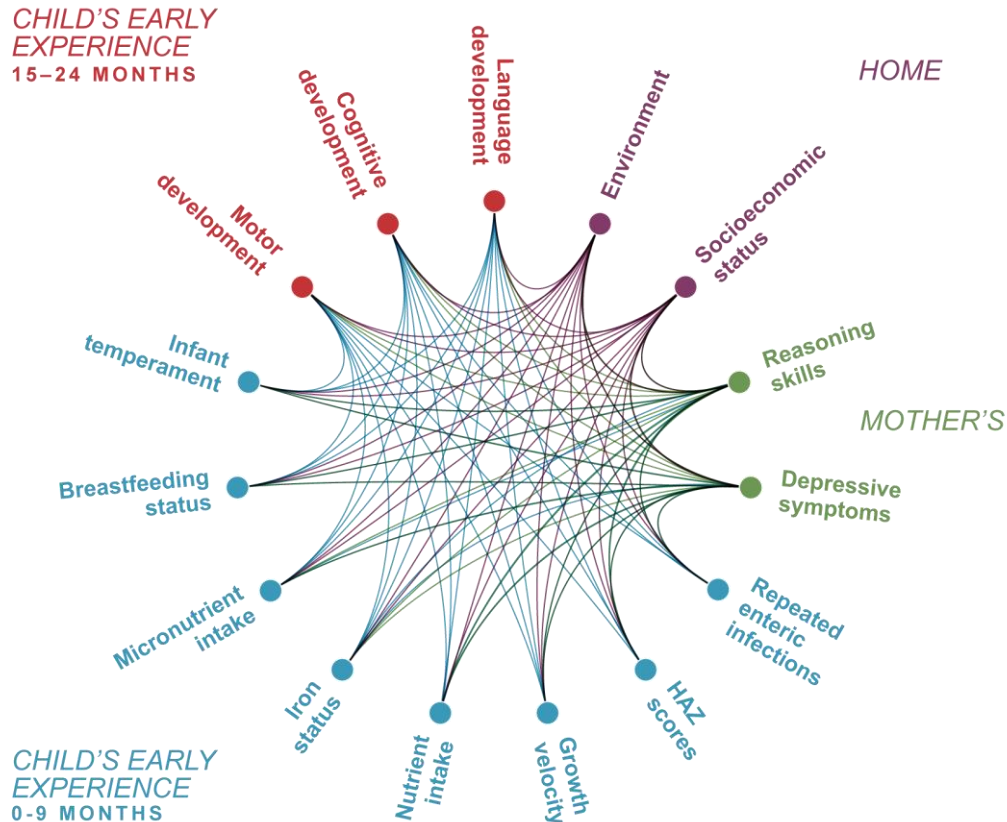


HEALTHY, BIRTH, GROWTH AND DEVELOPMENT

Knowledge Integration

Child health is complex



The global burden of stunting includes:

- **15M** babies born prematurely each year
- **200M** children with faltered growth
- **600M** children with neurocognitive deficits

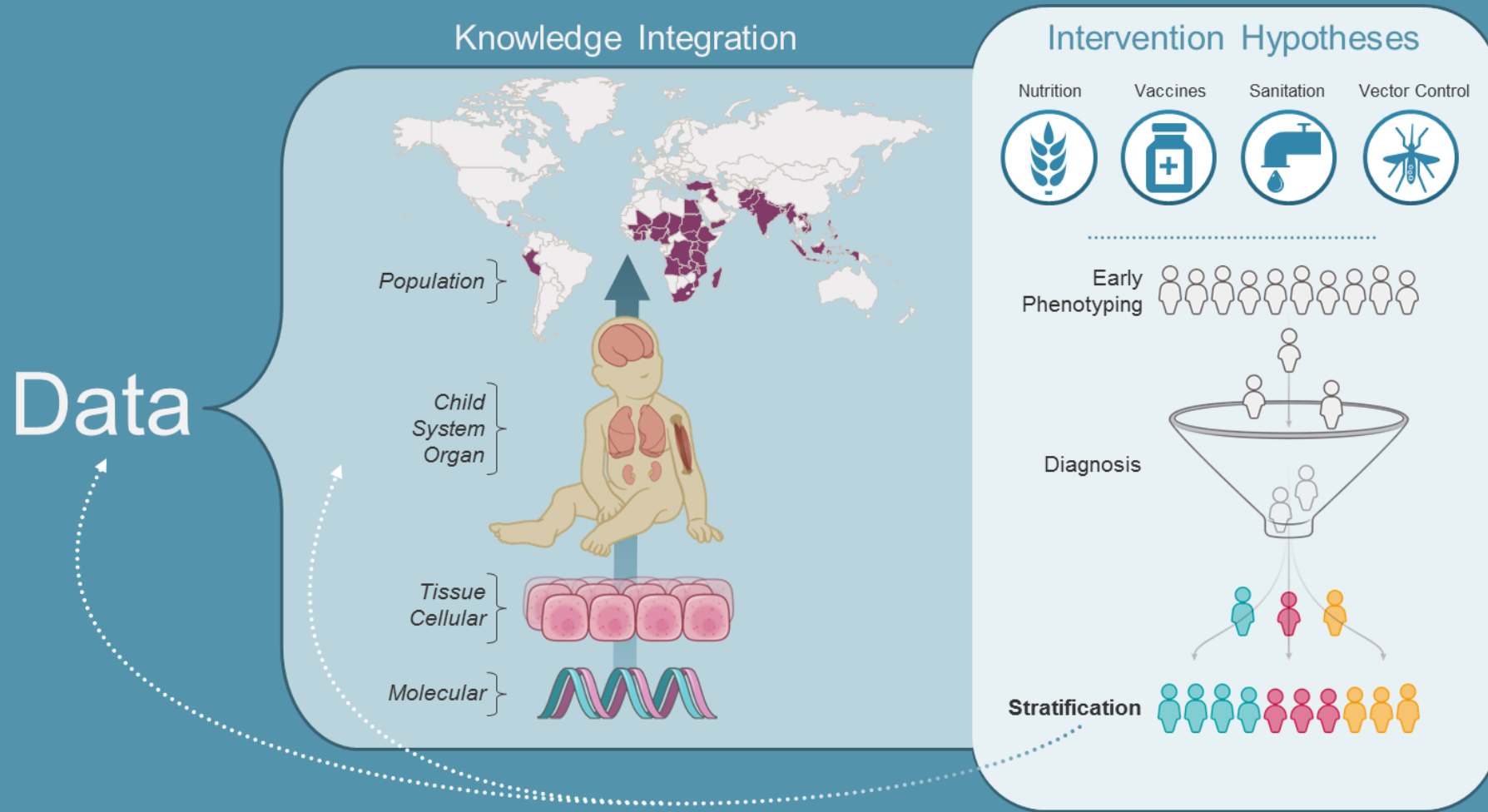
Further complicating this challenge:

- Multiple variables may affect each outcome
- Relative impact of different variables may vary in different contexts and for different populations
- There are often multiple plausible interventions, and it's difficult to know the most efficacious one

We need better information to be able to get the **right** group the **right** intervention at the **right** time

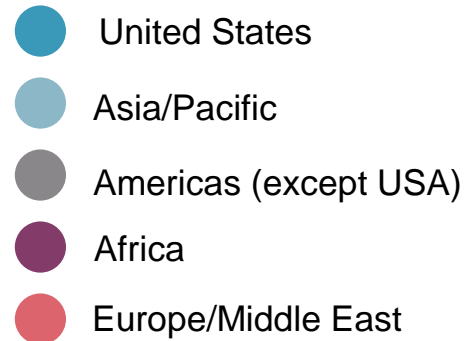
Complex problems require an integrated approach

Data → Discovery → Decision



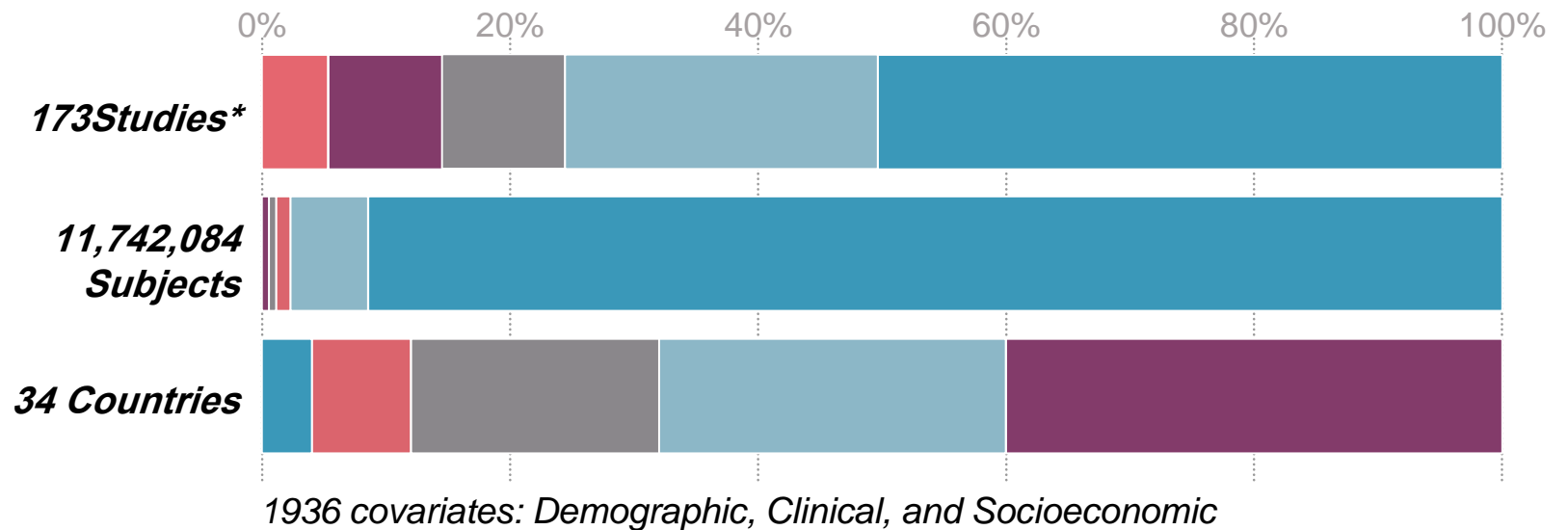
HBGD data is significant and increasing

Child Health Data



**As of October 3, 2016*

Numbers are clinical studies only



Population Survey

~116M Children 39 Countries 197/64 Surveys/Censuses

2400 variables:

- Nutrition, growth
- Disease burden, mortality
- Fertility, education, SES, and WASH
- Access to health care

Models help generate insights from the data

Population

Describe how populations at large are changing over time

Causal

Describe how given insults or interventions affect growth or development

Empirical

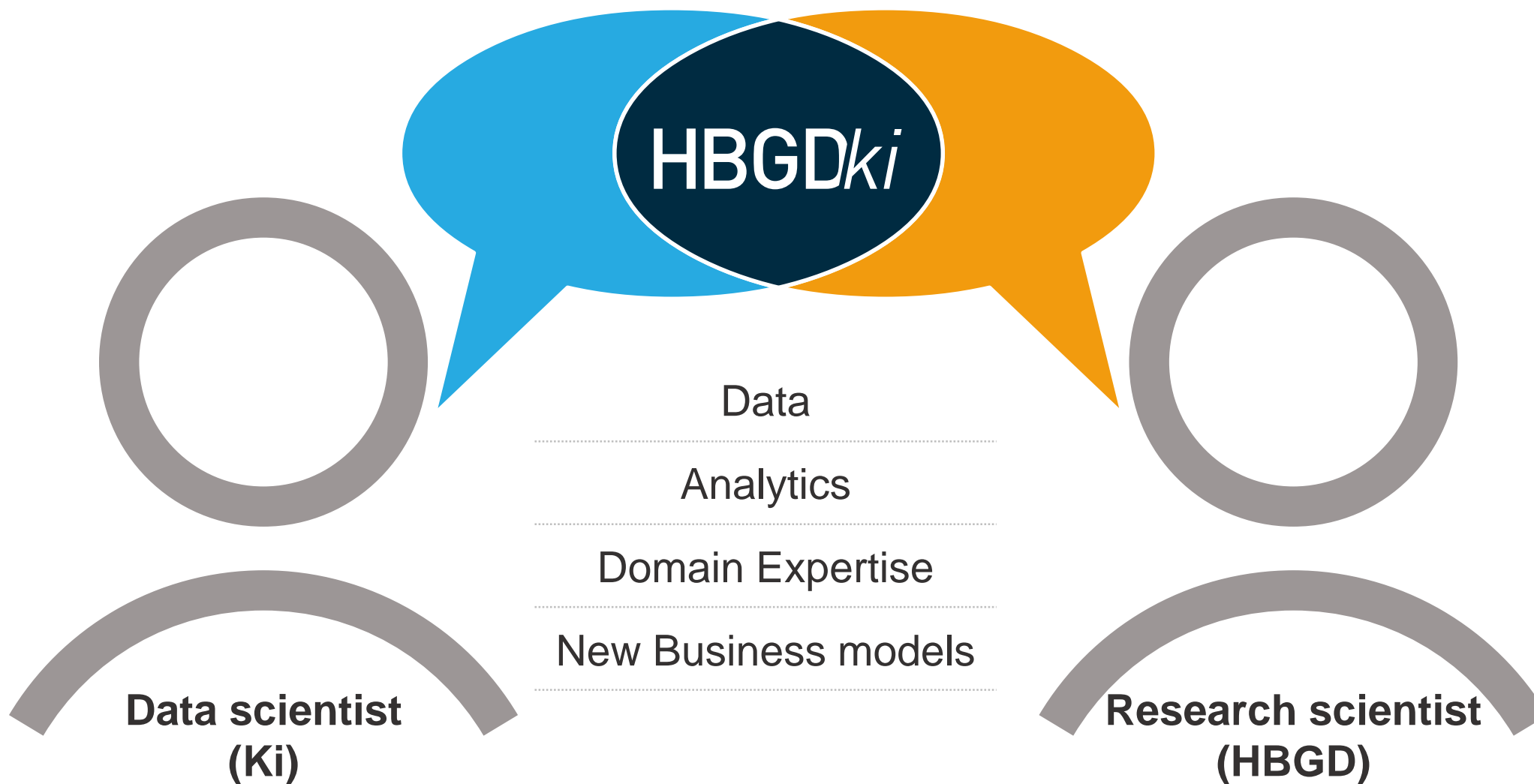
Describe trends inherent in observational data (as opposed to theoretical models that assume certain conditions)



Mechanistic

Describe a relevant process underlying growth and development, e.g., mathematical model of the human gut

New collaborative processes to quickly answer questions





Sharing Resources, Tools, and Insights

This website is designed to engage with four key audiences including: data contributors, data scientists, program officers, and the general public.

VISIT
hbgdki.org

Learn about the program and stay up-to-date on tools, models, and the ongoing work.

5 KEY QUESTIONS

- 1 INTERACTION
- 2 GROWTH OUTCOME DETERMINANTS
- 3 PATHWAYS

SEE THE MORE DETAILED QUESTIONS THAT OUR HBGDKI TEAMS ARE WORKING TO ANSWER

STUNTING
LEARN MORE

NEUROCOGNITIVE DEVELOPMENT
LEARN MORE

WASTING
LEARN MORE

Tools

HBGDki tools are interactive applications that are designed to explore data and advance learning to promote healthy birth, growth, and development. The information explored with HBGDKi tools includes existing knowledge (Seminal Events Timeline), isolated data sets (Trelliscope), and integrated data sets (Full Random Effects Model Explorer; Study Explorer).

Country Segmentation
Better understanding of nuanced differences and similarities between countries, to improve the effectiveness of recommended global policy.

FREM Explorer
A tool that helps design better clinical studies to promote child growth so that every child has a chance to live a healthy and productive life.

Seminal Events Timeline
A tool that highlights existing knowledge and identifies gaps to advance research in child growth and development.

Study Explorer

Trelliscope

Empirical models of longitudinal growth outcomes

Empirical models help us understand study data and identify key trends by fitting model curves to the measured data. HBGDKi empirical models include the Full Random Effects Model (FREM) that describes growth patterns in height- (HAZ) and weight-for-age z-score (WAZ), and the Development score (D-score) to model observations about cognitive development.

STATUS	TITLE	AGE RANGE
ACTIVE	Full random effects model (FREM)	0 - 15 YEARS
ACTIVE	Joint model for length, weight, and head circumference	0-2 YEARS
ACTIVE	Ordered categorical model for longitudinal measures of HAZ	0-2 YEARS
ACTIVE	Multistate Markov model to describe longitudinal changes in LAZ categories	0-2 YEARS
ACTIVE	Longitudinal growth measures and associations with brain development	0-1 YEAR
ACTIVE	SuperLearning to define and predict composite outcomes	0-2 YEAR (ANTHROPOMETRY); 11 YEARS (TEST...)
ACTIVE	SuperLearning of child growth trajectories	STUDY SPECIFIC, CURRENTLY USES ALL AGES...
ACTIVE	Pooled logistic regression to describe characteristics associated with wasting and recovery	0-24 MONTHS
ACTIVE	Machine learning models for child growth trajectories	0-5000 DAYS

Mechanistic Models

Mechanistic models describe underlying biological mechanisms that are relevant to growth and development outcomes. HBGDKi mechanistic models use data from published studies to quantitatively characterize the interactions of nutrients (quantity and quality), gut function, maternal-fetal interactions, infectious and noninfectious microbes, and environmental enteropathy pathways that affect birth, growth, and neurodevelopmental outcomes.

HBGDki has assembled a knowledge base (> 170 studies, 11M subjects, and 170M observations), model catalog, data science and visualization tools, and results to promote and advance healthy birth, growth, and development globally.

Agenda – emerging capabilities

Time	Agenda	Speaker(s)
11:00-11:10	Welcome & Introduction	Steven Kern, Ben Pierson, Thea Norman
11:10-11:40	Undiscovered Public Knowledge with Influence Search	Mihai Surdeanu
11:40-12:10	A Method and Tool for country segmentation and its application to childhood stunting	Dave King & Sofia Trommlerova
12:10-12:40	Visualization with the Data Journey Platform	Naomi Keena & Andrea Brennen
12:40-1:10	Innovation Trail Design: opportunities for global health	Scott Berry
1:10-1:30	Q&A and wrap up	Ben Pierson