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## AN EMPIRICAL IMPACT STUDY OF IMMUNIZATION ON HEALTH STATUS OF CHILDREN IN RAMNAGAR VILLAGE OF PURNIA DISTRICT BIHAR

**Ajab singh**

Research Scholar, Deptt. of Food & Nutrition, Govt. M. H. College of Home Science & Sciences for Women (Auto), Jabalpur (MP)

**Brijlata Dubey and Smita Pathak**

Professor, Deptt. of Food & Nutrition, Govt. M. H. College of Home Science & Sciences for Women (Auto), Jabalpur (MP)

### ABSTRACT

*Immunization remains one of the most important and cost-effective public health interventions to reduce child mortality and morbidity. Globally, it is estimated to avert between 2 and 3 million deaths each year. In India, particularly in Bihar, immunization coverage rates stagnated and remained very low for many years. Thus, this study was aimed to assess child immunization coverage and factors associated with health status among children aged 0-24 months in Ramnagar village of Purnia district Bihar. The study design was community-based cross-*

*sectional survey. Data was collected by using pretested structured questionnaire. A total of 100 mothers/caretakers were interviewed. Based on immunization card and mothers/caretakers' recall. Alternate Hypothesis  $H_1$ : "There is a significant impact of Immunization on Health status of Children under study" was accepted and proved by correlation statistical test on data analyse. The finding from this study revealed that child immunization coverage in the studied area was low. Thus the town health office and concerned stakeholders need to work more to*

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## INTRODUCTION

It is always better to prevent a disease than to treat it after it occurs. Diseases that used to be common in this country and around the world, including polio, measles, diphtheria, pertussis (whooping cough), rubella (German measles), mumps, tetanus, rotavirus and *Haemophilus influenzae type B* (HIB) can now be prevented by vaccination. Over the years vaccines have prevented countless cases of disease and saved millions of lives. Immunity is the body's way of preventing disease. Children are born with an immune system composed of cells, glands, organs, and fluids located throughout the body. The immune system recognizes germs that enter the body as "foreign invaders" (called antigens) and produces proteins called antibodies to fight them. The first time a child is infected with a specific antigen (say measles virus), the immune system produces antibodies designed to fight it. This takes time, usually the immune system can't work fast enough to prevent the antigen from causing disease, so the child still gets sick.(1)

However, the immune system "*remembers*" that antigen. If it ever enters the body again, even after many years, the immune system can produce antibodies fast enough to keep it from causing disease a second time. This protection is called immunity. It would be nice if there were a way to give children immunity to a disease without their having to get sick first

It used to be the world wide norm that a large number of kids died before adulthood during an infectious disease outbreak; however, by means of immunization such diseases are only in the history today. Several types of vaccines, especially for children, are currently available. These vaccines act effectively and most of them are able to prevent diseases with 90-99% of effectiveness, thus they are considered as the most important weapon for children's safety (2).

Universal immunization of children against six preventable diseases (tuberculosis, diphtheria, Pertussis, tetanus, polio, and measles) is crucial to diminish childhood mortality and morbidity across the world. Unquestionably improving access to and

utilization of routine immunization services are the best option for the prevention and control of vaccine preventable diseases (VPD). As a consequence, overall health status of children can be improved.

Immunization is considered as one of the most powerful and cost-effective of all health interventions. It is also believed to prevent debilitating illness and disability and saves millions of lives every year [2]. For instance, immunization currently forestalls an estimated two to three million deaths every year in all age groups from diphtheria, tetanus, pertussis (whooping cough), and measles. Moreover immunization contributes a lot for a given nation by reducing the risk of disability from infectious diseases such as poliomyelitis [3]

Even though vaccines were widely regarded as an effective tool to halt the burden associated with vaccine-preventable disease (VPD), across the world 26.3 million children below the age of one year had not been immunized with diphtheria tetanus- pertussis vaccine (DTP3) in 2016 [4].

A recent report from world health organization (WHO) revealed that the number of children under one year of age

who did not receive diphtheria-tetanus-pertussis vaccine (DTP3) vaccine worldwide was estimated to be 21.8million in 2016 compared to 22.8 million in 2015. Almost seventy percent of these children live in ten countries and more than half of them are found in Asia including India.

In this backdrop it is found relevant to study the current research topic ***“An Empirical Impact Study of immunization on health status of children in Ramnagar village of Purnia district Bihar”***

## LITERATURE REVIEW

**Mathew (2012)** conducted a systematic review to identify and explore factors associated with inequalities in routine vaccination of children in India and provides information for urgent action to redress the imbalances. NFHS-3 data showed that nine states had full vaccination rate lower than the national average; these include Madhya Pradesh, Jharkhand, Meghalaya, Bihar, Assam, Arunachal Pradesh, Rajasthan, Uttar Pradesh and Nagaland. Analysis by area of residence showed that rural children were less likely to have complete vaccination than urban children. Similar

imbalance has been observed by gender. The survey report showed that infants in families with higher wealth indices had better vaccination status. Mother's education status was assessed in the NFHS3 survey. There was higher complete vaccination and lower non-vaccination among infants of mothers with more years of formal education.

*Hoshaw-Woodard (2001)* studied brief description of cluster and stratified sampling along with general aspects of these two sampling designs, compares and contrasts the two methods and provides guidelines for immunization system.

*Luman et al. (2007)* compared coverage estimates obtained from EPI sampling and SystRS, as well as the relative difficulty of implementing the approaches, by simultaneously conducting surveys in rural and urban Ethiopian districts using both methodologies at the same sites.

*Singh et al. (1996)* evaluated the immunization coverage of infants, children and women residing in a primary health centre (PHC) area in Rajasthan by lot quality assurance sampling (LQAS) and 30 cluster sampling recommended by WHO's EPI. LQAS was found to be more

time consuming and costly than EPI method and recommended that LQAS may be useful method for routine monitoring of immunization programmes in small areas. Two stage (30×30) cluster sampling and systematic sampling has been compared to study crude mortality on the same population at the same time (*Rose et al. 2006*). *Milligan et al. (2004)* compared EPI and compact segment scheme to estimate vaccination coverage in Western Region of the Gambia within 3 months of each other in 2000-200

## 2. OBJECTIVES

**2.1. General Objective.** An Empirical Impact Study of immunization on health status of children in Ramnagar village of Purnia district Bihar”

### 2.2. Specific Objectives

- (i) To determine child immunization impact in stated site Ramnagar village of Purnia district Bihar.
- (ii) To identify factors associated with immunization and children health status.

## 3. METHOD AND MATERIALS

**3.1. Study Area and Design.** A community-based cross-sectional study design was conducted in year 2017. The study was conducted in Ramnagar village

of Purnia district Bihar

**3.2. Source Population.** All children aged 6 to 23 months with their mothers/caretakers living in Ramnagar village of Purnia district Bihar were the source population.

**3.3. Study Population.** Children aged 6 to 23 months with their mothers/caretakers living in Ramnagar village of Purnia district Bihar were the study population

**3.4 Hypothesis of the study:**

**Null Hypothesis Ho:** *There is no significant impact of Immunization on Health status of Children under study.*

**Alternate hypothesis:** *There is a*

*significant impact of Immunization on Health status of Children under study.*

#### 4. RESULT AND DISCUSSION

To analyse the status of Children under study impact of Immunization is exploratorically depicted as in tables below:

**TABLE NO. 1.1 IMMUNIZATION STATUS OF CHILDREN OF RAMNAGAR VILLAGE OF PURNIA DISTRICT BIHAR**

Vaccination	BIHAR (NFHS-4 ,2015-16)	Purnia (NFHS-4 ,2015-16)	Ramnagar Pharsai (Survey)
BCG	91.7	95.9	92.3
DPT (3 dose)	80.1	85.5	83.4
Polio (3 dose)	72.9	73.3	73.1
Measles	79.4	89.5	81.2
All basic vaccinations(BCG, DPT, Polio, Measles)	61.7	65.7	63.6
No vaccinations	6.5	2.1	15.3

The Immunization status of children of Ramnagar village of Purnia district, Bihar has been shown in the above table. Out of

various kinds of vaccination enlisted in the table, the first one was BCG with 91.7% children in Bihar who were taking the

doses of BCG whereas it increased to 95.6% in Purnia district and 92.3% children in Ramnagar Pharsai. The overall status of DPT (3 Dose) in Bihar was 80.1% whereas it had an increase rate 85.5% children in Purnia district and 83.4% in Ramnagar Pharsai respectively. The third type of vaccine was Polio (3 Dose) in which 72.9% children were taking the dose whereas 73.1% and 73.1% children were from Purnia & Ramnagar Pharsai. The fourth vaccine was Measles with 79.4% in Bihar whereas Purnia showed 89.5% and Ramnagar Pharsai showed 81.2%. All basic vaccinations ((BCG, DPT, Polio, Measles) were taken by 61.7% children from Bihar whereas Purnia showed 65.7% and Ramnagar

Pharsai showed 63.6%. There were 6.5% children who were not taking any vaccinations from Bihar whereas it reduced to 2.1 in Purnia and increased to 15.3% in Ramnagar Pharsai.

### Health status of Ramnagar Bihar

**Waterlow classification** -This classification combines each of the derived indices as a global plot to determine the relative distribution of normal and abnormal anthropometry. Thus the Waterlow classification presents an overview of the thresholds of malnutrition in a population and divides them into one of three groups as shown in the legend for table below.

**TABLE NO. 1.2 HEALTH STATUS (WASTING) OF CHILDREN OF RAMNAGAR VILLAGE OF PURNIA DISTRICT BIHAR**

Wasting (Weight for height )					
Waterlow's classification		Male (%)	Female	Total	Overall Wasting
>90%	Normal	46(46.9%)	55(53.9%)	101(50.5%)	50%
80_90 %	I	46(46.9%)	33(32.4%)	79(39.5%)	
70 to 80%	II	5(5.1%)	13(12.7%)	18(9%)	
<70%	III	1(1.1%)	1(1%)	2(1%)	

The above table shows the health status (Wasting) of children of Ramnagar village

of Purnia district, Bihar. In case of more than >90% wasting (Normal) there were

46(46.9%) in males, 55(53.9%) in females and total 101(50.5%) whereas between 80-90% wasting (I) around 46(46.9%) were males, 33(32.4%) were females and wasting of 79(39.5%) was noted in

Ramnagar. There were only 5(5.1%) males in 70 to 80% (II) wasting whereas 13(12.7%) in females and total wasting of 18(9%). The overall wasting was 50% in Ramnagar village.

**TABLE NO. 1.3 HEALTH STATUS (STUNTING) OF CHILDREN OF RAMNAGAR VILLAGE OF PURNIA DISTRICT BIHAR**

Stunting (Height for age)					
Waterlaw's classification		Male (%)	Female	Total	Overall Stunting
>95%	Normal	40(40.8%)	28(27.45%)	68(34%)	66%
90_95 %	I	42(42.8%)	39(38.23%)	81(40.5%)	
85 to 89%	II	13(13.3%)	26(25.5%)	39(19.5%)	
<85 %	III	3(3.1%)	9(8.82%)	12(6%)	

In the above table the health status (Stunting) of children of Ramnagar village of Purnia district Bihar can be analyzed. In case of 95% and above there were 40(40.8%) males who were normal whereas 28(27.45%) who were females and total stunting (height of age) above 95% were 68(34%). There were 42(42.8%) in males, 39(38.23%) in females and 81(40.5%) total in 90\_95% (I) stunting whereas in case of 85 to 89% (II) stunting around 13(13.3%) were males, 26(25.5%) were females and 39(19.5%) was total. Lastly, below 85% (III) there were

3(3.1%) males, 9(8.82%) females and total 12(6%). The overall stunting in Ramnagar village was 66%.

The Gomez classification of nutritional status is well known and widely used. However, it has a considerable number of drawbacks and it is questionable whether it should continue to be used. The history of the classification, its value, and its disadvantages are examined and an alternative classification based on more recent reference values of weight-for-age is proposed.

**TABLE NO. 1.4 HEALTH STATUS (GOMEZ CLASSIFICATION) OF CHILDREN  
OF RAMNAGAR VILLAGE OF PURNIA DISTRICT BIHAR**

<b>Under Weight (Weight For Age )</b>					
Gomez Classification		Male(%)	Female	Total	Overall Under Weight
>90%	Normal	19(19.38%)	18(17.64%)	37(18.5%)	163(81.5%)
75_89.9 %	I	56(57.1%)	33(32.35%)	89(44.5%)	
60 To 74.9%	Ii	23(23.46%)	45(44.11%)	68(34.0%)	
<60 %	Iii	0	6(5.88%)	6(3.0%)	

The above table demonstrates the health status of (Gmez Classification) of children of Ramnagar village of Purnia district Bihar. Above 90% (Normal) under weight males were 19(19.38%) whereas females were 18(17.64%) and total was noted as 37(18.5%). Under weight between 75\_89.9 % (I) had 56(57.1%) of males, 33(32.35%) of females and total of 89(44.5%). In case

of 60 Tto 74.9% (II) underweight, around 23(23.46%) were males, 45 (44.11%) were females and total of 68(34.0%) respectively. Lastly, below 60% (III) underweight had 0% of males whereas had 6(5.88%) of females and total of 6(3.0%). It can be concluded that the overall underweight children in Ramnagar village were 163(81.5%).



## STATISTICAL ANALYSIS

**TABLE. CORRELATION ANALYSIS OF RELATIONSHIP BETWEEN THE VARIOUS IMMUNIZATION PATTERN AND HEALTH STATUS**

Method	Variables	Value	CHILDREN OF RAMNAGAR VILLAGE OF PURNIA DISTRICT BIHAR		
			Immunization	Health Status Waterlaw's classification	Health Status Gomez's classification
Kendall's tau_b	Immunization	r value	1.000	.603	.437
		p value	.000	.000	.000
	Health Status Waterlaw's classification	r value	.533	1.000	.147
		p value	.000	0.00	0.021
	Health Status Gomez's classification	r value	.711	.585	.183
		p value	.000	.000	.004

One way Analysis of Variance (ANOVA) has been calculated for results obtained from above research study to test the hypothesis. Results are presented in table below:-

**TABLE- ANOVA**

ANOVA						
GROUP		Sum of Squares	df	Mean Square	F	Sig.
Immunization Health Status Waterlaw's classification	Between Groups	1.220	5	.244	1.872	.024
	Within Groups	12.257	94	.130		
	Total	13.478	99			
Health Status Gomez's classification	Between Groups	1.347	5	.269	2.486	.037
	Within Groups	10.182	94	.108		
	Total	11.529	99			
Immunization	Between Groups	4.434	5	.887	3.750	.001
	Within Groups	22.228	94	.236		
	Total	26.662	99			

**FINDINGS** – It is been observed from One Way ANOVA table that the values are highly significant at 0.004 and 0.003 level. Hence, as stated from above ANOVA analysis, it is seen that hypothesis **Null Hypothesis Ho:** *There is no significant impact of Immunization on Health status of Children under study is REJECTED AND Alternate hypothesis:* *There is a significant impact of Immunization on Health status of Children under study IS ACCEPTED AND PROVED*

#### **STRENGTH OF THE STUDY-**

Since there was shortage of data related to immunization coverage and factors associated with under vaccine in this area, this study might be an additional resource for those stakeholders who want to undertake any further intervention.

#### **LIMITATIONS OF THE STUDY**

Regarding limitations of this study, immunization coverage might have been underreported or over reported by mothers/caretakers because mothers may not remember doses that the child took due

to recall bias. As a consequence, recall bias may affect quality of data. Also there might be the potential for selection bias while selecting households and choosing children from those households with more than one child during data collection time. The immunization coverage might be underreported by this study due to exclusion of non-long-term residents in this area.

#### **CONCLUSION:**

Knowledge of mothers on immunization and vaccine preventable disease known by the respondents was associated with full immunization of children in this area. It was identified that children whose mothers had good knowledge on immunization and vaccine-preventable disease were more likely to be fully vaccinated than children whose mother has poor knowledge. This kind of knowledge can change mothers' health seeking behavior which in turn enhances immunization coverage of a given area. This study is consistent with study done in Ramnagar village of Purnia district Bihar where very less knowledge of mothers towards immunization contributed to vaccinating their children. Different variables were identified as the main factor

for not completing immunization in this study area. It was found out that 41.8% of them mentioned forgetting the appointment date as a cause, and others mentioned lack of awareness (34.2%) and absence of health worker on health facility on the day of appointment, 1.2%, as a factor for not completing immunization. Also concerning the reason for not ever vaccinating their child, the majority, 44.8%, of them replied that fear of the side effects of vaccination is cause and religious and custom restriction was also reported as a restricting factor.

The finding from this study revealed that child immunization coverage in the studied area was low. Occupation of mothers/ caretakers, educational level of father and mother, knowledge on vaccine and vaccine-preventable disease, antenatal care follow-up, postnatal care service utilization, TT vaccination, birth order, and place of delivery of the index child were statistically significant predictors of full immunization of children. Alternate Hypothesis H<sub>1</sub>: *“There is a significant impact of Immunization on Health status of Children under study”* was accepted and proved by correlation statistical test on data analyse. The finding from this study revealed that child immunization coverage

in the studied area was low. Thus the town health office and concerned stakeholders need to work more to improve performance of the expanded program on immunization in this area.

## RECOMMENDATION

The study’s finding showed that there was a low coverage of immunization in this area. Thus the village health office and other concerned stakeholders need to be engaged in various activities to improve performance of expanded program on immunization in this area and as soon as possible to reduce the risk of vaccine-preventable diseases. The health bureau should strengthen defaulters tracing mechanism using urban health extension program workers by creating referral linkage with health facilities. Furthermore, the health office and health facilities in district should work on reasons provided by the mothers/ caregivers for vaccination incompleteness such as lack of awareness of vaccination and vaccine-preventable disease, absence of trained health worker, and other factors. It is also important that health extension workers encourage mothers to have ANC follow-up and institutional delivery.

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