Is *Child Opportunity Index* Associated with *Imaging Missed Care Opportunities* in Pediatric Patients Scheduled for Ambulatory Nuclear Medicine Examinations?

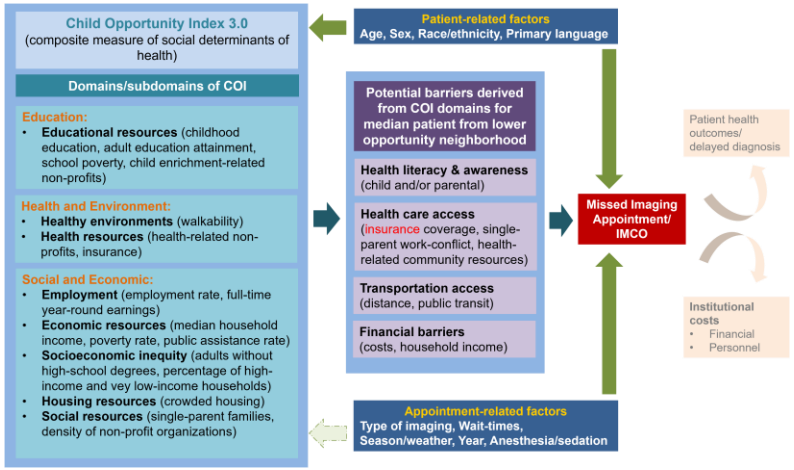
Neha Kwatra MD[1,2], Patrice Melvin MPH[2], Samantha G. Harrington MD[3], Valentina Ferrer Valencia MD[1], Melicia Y. Whitley, MM[2] and Valerie L. Ward MD, MPH[1,2]

[1]Department of Radiology and [2]Fenwick Institute, Boston Children's Hospital and [3]Department of Radiology, Massachusetts General Hospital, Boston, MA

BACKGROUND AND PURPOSE

- Little data exists on missed imaging appointments a.k.a., **imaging missed care opportunities (IMCO)** in pediatric nuclear medicine (NM) and related sociodemographic factors[1,2], specifically **Child Opportunity Index (COI)** 3.0, launched in 2024
- **COI is a composite measure of neighborhood resources linked to healthy child development** and is a combination of 44 weighted indicators[3,4]
- **COI levels** group neighborhoods into quintiles: **very low-, low-, moderate-, high- & very high-opportunity**
- **Primary aim** → To evaluate the **association of COI with IMCO** for outpatient pediatric NM examinations at an urban pediatric academic medical center, and secondarily to assess other sociodemographic factors related to IMCO

Fig 1. Conceptual Framework of proposed relationships between COI and other patient- and appointment- related factors and the pathway to IMCO



METHODS

- **Retrospective single-center cross-sectional review** of pediatric patients (≤21 yrs.) scheduled for outpatient NM examinations (2017-2022)
- **Outcome of interest→ IMCO**, defined as patient non-arrival; incomplete appointment upon arrival; or non-provider-driven cancellation up to 1 day prior
- **Primary exposure → COI level** (by zip code, state-normed)
- Other covariates →
  - **Patient-related factors** (age, sex, race/ethnicity, language, insurance & residency-type) and;
  - **Appointment-related factors** (imaging group, year, season & wait days).
- Univariate and multivariable analyses performed

RESULTS

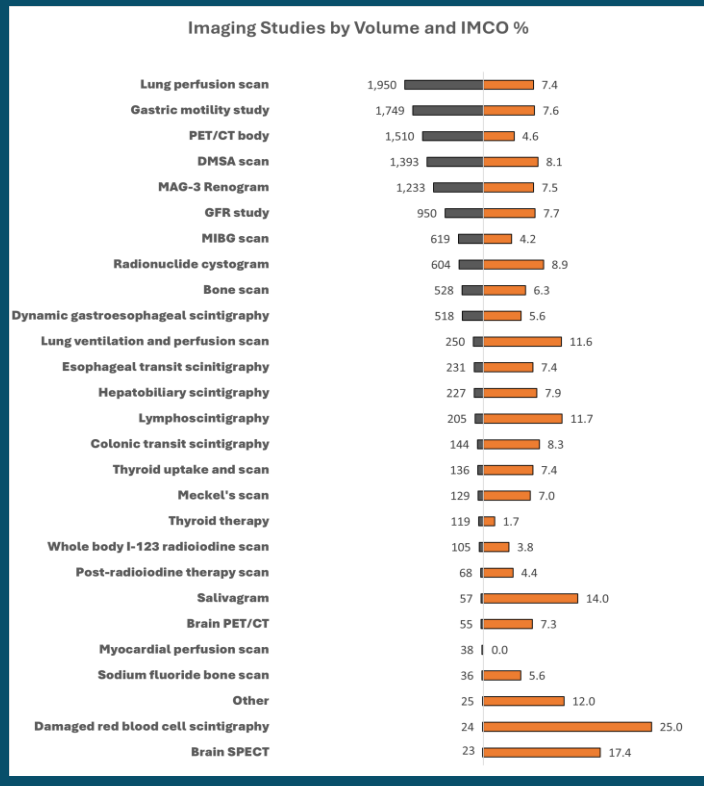
- 7655 patients met inclusion criteria
- Median age (IQR) → 8 yrs. (3-15 yrs.) with 4061 (53.1%) females
- **Of the 12,945 scheduled appointments, 922 (7.1%) resulted in IMCO**
- Most common exam type → lung perfusion scan (N=1950), IMCO rate of 7.4% (Fig. 2)
- On univariate as well as adjusted analysis[1], **COI was found to be a significant predictor of IMC0.** There were **66% percent higher odds of IMCO for patients in zip codes with very low/low compared to very high COI levels** (p< 0.001, table 1)
- Other factors associated with IMCO were age (p = 0.017), race/ethnicity (p = 0.019), insurance (p< 0.001), season (p< 0.001) & imaging group (p< 0.001)

Table 1: Relationship of COI and IMCO among scheduled ambulatory pediatric NM examinations (2017-2022)

COI levels, state-normed	IMCO (%)	#aOR (## 95% CI)	P-value	P-value (global)
Very Low/Low	9.8	1.66 (1.31-2.11)	<0.001*	
Moderate	7.2	1.23 (0.99-1.64)	0.064	<0.001*
High	6.1	1.18 (0.91-1.52)	0.208	
Very High	4.9	Reference		

[1]Multivariable mixed effects logistic regression model (at the appointment -level) with patient-level random effects
 # Adjusted Odds Ratio
95% Confidence Interval
* Two-sided p-value < 0.05 considered statistically significant

Fig. 2: Butterfly chart depicting the different types of scheduled NM examinations by volume with respective IMCO rates



CONCLUSIONS AND FUTURE DIRECTIONS

- Our study demonstrated a significant **association of COI with IMCO** in pediatric NM examinations
- **Targeted interventions are warranted for reducing IMCO & addressing imaging inequities** for children from lower-opportunity neighborhoods
- Future directions →
  - **qualitative studies** to explore provider- and families' perspectives of IMCO
  - investigating the impact of IMCO on **patient health outcomes**
  - evaluating **institutional costs** of IMCO
  - Trialing interventions such as transportation, phone reminders, clear preparatory instructions, same-day appointments, **use of patient navigators etc.**

REFERENCES

1.Flores EJ, Daye D, Peña MA, Lopez DB, Jaimes C, Glover M. Analysis of socioeconomic and demographic factors and imaging exam characteristics associated with missed appointments in pediatric radiology. Pediatr Radiol. 2021 Oct;51(11):2083–92.
2.Harrington S, Kwatra N, Melvin P, Tartarilla AB, Whitley MY, Valencia VF, et al. Sociodemographic factors and Child Opportunity Index disparities associated with missed care opportunities in pediatric patients with lymphoma and leukemia referred for FDG-PET/CT. Pediatr Radiol. 2024 May18; 54(6):1022-32.
3.COI30_TechDoc_20241004.pdf [Internet]. [cited 2024 Dec 22]. Available from: https://www.diversitydatakids.org/sites/default/files/file/COI30_TechDoc_20241004.pdf
4.Child Opportunity Index 3.0 database, 2010 census tracts - CKAN [Internet]. [cited 2024 Dec 22]. Available from: https://data.diversitydatakids.org/dataset/coi30-2010-tracts-child-opportunity-index-3-0-database--2010-census-tracts

Questions or Comments?
Email: *neha.kwatra@childrens.harvard.edu* ***OR***