

**cidacs**  
Centro de Integração de Dados  
e Conhecimentos para Saúde



Ministério da Saúde

FIOCRUZ

Fundação Oswaldo Cruz

Instituto Gonçalo Moniz

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

Valentina Martufi, MPH

2023 IDM Symposium, Seattle 22<sup>nd</sup>-24<sup>th</sup> May

## 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

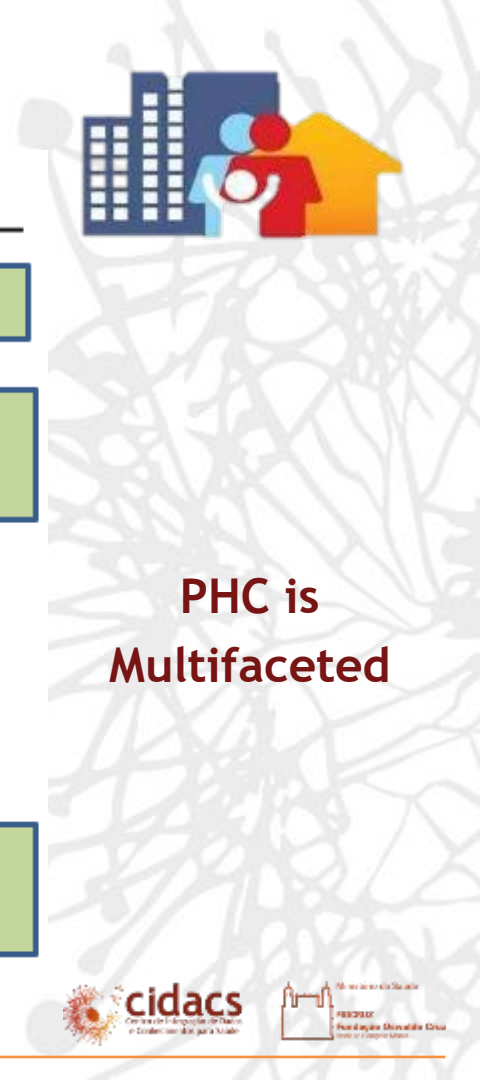
What we already knew



What we wanted to know

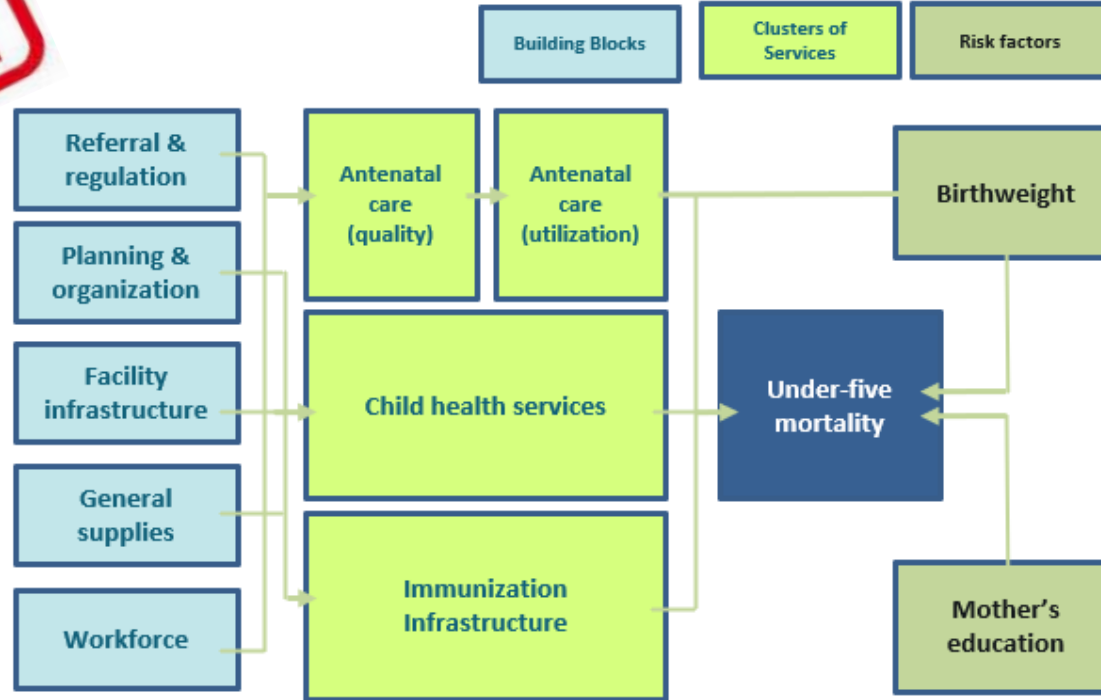


## II. What our challenge was



Analytical model diagram

PHC is  
Complex



PHC is  
Multifaceted

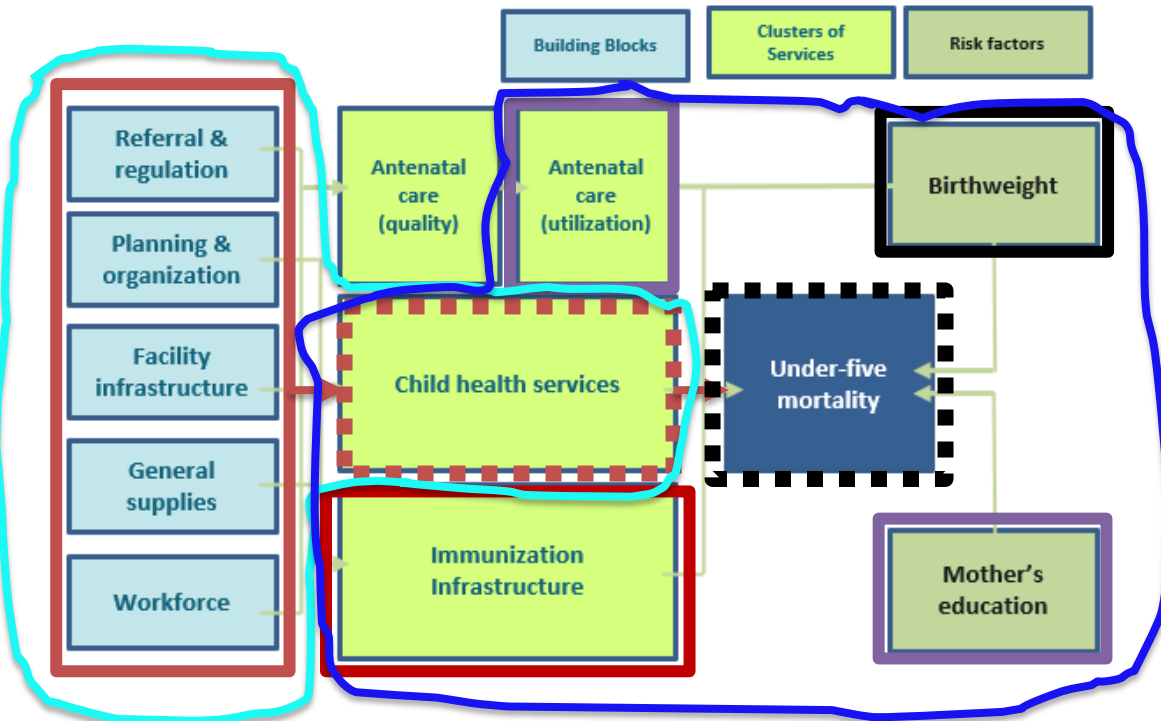
### III. What our aim was

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

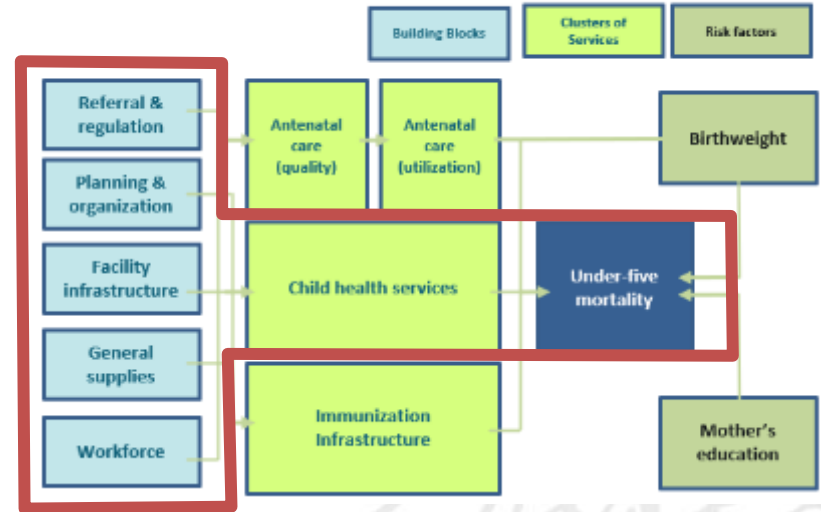


## IV. What we did to try to get there - Part II

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



### Analytical model diagram



### B. Simultaneous improvement across ALL Building Blocks (P10 → P90)

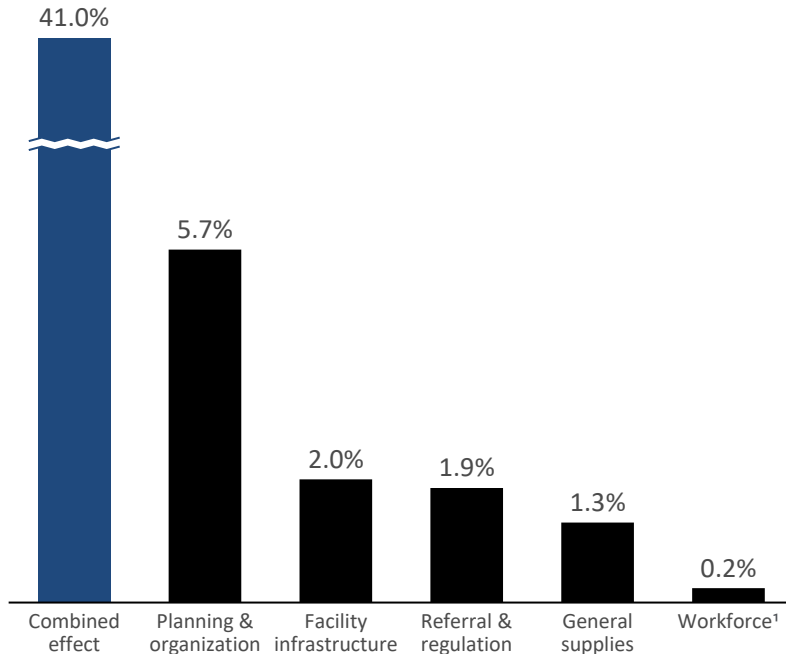




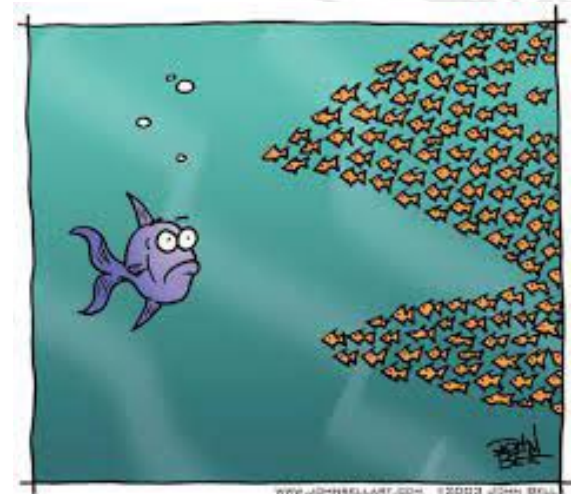
# V. What we found - Part I



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

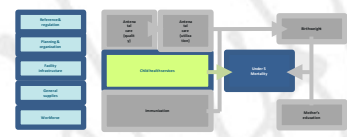


- 5.7% reduction in child mortality if Planning and Organization improved from low quality (10th percentile) to high quality (90th percentile).
- When all components were improved, a 41% reduction in predicted child mortality was observed.
- **Combined effect of the whole PHC system (41%) is larger than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

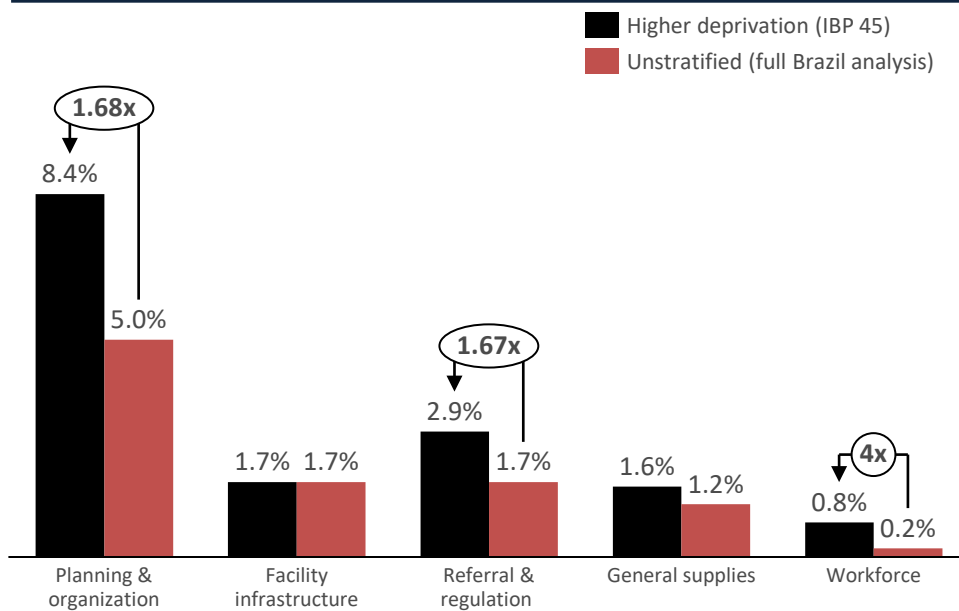


1. Combined effect result is based on modeled assumptions. The large difference in results is likely accounted for by non-linear effects, meaning that there are accelerating marginal returns in improving the quality of services.

# V. What we found - Part II



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



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



Ministério da Saúde

FIOCRUZ

Fundação Oswaldo Cruz

Instituto Gonçalves Moniz

THANK YOU!

Valentina Martufi

[valentina.martufi@fiocruz.br](mailto:valentina.martufi@fiocruz.br)

COLABORADORES CIENTÍFICOS






APOLADORES



Parque Tecnológico da Bahia  
Rua Mundo, 121, Trogoy  
Salvador - Ba, CEP 41745-715



[www.cidacs.bahia.fiocruz.br](http://www.cidacs.bahia.fiocruz.br)  
[cidacs@bahia.fiocruz.br](mailto:cidacs@bahia.fiocruz.br)

 [fiocruzbahia.cidacs](https://www.facebook.com/fiocruzbahia.cidacs)  
 [cidacs\\_fiocruz](https://twitter.com/cidacs_fiocruz)  
 [Cidacs Fiocruz](https://www.youtube.com/CidacsFiocruz)