

# MEASURING BASELINE INEQUITIES IN MEASLES VACCINATION DATA AMONG MONTREAL ELEMENTARY SCHOOLS IN MARCH 2024

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## CONTEXT

- In March 2024, a measles outbreak in Montreal (Canada) revealed differences in the way local stakeholders were approaching vaccination coverage (VC) data for elementary schools.
- Regional analyses of VC data from the Quebec Vaccination Registry (RVQ), combined with field information from the school vaccination catch-up operation in Montreal, led to questions regarding the interplay between school characteristics and VC.
- There was also significant variability between schools in the proportion of students missing from the RVQ. From an intervention perspective and with an equity lens, this question emerged: is the effect of missing data on measles VC estimates mediated by school socioeconomic status (SES)?

## METHODS

- School VCs were obtained from the provincial Info-Centre platform for public elementary schools in Montreal, based on RVQ data matched with student lists from the Ministry of Education (ME).
- School VCs were calculated using as denominator 1 the number of students in the RVQ, and as denominator 2, number of students enrolled (2023-24).
- School SES was measured by the Deprivation Index (DI) used to allocate the school tax to Montreal school boards and service centres (CGTSIM 2021).
- Associations between school DI and school VC were established with Pearson's correlations (significance threshold  $p < 0.05$ ). The same method was used to measure the association between school DI and proportions of students included in the RVQ.

## OBJECTIVES

1- Measure the correlation between school SES and measles VCs, using two methods based on different denominators

2- Measure the correlation between school SES and proportions of students included in the RVQ

## RESULTS

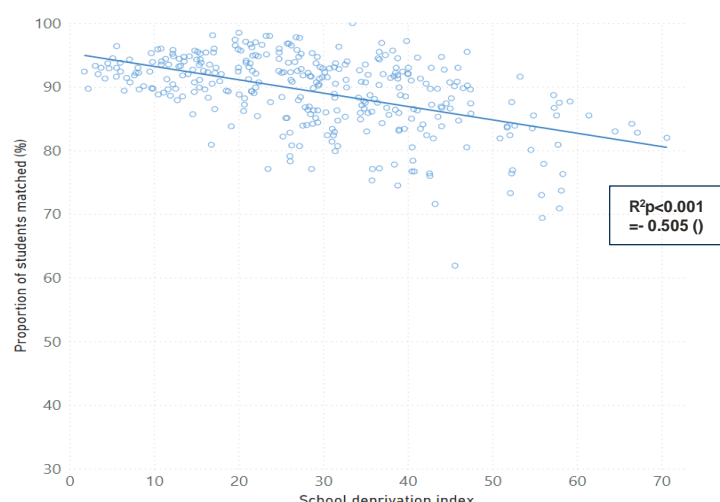
- The median measles VC among schools, calculated solely on students included in the RVQ, is **82.2% (IQR: 78.0% - 86.5%)**. Using all enrolled students in the school, it is **74.2% (IQR: 66.6% - 79.8%)** (fig. 1)
- A significant inverse correlation between school DI and measles VC was found with both methods:  **$R^2 = -0.374$  ( $p < 0.001$ )** for students included in the RVQ and  **$R^2 = -0.521$  ( $p < 0.001$ )** for all students enrolled in the school (fig 1).

**Fig. 1** Correlations between school DI and measles VC among students, with two methods based on different denominators, in Montreal elementary schools, March 2024



- The median proportion of students matched to the RVQ among all enrolled students is **90.5% (IQR: 85.9% - 93.4%)** in Montreal elementary schools (fig 2).
- A significant inverse correlation ( **$R^2 = -0.505$ ,  $p < 0.001$** ) was also found between school DI and the proportion of students included in the RVQ (fig 2).

**Fig. 2** Correlation between school DI and proportion of students matched to the RVQ, Montreal elementary schools, March 2024



## DISCUSSION

- Schools in socioeconomically deprived areas show lower measles VC, with both denominators (fig.1). As the DI of a school increases, the gap between the two methods of calculating VC widens because schools in deprived areas also show lower proportions of students matched to the RVQ (fig.2).
- Estimating VC using only students included in the RVQ supposes they are similar to the unmatched students. This is probably not the case, given the significant correlations between school SES, VC and % of matched students. More analyses are needed to characterize the unmatched students and evaluate potential differential biases in VC data.
- Estimating VC using total enrollment as denominator gives a "minimal VC", assuming the unmatched students are all unvaccinated. This likely underestimates the actual VC but clearly identifies schools where catch-up efforts for students without vaccination proof in the RVQ need to take place.

## CONCLUSION

- There is an association between the school SES and the measles VC among students of public elementary schools in Montreal, but also between the school SES and the proportion of students matched to the RVQ. This emphasises the need for careful method selection in public health monitoring to ensure we are not reinforcing bias.
- This exploratory analysis enhances our understanding of vaccination data in light of the socioeconomic characteristics of schools thus providing avenues to improve VC estimates and better plan public health interventions. More work needs to be done with local stakeholders to improve school VC data collection and reporting.

### References

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- IBM Corp. (2024). IBM SPSS Statistics for Windows. Version 24.0. IBM Corp.
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