

Improving Nutrition in Madhya Pradesh

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, mostly 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 assist in identifying 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 Madhya Pradesh.

Madhya Pradesh is situated in central India, and currently comprises of 51 districts. It is the second largest state in India with an area of 308,000 square kilometers. As of 2011, it has a population of 72.6 million people (Madhya Pradesh State Government 2017). The state has 27.6 percent of its population living in urban areas, and 70.6 percent of its residents are literate (Census of India 2011).

The purpose of this *Policy Note* is to examine the trends in undernutrition in Madhya Pradesh and to document the 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 the key areas of action to improve nutrition in Madhya Pradesh.

METHODS

We used 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 NFHS-3 from 2005–06 to compare trends in outcomes, determinants and interventions over a decade (International Institute for Population Sciences 2008). We also used 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. Since NFHS-4 used the Census 2011 district boundaries, this *Policy Note* reports information for only 50 districts.

For outcome indicators, we examined progress on a set of global nutrition targets for maternal, infant and young child nutrition (World Health Organization 2014). These include stunting, wasting, low birth weight, exclusive breastfeeding (EBF) 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 and health outcomes** in Madhya Pradesh between

2006 and 2016 (Figure 1). Stunting prevalence fell from 50 percent to 42 percent. Wasting declined from 35 percent to 25.8 and severe wasting declined from 12.6 percent to 9.2 percent. Madhya Pradesh is one of the few states that saw a decrease in wasting. Exclusive breastfeeding rates more than doubled in the state, from 21.6 percent in 2006 to 58.2 in 2016. However, the prevalence of low-birth weight remained stagnant with a minor shift from 23.4 percent to 23.1 percent.

Anemia among women of reproductive age remains a key public health challenge. With only a small decline from 55.9 percent to 52.5 over the decade, over half of the women in the state still suffer from anemia.

With regard to variability within the state, stunting among children under five years of age varies widely across districts, ranging between 32.1 percent in Balaghat and 52.1 percent in Sheopur district (Map 1). In nearly two thirds of the districts, over 40 percent of children under five are stunted. Burhanpur, Barwani and Sheopur have the highest levels of stunting, with at least half of the children under five stunted.

Prevalence of anemia among women of reproductive age (Map 2) is above 40 percent in all except one district. Anemia also varies considerably among districts, with the lowest level in Sagar (39.7 percent) and the highest in Mandla (69.9 percent). In 12 of the 50 districts of Madhya Pradesh, anemia prevalence was over 60 percent.

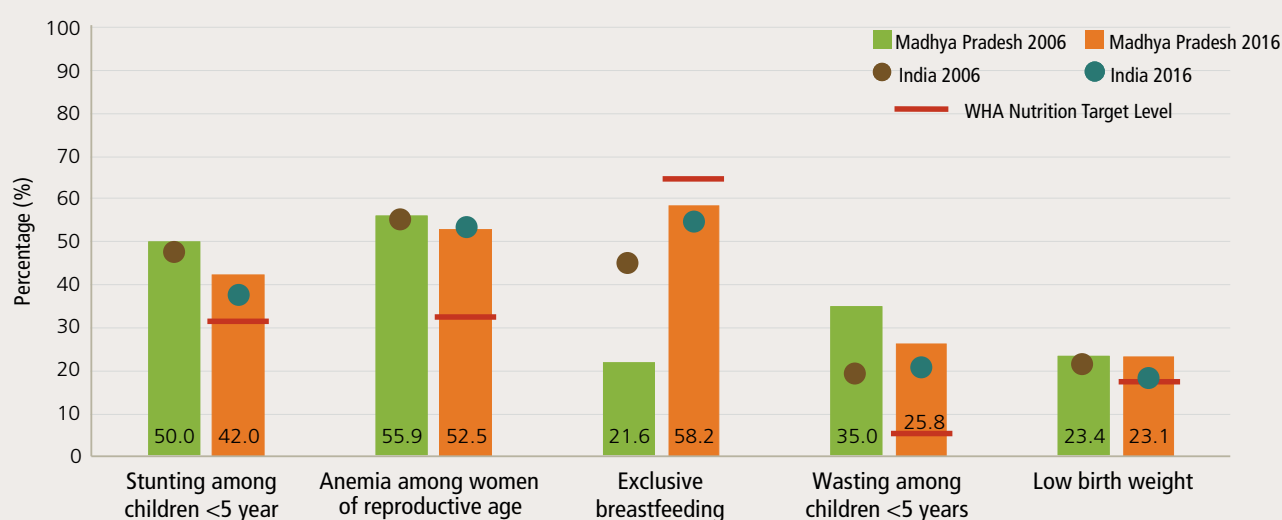
Wasting among children under five years of age in Madhya Pradesh is very high, with over 15 percent prevalence in all the 50 districts (Map 3). Sagar district has the lowest prevalence of wasting (16.9 percent) and severe wasting (5.2 percent) (Map 4). In contrast, Betul has the highest level of wasting (34.1 percent) and Singrauli has the highest level of severe wasting (17.4 percent).

There is high variability in the prevalence of EBF across Madhya Pradesh, ranging from 26.4 percent in Gwalior to 95.1 percent in Mandsaur (Map 5). On an encouraging note, EBF levels were over 60 percent in 23 districts, while EBF levels below 40 percent were seen only in 7 districts.

Changes in the determinants of nutrition

In order to improve the nutrition of women and children in states such as Madhya Pradesh, investments must be made to address the determinants of poor nutrition, using a variety of policy instruments and other efforts. Here, we examine changes in the immediate determinants of nutrition in the state, as well as the performance of nutrition-specific interventions to address these determinants. This is followed by a description of changes seen in the underlying determinants of nutrition. However, we do not examine the coverage data on programs to improve underlying determinants in this Note, because this data is not currently available.

FIGURE 1 Trends in nutrition outcomes in Madhya Pradesh, 2006 to 2016

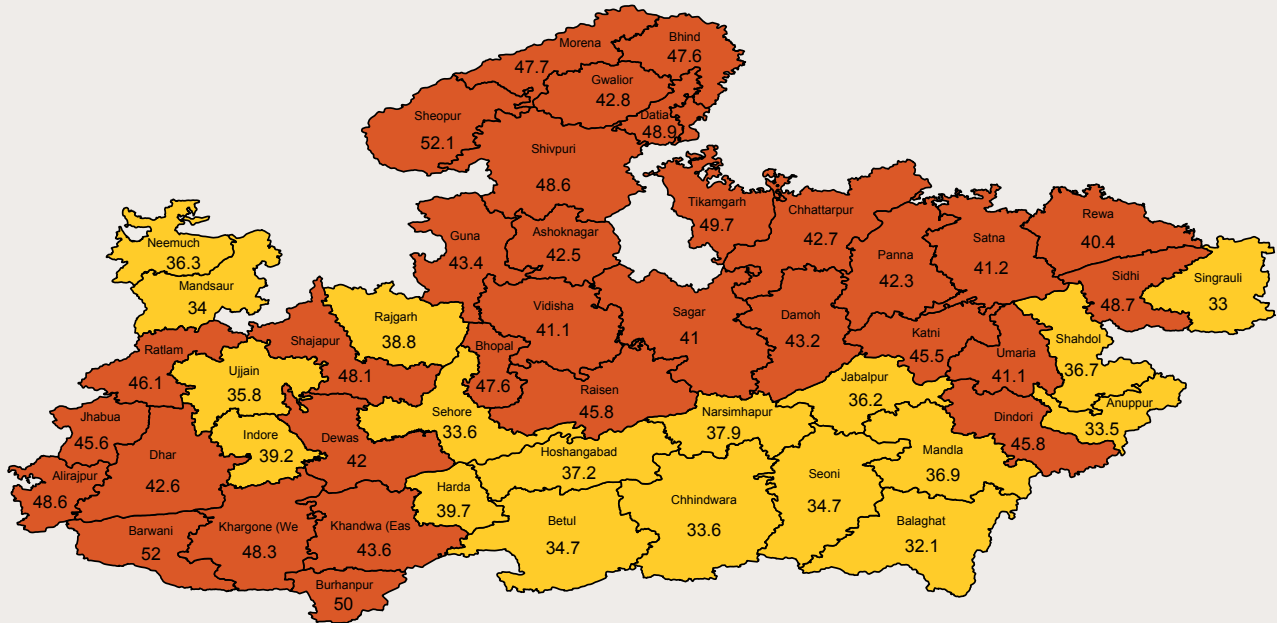


Source: NFHS-3 and NFHS-4; RSoC for low birth weight.

Note: 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 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 Madhya Pradesh in 2016, by district

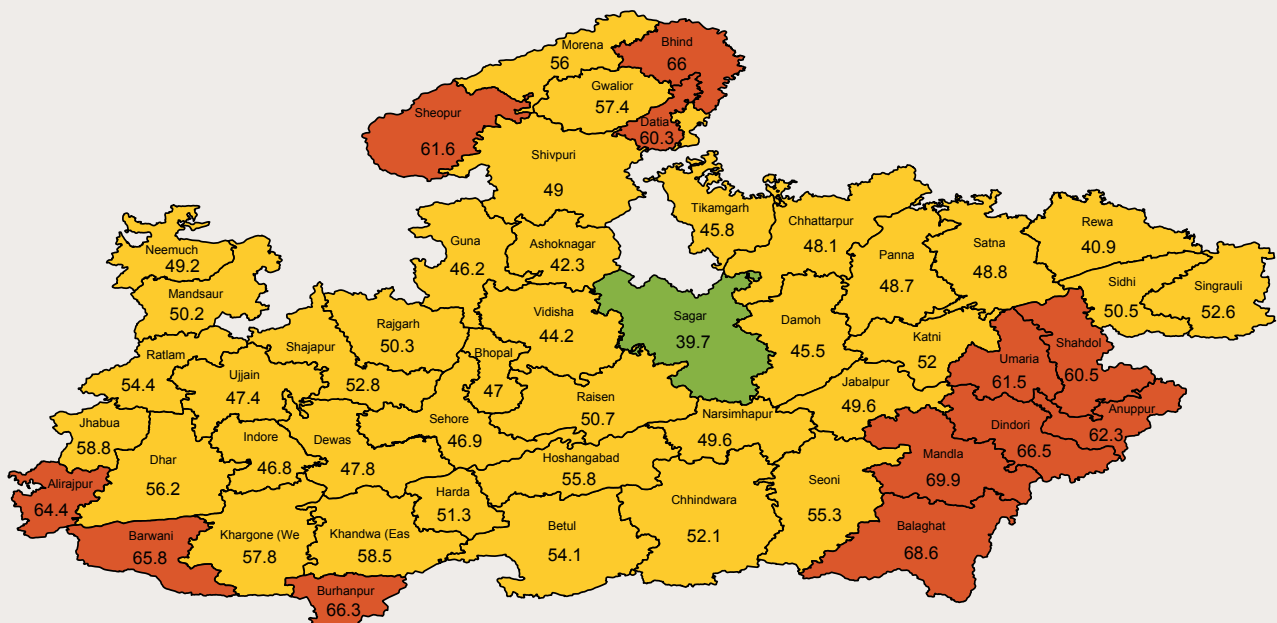
- Low prevalence (<20%)
- Medium prevalence (20% to <30%)
- High prevalence (30% to <40%)
- Very high prevalence (≥40%)



Source: NFHS-4.

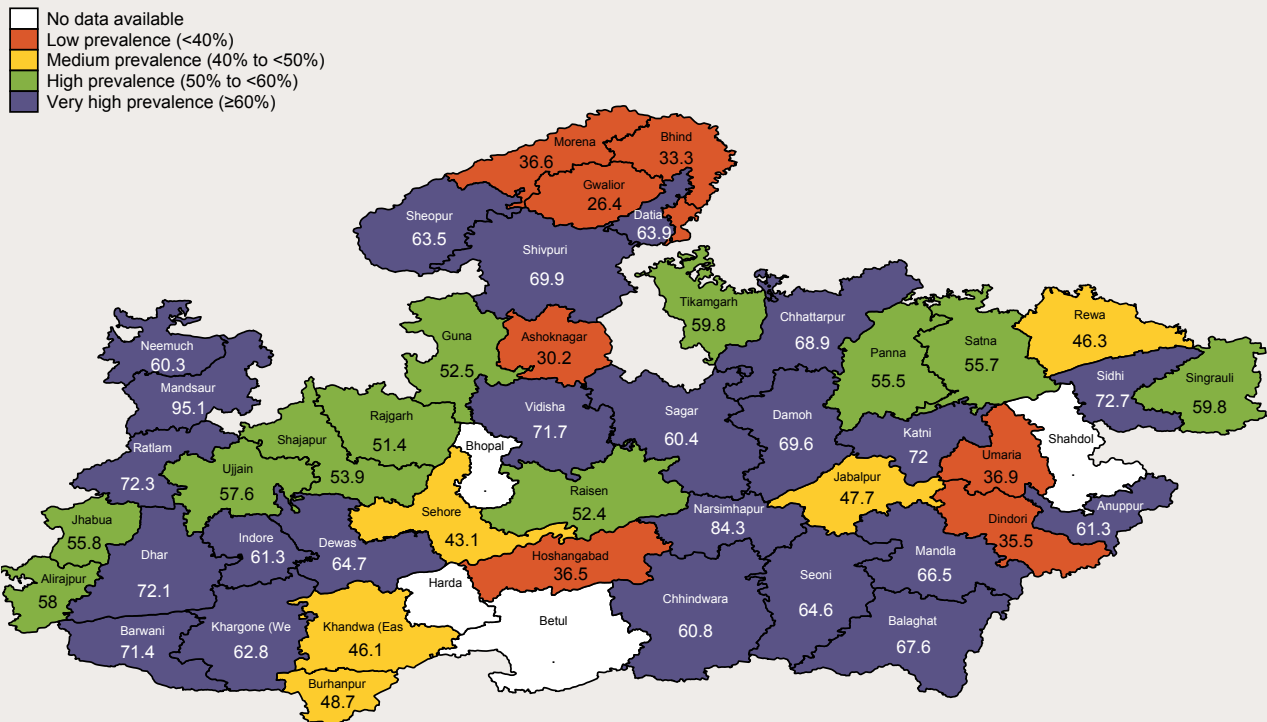
MAP 2 Anemia (among women of reproductive age) in Madhya Pradesh in 2016, by district

- Low prevalence (<20%)
- Medium prevalence (20% to <40%)
- High prevalence (40% to <60%)
- Very high prevalence (≥60%)



Source: NFHS-4.

MAP 5 Exclusive breastfeeding in Madhya Pradesh in 2016, by district



Source: NFHS-4.

Changes in the **immediate determinants** in Madhya Pradesh have been largely positive (Figure 2). The proportion of women with low body mass index (<18.5 kg/m²) declined from 41.7 percent in 2006 to 28.3 percent in 2016, and early initiation of breastfeeding increased from 14.9 percent to 34.5 percent over the last decade. However, complementary feeding for infants six months and older is of great concern in Madhya Pradesh. Timely introduction of complementary foods (between six and eight months of age) declined from 46 percent to 38.1 percent and in 2016, only 6.6 percent of children (between 6 and 23 months of age) received an adequate diet.

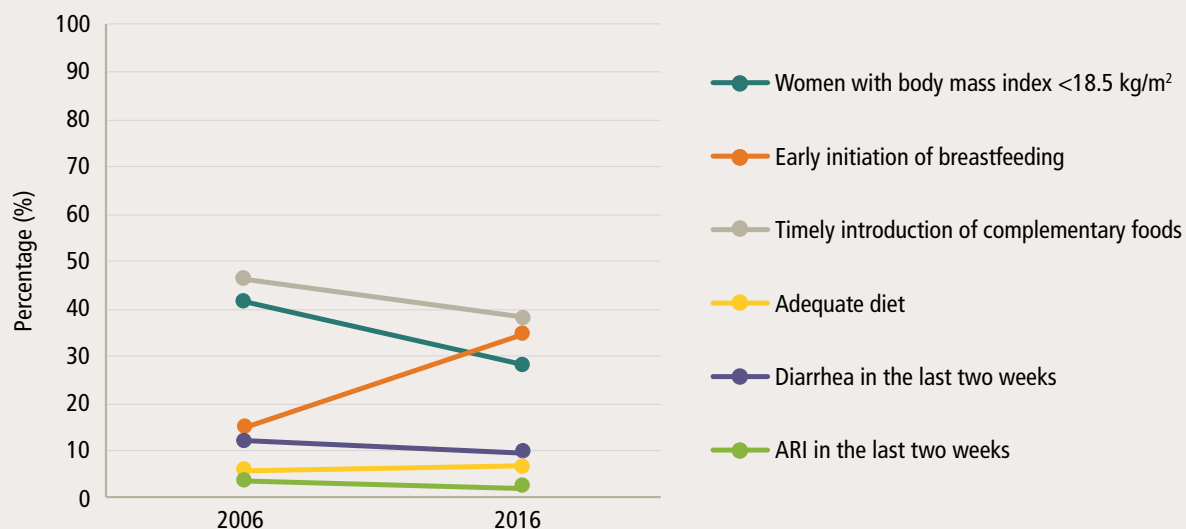
Disease burden among children improved slightly in Madhya Pradesh. The proportion of children with diarrhea reduced from 12.1 percent in 2006 to 9.5 percent in 2016 and the prevalence of acute respiratory infection (ARI) declined from 3.7 percent to 2.1 percent during the same time period.

The coverage of all **nutrition-specific interventions** in Madhya Pradesh improved during the last decade (Figure 3). Interventions related to child birth, such as institutional delivery, births assisted by health professionals and births registered, increased by

approximately 50 percentage points. Their coverage reached nearly 80 percent in 2016.

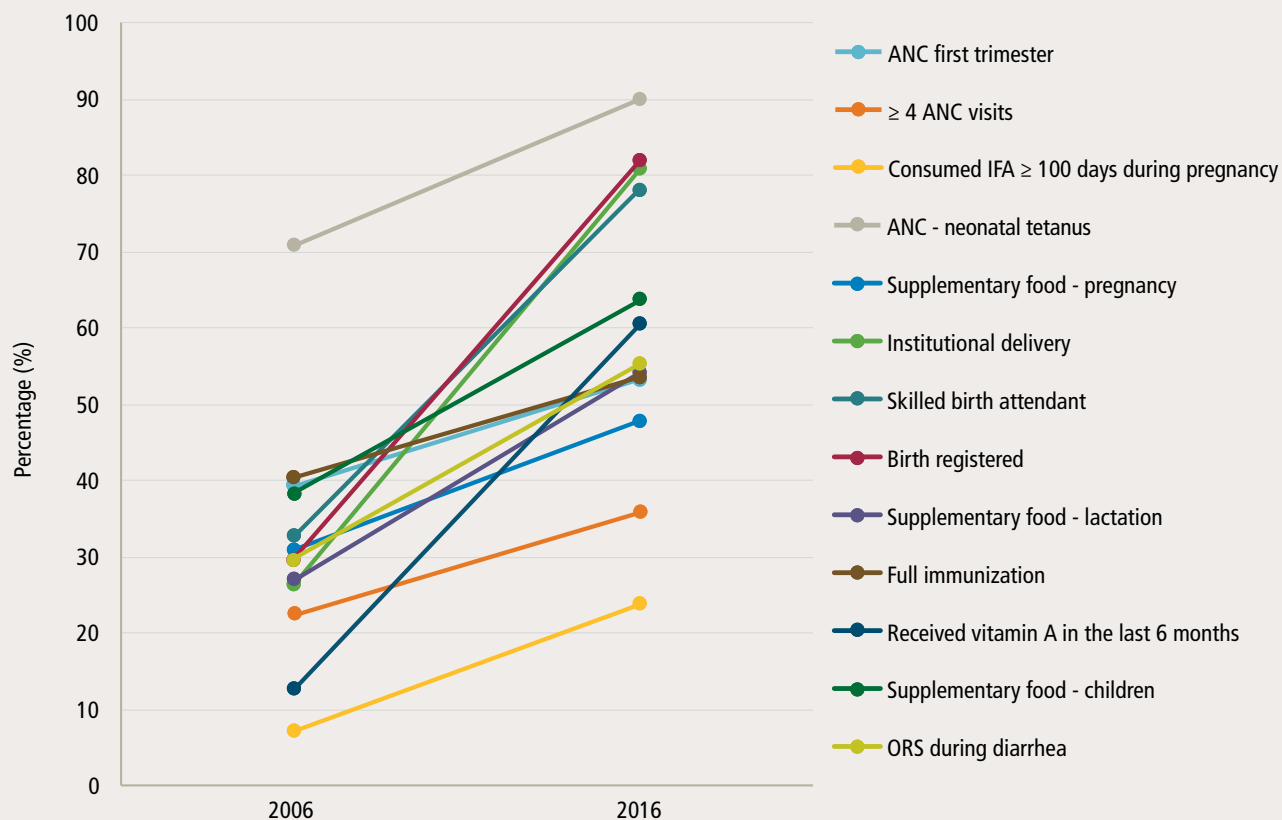
Although interventions related to care during pregnancy improved between 2006 and 2016, the coverage levels are still low. The proportion of women who had an antenatal check-up (ANC) in their first trimester of pregnancy increased moderately from 39.3 percent in 2006 to 53.1 percent in 2016. The proportion of women who received 4 or more ANC visits also improved, from 22.3 percent to 35.7 percent during this period. The proportion of women reporting consumption of iron-folic acid (IFA) supplements during pregnancy increased from 7.1 percent to 23.6 percent over the last decade, but more than three quarters of women did not consume IFA supplements during pregnancy. Between 2006 and 2016, the coverage of food supplements received by pregnant women improved (from 31 percent to 47.7 percent), as did the coverage for lactating mothers (from 26.9 percent to 54 percent)

Nutrition interventions focused on children have improved in the last ten years. The proportion of children who were fully immunized increased from 40.3 percent to 53.6 percent. The proportion of

FIGURE 2 Changes in immediate determinants of nutrition in Madhya Pradesh, 2006 to 2016


Source: NFHS-3 and NFHS-4.

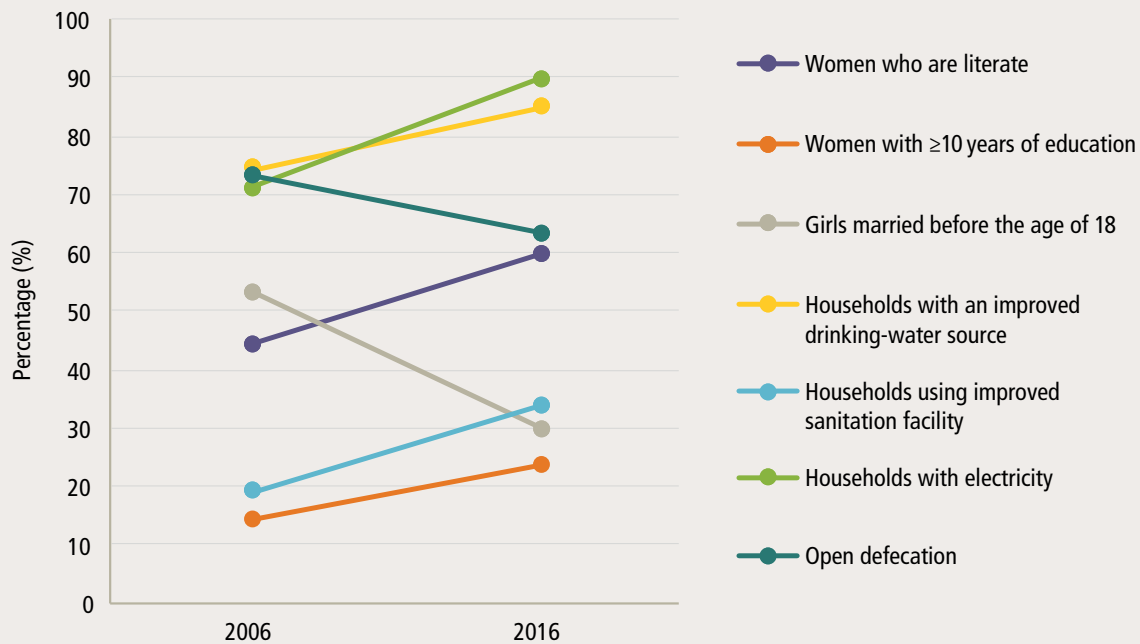
Note: ARI= Acute respiratory infection; Refer to endnotes for indicator definitions.

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


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

Note: 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 Madhya Pradesh, 2006 to 2016



Source: NFHS-3 and NFHS-4; RSoC data used for open defecation.

Note: Refer to endnotes for indicator definitions.

children receiving vitamin A supplementation increased substantially from 12.5 percent to 60.4 percent. The use of oral rehydration salts (ORS) during diarrhea increased from 29.8 percent to 55.2 percent among children under five years of age. Finally, the coverage of food supplementation for children improved substantially (from 38.2 percent to 63.6 percent).

In the last decade, Madhya Pradesh also experienced improvements in all the **underlying determinants of nutrition** (Figure 4). Literacy among women improved from 44.4 percent to 59.4 percent, and the proportion of women with 10 or more years of education increased from 14 percent to 23.2 percent over the decade. Underage marriage among girls, that is, below the age of 18, declined remarkably from 53 percent to 30 percent. The achieved levels of these indicators in 2016, however, are still low. More work is needed to strengthen the indicators of women's status which are important for nutrition.

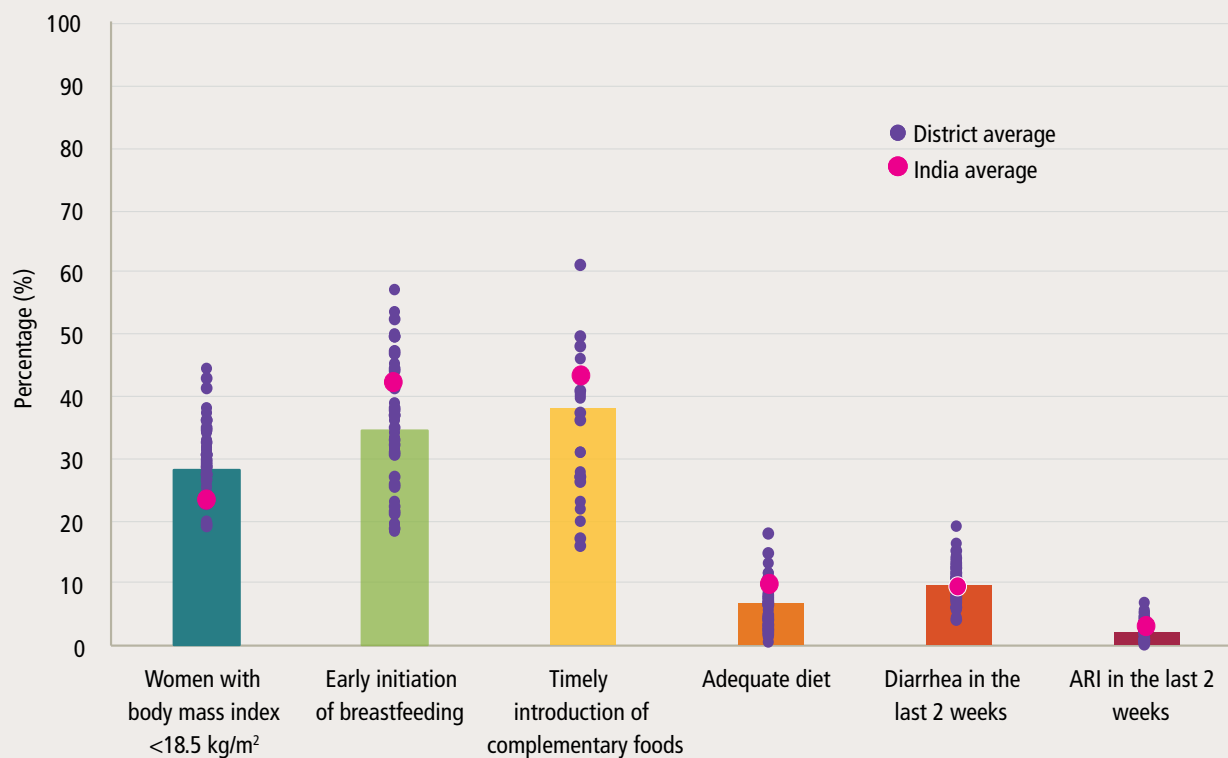
Infrastructure and facilities available to households in Madhya Pradesh has improved in the last decade. Access to improved drinking water increased from 74.2 percent in 2006 to 84.7 percent in 2016, while household access to electricity increased from 71.4 percent to 89.9 percent. Households using

improved sanitation facilities also improved from 18.7 percent to 33.7 percent, alongside a drop in open defecation from 73 percent to 63.4 percent. Despite improvements in sanitation over the decade, the state still has below 40 percent availability of sanitation facilities, and open defecation levels are above 60 percent. This calls for continued improvements in sanitation access and behavioral change support.

Inter-district variability in selected coverage of interventions in Madhya Pradesh in 2016

The 50 districts of Madhya Pradesh are subject to a range of geographical, social and economic conditions. Therefore, there is a high degree of inter-district variability among these districts for some key determinants (that is, early initiation of breastfeeding, timely introduction of complementary foods, antenatal care coverage, institutional delivery, full immunization, ORS and zinc treatment for diarrhea, households using improved sanitation) (Figure 5). In contrast, there is low inter-district variability for some determinants, either because the coverage is very high (for example, neonatal tetanus vaccination during ANC, MCP cards issued, households with electricity), or the challenges are uniform across all the districts (for example, IFA

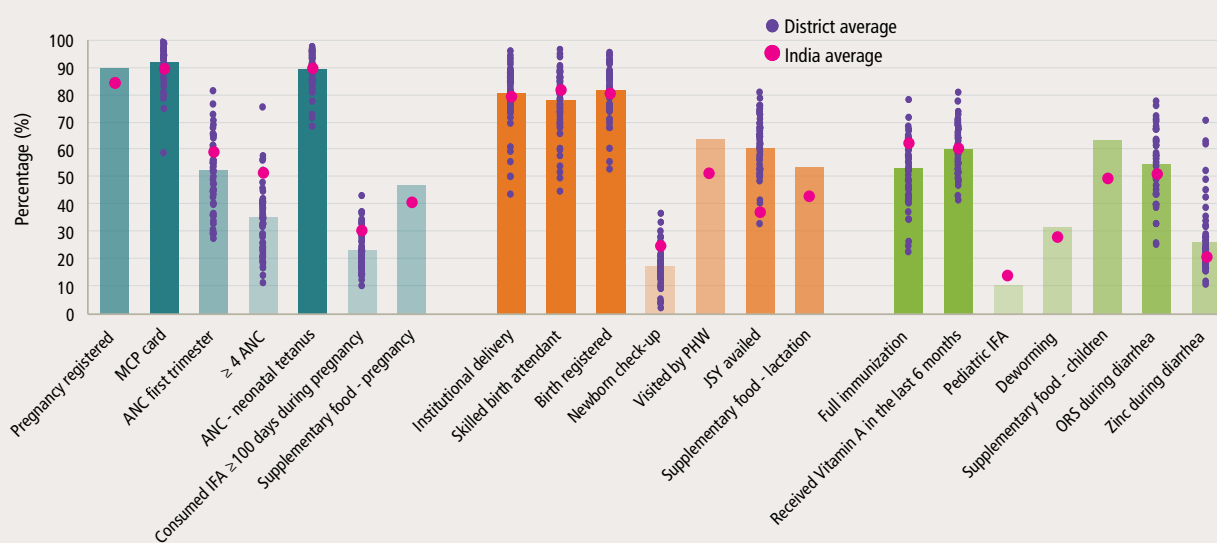
FIGURE 5 Inter-district variability in immediate determinants in Madhya Pradesh, in 2016



Source: NFHS-4.

Note: Bars represent state averages; ARI= Acute respiratory infection; Refer to endnotes for indicator definitions.

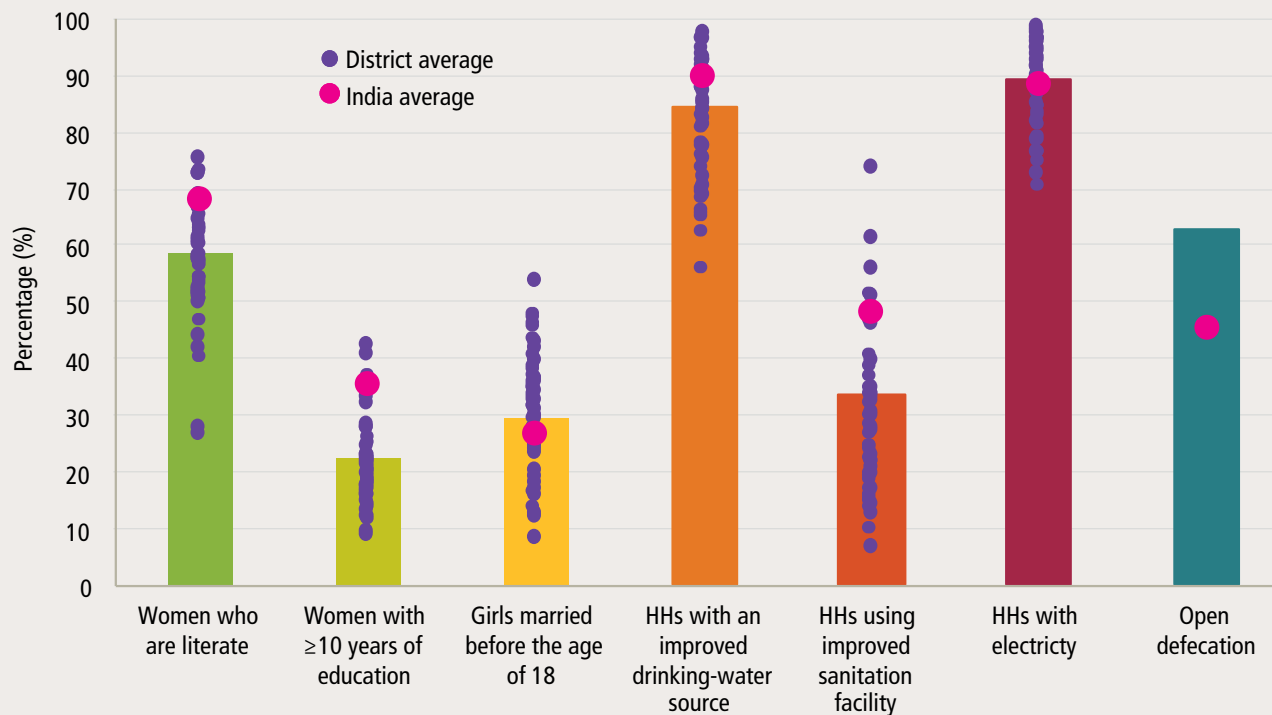
FIGURE 6 Inter-district variability in coverage of selected interventions in Madhya Pradesh, in 2016



Source: 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.

Note: Bars represent state averages; 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 Madhya Pradesh, in 2016



Source: NFHS-4; RSoC data is used for indicator for open defecation.

Note: Bars represent state averages; HH= Household; Refer to endnotes for indicator definitions.

consumption during pregnancy, and adequate diet among children 6–23 months).

For some indicators, for example, antenatal care visits, IFA consumption during pregnancy, infant and young child feeding practices, immunization among children, and women's education, most districts in Madhya Pradesh are doing much worse than the national average. For other indicators, these districts perform the same as the national average (Figure 6).

LOOKING FORWARD: IMPLICATIONS & RECOMMENDATIONS

In this era of India's commitment to global nutrition targets, this is an opportune time for Madhya Pradesh 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. In the last ten years, the state has seen some significant improvements in child undernutrition, but the stunting and wasting prevalence in Madhya Pradesh is still high, calling for special actions to tackle these issues. There has only been a marginal decline in anemia among women of reproductive age over the

last decade. Findings show that more than half of the women in the state are currently anemic. Therefore special efforts are needed to improve anemia among women of reproductive age.

To achieve progress on nutrition, Madhya Pradesh should invest in improving the coverage of interventions targeting the first 1000 days of life. Among nutrition-specific interventions, during the pre-natal period, special emphasis is needed on achieving greater coverage of four ANC visits and IFA consumption; coverage for both these interventions is still low at 36 percent and 24 percent, respectively. Interventions related to delivery have made tremendous progress, calling for continued investment in sustaining this good performance and improving the quality of care. On postnatal interventions, urgent action is required to increase full immunization coverage (since only 50 percent of children between 12 and 23 months are fully immunized). Emphasis also needs to be given to pediatric IFA, deworming and zinc treatment during diarrhea. With a reversing trend in timely introduction of complementary foods and very low proportion of children receiving adequate complementary feeding

diets, Madhya Pradesh needs to invest in promoting and supporting optimal complementary feeding.

Among underlying determinants (Figure 7), several improvements have taken place, but large inter-district variability indicates a development challenge for the state. Efforts towards achieving greater levels of women's education and reducing early marriage among girls need to be put in place. Low availability of improved sanitation facilities (33.7 percent) and high open defecation (63.4 percent) in the state call for urgent action around sanitation, which is known to be a significant driver of nutrition outcomes.

Alongside investments in early nutrition, it is also important for Madhya Pradesh to consider the challenge of non-communicable diseases. As Figure 8 below shows, the challenge is slowly emerging, with 13.6 percent of women and 10.9 percent of men being overweight or obese in 2016. The challenge of high blood pressure, especially in men, is also emerging with levels close to 30 percent in some districts. These numbers are currently below the national average, giving the state the opportunity to tackle this problem before it escalates further. Madhya Pradesh now needs to develop a strong nutrition strategy to simultaneously

address undernutrition and these emerging non-communicable diseases related to nutrition.

NOTES

1. Madhya Pradesh currently consists of 51 districts. Since the National Family Health Survey-4 used the Census 2011 district boundaries, this Policy Note reports information for only 50 districts.

2. Indicator definitions, in alphabetical order:

Acute respiratory infection (ARI) in the last two weeks: Percentage of children below 5 years of age with symptoms of ARI in 15 days preceding the survey.

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.

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

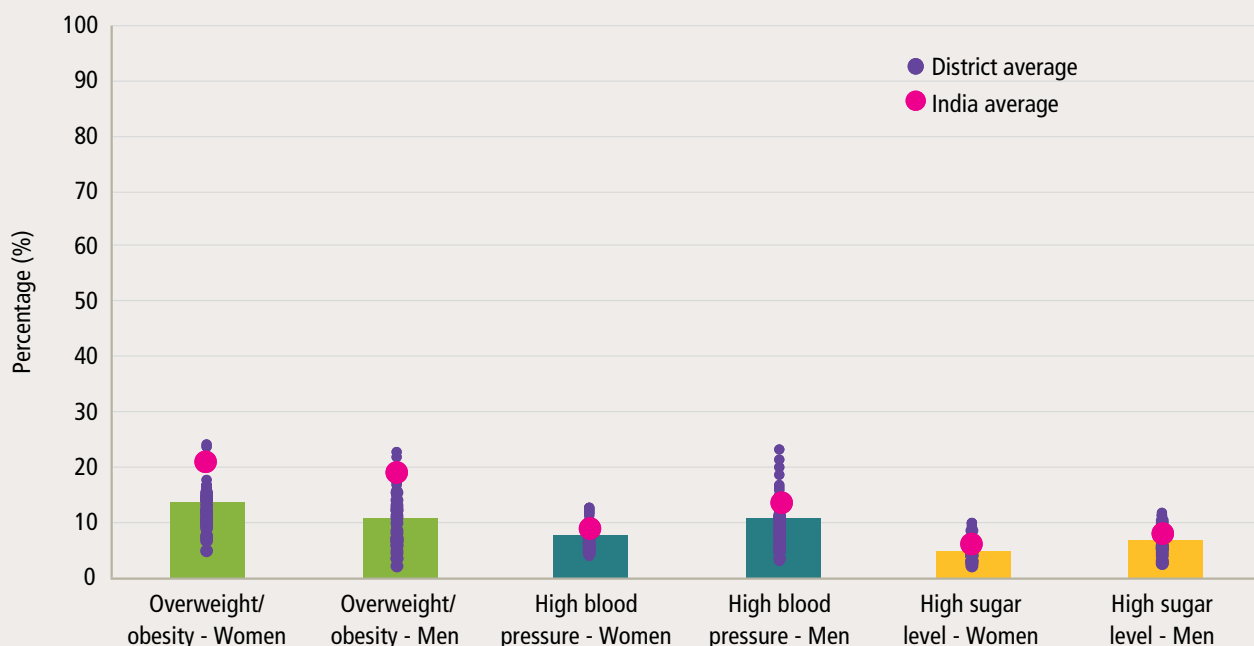
ANC-neonatal tetanus injections: Percentage of mothers who were protected against neonatal tetanus for the last birth in the last 5 years.

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 the age of 5 years whose birth was registered.

Consumed IFA ≥ 100 days during pregnancy: Percentage of mothers who took IFA supplements for at least 100 days for the last birth in the last 5 years.

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



Source: NFHS-4.

Note: Bars represent state averages; Refer to endnotes for indicator definitions.

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

Diarrhea in the last two weeks: Percentage of children below 5 years of age who had diarrhea in 15 days preceding the survey.

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.

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

High blood pressure: 15–49 years old men and women with systolic ≥ 140 mm of Hg and/or diastolic ≥ 90 mm of Hg.

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

Households with an improved drinking-water source: Percent distribution of households with an improved drinking water source.

Households with electricity: Percentage of households with electricity.

Households using improved sanitation facility: 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.

Newborn check-up: Percentage of children who received a health check after birth from a doctor/nurse/LHV/ANM/midwife/other health personnel within 2 days of birth.

Open defecation: Percentage of household having no sanitation facilities.

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

Overweight/obesity: 15–49 years old men and women with body mass index ≥ 25 kg/m².

Pediatric IFA: Percentage of children 6–59 months old who received iron and folic acid supplement in the last 6 months.

Pregnancy registered: Percentage of pregnancies registered among women who had a live birth in the 35 months preceding the survey.

Severe wasting: Percentage of children 0–59 months old who are $< -3SD$ 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 $< -2SD$ from median height for age of the WHO Child Growth Standards.

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

Supplementary food (lactation): Percentage of mothers with children under the age of 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 the age of 6 years in areas covered by an 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.

Visited by primary health worker (PHW): Percentage of women who were visited by a primary health worker (AWW/ASHA/ANM) at home within one week of delivery/discharge from health institution, among those who had a live birth in 35 months preceding the survey.

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 $< -2SD$ 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 of schooling.

Women with body mass index (BMI) < 18.5 kg/m²: Percentage of women 15–49 years old with BMI less than 18.5 kg/m².

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.
- Census 2011. Ministry of Home Affairs, Government of India. 2011. Accessed April 2017. http://www.censusindia.gov.in/2011census/population_enumeration.html.
- Fact File - Madhya Pradesh. Department of Public Relations, Madhya Pradesh State Government. Accessed April 2017. <http://mpinfo.org/MPinfoStatic/English/factfile/factindex.asp>.
- Global Targets 2025. World Health Organization. 2017. Accessed April 2017. <http://www.who.int/nutrition/global-target-2025/en/>.
- 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>.
- India Report. NFHS-3 (National Family Health Survey-3), International Institute for Population Studies. 2008. Accessed April 2017. <http://rchiips.org/NFHS/report.shtml>.
- Madhya Pradesh District Fact Sheets. NFHS-4 (National Family Health Survey-4), International Institute for Population Studies. 2016. Accessed April 2017. <http://rchiips.org/NFHS/MP.shtml>.
- Madhya Pradesh Fact Sheet. NFHS-4 (National Family Health Survey-4), International Institute for Population Studies. 2016. Accessed April 2017. http://rchiips.org/NFHS/pdf/NFHS4/MP_FactSheet.pdf.
- NIC Madhya Pradesh: About Madhya Pradesh. Madhya Pradesh State Government. Accessed April 2017. http://www.mp.nic.in/abt_mp.html.
- RSoc (Rapid Survey on Children), Ministry of Women and Child Development, Government of India. 2014. Accessed February 2017. <http://wcd.nic.in/acts/rapid-survey-children-rsoc-2013-14>.

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

Nitya George, Research Analyst, IFPRI

Phuong Hong Nguyen, Research Fellow, IFPRI

Rasmi Avula, Research Fellow, IFPRI

Lan Mai Tran, Independent Consultant

Purnima Menon, Senior Research Fellow, IFPRI

SUGGESTED CITATION

Please cite this Note as: George, N., R. Avula, P.H. Nguyen, L.M. Tran and P. Menon. 2017. *Improving Nutrition in Madhya Pradesh: Insights from Examining Trends in Outcomes, Determinants and Interventions between 2006 and 2016*. POSHAN Policy Note 13. New Delhi, India: International Food Policy Research Institute.

ACKNOWLEDGEMENTS

Financial support for this Policy Note was provided by the Bill & Melinda Gates Foundation through POSHAN, led by the International Food Policy Research Institute. The funder played no role in decisions about the scope of the analysis or the contents of this Note. 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 decision-making. 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

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
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.