Using Geographic Information Systems to assess the access to pediatric eye exams in Israel

Ariela Gordon-Shaag¹, Michal Isaacson² and Einat Shneor¹
1. Dept. of Optometry and Vision Science, Hadassah Academic College, Jerusalem, Israel.
2. Dept. of Gerontology, University of Haifa, Haifa, Israel

Introduction:
Uncorrected refractive error is the primary reason for vision impairment. The schedule of eye exams recommended by the American Optometric Association requires that children have good access to vision exams. This study examines access to eye exams in Israel, a country with universal health care making it a good venue to test pediatric access to eye exams, as affordability is not a limiting factor. In Israel, there are 55 practicing pediatric OMDs in Israel, 2,218,310 children ages 0-14 in the 2013 census. The ratio of pediatric OMDs per child is 26,600 children for each OMD. The scope of optometric practice does not include diagnostic pharmaceuticals, so we limit the study to ophthalmologists (OMD). As most OMDs do not examine children, this study was limited to pediatric OMD.

Aims of study:
• To evaluate access to pediatric eye care in Israel
• To evaluate service levels of practicing OMDs

Methods:
This study was approved by the Hadassah Academic College Ethics Committee
Data: Data on the number of pediatric OMD in Israel and their location was downloaded from the four Israeli Health Care provider websites and included address and zip code and weighted according to office hours per week. Pediatric population data for ages 0-14 from census tracks was obtained from the Israeli Census Bureau of Statistics (ICBS) 2013 data in .shp format
Analysis: ESRI’s (Environmental Systems Research Institute) ArcGIS Pro software spatial analysis was used to calculate the population that lives within the service areas for clinics: 15 km crow fly distance from the clinic. This distance was chosen with the idea that regular eye exams fall under the classification of primary care and should be within a short drive. Location Allocation was calculated along with stress on each OMD office.

Findings:
Access to pediatric OMDs
10 KM crow fly distance buffer from each pediatric OMD

Location Allocation Analysis Each line represents the connection between a census track and the closest pediatric OMD office. Distance was calculated referring to road travel.

21.9% from the Jewish population and 39.7% from the Non-Jewish population are not within 10KM from pediatric OMD

29.5% of the Jewish population and 45.0% from the Non-Jewish population drive more than 15KM for pediatric OMD appointments

Stress on pediatric OMD offices
Stress on each OMD office in Israel (location allocation analysis weighted by office days per week for each pediatric OMD)

Many pediatric OMD offices in Israel have high stress

Conclusion:
Distance and stress on OMD offices are barriers for children getting eye exams in Israel. Children living in the Northern and Southern areas of Israel have access to eye care that is inferior when compared to those living in central Israel. This problem effects the Non-Jewish population more acutely because of their tendency to live outside the central part of the country. Assuming that adding pediatric OMD practices may not be a feasible solution to improve access to pediatric eye care, expanding the scope of practice of optometry in Israel may improve access to pediatric eye care. Such a change would primarily benefit minorities and children living in peripheral areas.