



CIDACS Primary Health Care (CIDACS-PHC) Cohort: an innovative approach to link real-world data with health facilities surveys to evaluate how PHC components affect Under-5 mortality in Brazil

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Overview

- PHC in Brazil: a brief contextualization;
- CIDACS Data Ecosystem and the use of real-world data to evaluate social and health policies;
- CIDACS-PHC Cohort: combining individual-level data and a national health survey of PHC facilities and teams;
- Approaches for measuring PHC Components: Building Blocks and Clusters of Services;
- PHC Components and Under-5 mortality: what the data tell us?;

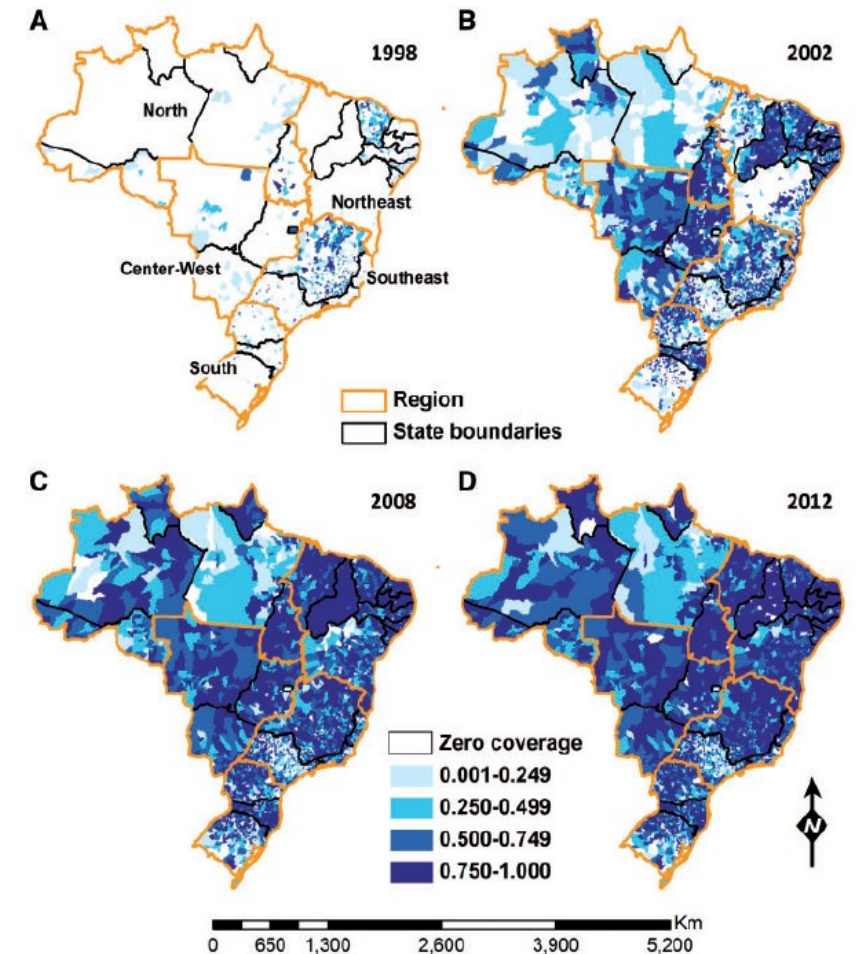
PHC in Brazil: a brief contextualization

The **Brazilian Primary Health Care System**, composed predominantly of *Estratégia Saúde da Família* (ESF - Family Health Strategy) teams, is part of the **Brazilian Unified Health System (SUS)**, which was structured according to the principles of universal coverage and health as a right of all citizens.

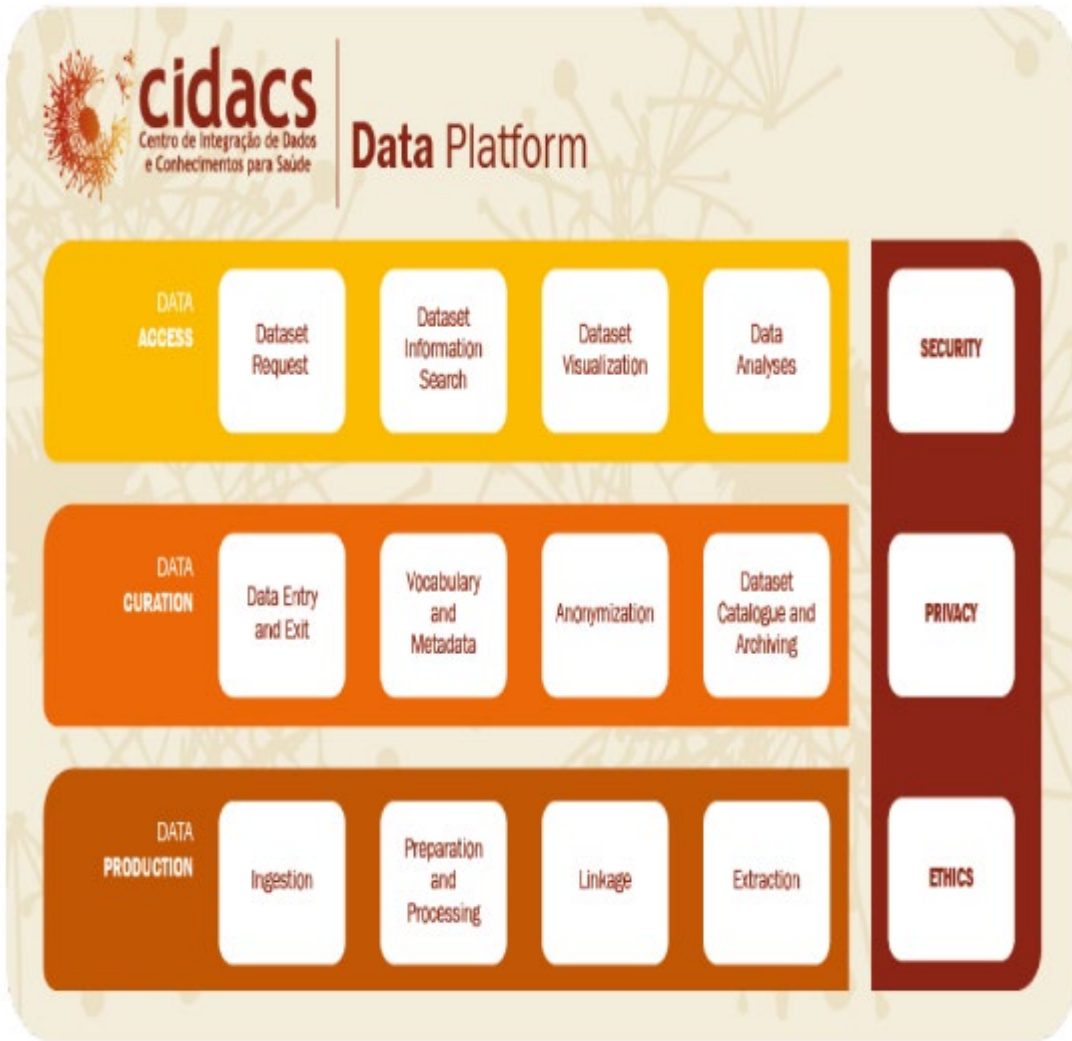
This strategy provides a **broad range of primary health care services** delivered by a **multidisciplinary team** comprised of a physician, nurse, dentist, nursing assistant, dental assistant, and community health workers. Each team is responsible for approximately 4,000 people.

Family Health Teams (FHTs) are supposed to work under the aegis of primary health care principles: **providing basic health care, promoting health activities and preventing diseases**, as well as **referring** those in need to **other levels of care**.

PHC Coverage in Brazil



CIDACS Data Ecosystem and the use of real-world data to evaluate social and health policies



Social and Health Policies

Health Outcomes



The 100 million Brazilians Cohort

Cohort Profile

Cohort profile: The 100 Million Brazilian Cohort

Population from Cadastro Único (2001 -2018): low-income families potentially eligible for social protection programs (N=131.697.800)

Cadastro Unico

Social and demographic records of Individuals and family

Bolsa Familia programme

Records of the payments of the benefit of the cash transfer program

MCMV

Records of beneficiarie s of the housing program

Wells

Records of beneficiaries of the sanitation programmse

SINASC

Records of live births, maternal and newborn characteristics

SIH

Records of hospitalisation

SIM

Records of deaths

Conditionalinaties

Records of monitoring of compliance with PBF programme (health and education)

SISVAN

Record monitoring of growth, development and food consumption

SINAN

Records of notifications of diseases

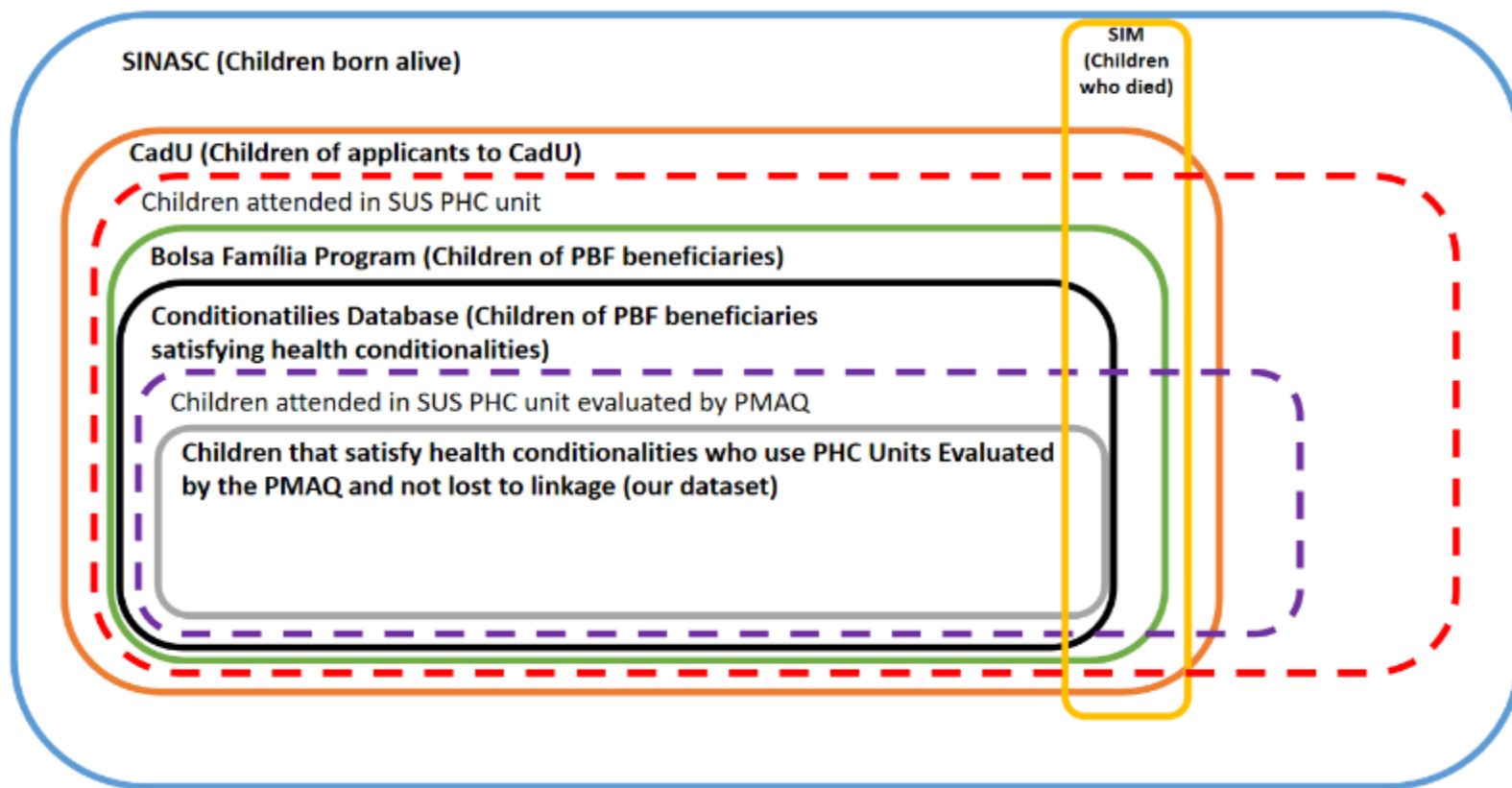
Anonymized datasets have been extracting

To analyse social determinants and to evaluate the impact of social programs on health outcomes

Infectious disease, Mortality under 5, prematurity, low birth weigh, homicide

CIDACS-PHC Cohort: combining individual-level data and a national health survey of PHC facilities and teams

The construction of this cohort, alongside the application of sophisticated statistical methods to create the PHC components and to evaluate their influence on U5M amplify the potential to evaluate complex interventions, especially in the Global South.



Programa de Melhoria do Acesso e da Qualidade



Quantifying the “softer side” of effective health systems: Is it a bad idea?

It is a great idea and here is how we did it!

YouTube



Measuring the impact of the quality of primary health care on child mortality

Cidacs Fiocruz
4,04 mil subscrições

Subscrito

1

Partilhar

Transferir

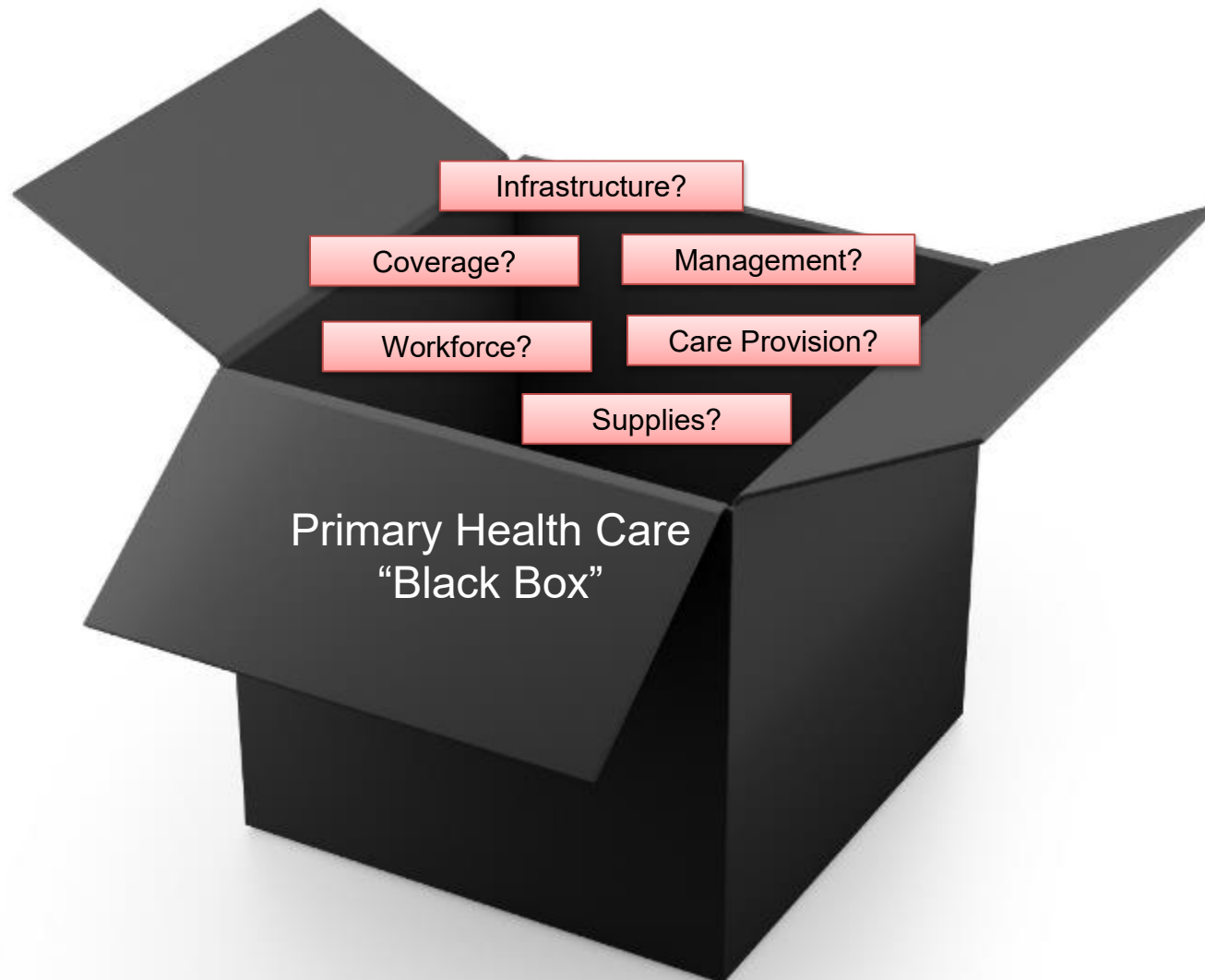
Clipe

Guardar

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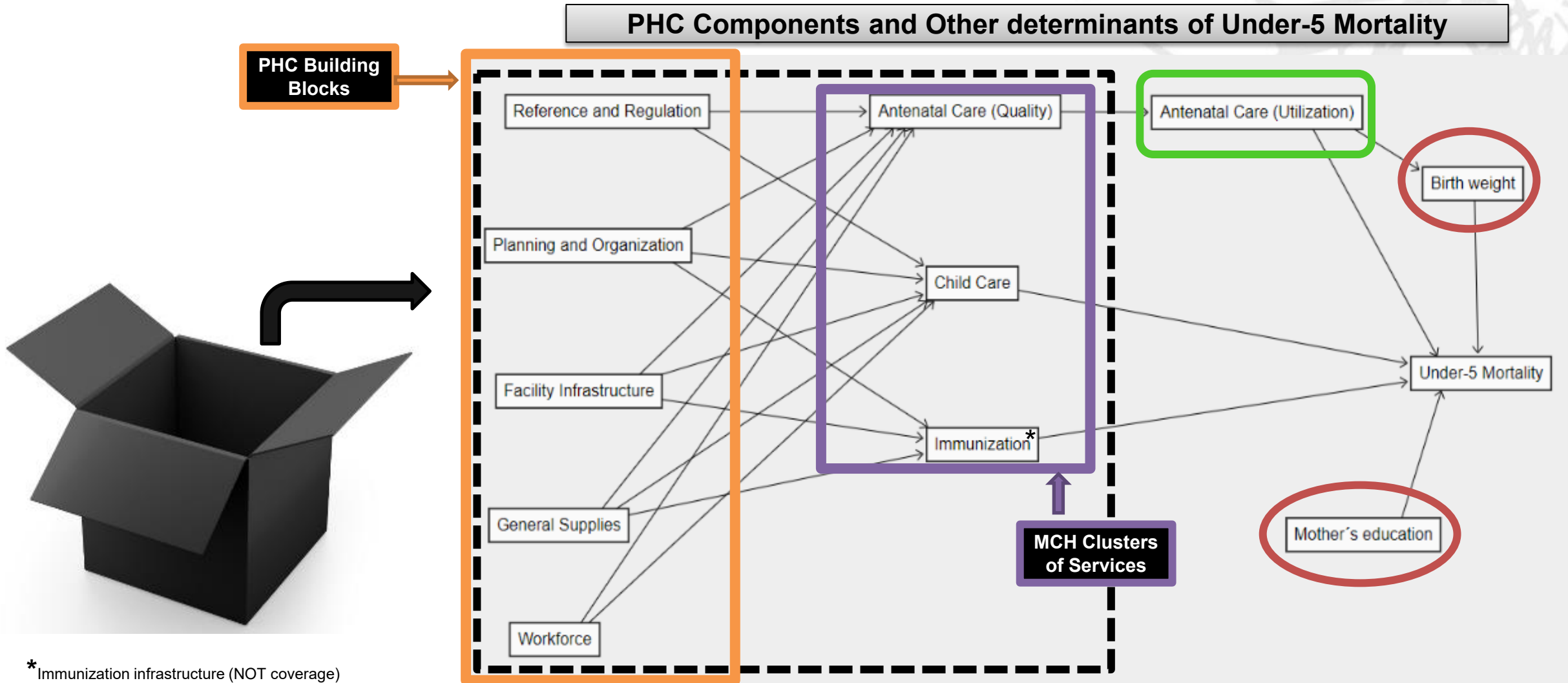


Approaches for measuring PHC Components: Building Blocks and Clusters of Services;



- ✓ We used criteria and standards from Brazilian legislation and scientific evidence to identify key questions included in the PMAQ survey.
- ✓ Based on this normative approach, the questions from the PMAQ survey were organized into **indicators**, which were in turn allocated to different **PHC Components**.
- ✓ All PHC indicators and components are binary variables (each item classified as **inadequate or adequate**).

PHC Model components: Opening the “PHC Black Box” and deciphering its relationship with Under-5 Mortality



Planning and Organization of Services and Work Processes (PLA) - Composite indicators and Observed Variables

Component (abbreviation)	Indicator	Observed variables/questions
Planning and Organization of Services and Work Processes (PLA)	Planning	The PHC team meets at least weekly or every other week
		In the past 12 months, the PHC team has carried out activity planning. There is a document to prove it
		The PHC team considers the PHC user's opinion for the reorganization and improvements of the work process
		The PHC team receives support/help for planning and organizing the work process
	Monitoring and evaluation	The PHC team carries out monitoring and analysis of health indicators and information
		The PHC team has evaluated or studied spontaneous demand in the past 12 months
		During meetings, the PHC team carries out monitoring and analysis of health indicators and information
	Support and supervision	Institutional support (municipal) for discussing the work process of the PHC team and also of the institutional support itself
		Institutional support (municipal) for self-assessment
		Institutional support (municipal) for monitoring and evaluation of information and indicators
		Institutional support (municipal) for planning and organization of the PHC team
		Institutional support (municipal) for sharing evaluation of PHC team progress and results
		Institutional support (municipal) through targeted workshops
		Institutional support (municipal) for permanent education
		Institutional support (municipal) during PHC team meetings
		The municipality offers the PHC team information that helps them to analyze the health situation of the population
	Empanelment and catchment area	The PHC team has a population of reference of up to 4,000
		The PHC team has maps with a drawing of the catchment area. There is a document to prove it
		The PHC team last updated the mapping of its catchment area in the last three years
		The PHC team has a survey / mapping of assigned users who need to receive care at home. There is a document to prove it

Facility Infrastructure Availability and Quality (FAI) - Composite indicators and Observed Variables

Component (abbreviation)	Indicator	Observed variables/questions
Facility Infrastructure Availability and Quality (FAI)	Supplies for medicines	Air-conditioning in pharmacy
		Fridge in pharmacy
	Nebulization and procedure room	Nebulization room
		Treatment/procedure room
	Non-clinical infrastructure	Meeting room
		Reception
		Waiting room
		Male toilet
		Female toilet
		Personnel toilet
		Biological waste dispenser
		Common garbage disposal
	Electronic medical records	The PHC team uses electronic medical records. There is a document to prove it

Child Care Availability and Quality (CHC) - Composite indicators and Observed Variables

Component (abbreviation)	Indicator	Observed variables/questions
Child Care Availability and Quality (CHC)	Perinatal care (visits/consultation)	In order to guarantee a posnatal visit within 10 days after delivery, a CHW carries out home visits to enroll women in the service
		In order to guarantee a posnatal visit within 10 days after delivery, a member of the team carries out home visits to enroll women in the service
		In order to guarantee a posnatal visit within 10 days after delivery, the team provides special consultation time for any day of the week;
		A physician carries out posnatal visits A nurse carries out posnatal visits
	Medicines	Antiparasitic; Vitamins, multivitamins, Oral rehydration salts; Antiasthmatics; Analgesics and antipyretics; Antibacterials
	Record keeping practices	There is a copy / record of the child care booklet, or another form with equivalent information, in the PHC facility
		The team uses the child care's booklet to monitor children
	Surveillance - traditional activities	The PHC team keeps records of children in the territory for follow up with regards to: Growth and development; Nutritional status; Guthrie test screening
		The PHC team has updated records of children up to two years old in the territory. There is a document to prove it
	Surveillance - external causes	The PHC team keeps records of children in the territory for follow up with regards to: Accidents; Domestic violence
	Community outreach	The PHC team carry out community outreach to identify children born prematurely
		The PHC team carry out community outreach to identify children born with low birth-weight
		The PHC team carry out community outreach to identify children who are behind on their growth and development follow up
	Care provision	The PHC team has defined protocols and therapeutic guidelines for: Children under two years old (growth / development)
The PHC team carry out growth and development follow up for children up to two years old		
Program offer	Child growth and development follow up is among the services provided to special interest groups	
Breastfeeding	The PHC team offers health education and health promotion activities for pregnant women and women in postpartum (breastfeeding guidance)	

Advanced Statistical Methods Measured Components of the Model and Their Effects on Mortality

DATA COMBINED INTO UNIQUE INDEX FOR EACH MODEL COMPONENT

Component	Composite indicators	Observed variables
Antenatal Care Availability and Quality (ANC)	10	30
Child Health Services Availability and Quality (CHC)	9	18
Immunization Availability and Quality (IMM)	7	15
General Supplies Availability and Quality (GSU)	4	35
Facility Infrastructure Availability and Quality (FAI)	8	34
Referral and Regulation System to Specialized Services (REF)	4	6
Workforce Availability and Quality (WOR)	6	18
Planning and Organization (PLA)	6	30

Method of estimation: Bayesian confirmatory factor analysis

MULTILEVEL BAYESIAN PATH ANALYSIS USED TO MODEL EFFECT SIZES

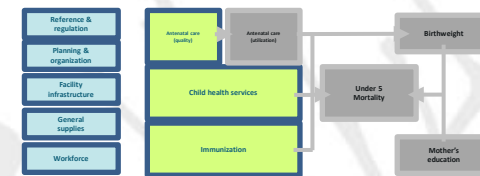
Building Blocks

Clusters of Services

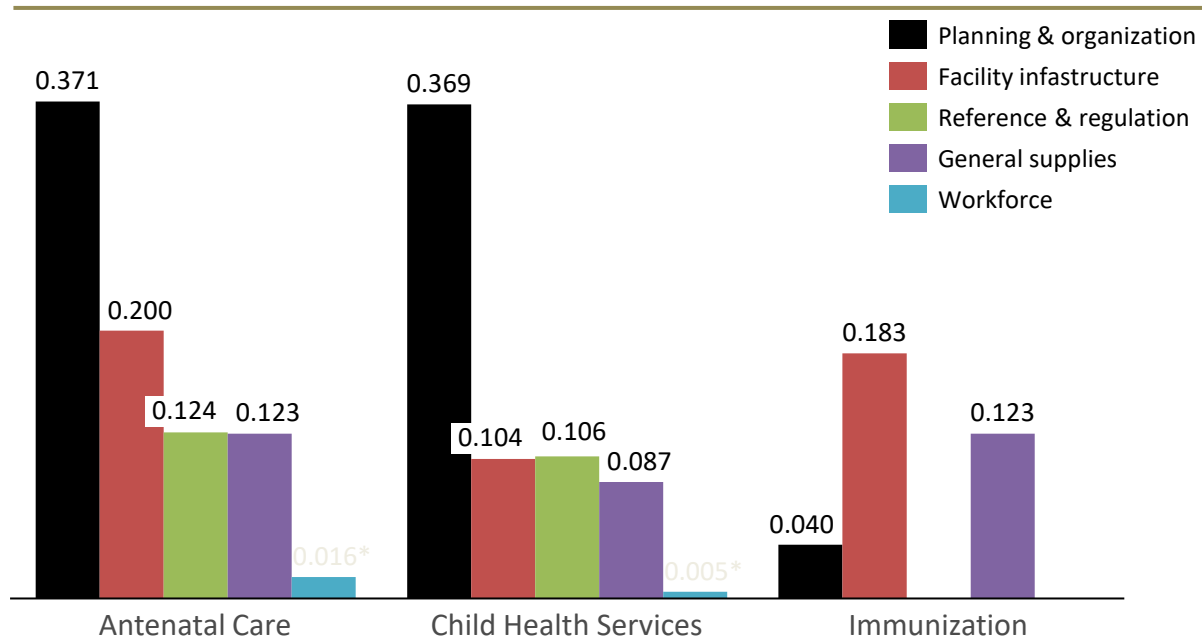
Under 5 Mortality

✓ Simultaneously estimates all pathways in the causal diagram

PLANNING AND ORGANIZATION HAS THE STRONGEST EFFECT ON QUALITY OF CARE FOR MOST PHC SERVICES IN BRAZIL



Effect of PHC Components on PHC Services



*Not statistically significant at 10%

Key Findings

- **Planning and Organization** has the largest effect on both Antenatal Care and Child Health Services
- **Facility infrastructure** also significantly affects Antenatal Care and Child Health Services
- **Workforce has a weaker effect than expected**
 - Much of how the workforce is *organized* is already captured in Planning and Organization and Referral and Regulation
 - PHC Workforce *quantity* and *composition* are distributed relatively uniformly in Brazil

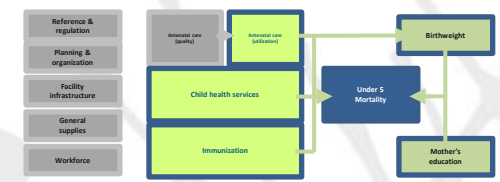
Implications

- Investing in improving **Planning and Organization practices** can potentially have a stronger effect on the quality of Child Health Services than investing in other components in Brazil

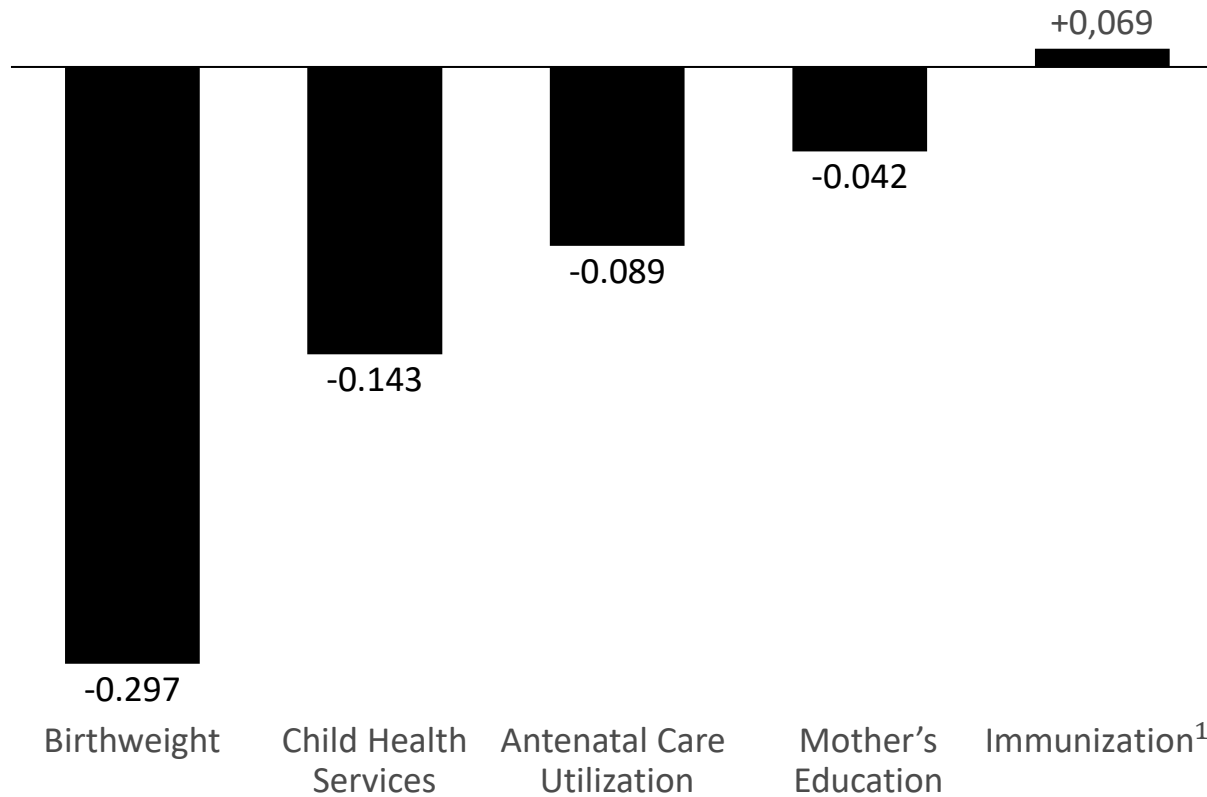
What is Planning and Organization?

This component represents the actions necessary to coordinate the PHC team and other assets to deliver any PHC services effectively. It includes indicators about the frequency of team meetings, self-monitoring, and evaluation practices, and mapping/surveying the population they serve.

THE MODEL ESTIMATES A STRONG EFFECT OF BIRTH WEIGHT AND CHILD HEALTH SERVICES ON CHILD SURVIVAL



Effect of PHC Services and Risk Factors on Under-Five Mortality (Multilevel BPA)



Key Findings

- **Birthweight** is the strongest determinant of under-five mortality in the model
- Among PHC factors, the availability and quality of **Child Health Services** is the strongest direct determinant of under-five mortality
- **Immunization** services has a statistically insignificant effect on under-five mortality in the model
 - Lack of relationship likely due to highly uniform vaccine coverage in Brazil

Implications

- These **results are consistent** with typical effect sizes for each determinant
- This helps to **validate the model** itself, demonstrating that it quantifies risks accurately compared with alternative study designs

1. Note that the relationship with immunization is not statistically significant (at 10%), likely due to highly uniform vaccine coverage in Brazil, as well as rarity of deaths due to diseases preventable via immunization

Key takeaways for Brazil and the World



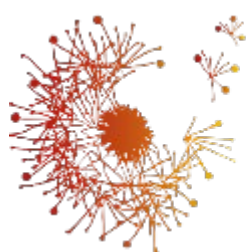
New insights about **which PHC components influence health** the most in Brazil

- **Relative comparison** between workforce, supplies, infrastructure, referrals, and planning
 - Planning and organization outweighs other PHC components in Brazil (**soft**)
 - Facility infrastructure remains an important factor in Brazil (**hard**)
- Among PHC factors, the availability and quality of **Child Health Services** is the strongest direct determinant of under-five mortality

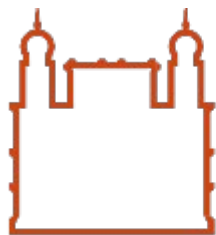


A **better understanding** of how to measure PHC systems and their effect on health

- **Operational indicators** that track with their corresponding components, for example, for planning and organization:
 - Frequency of team meetings
 - Non-clinical infrastructure
 - Monitoring and evaluation practices
- A reproducible model for understanding how PHC components **contribute to health**
 - These indicators are the most consistent metrics of performance in Brazil, and offer a model for other countries to explore
 - This modeling framework can now be adapted to other countries, even with more limited data



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Instituto Gonçalo Moniz

THANK YOU!

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