# Association between sociodemographic factors, visual acuity and corneal topographic outcomes after collagen cross-linking in patients with keratoconus

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## INTRODUCTION

Keratoconus is a characterised by a bilateral asymmetrical, progressive, non-inflammatory thinning and steepening of the cornea that results in astigmatism and worsening visual acuity, most common in the second and third decades.[1-4] Corneal cross-linking (CXL) using riboflavin and UV light is an effective treatment for reducing the risk of keratoconus progression.[5]

## OBJECTIVES

This study aimed to determine the association between sociodemographic factors (age, sex, ethnicity, deprivation) with post-operative visual acuity (VA) and corneal topography (KMax and K2) in an ethnically and socioeconomically diverse patient cohort.

## METHODS

An audit of 111 eyes of 91 keratoconus patients who underwent CXL between January 2021 and December 2022 at King's College Hospital was conducted. Univariate Kaplan-Meier and multivariate cox-regression survival analyses were performed with visual acuity and topographic outcomes.

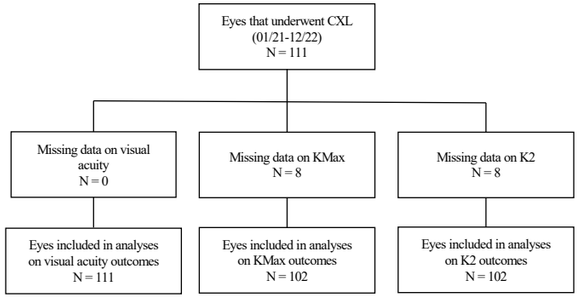



**Figure 1 | Flow chart of eyes included in the data analysis.** 111 eyes of 91 keratoconus patients at KCH were included in the data analysis.

## RESULTS

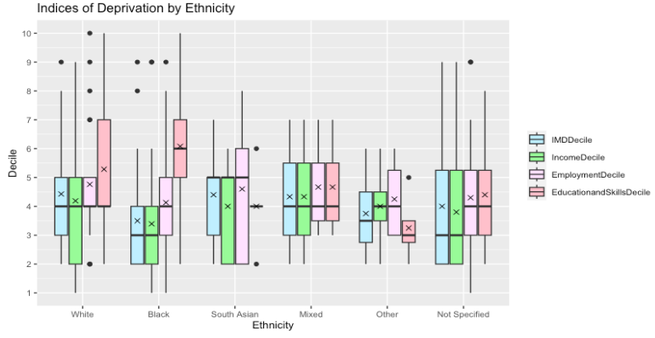



**Figure 2 | Indices of Deprivation by Ethnicity.** Mean IMD and deprivation subdomain deciles varied across different ethnicities.

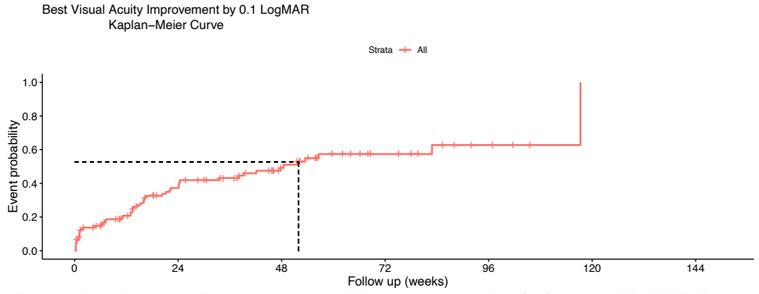



**Figure 3 | Kaplan-Meier curve illustrating post operative BVA improvement.** At 52 weeks, there was a 47.2% (95%CI: 37.4%–59.6%) probability of 0.1 LogMAR BVA improvement.

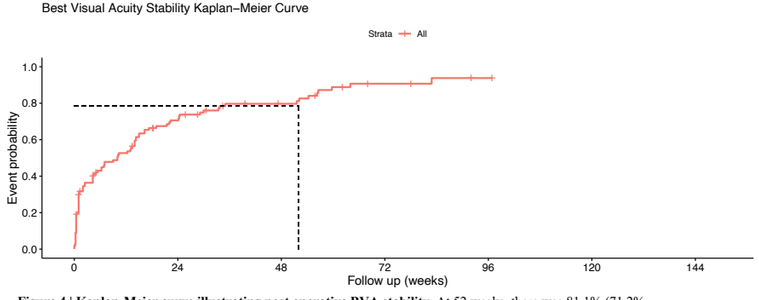



**Figure 4 | Kaplan-Meier curve illustrating post operative BVA stability.** At 52 weeks, there was 81.1% (71.2%–87.6%) probability of BVA stability.

| Outcome | Variable | Model | Sig. | HR | 95% CI for HR | |
|---|---|---|---|---|---|---|
| | | | | | Lower | Upper |
| BVA improvement | Mixed ethnicity | B | 0.048 | 5.11 | 1.02 | 25.66 |
| | | C | 0.047 | 5.11 | 1.02 | 25.60 |
| | | D | 0.046 | 5.12 | 1.03 | 25.59 |
| KMax deterioration | South Asian ethnicity | A | 0.004 | 9.72 | 2.06 | 45.86 |
| | | B | 0.003 | 11.36 | 2.31 | 55.89 |
| | | C | 0.004 | 10.76 | 2.18 | 53.16 |
| | | D | 0.007 | 7.91 | 1.75 | 35.80 |
| | Income | B | 0.018 | 0.75 | 0.59 | 0.95 |
| | Education | D | 0.038 | 0.79 | 0.64 | 0.99 |
| K2 improvement | Unspecified ethnicity | B | 0.040 | 3.95 | 1.06 | 14.69 |
| | IMD | A | 0.004 | 0.65 | 0.48 | 0.87 |
| | Income | B | 0.004 | 0.63 | 0.46 | 0.86 |
| | Employment | C | 0.009 | 0.73 | 0.58 | 0.93 |

**Table 1 | Multivariate cox-regression.** Significant associations identified between the six primary outcomes and sociodemographic factors, including ethnicity, IMD and deprivation subdomains.

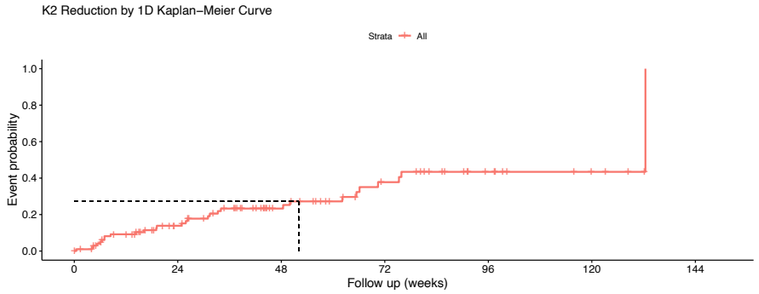



**Figure 5 | Kaplan-Meier curve illustrating post operative K2 improvement.** At 52 weeks, there was 27.2% (16.4%-36.7%) probability of 1D K2 improvement.

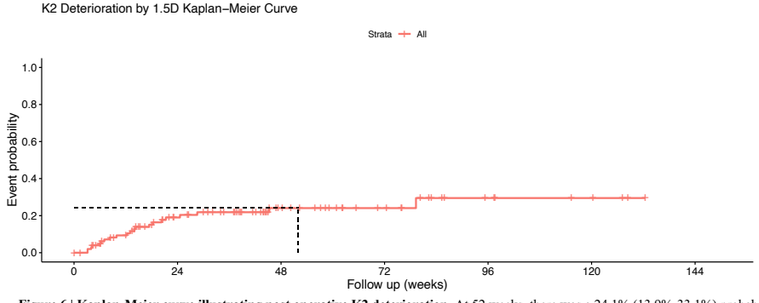



**Figure 6 | Kaplan-Meier curve illustrating post operative K2 deterioration.** At 52 weeks, there was a 24.1% (13.9%-33.1%) probability of 1.5D K2 deterioration.

## CONCLUSION

CXL resulted in the stabilisation or improvement of VA, KMax and K2 in the majority of eyes. Significant associations were observed between ethnicity, deprivation deciles, BVA and K2 improvement and KMax deprivation, suggesting the influence of sociodemographic factors on visual rehabilitation in keratoconus patients following CXL. Further investigation into the nature of these associations is warranted to guide interventions that ensure visual recovery is maximised across all keratoconus patients following CXL.

## REFERENCES

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