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BILL & MELINDA GATES foundation

AN EQUITY ANALYSIS ON ZERO DOSE CHILDREN IN INDIA FROM THE NATIONAL FAMILY HEALTH SURVEY DATA: WHERE WE STAND AND THE ROAD AHEAD

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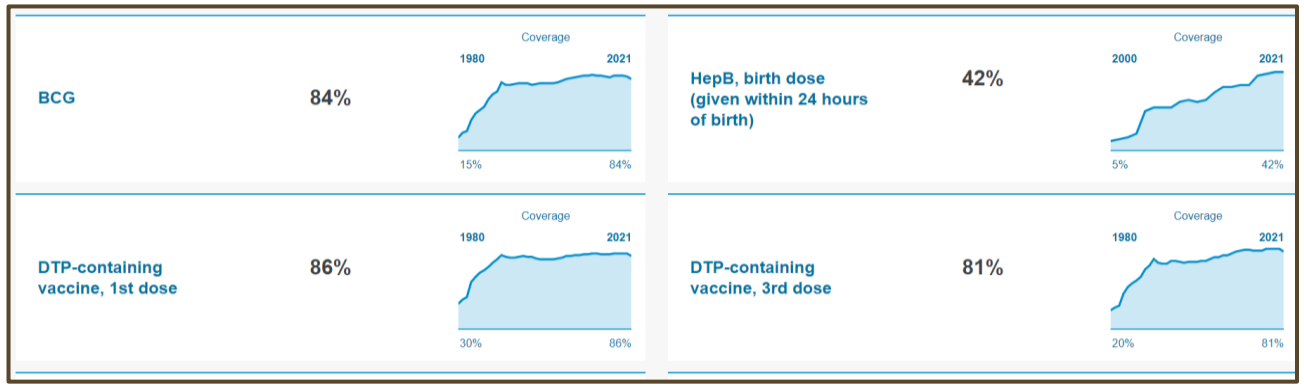
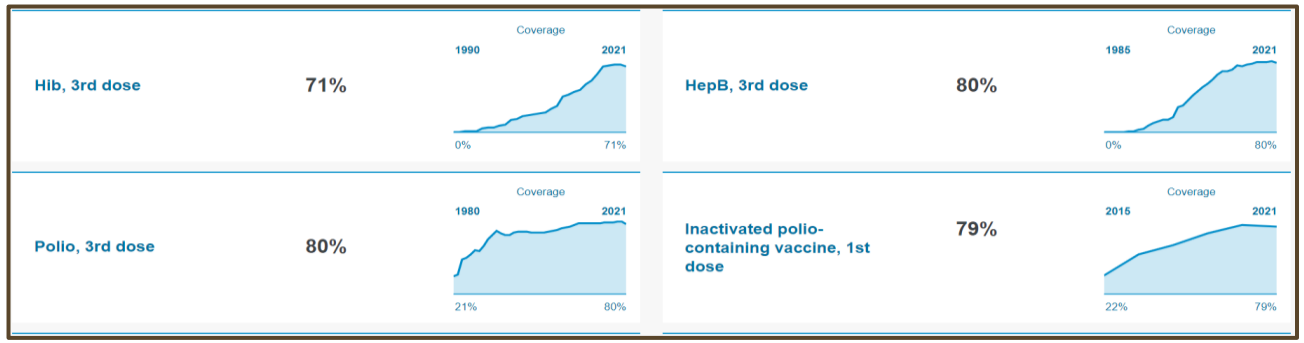
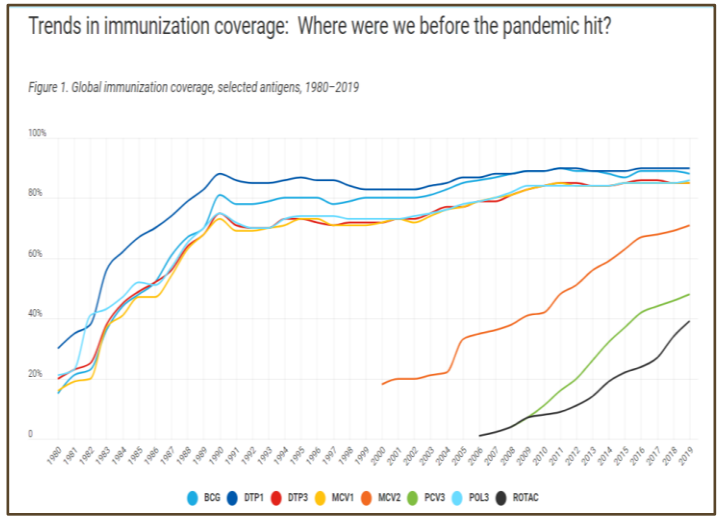
- IHEA world congress organizing team

PRE-PANDEMIC GLOBAL IMMUNIZATION SCENARIO : CONSISTENT PROGRESS BUT CHALLENGES REMAIN

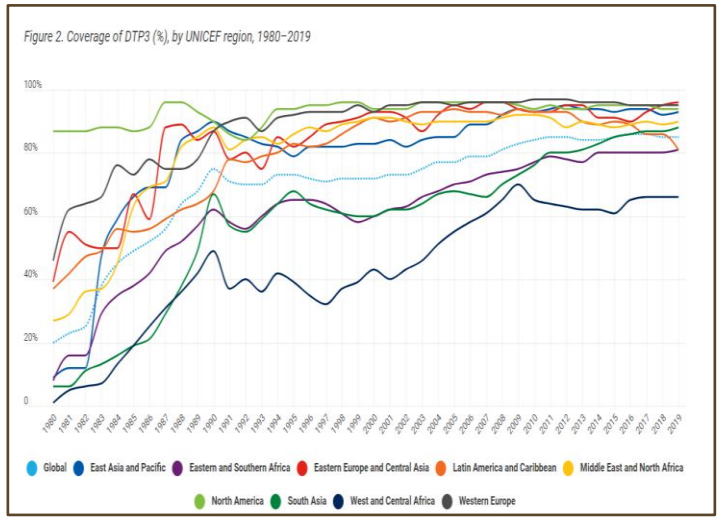




- Immunization is one of the most cost-effective public health interventions to date, saving an estimated 2 to 3 million lives each year.
- The world is closer than ever to eradicating polio, and deaths from measles – a major child killer – have declined by 73 per cent worldwide between 2000 and 2018, saving an estimated 23.2 million children's lives.
- From 2011 to 2030, immunization would avert $1510.4 billion ($674.3-$2643.2 billion) (2018 USD) in costs of illness in the 94 modeled countries, compared with the counterfactual of no vaccination.



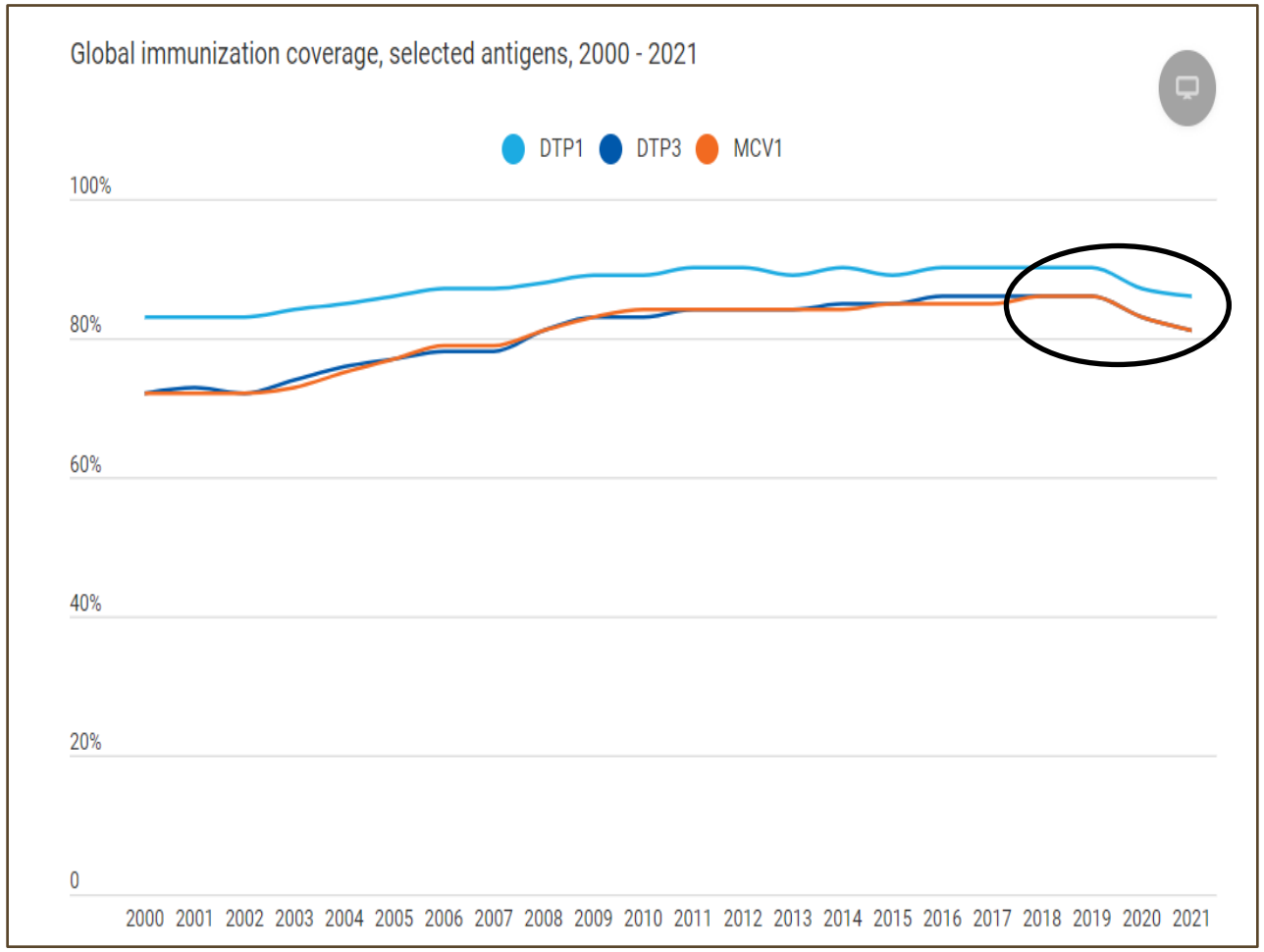
- Global trends from 1980 to 1990 show a rapid escalation
- Followed by a slower pace of progress until 2010
- Gradual plateauing in progress through 2019



- Regional trends in coverage of the third dose of DTP3 reveals considerable unevenness in progress.
- The West and Central Africa region is lagging behind
- Progress is not linear, and gains achieved can be lost.

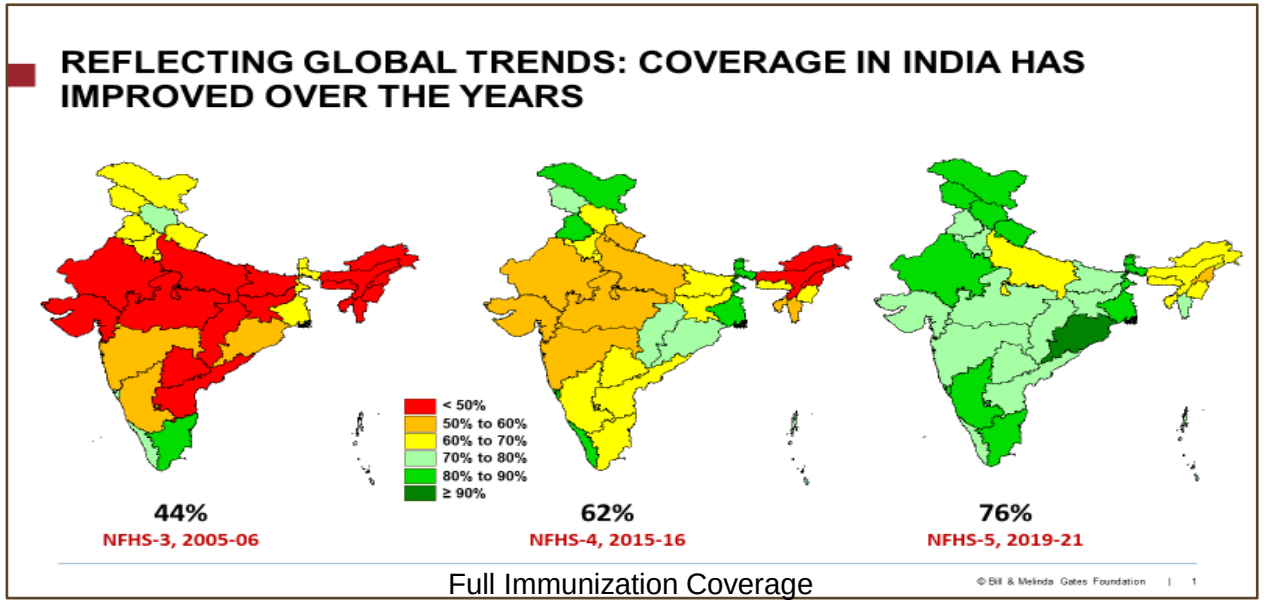
https://immunizationdata.who.int/, https://data.unicef.org/resources/immunization-coverage-are-we-losing-ground/, https://pubmed.ncbi.nlm.nih.gov/33431157/
WHO/UNICEF Estimates of National Immunization Coverage, 2019 Revision, https://data.unicef.org/resources/immunization-coverage-are-we-losing-ground

THE GLOBAL IMPACT OF THE PANDEMIC

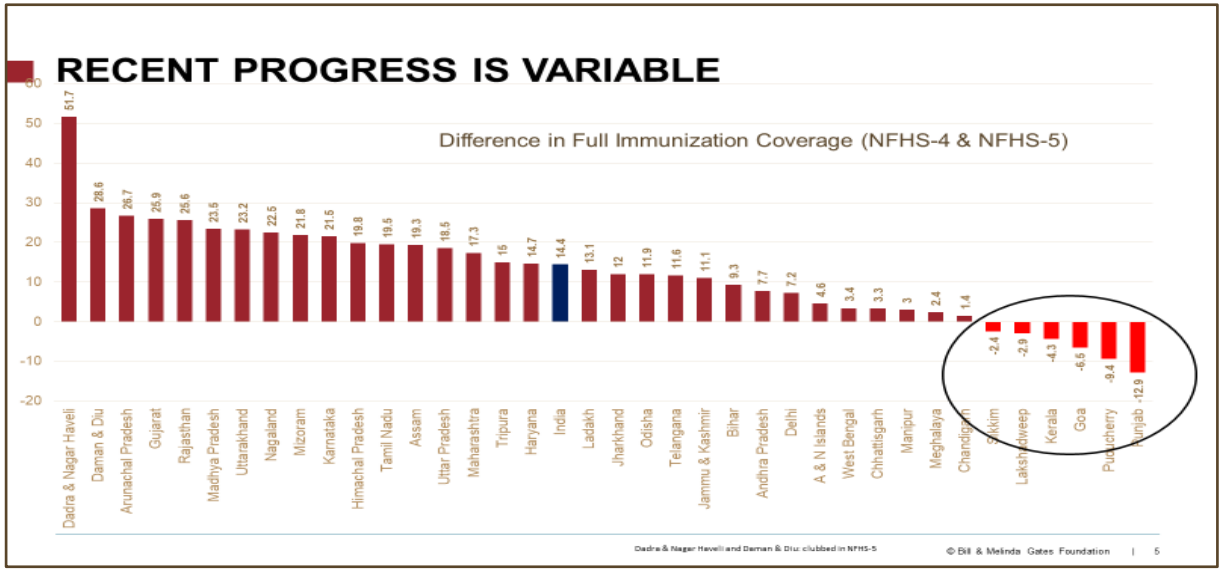


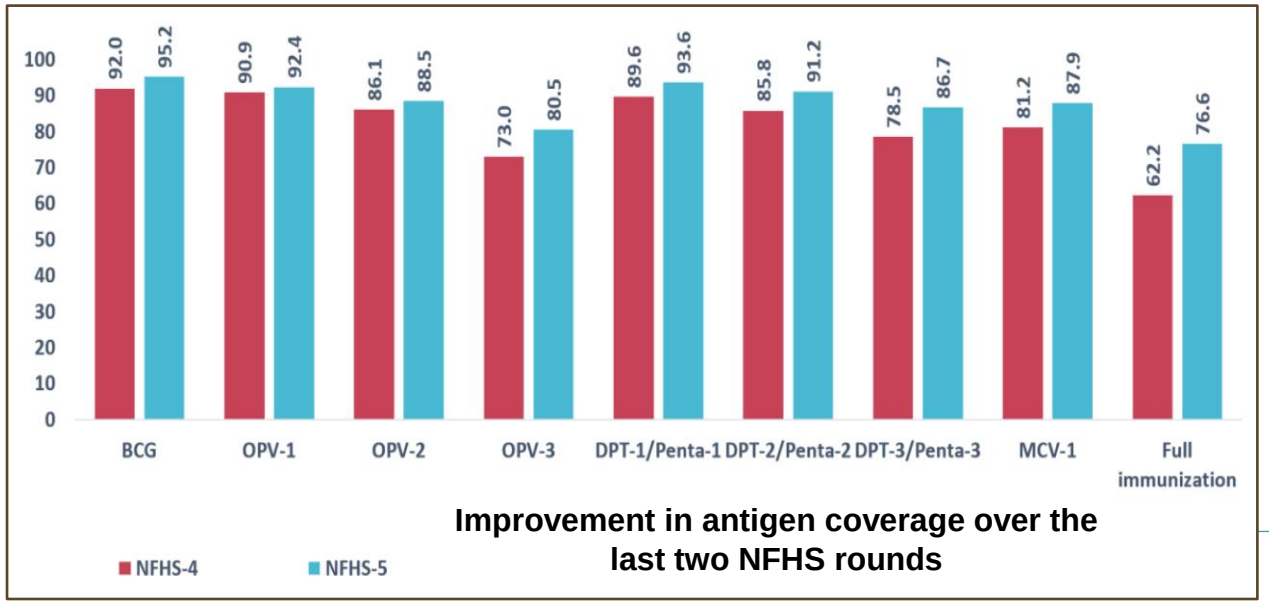
- In 2021, 25 million children missed out on lifesaving vaccines, 2 million in addition to the figure in 2020 and 6 million in addition to the figure in 2019.
- **Global coverages have declined, drop of DPT-1 from 90% in 2019 to 86% in 2021**
- **The number of Zero Dose (ZD) children has increased from 13 million in the pre-pandemic period (2019) to 18 million in 2021**

ROUTINE IMMUNIZATION IN INDIA



Full Immunization Coverage





Improvement in antigen coverage over the last two NFHS rounds

Impact of the pandemic

Indicator	2019	2020	2021
DPT 1 / Penta 1	94%	87%	88%
DPT 3 / Penta 3	91%	85%	85%
MCV 1	95%	89%	89%

2.7m ZD children in 2021, up from 1.6m in 2019 (the maximum across countries)

THE ZERO DOSE CHILDREN:

THE MOST MARGINALIZED & VULNERABLE POPULATION COHORT

- Children who have not received basic vaccinations, operationally measured as not those who have not received a single dose of Diphtheria, Pertussis and Tetanus (DPT) containing vaccine.
- Two-thirds of zero-dose children in 2019 lived in just five countries: Nigeria, India, the DRC, Pakistan and Ethiopia. A further 18% lived in 16 fragile countries.
- Nearly 50% of zero-dose children live in three key geographic contexts: urban areas, remote communities and populations in conflict settings.
- Substantial variations between and within countries, for example DRC and Ethiopia have the largest number of zero-dose children in remote rural areas, while Nigeria has the largest number of zero-dose children impacted by conflict.
- Two-thirds of zero-dose children live in households surviving on less than US$ 1.90 per day – the international poverty line
- Pre-pandemic analyses suggesting that nearly 50% of vaccine preventable deaths occur among ZD children.

https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2801239, https://www.gavi.org/vaccineswork/zero-dose-child-explained

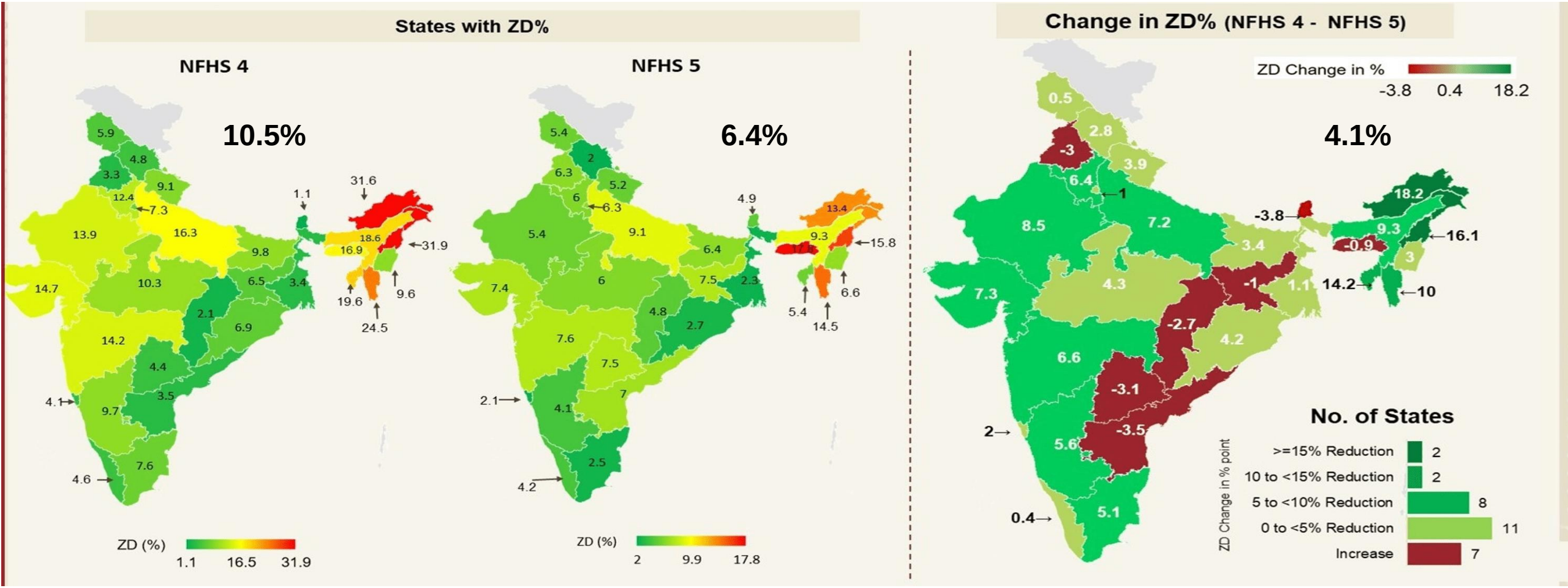
APPROACH

- Change across states of the country in reaching out to ZD children between the last two National Family Health Survey (NFHS) rounds (NFHS 5, 2019-2021 and NFHS 4, 2015-2016).
- NFHS is a large-scale, multi-round survey conducted in a representative sample of households throughout India
- The analysis presents findings of data sourced from the NFHS reports.
- Data for immunization is available for the point of service (public and private) and coverage estimates for individual antigens: BCG, hepatitis B birth dose, pentavalent (DPT, hepatitis B, and *Haemophilus influenzae* type b), oral polio vaccine, measles-containing vaccine (MCV), and rotavirus vaccine (RVV)
- Data is available for key equity parameters including gender, place of residence, religion, birth order, caste, and mother's schooling
- ZD proportions were measured using pentavalent 1 coverage as the indicator.
- The key determinants studied include the change in ZD prevalence at the national, state, and district levels; the proportion of change in equity determinants; the states with maximum improvements & the maximum disparity across these indicators.

LIMITATIONS

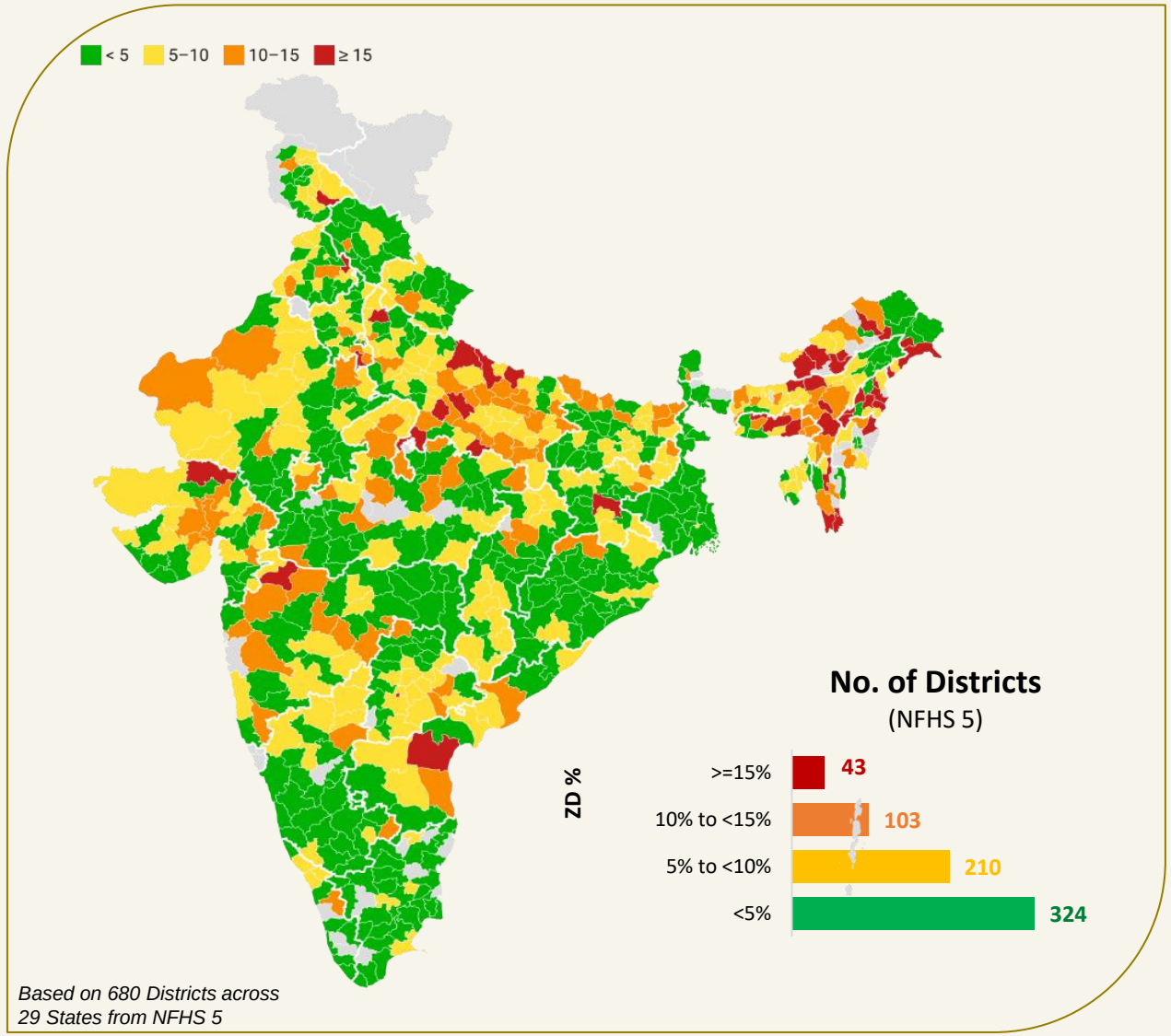
- As the analysis has been sourced from NFHS reports, the results need to be interpreted with caution
- The variability in the availability of data for certain equity determinants has also limited analysis to a certain extent
- The early trends sourced from NFHS reports need to be complemented with detailed analysis from NFHS micro data to better identify and account for uncertainty estimates and rule out differences and reductions attributable to chance
- The NFHS mico data should be further explored to better understand the interplay of the equity determinants at the national, state, and district levels
- The high baselines for ZD prevalence across certain states in NFHS 4 also need to be factored in while reflecting on the reduction between the two rounds

ZD CHILDREN: THE INDIAN SCENARIO – INSIGHTS FROM NFHS 4 (2015-16) & NFHS 5 (2019-21)



- Between the two NFHS rounds, 4 states reported a 10% or higher reduction in prevalence
- Highest prevalence is reported in the northeastern states of Meghalaya, Nagaland, Mizoram, and Arunachal Pradesh.
- Prevalence increased between 2016 and 2021 in 7 states, including several traditionally high-performing states and UTs, such as Andhra Pradesh, Punjab, Telangana, and Sikkim

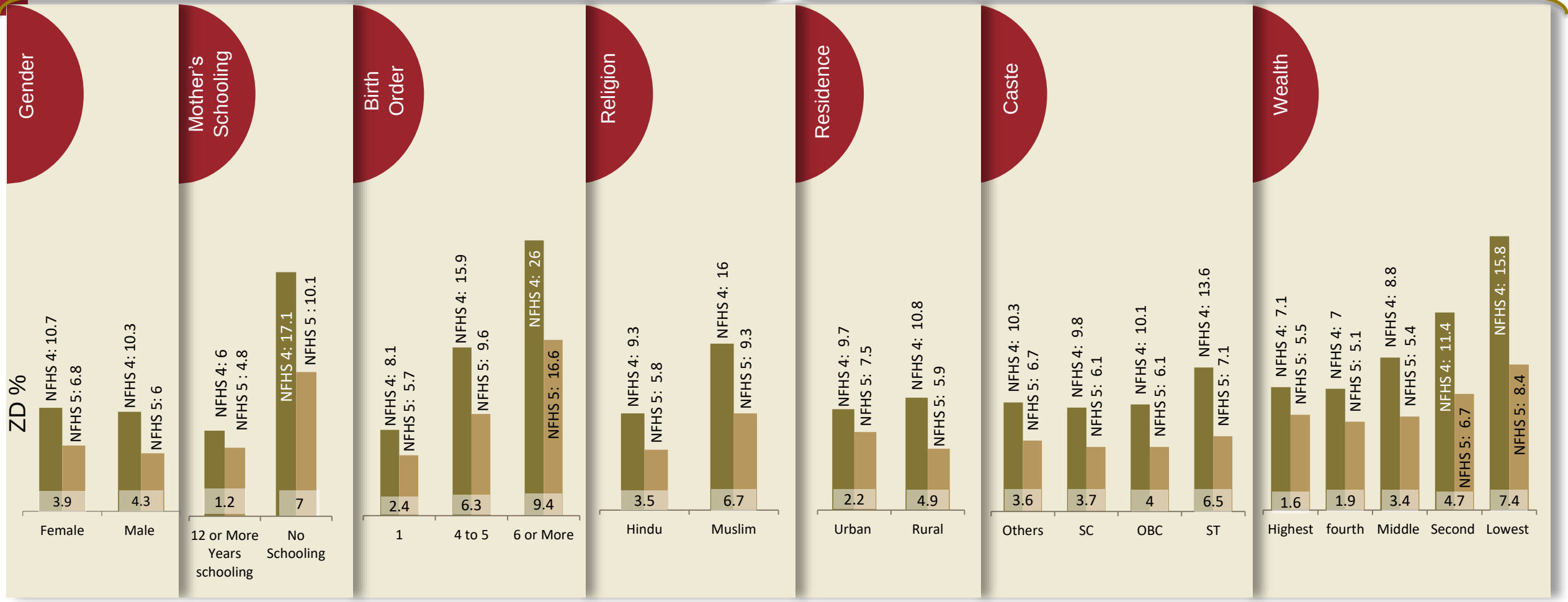
DISTRIBUTION ACROSS DISTRICTS (NFHS 5)



Based on 680 Districts across 29 States from NFHS 5

- **There are 82 districts with all the children have received Penta-1. Of these 12 districts are from Odisha.**
- Most of the districts in the North-Eastern states, except Tripura and some districts of Arunachal Pradesh, have a ZD prevalence of more than 5%.
- **"North Garo Hills" of Meghalaya has maximum ZD proportion (42.1%).**
- **43 districts with >=15% ZD**
  - Arunachal Pradesh : 9
  - Uttar Pradesh: 8
  - Nagaland: 7
  - Assam: 4
  - Meghalaya & Mizoram: 3 each
  - AP, Guj, Har, J&K, JHK, MH, Manipur, Punjab & TL: 1 each

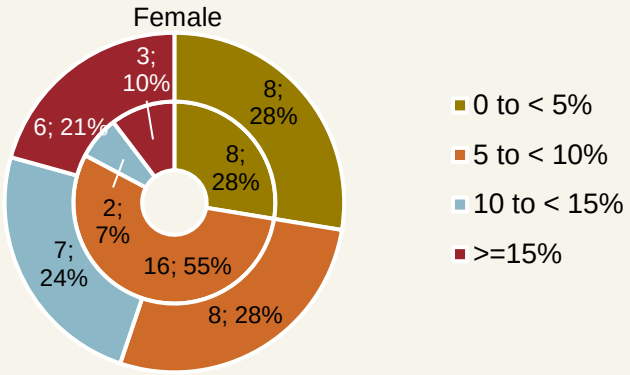
ZD & EQUITY DETERMINANTS (INDIA)

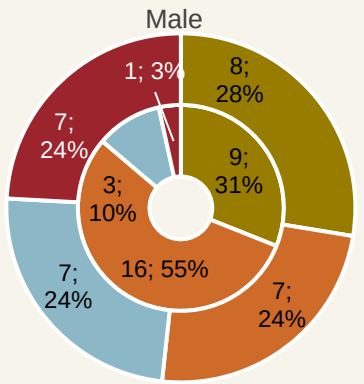


- The maximum reduction has been for cohorts that have been traditionally vulnerable and marginalized: 4.9% in rural geographies, 6.7% among Muslim children, 6.5% among Scheduled Tribe (ST) population groups, 9.4% among children with birth order six and above, 7.0% among mothers with no schooling, and 7.4% among populations in the lowest wealth quintile.
- Slow-footed reduction among ZD children for girl children, across urban geographies, first-born children, mothers with 12 or more years of schooling, and children in families with the highest wealth quintiles.

ZERO DOSE & GENDER

Distribution of ZD% (No. of States and its Proportion)



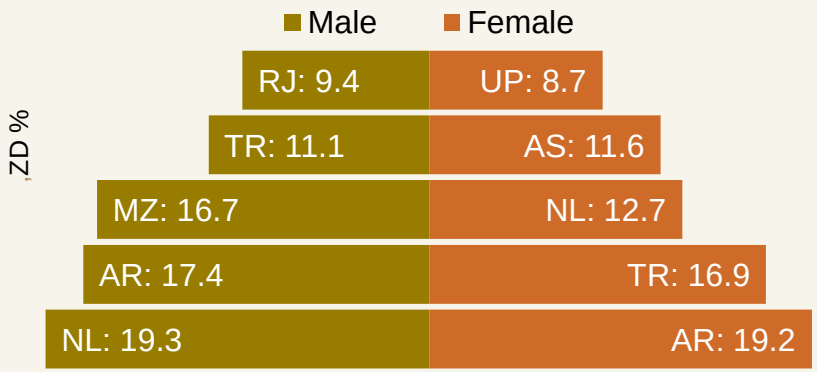


NFHS 5-inner circle ; NFHS-4 outer circle

- **Female ZD < Male ZD in 34% states in NFHS 5, a dip of 4% as compared to NFHS 4.**
- Male ZD has increased in 6 States and female ZD in 8 States.

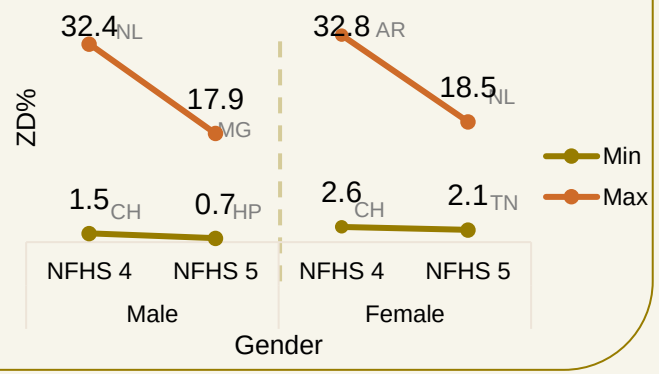
Top 5 States with max Improvement in ZD%

(NFHS 4 minus NFHS 5)



Reduction in disparities

(Male > Female)



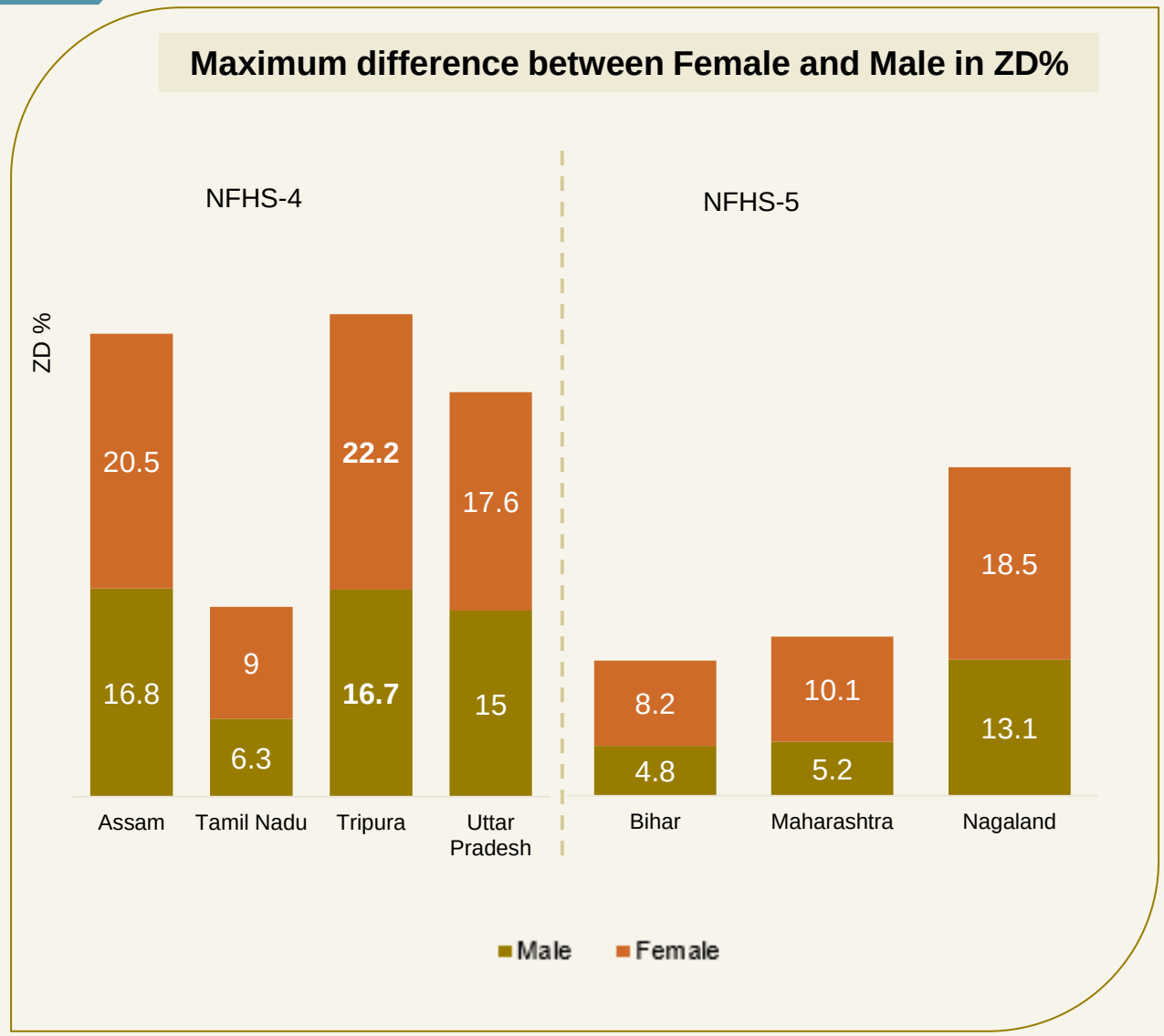
Exemplar : Tripura

- **The State has shown appreciable improvement in male (11.1%) and female (16.9%) ZD proportions.**
- Highest difference between female and male ZD% in NFHS 4 (female ZD > male ZD by 5.5%).
- Trend reversed in NFHS 5, female ZD < male ZD by 0.3%.

Note: From NFHS 5 Goa is excluded and NFHS 4 NCT Delhi excluded from this this analysis due to non-availability of data

RJ: Rajasthan, TR: Tripura, MZ: Mizoram, AR: Arunachal Pradesh, NL: Nagaland, UP: Uttar Pradesh, AS: Assam, NL: Nagaland

ZERO DOSE & GENDER (CONTD…)



Example of Inequities

- **Bihar:** Marginal improvement in female ZD (0.9%) as compared to male ZD (5.7%)

ZD %	Male	Female
NFHS 4	10.5	9.1
NFHS 5	4.8	8.2

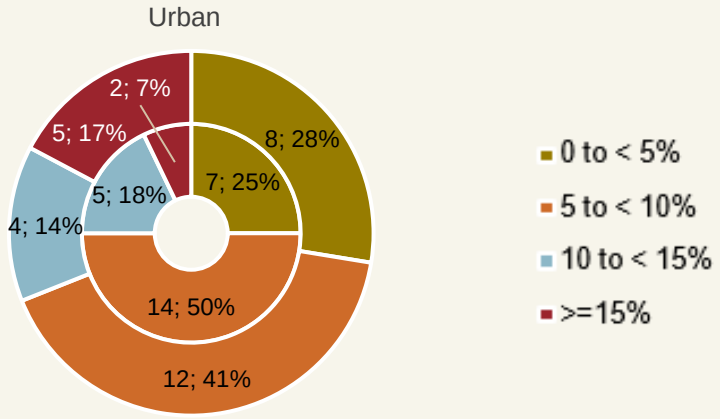
- **Maharashtra:** Improvement in female ZD (4.7%) relatively less than male ZD (8.4%)

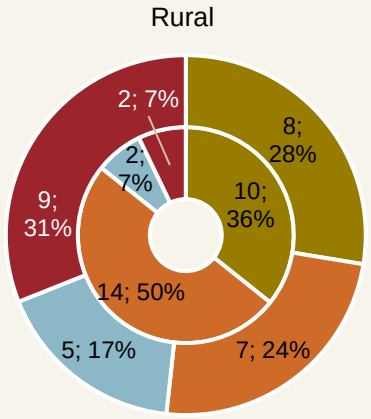
ZD %	Male	Female
NFHS 4	13.6	14.8
NFHS 5	5.2	10.1

Note: From NFHS 5 Goa is excluded and NFHS 4 NCT Delhi excluded from this this analysis due to non-availability of data

ZERO DOSE & RESIDENCE

Distribution of ZD% (No. of States and its Proportion)



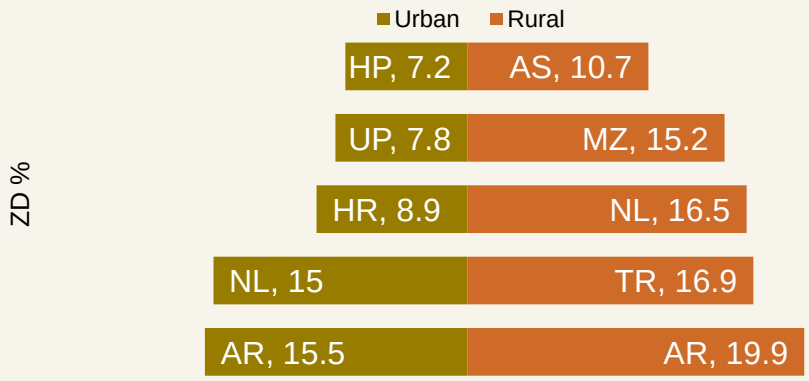


NFHS 5-inner circle ; NFHS-4 outer circle

- Urban ZD < Rural ZD in 34% states in NFHS 5, substantial decline of 32% as compared to NFHS 4.
- **Urban ZD has increased in 9 States and rural ZD in 4 States.**

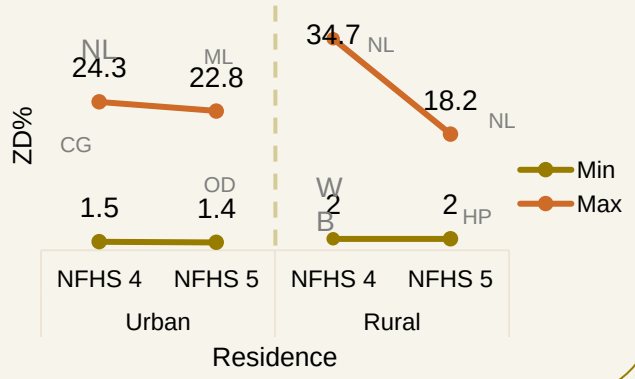
Top 5 States with max Improvement in ZD%

(NFHS 4 minus NFHS 5)



Reduction in disparities

(Rural > Urban)



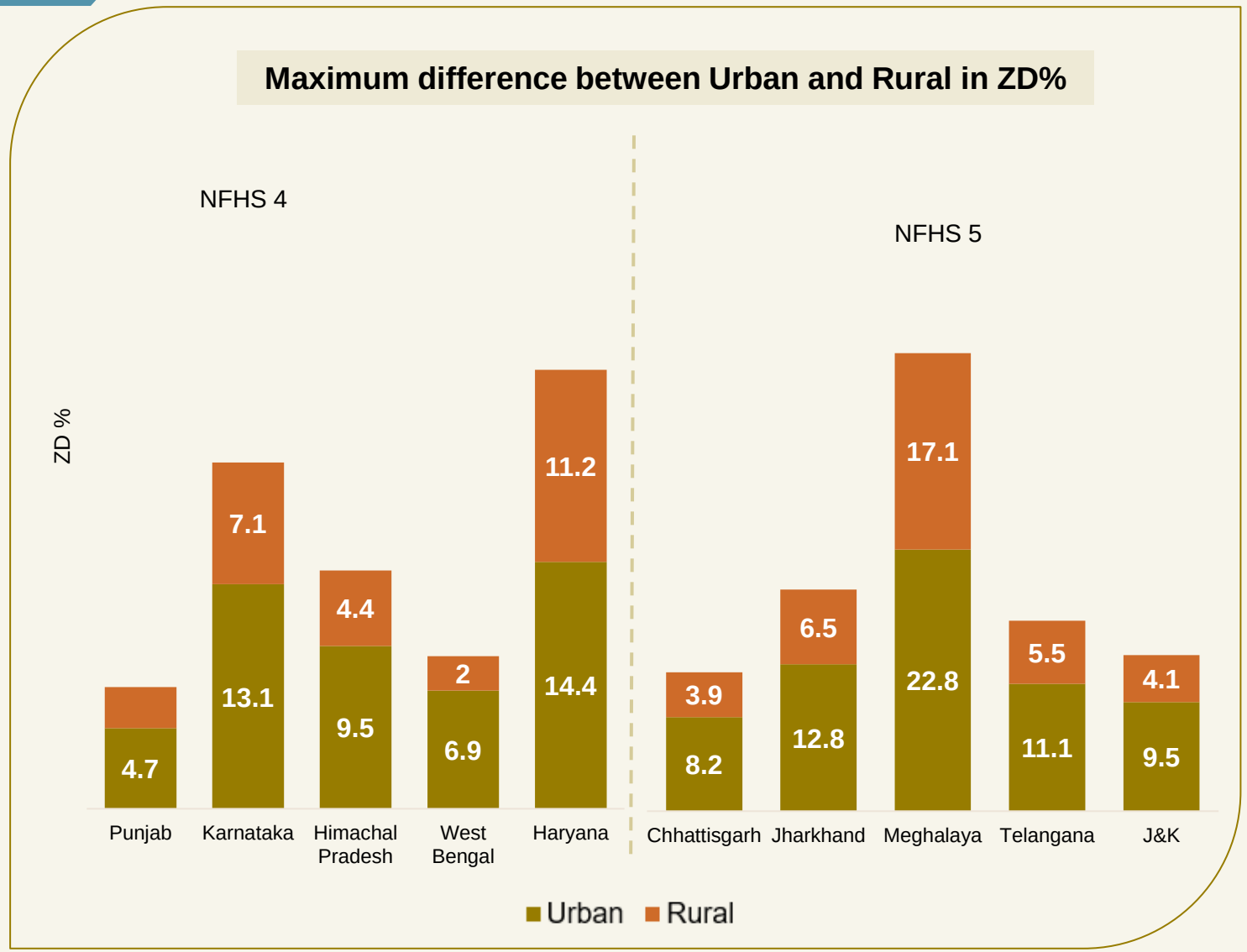
Exemplar : Arunachal Pradesh

- **Appreciable improvement in urban (15.5%) and rural (19.9%) ZD proportions.**

Note: From NFHS-5 Goa and Sikkim are excluded and NFHS-4 NCT Delhi is excluded from this analysis due to the non availability of data

HP: Himachal Pradesh, UP: Uttar Pradesh, HR: Haryana, NL: Nagaland, AR: Arunachal Pradesh, AS: Assam, MZ: Mizoram

ZERO DOSE & RESIDENCE (CONTD…)



Example of Inequities

- In **Andhra Pradesh, Chhattisgarh & Punjab** ZD proportion have increased in both urban and rural areas.

	ZD%	AP	CG	PB
Urban	NFHS 4	2.3	1.5	4.7
	NFHS 5	10.6	8.2	10.2
Rural	NFHS 4	3.9	2.2	2.4
	NFHS 5	5.4	3.9	6.6

- **Jharkhand** - increase in urban ZD, improvement in rural ZD stagnated

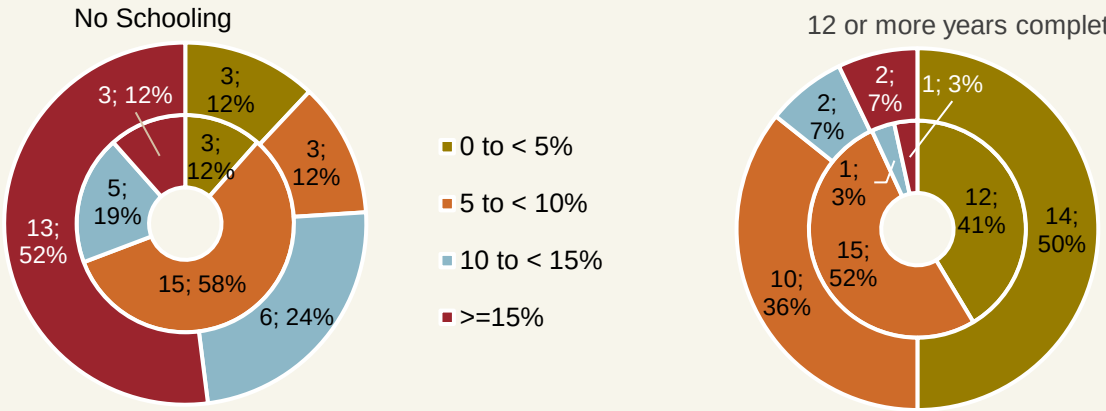
ZD %	Urban	Rural
NFHS 4	3.4	6.8
NFHS 5	12.8	6.5

- **Meghalaya -** increase in urban ZD (16.7%)

Note: From NFHS-5 Goa and Sikkim are excluded and NFHS-4 NCT Delhi is excluded from this analysis due to the non availability of data

ZERO DOSE & MOTHER'S SCHOOLING

Distribution of ZD% (No. of States and its Proportion)

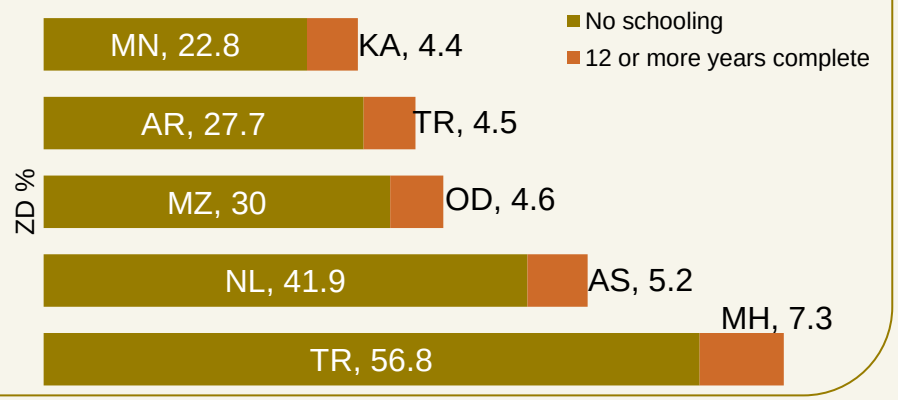


NFHS 5-inner circle ; NFHS-4 outer circle

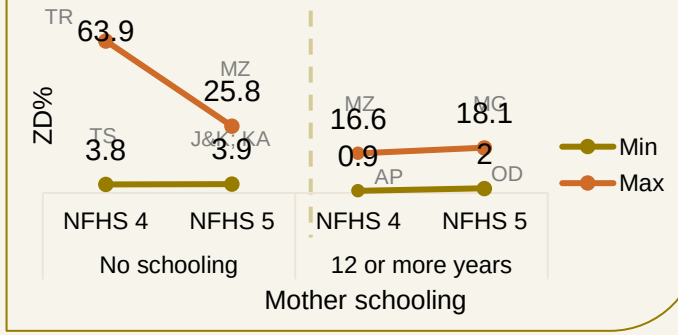
- States reporting ZD prevalence >15% among mothers with no schooling has reduced from 52% to 12%.
- ZD in case of no schooling has increased in 5 States and for 12 or more years of schooling in 14 States.

Top 5 States with max Improvement in ZD%

(NFHS 4 minus NFHS 5)



Maximum reduction in inequities (possibly the best performing equity indicator), however improvement has reversed in the educated group



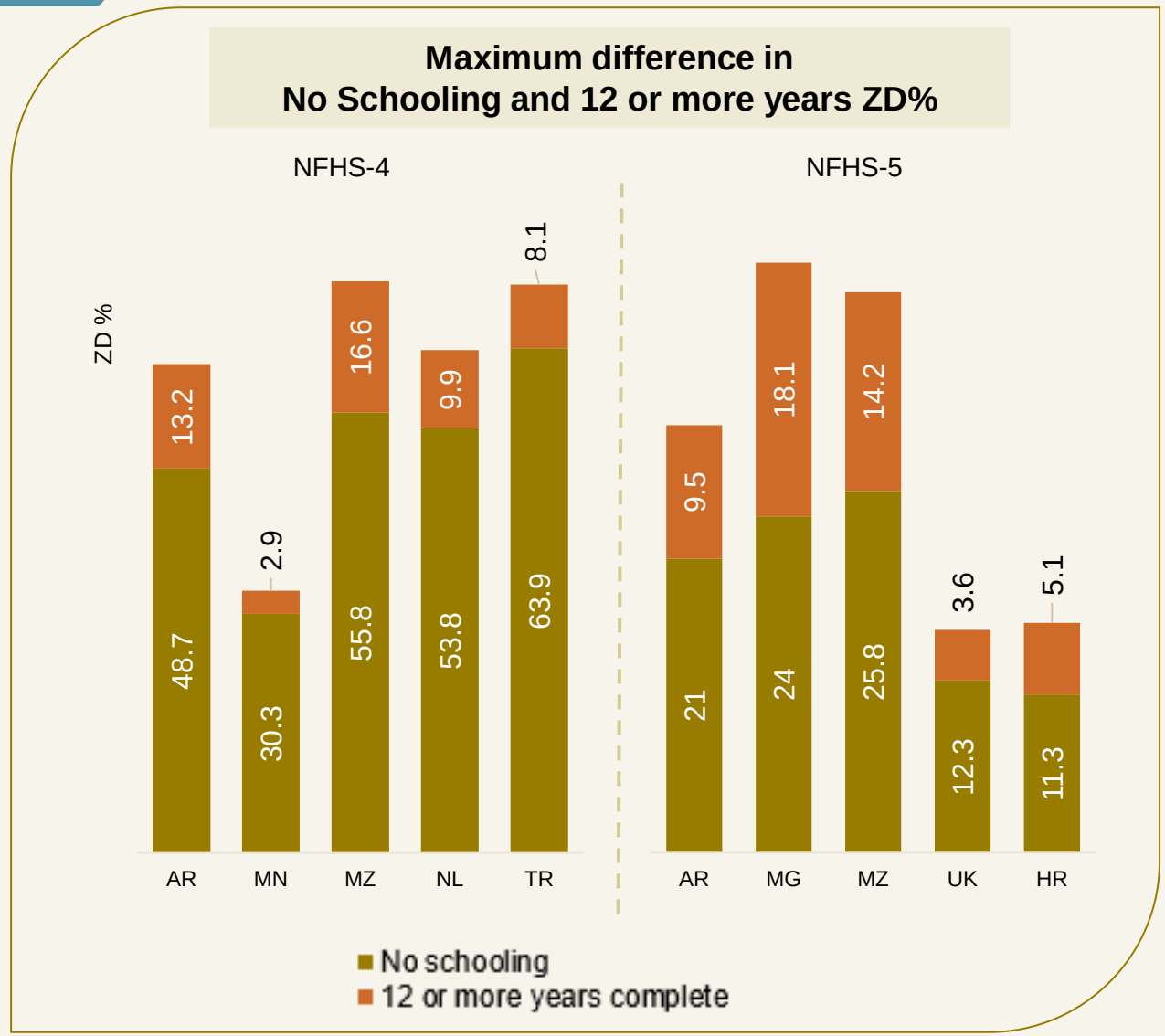
Exemplar : Tripura

- **Significant reductions in ZD for both the groups**.
- During NFHS 4 the State was at a significant disadvantage (ZD for no schooling at 63.9%).
- For no schooling, ZD proportion decreased by an average of 11.4% points over the last 5 years.

Note: From NFHS 5 Goa is excluded and NFHS 4 NCT Delhi excluded from this this analysis due to non-availability of data

MN: Manipur, AR: Arunachal Pradesh, MZ: Mizoram, NL: Nagaland, TR: Tripura, KA: Karnataka, OD: Odisha, AS: Assam, MH: Maharashtra

ZERO DOSE & MOTHER'S SCHOOLING (CONTD…)



Example of Inequities

- **Andhra Pradesh & Chhattisgarh:** in-equities in both the groups has increased

ZD %	No Schooling	12 or more
Andhra Pradesh		
NFHS 4	5.9	0.9
NFHS 5	8	6
Chhattisgarh		
NFHS 4	3.9	1.1
NFHS 5	6	3.7

- **Meghalaya:** Despite reduction, inequities persist or worsened.

ZD %	No Schooling	12 or more
NFHS 4	29.2	2.7
NFHS 5	24	18.1

Note: From NFHS 5 Goa is excluded and NFHS 4 NCT Delhi excluded from this this analysis due to non-availability of data

AR: Arunachal Pradesh, MN: Manipur, MZ: Mizoram, NL: Nagaland, TR: Tripura, MG: Meghalaya, UK: Uttarakhand, HR: Haryana

CONCLUSION

Visible progress

- Reduction in ZD children by 4.1% between the two rounds, progress across all the key equity parameters.
- The maximum reduction has been for cohorts that have been traditionally vulnerable and marginalized.
- Reflective of the improved reach of the immunization program in India
  - Mission Indradhanush & Intensified Mission Indradhanush (Periodic Intensification of Routine Immunization rounds)
  - Electronic vaccine intelligence network (eVIN)
  - Strengthened Adverse Events Following Immunization (AEFI) and safety surveillance
  - Introduction of new vaccines (Rotavirus & Pneumococcal Conjugate Vaccine in the recent past)
  - Investments in primary health care and broader health system strengthening efforts

Challenges continue to exist

- Five states of the country with high Pentavalent 1 coverage rates have reported an increase in ZD prevalence.
- High prevalence in populous states of the country (Bihar, Madhya Pradesh, Maharasthra, Uttar Pradesh)
- North-eastern states in the country report the highest prevalence, urbanized pockets too report high burden
- More than 20% districts in the country have a ZD prevalence of >10%
- States such as Andhra Pradesh, Chhattisgarh, Jharkhand, Meghalaya, Punjab, and Telangana have slipped across multiple equity parameters
- Slow-footed reduction among ZD children for girl children, across urban geographies, first-born children, mothers with 12 or more years of schooling, and children in families with the highest wealth quintiles.

Effects of the pandemic have persisted, and India has world's largest # ZD children, estimated at 2.7 million in 2021

WHAT NEXT

IT IS NOT ABOUT THE NUMBERS, BUT INDIVIDUALS, FAMILIES AND COMMUNITIES WHO ARE OFTEN MASKED IN PUBLIC HEALTH

A 4P Approach to improve outcomes

- **Interventions at the Policy level**
  - The goal remains to reach an FIC of 90%, however national policies need to strongly advocate for no child to be left behind
  - Incentivizing healthcare workers for identifying ZD children
  - Adequate financial resourcing at the national and sub-national levels
- **Identifying the Population groups that need to be targeted**
  - Attention on micro clusters, overcoming existing service delivery challenges
  - Addressing migration and vaccine hesitancy in a coordinated manner
- **Leveraging existing Platforms**
  - Digital approaches which are unitized, unified, ubiquitous, and universal (CoWIN being adapted for immunization – UWIN)
  - Complementary programs (home visitations for the newborn and infants) need to be leveraged
  - New avenues such as behavioral insights and human-centered design approaches to be integrated with planning and implementation
  - Surveillance efforts to be ramped up to provide timely and granular data to better organize coverage and equity improvement efforts
- **Establishing Partnerships**
  - Engage stakeholders beyond immunization and beyond health to further expand the reach
  - Ensure a comprehensive sociocultural customized approach with health system strengthening as the lever

The 3I Principle: Identify, Immunize, Integrate

THANK YOU

An Equity Analysis of Zero-Dose Children in India Using the National Family Health Survey Data: Status, Challenges, and Next Steps