

# Improving Nutrition in Karnataka: Insights from Examining Trends in Outcomes, Determinants and Interventions between 2006 and 2016

## INTRODUCTION

India has made considerable progress in child nutrition outcomes in the last decade. These rates of improvement, however, have been highly variable across the states, likely due to variability in state-level changes in the determinants of nutrition and in the coverage of health and nutrition interventions. Although all of the states operate under a similar national policy and programmatic environment, the variability in trends in nutritional outcomes points to state-specific factors. An understanding of such factors can facilitate both state-specific learning and cross-state learning, and help to identify strategies to help India accelerate progress in nutrition. In a series of *Policy Notes*, we examine state-specific trends in nutrition outcomes, determinants and the coverage of interventions, with the overall goal of supporting the state. This *Policy Note* focuses on Karnataka.

Karnataka, situated in the south-western region of India, comprises of 30 districts, 176 sub-districts, 29,340 villages and 347 towns (Census of India 2011). As of 2011, it is the ninth largest state in India by population and accounts for 5.05 percent of the country's population. More than one fourth of workers in the state are agricultural laborers. The state has a sex ratio of 916 females for 1000 males, and a literacy rate of 75.4 percent. (Census of India 2011).

The purpose of this *Policy Note* is to examine the trends in undernutrition in Karnataka and to document trends and geographic variability in the major determinants of nutrition and the coverage of

key nutrition and health interventions. In doing this analysis, we aim to highlight key areas for actions to improve nutrition in Karnataka.

## METHODS

We use summary data from the recently released National Family Health Survey-4 (NFHS-4) (2015–16) fact sheets (International Institute for Population Sciences 2017) and data from the NFHS-3 (2005–6) to compare trends in outcomes, determinants and interventions over a decade (International Institute for Population Sciences 2008). We also use information from fact sheets of the Rapid Survey on Children (RSoc 2013–2014) (Ministry of Women and Child Development 2015) for indicators that are currently not available in NFHS-4 fact sheets. We used summary data reported in the NFHS-4 district-level fact sheets to examine inter-district variability.

For outcome indicators, we examine progress on a set of global nutrition targets for maternal, infant and young child nutrition (WHO 2014). These include stunting, wasting, low birth weight, exclusive breastfeeding, and anemia status among women of reproductive age.

We also examined levels and changes in several immediate, underlying and basic determinants (Black et al. 2013). For intervention coverage, we chose a set of nutrition-specific interventions across the lifecycle, including interventions affecting pregnant women, newborn babies, infants, and children.

## FINDINGS

### Trends in nutrition outcomes and variability in outcomes by district

Overall, there have been improvements in nutrition outcomes in Karnataka between 2006 and 2016 (Figure 1). Stunting prevalence declined from 43.7 percent in 2006 to 36.2 percent in 2016. The prevalence of low birth weight declined slightly, from 18.7 percent to 17.2 percent. Anemia remains a significant public health challenge. In the last decade, anemia prevalence only decreased by 6 percent. In 2016, 44.8 percent of women of reproductive age in Karnataka were anemic. Wasting is another key concern, which increased drastically (from 17.6 to 26.1 percent) between 2006 and 2016; severe wasting increased from 5.9 to 10.5 percent in the same time period (IIPS 2008 and IIPS 2017). Exclusive breastfeeding for children under six months decreased from 58.6 percent in 2006 to 54.2 percent in 2016.

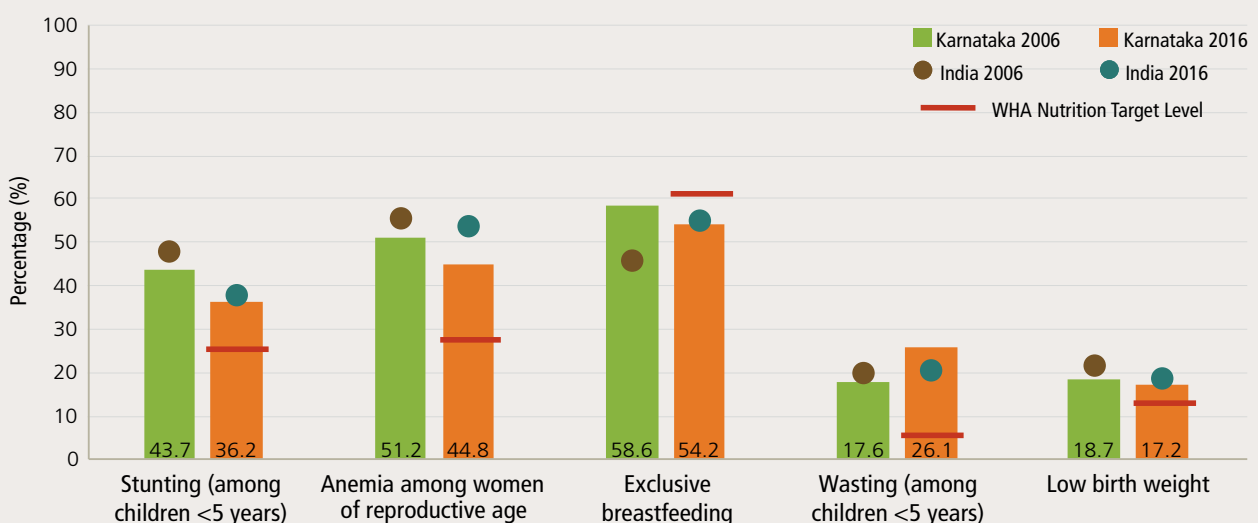
Stunting among children below five years varies widely across districts, ranging from 18.6 percent to 55.8 percent (Map 1). In 9 out of 30 districts of Karnataka, prevalence of stunting among children was greater than 40 percent. Koppal district had the highest stunting rate (55.8 percent) in the state, while

Mandya (18.6 percent) the lowest. There is little variability in the prevalence of anemia among women of reproductive age across Karnataka (Map 2). In all districts of Karnataka, with the exception of Bangalore and Kodagu, 40 to 60 percent of women of reproductive age were anemic in 2016. The prevalence of wasting (Map 3) among children under five years of age ranged from 14.3 percent (Shimoga) to 43.1 percent (Gadag), with all districts except for Shimoga having a very high prevalence of wasting (>15 percent). Shimoga also has the lowest prevalence of severe wasting (2.7 percent) while Gadag has the highest (27.5 percent), as seen in Map 4. Data on exclusive breastfeeding (EBF) is available only for 9 of the 30 districts in Karnataka (Map 5), because district-specific sample sizes for age sub-groups are too small. Among these districts, the prevalence of breastfeeding ranges from 45.4 percent (Yadgir) to 70.6 percent (Bagalkot).

### Changes in the determinants of undernutrition

Improving nutrition for women and children requires that investments be made in changing the determinants of poor nutrition, using a variety of policy instruments and other efforts. Here, we examine changes in the immediate determinants and in

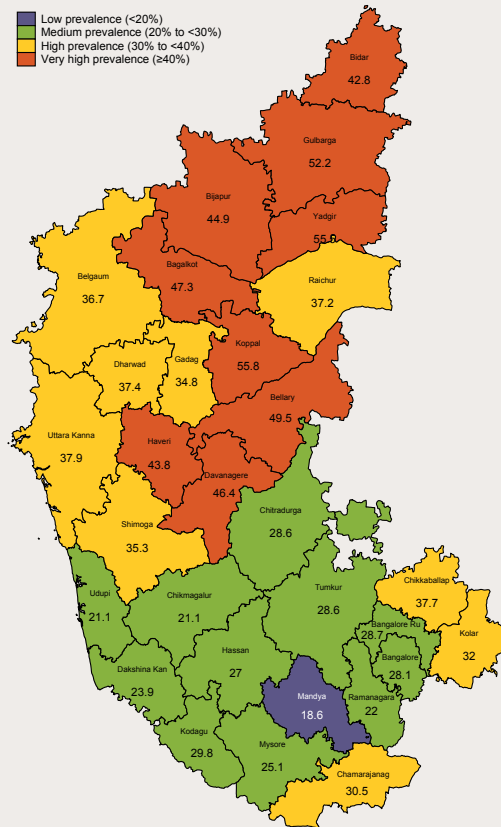
FIGURE 1 Trends in key nutrition outcomes in Karnataka, 2006 to 2016



Sources: NFHS-3 and NFHS-4. RSoC data used for low birth weight.

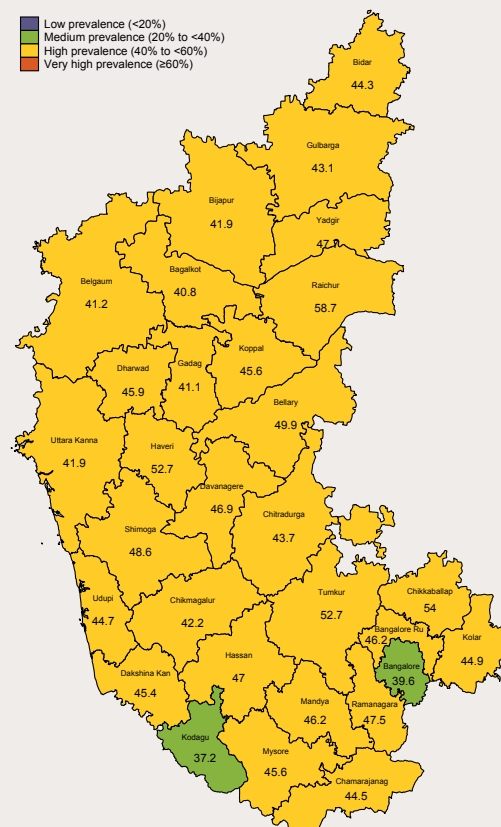
Notes: A set of global nutrition targets for maternal, infant and young child nutrition were endorsed by the World Health Assembly (WHA) in 2012. The red lines represent the WHA targets to be achieved by the state, by 2025. The baseline reference year for these targets is 2012. The state baseline estimates are based on the NFHS 4 (2016) as there is no survey data for 2012. Child overweight data is not available. Refer to endnotes for indicator definitions.

MAP 1 Stunting (among children <5 years) in Karnataka in 2016, by district



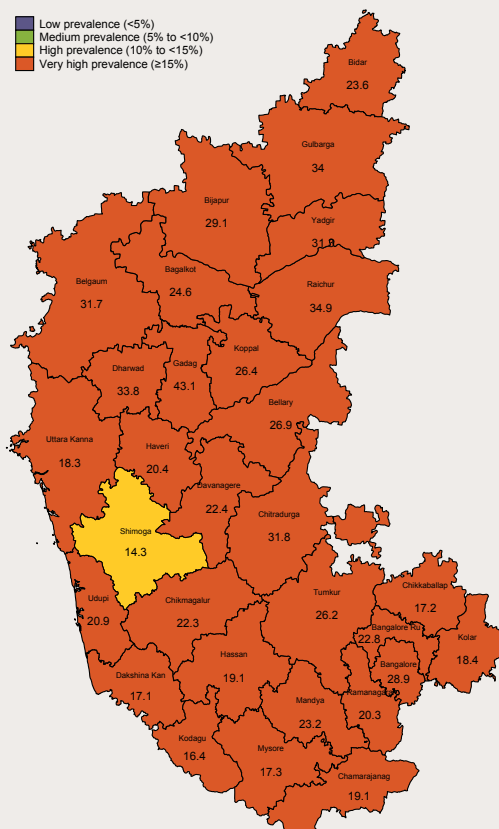
Source: NFHS-4.

MAP 2 Anemia (among women of reproductive age) in Karnataka in 2016, by district



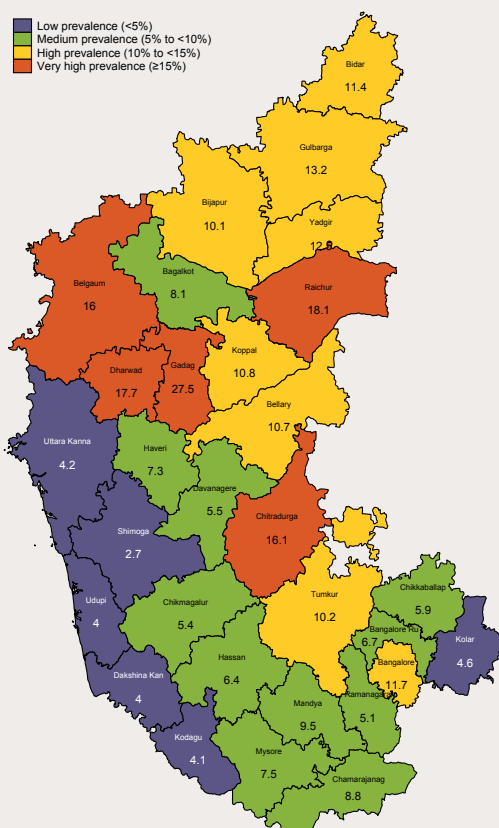
Source: NFHS-4.

MAP 3 Childhood wasting (among children &lt;5 years) in Karnataka in 2016, by district



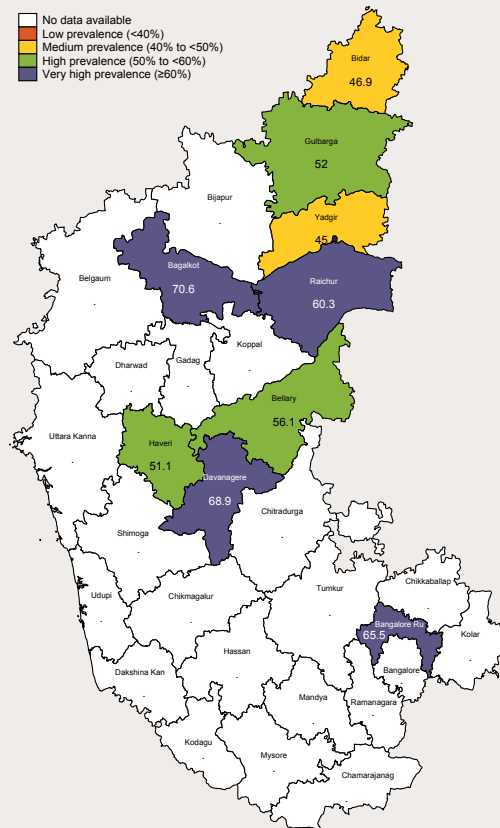
Source: NFHS-4.

MAP 4 Severe wasting (among children &lt;5 years) in Karnataka in 2016, by district



Source: NFHS-4.

## MAP 5 Exclusive breastfeeding in Karnataka in 2016, by district



Source: NFHS-4.

nutrition-specific interventions to address those determinants. We also describe changes in the underlying determinants of nutrition. We do not examine coverage data on programs to improve the underlying determinants in this Note because data on those are not available at this time.

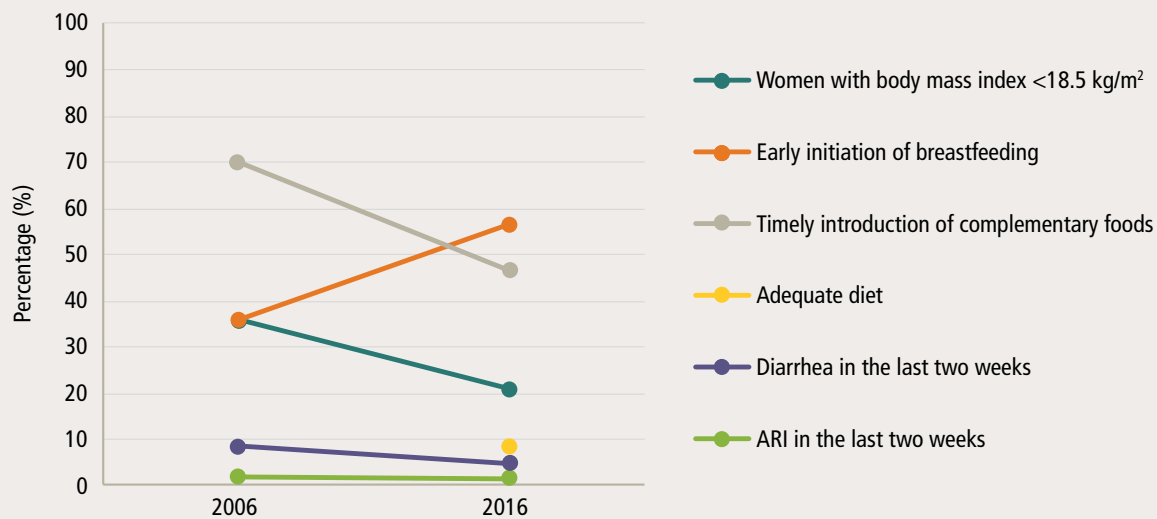
Changes in **immediate determinants** of nutrition in Karnataka are described in Figure 2. The prevalence of low body mass index (<18.5 kg/m<sup>2</sup>) among women declined from 35.4 percent to 20.7 percent. Early initiation of breastfeeding has improved considerably in the last decade from 35.6 percent in 2006 to 56.4 percent in 2016. However, complementary feeding is a key concern. Timely introduction of complementary foods (between 6 and 8 months of age) declined drastically over the last decade (from 69.7 percent to 46 percent). In 2016, only 8.2 percent of children (between 6 and 23 months of age) received an adequate diet.

The burden of disease has improved in Karnataka over the past decade. The proportion of children with diarrhea has declined from 8.6 percent in 2006

to 4.5 percent in 2016, while proportion of children with acute respiratory infection declined from 1.7 to 1.2 percent over the same time period.

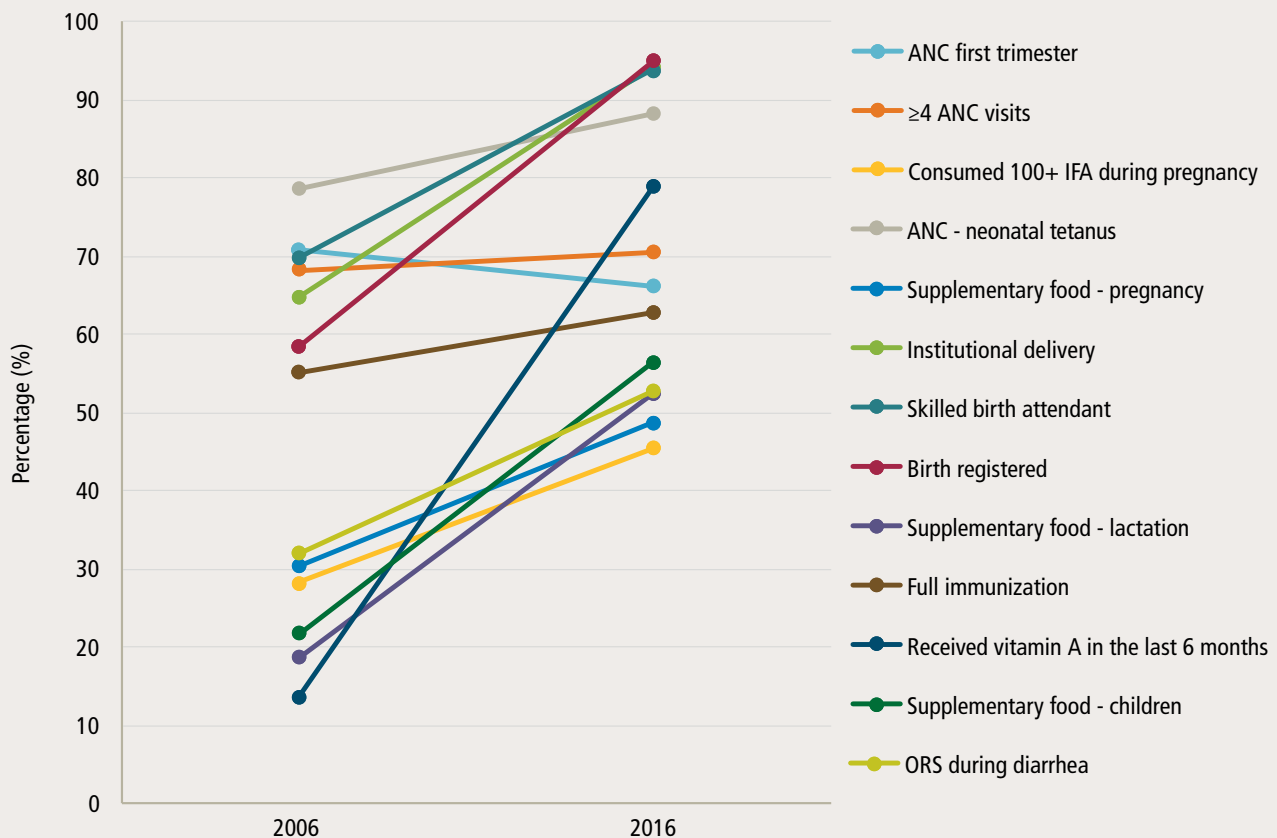
Changes in **nutrition-specific interventions** in Karnataka are presented in Figure 3. Coverage of nearly all interventions has improved in the last decade. Interventions related to delivery, such as institutional delivery, births assisted by health professionals, and birth registered improved substantially, reaching above 90 percent.

Changes in interventions related to care during pregnancy in the last decade have been mixed. The proportion of women who received any antenatal care (ANC) during first trimester declined from 70.9 percent to 66 percent, while the proportion of women who received more than four antenatal visits increased from 68 percent to 70.3 percent. The proportion of women reporting consumption of iron and folic acid (IFA) increased from 28.2 percent in 2006 to 45.3 percent in 2016. Nutrition interventions focusing on children have improved in the last ten years. The proportion of children who received vitamin A supplements

**FIGURE 2** Changes in immediate determinants of nutrition in Karnataka, 2006 to 2016


Sources: NFHS-3 and NFHS-4.

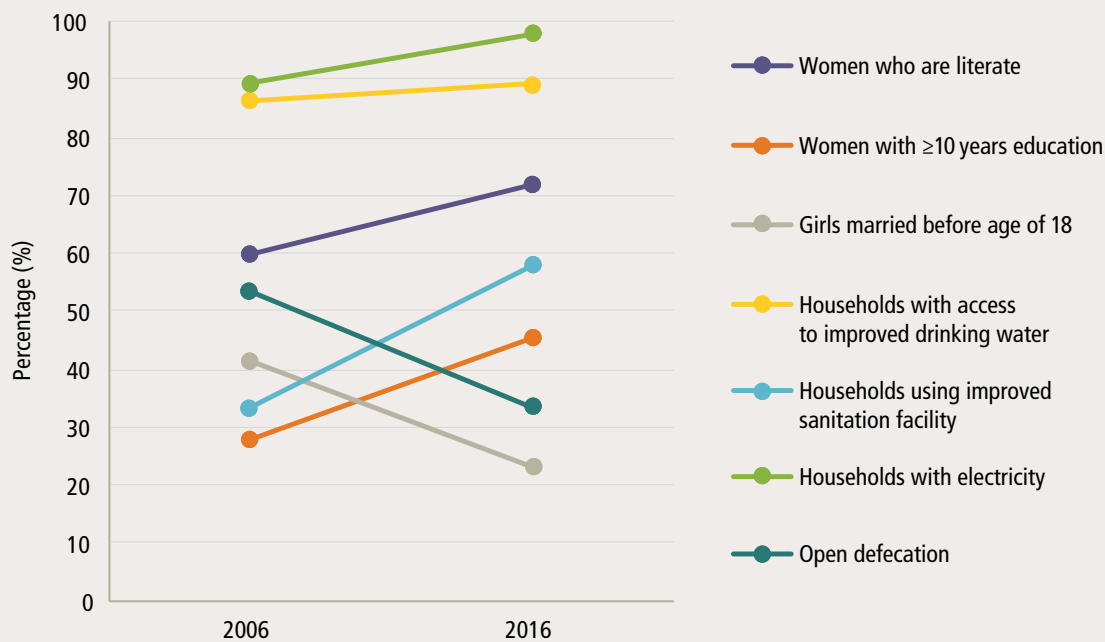
Notes: ARI= Acute respiratory infection. Refer to endnotes for indicator definitions.

**FIGURE 3** Changes in coverage of nutrition-specific interventions along the continuum of care in Karnataka, 2006 to 2016


Sources: NFHS-3 and NFHS-4. RSoC data used for food supplementation.

Notes: ANC= Antenatal care; IFA= Iron and folic acid; ORS= Oral rehydration salts. Refer to endnotes for indicator definitions.

FIGURE 4 Changes in underlying determinants of nutrition in Karnataka, 2006 to 2016



Sources: NFHS-3 and NFHS-4. RSoC data used for open defecation indicator.

Note: Refer to endnotes for indicator definitions.

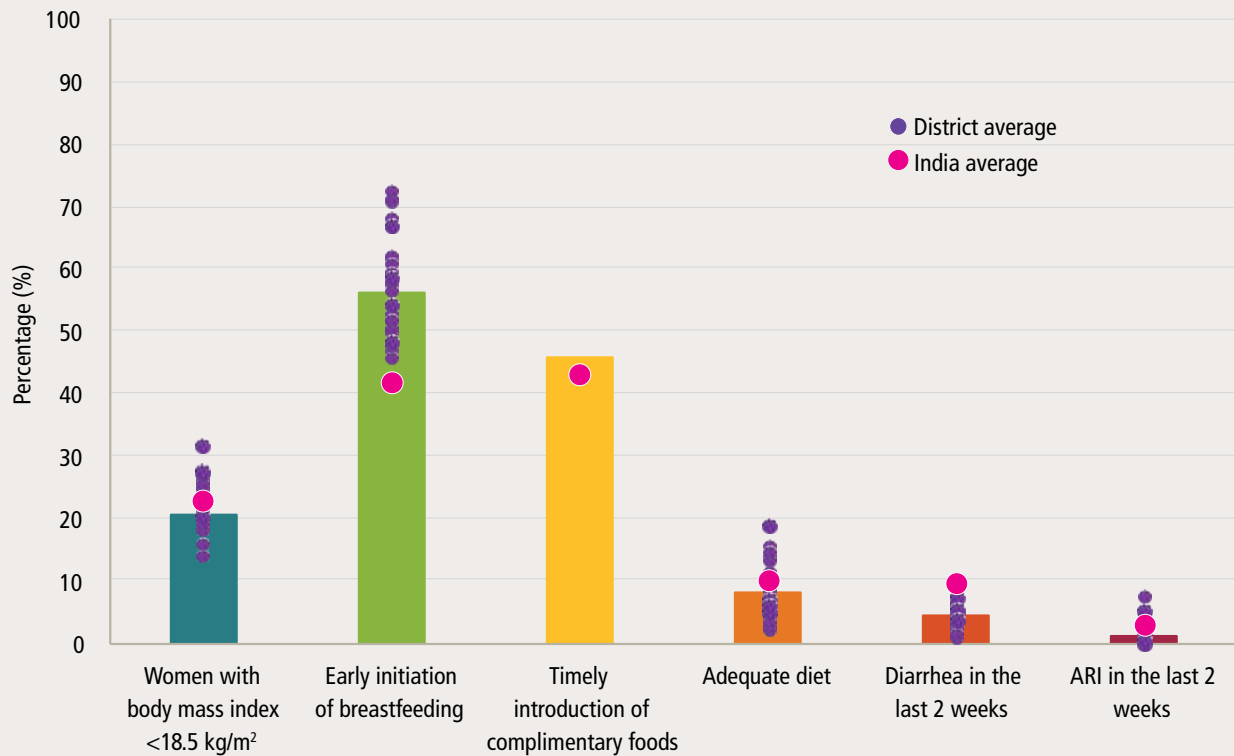
increased substantially from 13.6 to 78.7 percent, and the proportion of children with diarrhea who received oral rehydration salts (ORS) also increased from 32 to 53 percent. Although the proportion of children who were fully immunized increased from 55 percent to 62.6 percent, more than a third of children (12–23 months) did not receive all the requisite vaccinations in 2016. Between 2006 and 2016, the coverage of food supplementation improved for pregnant women (30.3 percent to 48.8 percent), lactating mothers (18.4 percent to 52.3 percent) and children less than three years of age (21.5 percent to 56.3 percent).

In the last decade, Karnataka experienced improvements in the **underlying determinants** of nutrition (Figure 4). Households using improved sanitation facilities improved in 2016 (from 33.5 percent to 57.8 percent). The proportion of households with access to electricity increased from 89.3 percent to 97.8 percent. There were also improvements in the proportion of literate women (59.7 percent to 71.7 percent) and the proportion of women with more than 10 years of education (27.8 percent to 45.5 percent) in the state. There was a significant decline in the proportion of girls who were married before 18 years (41.2 percent to 23.2 percent).

### Inter-district variability in selected coverage of interventions in Karnataka in 2016

In Figures 5, 6, and 7 below, we highlight the district variability in immediate determinants (Figure 5), coverage of health and nutrition interventions (Figure 6) and underlying determinants (Figure 7). Among the 30 districts in Karnataka, there is a high degree of inter-district variability for many key determinants (i.e. early initiation of breastfeeding, IFA during pregnancy, full immunization, women's education, improved drinking water, improved sanitation, etc.). In contrast, there is little to no inter-district variability for some other determinants, either because levels are very high (e.g. MCP card, institutional delivery, skilled birth attendant, mothers whose last birth was protected against neonatal tetanus and households with access to electricity) or because challenges are uniform across all districts (e.g. new born check-up, adequate diet among children 6–23 months old). For some determinants, e.g., early initiation of breastfeeding, diarrhea in the last two weeks and households with electricity, all or almost all districts in Karnataka are doing better than the India average. For some others, such as low body mass index (<18 kg/m<sup>2</sup>) and literacy among women

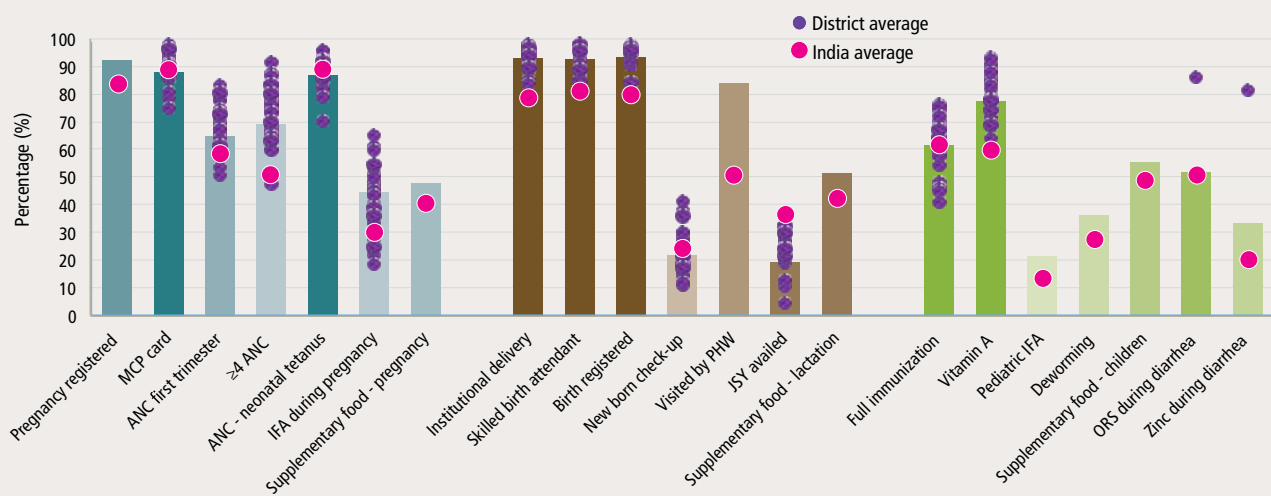
FIGURE 5 Inter-district variability in immediate determinants in Karnataka, in 2016



Source: NFHS-4.

Notes: ARI= Acute respiratory infection. Refer to endnotes for indicator definitions.

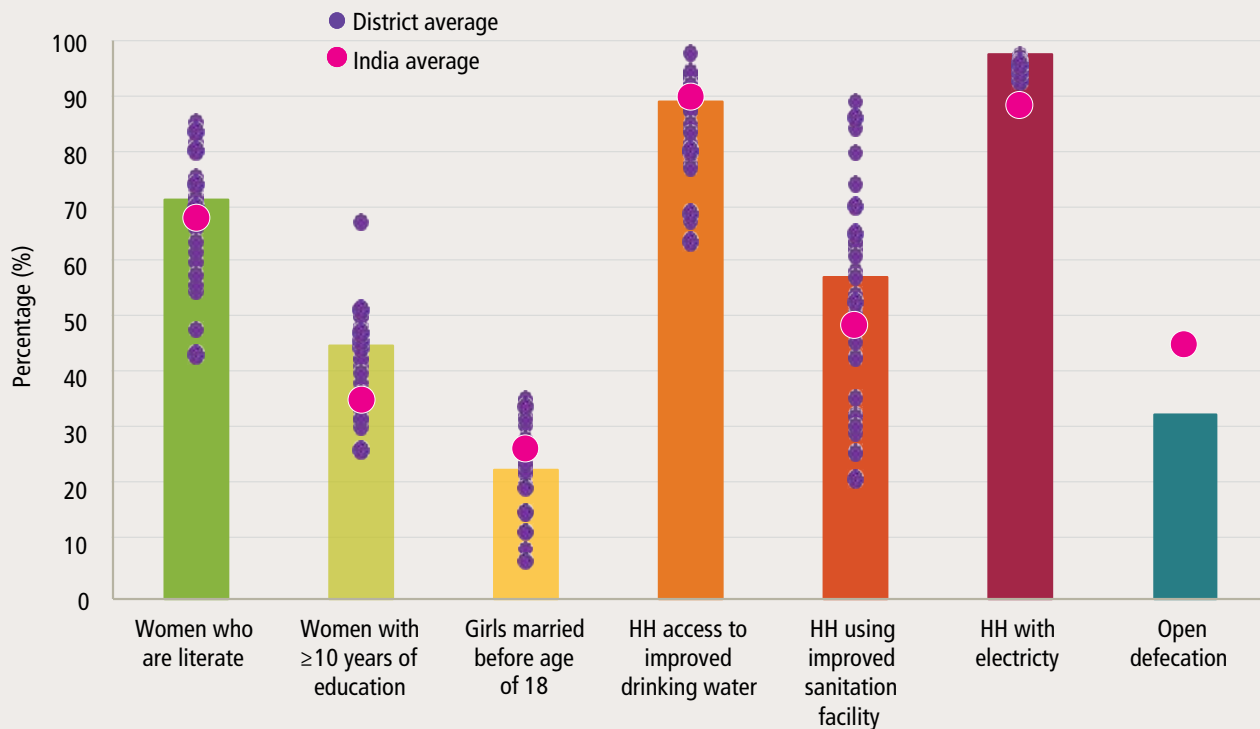
FIGURE 6 Inter-district variability in coverage of selected interventions in Karnataka, in 2016



Sources: NFHS-4. RSoC data was used for indicators on pregnancy registration, food supplementation during pregnancy, lactation; and for children, visits by a health worker, pediatric IFA and deworming.

Notes: As RSoC data is not representative at the district level, district variability is unavailable for these indicators. ANC= Antenatal care; IFA= Iron and folic acid; JSY= Janani Suraksha Yojana; ORS= Oral rehydration salts; MCP= Mother and child protection; PHW= Primary health worker. Refer to endnotes for indicator definitions.

FIGURE 7 Inter-district variability in underlying determinants in Karnataka, in 2016



**Sources:** NFHS-4. RSoC data is used for indicator for open defecation.

**Notes:** HH= Household. Refer to endnotes for indicator definitions.

and adequate diet among children, districts within Karnataka fall around the India average. Very few districts in Karnataka are below the national average on these indicators.

### LOOKING FORWARD: IMPLICATIONS & RECOMMENDATIONS

In the era of India's commitment to global nutrition targets, it is an opportune time for Karnataka to set its own nutrition targets to be achieved by 2025, to examine progress within and across the state, and to accelerate actions necessary to improve all forms of malnutrition. The state needs to tackle the issue of anemia in women of reproductive age as 28 of its 30 districts have high prevalence (40 to 60 percent) of anemia. Special efforts are needed for reversing the trend of increase in prevalence of wasting, which is more than 15 percent in nearly all districts. For each outcome, the state may also invest in identifying the factors that helped some districts perform well as

it can offer useful insights for the poor performing districts to improve.

To achieve progress on nutrition, Karnataka should invest in improving the coverage of interventions targeting the first one thousand days of life and continue to invest in sustaining adequate delivery where coverage is already high. On nutrition-specific interventions during the pre-natal phase, special emphasis is needed on reversing the declining trend in ANC visits during first trimester and increasing IFA consumption which is currently far from optimal. The state has high coverage of interventions for delivery care and should therefore ensure that it continues the good performance. Significant efforts need to be taken on strengthening coverage of several postnatal interventions, including immunization, newborn check-up, the *Janani Suraksha Yojana* (JSY), pediatric IFA and zinc supplement during diarrhea where coverage is low. Promotion of timely and appropriate complementary feeding practices for children are

recommended as the performance on related indicators is very poor. On underlying determinants, while the state's performance is better than the Indian average, further improvement is desired, especially on women's education and sanitation.

Alongside investments in early nutrition, it is also important for Karnataka to consider the challenge of non-communicable diseases. As Figure 8 below shows, nearly a quarter of women and men in Karnataka are now overweight or obese. The challenges of high blood pressure and high blood sugar are also emerging. These numbers are slightly above the Indian average, and need to be tackled and brought down. Karnataka now needs to develop a strong nutrition strategy to simultaneously address undernutrition and these emerging non-communicable diseases related to nutrition.

## NOTE

1. Indicator definitions, in alphabetical order:

**Access to electricity:** Percentage of households with electricity.

**Adequate diet:** Percentage of children 6–23 months old who received 4 or more food groups and a minimum meal frequency.

**ANC (4 or more visits):** Percentage of mothers receiving at least 4 ANC visits for the last birth in the last 5 years.

**Consumption of IFA supplements:** Percentage of mothers who took IFA supplements for at least 100 days for the last birth in the last 5 years.

**ANC (first trimester):** Percentage of mothers who received ANC during the first trimester of pregnancy for the last birth in the last 5 years.

**ANC-neonatal tetanus injections:** Percentage of mothers who were protected against neonatal tetanus for the last birth in the last 5 years.

**Anemia among women of reproductive age:** Percentage of women 15–49 years old who are anemic (<12.0 g/dl for non-pregnant women and <11.0 g/dl for pregnant women).

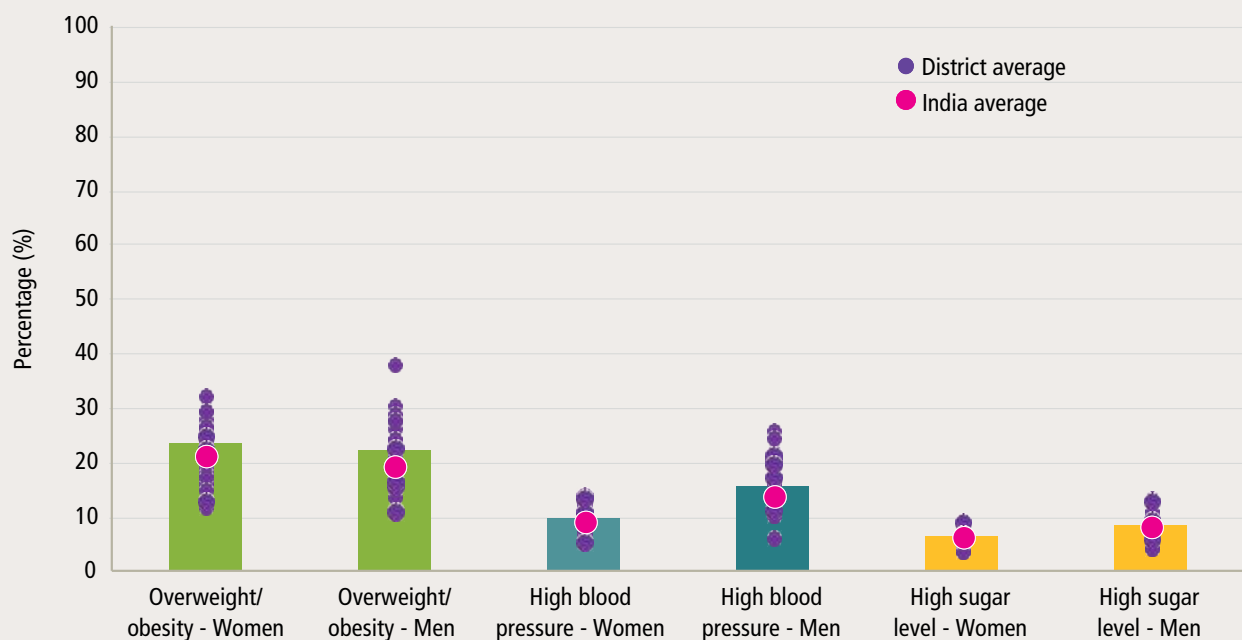
**Birth registered:** Percentage of children under age 5 years whose birth was registered.

**Deworming:** Percentage of children 6–59 months old who were given deworming medication in the last 6 months.

**Early initiation of breastfeeding:** Percentage of children who were breastfed within one hour of birth.

**Exclusive breastfeeding:** Percentage of infants 0–5 months old who were exclusively breastfed.

FIGURE 8 Levels of non-communicable diseases in Karnataka and India, in 2016



Source: NFHS-4.

Note: Refer to endnotes for indicator definitions.

**Full immunization:** Percentage of children 12–23 months old who received BCG, measles, and three doses each of DPT and polio vaccine (excluding polio vaccine given at birth).

**Girls married before age of 18:** Percentage of women 20–24 years old married before age of 18.

**High blood pressure:** 15–49 year old men and women with systolic  $\geq 140$  mm of Hg and/or diastolic  $\geq 90$  mm of Hg.

**High blood sugar:** 15–49 year old men and women with blood sugar level  $>140$  mg/dl.

**Improved drinking water:** Percent distribution of households with an improved drinking water source.

**Improved sanitation:** Percent distribution of households using improved sanitation facilities.

**Institutional delivery:** Percentage of births delivered in a health facility for births in the last 5 years.

**Janani Suraksha Yojana (JSY) availed:** Percentage of women who received financial assistance under JSY for births delivered in an institution for the last birth in the last 5 years.

**Low birth weight:** Percentage of live births in the last 5 years weighing less than 2,500 grams at birth.

**Mother child protection (MCP) card:** Percentage of registered pregnancies for which the mother received an MCP card.

**Open defecation:** Percentage of households having no sanitation facilities.

**ORS during diarrhea:** Percentage of children below 5 years of age who received ORS during diarrhea.

**Overweight/obesity:** 15–49 year old men and women with body mass index  $\geq 25$  kg/m<sup>2</sup> Prevalence of acute respiratory infection (ARI): Percentage of children below 5 years of age with symptoms of ARI in 15 days preceding the survey.

**Prevalence of diarrhea:** Percentage of children below 5 years of age who had diarrhea in 15 days preceding the survey.

**Severe Wasting:** Percentage of children 0–59 months old who are below  $<-3$ SD from median weight for height of the WHO Child Growth Standards.

**Skilled birth attendant:** Percentage of births assisted by a doctor/nurse/LHV/ANM/other health personnel.

**Stunting:** Percentage of children 0–59 months old who are  $<-2$ SD from median height for age of the WHO Child Growth Standards.

**Supplementary food (children):** Percentage of children 6–35 months old covered by AWC who received supplementary food provided at the AWC in the last 12 months.

**Supplementary food (lactation):** Percentage of mothers with children under age 6 years in areas covered by an AWC who received supplementary nutrition from the AWC during lactation.

**Supplementary food (pregnancy):** Percentage of mothers with children under age 6 years in areas covered by an Anganwadi center (AWC) who received supplementary nutrition from the AWC during pregnancy.

**Timely introduction of complementary foods:**

Percentage of infants 6–8 months old who received solid and semi-solid foods and breastmilk.

**Vitamin A:** Percentage of children 9–59 months old who received vitamin A supplements in the last six months.

**Wasting:** Percentage of children 0–59 months old who are below  $<-2$ SD from median weight for height of the WHO Child Growth Standards.

**Women who are literate:** Percentage of women who are literate.

**Women with at least 10 years of education:** Percentage of women 15–49 years old having at least 10 years schooling.

**Women with low body mass index (BMI):** Percentage of women 15–49 years old with BMI less than 18.5 kg/m<sup>2</sup>.

**Zinc during diarrhea:** Percentage of children below 5 years of age who received zinc during diarrhea.

## REFERENCES

- Black, R.E., C.G. Victora, S.P. Walker, Z.A. Bhutta, P. Christian, M.D. Onis, M. Ezzati, et al. 2013. "Maternal and Child Undernutrition and Overweight in Low-Income and Middle-Income Countries." *The Lancet* 382 (9890): 427–51.
- India Report. NFHS-3 (National Family Health Survey-3), International Institute for Population Studies. 2008. Accessed April 2017. [http://rchiips.org/nfhs/volume\\_1.shtml](http://rchiips.org/nfhs/volume_1.shtml)
- India Fact Sheet. NFHS-4 (National Family Health Survey-4), International Institute for Population Studies. 2017. Accessed April 2017. <http://rchiips.org/NFHS/pdf/NFHS4/India.pdf>
- Karnataka Fact Sheet. NFHS-4 (National Family Health Survey-4), International Institute for Population Studies. 2017. Accessed April 2017. [http://rchiips.org/NFHS/pdf/NFHS4/KA\\_FactSheet.pdf](http://rchiips.org/NFHS/pdf/NFHS4/KA_FactSheet.pdf)
- Karnataka District Fact Sheets. NFHS-4 (National Family Health Survey-4), International Institute for Population Studies. 2016. Accessed April 2017. <http://rchiips.org/NFHS/KA.shtml>
- Primary Census Abstract, Karnataka 2011- Data Highlights. Census of India 2011. Government of India. 2011. Accessed April 2017. [http://www.censusindia.gov.in/2011census/PCA/PCA\\_Highlights/pca\\_highlights\\_file/karnataka/Data\\_highlights.pdf](http://www.censusindia.gov.in/2011census/PCA/PCA_Highlights/pca_highlights_file/karnataka/Data_highlights.pdf)
- RSoc (Rapid Survey on Children), Ministry of Women and Child Development, Government of India. 2014. Accessed April 2017. <http://wcd.nic.in/acts/rapid-survey-children-rsoc-2013-14>
- Global Targets 2025. World Health Organization. 2014. Accessed April 2017. <http://www.who.int/nutrition/global-target-2025/en/>

## Led by IFPRI

### Partnership members:

Institute of Development Studies (IDS)

Public Health Foundation of India (PHFI)

One World South Asia

Vikas Samvad

The Coalition for Food and Nutrition Security (CFNS)

Save the Children, India

Public Health Resource Network (PHRN)

Vatsalya

Centre for Equity Studies

### WRITTEN BY

**Amrutha Jose Pampackal**, Communications Specialist-I, IFPRI

**Phuong Hong Nguyen**, Research Fellow, IFPRI

**Rasmi Avula**, Research Fellow, IFPRI

**Lan Mai Tran**, Independent Researcher

**Purnima Menon**, Senior Research Fellow, IFPRI

### SUGGESTED CITATION

Please cite this Note as: Pampackal, A.J., P.H. Nguyen, R. Avula, L.M. Tran, and P. Menon. 2017. *Improving Nutrition in Karnataka: Insights from Examining Trends in Outcomes, Determinants and Interventions between 2006 and 2016*. POSHAN Policy Note #7. New Delhi: International Food Policy Research Institute.

### ACKNOWLEDGEMENTS

Financial support for this paper was provided by the Bill & Melinda Gates Foundation through POSHAN, led by International Food Policy Research Institute. The funder played no role in decisions about the scope of the analysis or the contents of the report. We thank Abhilasha Vaid (IFPRI) for her help in reviewing this Note.

### ABOUT POSHAN

Partnerships and Opportunities to Strengthen and Harmonize Actions for Nutrition in India (POSHAN) is a multi-year initiative that aims to build evidence on effective actions for nutrition and support the use of evidence in decisionmaking. It is supported by the Bill & Melinda Gates Foundation and led by IFPRI in India.

### ABOUT POLICY NOTES

POSHAN Policy Notes aim to provide evidence-based guidance to support policy and program actions for nutrition in India.

### CONTACT US

Email us at [IFPRI-POSHAN@cgiar.org](mailto:IFPRI-POSHAN@cgiar.org)

### IFPRI-NEW DELHI

#### INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

NASC Complex, CG Block,  
Dev Prakash Shastri Road,  
Pusa, New Delhi 110012, India  
T +91.11.66166565  
F +91.11.66781699

### IFPRI-HEADQUARTERS

#### INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

2033 K Street, NW,  
Washington, DC 20006-1002 USA  
T. +1.202.862.5600  
F. +1.202.467.4439  
Skype: IFPRIhomeoffice  
[ifpri@cgiar.org](mailto:ifpri@cgiar.org)  
[www.ifpri.org](http://www.ifpri.org)

This publication has been prepared by POSHAN. It has not been peer reviewed. Any opinions stated herein are those of the author(s) and do not necessarily reflect the policies of the International Food Policy Research Institute.

Copyright © 2017 International Food Policy Research Institute. All rights reserved. For permission to republish, contact [ifpri-copyright@cgiar.org](mailto:ifpri-copyright@cgiar.org).