Using conditional prediction to translate the measurement of a complex theoretical model into interpretable results

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Overview

I. What drove our work
II. What our challenge was
III. What our aim was
IV. What we did to try to get there
V. What we found
VI. What, then?
I. What drove our work

Understanding the determinants of U5 mortality
I. What drove our work

What we already knew

What we wanted to know
II. What our challenge was

Analytical model diagram

PHC is Complex

PHC is Multifaceted
To predict under-5 mortality related to a complex theoretical model of PHC, providing **interpretable results** for the formulation of recommendations.
IV. What we did to try to get there - Part I

Analytical model diagram

- Bayesian Confirmatory Factor Analysis (BCFA)
- Conditional mortality prediction technique: 600+ scenarios

Continuous variables (BCFA stand. est.): percentiles (P10, P25, P50, P75, P90)

Categorical variables: adequate vs inadequate

Birthweight: mean observed
IV. What we did to try to get there - Part II

A. Improving quality in individual Building Blocks (P10 → P90)

B. Simultaneous improvement across ALL Building Blocks (P10 → P90)
V. What we found - Part I

Percentage Reduction in Under-Five Mortality via Improvement in Child Health Services

- **5.7% reduction** in child mortality if **Planning and Organization improved** from low quality (10th percentile) to high quality (90th percentile).
- When **all components** were improved, a **41% reduction** in predicted child mortality was observed.
- **Combined effect of the whole PHC system (41%)** is larger than the sum of individual components (11%)\(^1\)

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1. Combined effect result is based on modeled assumptions. The large difference in results is likely accounted for by non-linear effects, meaning that there are accelerating marginal returns in improving the quality of services.
V. What we found - Part II

Percentage Reduction in Under-Five Mortality via Improvement in Child Health Services

- Higher deprivation (IBP 45)
- Unstratified (full Brazil analysis)

<table>
<thead>
<tr>
<th>Component</th>
<th>Higher Deprivation (%)</th>
<th>Unstratified (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning &amp; organization</td>
<td>8.4%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Facility infrastructure</td>
<td>1.7%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Referral &amp; regulation</td>
<td>2.9%</td>
<td>1.7%</td>
</tr>
<tr>
<td>General supplies</td>
<td>1.6%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Workforce</td>
<td>0.8%</td>
<td>0.2%</td>
</tr>
</tbody>
</table>

The more process-centred components of PHC (cheaper?!) are yet more powerful in areas of greater deprivation.
VI. What, then?

A comprehensive PHC model, centred around **carefully planned and orchestrated** complementary primary care and community-centred services, within a **well-organised health service network**, is an intervention that promotes equity in the improvement of the population’s health.
THANK YOU!

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