

Time Trends and Demographic Disparities in Blindness Incidence Among Diabetic Patients in Israel, 2012–2024

A Nationwide Population-Based Analysis of the Israeli National Diabetes Registry (INDR)

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Scientific Background

Vision and Functional Autonomy

Visual health is fundamental for mobility, cognitive engagement, and late-life independence. National all-cause blindness decline has plateaued (2009–2020)¹ suggests an 'exhaustion' of preventive strategies. Healthy aging requires targeting primary contributors to visual morbidity, notably diabetes mellitus.

Diabetes Mellitus and Ocular Morbidity

Diabetes is a leading cause of preventable blindness. Whether the trend in Israel's diabetic population mirrors the national plateau—despite advanced Health Basket therapies (e.g., Anti-VEGF, GLP1)—remains uncharacterized. Bridging this gap and identifying associated demographic disparities is essential for promoting geriatric health equity.

Study Objective: To evaluate nationwide blindness incidence trends and to identify disparities among patients in the Israeli National Diabetes Registry (INDR) utilizing longitudinal real-world data (RWD) over a thirteen-year period.

Methods

Study Design & Population

Nationwide, population-based retrospective cohort analysis utilized a dynamic open cohort design cross-linking the Israeli National Diabetes Registry²—capturing comprehensive data from all four national health maintenance organizations (HMOs)—with the National Registry of the Blind (2012–2024). The at-risk population excluded individuals with prior blindness and those aged <25 years due to epidemiological rarity.

Variables and Measures

- Legal blindness was defined by standardized clinical criteria (best-corrected visual acuity $\leq 3/60$ or visual field $\leq 20^\circ$ in the better eye), aligning with WHO Category 3 and US statutory definitions.
- Data was stratified by sex, age, ethnicity, residential socioeconomic status (rSES), and primary blindness etiology (Diabetic Retinopathy [DR], Glaucoma, Age-related Macular Degeneration [AMD]).

1. LEGAL BLINDNESS DEFINITION

		1. Best-Corrected Visual Acuity $\leq 3/60$
		2. Visual Field $\leq 20^\circ$
		WHO Category 3 / US Statutory

2. STUDY STRATIFICATION (VARIABLES)

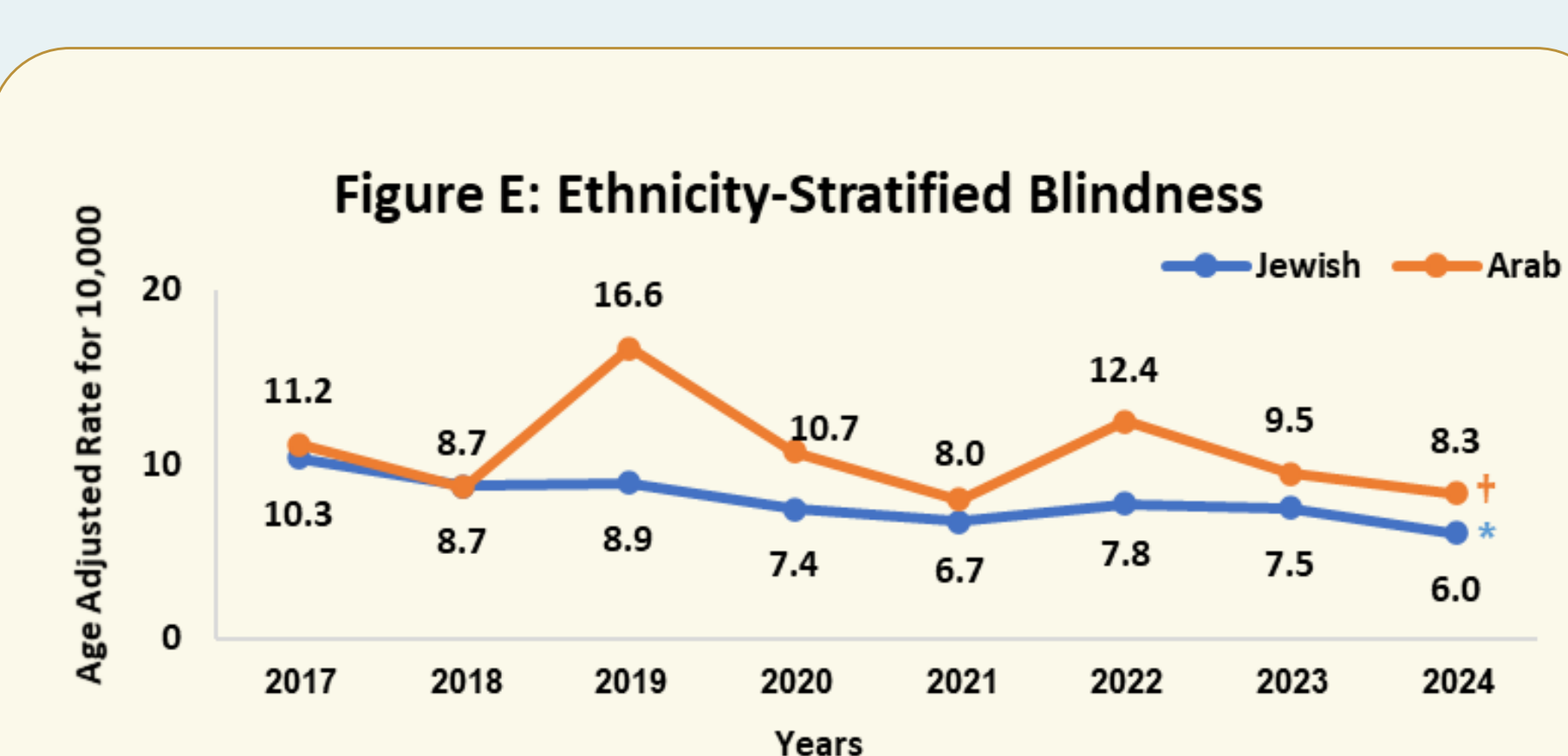
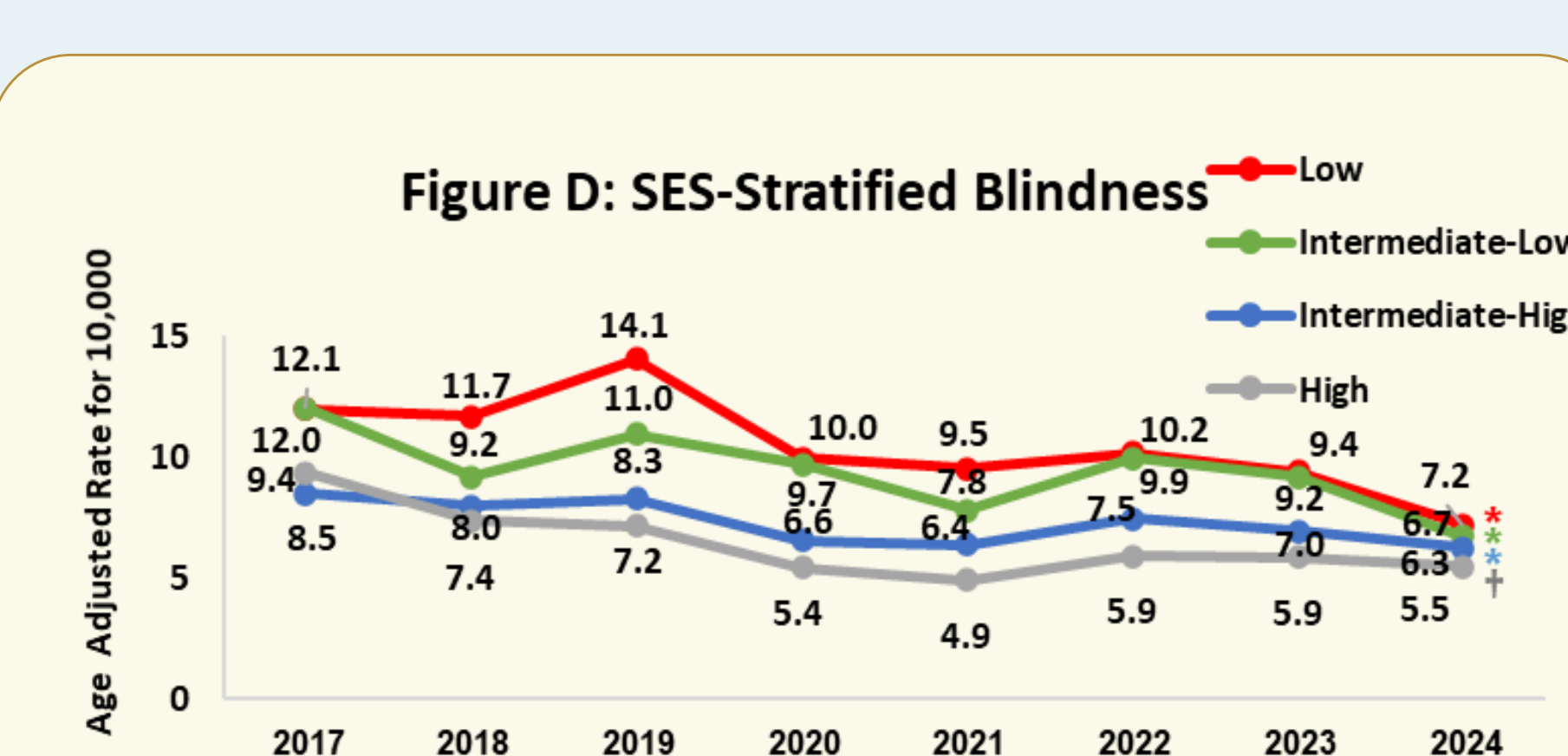
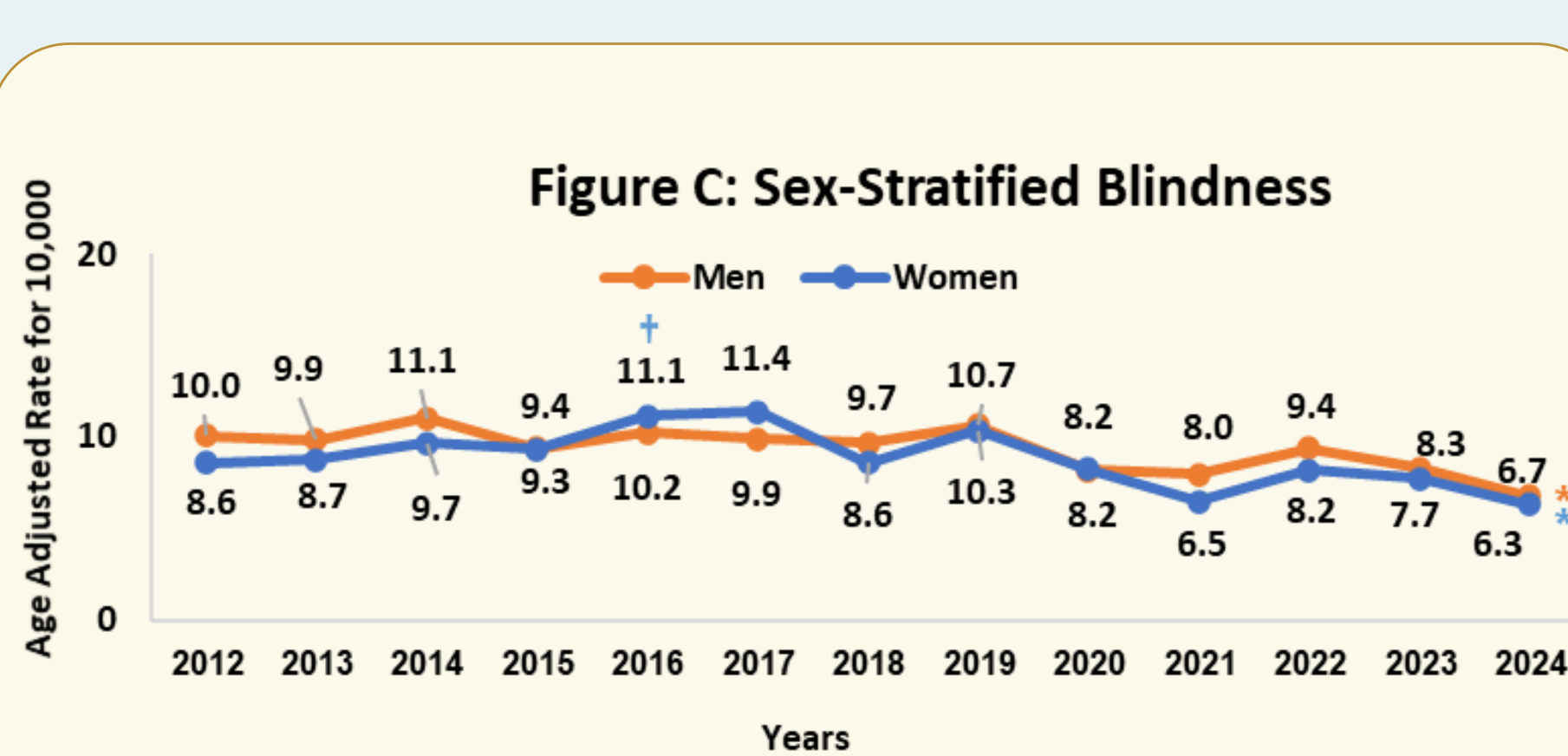
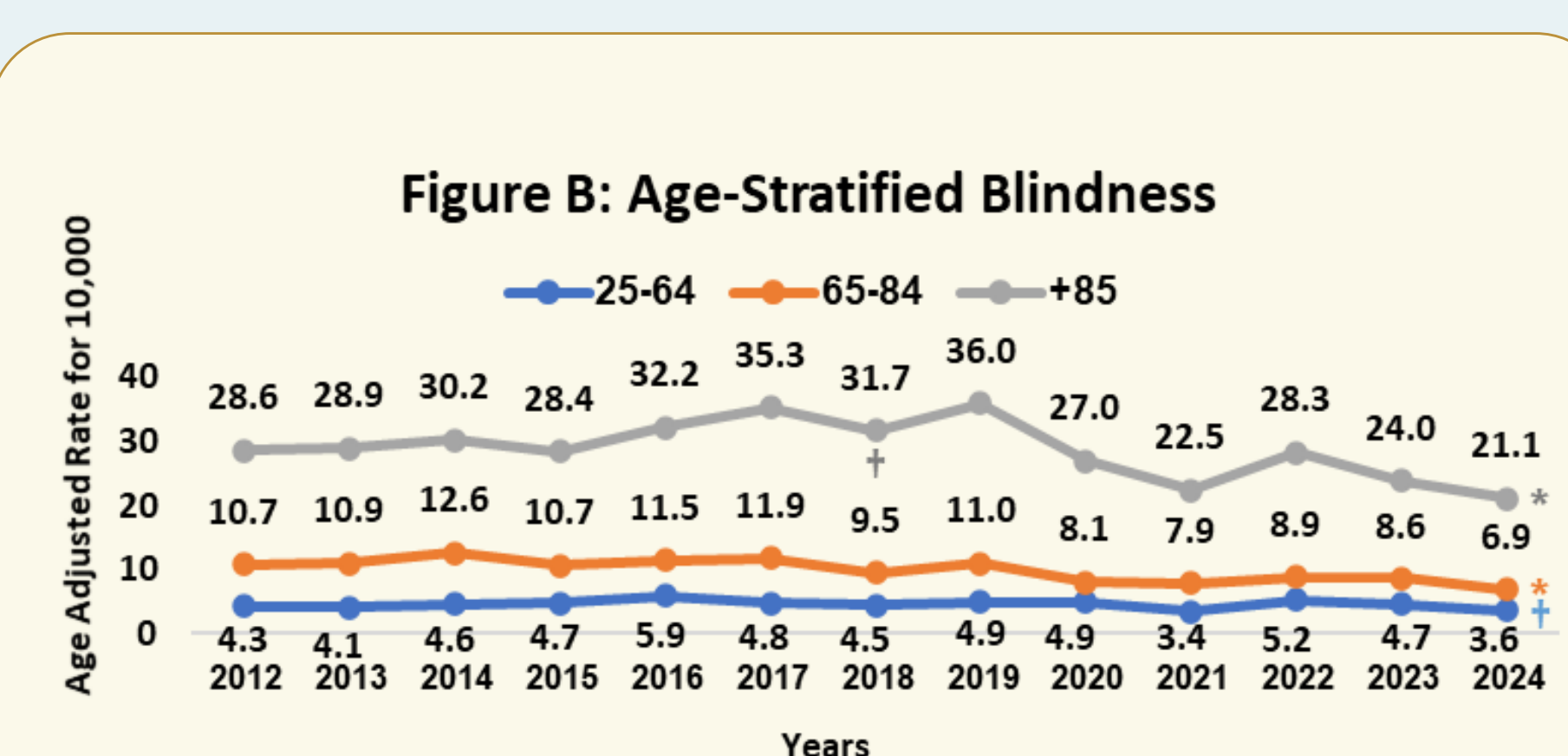
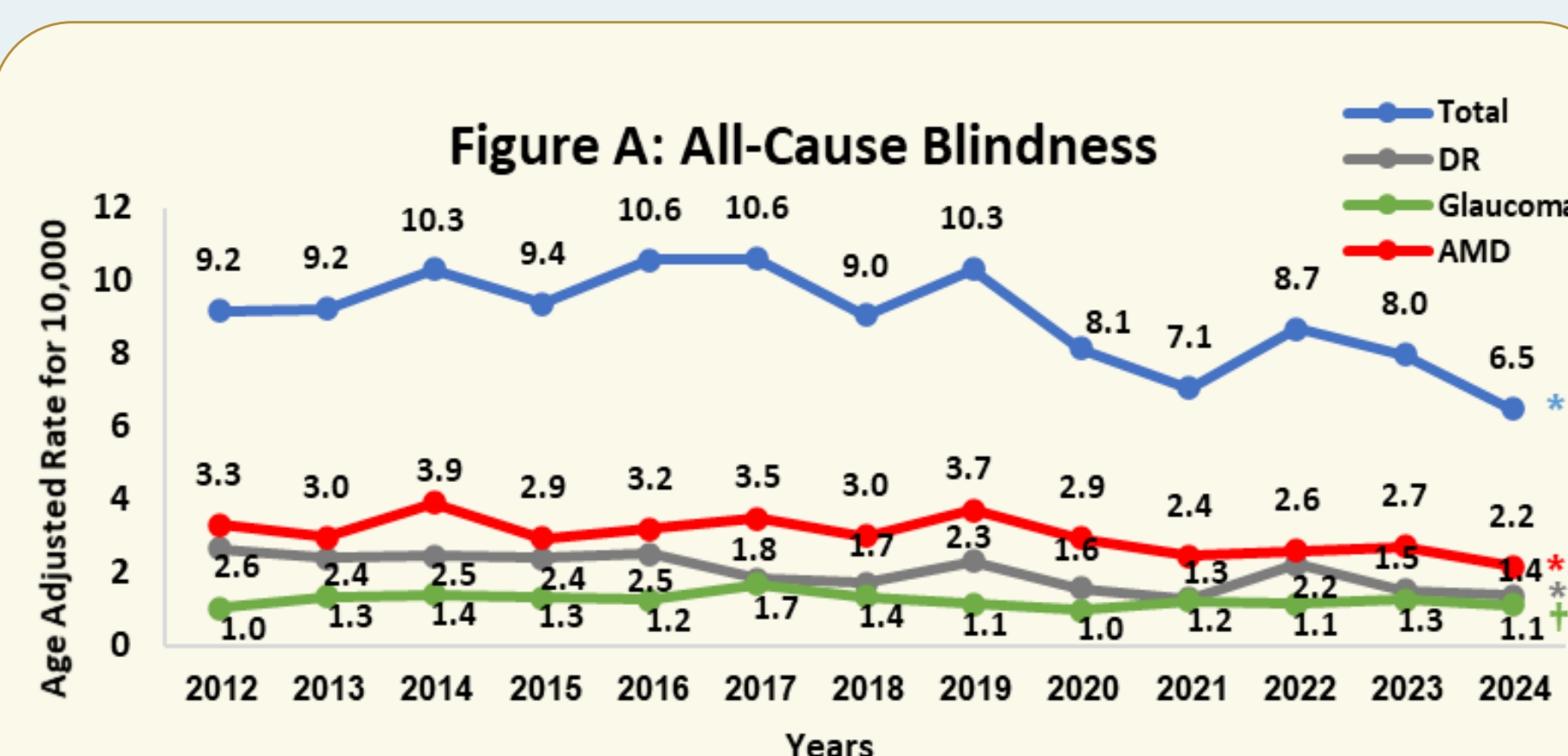
DEMOGRAPHICS	PRIMARY BLINDNESS ETIOLOGY
 Age	 Diabetic Retinopathy
 Sex	 Glaucoma
 Ethnicity	 Age-related Macular Degeneration
 SES (Residential Socioeconomic Status, 1–10)	

Statistical Analysis

- Yearly crude and age-standardized annual incidence rates (per 10,000, reference population - 2020 INDR) were calculated to ensure temporal comparability.
- Joinpoint Regression was employed to determine significant temporal inflection points and estimate the Annual Percent Change (APC).

Results

- Overall Trends:** Despite a 41% increase in diabetes prevalence, age-standardized blindness incidence significantly declined from 9.2 to 6.5 per 10,000 (APC = -2.6%, $P = 0.01$) (Fig. A).
- Clinical Etiology:** Significant declines were observed in Diabetic Retinopathy (APC = -4.9%, $P < 0.05$) and AMD (APC = -2.9%, $P < 0.05$), while Glaucoma rates remained stable (Fig. A).
- Demographics:** Reductions were most notable among ages 65–84, males, and low-to-mid socioeconomic groups (Fig. B, C, D).
- Disparities:** A significant decline in the Jewish population (APC = -5.8%, $P < 0.01$) was evident, while in the Arab population, no-significant trend was observed ($P = 0.41$) (Fig. E).



* significant trend ($P < .05$), † non-significant trend ($P \geq .05$)

Discussion

Declining Ocular Morbidity: Alongside rising diabetes prevalence, age-standardized blindness incidence significantly declined, suggesting a positive impact of robust prevention efforts and expanded coverage of National Health Basket vision-preserving therapies.

Novel Therapeutics & Screening Routine: Declines in retinal blindness (DR, AMD) contrast with stable glaucoma rates, reflecting the efficacy of novel retinal therapies included in the National Health Basket. Due to glaucoma's asymptomatic manifestation, mitigating advanced visual loss necessitates strict adherence to annual intraocular pressure screening within the routine geriatric care.

Sectoral Disparities in Aging & Geriatric Health Policy: The non-significant decline within the Arab population highlights persistent sectoral healthcare disparities unbridged by general national trends. Universal coverage remains a necessary yet insufficient foundation for health equity; Social Determinants of Health (SDoH) may impede sensory longevity. Achieving health equity in the third age necessitates dedicated health policy for sector-specific barriers.

Implications for Healthy Aging

Universal Access: The observed decline in ocular morbidity highlights the real-world value of the National Health Basket; sustaining universal access to advanced vision-preserving therapies is a public health priority for healthy aging and longevity.

Targeted Sectoral Interventions: The absence of a decline in the Arab population highlights the need to complement uniform strategies with targeted sectoral interventions, including culturally adapted screening and enhanced healthcare accessibility, to achieve health equity across diverse older populations.

Proactive Surveillance: Ongoing monitoring of etiology-specific trends and disparities via leveraging longitudinal real-world data is key for informed national healthcare resource allocation and support evidence-based evaluation of geriatric clinical practices.

Study Status

A formal manuscript has been drafted and is currently under internal peer-review, preparatory to submission to a leading Q1 journal.

References

- Israeli A, et al. Time trends of etiologies of blindness in Israel 2009–2020: have methods to decrease leading causes of blindness been exhausted? Am J Ophthalmol. 2022;240:149–158.
- Lutski M, et al. Incidence and risk factors for blindness in adults with diabetes: the Israeli National Diabetes Registry (INDR). Am J Ophthalmol. 2019;200:57–64.