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5. Conclusions

This study is among the first to evaluate the benefits of incorporating low-cost $PM_{2.5}$ measurements - including publicly available consumer-deployed devices - for $PM_{2.5}$ exposure prediction at cohort residential locations. This study also proposes a novel practical guidance tool for monitor deployment and/or data selection in monitoring campaigns using a PCA-based similarity metric. The increasing availability of consumer-deployed sensors such as PurpleAir represents a valuable opportunity for improving exposure models when applied in a rigorous framework. While our observations were made in a well-monitored region, we observed improvements in estimation by incorporating these data. More availability of spatially dense low-cost monitoring data, especially if deployed in resource-restricted environments with insufficient regulatory air quality stations, holds promise for improved $PM_{2.5}$ exposure assessment and epidemiological analyses.