Strengthening eye health evidence for children in low-income and middle-income countries

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Eye health research in low-income and middle-income countries has largely focused on describing the nature and extent of eye health problems.[1] We commend Hillary Rono and colleagues[2] for contributing to the solution space with their cluster randomised trial in this issue of *The Lancet Global Health* of a smartphone-based visual impairment screening tool in primary schools in Trans Nzoia County, Kenya.

In their study, Rono and colleagues tested the effectiveness of the Peek school eye health system—a smartphone-based sight test and referral system, which included referral cards that simulated the child's vision loss, followed by short messaging service (SMS) reminders to parents. This intervention was compared with standard visual acuity assessment using a Snellen chart and a written referral. Teachers performed vision screening in both groups, and the primary outcome was uptake of referral. Children in the Peek (intervention) group who failed the screening were more likely to attend the hospital for a full assessment than those in the standard group (adjusted odds ratio 7·35, 95% CI 3·49–15·47; p<0·0001),[2] indicating that the simulated referral cards combined with SMS reminders were effective at promoting uptake of referral.

Among the children who attended the hospital, 68 referred from the Peek group were bilaterally visually impaired (visual acuity of <6/12) compared with 37 from the standard group. However, intervention also resulted in more false positives, with only 25% of children presenting to the hospital confirmed with visual impairment in the Peek group compared with 47% from the standard group.[2] The authors acknowledge that the high number of false positives from the intervention risks overburdening already overstretched eye-care services, but the cost to parents of unnecessary referrals should also not be overlooked. In ongoing work, Rono and colleagues are assessing alternative testing algorithms to improve the positive predictive value of the smartphone vision test.[2] In these future trials, if the referral system of both groups includes simulated referral cards and SMS reminders, the effectiveness of the vision test can be directly compared with the Snellen chart to identify the best combination of screening and referral tools.

Rono and colleagues are rolling out the intervention to other settings and ideally this move will be accompanied by implementation research to understand "what, why, and how the intervention works in real world settings and test approaches to improve them".[3] Successful school vision screening requires several elements that are not insubstantial in many low-income and middle-income countries. The requirements for this intervention include education and health systems willing to collaborate, teachers and health workers doing additional work to a high standard, eye-care services being able to treat the conditions identified, and sufficient funds covering the cost of the intervention, including training, SMS, and spectacles. An opportunity arises in the next phase of the authors' research to do effectiveness-implementation hybrid studies,[4] whereby ongoing refinement of testing algorithms and maximising adherence to spectacle wear could occur alongside assessment of implementation outcomes. This approach would generate knowledge about the acceptability, feasibility, adoption, cost and coverage of the intervention, and their influence on effectiveness in different contexts.[3]

In pursuit of the Sustainable Development Goals, reflection on how the scale-up of school-based interventions can maximise health and wellbeing for all children should be considered, including for children not in school. Across Africa, an estimated 30 million children do not attend school,[5] and these children are more likely to have visual and other forms of impairment than children attending school.[6] Absenteeism will be more relevant in some locations than others. For example, Kenya's national primary school attendance rate of 85·7% masks the large difference between the central (94·3%) and northeastern regions (55·5%), between the highest (92·2%) and lowest (71·0%) wealth quintiles, and between girls and boys (gender parity index of 1·02 in the central region *vs* 0·85 in the northeastern region).[7] In settings where absenteeism is high, additional methods for use alongside the school-based intervention warrant testing, such as the use of key informants[8] or a child-to-child approach to identify children with visual impairment not at school.

Additionally, among children who attend school, vulnerable children might be less likely to participate at several stages of this intervention. These stages include gaining consent to be screened, being present on the day of screening, and travelling to the hospital if referred. Sex was the only social characteristic reported in Rono and colleagues' study.[2] Data were not presented on consent to participate for girls and boys separately, but approximately half of the participants in each group were girls, more girls than boys failed the screening test, and slightly more boys attended the hospital relative to those referred.[2] To understand whether some groups of children are being systematically excluded when the intervention is scaled up, differences between girls and boys at each of these stages could be monitored alongside a measure of socioeconomic status and place of residence and any other locally relevant social dimensions.[9] Furthermore, implementation research alongside the intervention could identify ways the intervention content (eg, the SMS) or delivery might be modified to improve participation for all children.

Visual impairment among children is a large and growing problem in some low-income and middle-income countries. Rono and colleagues have provided the most robust evidence to date on an effective school vision screening system in an African context. Further modifications to the Peek school eye health system are ongoing, and we look forward to continued rigorous assessment and modification as the authors translate this intervention into routine practice.

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We declare no competing interests. JR is in receipt of a Commonwealth Rutherford Fellowship from the Commonwealth Scholarships Commission, UK.

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