Study on Vaccination Timeliness in Children Aged 12 To 24 Months Under Universal Immunization Programme in Porbandar District, Gujarat

By

Amarjot Kaur

Dissertation submitted for the partial fulfillment of the
MBA Hospital and Health Management

Academic year, 2016-2018

The IIHMR University, Jaipur

1, Prabhu Dayal Marg, Sanganer, Airport
Jaipur 302029, Rajasthan
Ph: 0141 3924700, Fax: 3924738
Website: **www.iihmr.edu.in**

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INSTITUTE OF HEALTH
MANAGEMENT RESEARCH
(WHO Collaborating Centre for District Health System Based on Primary Health Care)

IIHMR UNIVERSITY

TO WHOMSOEVER MAY CONCERN

This is to certify that **Amarjot Kaur** student of MBA Hospital and Health Managementfrom The IIHMR University, Jaipur has undergone internship training at **National Health Mission, Gujarat** from 5th February 2018 to 5th May 2018.

She has successfully carried out the study designated to her during internship training and her approach to the study has been sincere, scientific, and analytical.
The Internship is in fulfillment of the course requirements.

I wish her all success in all her future endeavors.

Col. (Dr.) Ashok Kaushik
Dean, Academics and Student Affairs
The IIHMR University, Jaipur

Dr. Mohan Bairwa
Assistant Professor
The IIHMR University, Jaipur

1, Prabhu Dayal Marg, Near Sanganer Airport, Jaipur- 302029, Rajasthan, India.
Ph.: 0141- 3924700, 2791431- 32, Fax: 0141 3924738, E-mail: iihmr@iihmr.edu.in, Web.: www.iihmr.edu.in

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એસ.ટી. બસ સ્ટેન્ડ પાસે,
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ફેકસ નં. (૦૨૮૬) ૨૨૪૨૭૩૧
E-mail:- cdho.health.porbandar@gmail.com

District Programme Management Unit
Health Department
District Panchayat – Porbandar

The certificate is awarded to

AMARJOT KAUR

In recognition of having successfully completed her

Internship in the department of

HEALTH AND FAMILY WELFARE DEPARTMENT

And has successfully completed her Project on

VACCINATION TIMELINESS IN CHILDREN UNDER UNIVERSAL IMMUNIZATION PROGRAMME IN PORBANDAR DISTRICT, GUJARAT

5 FEB 2018- 5 MAY 2018

NHM, GUJARAT

She comes across as a committed, sincere and diligent person

who has a strong drive and zeal for learning

We wish her all the best for future endeavors

Chief District Health Officer

Date: 11.5.18

Place: Porbandar

THE IIHMR UNIVERSITY, JAIPUR

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled "A study on Vaccination Timeliness in children aged 12-24 months under Universal Immunization Programme in Porbandar District, Gujarat and submitted by Amarjot Kaur, MBA-HM(21); 0380 under the supervision of Dr. Mohan Bairwa for award of MBA in Hospital and Health Management in Health and Hospitals of the University carried out during the period from 5th February 2018 to 5th May 2018 embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other institute or other similar institution of higher learning.

Amarjot Kaur

Signature

ABSTRACT

India has the highest number of deaths among children under 5 years of age globally, the majority are from vaccine preventable diseases. Immunization plays an important role in reducing mortality due to vaccine preventable diseases in children. Although vaccination coverage rates among children is used as a basic indicator of vaccination program performance but in areas with high vaccine coverage, age-appropriate vaccination or timeliness of vaccination will be helpful in assessing quality of vaccination program. Untimely vaccination unnecessarily prolongs susceptibility to disease and contributes to the burden of childhood morbidity and mortality. The aim of this study is to characterize the timeliness of childhood vaccination administered under routine immunization program. Cluster sampling has been used to collect information on immunization using a questionnaire and immunization card. 210 mothers of children aged 12 - 24 months were interviewed by selecting 30 clusters in the district whereas seven eligible children per cluster were randomly selected. Analysis was done to observe timeliness for Bacillus Calmette-Guérin (BCG),Hepatitis- B, four oral polio vaccines, three doses of the pentavalent vaccine which protects against diphtheria, pertussis, tetanus, hepatitis B and Haemophilus influenzae type B and measles vaccine.

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The success of any task requires blessings and efforts of numerous individuals and this project is no exception. Hereby, I take this opportunity to express my deep sense of gratitude to all those who have helped me directly or indirectly in completion of my dissertation.

First and foremost I would like to thank god Almighty for providing favorable conditions, strength and determination to complete my dissertation. I take immense pleasure to thank IIHMR University and all its members for providing a platform to gain knowledge and acquire skills in various aspects of healthcare management.

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ABBREVIATIONS

BCG	Bacillus Calmette Guerin
GoI	Government of India
Hep-B	Hepatitis-B
HMIS	Health Management Information System
MCTS	Mother and Child Tracking System
MDG	Millenium Development Goal
NFHS	National Family Health Survey
OPV	Oral Polio Vaccine
Penta	Pentavalent
RCH	Reproductive and Child Health
UIP	Universal Immunization Programme
UNICEF	United Nations Children's Fund
VPD	Vaccine Preventable Diseases
WHO	World Health Organization

INTRODUCTION

Childhood immunization is one of the most cost-effective activities in health care. Immunization against common childhood diseases has been an integral component of mother and child health services in India since adoption of the primary health care approach in 1978. The programme was given the status of a National Technology Mission in 1986 (Government of India [GoI]) to provide a feeling of urgency and commitment to achieve the goals within the specified period. Universal Immunization Programme (UIP) became a part of the Child Survival and State Motherhood Programme in 1992 and Reproductive and Child Health (RCH) Programme in 1997. The GoI also launched Immunization Strengthening Project to achieve the goal of 100% routine immunization by 2010. The UIP aimed to attain universal immunization coverage in infants with three doses of DPT* and oral polio vaccine and one dose measles, BCG and Hepatitis-B. The GOI has been working in collaboration with WHO, UNICEF and other international and national organizations to achieve the universal immunization of children.

Immunization is a way of protecting the human body against infectious disease through vaccination. More than 1.5 million children die, and more than a million are disabled every year in India, due to vaccine-preventable diseases. India's high mortality rate among children under the age of five is 48 deaths for every 1,000 live births. It has missed its Millennium Development Goal of bringing under-five mortality down to 42 per 1,000 live births. The government's Universal Immunization Programme has helped reduce this mortality figure from 125 in 1990 by focusing on immunization coverage, that is, by increasing the number of children getting vaccinated. But a missing link seems to be in ensuring that the vaccination is administered on time. Various vaccination coverage surveys have been conducted in different parts of India providing coverage at specific ages but does not allow measurement of delay in age- appropriate vaccinations.

BCG	At birth or as early as possible till one year of age	0.1ml (.05ml until 1 month of age)	Intradermal	Left Upper Arm
Hepatitis B 0 Dose	At birth or as early as possible within 24 hours	0.5 ml	Intramuscular	Antero lateral side of mid thigh
OPV 0	At birth or as early as possible within the first 15 days	2 drops	Oral	Oral
OPV 1,2 , 3	At 6 weeks, 10 weeks & 14 weeks	2 drops	Oral	Oral
Pentavalent 1,2,3	At 6 weeks, 10 weeks & 14 weeks	0.5 ml	Intramuscular	Antero lateral side of mid thigh
Measles	9 completed months-12 months.(give up to 5 years if not received at 9-12 months age)	0.5 ml	Sub cutaneous	Right upper Arm
Vitamin A (1stdose)	At 9 months with measles	1 ml (1lac unit)	Oral	Oral

Fig1: Representing National Immunization schedule for infants under Universal Immunization Programme

The timeliness of vaccinations that is vaccination at the earliest appropriate age, should be an important public health goal, and yet this information is often lacking as coverage is the usual metric used. Timely vaccination is defined as administration of vaccine doses at the recommended time or by the maximum recommended age. Timeliness of vaccination was classified as early, on-time, delayed, or never, based on the recommended vaccination schedule.

Vaccination after 32 days from national schedule was considered “delayed”. Timely vaccination is essential to developing adequate immunity and minimizing susceptibility to these diseases. As children receiving vaccination late, they remain susceptible to vaccine preventable diseases, this may jeopardize their own health, as well as that of younger siblings and compromise herd

immunity with consequent potential risk of disease outbreaks. Conversely, vaccines given too early or with a shortened interval between doses may also result in a suboptimal immune response, leading to a false sense of protection. Timely vaccination is important to protect against infections with peaks in incidence or particular severity in the very you.

Despite being the high immunization coverage two thirds of children in India do not receive their vaccinations on time, prolonging their susceptibility to diseases and contributing to untimely deaths. Various strategies like outreach immunization session, Mother and Child Tracking System, involvement of ASHA, Anganwadi workers and village volunteers, were adopted by Government of India to improve coverage of immunization service throughout India and it has yielded success but no focus has been made on timeliness of vaccination as vaccination coverage rates among children is used as a basic indicator of vaccination program performance.

VACCINE	Vaccination Schedule			
	Expected Date	Early	Delay	Never
BCG	At birth(upto1 year if not given)		>32 days from birth	Not at all
OPV 0	At birth(upto 15 days if not given earlier)		>15 days	Not at all
HEP-B	At birth(within 24 hrs)		>24 hrs	Not at all
PENTA-1	6th week	<6 weeks	>6th week (plus additional margin of 32 days)*	Not at all
OPV-1	6th week	<6 weeks	>6 weeks (plus additional margin of 32 days)*	Not at all
PENTA-2	10th week	<10 weeks	>10weeks(plus additional margin of 32 days)*	Not at all
OPV-2	10th week	<10 weeks	>10 weeks (plus additional margin of 32 days)*	Not at all
PENTA-3	14th week	<14 weeks	>14 weeks (plus additional margin of 32 days)*	Not at all
OPV-3	14th week	<14 weeks	>14 weeks (plus additional margin of 32 days)*	Not at all
MEASLES	9 months	<9 months	>9 months (plus additional margin of 32 days)*	Not at all

Fig2: Representing expected schedule of full immunization under Universal Immunization Program

LITERATURE REVIEW

Author/citation	Type of study	Sample	Purpose	Key findings
• Rajesh Kumar Sood et al. High Immunization Coverage but Delayed Immunization Reflects Gaps in Health Management Information System (HMIS) in District Kangra, Himachal Pradesh, India—An Immunization Evaluation. World Journal of Vaccines Vol.05 No.02(2015), Article ID:55741,9 pages	Cross-sectional retrospective survey	Total sample size 224 (32 × 7) children. (32 clusters & only 7 children per cluster).	To analyze the factors associated with timely immunization by taking timely immunized children as cases and delayed immunized ones as controls.	1. Analysis of the timeliness revealed that only 29% of the children were fully immunized as per schedule (delay not more than 32 days). 2. Analysis of the immunization records revealed that 68% of the children were having at least one immunization delayed over 32 days from recommended schedule. 3. It also shows that validated field coverage estimates are lower than reported which can be due to inclusion of children of migrants in numerator & not in the denominator The difference in immunization by history and record points are due to gaps in record keeping by health workers and retention of health cards by the clients.

				4. Recommendations: To avoid delays study recommended (i) use of mono dose vials for BCG; (ii) precall notice to mothers; (iii) modification of HMIS software to track immunization status and timeliness of individual beneficiaries rather than aggregate numbers.

• Daniel J Corsi et al. Gender inequity and age-appropriate immunization coverage in India from 1992 to 2006.BMC International Health and Human Rights2009(Suppl 1):S3	Three cross-sectional surveys were conducted during 1992-93, 1998-99 and 2005-06.	Data from three consecutive rounds of the Indian National Family Health Survey (NFHS)	The aim of the study is to examine the trends in immunization coverage in India, with a focus on inequities in coverage by gender, birth order, year of birth, and state.	1. Immunization coverage in India has increased since the early 1990s, but complete, age-appropriate coverage is still under 50% nationally. Girls were found to have significantly lower immunization coverage ($p<0.001$) than boys for BCG, DPT, and measles across all three surveys . 2. By contrast, improved coverage of OPV suggests a narrowing of the gender differences in recent years . 3. Girls with a surviving older sister were less likely to be immunized compared to boys, and a large proportion of all children were found to be immunized considerably later than recommended.
• Lars T Fadnes et al. Vaccination coverage and timeliness in three South African areas: a	Community-based cluster-randomized trial	Total sample size:1137 children were	The purpose of the study is to measure the vaccination timeliness and	1. The proportion of children receiving all these eight recommended vaccines were 94% in Paarl (95% confidence interval [CI] 91-

prospective study.BMC Public Health2011**11**:404		included.	vaccination coverage in three geographical areas in South Africa.	96), 62% in Rietvlei (95%CI 54-68) and 88% in Umlazi (95%CI 84-91). 2. Slightly fewer children received all vaccines within the recommended time periods. 3. There was a trend towards worse vaccination coverage with the later vaccines in the vaccination programme. The situation was worst for the last pentavalent- and oral polio vaccines. 4. The hazard ratio for incomplete vaccination was 7.2 (95%CI 4.7-11) for Rietvlei compared to Paarl.
• Gomathi et al. Timeliness of primary childhood vaccination in a rural area of Puducherry, South India: evidence from routine	Cross-sectional.	Total sample size: 457 children who had completed 1 year of age were included.	The objective was to assess the delay in primary childhood vaccination in a primary health center (PHC) of rural Puducherry	1. A total of 457 children were included, 52.5% were males, and 47.5% were females. Immunization coverage was 100% for all vaccines. Delay in vaccination more than 2 weeks from the due date of vaccination for DPT1, DPT2, DPT3 and measles

management information system.International Journal of Contemporary Pediatrics Ramaswamy G et al. Int J Contemp Pediatr. 2014 Nov;1(3):131-134				were 7.4%, 41.9%, 64.4% and 38.8% respectively. 2. Median (interquartile range) days of delay for DPT1, DPT2, DPT3 and measles was found to be 6 (4-8), 13 (7-20), 19 (12-30) and 11 (4-24) respectively. 3. Children with higher birth order were vaccinated with significant delay for DPT3 ($p = 0.008$). 4. Delay in vaccination was less in children from the village where PHC is located ($p < 0.001$)
• Shrivastwa N[1] et al. Vaccination Timeliness in Children Under India's Universal Immunization Program. Pediatr Infect Dis J. 2016 Sep;35(9):955-60. doi: 10.1097/INF.0000000000001223.	District level household and facility survey data, 2008 from India were included using vaccination data from children with and	Total 268,553 children who were 0-60 months of age were included.	The aim of this study is to characterize the timeliness of childhood vaccinations administered under India's routine immunization program using a novel application of an existing statistical	1. Vaccination data on 268,553 children who were 0-60 months of age were analyzed; timely administration of BCG, DPT3 and MCV occurred in 31%, 19% and 34% of children, respectively. The estimated vaccination probability plateaued for DPT and BCG around the age of 24 months, whereas MCV uptake increased

	without immunization cards.		methodology.	another 5% after 24 months of age. 2. The 5-year coverage of BCG, DPT3 and MCV in Indian children was 87%, 63% and 76%, respectively. 3. Lack of timely administration of key childhood vaccines, especially DPT3 and MCV, remains a major challenge in India and likely contributes to the significant burden of vaccine preventable disease-related morbidity and mortality in children.
• Manash Pratim Barman et al. Affecting Timeliness of Immunization Coverage Among Children of Assam, India:A Cross-sectional Study.First	Cross sectional study"	Multistage cluster sampling	To estimate the timeliness of vaccination coverage & to model the pattern of timeliness of vaccination using techniques of survival analysis in order	1. Study shows that education of mother, caste, religion and socio-economic status of the family have significant impact on the age appropriate immunization coverage of children. 2. The child immunization coverage in Assam has been

Published August 24, 2015			to trace the determinants of age appropriate immunization status of children.	inclining, there is a still lot of concern over the timeliness of vaccination coverage.
• SuzanneWalton[a] et al. Measuring the timeliness of childhood vaccinations: Using cohort data and routine health records to evaluate quality of immunisation services. Volume 35, Issue 51, 18 December 2017, Pages 7166-7173	Cohort study	Total sample size: 1782 children, born between 2000 and 2001 were included.	To examine the uptake and timeliness of infant and pre-school booster vaccines using cohort study data linked to health records.	1. Analysis shows that 94% of children received the first dose of primary vaccines early on time whereas this was lower for the subsequent doses(82%, 65% and 88% for second and third doses and pre-school booster respectively). 2. Median intervals between doses exceeded the recommended schedule for all but the first dose with marked variation between children. 3. There was high concordance

				(97%) between parental reported and child health MMR status. 4. Timeliness of vaccination decreased with vaccine dose. 5. Most children had appropriate intervals between doses; marked variation occurred.

RATIONALE/ JUSTIFICATION

Porbandar has a full Immunization coverage rate of 68.8 % as per NFHS-4 and 95 % as per e-mamta status. Despite being high immunization coverage rate the timeliness of vaccination is very low in India. As vaccination coverage rates among children is used as a basic indicator of vaccination program performance there is less focus on timeliness of vaccination while also there are limited data available on vaccination timeliness.

In summary, immunization coverage is essential for the quality of services but timeliness factor can add on the better quality of services." Some studies have shown that high vaccination coverage for individual vaccines do not necessarily imply timely vaccination or adequate levels of population immunity. So a study has been designed to assess the vaccination timeliness in children aged 12 to 24 months under UIP in Porbandar district Gujarat.

RESEARCH QUESTION

- Are the children aged 12 to 24 months received three dose of Pentavalent and oral polio vaccine, one dose of BCG, Hepatitis-B and measles vaccine on time as scheduled in Porbandar district, Gujarat?
- Is there any association between parity and timeliness of the vaccine?

OBJECTIVE

- To assess the timeliness of three dose of Pentavalent and oral polio vaccine, one dose of BCG, Hepatitis-B and measles vaccine in Porbandar district, Gujarat.
- To assess the relationship between parity and the timeliness of the vaccines.

METHODOLOGY

Study setting: District Porbandar is located in Gujarat with a population of 585,449 (2011 census). The population density of the district is 253 per sq.km. The average literacy rate is 75.78% according to census 2011.It have 84 subcentres in total, 11 Primary healthcare centre, 6 Urban Primary healthcare centers, 4 Community healthcare centre and 1 District Hospital.

Various data sources like e-mamta & HMIS provides coverage estimates for immunization but information on timeliness is currently not available. Hence a study was conducted to assess the timeliness of immunization in Porbandar District of Gujarat through cross sectional survey.

Methods and sample size: Study design was cross - sectional. Total sample size of 210 children were included.

Sampling Procedure: Two stage cluster sampling for assessment of timeliness was chosen. Within the cluster 7 eligible children were taken. Within the cluster the first house is selected randomly, and then we moved in one random direction till the required number of eligible children was covered.

Data Collection: We administered a structured questionnaire and also examined the immunization card and recorded the immunization status and interpreted the timeliness of the vaccination.

Exclusion Criteria: Children who were younger than 12 months and older than 24 months were not taken into study.

Also the children who don't have Mamta/ Immunization card and those who emigrated were not taken into consideration.

The study was done on delay, before time vaccination was not the focus of the study.

Inclusion Criteria: Children aged between 12-24 months were taken into consideration.

The children of families who were migrated into district having Mamta/Immunization card were taken into study.

The household having more than 1 eligible beneficiary(age between 12-24 months& having mamta/ immunization card) were also taken into consideration for study.

Statistical Analysis: The analysis was done using excel and proportions of delayed immunization were computed.

RESULT AND OBSERVATIONS

The study included vaccination data on 210 children who were 12 to 24 months of age of Porbandar district, Gujarat and the timely administration of BCG, Hepatitis, OPV-0, Penta-1, Penta-2, Penta-3, Polio-1, Polio-2, Polio-3 and Measles was found to be occurred in 86.6%, 59.1%, 73.3%,. 71.4%, 67.2%, 61.0%, 71.9%, 67.2%, 60.0% and 74.8% of children respectively. The percentage timeliness of vaccines depicted in terms of delayed, timely, before time and never were presented in graph below:

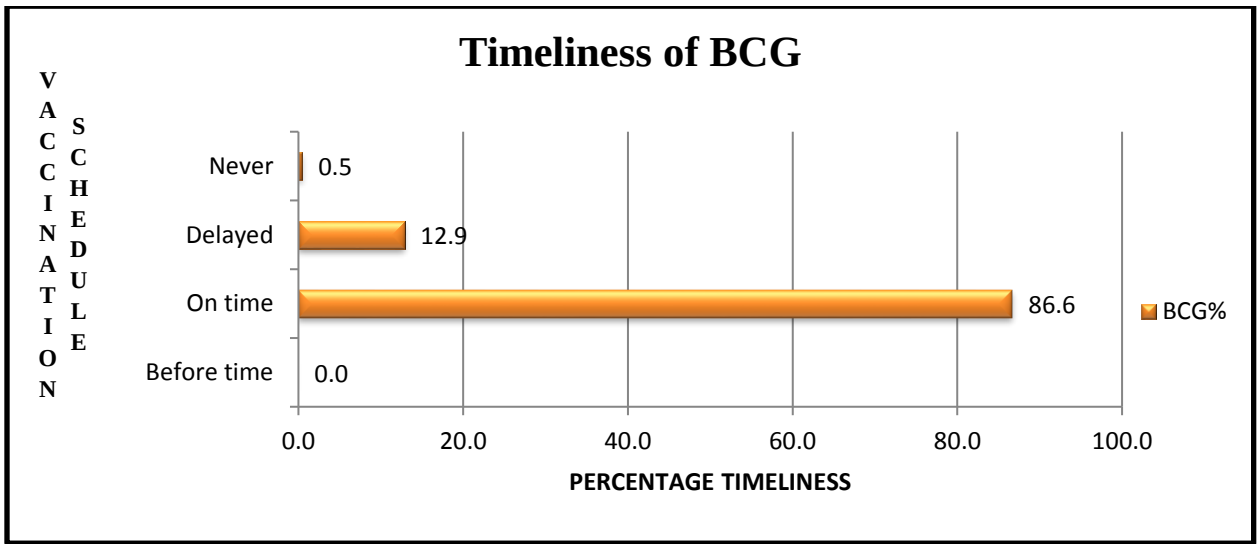

Fig3: Percentage timeliness of BCG vaccine.

Above graph represents the timely administration of BCG occurred in 86.6% of children whereas 12.9% of children received vaccine lately and 0.5% of children were not vaccinated with BCG vaccine.

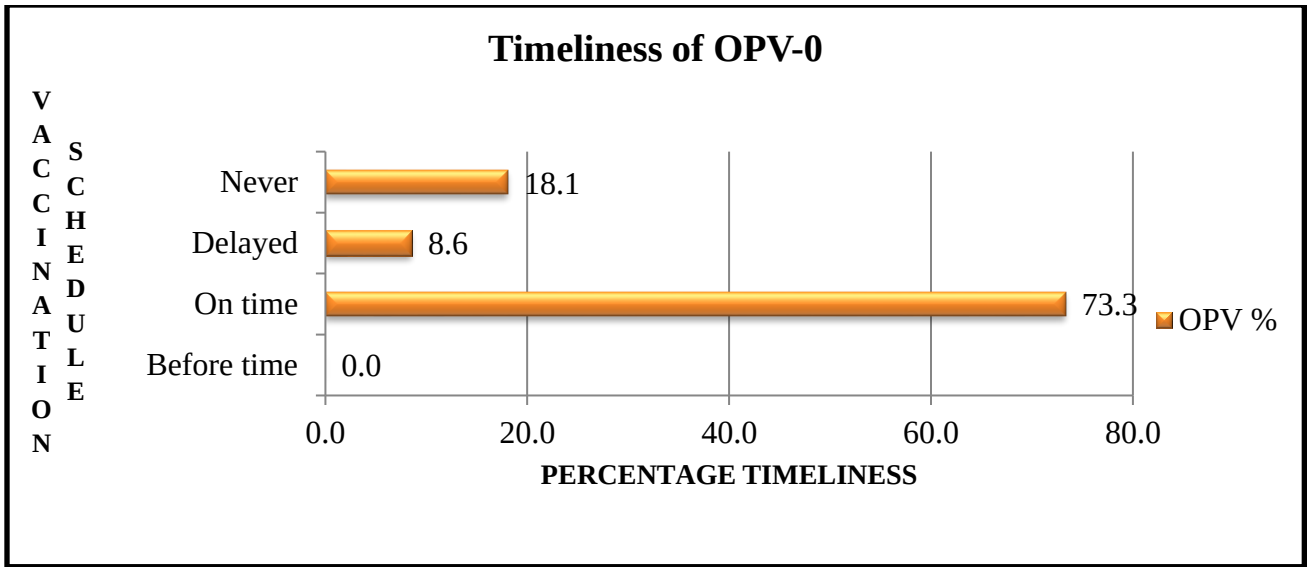

Fig4: Percentage timeliness of Zero dose of Oral Polio vaccine.

Graph above represents the timely administration of OPV-0 occurred in 73.3% of children whereas 8.6% of children received vaccine lately and 18.1% of children were not vaccinated with OPV-0 vaccine.

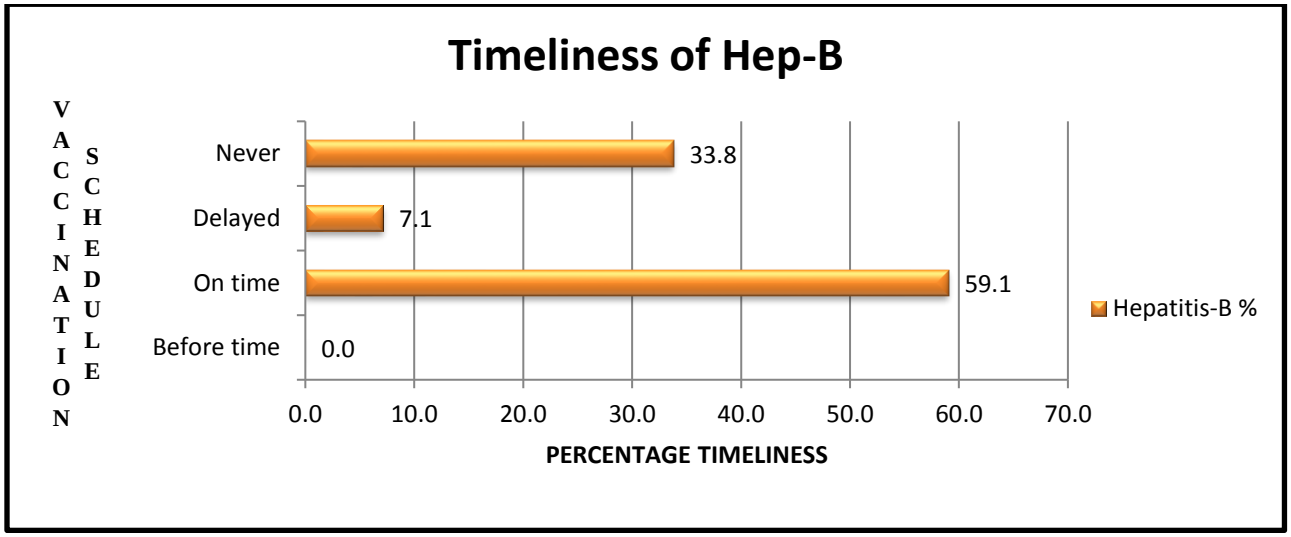

Fig5: Percentage timeliness of Hepatitis-B vaccine.

Graph above represents the timely administration of Hepatitis-B occurred in 59.1% of children whereas 7.1% of children received vaccine lately and 33.8% of children were not vaccinated with Hepatitis-B vaccine.

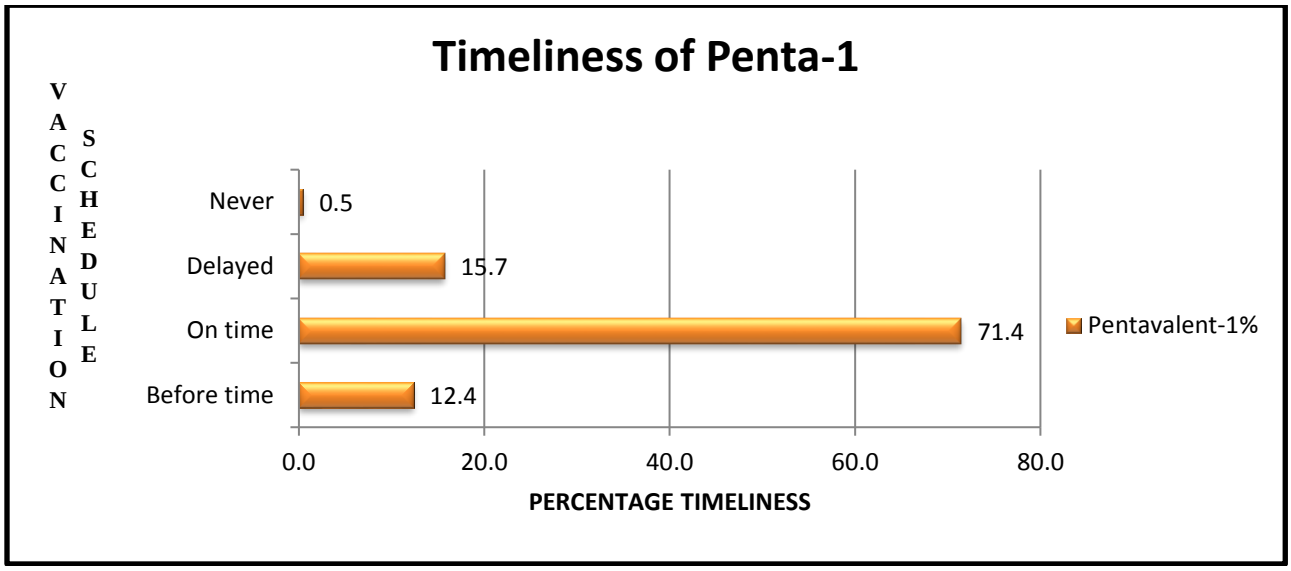

Fig6: Percentage timeliness of 1st dose of pentavalent vaccine.

Graph above represents the timely administration of Penta-1 occurred in 71.4% of children whereas 15.7% of children received vaccine lately, 12.4% received before time and 0.5% of children were not vaccinated with Penta-1 vaccine.

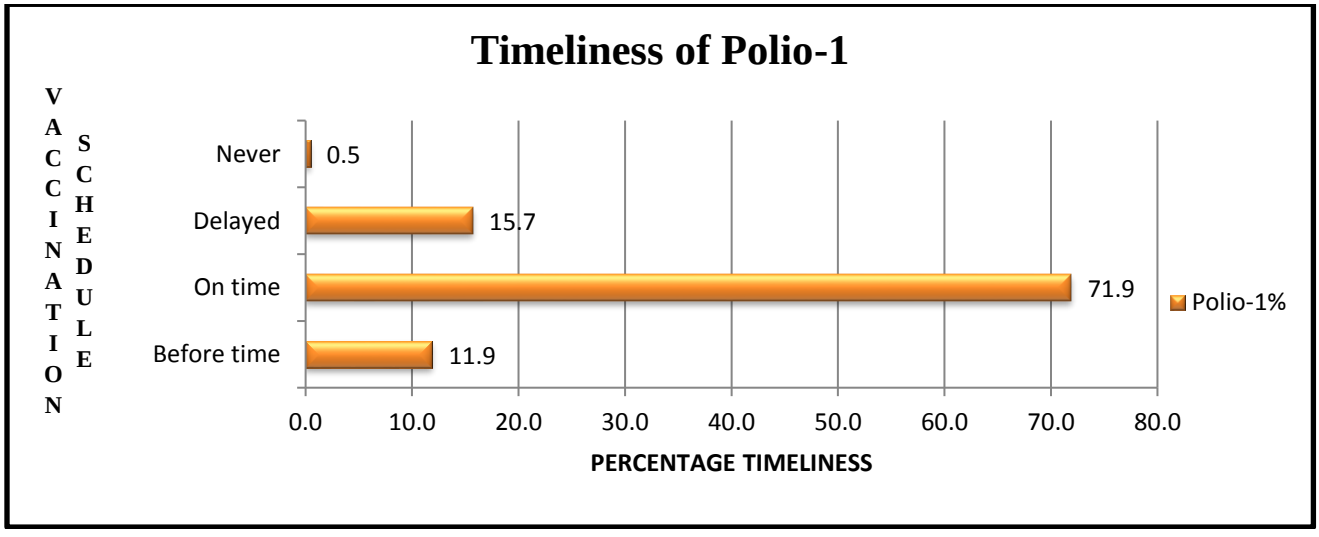

Fig7: Percentage timeliness of 1st dose of polio vaccine.

Graph above represents the timely administration of 1st dose of polio occurred in 71.9% of children whereas 15.7% of children received vaccine lately, 11.9% received before time and 0.5% of children were not vaccinated with 1 dose of polio vaccine.

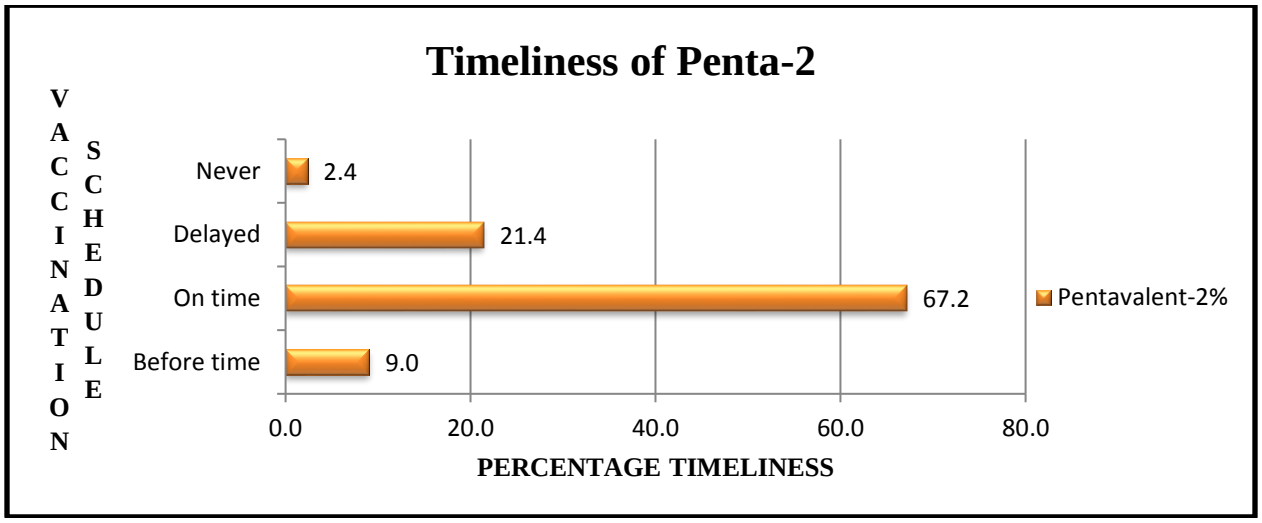

Fig8: Percentage timeliness of 2nd dose of pentavalent vaccine.

Graph above represents the timely administration of Penta-2 occurred in 67.2 % of children whereas 21.4% of children received vaccine lately, 9.0% received before time and 2.4% of children were not vaccinated with Penta-2 vaccine.

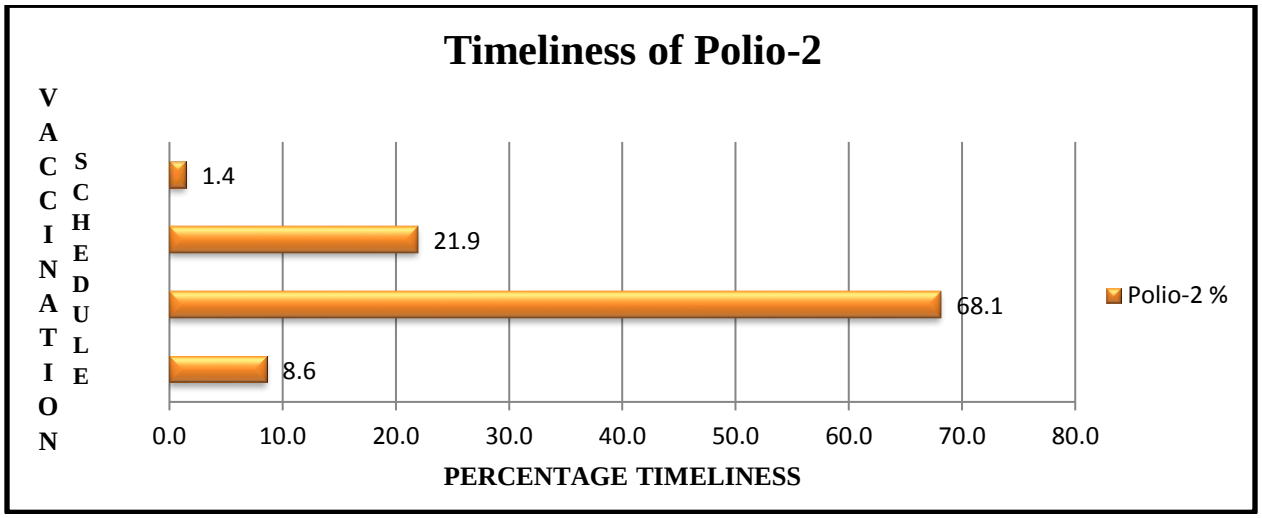

Fig9: Percentage timeliness of 2nd dose of Polio vaccine.

Graph above represents the timely administration of Polio-2 occurred in 68.1% of children whereas 21.9% of children received vaccine lately, 8.6% received before time and 104% of children were not vaccinated with Polio-2 vaccine.

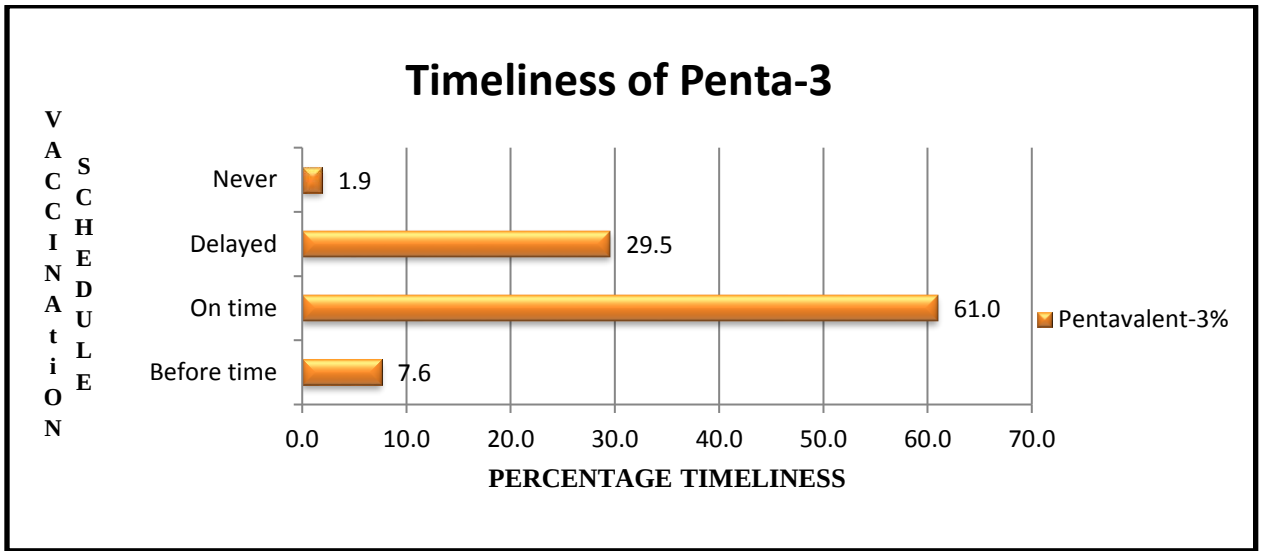

Fig10: Percentage timeliness of 3rd dose of Penta-3 vaccine.

Graph above represents the timely administration of Penta-3occurred in 61.0% of children whereas 29.5% of children received vaccine lately, 7.6% received before time and 1.9% of children were not vaccinated with Penta-3 vaccine.

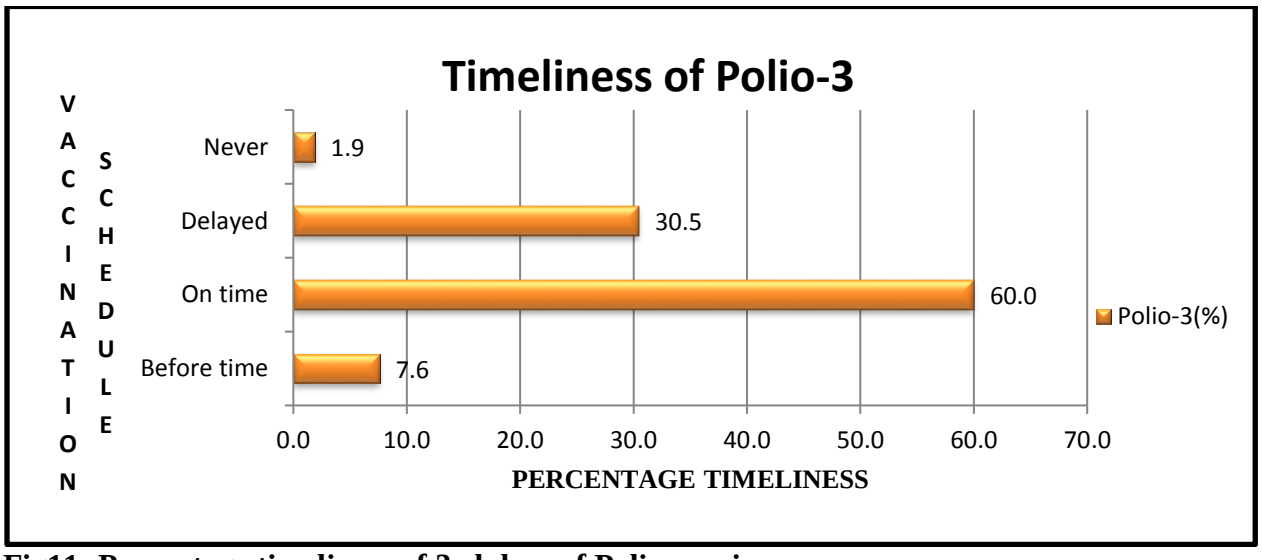

Fig11: Percentage timeliness of 3rd dose of Polio vaccine.

Graph above represents the timely administration of Polio-3 occurred in 60.0% of children whereas 30.5% of children received vaccine lately, 7.6% received before time and 1.9% of children were not vaccinated with Polio-3 vaccine.

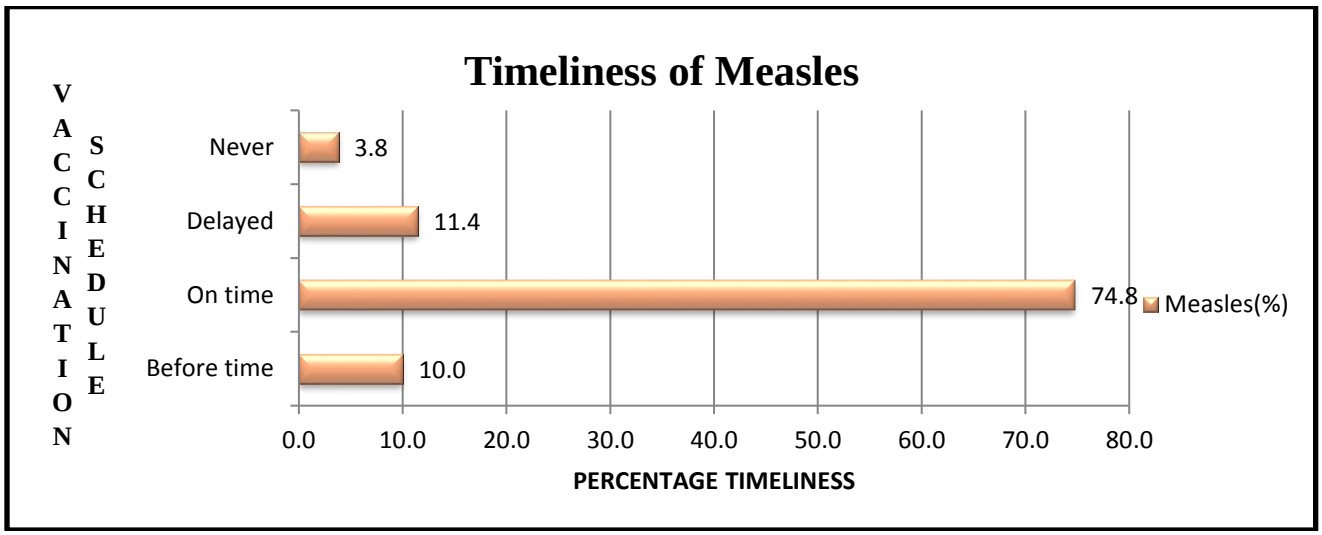

Fig12: Percentage timeliness of Measles vaccine.

Graph above represents the timely administration of Measles occurred in 74.8% of children whereas 11.4% of children received vaccine lately, 10.0% received before time and 3.8% of children were not vaccinated with Measles vaccine.

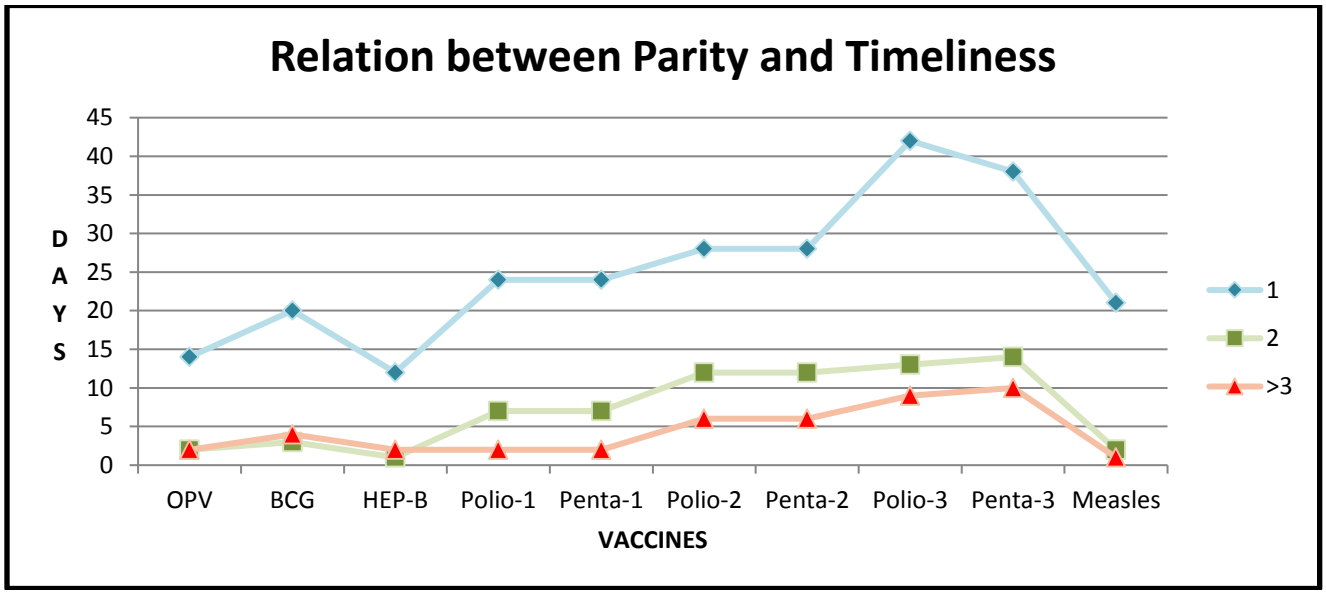

Fig13: Relationship between Parity and timeliness of vaccines.

Graph above represents the untimely administration of vaccines. It shows that as the parity increases the delay in administration of vaccine decreases i.e. timeliness increases.

Vaccine	DELAY				
	Male	Male(%)	Female	Female(%)	Total
BCG	19	70.4	8	29.6	27
OPV 0	11	61.1	7	38.9	18
Hep-B	9	60.0	6	40.0	15
PENTA-1	14	42.4	19	57.6	33
POLIO-1	14	42.4	19	57.6	33
PENTA-2	22	46.8	25	53.2	47
POLIO-2	22	46.8	25	53.2	47
PENTA-3	33	53.2	29	46.8	62
POLIO-3	36	56.3	28	43.8	64
MEASLES	10	41.7	14	58.3	24

Table1: Representing timeliness of vaccine according to gender.

The timeliness of vaccines given to be at birth i.e. BCG, OPV 0, Hep-B seen to be more in males i.e. 70.4%, 61.1% & 60.0% as compared to females i.e.29.6%, 38.9% & 40.0% respectively. Similarly, the timeliness of Penta-3 and Polio-3 vaccine was seen to be more in males as compared to females. However, the timeliness of vaccine Penta-1, Penta-2, Polio-1, Polio-2 and Measles seen to be more in females as compared to females.

DISCUSSION

As per the study, though the immunization coverage of the district is high but there are delays in vaccination, though not so high but there is a scope for improving timeliness in the vaccination in district Porbandar, Gujarat. Delay by type of vaccine observed was 12.9%, 8.6% and 7.1% of children who did not receive BCG, OPV-0 and Hepatitis-B vaccine respectively . On comparing the delay of these three vaccines it has been observed that though these vaccines have to be given together at the time of birth still data shows variation which depicts that the infants did not receive all three vaccines at the birth in spite of being delivered at institute. It has also been interpreted from the study that the approximately 34% of the children did not get vaccinated with Hepatitis-B in spite of the fact that these deliveries were institutional.

However it also has been depicted from data that if the children are subjected to receive two vaccines same day only, he/she did might not get vaccinated with both the vaccine. Adding to this, data shows that Penta-1 and Polio-1 is timely administered in 71.4% and 71.9% of children respectively. Furthermore analysis shows that approximately 12% of children get vaccinated with Penta-1 and Polio-1 before time which can result in a suboptimal immune response, leading to a false sense of protection. Similar trend has been observed with the doses of Penta-2 & Poilo-2 and Penta-3 & Polio-3.

On comparing the percentage of delayed immunization status it has been seen that as the infant progress towards the next doses of immunization the adherence to the timeliness decreases (Penta-1 (71.4%); Penta-2 (67.2%); Penta-3 (61.0%)).

Same trend has been seen in case of Measles also. 10% of the children got vaccinated before time and approximately 12% children recieved delayed shot of vaccine.

The relation between parity and timeliness has also been interpreted from the data. As the parity (birth order) increases the adherence to the timeliness i.e. getting vaccinated on time increases. The children of the 1st birth order shows more delay in getting vaccinated this might be due to low awareness among their mothers.

Lastly, the gender wise distribution of timeliness of vaccine were also studied, which shows that some vaccine like Penta-1, Polio-1, Penta-2, Polio-2 and Measles were administered more timely in females as compared to females where as vaccines like BCG, OPV 0, Hep-B, Penta-3 and

Polio-3 were administered more timely in males as compared to females. What are the factors possible for this trend was not being studied due to time constraint.

Due to time constraint, factors responsible for delay were not studied but most of the studies shows that the carelessness with low socio-economic status, maternal illiteracy, and lack of mothers' knowledge on vaccine preventable diseases can be the reasons for delay.

CONCLUSION

What have been revealed from the study concluded as follows: Lack of timely administration of key childhood vaccines remains a major challenge in India and likely contributes to the significant burden of VPD. Though the delay is not so high in Porbandar district but a significant proportion of population lacks age- appropriate vaccination in district. The timeliness of vaccination caninfluenced by different factors not being studied due to time constraint and language barrier. In states with high vaccination coverage, we need to focus on timeliness and surveillance for timely age-appropriate vaccination. This will further improve immunization delivery effectiveness and ensure low dropouts, as delayed first dose is associated with higher chances of dropout. To avoid delays we recommend (i) use of mono dose vials for BCG/ Measles; (ii) recall notice to mothers; (iii) modification of software to track immunization status and timeliness of individual beneficiaries rather than aggregate numbers. We also recommend educating the health workers regarding the importance of vaccine timeliness in reducing the morbidity and mortality in children.

LIMITATION

Data was collected through the mamta/immunization card during household visit and recall factor was not taken into consideration due to low awareness and literacy among the mothers. Due to time constraint and language barrier, the factors responsible for delay in timeliness of vaccination were not being studied.

APPENDIX

- **INSTRUMENTATION**

IMMUNIZATION SURVEY QUESTIONNAIRE

Name of Respondent _____ Village_____
District _____
Name of PHC _____ Block_____
Rural/Urban_____
1) Name of child_____ **2)** D.O.B_____**3)** Sex of child_____
4) Father's Name_____ **5)** Mother's Name_____
6) Number of Siblings (a) 1 (b) 2 (c) 3 & >3

S.NO	VACCINE/ Expected Date of Vaccination	STATUS-YES/NO
1	**BCG/ Date**	If Yes, then date of vaccination ____; If vaccination delayed, then mark right tick _____
2	**OPV/ Date**	If Yes, then date of vaccination____; If vaccination delayed, then mark right tick _____
3	**Hepatitis B/ Date**	If Yes, then date of vaccination____; If vaccination delayed, then mark right tick _____
4	**PENTAVALENT1/ Date**	If Yes, then date of vaccination____; If vaccination delayed, then mark right tick _____
5	**PENTAVALENT 2/ Date**	If Yes, then date of vaccination____; If vaccination delayed, then mark right tick _____
6	**PENTAVALENT-3/ Date**	If Yes, then date of vaccination____; If vaccination delayed, then mark right tick _____
7	**POLIO-1/ Date**	If Yes, then date of vaccination____; If vaccination delayed, then mark right tick _____
8	**POLIO-2/ Date**	If Yes, then date of vaccination____; If vaccination delayed, then mark right tick _____

9	**POLIO-3/ Date**	If Yes, then date of vaccination____ If vaccination delayed, then mark right tick _____
10	**MEASLES/ Date**	If Yes, then date of vaccination____ If vaccination delayed, then mark right tick _____

- **NFHS-4 Fact sheet**

GJ_FactSheet_478_Porbandar.pdf

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A Study on Vaccination Timeliness in children aged 12 to 24 months under Universal Immunization Programme in Porbandar district, Gujarat

By

AMARJOT KAUR

Dissertation submitted for the partial fulfillment of the

MBA Hospital and Health Management

Academic year, 2016-2018

Under the Guidance of

Dr. Mohan Lal Bairwa

The IIHMR University, Jaipur

1, PrabhuDayal Marg, Sanganer, Airport
Jaipur 302029, Rajasthan
Ph: 0141 3924700, Fax: 3924738
Website: **www.iihmr.edu.in**

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Jaipur 302029, Rajasthan
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Website: **www.iihmr.edu.in**

INSTITUTE OF HEALTH MANAGEMENT RESEARCH
(WHO Collaborating Centre for District Health System Based on Primary Health Care)

IIHMR UNIVERSITY

TO WHOMSOEVER MAY CONCERN

This is to certify that **Amarjot Kaur** student of MBA Hospital and Health Managementfrom The IIHMR University, Jaipur has undergone internship training at **National Health Mission, Gujarat** from 5th February 2018 to 5th May 2018.

She has successfully carried out the study designated to her during internship training and her approach to the study has been sincere, scientific, and analytical.
The Internship is in fulfillment of the course requirements.

I wish her all success in all her future endeavors.

Col. (Dr.) Ashok Kaushik
Dean, Academics and Student Affairs
The IIHMR University, Jaipur

Dr. Mohan Bairwa
Assistant Professor
The IIHMR University, Jaipur

1, Prabhu Dayal Marg, Near Sanganer Airport, Jaipur- 302029, Rajasthan, India.
Ph.: 0141- 3924700, 2791431- 32, Fax: 0141 3924738, E-mail: iihmr@iihmr.edu.in, Web.: www.iihmr.edu.in

District Programme Management Unit
Health Department
District Panchayat – Porbandar

મુખ્ય જિલ્લા આરોગ્ય અધિકારીશ્રીની કચેરી,
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એસ.ટી. બસ સ્ટેન્ડ પાસે,
ફોન નં. (૦૨૮૬) ૨૨૪૨૭૩૧-૨૨૧૧૦૮૩
ફેકસ નં. (૦૨૮૬) ૨૨૪૨૭૩૧
E-mail:- cdho.health.porbandar@gmail.com

The certificate is awarded to

AMARJOT KAUR

In recognition of having successfully completed her

Internship in the department of

HEALTH AND FAMILY WELFARE DEPARTMENT

And has successfully completed her Project on

VACCINATION TIMELINESS IN CHILDREN UNDER UNIVERSAL IMMUNIZATION PROGRAMME IN PORBANDAR DISTRICT, GUJARAT

5 FEB 2018- 5 MAY 2018

NHM, GUJARAT

She comes across as a committed, sincere and diligent person

who has a strong drive and zeal for learning

We wish her all the best for future endeavors

Chief District Health Officer

Date: 11.5.18

Place: Porbandar

THE IIHMR UNIVERSITY, JAIPUR

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled "A study on Vaccination Timeliness in children aged 12-24 months under Universal Immunization Programme in Porbandar District, Gujarat and submitted by Amarjot Kaur, MBA-HM(21); 0380 under the supervision of Dr. Mohan Bairwa for award of MBA in Hospital and Health Management in Health and Hospitals of the University carried out during the period from 5th February 2018 to 5th May 2018 embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other institute or other similar institution of higher learning.

Amarjot Kaur

Signature

ABSTRACT

India has the highest number of deaths among children under 5 years of age globally, the majority are from vaccine preventable diseases. Immunization plays an important role in reducing mortality due to vaccine preventable diseases in children. Although vaccination coverage rates among children is used as a basic indicator of vaccination program performance but in areas with high vaccine coverage, age-appropriate vaccination or timeliness of vaccination will be helpful in assessing quality of vaccination program. Untimely vaccination unnecessarily prolongs susceptibility to disease and contributes to the burden of childhood morbidity and mortality. The aim of this study is to characterize the timeliness of childhood vaccination administered under routine immunization program. Cluster sampling has been used to collect information on immunization using a questionnaire and immunization card. 210 mothers of children aged 12 - 24 months were interviewed by selecting 30 clusters in the district whereas seven eligible children per cluster were randomly selected. Analysis was done to observe timeliness for Bacillus Calmette-Guérin (BCG),Hepatitis- B, four oral polio vaccines, three doses of the pentavalent vaccine which protects against diphtheria, pertussis, tetanus, hepatitis B and Haemophilus influenzae type B and measles vaccine.

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ABBREVIATIONS

BCG	Bacillus Calmette Guerin
GoI	Government of India
Hep-B	Hepatitis-B
HMIS	Health Management Information System
MCTS	Mother and Child Tracking System
MDG	Millenium Development Goal
NFHS	National Family Health Survey
OPV	Oral Polio Vaccine
Penta	Pentavalent
RCH	Reproductive and Child Health
UIP	Universal Immunization Programme
UNICEF	United Nations Children's Fund
VPD	Vaccine Preventable Diseases
WHO	World Health Organization

INTRODUCTION

Childhood immunization is one of the most cost-effective activities in health care. Immunization against common childhood diseases has been an integral component of mother and child health services in India since adoption of the primary health care approach in 1978. The programme was given the status of a National Technology Mission in 1986 (Government of India [GoI]) to provide a feeling of urgency and commitment to achieve the goals within the specified period. Universal Immunization Programme (UIP) became a part of the Child Survival and State Motherhood Programme in 1992 and Reproductive and Child Health (RCH) Programme in 1997. The GoI also launched Immunization Strengthening Project to achieve the goal of 100% routine immunization by 2010. The UIP aimed to attain universal immunization coverage in infants with three doses of DPT* and oral polio vaccine and one dose measles, BCG and Hepatitis-B. The GOI has been working in collaboration with WHO, UNICEF and other international and national organizations to achieve the universal immunization of children.

Immunization is a way of protecting the human body against infectious disease through vaccination. More than 1.5 million children die, and more than a million are disabled every year in India, due to vaccine-preventable diseases. India's high mortality rate among children under the age of five is 48 deaths for every 1,000 live births. It has missed its Millennium Development Goal of bringing under-five mortality down to 42 per 1,000 live births. The government's Universal Immunization Programme has helped reduce this mortality figure from 125 in 1990 by focusing on immunization coverage, that is, by increasing the number of children getting vaccinated. But a missing link seems to be in ensuring that the vaccination is administered on time. Various vaccination coverage surveys have been conducted in different parts of India providing coverage at specific ages but does not allow measurement of delay in age- appropriate vaccinations.

BCG	At birth or as early as possible till one year of age	0.1ml (.05ml until 1 month of age)	Intradermal	Left Upper Arm
Hepatitis B 0 Dose	At birth or as early as possible within 24 hours	0.5 ml	Intramuscular	Antero lateral side of mid thigh
OPV 0	At birth or as early as possible within the first 15 days	2 drops	Oral	Oral
OPV 1,2 , 3	At 6 weeks, 10 weeks & 14 weeks	2 drops	Oral	Oral
Pentavalent 1,2,3	At 6 weeks, 10 weeks & 14 weeks	0.5 ml	Intramuscular	Antero lateral side of mid thigh
Measles	9 completed months-12 months.(give up to 5 years if not received at 9-12 months age)	0.5 ml	Sub cutaneous	Right upper Arm
Vitamin A (1stdose)	At 9 months with measles	1 ml (1lac unit)	Oral	Oral

Fig1: Representing National Immunization schedule for infants under Universal Immunization Programme

The timeliness of vaccinations that is vaccination at the earliest appropriate age, should be an important public health goal, and yet this information is often lacking as coverage is the usual metric used. Timely vaccination is defined as administration of vaccine doses at the recommended time or by the maximum recommended age. Timeliness of vaccination was classified as early, on-time, delayed, or never, based on the recommended vaccination schedule.

Vaccination after 32 days from national schedule was considered “delayed”. Timely vaccination is essential to developing adequate immunity and minimizing susceptibility to these diseases. As children receiving vaccination late, they remain susceptible to vaccine preventable diseases, this may jeopardize their own health, as well as that of younger siblings and compromise herd

immunity with consequent potential risk of disease outbreaks. Conversely, vaccines given too early or with a shortened interval between doses may also result in a suboptimal immune response, leading to a false sense of protection. Timely vaccination is important to protect against infections with peaks in incidence or particular severity in the very you.

Despite being the high immunization coverage two thirds of children in India do not receive their vaccinations on time, prolonging their susceptibility to diseases and contributing to untimely deaths. Various strategies like outreach immunization session, Mother and Child Tracking System, involvement of ASHA, Anganwadi workers and village volunteers, were adopted by Government of India to improve coverage of immunization service throughout India and it has yielded success but no focus has been made on timeliness of vaccination as vaccination coverage rates among children is used as a basic indicator of vaccination program performance.

VACCINE	Vaccination Schedule			
	Expected Date	Early	Delay	Never
BCG	At birth(upto1 year if not given)		>32 days from birth	Not at all
OPV 0	At birth(upto 15 days if not given earlier)		>15 days	Not at all
HEP-B	At birth(within 24 hrs)		>24 hrs	Not at all
PENTA-1	6th week	<6 weeks	>6th week (plus additional margin of 32 days)*	Not at all
OPV-1	6th week	<6 weeks	>6 weeks (plus additional margin of 32 days)*	Not at all
PENTA-2	10th week	<10 weeks	>10weeks(plus additional margin of 32 days)*	Not at all
OPV-2	10th week	<10 weeks	>10 weeks (plus additional margin of 32 days)*	Not at all
PENTA-3	14th week	<14 weeks	>14 weeks (plus additional margin of 32 days)*	Not at all
OPV-3	14th week	<14 weeks	>14 weeks (plus additional margin of 32 days)*	Not at all
MEASLES	9 months	<9 months	>9 months (plus additional margin of 32 days)*	Not at all

Fig2: Representing expected schedule of full immunization under Universal Immunization Program

LITERATURE REVIEW

Author/citation	Type of study	Sample	Purpose	Key findings
• Rajesh Kumar Sood et al. High Immunization Coverage but Delayed Immunization Reflects Gaps in Health Management Information System (HMIS) in District Kangra, Himachal Pradesh, India—An Immunization Evaluation. World Journal of Vaccines Vol.05 No.02(2015), Article ID:55741,9 pages	Cross-sectional retrospective survey	Total sample size 224 (32 × 7) children. (32 clusters & only 7 children per cluster).	To analyze the factors associated with timely immunization by taking timely immunized children as cases and delayed immunized ones as controls.	1. Analysis of the timeliness revealed that only 29% of the children were fully immunized as per schedule (delay not more than 32 days). 2. Analysis of the immunization records revealed that 68% of the children were having at least one immunization delayed over 32 days from recommended schedule. 3. It also shows that validated field coverage estimates are lower than reported which can be due to inclusion of children of migrants in numerator & not in the denominator The difference in immunization by history and record points are due to gaps in record keeping by health workers and retention of health cards by the clients.

				4. Recommendations: To avoid delays study recommended (i) use of mono dose vials for BCG; (ii) precall notice to mothers; (iii) modification of HMIS software to track immunization status and timeliness of individual beneficiaries rather than aggregate numbers.

• Daniel J Corsi et al. Gender inequity and age-appropriate immunization coverage in India from 1992 to 2006.BMC International Health and Human Rights2009(Suppl 1):S3	Three cross-sectional surveys were conducted during 1992-93, 1998-99 and 2005-06.	Data from three consecutive rounds of the Indian National Family Health Survey (NFHS)	The aim of the study is to examine the trends in immunization coverage in India, with a focus on inequities in coverage by gender, birth order, year of birth, and state.	1. Immunization coverage in India has increased since the early 1990s, but complete, age-appropriate coverage is still under 50% nationally. Girls were found to have significantly lower immunization coverage ($p<0.001$) than boys for BCG, DPT, and measles across all three surveys . 2. By contrast, improved coverage of OPV suggests a narrowing of the gender differences in recent years . 3. Girls with a surviving older sister were less likely to be immunized compared to boys, and a large proportion of all children were found to be immunized considerably later than recommended.
• Lars T Fadnes et al. Vaccination coverage and timeliness in three South African areas: a	Community-based cluster-randomized trial	Total sample size:1137 children were	The purpose of the study is to measure the vaccination timeliness and	1. The proportion of children receiving all these eight recommended vaccines were 94% in Paarl (95% confidence interval [CI] 91-

prospective study.BMC Public Health2011**11**:404		included.	vaccination coverage in three geographical areas in South Africa.	96), 62% in Rietvlei (95%CI 54-68) and 88% in Umlazi (95%CI 84-91). 2. Slightly fewer children received all vaccines within the recommended time periods. 3. There was a trend towards worse vaccination coverage with the later vaccines in the vaccination programme. The situation was worst for the last pentavalent- and oral polio vaccines. 4. The hazard ratio for incomplete vaccination was 7.2 (95%CI 4.7-11) for Rietvlei compared to Paarl.
• Gomathi et al. Timeliness of primary childhood vaccination in a rural area of Puducherry, South India: evidence from routine	Cross-sectional.	Total sample size: 457 children who had completed 1 year of age were included.	The objective was to assess the delay in primary childhood vaccination in a primary health center (PHC) of rural Puducherry	1. A total of 457 children were included, 52.5% were males, and 47.5% were females. Immunization coverage was 100% for all vaccines. Delay in vaccination more than 2 weeks from the due date of vaccination for DPT1, DPT2, DPT3 and measles

management information system.International Journal of Contemporary Pediatrics Ramaswamy G et al. Int J Contemp Pediatr. 2014 Nov;1(3):131-134				were 7.4%, 41.9%, 64.4% and 38.8% respectively. 2. Median (interquartile range) days of delay for DPT1, DPT2, DPT3 and measles was found to be 6 (4-8), 13 (7-20), 19 (12-30) and 11 (4-24) respectively. 3. Children with higher birth order were vaccinated with significant delay for DPT3 ($p = 0.008$). 4. Delay in vaccination was less in children from the village where PHC is located ($p < 0.001$)
• Shrivastwa N[1] et al. Vaccination Timeliness in Children Under India's Universal Immunization Program. Pediatr Infect Dis J. 2016 Sep;35(9):955-60. doi: 10.1097/INF.0000000000001223.	District level household and facility survey data, 2008 from India were included using vaccination data from children with and	Total 268,553 children who were 0-60 months of age were included.	The aim of this study is to characterize the timeliness of childhood vaccinations administered under India's routine immunization program using a novel application of an existing statistical	1. Vaccination data on 268,553 children who were 0-60 months of age were analyzed; timely administration of BCG, DPT3 and MCV occurred in 31%, 19% and 34% of children, respectively. The estimated vaccination probability plateaued for DPT and BCG around the age of 24 months, whereas MCV uptake increased

	without immunization cards.		methodology.	another 5% after 24 months of age. 2. The 5-year coverage of BCG, DPT3 and MCV in Indian children was 87%, 63% and 76%, respectively. 3. Lack of timely administration of key childhood vaccines, especially DPT3 and MCV, remains a major challenge in India and likely contributes to the significant burden of vaccine preventable disease-related morbidity and mortality in children.
• Manash Pratim Barman et al. Affecting Timeliness of Immunization Coverage Among Children of Assam, India:A Cross-sectional Study.First	Cross sectional study"	Multistage cluster sampling	To estimate the timeliness of vaccination coverage & to model the pattern of timeliness of vaccination using techniques of survival analysis in order	1. Study shows that education of mother, caste, religion and socio-economic status of the family have significant impact on the age appropriate immunization coverage of children. 2. The child immunization coverage in Assam has been

Published August 24, 2015			to trace the determinants of age appropriate immunization status of children.	inclining, there is a still lot of concern over the timeliness of vaccination coverage.
• SuzanneWalton[a] et al. Measuring the timeliness of childhood vaccinations: Using cohort data and routine health records to evaluate quality of immunisation services. Volume 35, Issue 51, 18 December 2017, Pages 7166-7173	Cohort study	Total sample size: 1782 children, born between 2000 and 2001 were included.	To examine the uptake and timeliness of infant and pre-school booster vaccines using cohort study data linked to health records.	1. Analysis shows that 94% of children received the first dose of primary vaccines early on time whereas this was lower for the subsequent doses(82%, 65% and 88% for second and third doses and pre-school booster respectively). 2. Median intervals between doses exceeded the recommended schedule for all but the first dose with marked variation between children. 3. There was high concordance

				(97%) between parental reported and child health MMR status. 4. Timeliness of vaccination decreased with vaccine dose. 5. Most children had appropriate intervals between doses; marked variation occurred.

RATIONALE/ JUSTIFICATION

Porbandar has a full Immunization coverage rate of 68.8 % as per NFHS-4 and 95 % as per e-mamta status. Despite being high immunization coverage rate the timeliness of vaccination is very low in India. As vaccination coverage rates among children is used as a basic indicator of vaccination program performance there is less focus on timeliness of vaccination while also there are limited data available on vaccination timeliness.

In summary, immunization coverage is essential for the quality of services but timeliness factor can add on the better quality of services." Some studies have shown that high vaccination coverage for individual vaccines do not necessarily imply timely vaccination or adequate levels of population immunity. So a study has been designed to assess the vaccination timeliness in children aged 12 to 24 months under UIP in Porbandar district Gujarat.

RESEARCH QUESTION

- Are the children aged 12 to 24 months received three dose of Pentavalent and oral polio vaccine, one dose of BCG, Hepatitis-B and measles vaccine on time as scheduled in Porbandar district, Gujarat?
- Is there any association between parity and timeliness of the vaccine?

OBJECTIVE

- To assess the timeliness of three dose of Pentavalent and oral polio vaccine, one dose of BCG, Hepatitis-B and measles vaccine in Porbandar district, Gujarat.
- To assess the relationship between parity and the timeliness of the vaccines.

METHODOLOGY

Study setting: District Porbandar is located in Gujarat with a population of 585,449 (2011 census). The population density of the district is 253 per sq.km. The average literacy rate is 75.78% according to census 2011.It have 84 subcentres in total, 11 Primary healthcare centre, 6 Urban Primary healthcare centers, 4 Community healthcare centre and 1 District Hospital.

Various data sources like e-mamta & HMIS provides coverage estimates for immunization but information on timeliness is currently not available. Hence a study was conducted to assess the timeliness of immunization in Porbandar District of Gujarat through cross sectional survey.

Methods and sample size: Study design was cross - sectional. Total sample size of 210 children were included.

Sampling Procedure: Two stage cluster sampling for assessment of timeliness was chosen. Within the cluster 7 eligible children were taken. Within the cluster the first house is selected randomly, and then we moved in one random direction till the required number of eligible children was covered.

Data Collection: We administered a structured questionnaire and also examined the immunization card and recorded the immunization status and interpreted the timeliness of the vaccination.

Exclusion Criteria: Children who were younger than 12 months and older than 24 months were not taken into study.

Also the children who don't have Mamta/ Immunization card and those who emigrated were not taken into consideration.

The study was done on delay, before time vaccination was not the focus of the study.

Inclusion Criteria: Children aged between 12-24 months were taken into consideration.

The children of families who were migrated into district having Mamta/Immunization card were taken into study.

The household having more than 1 eligible beneficiary(age between 12-24 months& having mamta/ immunization card) were also taken into consideration for study.

Statistical Analysis: The analysis was done using excel and proportions of delayed immunization were computed.

RESULT AND OBSERVATIONS

The study included vaccination data on 210 children who were 12 to 24 months of age of Porbandar district, Gujarat and the timely administration of BCG, Hepatitis, OPV-0, Penta-1, Penta-2, Penta-3, Polio-1, Polio-2, Polio-3 and Measles was found to be occurred in 86.6%, 59.1%, 73.3%,. 71.4%, 67.2%, 61.0%, 71.9%, 67.2%, 60.0% and 74.8% of children respectively. The percentage timeliness of vaccines depicted in terms of delayed, timely, before time and never were presented in graph below:

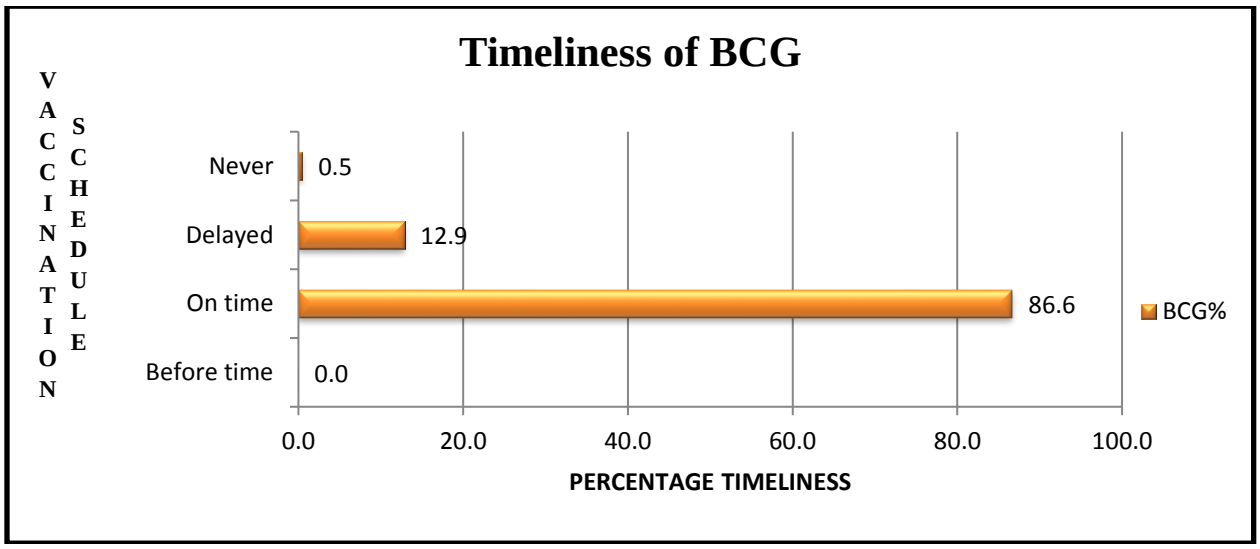

Fig3: Percentage timeliness of BCG vaccine.

Above graph represents the timely administration of BCG occurred in 86.6% of children whereas 12.9% of children received vaccine lately and 0.5% of children were not vaccinated with BCG vaccine.

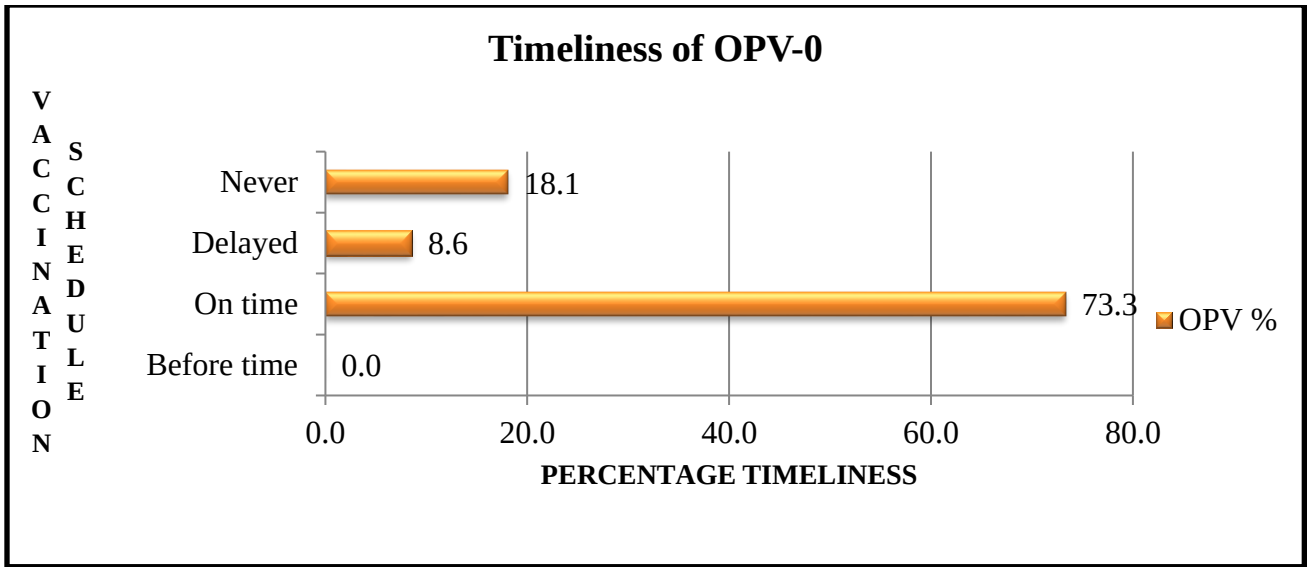

Fig4: Percentage timeliness of Zero dose of Oral Polio vaccine.

Graph above represents the timely administration of OPV-0 occurred in 73.3% of children whereas 8.6% of children received vaccine lately and 18.1% of children were not vaccinated with OPV-0 vaccine.

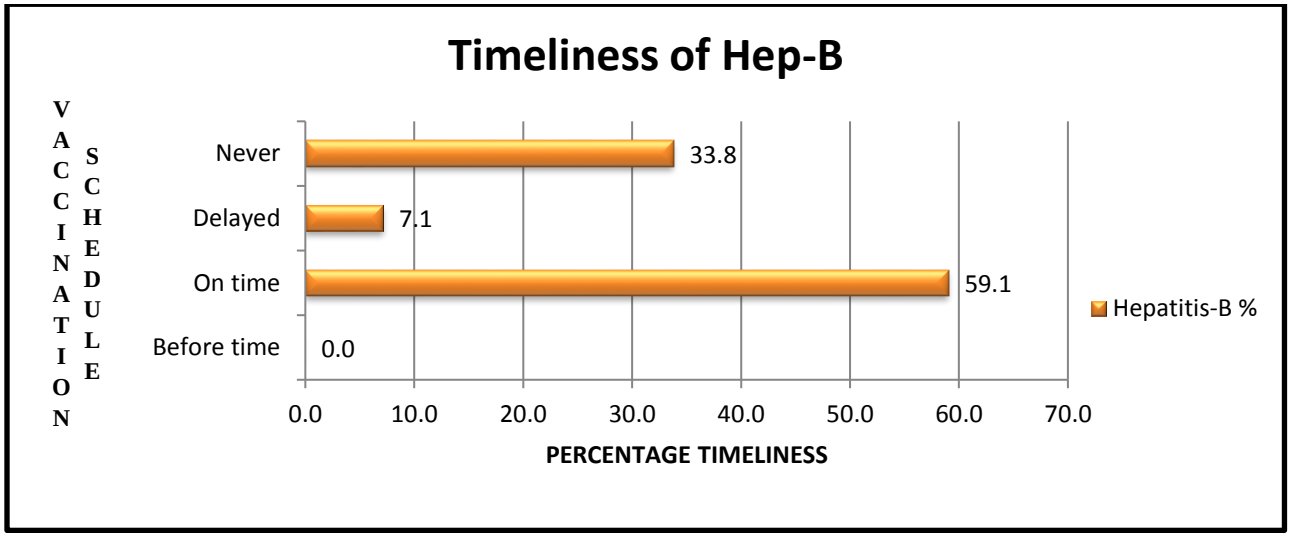

Fig5: Percentage timeliness of Hepatitis-B vaccine.

Graph above represents the timely administration of Hepatitis-B occurred in 59.1% of children whereas 7.1% of children received vaccine lately and 33.8% of children were not vaccinated with Hepatitis-B vaccine.

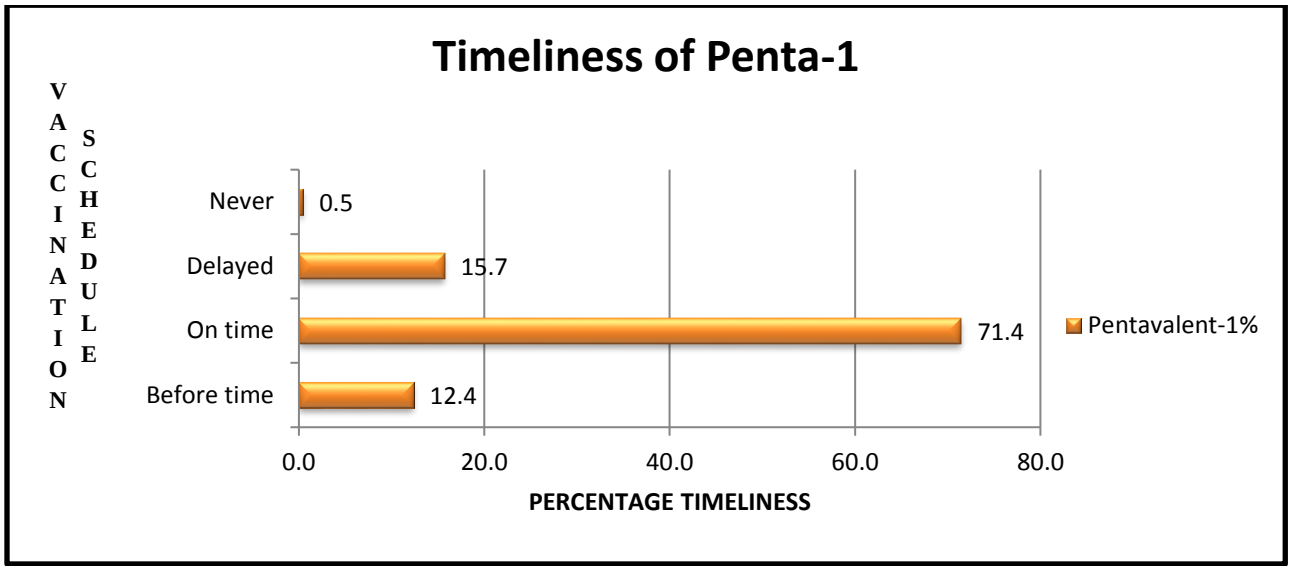

Fig6: Percentage timeliness of 1st dose of pentavalent vaccine.

Graph above represents the timely administration of Penta-1 occurred in 71.4% of children whereas 15.7% of children received vaccine lately, 12.4% received before time and 0.5% of children were not vaccinated with Penta-1 vaccine.

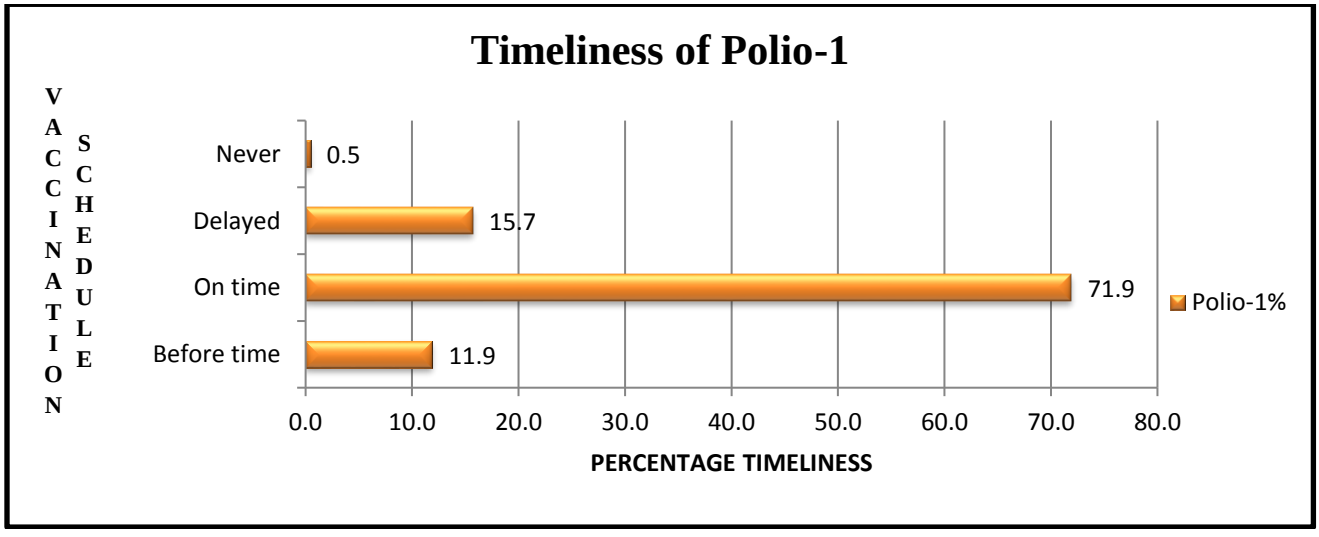

Fig7: Percentage timeliness of 1st dose of polio vaccine.

Graph above represents the timely administration of 1st dose of polio occurred in 71.9% of children whereas 15.7% of children received vaccine lately, 11.9% received before time and 0.5% of children were not vaccinated with 1 dose of polio vaccine.

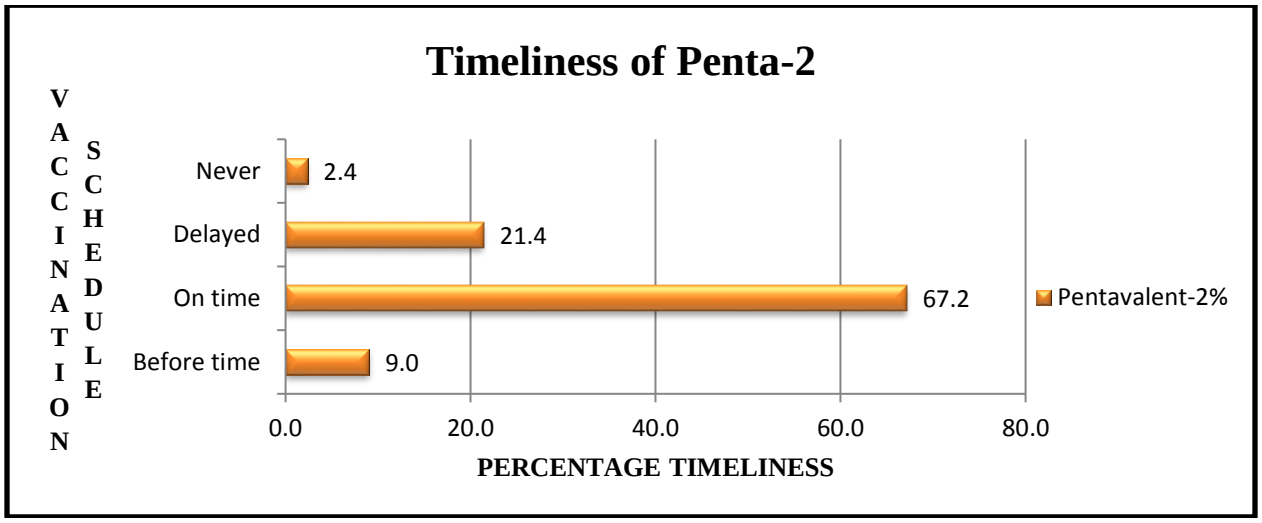

Fig8: Percentage timeliness of 2nd dose of pentavalent vaccine.

Graph above represents the timely administration of Penta-2 occurred in 67.2 % of children whereas 21.4% of children received vaccine lately, 9.0% received before time and 2.4% of children were not vaccinated with Penta-2 vaccine.

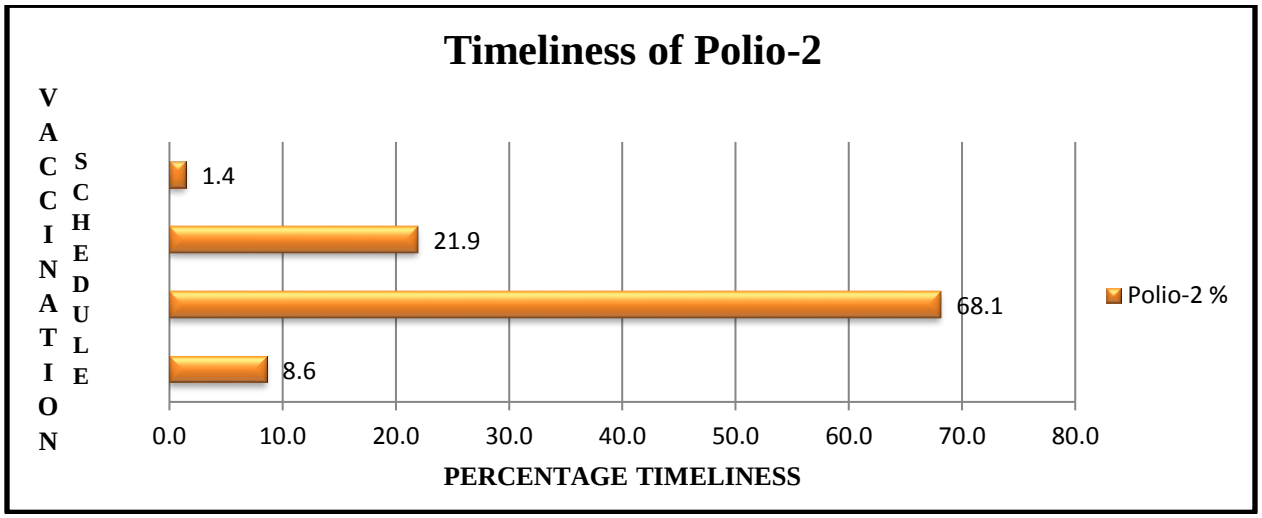

Fig9: Percentage timeliness of 2nd dose of Polio vaccine.

Graph above represents the timely administration of Polio-2 occurred in 68.1% of children whereas 21.9% of children received vaccine lately, 8.6% received before time and 104% of children were not vaccinated with Polio-2 vaccine.

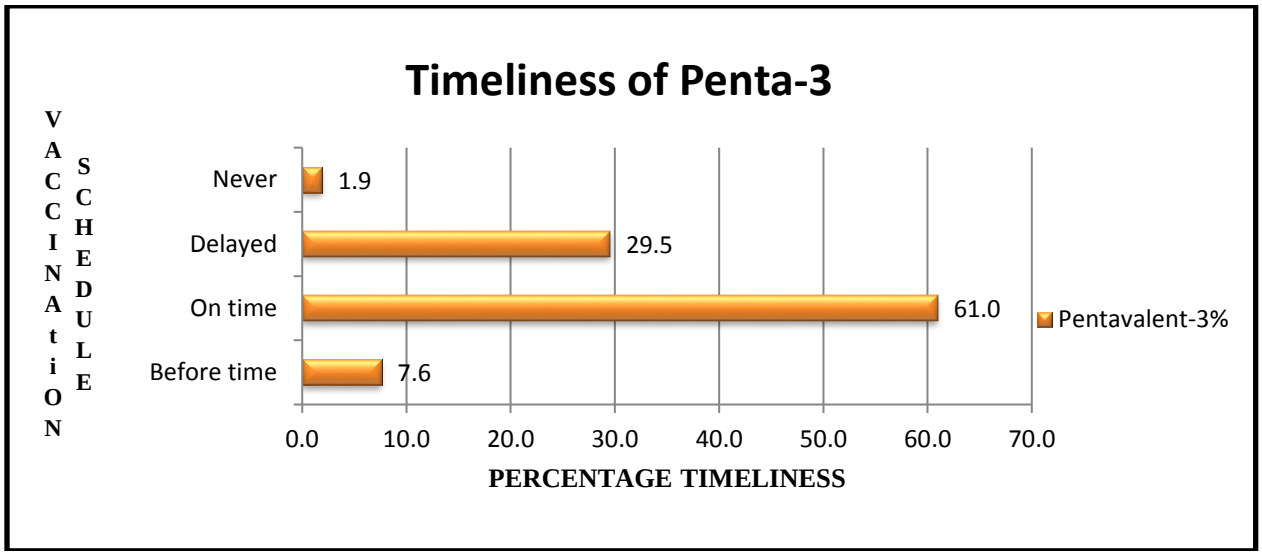

Fig10: Percentage timeliness of 3rd dose of Penta-3 vaccine.

Graph above represents the timely administration of Penta-3occurred in 61.0% of children whereas 29.5% of children received vaccine lately, 7.6% received before time and 1.9% of children were not vaccinated with Penta-3 vaccine.

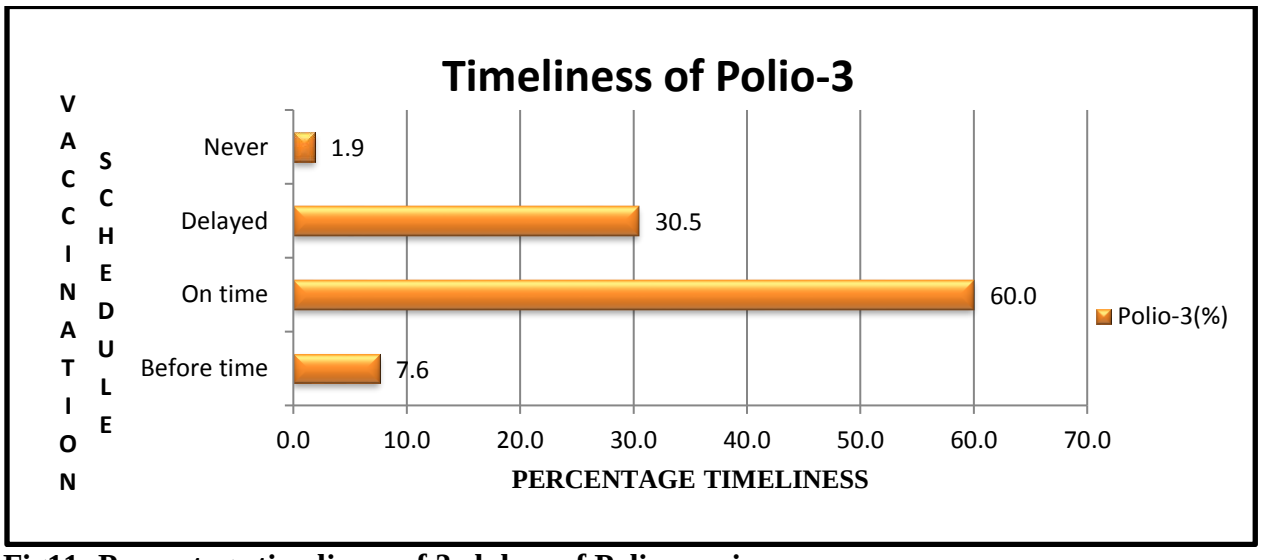

Fig11: Percentage timeliness of 3rd dose of Polio vaccine.

Graph above represents the timely administration of Polio-3 occurred in 60.0% of children whereas 30.5% of children received vaccine lately, 7.6% received before time and 1.9% of children were not vaccinated with Polio-3 vaccine.

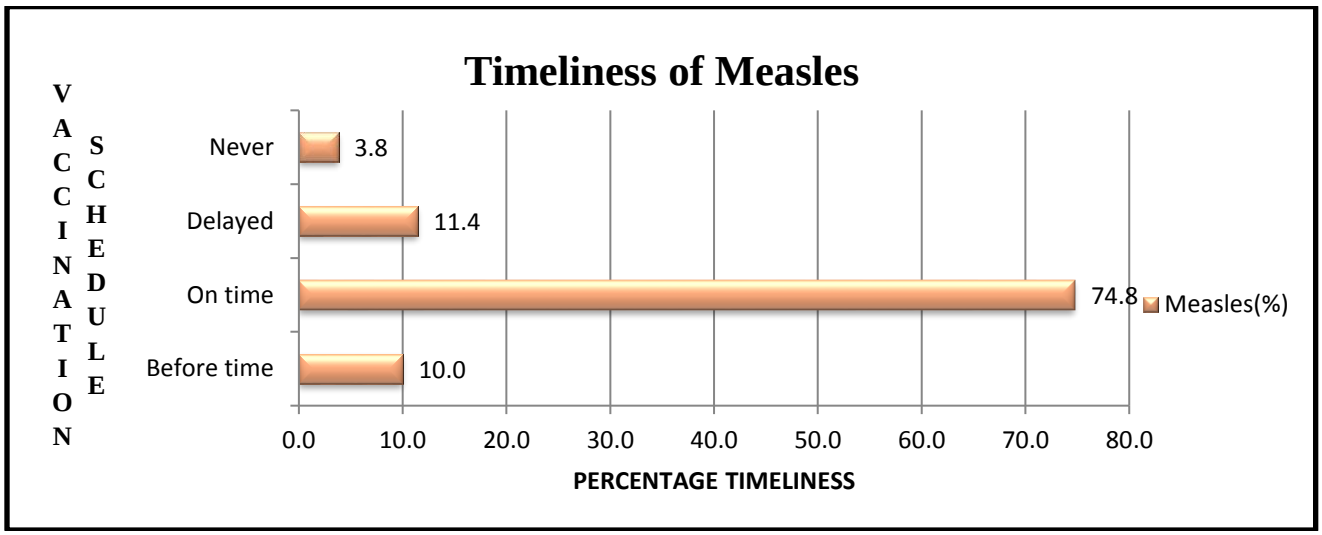

Fig12: Percentage timeliness of Measles vaccine.

Graph above represents the timely administration of Measles occurred in 74.8% of children whereas 11.4% of children received vaccine lately, 10.0% received before time and 3.8% of children were not vaccinated with Measles vaccine.

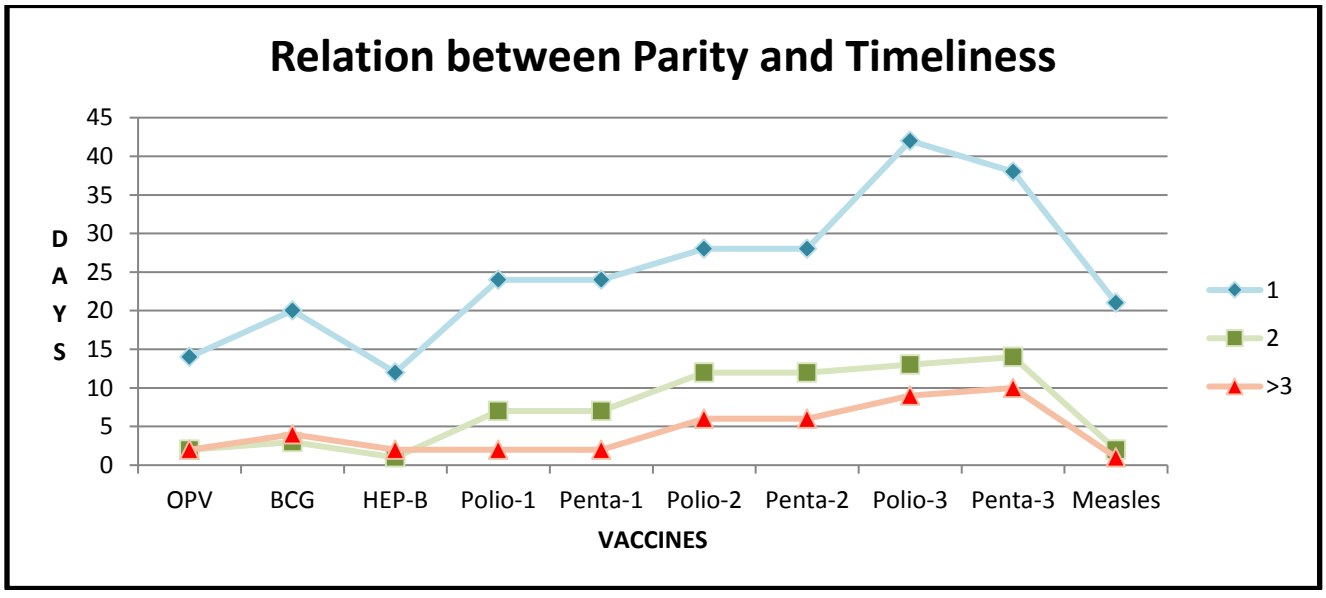

Fig13: Relationship between Parity and timeliness of vaccines.

Graph above represents the untimely administration of vaccines. It shows that as the parity increases the delay in administration of vaccine decreases i.e. timeliness increases.

Vaccine	DELAY				
	Male	Male(%)	Female	Female(%)	Total
BCG	19	70.4	8	29.6	27
OPV 0	11	61.1	7	38.9	18
Hep-B	9	60.0	6	40.0	15
PENTA-1	14	42.4	19	57.6	33
POLIO-1	14	42.4	19	57.6	33
PENTA-2	22	46.8	25	53.2	47
POLIO-2	22	46.8	25	53.2	47
PENTA-3	33	53.2	29	46.8	62
POLIO-3	36	56.3	28	43.8	64
MEASLES	10	41.7	14	58.3	24

Table1: Representing timeliness of vaccine according to gender.

The timeliness of vaccines given to be at birth i.e. BCG, OPV 0, Hep-B seen to be more in males i.e. 70.4%, 61.1% & 60.0% as compared to females i.e.29.6%, 38.9% & 40.0% respectively. Similarly, the timeliness of Penta-3 and Polio-3 vaccine was seen to be more in males as compared to females. However, the timeliness of vaccine Penta-1, Penta-2, Polio-1, Polio-2 and Measles seen to be more in females as compared to females.

DISCUSSION

As per the study, though the immunization coverage of the district is high but there are delays in vaccination, though not so high but there is a scope for improving timeliness in the vaccination in district Porbandar, Gujarat. Delay by type of vaccine observed was 12.9%, 8.6% and 7.1% of children who did not receive BCG, OPV-0 and Hepatitis-B vaccine respectively . On comparing the delay of these three vaccines it has been observed that though these vaccines have to be given together at the time of birth still data shows variation which depicts that the infants did not receive all three vaccines at the birth in spite of being delivered at institute. It has also been interpreted from the study that the approximately 34% of the children did not get vaccinated with Hepatitis-B in spite of the fact that these deliveries were institutional.

However it also has been depicted from data that if the children are subjected to receive two vaccines same day only, he/she did might not get vaccinated with both the vaccine. Adding to this, data shows that Penta-1 and Polio-1 is timely administered in 71.4% and 71.9% of children respectively. Furthermore analysis shows that approximately 12% of children get vaccinated with Penta-1 and Polio-1 before time which can result in a suboptimal immune response, leading to a false sense of protection. Similar trend has been observed with the doses of Penta-2 & Poilo-2 and Penta-3 & Polio-3.

On comparing the percentage of delayed immunization status it has been seen that as the infant progress towards the next doses of immunization the adherence to the timeliness decreases (Penta-1 (71.4%); Penta-2 (67.2%); Penta-3 (61.0%)).

Same trend has been seen in case of Measles also. 10% of the children got vaccinated before time and approximately 12% children recieved delayed shot of vaccine.

The relation between parity and timeliness has also been interpreted from the data. As the parity (birth order) increases the adherence to the timeliness i.e. getting vaccinated on time increases. The children of the 1st birth order shows more delay in getting vaccinated this might be due to low awareness among their mothers.

Lastly, the gender wise distribution of timeliness of vaccine were also studied, which shows that some vaccine like Penta-1, Polio-1, Penta-2, Polio-2 and Measles were administered more timely in females as compared to females where as vaccines like BCG, OPV 0, Hep-B, Penta-3 and

Polio-3 were administered more timely in males as compared to females. What are the factors possible for this trend was not being studied due to time constraint.

Due to time constraint, factors responsible for delay were not studied but most of the studies shows that the carelessness with low socio-economic status, maternal illiteracy, and lack of mothers' knowledge on vaccine preventable diseases can be the reasons for delay.

CONCLUSION

What have been revealed from the study concluded as follows: Lack of timely administration of key childhood vaccines remains a major challenge in India and likely contributes to the significant burden of VPD. Though the delay is not so high in Porbandar district but a significant proportion of population lacks age- appropriate vaccination in district. The timeliness of vaccination caninfluenced by different factors not being studied due to time constraint and language barrier. In states with high vaccination coverage, we need to focus on timeliness and surveillance for timely age-appropriate vaccination. This will further improve immunization delivery effectiveness and ensure low dropouts, as delayed first dose is associated with higher chances of dropout. To avoid delays we recommend (i) use of mono dose vials for BCG/ Measles; (ii) recall notice to mothers; (iii) modification of software to track immunization status and timeliness of individual beneficiaries rather than aggregate numbers. We also recommend educating the health workers regarding the importance of vaccine timeliness in reducing the morbidity and mortality in children.

LIMITATION

Data was collected through the mamta/immunization card during household visit and recall factor was not taken into consideration due to low awareness and literacy among the mothers. Due to time constraint and language barrier, the factors responsible for delay in timeliness of vaccination were not being studied.

APPENDIX

- **INSTRUMENTATION**

IMMUNIZATION SURVEY QUESTIONNAIRE

Name of Respondent _____ Village_____
District _____
Name of PHC _____ Block_____
Rural/Urban_____
1) Name of child_____ **2)** D.O.B_____**3)** Sex of child_____
4) Father's Name_____ **5)** Mother's Name_____
6) Number of Siblings (a) 1 (b) 2 (c) 3 & >3

S.NO	VACCINE/ Expected Date of Vaccination	STATUS-YES/NO
1	**BCG/ Date**	If Yes, then date of vaccination ____; If vaccination delayed, then mark right tick _____
2	**OPV/ Date**	If Yes, then date of vaccination____; If vaccination delayed, then mark right tick _____
3	**Hepatitis B/ Date**	If Yes, then date of vaccination____; If vaccination delayed, then mark right tick _____
4	**PENTAVALENT1/ Date**	If Yes, then date of vaccination____; If vaccination delayed, then mark right tick _____
5	**PENTAVALENT 2/ Date**	If Yes, then date of vaccination____; If vaccination delayed, then mark right tick _____
6	**PENTAVALENT-3/ Date**	If Yes, then date of vaccination____; If vaccination delayed, then mark right tick _____
7	**POLIO-1/ Date**	If Yes, then date of vaccination____; If vaccination delayed, then mark right tick _____
8	**POLIO-2/ Date**	If Yes, then date of vaccination____; If vaccination delayed, then mark right tick _____

9	**POLIO-3/ Date**	If Yes, then date of vaccination____ If vaccination delayed, then mark right tick _____
10	**MEASLES/ Date**	If Yes, then date of vaccination____ If vaccination delayed, then mark right tick _____

- **NFHS-4 Fact sheet**

GJ_FactSheet_478_Porbandar.pdf

सत्यमेव जयते
Government of India
Ministry of Health and Family Welfare

NATIONAL FAMILY HEALTH SURVEY - 4

2015-16

DISTRICT FACT SHEET
PORBANDAR
GUJARAT

(स्थापना / Established in 1956)
बेहतर भविष्य के लिए क्षमता निर्माण
Capacity Building for a Better Future

International Institute for Population Sciences
(Deemed University)
Mumbai

Introduction

The National Family Health Survey 2015-16 (NFHS-4), the fourth in the NFHS series, provides information on population, health and nutrition for India and each State / Union territory. NFHS-4, for the first time, provides district-level estimates for many important indicators.

The contents of previous rounds of NFHS are generally retained and additional components are added from one round to another. In this round, information on malaria prevention, migration in the context of HIV, abortion, violence during pregnancy etc. have been added. The scope of clinical, anthropometric, and biochemical testing (CAB) or Biomarker component has been expanded to include measurement of blood pressure and blood glucose levels. NFHS-4 sample has been designed to provide district and higher level estimates of various indicators covered in the survey. However, estimates of indicators of sexual behaviour, husband's background and woman's work, HIV/AIDS knowledge, attitudes and behaviour, and, domestic violence will be available at State and national level only.

As in the earlier rounds, the Ministry of Health and Family Welfare, Government of India designated International Institute for Population Sciences, Mumbai as the nodal agency to conduct NFHS-4. The main objective of each successive round of the NFHS has been to provide essential data on health and family welfare and emerging issues in this area. NFHS-4 data will be useful in setting benchmarks and examining the progress in health sector the country has made over time. Besides providing evidence for the effectiveness of the ongoing programmes, the data from NFHS-4 help in identifying need for new programmes with area specific focus.

Four Survey Schedules - Household, Woman's, Man's and Biomarker - were canvassed in local language using Computer Assisted Personal Interviewing (CAPI). In the Household Schedule, information was collected on all usual members of the household and visitors who stayed in the household the previous night as well as socio-economic characteristics of the household, water and sanitation, health insurance, number of deaths in the household in the three years preceding the survey etc. Information on the woman's characteristics, marriage, fertility, children's immunizations and childcare, nutrition, contraception, reproductive health, sexual behaviour, HIV/AIDS, domestic violence, etc. was canvassed in the Woman's Schedule. The Man's Schedule covered the man's characteristics, marriage, his number of children, contraception, fertility preferences, nutrition, sexual behaviour, attitudes towards gender roles, HIV/AIDS, etc. The Biomarker Schedule covered measurements of height, weight and haemoglobin levels for children; measurements of height, weight, haemoglobin levels, blood pressure, and random blood glucose level for women aged 15-49 years and men aged 15-54 years. In addition, women and men were requested to provide a few drops of blood from a finger prick for laboratory testing for HIV.

This fact sheet provides information on key indicators and trends for Porbandar. NFHS-4 fieldwork for Gujarat was conducted from 30 January 2016 to 30 June 2016 by Centre for Operations Research and Training (CORT). In Porbandar, information was gathered from 835 households, 932 women, and 234 men. The fact sheet shows information for urban and rural areas and the district as a whole because the percent urban population in Porbandar is between 30-70%, which provides a sufficiently large sample to produce reliable estimates of most indicators for both urban and rural areas.

Porbandar, Gujarat - Key Indicators

Indicators	NFHS-4 (2015-16)		
Population and Household Profile	**Urban**	**Rural**	**Total**
1. Population (female) age 6 years and above who ever attended school (%)	80.8	62.9	71.6
2. Population below age 15 years (%)	21.6	23.5	22.6
3. Sex ratio of the total population (females per 1,000 males)	959	926	941
4. Sex ratio at birth for children born in the last five years (females per 1,000 males)	722	853	803
5. Children under age 5 years whose birth was registered (%)	99.3	99.3	99.3
6. Households with electricity (%)	100.0	98.6	99.3
7. Households with an improved drinking-water source[1] (%)	93.0	78.1	85.1
8. Households using improved sanitation facility[2] (%)	84.1	61.8	72.4
9. Households using clean fuel for cooking[3] (%)	77.4	22.3	48.4
10. Households using iodized salt (%)	99.1	98.6	98.8
11. Households with any usual member covered by a health scheme or health insurance (%)	9.0	11.4	10.3
Characteristics of Adults (age 15-49)			
12. Women who are literate (%)	88.9	69.0	78.5
13. Men who are literate (%)	86.4	94.1	90.6
14. Women with 10 or more years of schooling (%)	47.4	20.6	33.4
Marriage and Fertility			
15. Women age 20-24 years married before age 18 years (%)	13.8	19.4	17.2
16. Men age 25-29 years married before age 21 years (%)	*	*	(16.0)
17. Women age 15-19 years who were already mothers or pregnant at the time of the survey (%)	3.5	9.6	6.9
Current Use of Family Planning Methods (currently married women age 15–49 years)			
18. Any method[4] (%)	35.8	35.2	35.5
19. Any modern method[4] (%)	35.5	33.8	34.6
20. Female sterilization (%)	19.9	28.1	24.2
21. Male sterilization (%)	0.0	0.0	0.0
22. IUD/PPIUD (%)	5.5	2.7	4.0
23. Pill (%)	1.1	1.4	1.3
24. Condom (%)	8.3	1.7	4.8
Unmet Need for Family Planning (currently married women age 15–49 years)[5]			
25. Total unmet need (%)	17.4	18.1	17.8
26. Unmet need for spacing (%)	7.8	10.0	9.0
Quality of Family Planning Services			
27. Health worker ever talked to female non-users about family planning (%)	3.7	18.8	11.6
28. Current users ever told about side effects of current method[6] (%)	(22.8)	(66.6)	50.5

[1] Piped water into dwelling/yard/plot, public tap/standpipe, tube well or borehole, protected dug well, protected spring, rainwater, community RO plant.
[2] Flush to piped sewer system, flush to septic tank, flush to pit latrine, ventilated improved pit (VIP)/biogas latrine, pit latrine with slab, twin pit/composting toilet, which is not shared with any other household. [3] Electricity, LPG/natural gas, biogas. [4] Includes other methods that are not shown separately
[5] Unmet need for family planning refers to fecund women who are not using contraception but who wish to postpone the next birth (spacing) or stop childbearing altogether (limiting). Specifically, women are considered to have unmet need for spacing if they are:
· At risk of becoming pregnant, not using contraception, and either do not want to become pregnant within the next two years, or are unsure if or when they want to become pregnant.
· Pregnant with a mistimed pregnancy.
· Postpartum amenorrheic for up to two years following a mistimed birth and not using contraception.
Women are considered to have unmet need for limiting if they are:
· At risk of becoming pregnant, not using contraception, and want no (more) children.
· Pregnant with an unwanted pregnancy.
· Postpartum amenorrheic for up to two years following an unwanted birth and not using contraception.
Women who are classified as infecund have no unmet need because they are not at risk of becoming pregnant. Unmet need for family planning is the sum of unmet need for spacing plus unmet need for limiting.
[6] Based on current users of female sterilization, IUD/PPIUD, injectables and pill who started using that method in the past 5 years.

( ) Based on 25-49 unweighted cases
* Percentage not shown; based on fewer than 25 unweighted cases

Porbandar, Gujarat - Key Indicators

Indicators	NFHS-4 (2015-16)		
Maternal and Child Health	**Urban**	**Rural**	**Total**
Maternity Care (for last birth in the 5 years before the survey)			
29. Mothers who had antenatal check-up in the first trimester (%)	64.0	78.7	73.0
30. Mothers who had at least 4 antenatal care visits (%)	51.5	60.3	56.9
31. Mothers whose last birth was protected against neonatal tetanus[7] (%)	97.1	98.0	97.7
32. Mothers who consumed iron folic acid for 100 days or more when they were pregnant (%)	54.7	36.7	43.7
33. Mothers who had full antenatal care[8] (%)	44.2	25.3	32.7
34. Registered pregnancies for which the mother received Mother and Child Protection (MCP) card (%)	92.3	96.1	94.6
35. Mothers who received postnatal care from a doctor/nurse/LHV/ANM/midwife/other health personnel within 2 days of delivery (%)	64.3	67.4	66.2
36. Mothers who received financial assistance under Janani Suraksha Yojana (JSY) for births delivered in an institution (%)	4.1	8.8	7.0
37. Average out of pocket expenditure per delivery in public health facility (Rs.)	(1,637)	1,433	1,493
38. Children born at home who were taken to a health facility for check-up within 24 hours of birth (%)	*	*	*
39. Children who received a health check after birth from a doctor/nurse/LHV/ANM/ midwife/other health personnel within 2 days of birth (%)	13.1	16.4	15.1
Delivery Care (for births in the 5 years before the survey)			
40. Institutional births (%)	97.5	97.2	97.3
41. Institutional births in public facility (%)	41.2	62.3	54.6
42. Home delivery conducted by skilled health personnel (out of total deliveries) (%)	1.8	2.3	2.1
43. Births assisted by a doctor/nurse/LHV/ANM/other health personnel (%)	95.6	96.6	96.2
44. Births delivered by caesarean section (%)	20.4	12.5	15.4
45. Births in a private health facility delivered by caesarean section (%)	30.5	21.3	25.7
46. Births in a public health facility delivered by caesarean section (%)	7.7	8.2	8.1
Child Immunizations and Vitamin A Supplementation			
47. Children age 12-23 months fully immunized (BCG, measles, and 3 doses each of polio and DPT) (%)	*	(76.4)	(68.8)
48. Children age 12-23 months who have received BCG (%)	*	(92.8)	(91.4)
49. Children age 12-23 months who have received 3 doses of polio vaccine (%)	*	(76.4)	(70.9)
50. Children age 12-23 months who have received 3 doses of DPT vaccine (%)	*	(92.8)	(91.4)
51. Children age 12-23 months who have received measles vaccine (%)	*	(96.1)	(89.9)
52. Children age 12-23 months who have received 3 doses of Hepatitis B vaccine (%)	*	(39.7)	(37.7)
53. Children age 9-59 months who received a vitamin A dose in last 6 months (%)	94.9	88.9	91.1
54. Children age 12-23 months who received most of the vaccinations in public health facility (%)	*	(96.8)	(95.4)
55. Children age 12-23 months who received most of the vaccinations in private health facility (%)	*	(3.2)	(4.6)
Treatment of Childhood Diseases (children under age 5 years)			
56. Prevalence of diarrhoea (reported) in the last 2 weeks preceding the survey (%)	9.0	7.5	8.0
57. Children with diarrhoea in the last 2 weeks who received oral rehydration salts (ORS) (%)	*	*	*
58. Children with diarrhoea in the last 2 weeks who received zinc (%)	*	*	*
59. Children with diarrhoea in the last 2 weeks taken to a health facility (%)	*	*	*
60. Prevalence of symptoms of acute respiratory infection (ARI) in the last 2 weeks preceding the survey (%)	0.7	0.6	0.6
61. Children with fever or symptoms of ARI in the last 2 weeks preceding the survey taken to a health facility (%)	*	*	*
Child Feeding Practices and Nutritional Status of Children			
62. Children under age 3 years breastfed within one hour of birth[9] (%)	57.8	59.1	58.7
63. Children under age 6 months exclusively breastfed[10] (%)	*	*	(52.2)
64. Children age 6-8 months receiving solid or semi-solid food and breastmilk[10] (%)	*	*	*
65. Breastfeeding children age 6-23 months receiving an adequate diet[10,11] (%)	*	(0.0)	0.0
66. Non-breastfeeding children age 6-23 months receiving an adequate diet[10,11] (%)	*	*	*
67. Total children age 6-23 months receiving an adequate diet[10,11] (%)	(0.0)	(0.0)	0.0
68. Children under 5 years who are stunted (height-for-age)[12] (%)	19.7	24.2	22.6
69. Children under 5 years who are wasted (weight-for-height)[12] (%)	16.0	30.6	25.4
70. Children under 5 years who are severely wasted (weight-for-height)[13] (%)	4.9	13.8	10.6
71. Children under 5 years who are underweight (weight-for-age)[12] (%)	21.6	31.1	27.7

[7] Includes mothers with two injections during the pregnancy of her last birth, or two or more injections (the last within 3 years of the last live birth), or three or more injections (the last within 5 years of the last birth), or four or more injections (the last within 10 years of the last live birth), or five or more injections at any time prior to the last birth. Not exactly comparable with NFHS-3 due to differences in definition. [8] Full antenatal care is at least four antenatal visits, at least one tetanus toxoid (TT) injection and iron folic acid tablets or syrup taken for 100 or more days. [9] Based on the last child born in the 5 years before the survey. [10] Based on the youngest child living with the mother. [11] Breastfed children receiving 4 or more food groups and a minimum meal frequency, non-breastfed children fed with a minimum of 3 Infant and Young Child Feeding Practices (fed with other milk or milk products at least twice a day, a minimum meal frequency that is receiving solid or semi-solid food at least twice a day for breastfed infants 6-8 months and at least three times a day for breastfed children 9-23 months, and solid or semi-solid foods from at least four food groups not including the milk or milk products food group). [12] Below -2 standard deviations, based on the WHO standard. [13] Below -3 standard deviations, based on the WHO standard.

Porbandar, Gujarat - Key Indicators

Indicators	NFHS-4 (2015-16)		
Nutritional Status of Adults (age 15-49 years)	**Urban**	**Rural**	**Total**
72. Women whose Body Mass Index (BMI) is below normal (BMI < 18.5 kg/m^2)[14] (%)	9.7	18.0	14.0
73. Men whose Body Mass Index (BMI) is below normal (BMI < 18.5 kg/m^2) (%)	11.5	17.7	14.9
74. Women who are overweight or obese (BMI ≥ 25.0 kg/m^2)[14] (%)	30.5	19.5	24.8
75. Men who are overweight or obese (BMI ≥ 25.0 kg/m^2) (%)	17.1	13.4	15.1
Anaemia among Children and Adults[15]			
76. Children age 6-59 months who are anaemic (<11.0 g/dl) (%)	69.8	71.5	70.8
77. Non-pregnant women age 15-49 years who are anaemic (<12.0 g/dl) (%)	60.3	58.5	59.4
78. Pregnant women age 15-49 years who are anaemic (<11.0 g/dl) (%)	*	(56.1)	(53.7)
79. All women age 15-49 years who are anaemic (%)	60.0	58.4	59.2
80. Men age 15-49 years who are anaemic (<13.0 g/dl) (%)	19.7	21.8	20.8
Blood Sugar Level among Adults (age 15-49 years)[16]			
Women			
81. Blood sugar level - high (>140 mg/dl) (%)	5.4	4.2	4.8
82. Blood sugar level - very high (>160 mg/dl) (%)	2.3	1.1	1.7
Men			
83. Blood sugar level - high (>140 mg/dl) (%)	10.1	5.0	7.4
84. Blood sugar level - very high (>160 mg/dl) (%)	4.3	2.0	3.1
Hypertension among Adults (age 15-49 years)			
Women			
85. Slightly above normal (Systolic 140-159 mm of Hg and/or Diastolic 90-99 mm of Hg) (%)	4.9	4.8	4.9
86. Moderately high (Systolic 160-179 mm of Hg and/or Diastolic 100-109 mm of Hg) (%)	0.8	0.5	0.6
87. Very high (Systolic ≥180 mm of Hg and/or Diastolic ≥110 mm of Hg) (%)	0.2	0.9	0.6
Men			
88. Slightly above normal (Systolic 140-159 mm of Hg and/or Diastolic 90-99 mm of Hg) (%)	5.2	4.6	4.9
89. Moderately high (Systolic 160-179 mm of Hg and/or Diastolic 100-109 mm of Hg) (%)	0.9	0.0	0.4
90. Very high (Systolic ≥180 mm of Hg and/or Diastolic ≥110 mm of Hg) (%)	0.8	3.1	2.0
Women Age 15-49 Years Who Have Ever Undergone Examinations of:			
91. Cervix (%)	17.9	16.2	17.0
92. Breast (%)	3.8	3.4	3.6
93. Oral cavity (%)	8.8	6.8	7.7

[14] Excludes pregnant women and women with a birth in the preceding 2 months. [15] Haemoglobin in grams per decilitre (g/dl). Among children, prevalence is adjusted for altitude. Among adults, prevalence is adjusted for altitude and for smoking status. [16] Random blood sugar measurement (including those under medication).

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For additional information, please contact:

Director/Project Coordinator (NFHS-4)
International Institute for Population Sciences
Govandi Station Road, Deonar
Mumbai - 400 088 (India)
Telephone: 022-4237 2442
Fax: 022-25563257
Email: nfhs42013@gmail.com, director@iips.net
Website: http://www.rchiips.org/nfhs
http://www.iipsindia.org

Chief Director (Stat.)
Ministry of Health and Family Welfare
Government of India
Nirman Bhavan
New Delhi 110 108
Telephone: 011 – 23062288
Fax: 011 - 23062288
Email: cdstat@nic.in
Website: http://www.mohfw.nic.in
https://www.nrhm-mis.nic.in

Director (Stat.)
Ministry of Health and Family Welfare
Government of India
Nirman Bhavan
New Delhi 110 108
Telephone: 011 - 23062647
Fax: 011 - 23062647
Email: jdstat2-mohfw@nic.in
Website: http://www.mohfw.nic.in
https://www.nrhm-mis.nic.in

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