

Estimating Return on Investment (ROI) of Assistive Technologies in Bangladesh: Evidence for Wheelchairs, Hearing Aids, and Eyeglasses

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SUMMARY FINDINGS

Every US\$1 invested returns

US\$5.97

in lifetime socioeconomic benefit

US\$10.23 billion Total lifetime benefits

US\$1.47 billion Total lifetime costs

RETURN ON INVESTMENT (ROI)

Eyeglasses

54.47

Best buy

Wheelchairs

5.23

Largest net benefit

Hearing aids

2.42

Cost-beneficial

BACKGROUND

- 7.07% of the population lives with a functional difficulty; only 33.78% of adults with disability are employed, against 59.03% overall.¹
- Just 7.1% of people with functional difficulty use any AT, and 71% of those in need report unmet need.²
- No national estimate of the economic return on AT investment exists for Bangladesh.

OBJECTIVE

To estimate the lifetime return on investment (ROI) of three high-priority assistive technologies (ATs), wheelchairs, hearing aids, and eyeglasses in Bangladesh

KEY INPUTS

GDP/capita US\$2,593; QALY valued at $0.5 \times \text{GDP/capita}$; Returns to schooling 7.3%; Caregiver time 3.8 h/week; Devices WC US\$166; HA US\$171.50; EG US\$11.22

METHODS

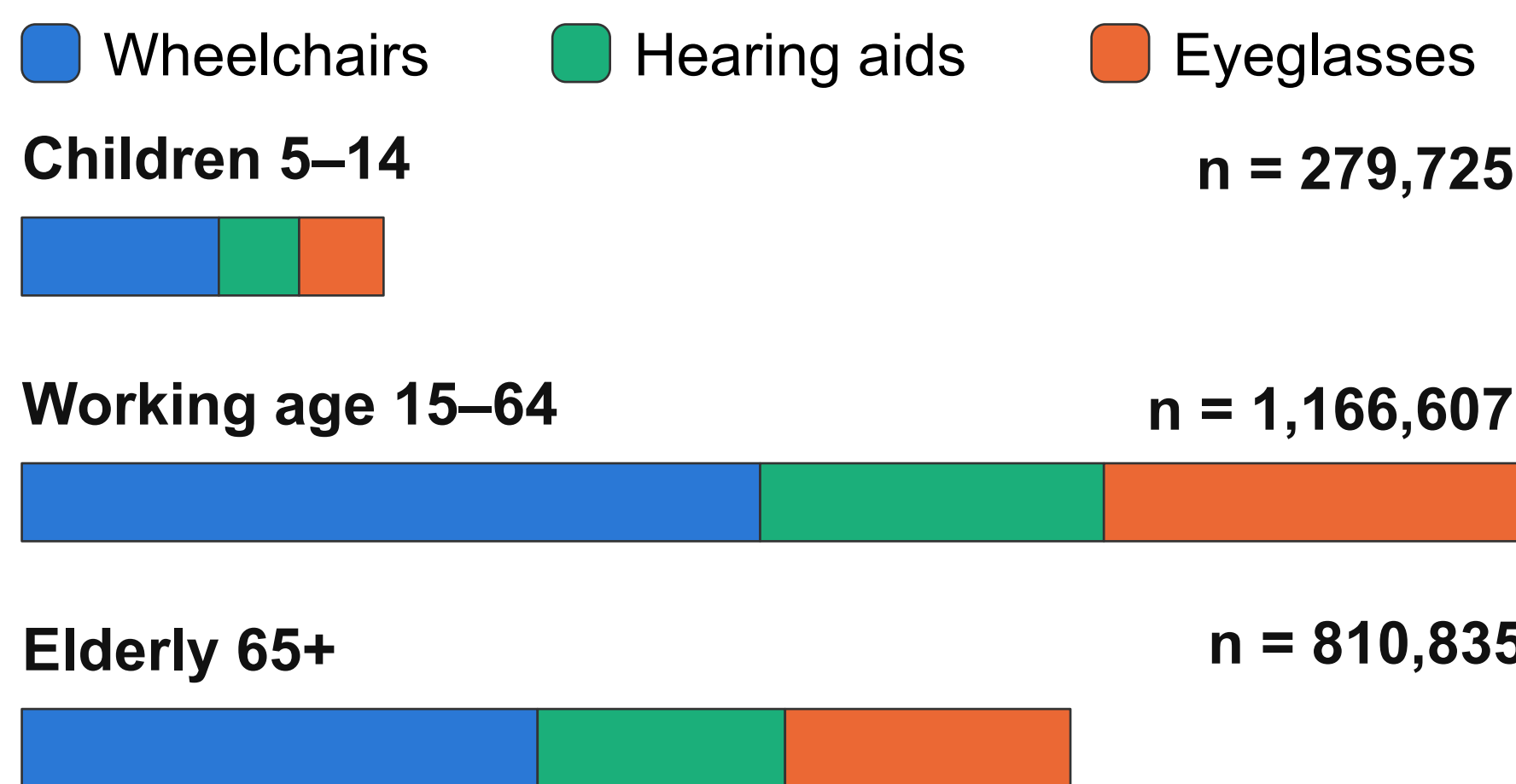
- Model:** Deterministic cohort cost–benefit model, societal perspective, lifetime horizon.
- Population:** HIES 2022 functional-difficulty prevalence applied to the national population.³
- Discounting and uptake:** 5% annual discount rate; uptake ramps from 35% to 100% by year 15.⁴
- Sensitivity Analysis:** 5,000-iteration Monte Carlo PSA.

Benefit and Cost Estimation

- Employment Benefits:** Lifetime earnings gains from AT use, using a human capital approach.
- Education Benefits:** Increased lifetime earnings from improved schooling, using the Mincerian earnings framework.
- Caregiver Time Savings:** Productivity gains from reduced caregiving burden, using the opportunity-cost approach
- Health Benefits:** Estimated health gains as monetised QALY improvements
- Cost Estimation:** Discounted lifetime costs of device purchase, fitting, maintenance, and replacement (5% discount rate)

RESULTS

Who Needs AT

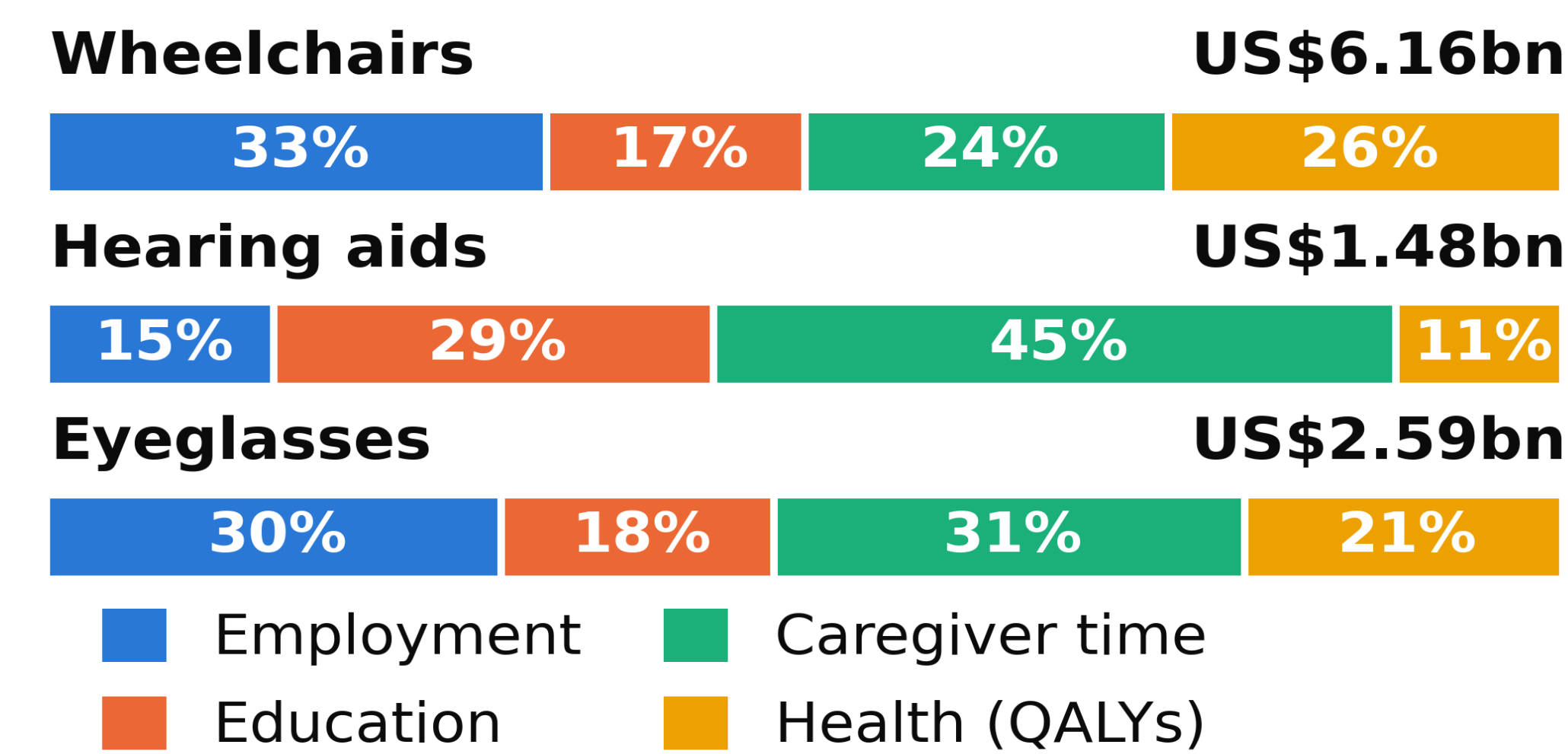


Where the Benefit Comes From



Benefit Streams By AT Devices

Share of each device's total benefit



What It Costs and What It Returns (Lifetime, per eligible user (2022 US\$))

AT device	Eligible users	Cost per user	Benefit per user	Net benefit per user	ROI
Wheelchairs	1,122,097	US\$880	US\$5,485	US\$4,605	5.23
Hearing aids	519,239	US\$835	US\$2,857	US\$2,022	2.42
Eyeglasses	615,831	US\$76	US\$4,210	US\$4,134	54.47
All three ATs	2,257,167	US\$650	US\$4,533	US\$3,883	5.97

Robust to Parameter Uncertainty (5,000 Monte Carlo simulations)

ATs	Mean	95% CI (low, high)	Probability (ROI>1)
Wheelchair ROI	5.62	(5.54, 5.69)	99.88%
Hearing Aid ROI	2.65	(2.61, 2.69)	90.70%
Eyeglasses ROI	57.62	(56.95, 58.29)	100.00%
Overall ROI	6.19	(6.12, 6.26)	99.98%

LIMITATIONS

- Costs cover device price and maintenance only; service delivery, training and administration-related costs were not included.
- Caregiver time saved (3.8 h/week) comes from one US study, applied to all devices.
- QALY gains and ramp-up follow ATscale (2020), not Bangladesh-validated.
- PSA assumes parameter independence.

CONCLUSIONS AND POLICY IMPLICATIONS

- ✓ **Investment, not expenditure.** Every device returns more than it costs, at an overall ROI of 5.97.
- ✓ **Returns beyond the user.** Caregiver time savings are 29% of all benefits, largely borne by women.
- ✓ **A tiered purchasing strategy.** Eyeglasses are an outright best buy; wheelchairs give the largest absolute gain.
- ✓ **Ready for financing decisions.** Supports including these ATs in the essential health service package.

REFERENCES

¹ Bangladesh Bureau of Statistics. (2022b). *National Survey on Persons with Disability 2021*

² Pryor, W. et al. (2018). Unmet Needs and Use of Assistive Products in Two Districts of Bangladesh: Findings from a Household Survey. *Int J Environ Res Public Health*, 15(12)

³ Bangladesh Bureau of Statistics.(2022) *Household Income and Expenditure Survey 2022*

⁴ ATscale (2020) *The case for investing in assistive technology*

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