.27				
Babalola	69	1960	West Africa		40	**69.64**	67.5	68.5
Kikudi	30	1988	Kinshasa, Zaire		100	67.15	64.85	**66**
Kaimbo	89	1994	Kinshasa, Zaire		11	**70.25**	**65.3**	**67.8**
Umar	90	2005	Jos, Central Nigeria		213	**89**	86.7	87.85
Ilechie	91	2010	Cape Coast, Ghana		400	**69.6**	**66.3**	**68**
Oladipo	92	2010	Bayelsa State, Nigeria	Ijaw	1,000	**69.60**	**66.64**	**68.1**
Osunwoke	93	2010	Enugu-Owerri, Nigeria	Igbo	1,000	**74.9**	**74.5**	**74.7**
Esomonu	94	2012	Enugu-Owerri, Nigeria	Igbo	2,000	**74.25**	**74.2**	74.2
Osunwoke	42	2012	Port Harcourt, Nigeria	Ijaw	175	**65.08**	**65.01**	65.05
Kumah	95	2016	Kumasi, Ghana		302	**66.2**	**65.2**	**65.7**
Omodele	96	2016	Yoruba, Nigeria		1,274	**68.8**	**66.58**	**67.7**
Usman	97	2016	North-Eastern Nigeria	Bura	300	**69.6**	**68.0**	**69.0**
Adekunle	98	2021	Lagos, Nigeria	Yoruba	325	**68.19**	**65.35**	**66.99**
Adekunle	98	2021	Lagos, Nigeria	Igbo	80	**68.36**	**66.24**	**67.34**
Adekunle	98	2021	Lagos, Nigeria	Hausa	50	**66.86**	**63.41**	**66.73**
Adekunle	98	2021	Lagos, Nigeria	other	48	68.23	65.96	**67.09**
Adekunle	99	2022	Lagos, Nigeria		452	**69.63**	**65.54**	**67.85**
Soumboundou	100	2023	Dakar, Senegal		104	**61.9**	**59.9**	60.9
DOWN SYNDROME								
Adio	101	2012	Port Harcourt, Nigeria		42			**59.5**
AFRICA – NORTHEAST, CENTRAL, SOUTH				M=F+2.4				
Ried	102	1915	Congo, Tanganyika		37	**68**	**63.3**	65.65
El-Mokadem	103	1987	Egypt		2,600	**63.4**	**60**	**61.7**
Rasengane	104	2001	Johannesburg, South Africa		200	68.1	65.9	**67**
McAlister	105	2002	Uganda (Army)		104	**67.4**	65.0	66.2
Ruiz-Alcocer	106	2011	Maputo, Mozambique		423	**68.1**	**67.4**	**67.8**
Siraj	107	2017	Khartoum, Sudan		920	**63.0**	**61.57**	**62.3**
Halladay	108	2019	Malawi		179	**68.6**	**65.6**	**67.8**
Elrazky	109	2020	Cairo, Egypt		83	65.7	61.3	**63.5**
Flament	82	2020	Johannesburg, South Africa		315	71.1	**68.7**	69.9
Mhaleni	110	2021	Polokwane, Limpopo Province, South Africa		386	**68**	**66.5**	**67.3**
Samuel	111	2021	Mashonaland, Zimbabwe	Shona	471	**66.4**	**65.0**	**65.7**

MIDDLE EAST				M=F+2.44				
Osuobeni	112	1993	Riyadh, Saudi Arabia		353	63.4	**60.9**	62.15
Osuobeni	113	1994	Riyadh, Saudi Arabia		198	**63.38**	60.94	62.16
Al-El-Sheikh	114	1998	Riyadh, Saudi Arabia		163	**64.9**	**59.4**	**62.15**
Evereklioglu	115	1999	Malatya, Turkey		1,404	**63.7**	**61.5**	**62.6**
Evereklioglu	116	2002	Malatya, Turkey		1,414	**63.7**	**61.5**	**62.6**
Bozkir	117	2003	Adana, Turkey		1,404	**63.9**	**60.8**	**62.3**
Kassab	118	2005	Mosul, Iraq		100	**64.9**	**59.4**	62.15
Bayani	119	2006	Tehran, Iran		400	**65**	**63**	**64**
Ozturk	120	2006	Afyon, Turkey (West)		261	**61.4**	**61.0**	**61.2**
Beden	121	2008	Samsun, Turkey		2,477	64.2	61.76	**62.98**
Ozsoy	122	2009	Antalya, Turkey		70	64.25	61.75	**63.0**
Aksu	123	2010	Ankara, Turkey		100	**48.3**	**51.4**	**49.9**
Mahdavilzadi	124	2010	Mashhad, Iran		100	63.54	60.88	**62.1**
Fesharaki	125	2012	Isfahan, Iran		947	**63.6**	**61.1**	**62.4**
Alanazi	126	2013	Riyadh, Saudi Arabia		133	**62.65**		61.40
Aslankurt	127	2013	Kahramanmaras, Turkey		120	**64.4**	**61.3**	62.85
Gudek	128	2015	Samsun, Turkey		115	**61.7**	**59.0**	**60.4**
Ilhan	10	2015	Kayseri, Turkey		1,002	61.12	58.68	**59.9**
Yildirim	129	2015	Istanbul, Turkey		756	**63.9**	**61.4**	**62.7**
Al-Kaisy	130	2016	Kurds in Iraq		65	59.82	57.38	**58.6**
Direk	131	2016	Sanliurfa, Turkey		311	66.64	**64.2**	65.42
Moravej	132	2017	Tehran (W), Iran		487	61.44	**59**	60.22
Ozdemir	133	2017	Bursa, Turkey		172	**59.3**	**57.5**	**58.4**
Majeed	134	2018	Abha, Saudi Arabia		228	**65.87**	**57.79**	**61.9**
Rabaji	135	2019	Tehran, Iran		24	**66.03**	**64.60**	65.32
Sahbaz	136	2020	Azeri population		1,132	**65**	**62.7**	**63.9**
Sahbaz	137	2021	Azerbaijan		700	**66.0**	**64.1**	**65.05**
Bahsi	138	2021	Gaziantep, Turkey		200	**67.6**	**63.2**	**65.4**
Gantz	139	2021	Jerusalem, Israel	Jews, Arabs	199	**61.9**	**60.0**	**60.6**
Sahbaz	137	2021	Istanbul, Turkey		700	**63.1**	**61.1**	**62.1**
Moradi	140	2022	Tehran, Iran		300	**63.26**	**61.13**	**61.95**
Ozdemir	141	2022	Samsun, Turkey		80	**66.15**	**65.21**	65.68
Alshamri	142	2023	Yemen		150	**60.8**	**59.9**	60.35
Hatipoglu	143	2023	Nigde, Turkey		57	**64**	**62**	**63**
Abbas	144	2024	Najaf, Iraq		77	63.6	61.16	**62.38**
Eltahir	145	2024	AL-Qassim, Saudi Arabia		56	60.53	**58.09**	59.31
SOUTH ASIA (NORTHWEST)				M=F+2.68				
Singh JR	146	1983	Amritsar, Punjab, India		71	**59.1**	**56.5**	57.8
Gupta VP	147	2003	Delhi, India		1,516	**58.5**	**57**	57.8
Bali	148	2005	Kinnaur/Lahaul-Spiti, India		50	66.4	63.72	**65.06**
Patil	149	2011	Nagpur, India		216	**64.2**	**63.1**	63.7
Hussain	150	2012	Lahore, Pakistan		159	**67.57**	**62.92**	65.2
Kini	151	2012	Loni, Maharashtra, India		70	63.34	60.66	**62**
Sharma	152	2012	Sundar Nagar, India		100	**59.8**	**57.6**	58.7
Purkait R	153	2013	Sagar, India		116	**60.7**	**57.4**	59.1
Ladda	154	2014	Loni, Maharashtra, India		400	**61.1**	**58.2**	59.65
Shah	43	2014	Gujarat, India		1,696	**61.5**	**60**	**61.25**

Nazir	155	2015	Srinagar, Kashmir, India		60	**63.5**	**61.9**	**62.0**
Alkhairy	156	2016	Karachi, Pakistan		500	**61.9**	**61.5**	61.7
Gupta R	157	2016	Shimla, Himachal Pradesh, India		40	**67.9**	**61**	64.5
Arshad	158	2017	Faisalabad, Pakistan		100	65.34	62.66	**64.0**
Ayoub	159	2017	Kashmir, India		60	**60.2**	**59.5**	59.85
Bangar	160	2017	Latur, Maharashtra, India		250	**62.3**	**61.5**	61.9
Batool	161	2017	Faisalabad, Pakistan		30	63.4	60.4	**62.6**
Shah DS	162	2017	Gandhinagar, Gujarat, India		100	**60.3**	**58.79**	59.55
Saifullah	163	2018	Peshawar, Pakistan		100	**63.7**	**61.0**	**62.3**
Hayat	164	2019	Karachi, Pakistan		499	**62.7**	**60.7**	61.7
Rattan	165	2019	Uttarakhand, India		100	**59.4**	**48.3**	53.9
Gupta P	166	2020	Bathinda, Punjab, India		200	**67.2**	**65.9**	66.5
Dhinsa	167	2021	Haryana, India		100	**54.6**	**51.6**	53.1
Sarathi	168	2021	Gujarat+, India		71	63.84	61.16	**62.5**
Bhalla	169	2022	Chandigarh, India		45	**61.9**	**60.8**	61.35
Ahmed	170	2022	Karachi, Pakistan		230	**66.62**	**71.72**	**69.23**
Malik	171	2022	Lahore, Pakistan		380	**60.23**	**58.86**	**59.6**
Poonia	172	2022	Ahmedabad, India		150	60.85	58.15	**59.5**
Kamboj	173	2023	Haryana, India		100	**62.6**	**61.55**	**62.05**
Maseedupalli	11	2023	Hyderabad, India		455	**62.8**	**60.0**	61.4
DOWN SYNDROME								
Bhalla	57	2021	Chandigarh, India		51	**58.3**	**58.0**	58.15
SOUTH ASIA (SOUTH, CENTRAL, EAST)				M=F+3.07				
Anitha	174	2011	Chennai, India		100	**64**	**58**	61
Packiriswamy	175	2012	Manipal, Karnataka, India		300	**68.1**	**63.6**	65.9
Vasanthakumar	176	2013	Manipal, Karnataka, India	Dravidians	200	**66.72**	**62.59**	64.7
Mostafa	177	2014	Chittagong/Rangamati, Bangladesh	Buddhist	100	56.9	**55.3**	56.1
Shivhare	178	2015	Bangalore, India		90	**63.1**	**60.6**	61.9
Narain	179	2016	Davanagere, Karnataka, India		200	**63.1**	**60.6**	**63.01**
Banu	180	2017	Mangalore, Karnataka		120	**65.2**	**61.8**	63.5
Barman	181	2018	Meghalaya, Assam, India		120	**70.86**	**70.0**	70.43
Sasidharan	182	2019	Mangaluru, Karnataka		400	**62.1**	**61.3**	**61.7**
Sivaranjani	183	2019	Chennai, Tamil Nadu		100	**62**	**62**	62
Yu	184	2019	Indians residing in Singapore		70	**62.7**	**57.6**	60.2
Flament	82	2020	Chennai, Kolkata, Delhi, India		886	66.07	**63.0**	64.34
Nehaapriya	185	2020	Chennai, Tamil Nadu		150	60.03	56.97	**58.5**
Rupashri	186	2020	Chennai, Tamil Nadu		250	**62.7**	**61.8**	62.3
Deepasakthi	187	2021	Chennai, Tamil Nadu		102	**66.91**	**63.39**	65.15
Sarathi	168	2021	Tamil Nadu+, India		78			62.9
Shetty	188	2021	Mangalore, Karnataka, India		252	**62.26**	**58.46**	60.36
Girimallanavar	189	2022	Bangalore, Karnataka, India		100	**65.1**	**60.9**	63.0
Singh AD	190	2023	Andhra Pradesh, India		100	64.41	61.35	**62.88**

Bandhu	191	2023	Jharkhand, India		500	**63.3**	**61**	**62.18**
EAST ASIA				M=F+2.55				
Fung	192	1964	Beijing, China		1,113	**61.29**	**59.85**	60.57
White	193	1964	Thailand (South)		2,950	**64.0**	61.5	62.75
White	194	1964	Vietnam		2,129	**62.0**	59.5	60.75
Pryor	36	1969	Japanese (in USA)		149	**66.0**	**64.0**	65.0
Nakagawa	195	1974	Sapporo, Japan		281	**63.5**	**61.6**	62.6
Park YK	196	1975	Seoul (South), Korea		570	**65.31**	**60.78**	63.05
Sun	197	1979	Tianjin, China		650	**61.0**	58.5	59.75
Wang JL	198	1981	Guanxi Zhuang, China		944	**62.0**	**60.3**	61.2
Kim CJ	199	1988	Korea (cited by Vasanthakumar, 2013)		323	**59.9**	**63.5**	61.7
Park	38	1990	Daegu, Korea		1,653	**65.45**	**64.30**	64.88
Quant	200	1992	Hong Kong, China		243	**64.59**	**61.31**	62.95
Quant	201	1992	Guangdong, China		~200	**63.72**	**61.04**	62.38
Cho JH	202	1993	Korea		1,500	**69.4**	**66.6**	68.0
Hwang	203	1996	Seoul, Korea		700	**69.4**	**66.6**	**67.6**
Tang	204	1998	Hong Kong, China		500	**64.3**	**61.6**	62.95
Song	205	1999	Daegu, Korea		498	**64.6**	**63.6**	64.1
Wang Y	40	2001	Qingdao+, China		740	**61.5**	**59.37**	**60.39**
Ngeow	206	2006	Sabah, Malaysia	KadasanDusun	140	**64.6**	**61.2**	62.9
Al Junid	207	2007	Kuala Lumpur, Malaysia	Malays	100	**64.5**	**62.3**	**63.4**
Al Junid	207	2007	Kuala Lumpur, Malaysia	Chinese	100	**64.8**	**61.4**	**63.1**
Al Junid	207	2007	Kuala Lumpur, Malaysia	Indians	100	**64.1**	**61.1**	**62.6**
Du	208	2008	Hubei, Jianxi, Chongqing, Guangxi, Shanxi (China)		3,000	**64.2**	**61.1**	62.6
Lee	209	2008	Daejeon, Korea		275	**62.3**	**59.9**	61.1
Lee	209	2008	Ueda, Nagano, Japan		275	**68.9**	**63.9**	66.4
Park DH	210	2008	Daegu, Korea		498	**64.6**	**63.6**	64.1
Isa	211	2010	Kuala Lumpur, Malaysia	Malays	61	63.58	61.03	**62.3**
Preechawai	212	2011	Thailand (South)	Chinese	24	**64.4**	**59.7**	62.1
Preechawai	212	2011	Thailand (South)	Thai	24	**61.3**	**59.5**	60.5
Preechawai	212	2011	Thailand (South)	Thai-Malay	24	**62.9**	**60.7**	61.8
Preechawai	212	2011	Thailand (South)	Thai-Chinese	24	**63.8**	**60.0**	61.9
Eom	213	2013	Seoul, Korea		33	64.38	61.83	**63.1**
Takahashi	214	2014	Aichi, Japan		143	**64.7**	**61.9**	63.3
Mishra MK	215	2016	Dharan, Nepal	Mongoloid	85	58.78	56.23	**57.5**
Mishra MK	215	2016	Dharan, Nepal	Aryans	85	63.2	60.65	**61.92**
Lin	216	2017	Taiwan, China		206	**61.6**	**58.8**	60.2
Lu	217	2017	Kuala Lumpur, Malaysia	Malays	103	**66.03**	**62.44**	**64.04**
Lu	217	2017	Kuala Lumpur, Malaysia	Chinese	97	**64.37**	**61.33**	**62.85**
Hwang H	218	2018	Daejeon, Korea		21	65.48	62.93	**64.2**
Kim YC	219	2018	Seoul, Korea		91	63.35	**61.0**	62.2
Rokaya	220	2018	Kathmandu, Nepal		200	**62.67**	**59.46**	61.07
Mishra S	221	2019	Bharatpur, Nepal		113	62.0	**59.5**	60.75
Sano	222	2019	Tochigi, Japan		213	64.38	61.83	**63.1**
Yu P	183	2019	Residing in Singapore	Chinese	150	**61.9**	**59.2**	60.6
Flament	82	2020	China (multiple sites)		574	67.55	**65.0**	66.3
Flament	82	2020	Tokyo, Japan		915	68.55	**66.0**	67.3
Jung	223	2020	Daegu, Korea		120	64.6	**62.2**	63.4

Aziz	224	2021	Selangor, Malaysia		170	**68.3**	**65.9**	67.2
Kim JS	18	2021	Seoul, Korea		22	**66.8**	**60.5**	63.65
Husna	225	2022	Java (West)		39	65.1	**62.6**	63.85
Lim	226	2022	Malaysia (multiple sites)		2,127	65.0	62.4	**63.70**
Tuladhar	227	2023	Pokhara, Nepal		199	**67.13**	**65.15**	**66.09**
Xu Y	228	2023	Shanghai, China		103	63.95	61.6	**62.75**
Hor	229	2023	Cambodia		50	64.36	61.81	**63.08**
Alberto	230	2024	Cabanatuan City, Philippines		300	**62.59**	**60.29**	61.44
Laher	231	2024	Dang Valley, Nepal	Aryans	406	**62.25**	**60.48**	61.37
Laher	231	2024	Dang Valley, Nepal	Mongoloids	406	**62.71**	**61.91**	62.31
Wang J	232	2024	Taiyuan, Shanxi, China		409	**65.43**	**61.64**	**63.49**
OCEANIA								
INDIGENOUS								
Bridgman	233	1999	New Zealand, Maori		191	**63.3**	**60.1**	61.2
Bridgman	233	1999	New Zealand, Samoan		148	**64.5**	**61.7**	63.1
MULTIPLE ETHNICITIES								
Swan	234	2005	Adelaide, Australia	Caucasian	54	**63.6**	**59.6**	61.6
Ellakwa	235	2011	Sydney, Australia	Multiple Ethnicities	120	**62.01**	**58.91**	**60.68**
Kolose	236	2021	New Zealand, Mixed Populations	Defense Force	1,002	**61**	**58**	59.5
Rana	237	2023	Adelaide, Australia	Caucasian	316	62.7	59.7	**61.2**
Rana	237	2023	Adelaide, Australia	East Asian	28	63.2	60.2	**61.7**
Rana	237	2023	Adelaide, Australia	South Asian	27	63.9	59.9	**61.4**
Rana	237	2023	Adelaide, Australia	African	9	66.8	63.8	**65.3**
McAnally	238	2024	Brisbane, Australia		30	65.2	62.2	**63.7**
DOWN SYNDROME								
Fanning	239	1971	Brisbane, Australia		24			**53.0**
AMERICA								
CAUCASIAN				M=F+2.64				
Jackson	35	1921	Colorado, USA		4,560	**63.7**	**61.5**	62.6
Davenport	240	1929	Jamaica		100	**65.12**	**62.60**	63.86
Lucas	241	1935	San Francisco, CA, USA		370	**59**	**59**	**59**
Hertzberg	242	1954	Ohio, USA		4,057	**63.27**	60.6	61.95
Ditmars	29	1966	San Francisco, CA, USA		500	**65.44**	**62.62**	**64.18**
Pryor	36	1969	San Francisco, CA, USA		391	**62.0**	59.35	60.65
White	243	1971	US Army, USA		6,680	**61.3**	58.65	60.0
Backman	244	1972	Quebec, Canada		5	66.32	63.68	**65.0**
Hofstetter	245	1972	Indiana, USA		331	**66.5**	64.0	65.3
Hofstetter	245	1972	Indiana, USA		134	**65.7**	63.2	64.5
Hofstetter	245	1972	Indiana, USA		113	**64.4**	61.9	63.2
White	246	1977	US Marine Corps, USA		2,008	**60.8**	58.1	59.45
Jaeger	247	1980	Philadelphia, PA, USA		88	**61.4**	**60.0**	60.7
Cesario	5	1984	Washington DC, USA		50	**57.87**	**56.61**	57.2

Bogren	248	1986	Sacramento, CA, USA		7	61.66	**59**	**60.3**
Latta	6	1991	Tennessee, USA		54	**63**	**60**	61.5
Young	249	1993	USA		238	**61.39**	**58.44**	59.92
Farkas	250	1994	Toronto, Canada		309	**67.0**	**62.6**	64.8
Nanda	251	1995	Oklahoma, USA		50	**65.11**	**61.45**	63.28
Hall	252	1996	Forest Grove, OR, USA		201	**62.7**	60.0	61.35
Cole	253	1997	Tulane, LA, USA		104	**61.57**	**60.15**	60.86
Barretto	254	1999	Michigan, USA		65	**65.15**	**61.47**	63.3
Pivnick	255	1999	Tennessee, USA		391	**62**	**60**	61
MacLachlan	41	2002	Ithaca, NY, USA		13	**62.21**	**59.99**	61.11
Bradtmiller	256	2004	USA		1,886	**64.00**	**61.17**	62.6
Dodgson	4	2004	USA		2,302	63.35	60.65	**61.99**
Keefe	257	2012	Canada (Forces)		2,191	**63**	**59**	61
Gordon	258	2016	US Pilots, 977 m, 42 f	88% Caucasian	1,372	**63.4**	**60.3**	61.85
Parciak	7	2017	Riverside, CA, USA		120	**77.4**	**74.8**	76.1
DOWN SYNDROME								
				M=F-0.1				
Lyle	259	1972	Waterloo, Ontario, Canada		22	**54.3**	**55.6**	55.0
Jaeger	247	1980	Philadelphia, PA, USA		50	**58.6**	**57.4**	58.0
Krinsky-McHale	260	2014	New York City, NY, USA		5	56.35	56.45	**56.4**
AFRICAN AMERICAN				M=F+3.32				
Herskovits	261	1926	New York City, USA		529	**68.1**	64.85	66.5
Davenport	240	1929	Jamaica		100	**70.60**	**66.68**	68.64
Cesario	5	1984	Washington DC, USA		50	**62.86**	**59.39**	61.1
Murphy	262	1990	Virginia, USA		100	**66.3**	**62.6**	64.5
Latta	6	1991	Tennessee, USA		55	**66**	**63**	64.5
Cole	253	1997	Tulane, Louisiana		236	**64.63**	**63.2**	63.92
Barretto	254	1999	Michigan, USA		61	**68.97**	**65.93**	67.5
Pivnick	255	1999	Tennessee, USA		52	**70**	**66**	68
Bradtmiller	256	2004	USA		1,223	**67.70**	**65.51**	66.6
Dodgson	4	2004	USA		1,376	67.2	64.0	**65.62**
Parciak	7	2017	Riverside, CA, USA		120	**82.7**	**77.6**	80.15
NATIVE AMERICAN								
Dodgson	4	2004	USA		26	66.1	64.1	**65.12**
MULTIPLE ETHNICITIES								
				M=F+3.07				
Gordon	263	2014	US Army		6,068	**64.0**	**61.7**	62.85
Murray	264	2017	North Carolina, USA		416	**65.32**	**61.53**	63.4
LATINO / HISPANIC				M=F+2.01				
Pryor	36	1969	Oaxaca, Mexico		106	**65.0**	**64.0**	64.5
Kawagoe	265	1998	Sao Paulo, Brazil		30	62.3	60.3	**61.3**
Bradtmiller	256	2004	USA		538	**64.66**	**62.17**	63.42
Dodgson	4	2004	USA		125	64.5	62.5	**63.54**
Gomes	266	2006	Uberlandio, Brazil		81	70.1	68.1	**69.1**

Roehe	267	2008	Recife, Brazil		135	65.2	63.2	**64.2**
Arenas	268	2014	Bogota, Colombia		1,262	63.58	61.58	**62.58**
Da Cunha	269	2015	Santa Rosa, Brazil		160	**65.02**	**62.47**	63.75
Flament	82	2020	NJ, USA; Mexico City		329	66.5	**64.5**	65.5

The mean difference between males (M) and females (F) for each ethnicity with data is indicated as: M=F+x (mm). Reported values for the IPD are shown in bold font and estimated/calculated values (for male, female or the mean) are shown in regular font. Ref, reference showing the number in the List of References.

Supplemental Table S2. Esotropia/exotropia (ET/XT) ratio in different populations/regions.

First Author	Ref #	Year	Ethnicity/Region	Comments	Cohort size	ET %	XT %	ET/XT Ratio
EUROPE								
Schenk	S1	1969	Vienna, Austria		67	8.96	1.49	6.00
Aichmair	S2	1992	Vienna, Austria		843	2.97	0.95	3.13
Vereecken	S3	1966	Belgium		1,215	3.29	0.41	8.00
Popovic-Beganovic	S4	2018	Bosnia		997	1.50	1.40	1.07
Medkova	S5	1959	Opava, Czechoslovakia		148	4.05	0.68	6.00
Karlica	S6	2008	Croatia		20,045	2.14	1.84	1.16
Frandsen	S7	1960	Denmark		13,107	3.47	0.92	3.77
Frandsen	S7	1960	Denmark		2,570	5.29	0.74	7.16
Frandsen	S7	1960	Denmark		10,537	3.36	1.05	3.19
Sandfeld	S8	2018	Roskilde, Denmark		445	1.35	0.22	6.00
Hultman	S9	2019	Denmark		3,785	0.77	0.32	2.42
Rantanen	S10	1971	Helsinki, Finland		2,100	2.62	2.14	1.22
Laatikainen	S11	1980	Helsinki, Finland		411	2.92	1.70	1.71
Kaakinen	S12	1981	Helsinki, Finland		182	1.10	0	5*
Kaakinen	S13	1986	Helsinki, Finland		169	2.96	0.59	5.00
Tuppurainen	S14	1993	Kuopio, Finland		56	0	1.79	0.33*
Speeg-Schatz	S15	2004	Alsace, France		2,318	2.89	0.22	13.4
Cohn	S16	1867	Breslau, Germany		10.060	2.21	0.04	55.5
Schleich	S17	1905	Tübingen, Germany		2,098	1.38	0.10	15.5
Schleich	S17	1905	Tübingen, Germany		566	1.06	1.77	0.60
Schild*wä*chter	S18	1972	Hessia, Germany		2,660	4.10	0	219*
De Decker	S19	1973	Kiel, Germany		1,525	4.39	0.85	5.15
Schütte	S20	1976	Aachen, Germany		4,229	3.43	0.83	4.14
Toppel	S21	1978	Munich, Germany		1,212	3.47	0.08	42.0
Haase	S22	1979	Hamburg, Germany		830	5.18	1.08	4.78
Rüssmann	S23	1990	Cologne, Germany		254	1.18	0.79	1.5
Kasmann-Keller	S24	1998	Saar, Germany		939	1.70	0.64	2.67
Fiess	S25	2017	Wiesbaden, Germany		264	1.14	0.38	3.00
Fiess	S26	2020	Mainz, Germany		14,700	1.60	0.80	2.00
Donnelly	S27	2005	Ulster, N. Ireland		1,582	3.35	0.63	5.30
Montvilaite	S28	2015	Lithuania		40	2.50	0	3*
Paduca	S29	2020	Moldova		861,682	1.00	0.29	3.41
Holst	S30	1962	Oslo, Norway		21,484	2.16	0.1	21.6
Holst	S30	1962	Oslo, Norway		31,330	1.95	0.1	19.5
Aslaksen	S31	2023	Sorlandet, Norway		63	0	4.76	0.14*
Dalz	S32	2009	Poznan, Poland		3,025	1.39	0.40	3.50
Quental	S33	2013	Portugal (South)		885	0.79	0.68	1.17
Lanca	S34	2014	Lisbon, Portugal		672	2.08	1.79	1.16
Hendrickson	S35	2001	Sibiu, Romania		676	6.07	2.96	2.05
Hendrickson	S35	2001	Sibiu, Romania		184	3.26	2.17	1.50
Mazepa	S36	1967	Saratov, Russia		1,507	1.99	0	61*
Maimulov	S37	1971	Leningrad, Russia		2,034	1.67	1.38	1.21

Delgado-Molina	S38	1991	Madrid, Spain		1,852	0.86	0.22	4.00
Martinez	S39	1997	Valladolid, Spain		1,179	2.88	1.10	2.62
Nordlöw	S40	1944	Gotaland, Sweden		2,271	3.17	0.40	8.00
Nordlöw	S41	1964	Gotaland, Sweden		6,004	3.55	0.43	8.19
Köhler	S42	1973	Lund, Sweden		2,397	2.89	0.92	3.17
Lennerstrand	S43	1991	Stockholm, Sweden		1,047	0.76	0.57	1.33
Rassmussen	S44	2000	Uppsala, Sweden		3,493	2.38	1.12	2.13
Kvarnström	S45	2001	Lund/Linköping, Sweden		3,126	1.50	0.58	2.59
Ohlsson	S46	2001	Göteborg, Sweden		1,046	0.86	0.67	1.29
Aring	S47	2005	Göteborg, Sweden		143	2.80	0.70	4.00
Holmström	S48	2006	Stockholm, Sweden		217	0.92	2.30	0.40
Abdi	S49	2008	Stockholm, Sweden		216	0.93	0.46	2.00
Voirol	S50	1912	Basel, Switzerland		939	0.64	0.21	3.04
Franceschetti	S51	1966	Geneva, Switzerland		314	1.59	1.27	1.25
Gansner	S52	1968	Zürich Switzerland		9,384	1.25	0.30	4.19
Worth	S53	1906	London, UK		10.239	2.26	0.21	10.50
Tyser	S54	1949	London, UK		460	2.39	0	23*
Sorsby	S55	1960	UK	recruits	1,033	3.29	0.68	4.86
Graham	S56	1974	Cardiff, UK		4,784	3.62	0.77	4.70
Bruce	S57	1991	Bradford, UK		339	2.95	1.18	2.50
Stayte	S58	1993	Berkshire, UK		6,483	1.88	0.40	4.70
Newman	S59	1996	Cambridge, UK		6,794	0.21	0.29	0.70
O'Connor	S60	2002	East Midlands, UK		169	1.78	0.59	3.00
Williams	S61	2008	Avon, UK		7,538	1.70	0.49	3.46
Hu	S62	2012	Walsall, UK		2,830	0.74	0.14	5.25
Toufeeq	S63	2014	Chesterfield, UK		3,726	2.41	1.31	1.84
Bruce	S64	2016	Bradford, UK		1,558	1.22	0.90	1.36
Plotnikov	S65	2019	Avon, UK		5,172	2.83	0.54	5.11
DOWN SYNDROME (EUROPE)								
Skeller	S66	1951	Copenhagen, Denmark		77	31.2	3.9	8.0
Oster	S67	1953	Seeland, Denmark		526	22.2	0.4	58.5
Haargaard	S68	2006	Denmark (national)		29	51.7	6.9	7.5
Pearce	S69	1910	London, UK		28	25	0	15*
Ormond	S70	1912	London, UK		42	21.4	0	19*
Brushfield	S71	1924	London, UK		177	100	0	355*
Engler	S72	1949	London, UK		145	49	1.4	35
Lowe	S73	1949	London, UK		67	32.8	0	45*
Oladiwura	S74	2022	London, UK		48	37.5	12.5	3.0
Woodhouse	S75	1997	Cardiff, Wales, UK		92	34	1	34
Bromham	S76	2002	Wales, UK		58	43.1	3.4	12.68
Cregg	S77	2003	Wales, UK		55	29.1	0	33*
Stewart	S78	2007	Wales, UK		53	20.8	1.9	10.95
Vontobel	S79	1933	Zurich, Switzerland		25	60	0	31*
Gnad	S80	1979	Vienna, Austria		420	28	3	9.33
Missiroli	S81	1970	Rome, Italy		25	28	0	15*
Fimiani	S82	2007	Naples, Italy		157	28.7	7	4.1
Purpura	S83	2019	Pisa/Florence, Italy		42	19	0	17*
AFRICA (NORTHEAST, CENTRAL, SOUTH)								

Elsahn	S84	2014	Alexandria, Egypt		6,029	0.12	0.02	7.0
Abdelrahman	S85	2020	Sohag City, Egypt		584	0.51	0	7*
Giorgis	S86	2001	Addis Abeba, Ethiopia		1,894	1.06	0.37	2.86
Tegegne	S87	2021	Bahir Dar City, Ethiopia		611	4.09	0.98	4.17
Onsomu	S88	2003	Nairobi, Kenya		559	0.18	2.68	0.07
Mutie	S89	2008	Nairobi (East), Kenya		602	0.33	0	5*
Gordon	S90	1982	Maseru, Lesotho		1,296	0.54	0.15	3.50
Auzemery	S91	1995	Madagascar		1,081	0.69	0.42	1.64
Freedman	S92	1973	Namibia		680	0.15	0.15	1.00
Yassur	S93	1972	Rwanda		1,550	0.32	0.52	0.62
Naidoo	S94	2003	Durban, South Africa		4,890	0.88	0.33	2.69
Zeidan	S95	2007	Khartoum City, Sudan		916	0	0.33	0.2*
Taha	S96	2015	Khartoum City, Sudan		768	2.21	0.39	5.67
Alrasheed	S97	2016	South Darfur, Sudan		1,666	0.18	0.12	1.50
Kingo	S98	2009	Dar es Salaam, Tanzania		400	0	0	1*
AFRICA (WEST)								
Pergens	S99	1898	Congo		100	0	0	1*
Holm	S100	1939	Gabon		1,931	0.10	0.52	0.20
Kumah	S101	2013	Ashanti, Ghana		2,435	0	1.77	0.01*
Nartey	S102	2016	Accra, Ghana		811	0	0	1*
Abdul-Kabir	S103	2017	Kumasi, Ghana		67	0	1.49	0.33*
Hertz	S104	1964	Liberia		1,020	0	1.37	0.34*
Abiose	S105	1980	Kaduna, Nigeria	Hausa-Fulani	5,220	0.3	0.44	0.52
Baiyerou-Agbeja	S106	1998	Ibadan, Nigeria	Yoruba	759	0.26	0	5*
Abah	S107	2001	Zaria, Nigeria	Hausa-Fulani	327	0.31	0	3*
Ajaiyeoba	S108	2005	Ilesa, Nigeria	Yoruba	1,144	0.09	0.17	0.50
Atamah	S109	2005	Benin City, Nigeria	Edo	600	0.33	0.83	0.40
Azonobi	S110	2009	Ilorin, Nigeria	Yoruba	7,288	0.30	0.14	2.20
Ayanniyi	S111	2010	Ilorin, Nigeria	Yoruba	1,393	0.14	0.22	0.66
Akpe	S112	2014	Benin City, Nigeria	Edo	2,139	0.56	0.33	1.70
Ezinne	S113	2018	Anambra, Nigeria	Igbo	998	0.70	2.10	0.33
Atuanya	S114	2024	Benin City, Nigeria		300	2.0	1.7	1.18
DOWN SYNDROME								
Adio	S115	2012	Port Harcourt, Nigeria		42	7.1	2.4	2.96
MIDDLE EAST								
Abdiyeha	S116	2021	Azerbaijan		2,700	0.56	2.41	0.23
Fotouhi	S117	2007	Dezful, Iran		5,544	0.51	0.22	2.33
Jamali	S118	2009	Shahrood, Iran		815	0.61	0.49	1.24
Yekta	S119	2010	Shiraz, Iran		2,683	0.56	1.16	0.48
Faghihi	S120	2011	Mashhad, Iran		2,150	0.88	2.09	0.42
Kwak	S121	2011	Alborz Mountains,		243	1.65	11.93	0.14

			Iran					
Faghihi	S122	2012	Varamin, Iran		1,133	0.44	0.88	0.50
Yekta	S123	2012	Bojnourd, Iran		1,551	0.52	1.35	0.39
Hashemi	S124	2015	Iran (multiple sites)		3,675	0.44	1.27	0.34
Rajavi	S125	2015	Tehran, Iran		2,410	1.00	1.29	0.77
Yekta	S126	2016	Dezful, Iran		1,130	0.71	1.24	0.57
Hashemi	S127	2017	Tehran (North), Iran		1,414	0.30	4.44	0.68
Hashemi	S127	2017	Dezful, Iran		1,834	0.53	3.44	0.15
Hamidi	S128	2019	Bojnurd, Iran		6,600	0.36	0.24	2.0
Hashemi	S129	2020	Shahrekord (Isfahan), Iran		726	0.28	1.24	0.18
Derakhshan	S130	2024	Mashhad, Iran		5,054	0.51	1.46	0.35
Halboos	S131	2023	Babylon, Iraq		1,016	3.1	2.1	1.48
Mukhaiser	S132	2023	Baghdad, City, Iraq		8,850	0.37	0.16	2.36
Neumann	S133	1971	Haifa, Israel		6,400	1.41	0.61	2.31
Friedman	S134	1980	Haifa, Israel		38,000	0.95	0.30	3.17
Friedmann	S135	1980	Negev, Israel		3,375	0.71	3.08	0.23
Maaita	S136	2003	Jordan		1,725	0.41	0.12	3.50
Lithander	S137	1998	Oman		6,292	0.41	0.24	1.71
Labadi	S138	2022	Nablus, Palestine		727	0.69	0.14	5.0
Badr	S139	1981	Al Majma'ah, Saudi Arabia		833	1.08	0.72	1.50
Abolfotouh	S140	1994	Abha, Saudi Arabia		971	1.96	1.03	1.90
Bardisi	S141	2002	Jeddah, Saudi Arabia		609	0.53	0.18	2.94
Gorham	S142	2021	Syria	refugees	91	9.9	3.3	3.00
Turacli	S143	1995	Ankara, Turkey		23,810	1.37	0.91	1.51
Aslan	S144	2013	Kahramanmaras, Turkey		116	1.72	0.86	2.00
Caca	S145	2013	Diyarbakir, Turkey		21,062	1.20	0.89	1.35
Gursoy	S146	2013	Eskisehir, Turkey		709	1.41	0.71	2.00
Celikay	S147	2016	Ankara, Turkey		686	0.44	0.29	1.50
SOUTH ASIA (NORTHWEST)								
McLaren	S148	1961	Gujarat, India	migrants	359	1.11	0	9*
Agarwal	S149	1966	Delhi, India		4,201	0.52	0.60	0.88
Gupta	S150	2000	Aligarh, India		310	1.94	0.97	2.0
Murthy	S151	2002	New Delhi, India		6,447	0.29	0.22	1.36
Bedi	S152	2016	Rajasthan, India		2,754	0.11	0.15	0.75
Mohan	S153	2017	Rajasthan, India		16,168	0.95	0.83	1.14
Awan	S154	1995	Pakistan (North)		1,306	0.61	1,84	0.33
Shaikh	S155	2005	Karachi, Pakistan		5,110	0.49	0.08	6.25
Awan	S156	1998	Afghan refugees	in Pakistan	1,156	0.52	0.87	0.60
Gupta	S157	2021	Surat, India		1,747	0.63	1.43	0.44
DOWN SYNDROME								
Qayyum	S158	2006	Lahore, Pakistan		37	21.6	8.1	2.67
Khan	S159	2016	Lahore, Pakistan		40	60	15	2.67
Ateeq	S160	2023	Lahore, Pakistan		60	35.0	3.3	10.5
SOUTH ASIA (SOUTH, CENTRAL, EAST)								
Asaduzzaman	S161	2024	Dhaka, Bangladesh		200	0	2.00	0.11*

Kuruvilla	S162	1978	Udupi, Karnataka, India		8,496	0.38	1.13	0.33
Datta	S163	1983	Calcutta, India		24,007	0.13	0.09	1.44
Reddy	S164	1987	Kakinada, India		3,675	0.08	0.19	0.43
Kalikivayi	S165	1997	Hyderabad, India		4,029	0.22	0.52	0.42
Dandona	S166	2002	Mahabubnagar District, Telangana, India		4,074	0.54	1.33	0.41
Singh	S167	2011	Bhopal, India		20,800	0.04	0.06	0.69
Kemmanu	S168	2016	Karnataka, India		23,100	0.11	0.34	0.33
Akarkar	S169	2019	Goa, India		817	0.86	0.24	3.50
Saxena	S170	2019	Indore District, Madhya Pradesh, India		1,322	0.76	2.04	0.37
Agrawal	S171	2020	Raipur, India		1,557	0	0.19	0.14*
Atiya	S172	2020	Chennai, India		75	0	12.00	0.53*
EAST ASIA								
Liang	S173	1984	Taiwan, China		5,507	0.83	0.86	0.97
Wang	S174	1989	Taiwan, China		11,806	0.34	0.47	0.72
Ji	S175	1994	Xinjiang, China	Kazaks	4,125	0.39	0.78	0.50
See	S176	1996	Taiwan, China		862	0.46	0.93	0.50
He	S177	2004	Guangzhou, China		4,364	0.42	2.58	0.16
He	S178	2007	Yangxi, China		2,454	0.37	1.22	0.30
Lai	S179	2009	Taiwan, China		618	0.49	0.32	1.53
Fan	S180	2011	Hong Kong, China	1996-97	601	0.50	1.83	0.27
Fan	S180	2011	Hong Kong, China	2006-07	823	0.24	1.46	0.17
Jin	S181	2011	Nanchang, China		4,376	0.73	1,49	0.49
Pi	S182	2012	Yongchuan, China		3,079	0.10	0.16	0.63
Lin	S183	2013	Shantou, China		7,464	0.19	2.71	0.07
Fu	S184	2014	Anyang, China		2,260	0.08	4.51	0.02
Zhu	S185	2015	Nanjing, China		5,831	0.77	4.63	0.17
Chen	S186	2016	Nanjing, China		5,667	0.76	4.57	0.16
Pan	S187	2017	Yunnan, China		9,263	0.30	2.85	0.11
Zhu	S188	2019	Yunnan, China		3,050	0.16	1.74	0.09
Chen	S189	2021	Nanjing, China	3 yrs	2,018	0.20	2.23	0.09
Chen	S189	2021	Nanjing, China	4-5 yrs	1,766	0.34	3.23	0.11
Lu	S190	2008	Maqin County, Tibet		1,084	0.37	2.12	0.17
He H	S191	2020	Lhasa, Tibet, China		1,856	0.4	2.3	0.19
Wang	S192	2021	Nanjing, China		1,986	0.56	4.84	0.12
Zhang	S193	2021	Hong Kong, China		4,273	0.28	2.74	0.10
Nakagawa	S194	1954	Sapporo, Japan		4,171	0.26	1.25	0.21
Majima	S195	1960	Tokyo, Japan		3,033	0.23	0.33	0.70
Nakajima	S196	1960	Shizuoka, Japan		2,874	0.10	0.17	0.60
Nakajima	S196	1960	Shizuoka, Japan		1,159	0.43	0.17	2.50
Harada	S197	1961	Tokyo, Japan		1,058	1.04	0.95	1.10
Yazawa	S198	1973	Hoya City, Japan	6-12 yrs	7,989	0.24	0.41	0.58
Yazawa	S198	1973	Hoya City, Japan	12-15 yrs	2,700	0.04	0.44	0.08
Inatomi	S199	1976	Tokyo, Japan		4,963	0.28	0.28	1.00
Maruo	S200	1977	Tokyo, Japan		10,512	0.95	1.23	0.79
Matsuo	S201	2005	Okayama, Japan	2003	86,531	0.28	0.69	0.41
Matsuo	S202	2007	Okayama, Japan	2005	84,619	0.22	0.62	0.36

Matsuo	S203	2007	Okayama, Japan	1.5 yrs	33,929	0.02	0.04	0.50
Goseki	S204	2017	Tokyo, Japan		1,214	0.16	1.15	0.14
Satou	S205	2018	Tochigi, Japan		760	0.26	1.45	0.15
Yu	S206	1991	Seoul, Korea		1,211	0.33	0.66	0.50
Rah	S207	1997	Seoul, Korea		9,054	0.66	2.89	0.23
Yoon	S208	2011	Korea	3-95 yrs	14,464	0.20	1.10	0.18
Lee	S209	2017	Korea	3-70+ yrs	30,538	0.20	0.99	0.20
Han	S210	2018	Korea	2008-11	5,935	0.22	1.42	0.15
Casson	S211	2012	Vientiane, Laos		2,842	0.21	1.13	0.19
Teoh	S212	1982	Petaling Jaya, Malaysia		650	0.15	1.85	0.08
Goh	S213	2005	Kuala Lumpur, Malaysia		4,634	0.15	0.52	0.29
Premsenthil	S214	2013	Kuching, Malaysia		400	0	0.25	0.33*
Chew	S215	2018	Segamat, Malaysia		1,287	0.08	0.16	0.50
Nepal	S216	2003	Kathmandu, Nepal		1,100	0.09	1.55	0.06
Shrestha	S217	2006	Kathmandu, Nepal		1,816	0.11	1.10	0.10
Sherpa	S218	2011	Dhulikhel, Nepal		466	0	0.43	0.20*
Shrestha	S219	2011	Kathmandu, Nepal		4,228	0.24	2.89	0.08
Pant	S220	2014	Kathmandu, Nepal		569	0.35	2.64	0.13
Sherpa	S221	2014	Chitwan District, Nepal		332	0	3.01	0.48*
Chia	S222	2010	Singapore (STARS)		2,992	0.10	0.67	0.15
Konyama	S223	1972	Bangkok, Thailand		2,415	0.37	0.75	0.50
Mahachaiyakul	S224	1997	Bangkok, Thailand		1,219	0	0.16	0.20*
Tananuvat	S225	2004	Chiang Mai, Thailand		1,084	0.26	0.64	0.41
Jenchitr	S226	2012	Bangkok, Thailand		1,780	1.57	0.98	1.65
Paudel	S227	2014	Ba Ria (Vung Tau), Vietnam		2,238	0.13	0	7*
OCEANIA (AUSTRALASIA AND MELANESIA)								
INDIGENOUS								
Mann	S228	1966	Australia (Northwest)		1,680	0	0.30	0.09*
Mann	S229	1968	Australia (Desert)		1,014	0	0.25	0.14*
Royal Austral College	S230	1980	Australia		62,116	0.18	0.55	0.33
Hopkins	S231	2016	Queensland, Australia		181	0	0	1.00
Ward	S232	1955	Fiji		4,000	0	0	1.00
Mann	S233	1969	New Zealand, Maori		333	1.5	1.2	1.25
Mann	S234	1956	Papua-New Guinea		13,751	0.11	0.04	3.0
Elliott	S235	1965	Tokelau Islands		1,862	0	0	1.00
Elliott	S235	1965	Tokelau Islands		476	0	0	1.00
Elliott	S235	1965	Tokelau Islands		884	0	0	1.00
Verlee	S236	1968	Solomon Islands		616	0.16	1.79	0.09
CAUCASIAN								
Brown	S237	1976	Sydney, Australia		5,426	1.79	1.64	1.09
Macfarlane	S238	1987	Brisbane, Australia		877	1.60	0.91	1.75

Robaei	S239	2006	Sydney, Australia		1,107	1.99	1.08	1.83
Robaei	S240	2006	Sydney, Australia		1,406	1.14	0.85	1.34
Sharbini	S241	2015	Sydney, Australia		1,131	1.24	2.12	0.58
Ward	S232	1955	Fiji		438	0.46	0	5*
Simpson	S242	1984	New Zealand (West)		988	2.02	0.61	3.33
MULTIPLE ETHNICITIES								
Robaei	S239	2006	Sydney, Australia		1,739	1.50	0.81	1.86
Robaei	S240	2006	Sydney, Australia		2,353	0.89	1.15	0.78
Leone	S243	2009	Sydney, Australia		1,740	1.49	0.80	1.86
Pai	S244	2013	Sydney, Australia		1,188	0.34	0.08	4.00
Sharbini	S241	2015	Sydney, Australia		491	1.22	1.83	0.67
Ward	S232	1955	Fiji		943	1.27	0.21	6.00
Anstice	S245	2012	New Zealand		3,273	0.18	0.06	3.00
EAST ASIAN (NON-CAUCASIAN)								
Robaei	S239	2006	Sydney, Australia		632	0.79	1.27	0.63
Robaei	S240	2006	Sydney, Australia		947	0.53	1.58	0.34
Sharbini	S241	2015	Sydney, Australia		516	0.39	1.74	0.22
Ward	S232	1955	Fiji		205	0.49	0.98	0.50
DOWN SYNDROME								
Fanning	S246	1971	Brisbane, Australia		24	25.0	4.2	5.95
NORTH AMERICA								
CAUCASIAN								
Kornder	S247	1974	British Columbia, Canada		1,074	2.05	1.02	2.00
Kornder	S248	1974	British Columbia, Canada		2,619	2.71	1.72	1.59
Johnson	S249	1984	Nain, Labrador, Canada		80	0	1.25	0.33*
Woodruff	S250	1986	New Brunswick, Canada		6,080	2.70	1.28	2.11
Robinson	S251	1999	Ontario, Canada		3,434	0.84	0.20	4.14
Collins	S252	1925	NY, IN, SC, USA		12,134	0.73	0.17	4.29
Knapp	S253	1931	Duluth, MN, USA	adults	4,424	0.14	0.20	0.67
Knapp	S253	1931	Duluth, MN. USA	children	12,253	1.77	0.58	3.06
Downing	S254	1945	USA	nation	60,000	1.43	0.65	2.20
Blum	S255	1959	Oakland, USA		1,163	3.18	1.46	2.18
Roberts	S256	1972	Multiple sites, USA	1963-65	7,119	1.12	0.60	1.88
Roberts	S257	1975	Multiple sites, USA	1971-72	6,768	1.46	2.47	0.59
Roberts	S258	1978	Multiple sites, USA		10,126	1.3	2.0	0.65
Chew	S259	1994	Multiple sites, USA	1966-72	17,931	4.13	1.27	3.25
Friedman	S260	2009	Baltimore, MD, USA		771	1.43	2.08	0.83
Cotter	S261	2011	Baltimore, MD, USA		1,861	1.77	1.07	1.65
McKean-Cowdin	S262	2013	Riverside, CA, USA		1,514	2.31	0.73	3.16
NATIVE AMERICAN								
Wick	S263	1976	South Dakota, USA		398	0.25	3.51	0.07
Adler-Grinberg	S264	1986	Dakota, USA		1,886	0.27	0.95	0.28

Maples	S265	1980	Oklahoma, USA		792	1.14	1.14	1.00
Maples	S265	1980	Minnesota, USA		5,133	0.21	0.23	0.92
Lang	S266	2007	Alaska, USA		80	1.25	5.00	0.25
Garvey	S267	2010	Arizona, USA		909	0.33	0.88	0.38
Chiarelli	S268	2013	Ontario, Canada		146	0.68	3.42	0.20
INUIT (ESKIMO)								
Woodruff	S269	1976	Belcher Island, Canada		138	3.62	2.17	1.67
Johnson	S249	1984	Nain, Labrador, Canada		330	0.91	0.30	3.00
AFRICAN AMERICAN								
Friendly	S270	1978	Washington DC, USA		633	0.95	0.16	6.00
Roberts	S258	1978	Multiple sites, USA		1,205	0.6	2.7	0.22
Chew	S259	1994	Multiple sites, USA	1966-72	19,619	2.28	1.34	1.71
Preslan	S271	1996	Baltimore, MD, USA		680	2.79	0.29	9.50
Preslan	S272	1998	Baltimore, MD, USA		285	1.75	1.40	1.25
Multi-ethnic	S273	2008	Los Angeles, CA, USA		3,005	1.10	1.36	0.80
Friedman	S260	2009	Baltimore, MD, USA		994	1.21	1.21	1.00
Cotter	S261	2011	Baltimore, MD, USA		3,604	1.11	1.11	1.00
LATINO / HISPANIC								
Choi	S274	1995	Los Angeles, CA, USA		2,192	0.59	0.64	0.92
Multi-ethnic	S273	2008	Los Angeles, CA, USA		3,003	0.87	1.47	0.59
Cotter	S261	2011	Baltimore, MD, USA		3,026	0.93	1.35	0.68
DOWN SYNDROME								
Levinson	S275	1955	Chicago, USA		50	12	2	6.0
Shapiro	S276	1985	Wisconsin, USA		53	41.5	1.9	22.0
Roizen	S277	1994	Chicago, USA		77	26	1	26
Averbuch-Heller	S278	1999	Cleveland, OH, USA		26	61.5	15.4	4.0
Cullen	S279	1963	Maryland, USA		143	32.2	0	93*
Jaeger	S280	1980	Philadelphia, PA, USA		75	37.3	2.7	14.0
Warshowsky	S281	1981	New York, USA		39	35.9	0	29*
Krinsky-McHale	S282	2012	New York, USA		355	17.4	0.4	39.5
LATIN AMERICA								
NATIVE AMERICAN								
Urrets-Zavalia	S283	1961	La Paz, Bolivia		2,089	0.29	1.72	0.17
Urrets-Zavalia	S283	1961	La Paz, Bolivia		2,526	0.08	0.20	0.40
Belfort-Mattos	S284	1970	Amazon, Brazil		81	0	3.70	0.14*
Germano	S285	2017	Avai City, Brazil		377	0	1.19	0.11*

LATINO / HISPANIC								
Couto Jr	S286	2007	Rio de Janeiro, Brazil		1,800	0.78	0.61	1.27
Couto Jr	S287	2010	Rio de Janeiro, Brazil		1,800	0.22	0.11	2.00
Maul	S288	2000	Santiago, Chile		5,303	2.34	7.52	0.24
Vasquez	S289	2014	Bogota, Colombia		855	1.64	1.40	1.17
Márquez Galvis	S290	2017	Pereira, Colombia		718	0.56	0.56	1.00
Molinari	S291	2005	Sierra, Ecuador		6,143	0.36	0.28	1.29
Juárez-Muñoz	S292	1996	Mexico City, Mexico		343	0.58	0.58	1.00
Ohlsson	S293	2003	Monterrey, Mexico		1,035	0.68	0.58	1.17
CAUCASIAN								
Costa	S294	1979	Sao Paulo, Brazil		569	0.88	0.53	1.67
Schimiti	S295	2001	Ibipora, Brazil		13,471	0.54	0.25	2.16
Beer	S296	2003	Sao Paulo, Brazil		476	0.84	2.52	0.33
Beer	S296	2003	Sao Paulo, Brazil		2,164	0.92	0.51	1.82
Garcia	S297	2004	Parana, Brazil		1,015	0.59	2.17	0.27
de Sousa	S298	2012	Sao Paulo, Brazil		500	0.20	0.60	0.3
Shimauti	S299	2012	Sao Paulo, Brazil		10,994	0.63	0.52	1.21
Schaal	S300	2018	Brazil (South East)		1,852	1.13	0.32	3.50
EAST ASIAN								
Beiguelman	S301	1964	Sao Paulo, Brazil		296	4.05	1.35	3.00

Data from von Bartheld et al., 2025[22] (for References – see Supplemental Material S1)
* 0.5 was added to each value for the ET/XT ratio when the value was 0, to avoid a zero in the denominator or enumerator, according to Sweeting et al., 2004.[52] Ref, reference number from the Supplemental Material S1.

Supplemental Table S3: Pairs of ET/XT ratio and IPD within populations for regression analysis

REGION	n	**IPD (mm)**	References	Ref #	n	**ET/XT Ratio**	References	Ref #
EUROPE								
Sweden	191	62.1	Holmgren	60	19960	4.72	Nordlow, Koehler, Lennerstrand, Rasmussen, Kvarnstroem, Ohlsson, Aring,Holmstrom, Abdi	S40, 41, 42,43 ,44, 45, 46, 47, 48, 49
Finland	40	60.4	Hakala	81	2918	1.73	Rantanen, Laatikainen, Kaakinen, Tuppurainen	S10, 11, 12, 13, 14
Russia (West)/Belarus	296	64.05	Koegel	65	2034	1.21	Maimulov	S37
Denmark	554	61.95	Fledelius, Bertelsen, Kisling	37, 67, 70	30444	3.72	Frandsen, Sandfeld, Hultman	S7, 8, 9
Denmark (Down Syndr)	71	55.4	Kisling	70	632	49.04	Skeller, Oster, Haargaard	S66, 67, 68
North England	136	60.54	Howarth, Wilkinson	74, 77	7064	3.27	O'Connor, Hu, Toufeeq, Bruce	S60, 62, 63, 64
Central England	1840	63.70	Pointer, Babalola	9, 69	12710	4.13	Williams, Plotnikov	S61, 63
London and East UK	200	62.45	Kerwood	68	23976	6.39	Worth, Tyser, Stayte, Newman	S53, 54, 58, 59
Wales, Ulster (Down Syndr)	15	52.07	Woodhouse, Doyle	56, 87	258	24.26	Woodhouse, Bromham, Cregg, Stewart	S75, 76, 77, 78
London (Down Syndr)	101	52.50	Brushfield, Lowe	85, 86	507	142.6	Pearce, Ormond, Brushfield, Engler, Lowe, Oladiwura	S69, 70, 71, 72, 73, 74
East England (Down Syndr)	33	55.5	Kerwood	68	28	15	Pearce	S69
Belgium	50	60.0	Mommaerts	78	1215	8.00	Vereecken	S3
Germany	7208	61.23	Becker, Beselin,	58, 61	36677	19.21	Cohn, Schleich, De	S16, 17,

			Seggel, Speidel, Helmbold, Guenther, Zilch, Schuetz				Decker, Schuette, Toppel, Haase, Russmann, Kasmann-Keller, Fiess	19, 20, 21, 22, 23. 24, 25, 26
France	1421	61.19 60.99	Garrett, Mestre, Flament	71, 14, 82	2318	13.4	Speeg-Schatz	S15
Spain	43	62.98	Garcia-Lazaro, Lupon-Bas	79, 80	3031	3.46	Delgado-Molina, Martinez	S38, 39
Switzerland	225	61.47	Pfluger, Bruckner	59, 72	10637	4.00	Voirol, Franceschetti, Gansner	S50, 51, 52
Switzerland (Down Syndr)	10	50.7	Vontobel	54	445	10.55	Vontobel, Gnad	S79, 80
Croatia	200	63	Filipovic	76	20045	1.16	Karlica	S6
Italy (Down Syndr)	15	60.4	Missiroli	55	224	7.74	Missiroli, Fimiani, Purpura	S81, 82, 83
AFRICA								
Ghana	702	67.01	Ilechie, Kumah	91, 95	3313	0.26	Kumah, Nartey, Abdul-Kabir	S101 ,102, 103
Nigeria, Enugu (Igbo)	3080	74.18	Osunwoke, Esomonu, Adekunle	93, 94, 98	998	0.33	Ezinne	S113
Nigeria (East) Ilorin, Ibadan, Lagos (Yoruba)	1599	67.51	Omodele Adekunle	96, 98, 99	10404	1.96	Baiyerou-Agbeja, Ajaiyeoba, Azonobi, Ayanniyi	S106 , 108, 110, 111
Nigeria (South)	176	65.0	Osunwoke	42	3039	1.39	Atamah, Akpe, Atuanya	S109 , 112, 114
Nigeria (Down Syndr)	42	59.5	Adio	101	42	2.96	Adio	S115
Zaire / Gabon	111	66.18	Kikudi, Kaimbo	30, 89	1931	0.20	Holm	100
Sudan	920	62.3	Siraj	107	3350	2.10	Zeidan, Taha, Alrasheed	S95, 96, 97
Uganda / Tanzania	104	66.2	McAllister	105	400	1.0	Kingo	98
Egypt	2683	61.76	El-Mokadem, Elrazky	103, 109	6613	7.00	El Sahn, Abdelrahman	S84, 85
MIDDLE EAST								
Turkey (Northwest)	2361	60.50	Ozturk, Ozsoy,	120, 122,	25205	1.52	Turacli, Gursoy,	S142 , 145,

			Aksu, Ilhan, Yildirim, Ozdemir	123, 129, 133			Celikay	146
Turkey (Southeast)	4764	63.02	Bozkir, Beden, Aslankurt, Gudek, Direk, Ozdemir, Bahsi, Hatipoglu	117, 121, 127, 128, 131, 133, 138, 143	21178	1.35	Aslan, Caca	S143, 144
Israel	199	60.6	Gantz	139	47775	2.85	Neumann, Friedman, Friedmann	S132, 133, 134
Iraq	177	62.25	Kassab, Abbas	118, 144	9866	2.27	Halboos, Mukhaiser	S129, 130
Saudi Arabia Central (Riyadh)	903	61.87	Osuobeni, Al-El-Sheikh, Alanazi, Eltahir	112, 113, 114, 126, 145	833	1.50	Badr	S138
Saudi Arabia (Southwest)	228	61.9	Majeed	134	971	1.90	Albolfotouh, Bardisi	S139, 140
Azerbaijan	1,832	64.34	Sahbaz	136, 137	2700	0.23	Abdiyeva	S116
Iran (West, Tehran)	1834	62.18	Bayani, Fesharaki, Moravej	119, 125, 132	6741	0.68	Jamali, Kwak, Faghihi, Rajavi, Hashemi	S118, 121, 120, 122, 125, 127
Iran (East)	100	62.85	Mahdavilzadi	124	15355	0.47	Faghihi, Yekta, Hamidi, Derakshan	S120, 122, 128, 130
SOUTH ASIA								
Pakistan S, India W	3225	62.23	Shah, Gupta, Alkhairy, Shah, Hayat, Ahmed,	43, 147, 156, 162, 164, 170	25779	2.06	Gupta, Bedi, Mohan, Shaikh	S150, 152, 153, 155
Pakistan N	769	61.80	Hussain, Arshad, Batool, Saifullah, Malik	150, 158, 161, 163, 171	1306	0.33	Awan	S154
Pakistan NW	100	62.3	Saifullah	163	1306	0.33	Awan	S154
Delhi, Haryana, Punjab, Chandigarh, Shimla, Uttarakhand, Kashmir	3068	58.78	Singh, Gupta, Dhinsa, Kamboj, Sharma,	146, 147, 167, 173, 152,	10958	1.19	Agarwal, Gupta, Murthy	S149, 150, 151

			Gupta, Rattan, Bhalla Gupta P, Bali, Nazir, Ayoub	157, 165, 169, 166, 148, 155, 159				
Pakistan N / Chandigarh Down Syndr	51	58.15	Bhalla	169	137	6.1	Qayyum, Khan, Ateeq	S158, 159, 160
India Central (Madhya Pradesh, Maharashtra, Chhattisgarh)	652	62.01	Patil, Kini, Purkait, Bangar,	149. 151, 153, 160	23679	0.64	Singh, Saxena, Agrawal	S167, 170, 171
India, Karnataka. Mangalore (coastal) Manipal,	1272	63.07	Packiriswamy, Vasanthakumar, Banu, Sasidharan, Shetty	175, 176, 180, 182, 188	8496	0.33	Kuruvilla	S162
India, Bangalore region	490	62.78	Shivhare, Girimallanavar, Narain, Singh AD	178, 189, 179, 190	23100	0.33	Kemmanu	S168
India, Chennai, Tamil Nadu,	702	61.67	Anitha, Sivaranjani, Neehapriya, Rupashri, Deepasakthi	174, 183, 185, 186, 187	75	0.53	Atiya	S172
India, Telangana, Andhra Pradesh	100	62.88	Singh AD	190	11778	0.42	Dandona, Reddy, Kalikivayi	S166, 164, 165
E. India Jharkhand, Meghalaya, Assam, Bangladesh	720	62.84	Bandhu, Mostafa, Barman	191, 177, 181	24207	1.43	Datta, Asaduzzaman	S163, 161
Nepal	1494	61.98	Mishra MK, Rokaya, Mishra S, Tuladhar, Laher	215, 219, 221, 227, 231	8511	0.11	Nepal, Shresthra, Sherpa, Pant	S215, 216, 217, 220, 219
EAST ASIA								
Thailand	3046	62.71	White, Preechawai	193, 212	6498	0.91	Konyama, Mahachaiyakul, Tananuvat, Jenchitr	S222, 223, 224, 225
Malaysia	2561	63.90	Isa, Lu, Aziz, Al Junid, Lim	211, 219, 224, 207, 226	5284	0.26	Teoh, Goh	S212, 213
Vietnam	2129	60.75	White	194	2231	7	Paudel	S227
Singapore	220	60.47	Yu	183	2992	0.15	Chia	S222

China, Taiwan	206	60.2	Lin	216	18793	0.81	Liang, Wang, See, Lai	S173 , 174, 176, 179
China Central	3983	63.22	Du, Wang J, Flament	208, 232, 82	9715	0.43	Jin, Pi, Fu	S181 , 182, 184
China, Hongkong Guangdong region	943	62.83	Quant, Quant, Tang	200, 201, 204	18555	0.13	He, He, Lin, Zhang	S177 , 178, 183, 193
China, Shanghai, Nanjing	103	62.75	Xu Y	228	9615 17268	0.14	Zhu, Chen, Chen, Wang	S185 , 186, 189, 190
Korea (nation)	1319	63.51	Kim CJ, Song, Park DH	199, 205, 210	50937	0.19	Yoon, Lee, Han	S208 , 209, 210
Korea, Seoul	1404	65.29	Park YK, Kim JS, Kim YC, Hwang	196, 18, 218, 203	10265	0.26	Yu, Rah	S206 , 207
Korea, Daegu, Daejeon	2048	64.29	Park, Jung, Lee	38, 223, 209	50937	0.19	Yoon, Lee, Han	S208 , 209, 210
Japan, Sapporo	281	62.6	Nakagawa	195	4171	0.21	Nakagawa	S194
Central Japan	1695	66.09	Lee, Sano, Pryor, Takahashi, Flament	209, 222, 36, 214, 82	36262	0.73	Majima, Nakajima, Harada, Yazawa, Inatomi, Maruo, Goseki, Satou	S195 , 196, 197, 198, 199, 200, 204, 205
OCEANIA								
INDIGENOUS								
Maori (New Zealand)	191	61.2	Bridgman	233	333	1.25	Mann	S233
CAUCASIAN								
Australia	370	61.26	Swan, Rana	234, 237	9947	1.21	Brown, Macfarlane, Robaei, Sharbini,	S237 ,238, 239, 240, 241
New Zealand	1002	59.5	Kolose	236	988	3.33	Simpson	S242
EAST ASIAN	126	60.74	Ellakwa, Rana	235, 237	2095	0.4	Robaei, Sharbini	S239 , 240, 241
DOWN SYNDROME	24	53.0	Fanning	239	24	5.95	Fanning	S246
AMERICAS								

CAUCASIAN								
Canada	2505	61.48	Backman, Farkas, Keefe	244, 250, 257	13287	2.51	Kornder, Johnson, Woodruff, Robinson	S247, 248, 249, 250, 251,
USA, East, Midwest	23299	61.42	Jackson, Hertzberg, White, Hofstetter, Cesario, Latta, Nanda, Hall, Cole, Barretto, Pivnick, Bradtmiller, Dodgson, Gordon	35, 242, 243, 245, 5, 6, 251, 252, 253, 254, 255, 256, 4, 258	133387	2.33	Collins, Knapp, Downing, Roberts, Chew, Friedman, Cotter	S252, 253, 254, 256, 257, 258, 259, 260, 261
USA, West Coast	1435	62.73	Ditmars, Lucas, Pryor, Bogren, Parciak	29, 241, 36, 248, 7	2677	2.73	Blum, McKean-Cowdin	S255, 262
NATIVE AMERICAN								
USA, Canada	26	65.12	Dodgson	4	9344	0.69	Wick, Adler-Grinberg, Maples, Lang, Garvey, Chiarelli	S263, 264, 265, 266, 267, 268
Latin America	26	65.12	Dodgson	4	5073	0.28	Urrets-Zavalia, Belfort-Mattos, Germano	S283, 284, 285
INUIT (ESKIMO)	76	59.47	Skeller	88	468	2.61	Woodruff, Johnson	S250, 249
DOWN SYNDROME								
Ontario, Canada	22	55	Lyle	259	206	17.34	Levinson, Shapiro, Roizen, Averbuch-Heller	S275, 276, 277, 278
Philadelphia, PA, and New York, NY, USA	55	57.86	Jaeger, Krinsky-McHale	247, 260	612	48.21	Cullen, Jaeger, Warshowsky, Krinsky-McHale	S279, 280, 281, 282

AFRICAN AMERICAN	3902	66.42	Herskovits, Davenport, Cesario, Murphy, Latta, Cole, Barretto, Pivnick, Bradtmiller, Dodgson, Parciak	261, 240, 5, 262, 6, 253, 255, 256, 4, 7	30025	1.71	Friendly, Roberts, Chew, Preslan, Multiethnic, Friedman, Cotter	S270, 256, 259, 271, 272, 273, 260, 261
LATINO / HISPANIC								
USA	828	63.85	Bradtmiller, Dodgson, Flament	256, 4, 82	8221	0.71	Choi, Multiethnic, Cotter	S274, 273, 261
Mexico	271	65.11	Pryor, Flament	36, 82	1378	1.13	Juarez-Munoz, Ohlsson	S292, 293
Colombia	1262	63.58	Arenas	267	1573	1.09	Vasquez, Marquez-Galvis	S289, 290
Brazil	406	64.79	Kawagoe, Gomes, Roehe, Da Cunha	264, 265, 266, 268	3600	1.64	Couto Jr	S286, 287

Abbreviations: ET/XT ratio, esotropia/exotropia ratio; IPD, interpupillary distance; n, number of subjects; Ref #, reference number.

Supplemental Table S4: Random pooled estimates of mean IPDs for major ethnicities with 95% confidence intervals

Subgroups	N	Mean IPD (mm)	95% CI
Caucasians with Down Syndrome	4	55.2	51.6 – 58.8
South Asian (Northwest)	32	61.4	60.2 – 62.5
Caucasians Outside of Europe	25	61.8	60.5 – 63.2
South Asian (South, Central, East)	19	62.4	60.9 – 63.9
Caucasians in Europe	13	62.4	61.0 – 63.9
East Asian	50	62.8	61.9 – 63.6
Middle Eastern	34	63.4	62.7 - 64.0
Latino/Hispanic	11	63.9	62.4 – 65.5
African American	10	66.0	63.9 – 68.0
West African	15	68.0	66.2 - 70.0
African (Northeast, Central, South)	9	68.3	66.7 – 70.0
Overall	*222*	*63.2*	*62.7-63.6*

Abbreviations: CI, confidence interval; IPD, interpupillary distance; N, number of studies.

Supplemental Material S1: List of References for the esotropia/exotropia (ET/XT) ratio (from von Bartheld et al., 2025)[22]

1. Schenk H, Haydn M. [Experiences with the Rodenstock vision test device for children, (serial examination in the Central Children's Home of the City of Vienna)]. Klin Monbl Augenheilkd. 1969; 154(5):739-746.
2. Aichmair H, Grossmann W, Aichmair M, Bomze I, Fröschl K, Futschik A, Theyer I, Hirmann E, Kautzky I, Hafner J, Spadt U. [Randomized field study of the etiology of strabismus concomitans]. Wien Klin Wochenschr. 1992; 104(19):600-606.
3. Vereecken E, Feron A, Evens L. [The importance of early detection of strabismus and amblyopia]. Bull Soc Belge Ophtalmol. 1966; 143:729-739.
4. Popović-Beganović A, Zvorničanin J, Vrbljanac V, Zvorničanin E. The prevalence of refractive errors and visual impairment among school children in Brčko district, Bosnia and Herzegovina. Semin Ophthalmol. 2018; 33(7-8):858-868.
5. Medkova L, Bersky K, Bublikova D, Hajek F. [Appearance of strabismus in children of mothers with late pregnancy toxemia.] Cesk Oftalmol. 1959; 15:254-257.
6. Karlica D, Galetović D, Znaor L, Bucat M. Strabismus incidence in infants born in Split-Dalmatia County 2002-2005. Acta Clin Croat. 2008; 47(1):5-8.
7. Frandsen AD. Occurrence of squint: a clinical-statistical study on the prevalence of squint and associated signs in different groups and ages of the Danish population. Acta Ophthalmol Suppl 1960; 62:9–157.
8. Sandfeld L, Weihrauch H, Tubaek G, Mortzos P. Ophthalmological data on 4.5- to 7-year-old Danish children. Acta Ophthalmol. 2018; 96(4):379-383.
9. Hultman O, Beth Høeg T, Munch IC, Ellervik C, la Cour M, Andersson Grönlund M, Buch Hesgaard H. The Danish Rural Eye Study: prevalence of strabismus among 3785 Danish adults - a population-based cross-sectional study. Acta Ophthalmol. 2019; 97(8):784-792.
10. Rantanen A**,** Tommila V. Prevalence of strabismus in Finland. Acta Ophthalmol. 1971; 49:506-509.
11. Laatikainen L, Erkkila H. Refractive errors and other ocular findings in school children. Acta Ophthalmol Scand. 1980; 58:129–136.
12. Kaakinen K. Photographic screening for strabismus and high refractive errors of children aged 1-4 years. Acta Ophthalmol (Copenh). 1981; 59(1):38-44.
13. Kaakinen K, Kaseva H, Kause ER. Mass screening of children for strabismus or ametropia with two-flash photoskiascopy. Acta Ophthalmol (Copenh). 1986; 64(1):105-110.
14. Tuppurainen K, Herrgård E, Martikainen A, Mäntyjärvi M. Ocular findings in prematurely born children at 5 years of age. Graefes Arch Clin Exp Ophthalmol. 1993; 231(5):261-266.
15. Speeg-Schatz C, Lobstein Y, Burget M, Berra O, Riehl C, Hoffmann C. A review of preschool vision screening for strabismus and amblyopia in France: 23 years experience in the Alsace region. Binocul Vis Strabismus Q. 2004; 19(3):151-158.
16. Cohn H. [Untersuchungen der Augen von 10060 Schulkindern nebst Vorschlaegen zur Verbesserung der den Augen nachtheiligen Schuleinrichtungen.] Leipzig, Verlag von Friederich Fleischer, 1867. https://archive.org/details/b2163693x
17. Schleich G. [Die Augen der Schuler und Schulerinnen der Tubinger Schulen.] Int Arch Schulhygiene. 1905; 1:19-27.
18. Schild*wä*chter K. [Experience with screening the R5 device in Hessen.] Arbeitskreis Schielb. 1972; 4:102-112.
19. De Decker W, Tessmer J. [Occurrence of squint and efficiency of treatment in Schleswig-Holstein]. Klin Monbl Augenheilkd. 1973; 162(1):34-42.

20. Schütte E, Groten H, Leymann J, Lizin F. [Ophthalmic and orthoptic investigations in the kindergarten (author's transl)]. Klin Monbl Augenheilkd. 1976; 168(4):584-590.
21. Toppel L. [Epidemiology of juvenile functional disorders of the eye]. Fortschr Med. 1978; 96(20):1087-1094.
22. Haase W, Mühlig HP. [The incidence of squinting in school beginners in Hamburg]. Klin Monbl Augenheilkd. 1979; 174(2):232-235.
23. Rüssmann W, König U, Schlimbach K, Pawlowska-Seyda D, Wirbatz B. [Refractive errors, strabismus and amblyopia in pre-school screening--experiences using a vision test in kindergarten]. Offentl Gesundheitswes. 1990; 52(2):77-84.
24. Käsmann-Kellner B, Heine M, Pfau B, Singer A, Ruprecht KW. [Screening for amblyopia, strabismus and refractive abnormalities in 1,030 kindergarten children]. Klin Monbl Augenheilkd. 1998; 213(3):166-73.
25. Fiess A, Kölb-Keerl R, Schuster AK, Knuf M, Kirchhof B, Muether PS, Bauer J. Prevalence and associated factors of strabismus in former preterm and full-term infants between 4 and 10 years of age. BMC Ophthalmol. 2017; 17(1):228.
26. Fiess A, Elflein HM, Urschitz MS, Pesudovs K, Münzel T, Wild PS, Michal M, Lackner KJ, Pfeiffer N, Nickels S, Schuster AK. Prevalence of strabismus and its impact on vision-related quality of life: Results from the German population-based Gutenberg Health Study. Ophthalmology. 2020; 127(8):1113-1122.
27. Donnelly UM, Stewart NM, Hollinger M. Prevalence and outcomes of childhood visual disorders. Ophthalmic Epidemiol. 2005; 12(4):243-250.
28. Montvilaite D, Grizickaite A, Augyte A, Skvarciany I, Barkus A, Usonis V. Ophthalmological follow-up of prematurely born children in preschool age: prospective study of visual acuity, refractive errors and strabismus. Acta Med Lituanica. 2015; 22(4):205-215.
29. Paduca A, Arnaut O, Cardaniuc C, Spinei L, Bendelic E, Bruenech JR, Lundmark PO. Epidemiology of childhood manifest strabismus in the Republic of Moldova. Strabismus. 2020; 28(3):128-135.
30. Holst JC, Tjaland J. [Some figures from the ophthalmological department of the schools in Oslo.] Tidsskr Nor Laegeforen. 1962; 82:1291-1293.
31. Aslaksen AK, Vikesdal GH, Voie MT, Rowlands M, Skranes J, Haugen OH. Visual function in Norwegian children aged 5-13 years with prenatal exposure to opioid maintenance therapy: A case-control study. Acta Ophthalmol. 2024; 102(4):409-420.
32. Dalz M, Gotz-Wieckowska A, Dalz M. [Schielenkrankheit bei den Kindern im Schulalter.] 107th Kongress, Deutsche Ophthalmologische Gesellschaft (DOG), Leipzig, Germany, Abstract P 094, 2009 https://2009.archiv.dog.org/abstracts/P094.html
33. Quental H, Poças IM, Esteves C, Quintino W, Fortes CS. [Caracterização visual numa amostra infantil em idade pré-escolar e escolar - o estado da arte num rastreio.] XIV Congresso Nacional de Ortoptistas, 2013. https://pdfs.semanticscholar.org/00b8/c3287f0cbde1d04ec7514b0d0a1d707ba4dd.pdf
34. Lança C, Serra H, Prista J. Strabismus, visual acuity, and uncorrected refractive error in Portuguese children aged 6 to 11 years. Strabismus. 2014; 22(3):115-119.
35. Hendrickson K, Bleything W. The visual profile of Romanian children and adults assessed through vision screenings. Optometry. 2001; 72(6):388-396.
36. Mazepa GM. [Results of a thorough eye examination in kindergarten children of the city of Saratov]. Oftalmol Zh. 1967; 22(2):151-154.
37. Maĭmulov VG. [State of visual functions of Leningrad preschool children]. Oftalmol Zh. 1971; 26(5):378-381.
38. Delgado Molina A, Zato Gomez de Liano MA. [Estereogramas y prevencion visual escolar.] Arch Soc Esp Oftal. 1991; 60:445-450.

39. Martínez J, Cañamares S, Saornil MA, Almaraz A, Pastor JC. Original papers: Prevalence of amblyogenic diseases in a preschool population sample of Valladolid, Spain. Strabismus. 1997; 5(2):73-80.
40. Nordlöw W. [Ögonen inom den förebyggande barnavården.] Svenska L*ä*k-tidn. 1944; 41:1385-1395.
41. Nordlöw W. Squint—the frequency of onset at different ages, and the incidence of some associated defects in a Swedish population. Acta Ophthalmol. 1964; 42:1015–1037.
42. Köhler L, Stigmar G. Vision screening of four-year-old children. Acta Paediatr Scand. 1973; 62(1):17-27.
43. Lennerstrand G, Gallo JE. Prevalence of refractive errors and ocular motility disorders in 5- to 10-year-old Swedish children born prematurely or at full-term. Acta Ophthalmol (Copenh). 1989; 67(6):717-718.
44. Rasmussen F, Thorén K, Caines E, Andersson J, Tynelius P. Suitability of the Lang II random dot stereotest for detecting manifest strabismus in 3-year-old children at child health centres in Sweden. Acta Paediatr. 2000; 89(7):824-829.
45. Kvarnström G, Jakobsson P, Lennerstrand G. Visual screening of Swedish children: an ophthalmological evaluation. Acta Ophthalmol Scand. 2001; 79(3):240-244.
46. Ohlsson J, Villarreal G, Sjöström A, Abrahamsson M, Sjöstrand J. Visual acuity, residual amblyopia and ocular pathology in a screened population of 12-13-year-old children in Sweden. Acta Ophthalmol Scand. 2001; 79(6):589-595.
47. Aring E, Grönlund MA, Andersson S, Hård AL, Ygge J, Hellström A. Strabismus and binocular functions in a sample of Swedish children aged 4-15 years. Strabismus. 2005; 13(2):55-61.
48. Holmström G, Rydberg A, Larsson E. Prevalence and development of strabismus in 10-year-old premature children: a population-based study. J Pediatr Ophthalmol Strabismus. 2006; 43(6):346-352.
49. Abdi S, Lennerstrand G, Pansell T, Rydberg A. Orthoptic findings and asthenopia in a population of Swedish schoolchildren aged 6 to 16 years. Strabismus. 2008; 16(2):47-55.
50. Voirol AF. [Untersuchungen ueber Refraktion, Visus, Farbensinn und Muskelgleichgewicht an den Augen von 939 Schulkindern.] Zeitschr Augenheilk. 1912; 28:95-110.
51. Franceschetti A, Fransceschetti AT, Hudson-Shaw S. [Detection of eye disorders in children of pre-school age]. Klin Monbl Augenheilkd. 1966; 149(5):657-662.
52. Gansner J. [On the incidence of strabismic amblyopia. Statistical survey of the preschool children of an urban population]. Ophthalmologica. 1968; 155(3):234-244.
53. Worth CA. Squint: Its Causes, Pathology, And Treatment. 3rd Edition. 234 pages, 1906.
54. Tyser PA, Letchworth TW. A study in visual defects in young children. Br Med J. 1949; 2:1022-1023.
55. Sorsby A, Sheridan M, Leary GA, Benjamin B. Vision, visual acuity, and ocular refraction of young men: findings in a sample of 1,033 subjects. Br Med J. 1960; 1(5183):1394-1398.
56. Graham PA. Epidemiology of Strabismus. Brit J Ophthalmol. 1974; 58(3):224-231.
57. Bruce A, Hurst M, Abbott H, Harrison H. The incidence of refractive error and anomalies of binocular vision in infants. Br Orthoptic J. 1991; 48:32-35.
58. Stayte M, Reeves B, Wortham C. Ocular and vision defects in preschool children. Brit J Ophthalmol. 1993; 77(4):228-232.
59. Newman DK, Hitchcock A, McCarthy H, Keast-Butler J, Moore AT. Preschool vision screening: outcome of children referred to the hospital eye service. Brit J Ophthalmol. 1996; 80(12):1077-1082.
60. O'Connor AR, Stephenson TJ, Johnson A, Tobin MJ, Ratib S, Fielder AR. Strabismus in children of birth weight less than 1701 g. Arch Ophthalmol. 2002; 120(6):767-773.
61. Williams C, Northstone K, Howard M, Harvey I, Harrad RA, Sparrow JM. Prevalence and risk factors for common vision problems in children: data from the ALSPAC study. Brit J Ophthalmol. 2008; 92(7):959-964.

62. Hu VH, Starling A, Baynham SN, Wager H, Shun-Shin GA. Accuracy of referrals from an orthoptic vision screening program for 3- to 4-year-old preschool children. J AAPOS. 2012; 16(1):49-52.
63. Toufeeq A, Oram AJ. School-entry vision screening in the United Kingdom: practical aspects and outcomes. Ophthalmic Epidemiol. 2014; 21(4):210-216.
64. Bruce A, Santorelli G. Prevalence and risk factors of strabismus in a UK multi-ethnic birth cohort. Strabismus. 2016; 24(4):153-160.
65. Plotnikov D, Shah RL, Rodrigues JN, Cumberland PM, Rahi JS, Hysi PG, Atan D, Williams C, Guggenheim JA; UK Biobank Eye and Vision Consortium. A commonly occurring genetic variant within the NPLOC4-TSPAN10-PDE6G gene cluster is associated with the risk of strabismus. Hum Genet. 2019; 138(7):723-737.
66. Skeller E, Øster J. Eye symptoms in mongolism. Acta Ophthalmol (Copenh). 1951; 29(2):149-161.
67. Oster J. Mongolism; a clinicogenealogical investigation comprising 526 mongols living on Seeland and neighbouring islands in Denmark. 1953. Copenhagen: Danish Science Press Ltd.
68. Haargaard B, Fledelius HC. Down's syndrome and early cataract. Br J Ophthalmol. 2006; 90(8):1024-1027.
69. Pearce FH, Rankine R, Ormond AW. Notes on twenty-eight cases of Mongolian imbeciles: with special reference to their ocular condition. Br Med J. 1910; 2(2586):186-190.
70. Ormond AW. Notes on the ophthalmic condition of forty-two Mongolian imbeciles. Trans Am Ophthalmol Soc. 1912; 32:69-76.
71. Brushfield T. Mongolism. Brit J Child Dis. 1924; 21:241-258.
72. Engler M. Mongolism (Peristatic Amentia). John Wright, Bristol, 1949. 215 pp. Caterham, UK.
73. Lowe RF. The eyes in mongolism. Br J Ophthalmol. 1949; 33(3):131-174.
74. Oladiwura D, Shweikh Y, Roberts C, Theodorou M. Nystagmus in Down Syndrome - a Retrospective Notes Review. Br Ir Orthopt J. 2022; 18(1):48-56.
75. Woodhouse JM, Pakeman VH, Cregg M, Saunders KJ, Parker M, Fraser WI, Sastry P, Lobo S. Refractive errors in young children with Down syndrome. Optom Vis Sci. 1997; 74(10):844-851.
76. Bromham NR, Woodhouse JM, Cregg M, Webb E, Fraser WI. Heart defects and ocular anomalies in children with Down's syndrome. Br J Ophthalmol. 2002; 86(12):1367-1368.
77. Cregg M, Woodhouse JM, Stewart RE, Pakeman VH, Bromham NR, Gunter HL, Trojanowska L, Parker M, Fraser WI. Development of refractive error and strabismus in children with Down syndrome. Invest Ophthalmol Vis Sci. 2003; 44(3):1023-1030.
78. Stewart RE, Woodhouse JM, Cregg M, Pakeman VH. Association between accommodative accuracy, hypermetropia, and strabismus in children with Down's syndrome. Optom Vis Sci. 2007; 84(2):149-155.
79. Vontobel W. Uber Linsen und Hornhautuntersuchungen an mongoloiden Idioten. Arch Ophthalmol. 1933; 130:325-338.
80. Gnad HD, Rett A. [Ocular signs in cases of Down's syndrome (author's translation)]. Wien Klin Wochenschr. 1979; 91(21):735-737.
81. Missiroli A, Vanni V. Sui segni oculari della sindrome di Down (mongolismo [Ocular signs in Down's syndrome (mongolism)]. Boll Ocul. 1970; 49(2):123-139. Italian.
82. Fimiani F, Iovine A, Carelli R, Pansini M, Sebastio G, Magli A. Incidence of ocular pathologies in Italian children with Down syndrome. Eur J Ophthalmol. 2007; 17(5):817-822.
83. Purpura G, Bacci GM, Bargagna S, Cioni G, Caputo R, Tinelli F. Visual assessment in Down syndrome: The relevance of early visual functions. Early Hum Dev. 2019; 131:21-28.
84. Elsahn, M. International Vision Screening: Results from Alexandria, Egypt. Curr Ophthalmol Rep. 2014; 2:137-141.
85. Abdelrahman A, Abdellah M, Alsamman A, Radwan G. The prevalence of strabismus in children at school age in Sohaf City. Egypt J Clin Ophthalmol. 2020; 3(1):11-17.

86. Giorgis AT, Bejiga A. Prevalence of strabismus among pre-school children community in Butajira Town. Ethiop J Health Dev. 2001; 15(2):125-130.
87. Tegegne MM, Fekadu SA, Assem AS. Prevalence of Strabismus and Its Associated Factors Among School-Age Children Living in Bahir Dar City: A Community-Based Cross-Sectional Study. Clin Optom (Auckl). 2021; 13:103-112.
88. Onsomu EM. Strabismus as seen in children aged 3 to 5 years attending Nairobi City Council day nursery schools in Nairobi province, Kenya. Dissertation, 2003, University of Nairobi, College of Health Sciences [2678]
89. Mutie DM. Ocular morbidity in nursery school children in Kilungu Division, Makueni District. Dissertation Master of Medicine, Ophthalmology, University of Nairobi, Kenya, 2008.
90. Gordon YJ, Mokete M. Screening of pre-school and school children for ocular anomalies in Lesotho. J Trop Med Hyg. 1982; 85(4):135-137.
91. Auzemery A, Andriamanamihaja R, Boisier P. [A survey of the prevalence and causes of eye disorders in primary school children in Antananarivo]. Sante. 1995; 5(3):163-166.
92. Freedman J. Survey of ocular disease among the Nama people of South West Africa. Brit J Ophthalmol. 1973; 57(9):681-687.
93. Yassur Y, Yassur S, Zaifrani S, Sachs U, Ben-Sira I. Amblyopia among African pupils in Rwanda. Brit J Ophthalmol. 1972; 56(4):368-370.
94. Naidoo KS, Raghunandan A, Mashige KP, Govender P, Holden BA, Pokharel GP, Ellwein LB. Refractive error and visual impairment in African children in South Africa. Invest Ophthalmol Vis Sci. 2003; 44(9):3764-3770.
95. Zeidan Z, Hashim K, Muhit MA, Gilbert C. Prevalence and causes of childhood blindness in camps for displaced persons in Khartoum: results of a household survey. East Mediterr Health J. 2007; 13(3):580-585.
96. Taha AO, Ibrahim SM. Prevalence of manifest horizontal strabismus among basic school children in Khartoum City, Sudan. Sudanese J Ophthalmol. 2015; 7:53-57.
97. Alrasheed SH, Naidoo KS, Clarke-Farr PC. Prevalence of visual impairment and refractive error in school-aged children in South Darfur State of Sudan. Afr Vision Eye Health. 2016; 75(1):a355. doi: 10.4102/aveh.v75i1.355
98. Kingo AU, Ndawi BT. Prevalence and causes of low vision among schoolchildren in Kibaha District, Tanzania. Tanzan J Health Res. 2009; 11(3):111-115.
99. Pergens E. [Les yeux et les fonctions visuelles des Congolais.] Janus. 1898; 2:459-463.
100. Holm S. [Le strabisme concomitant chez les palénégrides au Gabon, Afrique Equatoriale Française. Contribution å la question de race et de strabisme.] Acta Ophthalmol. 1939; 17:367-387.
101. Kumah BD, Ebri A, Abdul-Kabir M, Ahmed AS, Koomson NY, Aikins S, Aikins A, Amedo A, Lartey S, Naidoo K. Refractive error and visual impairment in private school children in Ghana. Optom Vis Sci. 2013; 90(12):1456-1461.
102. Nartey ET, van Staden DB, Amedo AO. Prevalence of ocular anomalies among schoolchildren in Ashaiman, Ghana. Optom Vis Sci. 2016; 93(6):607-611.
103. Abdul-Kabir M, Abdul-Sadik A, Ansah DO and Ofosu-Koranteng L. Prevalence of anisometropia, strabismus and amblyopia among first year optometry students in Kwame Nkrumah University of Science and Technology, Ghana. Mathews J Ophtalmol. 2017; 2(2):018
104. Hertz J, Gombosh G, Avshalom A. Vision screening of students in Liberia. A preliminary report. J Pediatr Ophthalmol Strabismus 1964; 1(3):33-36.
105. Abiose A, Bhar IS, Allanson MA. The ocular health status of postprimary school children in Kaduna, Nigeria: report of a survey. J Pediatr Ophthalmol Strabismus. 1980; 17(5):337-340.
106. Baiyeroju-Agbeja AM, Owoeye JFA. Strabismus in children in Ibadan. Niger J Ophthalmol. 1998; 6(1):31-33.
107. Abah ER, Oladigbolu KK, Samaila E, Gani-Ikilama A. Ocular disorders in children in Zaria children's school. Niger J Clin Pract. 2011; 14(4):473-476.

108. Ajaiyeoba AI, Isawumi MA, Adeoye AO, Oluleye TS. Prevalence and causes of blindness and visual impairment among school children in south-western Nigeria. Int Ophthalmol. 2005; 26(4-5):121-125.
109. Atamah AO. Frequency and pattern of eye diseases among prisoners in Benin City. (A survey of Oko prisons, Benin City.) Dissertation, Medical College of Nigeria, 2005.
110. Azonobi IR, Olatunji FO, Addo J. Prevalence and pattern of strabismus in Ilorin. West Afr J Med. 2009a; 28(4):253-256.
111. Ayanniyi AA, Mahmoud AO, Olatunji FO. Causes and prevalence of ocular morbidity among primary school children in Ilorin, Nigeria. Niger J Clin Pract. 2010; 13(3):248-253.
112. Akpe BA, Dawodu OA, Abadom EG. Prevalence and pattern of strabismus in primary school pupils in Benin City, Nigeria. Nigerian J Ophthalmol. 2014; 22:38-43
113. Ezinne NE, Mashige KP. Refractive error and visual impairment in primary school children in Onitsha, Anambra State, Nigeria. Afr Vision Eye Health. 2018; 77(1):a455.
114. Atuanya GN, Suzan OI. Visual Problems Affecting Reading and Learning Among Primary School Children in Benin City, Nigeria. Optom Vis Perform. 2024; 12(2):91-98.
115. Adio AO, Wajuihian SO. Ophthalmic manifestations of children with Down syndrome in Port Harcourt, Nigeria. Clin Ophthalmol. 2012; 6:1859-1864.
116. Abdiyeva Y. The level of prevalence and risk factors of strabismus among children and adolescents, depending on the type of settlements in the Ganja-Gazakh economic district (Azerbaijan). Ophthalmol Reports. 2021; 14(4):45-53.
117. Fotouhi A, Hashemi H, Khabazkhoob M, Mohammad K. The prevalence of refractive errors among schoolchildren in Dezful, Iran. Br J Ophthalmol. 2007; 91(3):287-292.
118. Jamali P, Fotouhi A, Hashemi H, Younesian M, Jafari A. Refractive errors and amblyopia in children entering school: Shahrood, Iran. Optom Vis Sci. 2009; 86(4):364-369.
119. Yekta A, Fotouhi A, Hashemi H, Dehghani C, Ostadimoghaddam H, Heravian J, Derakhshan A, Yekta R, Rezvan F, Behnia M, Khabazkhoob M. The prevalence of anisometropia, amblyopia and strabismus in schoolchildren of Shiraz, Iran. Strabismus. 2010; 18(3):104-110.
120. Faghihi M, Ostadi moghaddam H, Fatemi A, Heravian Shandiz J, Yekta A. Strabismus and amblyopia in schoolboys of Varamin, Iran, in 2010. Iranian J Ophthalmol. 2012; 24:32-38.
121. Kwak J, Movahedan J, Tadjvidi P, Aref P, Maumenee IH. Mendelian inheritance of strabismus in a rural community of Northern Iran. Invest Ophthalmol Vis Sci. 2011; 52(14):6359.
122. Faghihi M, Ostadi moghaddam H, Fatemi A, Heravian Shandiz J, Yekta A. Strabismus and amblyopia in schoolboys of Varamin, Iran, in 2010. Iranian J Ophthalmol. 2012; 24:32-38.
123. Yekta A, Hashemi H, Azizi E, Rezvan F, Ostadimoghaddam H, Derakhshan A, Azimi A, Khabazkhoob M, Maboudi AAK. The prevalence of amblyopia and strabismus among schoolchildren in Northeastern Iran, 2011. Iran J Ophthalmol. 2012; 24:3-10.
124. Hashemi H, Yekta A, Jafarzadehpur E, Ostadimoghaddam H, Eshrati B, Mohazzab-Torabi S, Khabazkhoob M, Soroush S. The prevalence of strabismus in 7-year-old schoolchildren in Iran. Strabismus. 2015; 23(1):1-7.
125. Rajavi Z, Sabbaghi H, Baghini AS, Yaseri M, Moein H, Akbarian S, Behradfar N, Hosseini S, Rabei HM, Sheibani K. Prevalence of amblyopia and refractive errors among primary school children. J Ophthalmic Vis Res. 2015; 10(4):408-416.
126. Yekta A, Hashemi H, Ostadimoghaddam H, Haghighi B, Shafiee H, Mehravaran S, Nabovati P, Asharlous A, Khabazkhoob M. Strabismus and near point of convergence and amblyopia in 4-6 year-old children. Strabismus. 2016; 24(3):113-119.
127. Hashemi H, Nabovati P, Yekta A, Ostadimoghaddam H, Behnia B, Khabazkhoob M. The prevalence of strabismus, heterophorias, and their associated factors in underserved rural areas of Iran. Strabismus. 2017; 25(2):60-66.
128. Hamidi A, Heravian Shandiz J, Jalalifar S, Boomi Quchan Atigh S, Darvishi A, Lashkardoost H. The Prevalence of Strabismus and Heterophoria in 3-6 Years Old Children in Bojnurd, Iran, in 2016-2017. J Paramed Sci Rehabil. 2020; 9(1):59-67. Persian

129. Hashemi H, Pakzad R, Nabovati P, Azad Shahraki F, Ostadimoghaddam H, Aghamirsalim M, Pakbin M, Yekta A, Khoshhal F, Khabazkhoob M. The prevalence of tropia, phoria and their types in a student population in Iran. Strabismus. 2020; 28(1):35-41.
130. Derakhshan A, Sabermoghaddam A, Abdolahian M, Ghanavati SZ, Shakeri MT, Alirezaei M, Zareei A, Bamdad S. The Strabismus Prevalence in a Random Sample of Iran's Northeastern Population. Pak J Ophthalmol. 2024; 40(1):34-39.
131. Halboos MT, Mohammed MH, Al Jenabi ZK, Hamad N. Determination of Refractive Error and Strabismus in Two Primary Schools. J Opht Res Rev Rep. 2024; 5(1):1-5.
132. Mukhaiser MH, Al-Khateeb HS, Mohammed IA. (2023). Prevalence of Lazy Eyes Among Primary School Students in Rural Areas of Baghdad City. J Adv Sci Nanotechnol. 2023; *2*(1):204-214.
133. Neumann E, Eibschitz N, Hyams S, Friedman Z. Ophthalmic screening in child welfare clinics in Israel with particular reference to strabismus and amblyopia. J Pediatr Ophthalmol Strabismus. 1971; 8:257–260.
134. Friedman Z, Neumann E, Hyams SW, Peleg B. Ophthalmic screening of 38,000 children, age 1 to 2 1/2 years, in child welfare clinics. J Pediatr Ophthalmol Strabismus. 1980; 17(4):261-267.
135. Friedmann L, Biedner B, David R, Sachs U. Screening for refractive errors, strabismus and other ocular anomalies from ages 6 months to 3 years. J Pediatr Ophthalmol Strabismus. 1980; 17(5):315-317.
136. Maaita JF, Sunna LF, Al-Madani MV, Horrani SM. Eye diseases in children in Southern Jordan. Saudi Med J. 2003; 24(2):154-156.
137. Lithander J. Prevalence of amblyopia with anisometropia or strabismus among schoolchildren in the Sultanate of Oman. Acta Ophthalmol Scand. 1998; 76(6):658-662.
138. Labadi L, Shahin R, Eperjesi F, Al-Shanti Y, Shehadeh M, Taha I. Prevalence of Visual Disorders among Urban Palestinian Preschool Children. Open Ophthalmol J. 2022; 16(1): e187436412112241.
139. Badr I, Qureshi I. Ocular status of school children in the town of Al-Majma'ah, Central Province, Saudi Arabia. Saudi Med J. 1981; 2:221-224.
140. Abolfotouh MA, Badawi I, Faheem Y. Prevalence of amblyopia among schoolboys in Abha city, Asir Region, Saudi Arabia. J Egypt Public Health Assoc. 1994; 69(1-2):19-30.
141. Bardisi WM, Bin Sadiq BM. Vision screening of preschool children in Jeddah, Saudi Arabia. Saudi Med J. 2002; 23:445–449.
142. Gorham JP, Behshad S, Weil NC. Comparison of Two Photoscreeners in a Population of Syrian Refugee Children. J Pediatr Ophthalmol Strabismus. 2021; 58(6):396-400.
143. Turaçli ME, Aktan SG, Dürük K. Ophthalmic screening of school children in Ankara. Eur J Ophthalmol. 1995; 5(3):181-186.
144. Aslan L, Aslankurt M, Aksoy A, Altun H. Preventable visual impairment in children with nonprofound intellectual disability. Eur J Ophthalmol. 2013; 23(6):870-875.
145. Caca I, Cingu AK, Sahin A, Ari S, Dursun ME, Dag U, Balsak S, Alakus F, Yavuz A, Palanci Y. Amblyopia and refractive errors among school-aged children with low socioeconomic status in southeastern Turkey. J Pediatr Ophthalmol Strabismus. 2013; 50(1):37-43.
146. Gursoy H, Basmak H, Yaz Y, Colak E. Vision screening in children entering school: Eskisehir, Turkey. Ophthalmic Epidemiol. 2013; 20(4):232-238.
147. Çelikay O, Çalışkan S, Acar M, Biçer T, Doğan AS, Kabataş N, Arslan N, Köşker M, Gürdal C. [The results of an eye health screening in a primary school children.] Turkiye Klinikleri J Ophthalmol. 2016; 25.10.5336/ophthal.2015-48981.
148. McLaren DS. The refraction of Indian school children: a comparison of data from East Africa and India. Br J Ophthalmol. 1961; 45(9):604-613.
149. Agarwal LP, Prakash P, Mahur A, Pathak MM. Visual defects in school children. Orient Arch Ophthal. 1966; 4:1-8.

150. Gupta M, Gupta Y. A survey on refractive error and strabismus among children in a school at Aligarh. Indian J Public Health. 2000; 44(3):90-93.
151. Murthy GVS, Gupta SK, Ellwein LB, Muñoz SR, Pokharel GP, Sanga L, Bachani D. Refractive error in children in an urban population in New Delhi. Invest Ophthalmol Vis Sci. 2002; 43(3):623-631.
152. Bedi R, Bedi DK, Dudule CN, Nizamuddin, Keswani M, Saxena P. 2016. Prevalence of ocular morbidities among school children: a comparative study across social categories in Ajmer City. Natl J Commun Med. 2016; 7(3):184-188.
153. Mohan A, Bisht A, Sharma VK, Jamil Z. Epidemiology of ocular morbidity among school-going children. All India Ophthalmol Soc Proc. 2017; FP1242.
154. Awan AA, Aftab M, Arif S. Refractive error and squint in primary school children. J Ayub Med Coll Abbotabad Pak. 1995; 7(2):26-27.
155. Shaikh SP, Aziz TM. Pattern of eye diseases in children of 5-15 years at Bazzertaline area (South Karachi) Pakistan. J Coll Physicians Surg Pak. 2005; 15(5):291-294.Awan HR, Ihsan T. Prevalence of visual impairment and eye diseases in Afghan refugees in Pakistan. E Mediterr Health J. 1998; 4(3):560-566.
156. Awan HR, Ihsan T. Prevalence of visual impairment and eye diseases in Afghan refugees in Pakistan. E Mediterr Health J. 1998; 4(3):560-566.
157. Gupta PK, Caculo DU. The attitude towards strabismus and barriers for its treatment in parents from rural and urban areas. Indian J Clin Exp Ophthalmol 2021;7(1):54-61.
158. Qayyum S. Ocular disorders in children with Down's syndrome. J Surg Pakistan Int. 2006;11(1):31-33.
159. Khan, M. I., Ahmad, S., Anjum Nadeem, S. H., & Zaidi, S. R. (2016). Anomalies of Refraction, Accommodation and Binocular Single Vision in Down Syndrome. Asian J Allied Health Sci. (AJAHS) 2016; 1(1):11-16.
160. Ateeq A, Nadeem F. Frequency of Strabismus with Down Syndrome. Ophthalmol Pakistan. 2023;13(4):70-73.
161. Asaduzzaman M. Pattern of Ocular Morbidity among Children Referred Ophthalmology Dept. at Mugda Medical College Hospital, Mugda, Dhaka, Bangladesh. J Med Sci. 2024; 4(3):66-89.
162. Kuruvilla J, Srinivasa Rao P N. Ocular morbidity in school children in rural coastal area of Karnataka. Indian J Ophthalmol. 1978; 26(2):9-12.
163. Datta A, Choudhury N, Kundu K. An epidemiological study of ocular condition among primary school children of Calcutta Corporation. Indian J Ophthalmol. 1983; 31(5):505-510.
164. Reddy SC. Ocular morbidity and colour blindness among school children in Kakinada. The Antiseptic. 1987; 84(5):611-616.
165. Kalikivayi V, Naduvilath TJ, Bansal AK, Dandona L. Visual impairment in school children in Southern India. Indian J Ophthalmol. 1997; 45:129-134.
166. Dandona R, Dandona L, Srinivas M, Sahare P, Narsaiah S, Muñoz SR, Pokharel GP, Ellwein LB. Refractive error in children in a rural population in India. Invest Ophthalmol Vis Sci. 2002; 43(3):615-622.
167. Singh H. Pattern of ocular morbidity in school children in central India. Natl J Community Med. 2011; 2(3):429-431.
168. Kemmanu V, Hegde K, Giliyar SK, Shetty BK, Kumaramanickavel G, McCarty CA. Prevalence of Childhood Blindness and Ocular Morbidity in a Rural Pediatric Population in Southern India: The Pavagada Pediatric Eye Disease Study-1. Ophthalmic Epidemiol. 2016; 23(3):185-192.
169. Akarkar SO, Naik PG, Cacodcar JA. Prevalence and distribution of ocular morbidities among primary school children in Goa. J Clin Ophthalmol Res 2019; 7:61-64.
170. Saxena A, Nema N, Deshpande A. Prevalence of refractive errors in school-going female children of a rural area of Madhya Pradesh, India. J Clin Ophthalmol Res. 2019; 7(2):45-49.
171. Agrawal D, Sahu A, Agrawal D. Prevalence of ocular morbidities among school children in Raipur district, India. Indian J Ophthalmol. 2020; 68(2):340-344.

172. Atiya A, Hussaindeen JR, Kasturirangan S, Ramasubramanian S, Swathi K, Swaminathan M. Frequency of undetected binocular vision anomalies among ophthalmology trainees. J Optom. 2020; 13(3):185-190.
173. Liang YS, Lai IC, Loke TY, Chen TT. [Preliminary report of ocular examination in school children.] Acta Soc Ophthalmol Sin. 1984; 23:1-7.
174. Wang YC, Lee RF, Wang MW, Jeng ST, Lin SA. [Report of ocular examination of primary school children in south Taiwan.] Acta Soc Ophthalmol Sin. 1989; 28(1):29-33.
175. Ji G. [An investigation of 4,125 cases of Kazak childhood strabismus and amblyopia]. Yan Ke Xue Bao. 1994; 10(4):193-196.
176. See LC, Song HS, Ku WC, Lee JS, Liang YS, Shieh WB. Neglect of childhood strabismus: Keelung Ann-Lo Community ocular survey 1993-1995. Changgeng Yi Xue Za Zhi. 1996; 19(3):217-224.
177. He MG, Zeng J, Liu Y, Xu J, Pokharel GP, Ellwein LB. Refractive error and visual impairment in urban children in Southern China. Invest Ophthalmol Vis Sci. 2004; 45(3):793-799.
178. He MG, Huang W, Zheng Y, Huang L, Ellwein LB. Refractive error and visual impairment in school children in rural southern China. Ophthalmology. 2007; 114(2):374-382.
179. Lai YH, Hsu HT, Wang HZ, Chang SJ, Wu WC. The visual status of children ages 3 to 6 years in the vision screening program in Taiwan. J AAPOS. 2009; 13(1):58-62.
180. Fan DSP, Lai C, Lau HH, Cheung EY, Lam DS. Change in vision disorders among Hong Kong preschoolers in 10 years. Clin Exp Ophthalmol. 2011; 39(5):398-403.
181. Jin H, Yi JL, Xie H, Xiao F, Wang WJ, Shu XM, Xu YL, Chen SL, Ye WX. [A study on visual development among preschool children]. Zhonghua Yan Ke Za Zhi. (Chin J Ophthalmol) 2011; 47(12):1102-1106.
182. Pi LH, Chen L, Liu Q, Ke N, Fang J, Zhang S, Xiao J, Ye WJ, Xiong Y, Shi H, Zhou XY, Yin ZQ. Prevalence of eye diseases and causes of visual impairment in school-aged children in Western China. J Epidemiol. 2012; 22(1):37-44.
183. Lin S, Huang Y, Ma D, Qiu K, Chen B, Li L, Zhang M. [A cross-sectional study of strabismus prevalence in urban and rural primary and secondary school students in Shantou City.] Chin J Strabismus Pediatr Ophthalmol. 2013; 21(3):25-33.
184. Fu J, Li SM, Liu LR, Li JL, Li SY, Zhu BD, Li H, Yang Z, Li L, Wang NL; Anyang Childhood Eye Study Group. Prevalence of amblyopia and strabismus in a population of 7th-grade junior high school students in Central China: The Anyang Childhood Eye Study (ACES). Ophthalmic Epidemiol. 2014; 21(3):197-203.
185. Zhu H, Yu JJ, Yu RB, Ding H, Bai J, Chen J, Liu H. Association between childhood strabismus and refractive error in Chinese preschool children. PLoS One. 2015; 10(3):e0120720.
186. Chen X, Fu Z, Yu J, Ding H, Bai J, Chen J, Gong Y, Zhu H, Yu R, Liu H. Prevalence of amblyopia and strabismus in Eastern China: results from screening of preschool children aged 36-72 months. Brit J Ophthalmol. 2016; 100(4):515-519.
187. Pan CW, Chen X, Zhu H, Fu Z, Zhong H, Li J, Huang D, Liu H. School-based assessment of amblyopia and strabismus among multiethnic children in rural China. Sci Rep. 2017; 7(1):13410.
188. Zhu H, Pan C, Sun Q, Huang D, Fu Z, Wang J, Chen X, Wang Z, Liu H. Prevalence of amblyopia and strabismus in Hani school children in rural southwest China: a cross-sectional study. BMJ Open. 2019; 9(2):e025441.
189. Chen D, Li R, Li X, Huang D, Wang Y, Zhao X, Zhang X, Sun Q, Hao Q, Tong H, Yao X, Fan W, Lu W, Dang J, Zhu H, Liu H. Prevalence, incidence and risk factors of strabismus in a Chinese population-based cohort of preschool children: the Nanjing Eye Study. Br J Ophthalmol. 2021; 105(9):1203-1210.
190. Wang Y, Zhao A, Zhang X, Huang D, Zhu H, Sun Q, Yu J, Chen J, Zhao X, Li R, Han S, Dong W, Ma F, Chen X, Liu H. Prevalence of strabismus among preschool children in eastern China and comparison at a 5-year interval: a population-based cross-sectional study. BMJ Open. 2021; 11(10):e055112.

191. Lu P, Chen X, Zhang W, Chen S, Shu L. Prevalence of ocular disease in Tibetan primary school children. Can J Ophthalmol. 2008; 43(1):95-99.
192. He H, Fu J, Meng Z, Chen W, Li L, Zhao X. Prevalence and associated risk factors for childhood strabismus in Lhasa, Tibet, China: a cross-sectional, school-based study. BMC Ophthalmol. 2020; 20(1):463.
193. Zhang XJ, Lau YH, Wang YM, Kam KW, Ip P, Yip WW, Ko ST, Young AL, Tham CC, Pang CP, Chen LJ, Yam JC. Prevalence of strabismus and its risk factors among school aged children: The Hong Kong Children Eye Study. Sci Rep. 2021; 11(1):13820.
194. Nakagawa J, Suzuki S. [The incidence of strabismus in schoolchildren.] J Sapporo City Gen Hosp. 1954; 36:60-65.
195. Majima A, Nakajima A, Ichikawa H, Watanabe M. Prevalence of ocular anomalies among school children. Am J Ophthalmol. 1960; 50:139-146.
196. Nakajima A, Yoshimoto T, Ito N, Kimura T, Majima A, Awaya S. [Distribution of eye diseases among school children.] Rinsho Ganka (Jpn J Clin Ophthalmol). 1960; 14:1762–1769.
197. Harada M, Yamamoto H. [Strabismus and amblyopia mass screening of preschool children.] Ganrin. 1961; 55(4): 374-377.
198. Yazawa K. [Ocular examination on 10,000 school children.] Rinsho Ganka (Jpn J Clin Ophthalmol.) 1973; 27:557–569.
199. Inatomi M, Futenma M, Hayashi M, Shimojima Y, Kawamura M, Okazaki H, Kinoshita K. [Natural course of uncorrected visual acuity and refraction among school children.] Jap J Clin Ophthal. (Rinsho Ganka) 1976; 30:1387-1397.
200. Maruo T, Kubota N, Arimoto H. [The results of examinations for strabismus and amblyopia in elementary and secondary school pupils.] Ganka Rinsho Iho (Jpn Rev Clin Ophthalmol.) 1977; 71:712–714.
201. Matsuo T, Matsuo C. The prevalence of strabismus and amblyopia in Japanese elementary school children. Ophthalmic Epidemiol. 2005; 12(1):31-36.
202. Matsuo T, Matsuo C. Comparison of prevalence rates of strabismus and amblyopia in Japanese elementary school children between the years 2003 and 2005. Acta Med Okayama. 2007; 61(6):329-334.
203. Matsuo T, Matsuo C, Matsuoka H, Kio K. Detection of strabismus and amblyopia at 1.5- and 3-year-old children by preschool vision-screening program in Japan. Acta Med Okayama. 2007; 61:9–16.
204. Goseki T, Ishikawa H. The prevalence and types of strabismus, and average of stereopsis in Japanese adults. Jpn J Ophthalmol. 2017; 61(3):280-285.
205. Satou T, Takahashi Y, Ito M, Mochizuki H, Niida T. Evaluation of visual function in preschool-age children using a vision screening protocol. Clin Ophthalmol. 2018; 12:339-344.
206. Yu YS, Kim SM, Kwon JY, Kim BC, Oh S, Rho YB, Lee WR. [Preschool vision screening in Korea: Preliminary study.] J Korean Ophthalmol Soc. 1991; 32(12):1092-1096.
207. Rah SH, Jun HS, Kim SH. [An epidemiological survey of strabismus among school-children in Korea.] J Korean Ophthalmol Soc. 1997; 38(12):2195-2199.
208. Yoon KC, Mun GH, Kim SD, Kim SH, Kim CY, Park KH, Park YJ, Baek SH, Song SJ, Shin JP, Yang SW, Yu SY, Lee JS, Lim KH, Park HJ, Pyo EY, Yang JE, Kim YT, Oh KW, Kang SW. Prevalence of eye diseases in South Korea: data from the Korea National Health and Nutrition Examination Survey 2008-2009. Korean J Ophthalmol. 2011; 25(6):421-433.
209. Lee JF, Kim CZ, Nam KY, Lee SU, Lee SJ. [An epidemiological survey of strabismus and nystagmus in South Korea: KNHANES V.] J Korean Ophthalmol Soc. 2017; 58(11):1260-1268.
210. Han KE, Baek SH, Kim SH, Lim KH; Epidemiologic Survey Committee of the Korean Ophthalmological Society. Prevalence and risk factors of strabismus in children and adolescents in South Korea: Korea National Health and Nutrition Examination Survey, 2008-2011. PLoS One. 2018; 13(2):e0191857.

211. Casson RJ, Kahawita S, Kong A, Muecke J, Sisaleumsak S, Visonnavong V. Exceptionally low prevalence of refractive error and visual impairment in schoolchildren from Lao People's Democratic Republic. Ophthalmology. 2012; 119(10):2021-2027.
212. Teoh GH, Yow CS. Prevalence of squints and visual defects in Malaysian primary one school children. Med J Malaysia. 1982; 37(4):336-337.
213. Goh PP, Abqariyah Y, Pokharel GP, Ellwein LB. Refractive error and visual impairment in school-age children in Gombak District, Malaysia. Ophthalmology. 2005; 112(4):678-685.
214. Premsenthil M, Manju R, Thanaraj A, Rahman SA, Kah TA. The screening of visual impairment among preschool children in an urban population in Malaysia; the Kuching pediatric eye study: a cross sectional study. BMC Ophthalmol. 2013; 13:16.
215. Chew FLM, Thavaratnam LK, Shukor INC, Ramasamy S, Rahmat J, Reidpath DD, Allotey P, Alagaratnam J. Visual impairment and amblyopia in Malaysian pre-school children - The SEGPAEDS study. Med J Malaysia. 2018; 73(1):25-30.
216. Nepal BP, Koirala S, Adhikary S, Sharma AK. Ocular morbidity in schoolchildren in Kathmandu. Brit J Ophthalmol. 2003; 87(5):531-534.
217. Shrestha RK, Joshi MR, Ghising R, Pradhan P, Shakya S, Rizyal A. Ocular morbidity among children studying in private schools of Kathmandu valley: A prospective cross sectional study. Nepal Med Coll J. 2006; 8(1):43-46.
218. Sherpa D, Panta CR, Joshi N. Ocular morbidity among primary school children of Dhulikhel, Nepal. Nepal J Ophthalmol. 2011; 3(2):172-176.
219. Shrestha RK, Joshi MR, Ghising R, Rizyal A. Ocular morbidity among children attending government and private schools of Kathmandu valley. J Nepal Med Assoc. (JNMA) 2011; 51(184):182-188.
220. Pant M, Shrestha GS, Joshi ND. Ocular morbidity among street children in Kathmandu Valley. Ophthalmic Epidemiol. 2014; 21(6):356-361.
221. Sherpa D. Ocular morbidity among primary school children. J Chitwan Med Coll. 2014; 4(2):32-34.
222. Chia A, Dirani M, Chan YH, Gazzard G, Au Eong KG, Selvaraj P, Ling Y, Quah BL, Young TL, Mitchell P, Varma R, Wong TY, Saw SM. Prevalence of amblyopia and strabismus in young Singaporean Chinese children. Invest Ophthalmol Vis Sci. 2010; 51:3411-3417.
223. Konyama K. Refractive state and ocular deviation of the school children in Thailand. Orient Arch Ophthal. 1972; 10:229-237.
224. Mahachaiyakul A, Sinpornchai N, Kunavisarut S. [The study of refractive state and strabismus prevalence in school children.] Thai J Ophthalmol. 1997; 11:1-8.
225. Tananuvat N, Manassakorn A, Worapong A, Kupat J, Chuwuttayakorn J, Wattananikorn S. Vision screening in schoolchildren: two years results. J Med Assoc Thai. 2004; 87(6):679-684.
226. Jenchitr W, Pongprayoon C, Vongkittiruk, Imsuwan Y. [Ocular health in private school girls in Sukhumvit area of Bangkok.] J Health Sci. 2012; 21(3):489-498.
227. Paudel P, Ramson P, Naduvilath T, Wilson D, Phuong HT, Ho SM, Giap NV. Prevalence of vision impairment and refractive error in school children in Ba Ria - Vung Tau province, Vietnam. Clin Exp Ophthalmol. 2014; 42(3):217-226.
228. Mann I. Culture, Race, Climate and Eye Disease. Springfield, Illinois, Charles C. Thomas, 1966. 580 pages.
229. Mann I, Rountree P. Geographic ophthalmology. A report on a recent survey of Australian aboriginals. Am J Ophthalmol. 1968; 66(6):1020-1034.
230. Royal Australian College of Ophthalmologists. The National Trachoma and Eye Health Program. 217 pp, Sydney, 1980.
231. Hopkins S, Sampson GP, Hendicott PL, Wood JM. A Visual Profile of Queensland Indigenous Children. Optom Vis Sci. 2016; 93(3):251-258.

232. Ward BA. Ophthalmic survey of Fiji with special reference to the problem of Trachoma, February-November 1955. In: Annual Report of the Medical Department for the year 1955 and File A48/201/1. Suva: National Archives of Fiji.
233. Mann I, Potter D. Geographic ophthalmology. A preliminary study of the Maoris of New Zealand. Am J Ophthalmol. 1969; 67(3):358-369.
234. Mann I, Loschdörfer J. Ophthalmic survey of the Territories of Papua and New Guinea, 1955. Public Health Department publication, Port Moresby, 1956, 53 p.
235. Elliott R. An ophthalmic survey of the Tokelau Islands. Trans Ophthalmol Soc NZ. 1965; 17:25-35.
236. Verlee DL. Ophthalmic survey in the Solomon Islands. Am J Ophthalmol. 1968; 66(2):304-319.
237. Brown S, Jones D. A survey of the incidence of defective vision and strabismus in kindergarten age children – Sydney, 1976. Aust Orthopt J. 1976; 15:24-28.
238. Macfarlane DJ, Fitzgerald WJ, Stark DJ. The prevalence of ocular disorders in 1000 Queensland primary schoolchildren. Aust N Z J Ophthalmol. 1987; 15(3):161-174.
239. Robaei D, Rose KA, Kifley A, Cosstick M, Ip JM, Mitchell P. Factors associated with childhood strabismus: findings from a population-based study. Ophthalmology. 2006a; 113(7):1146-1153.
240. Robaei D, Kifley A, Mitchell P. Factors associated with a previous diagnosis of strabismus in a population-based sample of 12-year-old Australian children. Am J Ophthalmol. 2006b; 142(6):1085-1088.
241. Sharbini SH. Prevalence of strabismus & associated risk factors: The Sydney Childhood Eye Studies. Dissertation, University of Sydney, Faculty of Health Sciences (Orthoptic), 2015, 290 pp.
242. Simpson A, Kirkland C, Silva PA. Vision and eye problems in seven year olds: a report from the Dunedin Multidisciplinary Health and Development Research Unit. NZ Med J. 1984; 97:445-449.
243. Leone JF, Cornell E, Morgan IG, Mitchell P, Kifley A, Wang JJ, Rose KA. Prevalence of heterophoria and associations with refractive error, heterotropia and ethnicity in Australian school children. Br J Ophthalmol. 2010; 94(5):542-546.
244. Pai ASI. Vision and refraction in Australian preschool children: Measures, prevalence, and associated factors. PhD Thesis, University of Sydney, 2013.
245. Anstice N, Spink J, Abdul-Rahman A. Review of preschool vision screening referrals in South Auckland, New Zealand. Clin Exp Optom. 2012; 95(4):442-448.
246. Fanning GS. Vision in children with Down's syndrome. Aust J Optom. 1971; 54(3):74-82.
247. Kornder LD, Nursey JN, Pratt-Johnson JA, Beattie A. Detection of manifest strabismus in young children. I. A prospective study. Am J Ophthalmol. 1974a; 77(2):207-210.
248. Kornder LD, Nursey JN, Pratt-Johnson JA, Beattie A. Detection of manifest strabismus in young children. 2. A retrospective study. Am J Ophthalmol. 1974b; 77(2):211-214.
249. Johnson GJ, Green JS, Paterson GD, Perkins ES. Survey of ophthalmic conditions in a Labrador community: II. Ocular disease. Can J Ophthalmol. 1984; 19(5):224-233.
250. Woodruff ME. Vision and refractive status among grade 1 children of the Province of New Brunswick. Am J Optom Physiol Opt. 1986; 63(7):545-552.
251. Robinson B, Bobier WR, Martin E, Bryant L. Measurement of the validity of a preschool vision screening program. Am J Public Health. 1999; 89(2):193-198.
252. Collins SD. Strabismus and defective color sense among school children. Pub Health Rep. (Washington) 1925; 40:1515-1523.
253. Knapp FN. The economic importance of squint in children and its effect in after years. Minnesota Med. 1931; 14(4):324-329.
254. Downing AH. Ocular defects in sixty thousand selectees. Arch Ophthalmol. 1945; 33(2):137-143.

255. Blum HL, Peters HB, Bettman JW. Vision Screening for Elementary Schools. The Orinda Study. Univ of California Press, Berkeley and Los Angeles, 1959, 146 pages.
256. Roberts J. Eye examination findings among children, United States. Vital and health statistics: Series 11-No. 115, DHEW publication No. (HSM) 72-1057. Health Services and Mental Health Administration. Washington. U.S. Government Printing Office, June 1972.
257. Roberts J. Eye examination findings among youths aged 12-17 years, United States. Vital and health statistics: Series 11-No. 155, DHEW publication no. (HRA) 76-1637. Health Resources Administration. Washington. U.S. Government Printing Office, Nov. 1975.
258. Roberts J, Rowland M. Refractive status and motility defects of persons 4-74 years, United States 1971-1972. Vital and health statistics: series 11, DHEW publication no. (PHS) 78-1654. Hyattsville, MD: National Center for Health Statistics, 1978.
259. Chew E, Remaley NA, Tamboli A, Zhao J, Podgor MJ, Klebanoff M. Risk factors for esotropia and exotropia. Arch Ophthalmol. 1994; 112(10):1349-1355.
260. Friedman DS, Repka MX, Katz J, Giordano L, Ibironke J, Hawse P, Tielsch JM. Prevalence of amblyopia and strabismus in white and African American children aged 6 through 71 months: The Baltimore Pediatric Eye Disease Study. Ophthalmology. 2009; 116:2128-2134.
261. Cotter SA, Varma R, Tarczy-Hornoch K, McKean-Cowdin R, Lin J, Wen G, Wei J, Borchert M, Azen SP, Torres M, Tielsch JM, Friedman DS, Repka MX, Katz J, Ibironke J, Giordano L; Joint Writing Committee for the Multi-Ethnic Pediatric Eye Disease Study and the Baltimore Pediatric Eye Disease Study Groups. Risk factors associated with childhood strabismus: the multi-ethnic pediatric eye disease and Baltimore pediatric eye disease studies. Ophthalmology. 2011; 118(11):2251-2261.
262. McKean-Cowdin R, Cotter SA, Tarczy-Hornoch K, Wen G, Kim J, Borchert M, Varma R, & Multi-Ethnic Pediatric Eye Disease Study Group: Prevalence of amblyopia or strabismus in Asian and non-Hispanic white preschool children: multi-ethnic pediatric eye disease study. Ophthalmology. 2013; 120:2117-2124.
263. Wick B, Crane S. A vision profile of American Indian children. Am J Optom Physiol Opt. 1976; 53(1):34-40.
264. Adler-Grinberg D. Need for eye and vision care in an underserved population: refractive errors and other ocular anomalies in the Sioux. Am J Optom Physiol Opt. 1986; 63(7):553-558.
265. Maples WC, Atchley J, Ashby W, Ficklin T. An epidemiological study of the ocular and visual profiles of Oklahoma Cherokees and Minnesota Chippewas. J Am Optom Assoc. 1990; 61(10):784-788.
266. Lang D, Leman R, Arnold AW, Arnold RW. Validated portable pediatric vision screening in the Alaska Bush. A VIPS-like study in the Koyukon. Alaska Med. 2007; 49(1):2-15.
267. Garvey KA, Dobson V, Messer DH, Miller JM, Harvey EM. Prevalence of strabismus among preschool, kindergarten, and first-grade Tohono O'odham children. Optometry. 2010; 81(4):194-199.
268. Chiarelli CA, Chris AP. Visual status of First Nations children: The Sagamok First Nation Vision Care Project. Can J Optom. 2013; 75(4):39-46.
269. Woodruff ME, Samek MJ. The refractive status of Belcher Island Eskimos. Can J Public Health. 1976; 67(4):314-320.
270. Friendly DS. Preschool visual acuity screening tests. Trans Am Ophthalmol Soc. 1978; 76:383-480.
271. Preslan MW, Novak A. Baltimore Vision Screening Project. Ophthalmology. 1996; 103(1):105-109.
272. Preslan MW, Novak A. Baltimore Vision Screening Project. Phase 2. Ophthalmology. 1998; 105(1):150-153.
273. Multi-ethnic Pediatric Eye Disease Study Group. Prevalence of amblyopia and strabismus in African American and Hispanic children ages 6 to 72 months: the Multi-ethnic Pediatric Eye Disease Study. Ophthalmology. 2008; 115:1229-1236.

274. Choi TB, Lee DA, Oelrich FO, Amponash D, Bateman JB, Christensen RE. A retrospective study of eye disease among first grade children in Los Angeles. J Am Optom Assoc. 1995; 66(8):484-488.
275. Levinson A, Friedman A, Stamps F. Variability of mongolism. Pediatrics. 1955;16(1):43-54.
276. Shapiro MB, France TD. The ocular features of Down's syndrome. Am J Ophthalmol. 1985; 99(6):659-663.
277. Roizen NJ, Mets MB, Blondis TA. Ophthalmic disorders in children with Down syndrome. Dev Med Child Neurol. 1994; 36(7):594-600.
278. Averbuch-Heller L, Dell'Osso LF, Jacobs JB, Remler BF. Latent and congenital nystagmus in Down syndrome. J Neuroophthalmol. 1999; 19(3):166-172.
279. Cullen JF, Butler HG. Mongolism (Down's syndrome) and keratokonus. Br J Ophthalmol. 1963; 47(6):321-330.
280. Jaeger EA. Ocular findings in Down's syndrome. Trans Am Ophthalmol Soc. 1980; 78:808-845.
281. Warshowsky J. A vision screening of a Down's syndrome population. J Am Optom Assoc. 1981; 52(7):605-607.
282. Krinsky-McHale SJ, Silverman W, Gordon J, Devenny DA, Oley N, Abramov I. Vision deficits in adults with Down syndrome. J Appl Res Intellect Disabil. 2014; 27(3):247-263.
283. Urrets-Zavalía A, Solares-Zamora J, Olmos HR. Anthropological studies on the nature of cyclovertical squint. Br J Ophthalmol. 1961; 45(9):578-596.
284. Belfort Mattos R. [Estudo oftalmologico dos Indios do Medio Xingu.] Arq Bras Oftalmol. 1970; 33(20):33-43.
285. Germano RAS, Kawai RM, de Souza BL, Germano FAS, Germano CS, Germano JE. Frequency of ocular conditions in native Brazilians from Avai City, Sao Paulo state. Rev Bras Oftalmol. 2017; 76(5):227-231.
286. Couto Jr AS, Pinto GR, de Oliveira DA, Holzmeister D, Portes ALF, Neurauter R, Portes AJF. [Prevalence of the ametropias and eye diseases in preschool and school children of Alto da Boa Vista favelas, Rio de Janeiro, Brazil]. Rev Bras Oftalmol. 2007; 66(5):304-308.
287. Couto Jr AS, Jardim JL, de Oliveira DA, Gobetti TC, Portes AJF, Neurauter R. [Eye diseases in preschool and school children in the city of Duque de Caxias, Rio de Janeiro, Brazil]. Rev Bras Oftalmol. 2010; 69(1):7-11.
288. Maul E, Barroso S, Munoz SR, Sperduto RD, Ellwein LB. Refractive error study in children: results from La Florida, Chile. Am J Ophthalmol. 2000; 129(4):445-454.
289. Vasquez SC, Lopez AMV. [Análisis de la situación de salud visual y ocular en los niños y niñas entre 3 y 18 años pertenecientes al proyecto de educacion en convivencia y ciudadanía pecc en la clínica de optometría de la universidad de la sale.] Thesis, Univ de la Salle, Bogota, 2014
290. Márquez Galvis MM, Cáceres Díaz MC. [Visual and ocular health profile of children from two child development centers in Pereira, Colombia.] Cienc Tecnol Salud Vis Ocul. 2017; 15(2):61-70.
291. Molinari A, Heede S, Virgili G, Angi M. [Trastornos de la motilidad ocular en una población de niños escolares de la Sierra Ecuatoriana / Ocular motility disorders in a population of school children in the Sierra Ecuatoriana.] Arch Chil Oftalmol. 2005; 63(2):359-362.
292. Juárez-Muñoz IE, Rodríguez-Godoy ME, Guadarrama-Sotelo ME, Guerrero-Anaya M, Mejía-Arangúre JM, Sciandra-Rico M. [Incidence of common ophthalmological disorders in preschool children in Mexico City]. Salud Publica Mex. 1996; 38(3):212-216.
293. Ohlsson J, Villarreal G, Sjöström A, Cavazos H, Abrahamsson M, Sjöstrand J. Visual acuity, amblyopia, and ocular pathology in 12- to 13-year-old children in Northern Mexico. J AAPOS. 2003; 7(1):47-53.

294. Costa MN, Jose NK, Filho NM, Rangel FF, Rueda G, Pereira VL, Favero M. [Estudo da incidência de ambliopia, estrabismo e anisometropia em pré-escolares.] Arq Bras Oftal 1979; 42(6):249-252.
295. Schimiti RB, Costa VP, Gregui MJF, Kara-José N, Temporini ER. Prevalence of refractive errors and ocular disorders in preschool and schoolchildren of Ibiporã-PR, Brazil (1989 to 1996). Arq Bras Oftalmol. 2001; 64(5):379-384.
296. Beer SMC, Scarpi MJ, Minello A. [Ocular findings in children between 0 and 6 years of age, residing in the city of Sao Caetano do Sul, SP]. Arq Bras Oftalmol. 2003; 66(6):839-845.
297. Garcia CA, de Sousa AB, Mendonca MB, Andrade LL, Orefice F. Prevalence of strabismus among students in Natal/RN – Brazil. Arq Bras Oftalmol. 2004; 67(5):791-794.
298. De Sousa RLF, Funayama BS, Cataneo L, Padovini CR, Schellini SA. [Comparison between visual acuity and photoscreening used like visual screening methods for scholar aged children.] Rev Bras Oftalmol. 2012; 71(6):358-363.
299. Shimauti AT, Pesci LT, Sousa RL, Padovani CR, Schellini SA. [Strabismus: Detection in a population-based sample and associated demographic factors.] Arq Bras Oftalmol. 2012; 75(2):92–96.
300. Schaal LF, Schellini SA, Pesci LT, Galindo A, Padovani CR, Corrente JE. The prevalence of strabismus and associated risk factors in a Southeastern region of Brazil. Semin Ophthalmol. 2018; 33(3):357-360.
301. Beiguelman B. A survey on genetical and anthropological traits among Japanese immigrants in Brazil. Z Morphol Anthropol. 1964; 55(1):46-59.