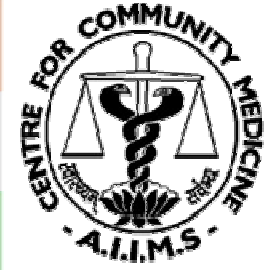




**Ballabgarh HDSS**

**Centre for Community Medicine**

**All India Institute of Medical Sciences, INDIA**



**INDEPTH 10<sup>th</sup> Annual General & Scientific Meeting**

**27<sup>th</sup> September, 2010**

**Accra, Ghana**

**Significant vaccination delay can occur even in a community with very high vaccination coverage: evidence from Ballabgarh, INDIA**



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Sanjay Rai, K Anand**

# Presentation strategy...



3

1. **Introduction**
2. **Objectives**
3. **Methods**
4. **Results**
5. **Discussion**
6. **Conclusions**
7. **Recommendations**



# INTRODUCTION



- **Vaccination coverage is one of the 3 indicators to monitor the progress towards achieving Millennium Development Goal 4 (MDG 4)**
- **While the focus in the country currently is appropriately on increasing vaccination coverage, vaccination coverage surveys may mask underlying delays in vaccination**



# INTRODUCTION ...2



- **Vaccination delay can affect the protective effect of vaccines during infancy and early childhood when the disease incidence and mortality are highest<sup>1,2</sup>**
- **Altered sequence of vaccination, by interactions in immune stimulant effect of vaccines, may have implications for vaccine effectiveness<sup>3,4</sup>**

1 - Semba RD, de Pee S et al. Malnutrition and infectious disease morbidity among children missed by the childhood immunization program in Indonesia. Southeast Asian J Trop Med Public Health 2007; 38: 120–29.

2 - Bates AS et al. Risk factors for underimmunization in poor urban infants. JAMA. 1994; 272: 1105–10.

3 - Peter Aaby et al. Differences in female-male mortality after high-titre measles vaccine and association with subsequent vaccination with diphtheria-tetanus-pertussis and inactivated poliovirus: reanalysis of West African studies. Lancet. 2003; 361(9376): 2183 – 2188.

4 - Aaby Peter et al. Increased Female-Male Mortality Ratio Associated With Inactivated Polio and Diphtheria-Tetanus-Pertussis Vaccines: Observations From Vaccination Trials in Guinea-Bissau. The Pediatric Infectious Disease Journal. 2007;26 (3) :247-252.



# INTRODUCTION ...3



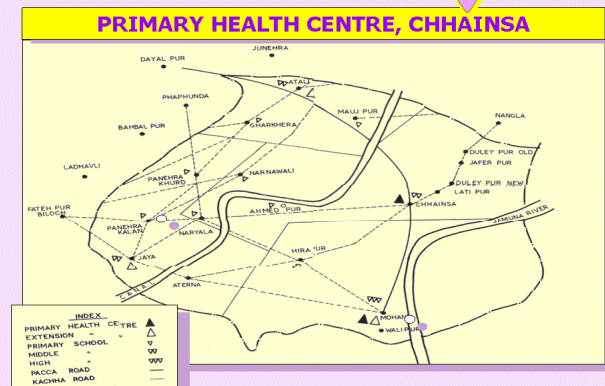
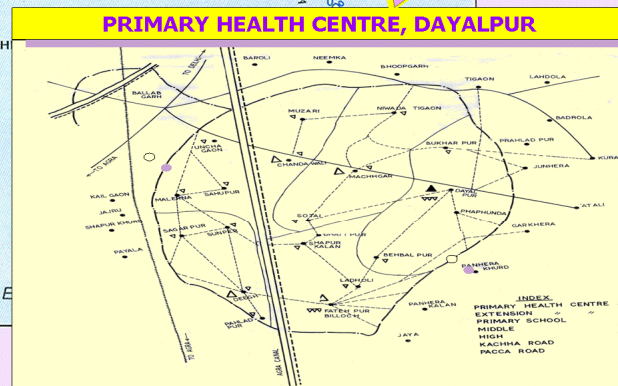
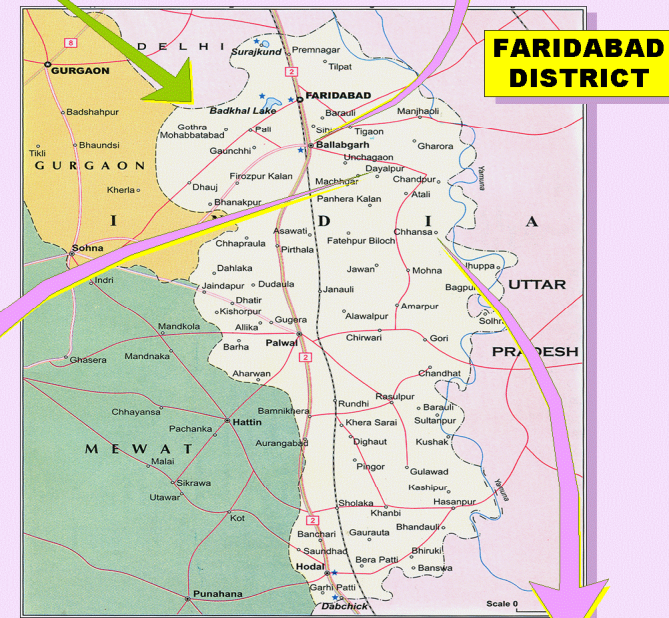
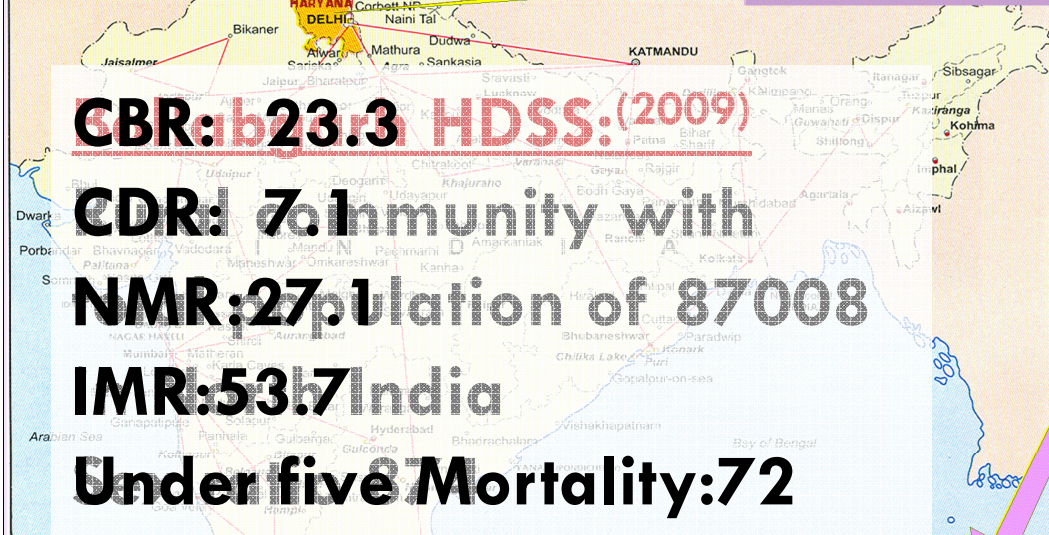
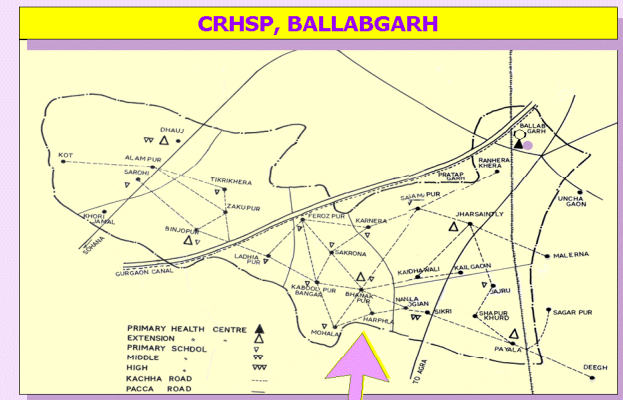
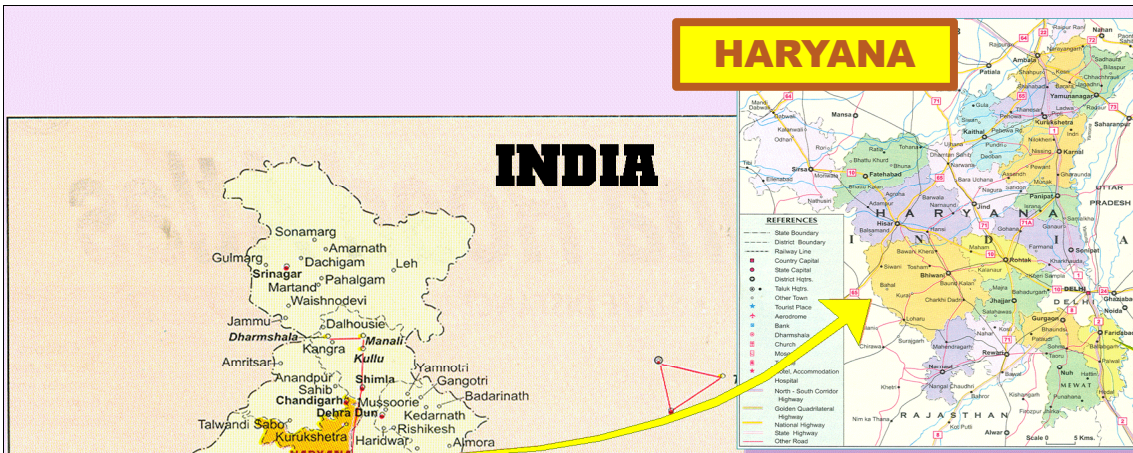
- **Significant delay in vaccination would expose the children to risk of acquiring infection due to vaccine preventable diseases for a greater period of time**
- **The current record based analysis of vaccination data from Ballabgarh Health and Demographic Surveillance Site (HDSS) was undertaken to**

**Estimate the delay in vaccination for National Immunization Schedule (NIS) vaccines in under-five children and to explore the causes for this delay**





# METHODS

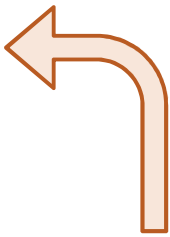




# Vaccination at CRHSP, Ballabgarh



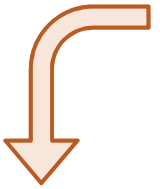
Health workers administer the vaccine



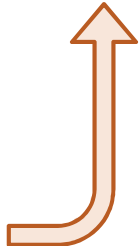
Computer generates monthly house to house visit work plan for HW



Vaccination data including vaccination dates are recorded by health workers



Monthly entry of all the births & Vaccination into the HMIS, hence updating of individual based temporal relational database



# Methodology



## Study population:

- Children born after 1<sup>st</sup> January, 1991 and before 31<sup>st</sup> December 2004

**Study design:** Record based retrospective study supplemented by Qualitative component

## Data collection:

- Vaccination data was accessed for the under-five HDSS population from period of 1991-2004
- To ascertain cause of Delay: Focus group Discussions and interviews



# Data analysis



- **Vaccination coverage for individual vaccines was computed at different ages**
- **Median age at vaccination with inter-quartile range**
- **Survival curve for age at vaccination with vaccination defined as outcome event, were plotted for individual vaccines using Stata 9 & median delay in vaccination and percentage with delayed vaccination were computed**





# Vaccination Delay Definition

**Delay in vaccination was defined for each individual vaccine**

**(No std. definition was available for delay, hence NIS was used for the reference)**

S No	Vaccine	NIS	Delay-1	Delay-2 (alt.)
1	BCG/OPV0	At birth (Instit. Del.)	>6 weeks	>8 weeks
2	OPV1/DPT1	6 weeks	>6 weeks	>8 weeks
3	OPV2/DPT2	10 weeks	>10 weeks	>12 weeks
4	OPV3/BCG3	14 weeks	>14 weeks	>16 weeks
5	Measles	9-12 months	>9 months	>12 months
6	OPVb/DPTb	16 to 24 months	>24 months	

## **Alternate definition**

- 1. Gap between different doses of vaccination**
- 2. Other studies, Clark et al<sup>1</sup>**

\*Clark A, Sanderson C. Timing of children's vaccinations in 45 low-income and middle-income countries: an analysis of survey data. Lancet 2009;273:1543-1549.



# Ascertain the causes of Delay



Leading causes of delay in vaccination were identified from

1. Questionnaire based Interview of the program managers
2. Two Focus group discussion (FGD) with health workers (Male and Female)



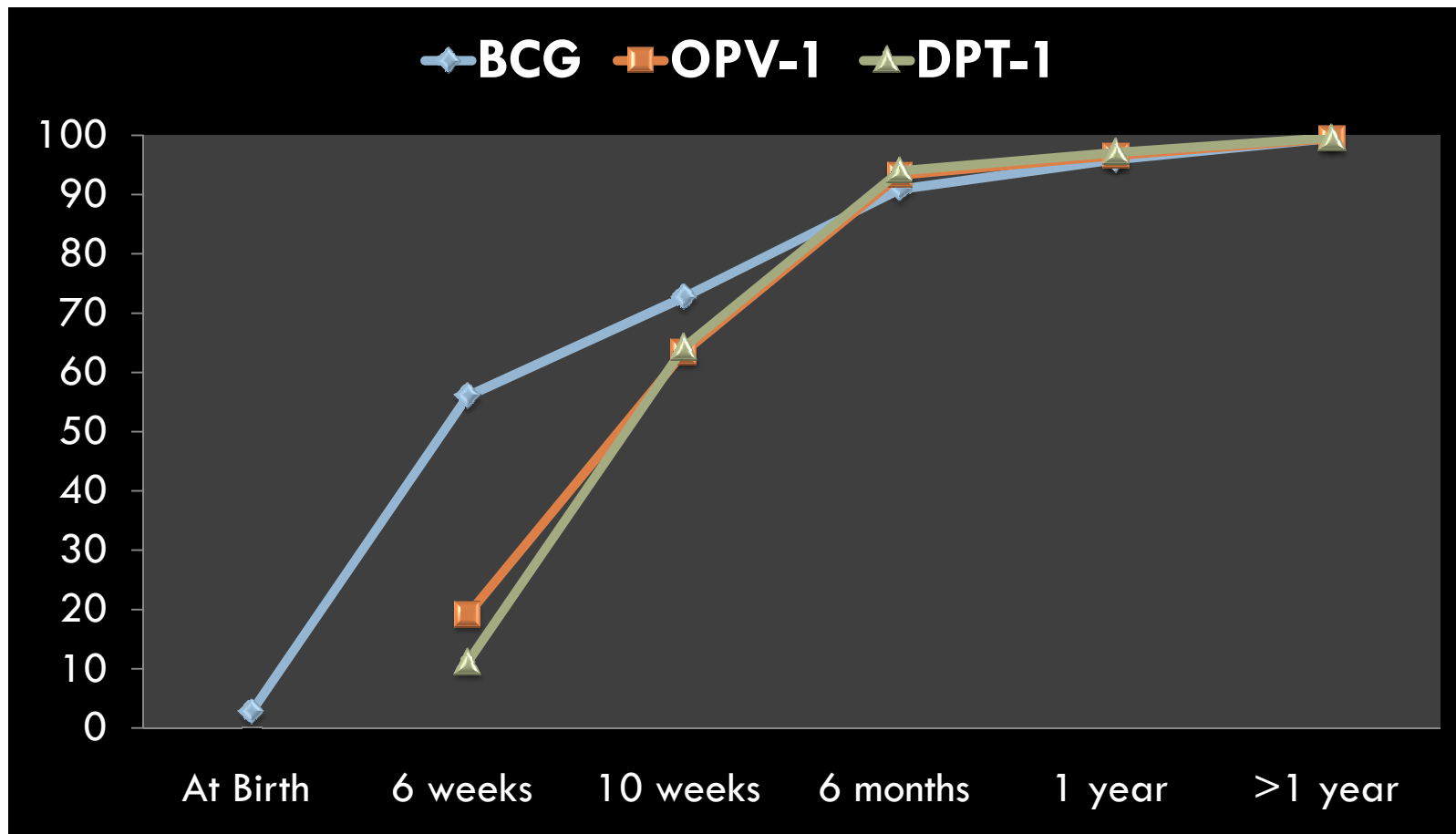


# RESULTS

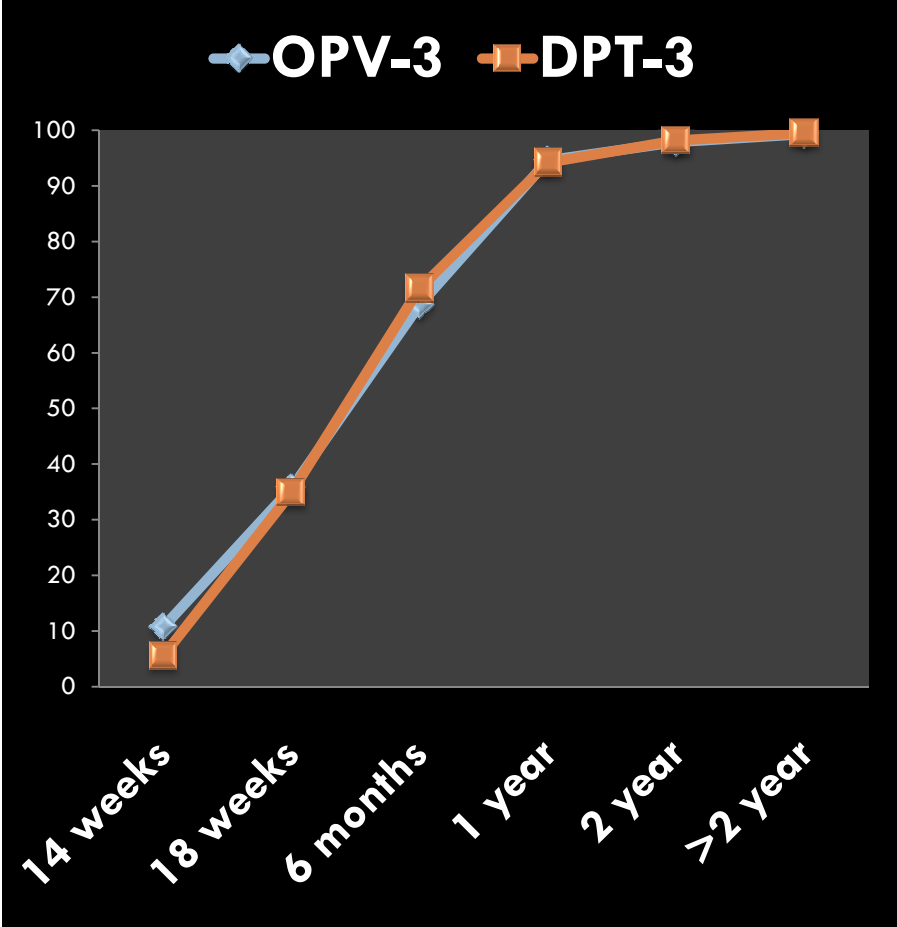
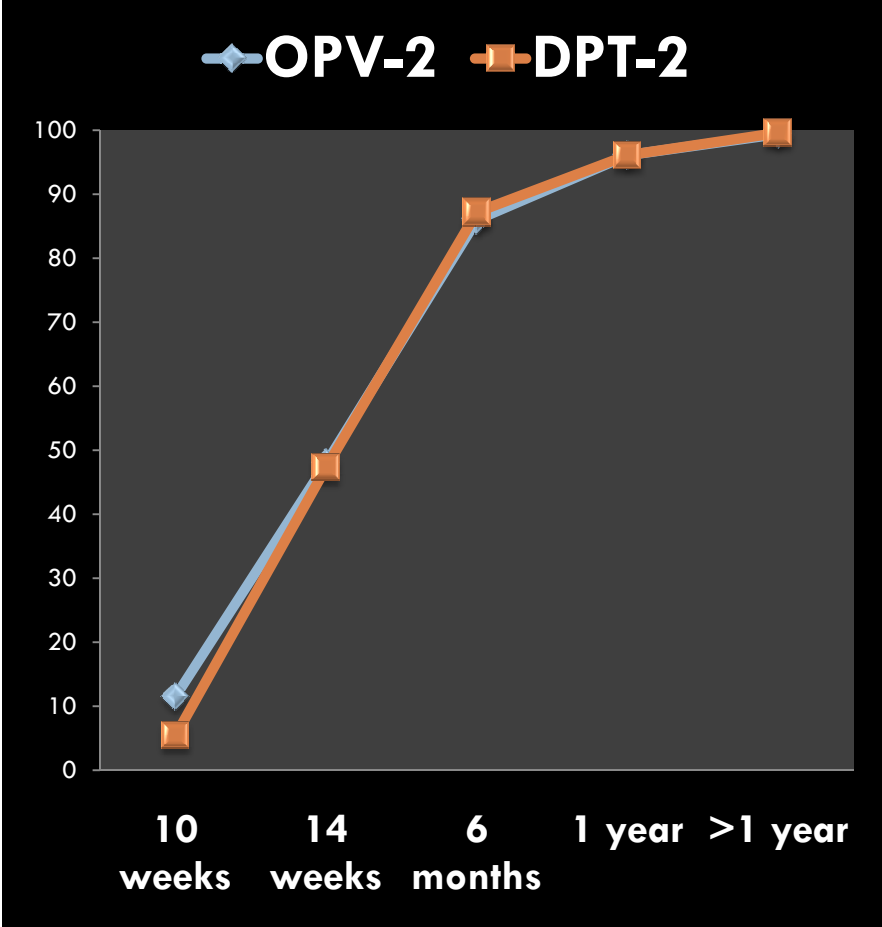
**25,517 underfives (53% males and 47% Females)**



# Vaccination Coverage...1

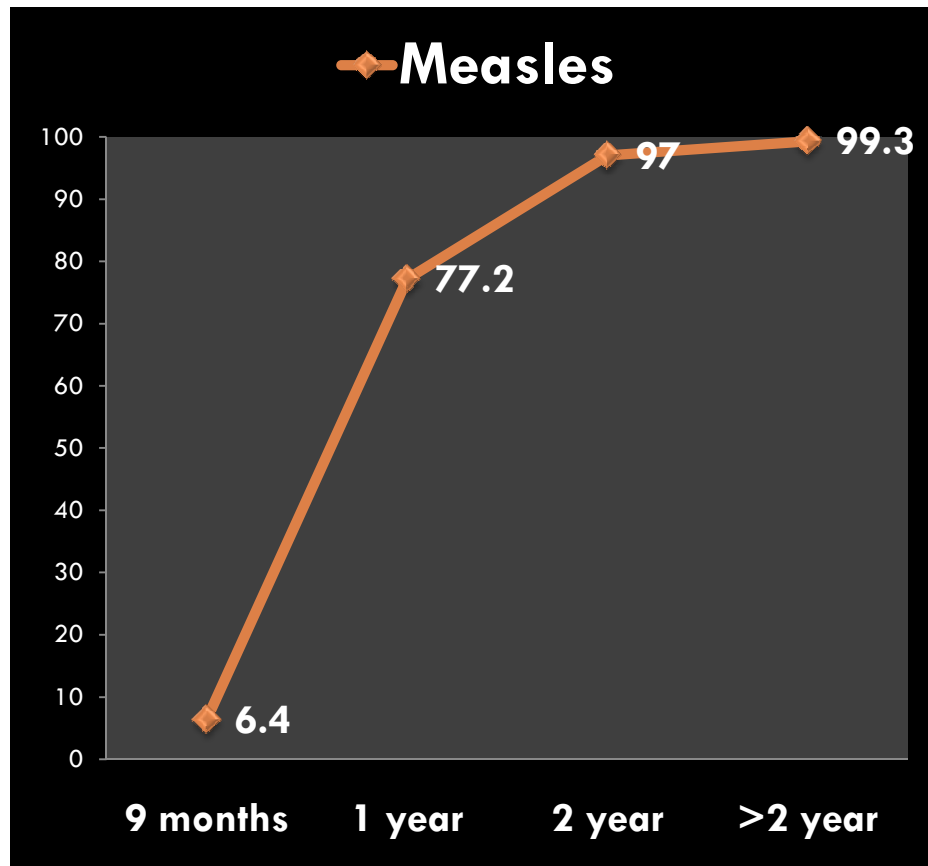


# Vaccination Coverage...2





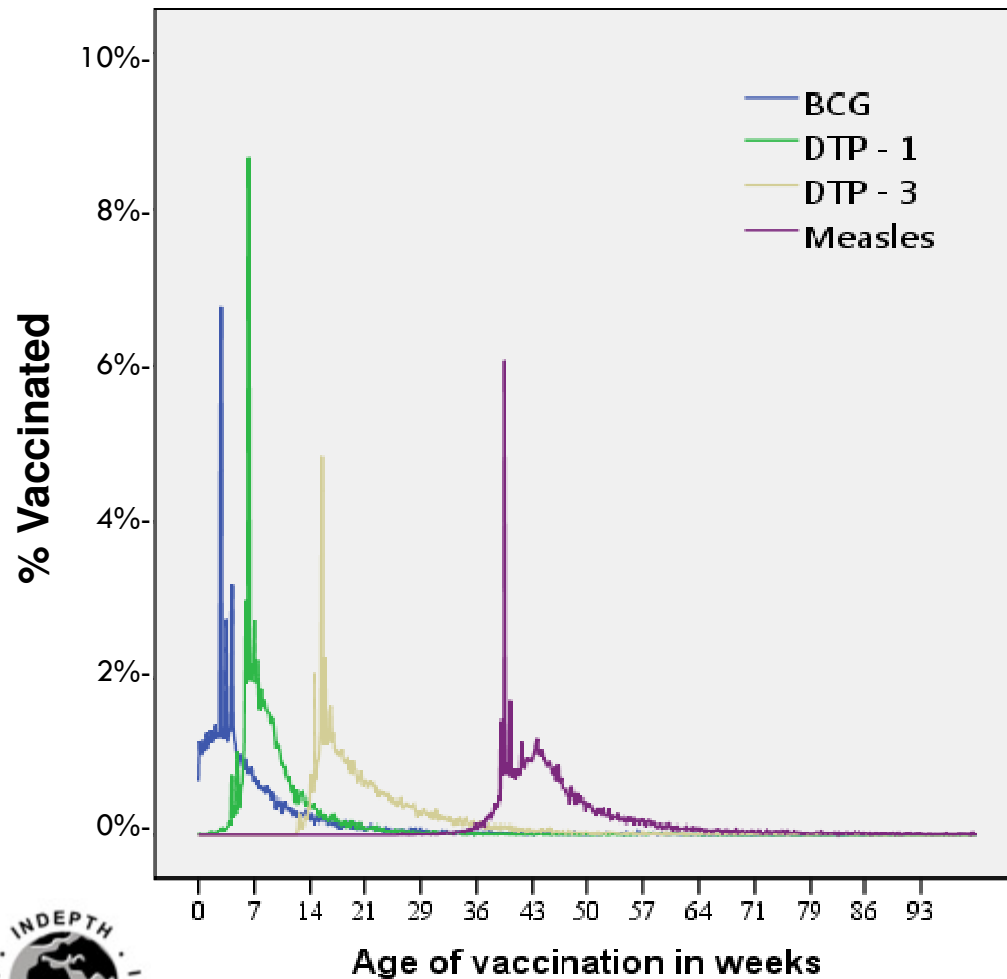
# Vaccination Coverage...3



Coverage at 2 year	
OPV- booster	87.3%
DPT- booster	89.3%



# Median age of vaccination



	Median age (weeks)(IQ range)	
<b>BCG</b>	<b>4.8</b>	(2.8-10.4)
<b>DPT-1</b>	<b>8.4</b>	(6.5-11.5)
<b>OPV-1</b>	<b>8.2</b>	(6.4-12.0)
<b>DPT-2</b>	<b>14.1</b>	(11.7-19.0)
<b>OPV-2</b>	<b>14.1</b>	(11.1-19.8)
<b>DPT-3</b>	<b>20.1</b>	(16.7-26.7)
<b>OPV-3</b>	<b>20.5</b>	(16.2-27.8)
<b>Measles</b>	<b>44.2</b>	(40.2-50.0)
<b>DPTb</b>	<b>80.0</b>	(73.0-88.1)
<b>OPVb</b>	<b>80.2</b>	(72.5-88.2)

# Delay in vaccination

	Delay – 1 (%)(95% CI)	Median delay (weeks) (IQ range)	Delay–2 (Alternate) (%)(95% CI)
BCG	<b>44.5</b> (43.9 - 45.2)	7.0 (2.28 - 14.6)	<b>34.8</b> (34.2-35.4)
DPT-1	<b>92.6</b> (92.2 - 92.9)	3.0 (1.1 - 6.42)	<b>57.7</b> (57.1-58.3)
OPV-1	<b>84.1</b> (84.0 - 84.5)	3.4 (1.2 - 7.71)	<b>58.8</b> (55.2-56.4)
DPT-2	<b>98.2</b> (98.1 - 98.4)	4.6 (2.1 - 9.6)	<b>73.4</b> (72.8-73.9)
OPV-2	<b>91.7</b> (91.4 - 92.1)	5.1 (2.1 - 11.1)	<b>69.2</b> (68.6-69.7)
DPT-3	<b>97.5</b> (97.3 - 97.7)	6.9 (3.3 - 13.6)	<b>83.4</b> (83.6.-83.9)
OPV-3	<b>92.1</b> (91.7 - 92.4)	7.9 (3.6 - 15.1)	<b>83.5</b> (83.1-83.9)
Measles	<b>95.7</b> (95.5 - 96.0)	6.4 (3.0 - 12.8)	<b>25.2</b> (24.7-25.7)
DPTb	<b>15.9</b> (15.4-16.3)	16.1(6.2-32)	
OPVb	<b>18.6</b> (18.1-19.1)	18.5(7.2-36.1)	



# Gap between DPT doses

- **Median gap between DPT - 1 and DPT - 2**
  - **35 days (30 - 47)**
  - **36% of Under fives had a gap of more than 35 days\***
  
- **Median gap between DPT - 2 and DPT - 3**
  - **35 days (30 - 50)**
  - **38% of Under fives had a gap of more than 35 days\***

\*Shankar Prinja, a Madhu Gupta, a Amarjeet Singha & Rajesh Kumara. Effectiveness of planning and management interventions for improving age-appropriate immunization in rural India. *Bull World Health Organ* 2010;88:97–103 | doi:10.2471/BLT.08.059543



# Causes for Delay



## □ Family level determinants

### □ Nonappearance of child at home on the due date of vaccination

“.....don't find children at home, after birth child goes to the maternal house as a tradition and he doesn't receive any vaccination.....”

“...mother carries the baby along with her when she goes for work....”

### □ Less priority to it in comparison to other commitments (family says)

“.....if the vaccine is given then its fine if not then also its fine, there are many more work than this.....”

“....what's the hurry for vaccination.....”

**Major cause for the delay: Health workers and Program managers**



# Causes for Delay...2

- **Community level determinants**
  - **Community perception**
  - **Health care access frequency**
- **Programmatic Delays**
  - **Fixed day for vaccination**
  - **Shortage of Vaccine and the other materials**
  - **Lack of manpower**

**Rare cause for the delay: Health workers and Program managers**



# Discussion

**High Vaccination coverage**

**Significant Vaccination delay**



# Discussion



- **Almost all underfives, exact vaccination dates were available, since they are administered by health workers under supervision with monthly updating of the database**
- **Unlike other studies where only in 2/3<sup>rd</sup> cases the documented vaccination dates were available\***
- **Vaccination coverage was more than 90% for all vaccines in Ballabgarh**



\*Clark A, Sanderson C. Timing of children's vaccinations in 45 low-income and middle-income countries: an analysis of survey data. Lancet 2009;273:1543-1549.



# Discussion...2



- **Studies from other countries have also documented presence of significant delay in vaccination even with high vaccination coverage<sup>1,2</sup>**
- **Vaccination delay is likely to be even more pronounced in population where the vaccination coverage is less as compared to Ballabgarh HDSS**
- **The results of our study may not be generalisable to other populations in India beyond Ballabgarh HDSS because of high vaccination coverage in Ballabgarh**

1 - Kevin J. Dombkowski, Paula M. Lantz, Gary L. Freed. Risk Factors for Delay in Age-Appropriate Vaccination. Public Health Reports. 2004;119:144-155.

2 - Manas K. Akmatova, Mirjam Kretzschmar, Alexander Krämera, and Rafael T. Mikolajczyk. Determinants of childhood vaccination coverage in Kazakhstan in a period of societal change: Implications for vaccination policies. Vaccine, February 2007; 25 (10):1756-1763.



# Conclusions



- Significant vaccination delay was observed in Ballabgarh HDSS, a population with very high vaccination coverage
- Quantity in vaccination (**high vaccination coverage**) may not necessarily ensure quality of vaccination (**delay in vaccination**)
- Family level determinants comes out to be the major cause for the delay in vaccination



# Recommendations



- **Delay in vaccination should be incorporated as a performance/monitoring indicator for vaccination program**
- **Need to strengthen the health care delivery system with focus on age appropriate vaccination**
- **Immunization programme needs to be strengthen at other places and vigorous IEC activities must be followed to aware community & HW**

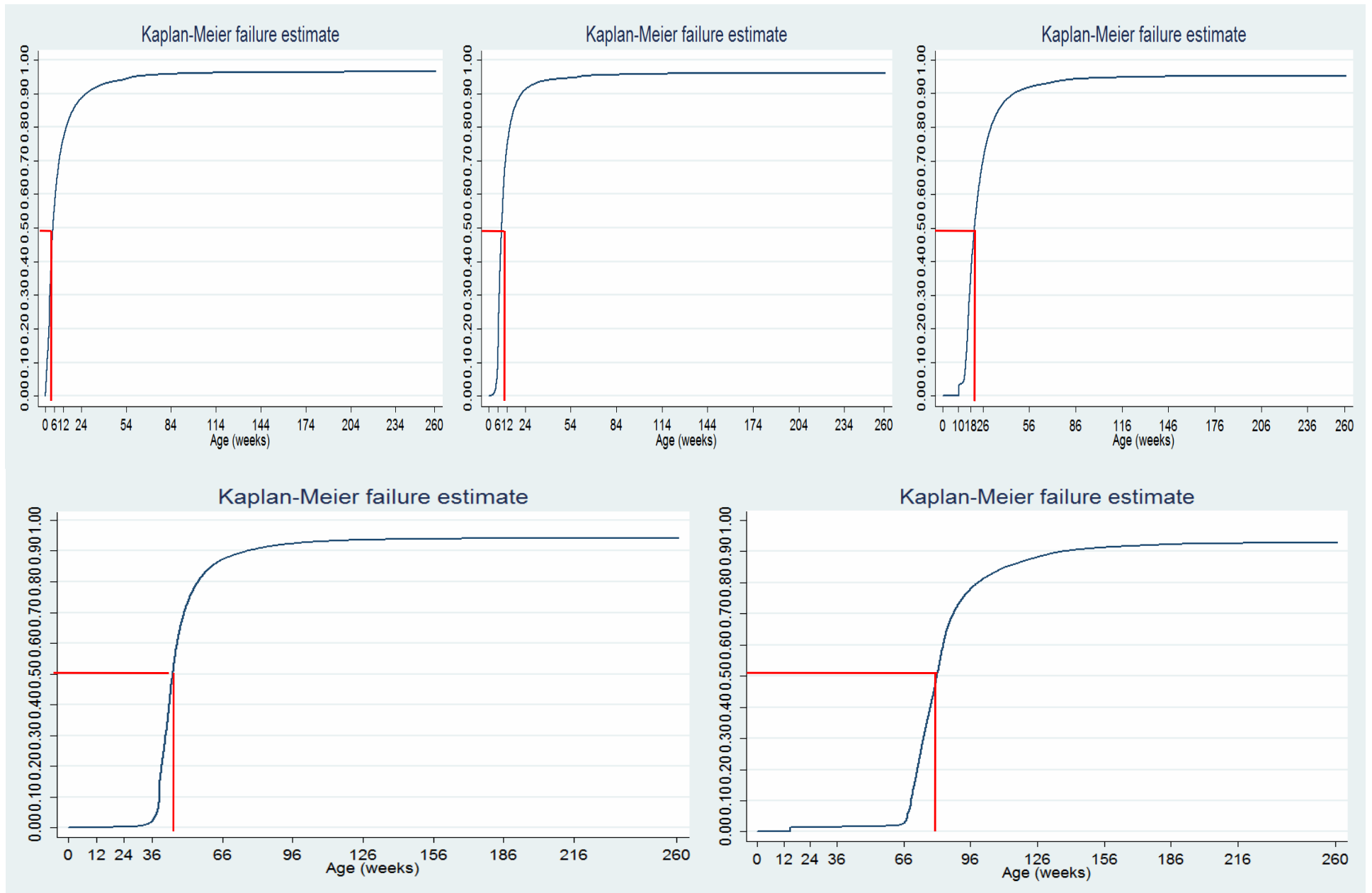




Thank you

*“Children are the living messages  
we send to a time we will not see”*

**John W. Whitehead**



**Fig 1 to 5: Survival curves for BCG, DPT1, DPT3, Measles, DPTb with vaccination taken as the event. The red lines represent the median age at vaccination**