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# Feeding The Future:

Using Socioeconomic, Environmental,  
and Agricultural Indicators to Predict  
Child Stunting in Sub-Saharan Africa

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# Data Delays Cost Lives

**1/3**

## Children Affected

One in three children under five suffers from stunting in Sub-Saharan Africa [1]

## Years Between Surveys

Demographic and Health Surveys conducted only every 4-5 years [2]

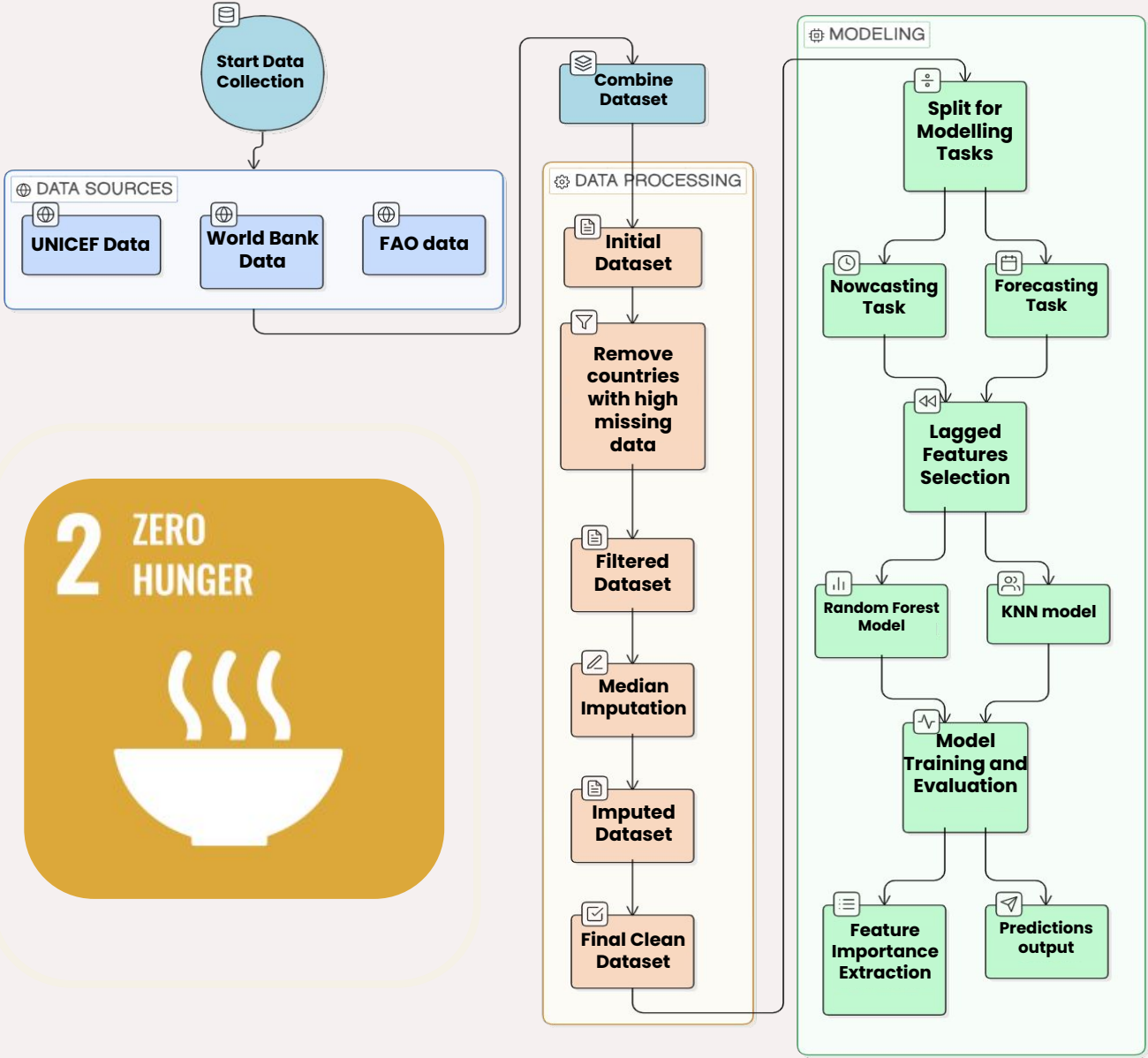
**4-5**

**2**

## Years Until Stunting Becomes Permanent

Child stunting becomes largely irreversible after a child turns two years old [3]

# Our Approach





# Nowcasting vs Forecasting



## Nowcasting

Uses present-year + lagged features to estimate **current** stunting prevalence

Provides interim estimates between survey rounds



## Forecasting

Uses only lagged features to predict **future** stunting risk

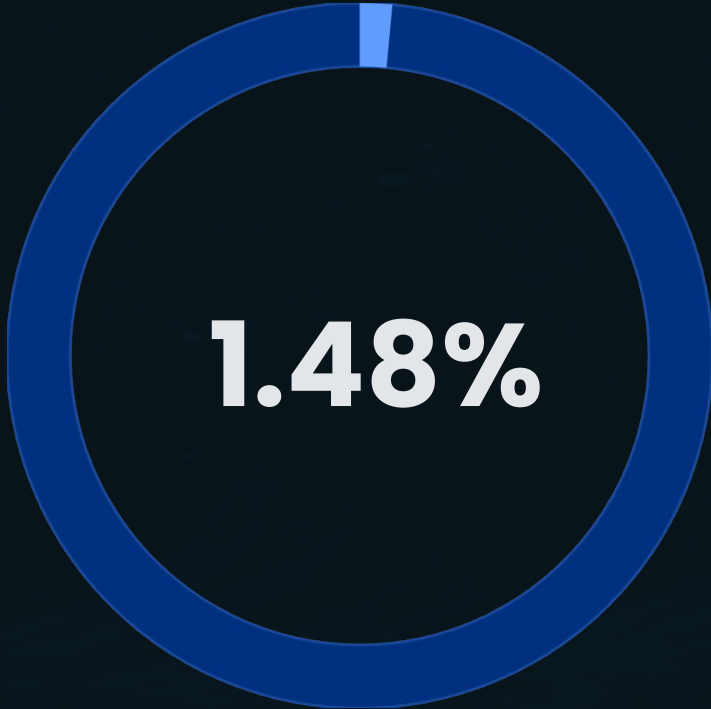
Enables 12-24 month advance warning for planning

# Model Performance



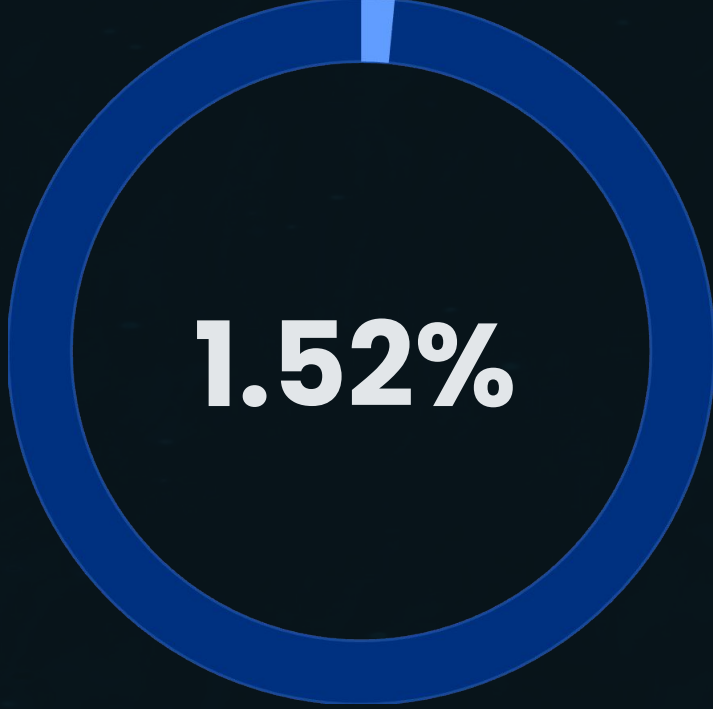
**R-squared**

Proportion of variance explained by models



**MAE (Nowcasting)**

Average prediction error in percentage points



**MAE (Forecasting)**

Forecasting error rate with lagged predictors

Both Random Forest and KNN achieved exceptional accuracy, with **over 68% of predictions within  $\pm 2$  percentage points** of observed rates



## Key Finding: What Drives Stunting Overall?

### GDP per Capita

Strongest predictor  
(-0.37 importance score)

### Water Access

Immediate and  
long-term impact (-0.1)

### Wheat Production

0.026-0.036 importance score

Lagged features consistently outperformed current-year features, highlighting the slow-developing nature of chronic malnutrition.

# Two Classes of Drivers

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## Underlying Drivers

 **GDP Per Capita**

 **Water Access**

 **Temperature**

 **Wheat**

## Immediate Factors

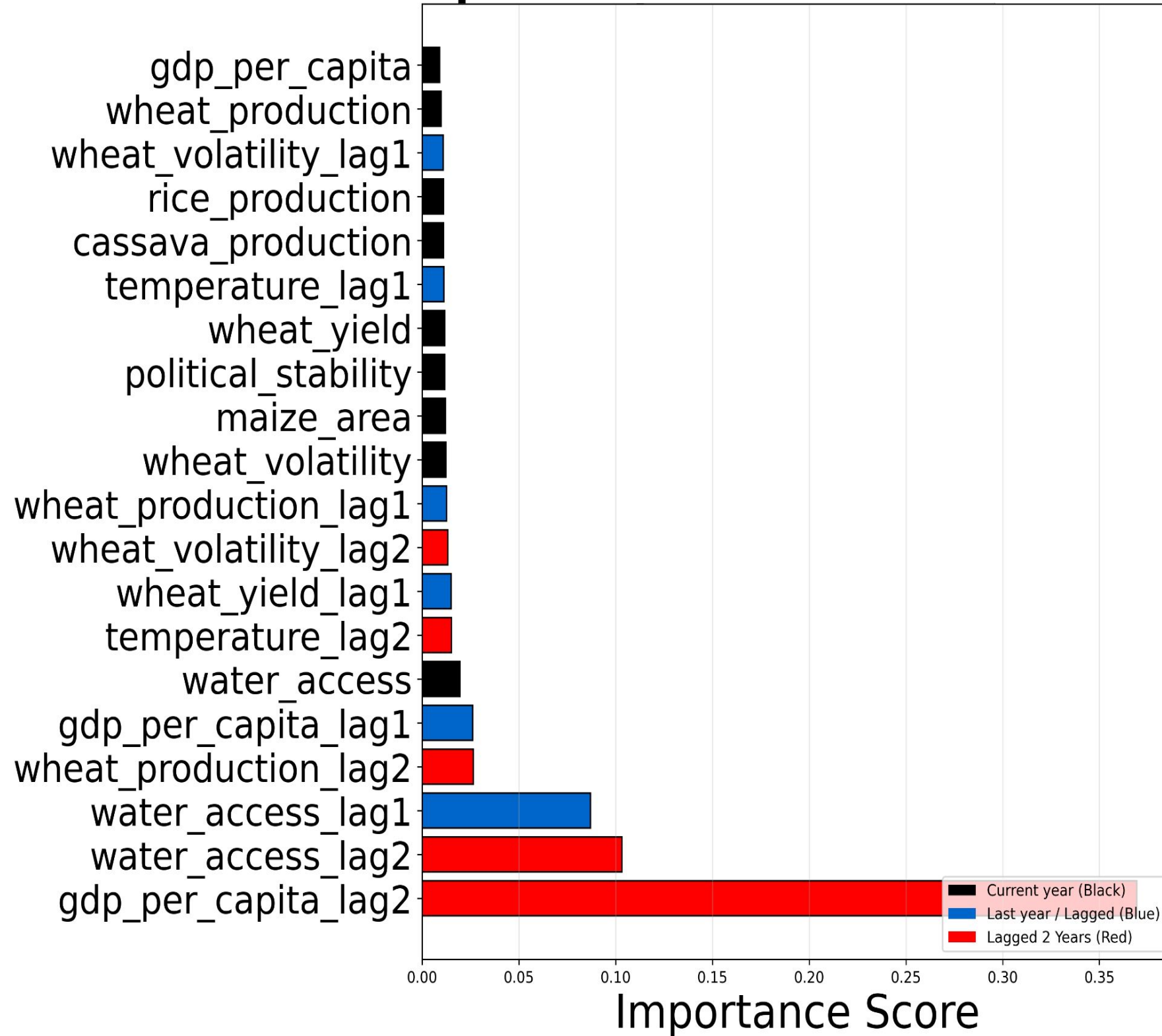
 **Cassava**

 **Rice**

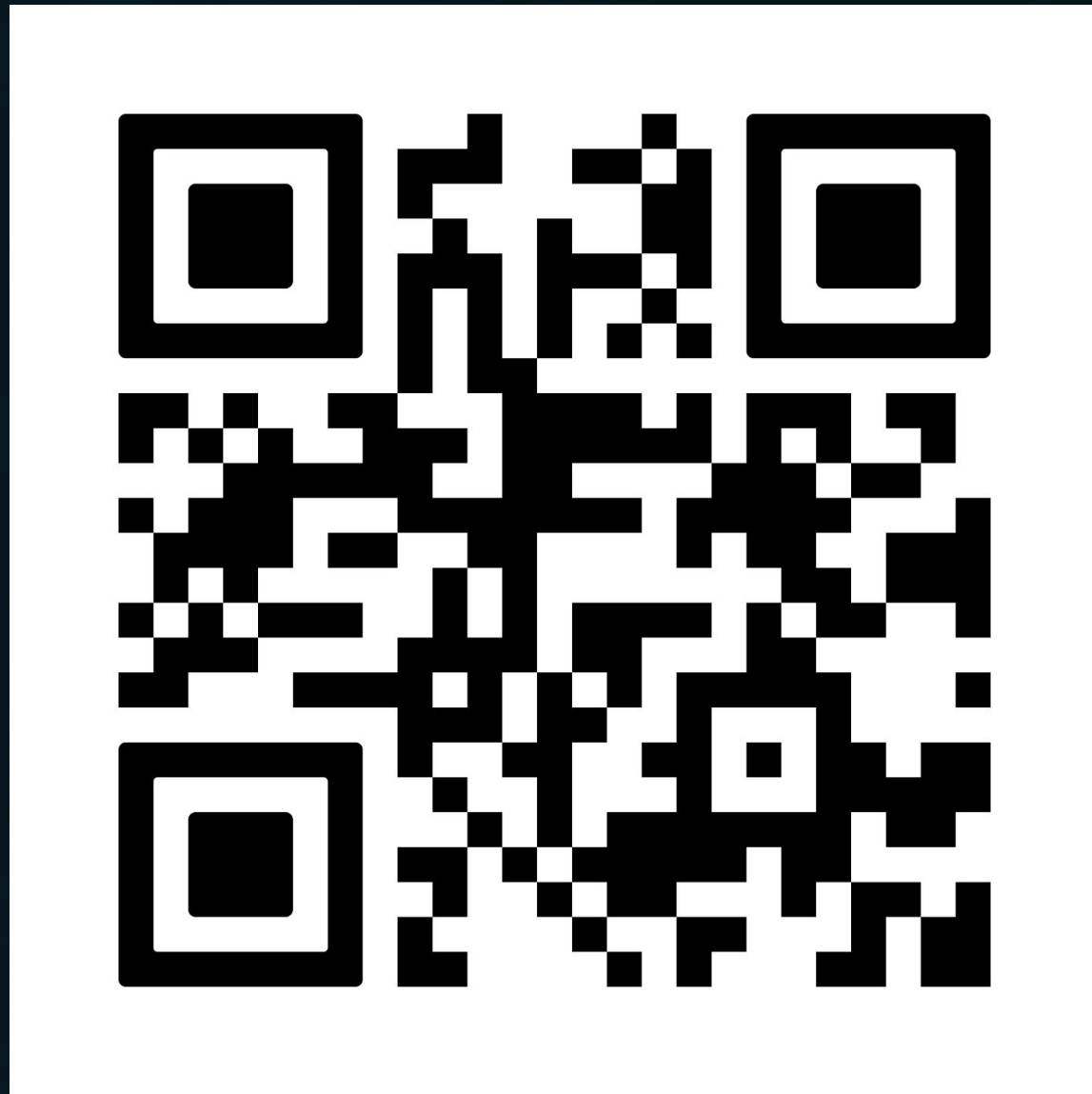
 **Maize**

 **Political Stability**

# Nowcast Model: Top 20 Predictors of Child Stunting



# Interactive Web Application



## Explore the Data

Interactive dashboard for visualizing predictions, feature importance, and country-level insights.

Scan to access or go to link:

[stunting-prediction-app.streamlit.app](https://stunting-prediction-app.streamlit.app)

# Limitations and Future Directions



## Current Limitations

- Annual data aggregation misses within-year shocks
- Correlation vs. causation
- Stability assumption in data (must be frequently updated)

## Future Directions

- Subnational (within countries) data integration
- Additional data sources
- Causal Inferences
- Integration with systems like FEWS NET or UN Global Early Warning System

# Conclusion and Impact

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## Highly Predictable

Child stunting is predictable using routinely available national data

02

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## Beyond Food Production

Strongest drivers extend well beyond agricultural output alone

03

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## Data-Driven Action

Machine learning enables proactive, targeted interventions

By prioritizing high-impact factors like water access and wheat resilience, governments can achieve more tangible reductions in stunting than increasing food production alone.

# Acknowledgements

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# References

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# Thank You!

We appreciate your time and interest in this project.