

Using high resolution data to explain inequities in vaccination coverage among children: An example from The Philippines

Rajendra-Prasad Yadav, Fukushi Morishita, Sumbul Hashmi, Anne-Laure Budts, Vincent Meurrens and Huong Thi Giang Tran

Presented By : Sumbul Hashmi



EPCON



World Health
Organization

Content

About EPCON

Background

Methods

Results

Conclusion & Implications

About EPCON

EPCON is an impact company, using AI to help NGOs and governments in LMIC to strengthen public health.

Our partners use our Epi-control platform for more efficient case-finding interventions, diagnostic network optimization, predict treatment outcome, improved vaccination planning or service delivery.

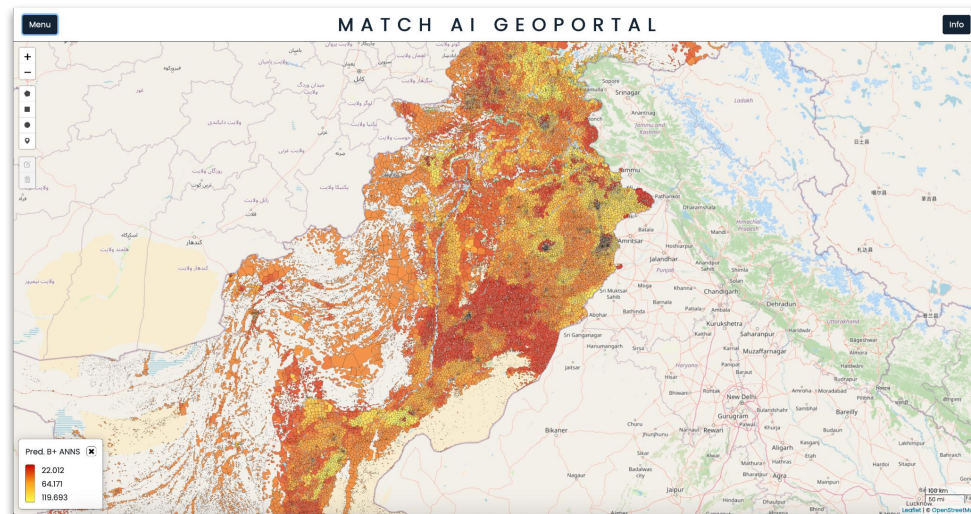
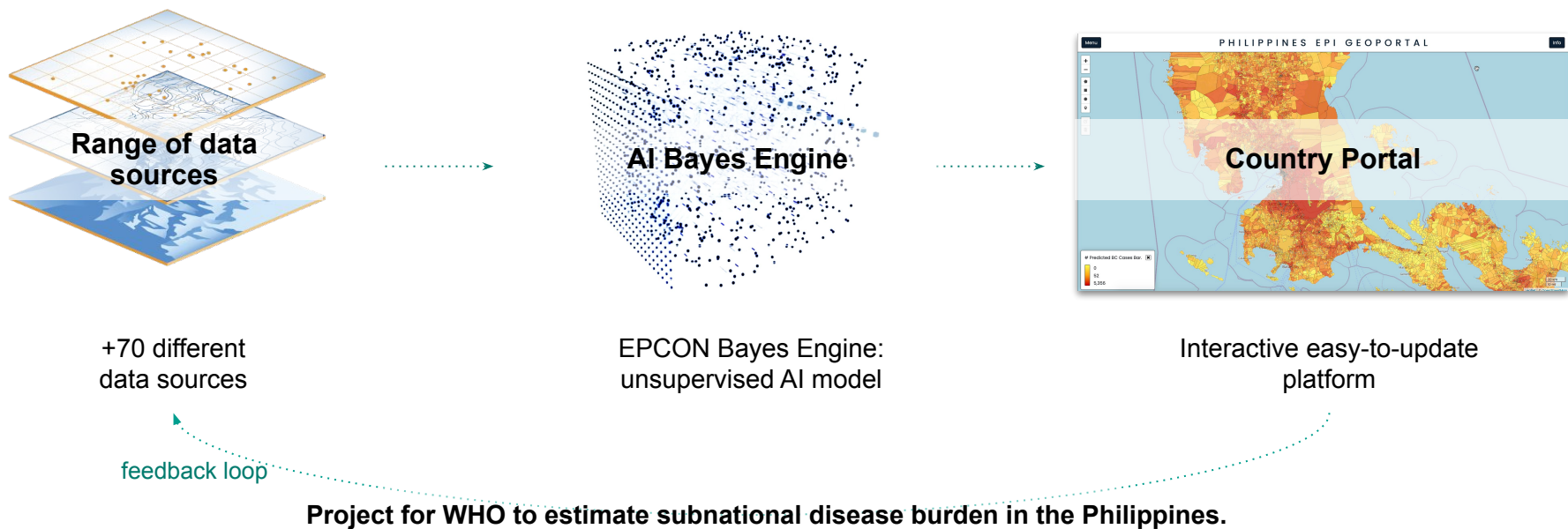


Image showing distribution of Tuberculosis Risk in Pakistan as modelled by EPCON

The solution gives a live view on subnational disease estimates



Background

There were around 637,000 zero dose children in the Philippines in 2022 (UNICEF, 2023).

Analysis of sub-national data at high spatial resolution can help to unmask gaps in immunization coverage

Inequity : Vaccination coverage percentage in Davao region, eastern Visayas, Zamboanga peninsula and Cagayan valley was 87.0 [77.5-92.9], 84.2 [74.0-90.9], 61.1 [48.7-72.3] and 64.2 [46.3-78.9] percent respectively (WHO-SEARO,2022)

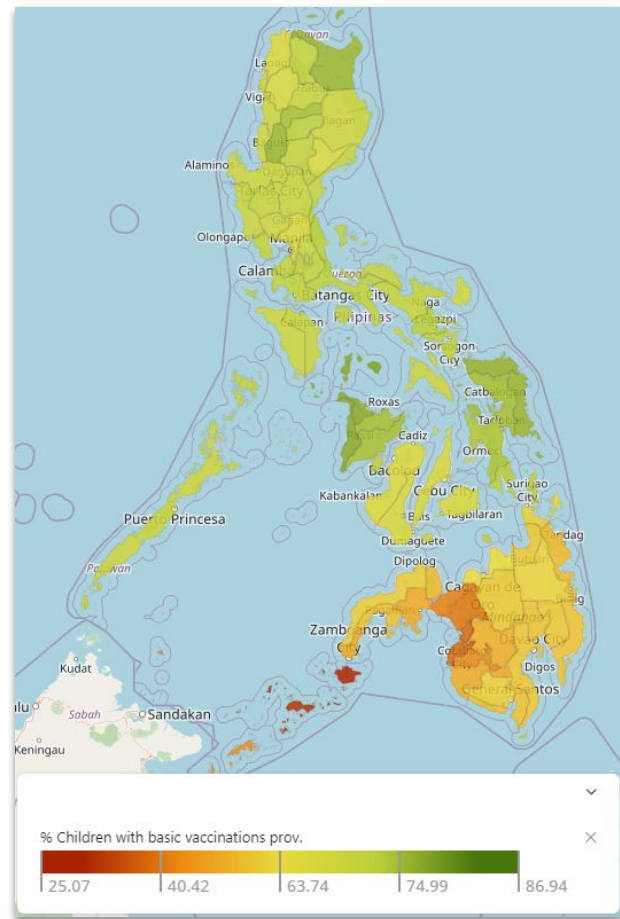


Image from EPCON geoportal

Background

The **Positive Deviance (PD) approach** is a problem-solving approach stemming from the observation that in all communities there are some people (Positive Deviants, PDs) **who manage to find better solutions and better results** to their problems as compared to their peers faced with the same set of challenges and with a similar access to resources

Objective: To identify geographical distribution of 'positive deviants' in immunization coverage using sub-national data such socioeconomic status and other proxies of access to health care across the Philippines.



Image from Wikimedia Commons under Creative Commons Attribution Share-Alike License Source author: Kleuske

Methodology

- Secondary Analysis of open-source subnational high-resolution data
- **Outcome of Interest: Full basic vaccination coverage (8 doses):**

Proportion of children aged 12-23 months who have received the complete schedule of recommended doses, including one dose each of Bacille Calmette-Guérin (BCG) and measles vaccines, as well as three doses of both DTP (diphtheria, tetanus, and pertussis) and polio vaccines, amounting to a total of 8 doses (DHS 2017)

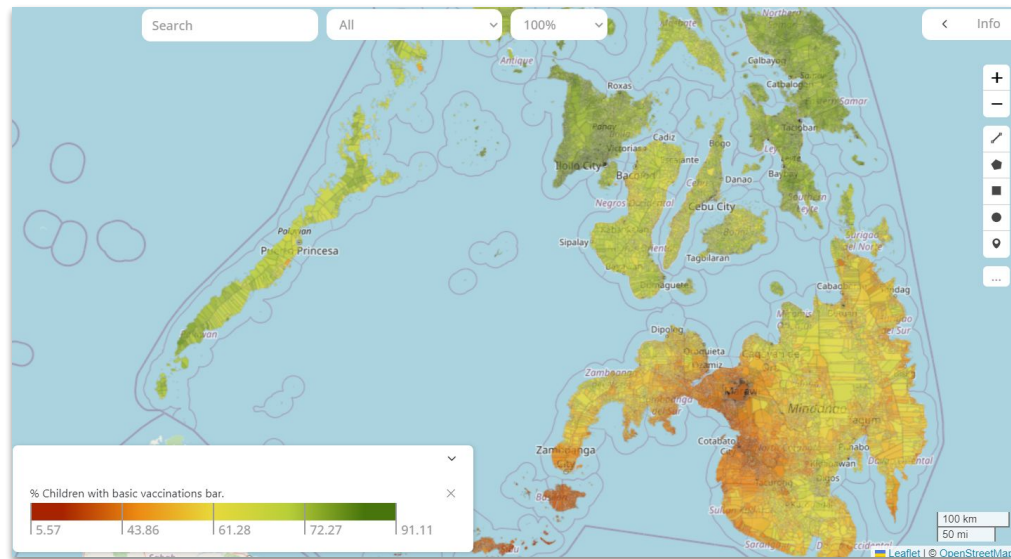


Image from EPCON geoportal

Methodology

Independent variables/Proxy Indicators available from open-source platforms:

1. Relative Wealth Index (Vulnerability Index)
2. Total population density
3. Night-time lights
4. **Access to improved water source**
5. Access to improved sanitation facilities
6. **Motorised travel time to a healthcare facility**
7. **Distance to major roads in kilometres**
8. Elevation above sea level
9. Distance to artificial surfaces in kilometres

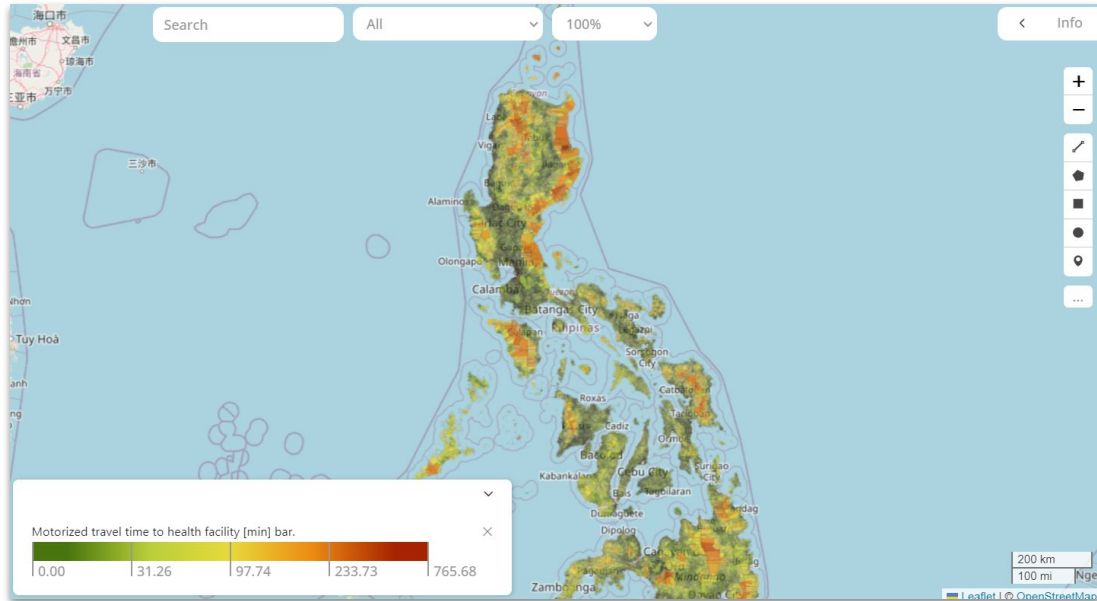


Image from EPCON geoportal

Methodology

Categorization of Variables:

Variable	Low	Medium	High
Access to improved water source	< 80% (1.49%)	-	> 80% (98.51%)
Distance to major roads	< 5 km (95.92%)	5-10 km (3.00)	> 10 km (1.08%)
Motorised travel time to healthcare facility	< 30 mins (86.44%)	30-60 mins (7.74%)	> 60 mins (5.82%)
Vaccination coverage	< 60% (36.51%)	-	> 60% (63.49%)
Vulnerability index	< 0.7 (37.94%)	0.7-0.9 (52.87%)	> 0.9 (9.19%)

Methodology

Residual Outlier Analysis

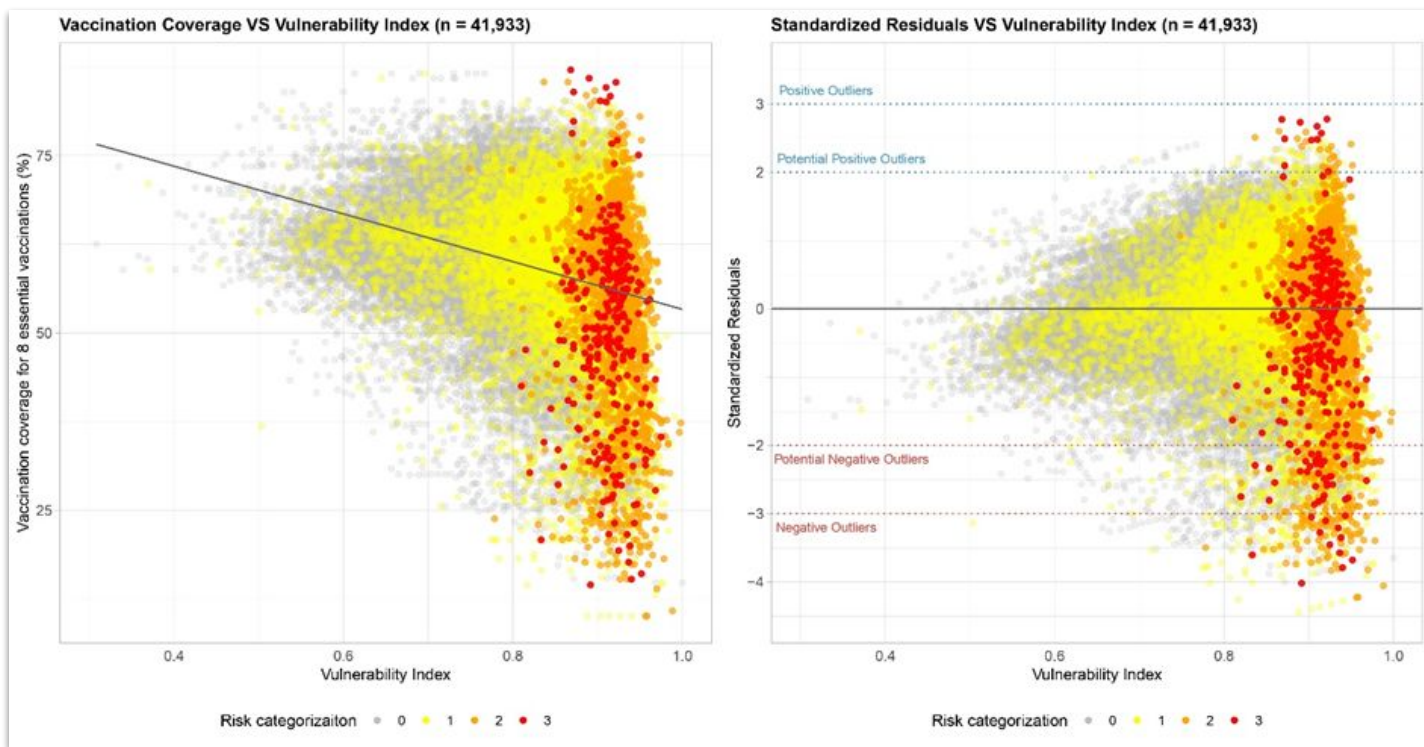
Potentially positive outliers : standardised residuals ≥ 2 or < 3 } Achieved high vaccination coverage despite high vulnerability

Positive outliers: standardised residuals > 3

Negative outliers: standardised residuals ≤ -2 or > -3 } low vaccination coverage despite low vulnerability

Negative outliers: standardised residuals < -3

Results



Results

Positive Outliers :

There could have been more targeted vaccination campaigns, incentivisation of vaccination completion, innovative models for vaccine delivery or other differences in local policies.

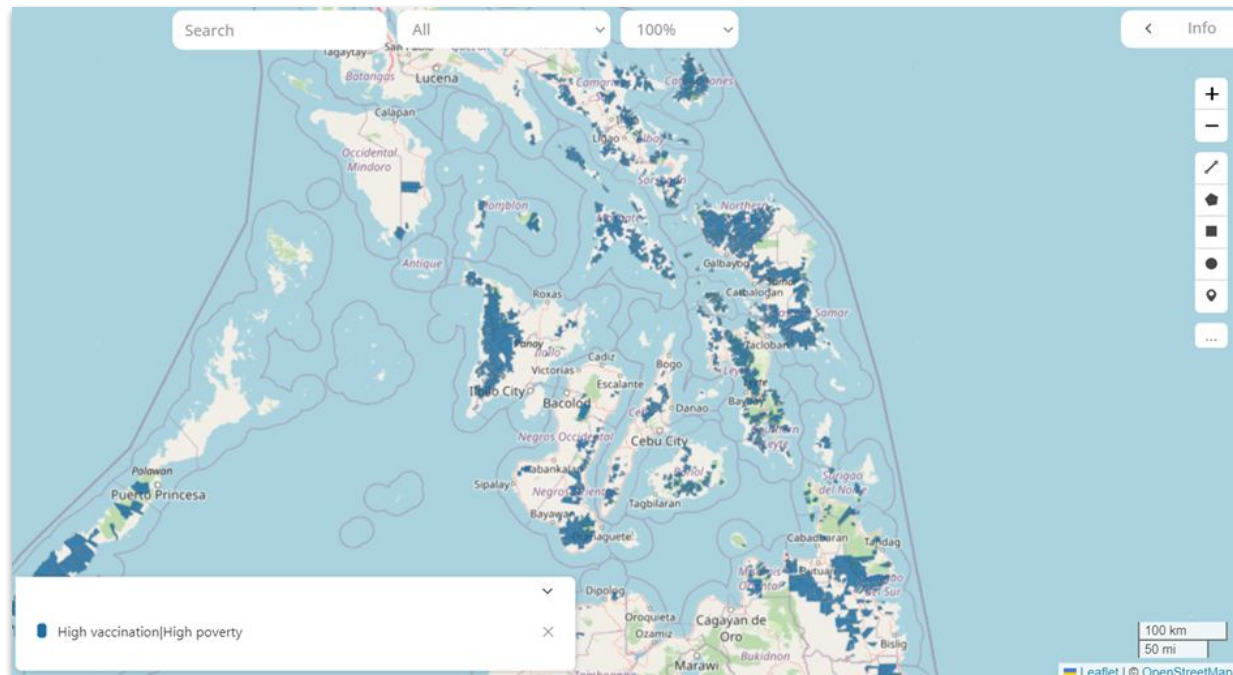


Image from EPCON geoportal

Results

Negative Outliers:

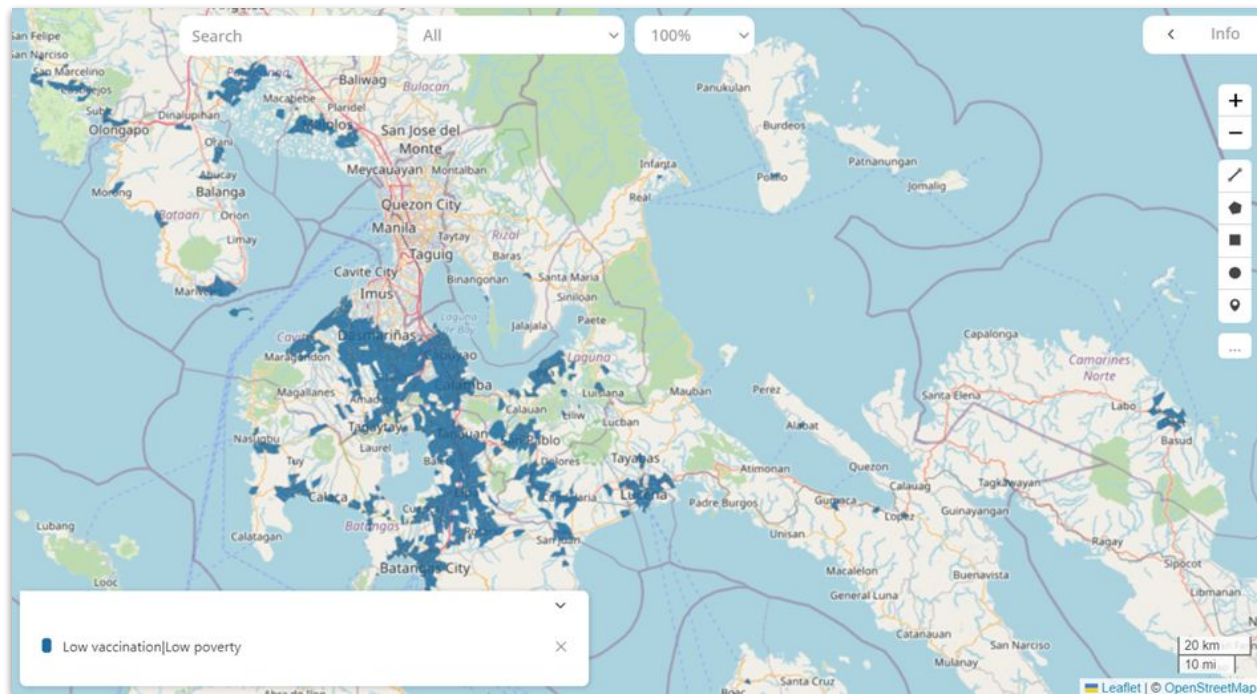


Image from EPCON geoportal

Conclusion & Implications

- Analysis of subnational high-resolution data can unmask gaps in access to health care which would have gone undetected.
- Specific geographical regions need very specific and tailored interventions designed to suit the local context.
- High resolution mapping of data can help to identify and locate communities or villages that are underserved or vulnerable
- Open opportunities for further research and modelling

Acknowledgement

The idea of using Positive deviance approach to study vaccination coverage in the Philippines was conceived at The Regional office WHO, WPR, Manila

The execution of analysis and visualization was done at EPCON, supported by WPRO

The study was funded by USAID

Thank you

www.epcon.ai