Dissertation at IIHMR, DELHI

A Report By:

Dr. Kanika Wadhwa (PG/19/37)

Under the Guidance of:

Dr. Vinay Tripathi
(Associate Professor)

Post-Graduate Diploma
in

Hospital and Health Management
2019-2021

Internship Training

At

Maternity India Foundation

Study/Project Title – Role of ANC in Reducing Neonatal Mortality: A Review of Secondary Data and Analysis

By

Name - Dr. Kanika Wadhwa

Enrol No. – PG/19/37

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PGDM (Hospital & Health Management)

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MATERNITY INDIA FOUNDATION

Under Companies Act, 2013

CIN: U85100UP2019NPL119339 PAN: AAMCM8276H

The certificate is awarded to **Dr. Kanika Wadhwa.** In recognition of having successfully completed her Internship in the Maternity India Foundation and has successfully completed her Project on

Title of the Project - Role of ANC in Reducing Neonatal Mortality: **A** Review of Secondary Data and Analysis

Date - 5th June 2021

Organization - Maternity India Foundation

She comes across as a committed, sincere & diligent person who has a strong drive & zeal for learning.

We wish her all the best for future endeavours.

Maternity India Foundation
Director

Country Director

Maternity India

Foundation

5.6.2021

Address: T9-1201, Sunworld Vanalika,
Sector 107 Noida, Uttar Pradesh,
India 201301
Contact- 8010997046 Email id – tarun@maternity.dk

Training & Development **Zonal Head-Human Resource**

MATERNITY INDIA FOUNDATION

Under Companies Act, 2013

CIN: U85100UP2019NPL119339 PAN: AAMCM8276H

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Dr. Kanika Wadhwa** student of PGDM (Hospital & Health Management) from International Institute of Health Management Research; New Delhi has undergone internship training at **Maternity India Foundation** from **01/03/2021** to **31/05/2021**.

The Candidate 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 fulfilment of the course requirement. I wish her all success in all her future endeavours.

Maternity India Foundation
Director

Ms Divya Aggarwal

Associate Dean, Academic and Student Affairs

IIHMR, New Delhi

Country Director

Maternity India Foundation

Address: T9-1201, Sunworld Vanalika, Sector 107 Noida, Uttar Pradesh, India 201301
Contact- 8010997046 Email id – tarun@maternity.dk

Certificate of Approval

The following dissertation titled **"Role of ANC in Reducing Neonatal Mortality: A Review of Secondary Data and Analysis"** At **"International Institute of Health Management Research (IIHMR), Delhi"** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **PGDM (Hospital & Health Management)** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

Dissertation Examination Committee for evaluation of dissertation.

Name	Signature
_____	_____
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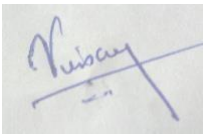
_____	_____

Certificate from Dissertation Advisory Committee

This is to certify that **Dr. Kanika Wadhwa** a graduate student of the **PGDM (Hospital & Health Management)** has worked under our guidance and supervision. He/ She is submitting this dissertation titled " **Role of ANC in Reducing Neonatal Mortality : A Review of Secondary Data and Analysis**" at "**International Institute of Health Management Research (IIHMR), Delhi** " in partial fulfilment of the requirements for the award of the **PGDM (Hospital & Health Management).**

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.



Dr Vinay Tripathi
Associate Professor
IIHMR, Delhi

Dr. Tarun Singh Sodha
Country Director
Maternity India Foundation

INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH, NEW DELHI

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled **"Role of ANC in Reducing Neonatal Mortality: A Review of Secondary Data and Analysis"** and submitted by (Name) **Dr. Kanika Wadhwa, e**nrolment No. **PG/19/37**under the supervision of **Dr. Vinay Tripathi** for award of PGDM (Hospital & Health Management) of the Institute carried out during the period from **01-03-2021 to 31-05-2021** 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.

Signature 

FEEDBACK FORM

Name of the Student: Dr. Kanika Wadhwa

Dissertation Organisation: Maternity India Foundation

Area of Dissertation:

Attendance: 100%

Objectives achieved: Yes

Deliverables:

Strengths: Dr Kanika is a self-driven, dedicated and determined professional. She has very good research and implementation skills during her tenure with us.

Suggestions for Improvement: She always go for perfection which sometimes is difficult in time bound projects and area like public health. She needs to work on maintaining balance between perfection and what is possible in given timeline.

Suggestions for Institute (course curriculum, industry interaction, placement, alumni):

Maternity India Foundation
Director

Signature of the Officer-in-Charge/ Organisation Mentor (Dissertation)

Date: 05/6/2021

Place: Noida

ACKNOWLEDGEMENT

On the very outset of this report, I would like to extend my sincere & heartfelt obligation towards all the personages who have helped me in this endeavour. Without their active guidance, help, cooperation & encouragement, I would not have made headway in the project.

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I also acknowledge with a deep sense of reverence, my gratitude towards my family and friends who has always supported me morally.

Any omission in this brief acknowledgement does not mean lack of gratitude.

Thanking You
Dr. Kanika Wadhwa

TABLE OF CONTENT

ABSTRACT

Neonatal period is the most essential period of newborn life as majority of deaths occurs during this period. Ensuring appropriate antenatal care (ANC) can play a significant role in reducing these deaths. Under the study, literature and secondary data has been reviewed to examine the contribution of different antenatal care interventions, namely, antenatal visits, IFA consumption and TT immunization, and their role in reducing the neo-natal mortality. The review of studies suggests that ANC intervention plays a role in reducing the neonatal mortality. Data from recently held round of NFHS has also been used to examine the state-wise variations found in the utilization of these components of ANC and relate it to the neon-natal mortality. The analysis shows that states falling under the top quintile, where the neo-natal mortality is less than 10 per thousand live births, has a very high coverage of TT immunization (above 90%), ANC visits (above 78%, except for Sikkim), and IFA consumption (above 60%, with the exception of Sikkim and J&K). While the states falling under the bottom quintile with neonatal mortality more than 21 per thousand live births, have coverage of TT immunization (close to 90%), but low IFA consumption (less than 20%, except Daman & Diu and Dadar & Nagar Haveli; and Gujarat) and ANC visits (less than 53%, except Daman & Diu and Dadar & Nagar Haveli and Gujarat).

Keywords: ANC, Antenatal Visits, TT immunization, IFA Tablets, Neonatal Mortality.

LIST OF SYMBOLS AND ABBREVIATIONS

KEYWORDS:

Antenatal Care Interventions

Antenatal Tetanus Toxoid (TT)

Antenatal Visits

Iron Folic Acid Tablet (IFA)

Neonatal Mortality Rate (NMR)

ABBREVIATIONS:

ANC	Antenatal Care
NMR	Neonatal Mortality Rate
ENM	Early Neonatal Mortality
LBW	Low Birth Weight
IFA	Iron Folic Acid
TT	Tetanus Toxoid
UT's	Union Territories
NHM	National Health Mission
NHP	National Health Policy
GoI	Government of India
WHO	World Health Organization
NFHS	National Family Health Survey
SRS	Sample Registration System

1. BACKGROUND

1.1 ORGANIZATION PROFILE

Maternity Foundation was established in 2005 and is headquartered in Denmark.. The Organization aims to reduce maternal and new born mortality in developing countries

Since 2010, HRH Crown Princess Mary of Denmark has been a patron of Maternity Foundation. The Crown Princess is an active advocate for women's rights and health, and is a member of the international high-level panel of ICPD and patron for the UN Population Fund.

Mission

Maternity Foundation works to improve maternal and newborn health. We develop and integrate scalable programs and digital solutions that empower birth attendants, pregnant women and new mothers in low- and middle-income countries.

Vision

A world where no woman or newborn suffers preventable disease or death related to pregnancy or childbirth.

Every year, about 300,000 women die as a result of complications during pregnancy or childbirth, 2.7 million babies die in their first 28 days of life, and 2.6 million babies are stillborn. The majority of these deaths could have been avoided.

Maternity Foundation works to empower and mobilize women to seek care, to build the capacity of and train health practitioners, so that more women give birth with skilled birth attendance. Maternity Foundation's own program, the Maternal and Newborn Health Program in Ethiopia, works with local partners in the capacity building of health care workers and empowering the community to seek care.

Maternity Foundation focuses on developing evidence-based solutions that can be scaled up to benefit as many women and newborns as possible. With this approach, the organisation is positioning itself as a strong actor within the emerging field of mHealth, with mobile solutions such as The Safe Delivery App, which is currently being implemented across sub-Saharan Africa and Southeast Asia.

The Safe Delivery App is a smartphone application that provides skilled birth attendants with direct and instant access to evidence-based and up-to-date clinical guidelines on Basic Emergency Obstetric and Neonatal Care.

The App leverages the growing ubiquity of mobile phones to provide life-saving information and guidance through easy-to-understand animated instruction videos, action cards and drug lists. It can serve as a training tool both in pre- and in-service training, and equips birth attendants even in the most remote areas with a powerful on-the-job reference tool.

Core values and Guiding principles:

Maternity India Foundation and its staff are committed to the following fundamental values and principles:

i. The values enshrined in the Charter of the United Nations: respect for fundamental human rights, social justice and human dignity, and respect for the equal rights of men and women. Maternity India Foundation and its staff shall actively promote adherence to the principles of international refugee law, international human rights law, and international humanitarian law.

ii. It is Maternity India Foundation's and its staffs' primary commitment to ensure the support and assistance to target group, in accordance with Maternity India Foundation's mandate. Maternity India Foundation's and its staff are committed to supporting the fullest possible participation of persons from the target group – as individuals, families, and communities – in decisions that affect their lives.

iii. Maternity India Foundation and its staff will respect the dignity and worth of every individual, will promote and practice understanding, respect, compassion, and tolerance, and will demonstrate discretion and maintain confidentiality as required. Maternity India Foundation and its staff will aim to build constructive and respectful working relations with partners, will continuously seek to improve performance, and will foster a climate that encourages learning, supports positive change, and applies the lessons learned from experience.

iv. Maternity India Foundation and its staff will show respect for all persons equally without distinction whatsoever of race, gender, religion, color, national or ethnic origin, language, marital status, sexual orientation, age, socio-economic status, disability, political conviction, or any other distinguishing feature. Maternity India Foundation and its staff will strive to remove all barriers to equality.

v. Maternity India Foundation and its staff will respect cultures, customs, and traditions of all peoples, and will strive to avoid behaving in ways that are not acceptable in a particular cultural context. However, when the tradition or practice is directly contrary to an international human rights instrument or standard, Maternity India Foundation and its staff will be guided by the applicable human rights instrument or standard.

vi. Maternity India Foundation and its staff will not tolerate any form of sexual exploitation or abuse and are aware that misconduct is ground for disciplinary measures including summary dismissal.

1.2 INTRODUCTION:

Globally, more than 2.5 million newborn died in 2017 out of which 0.6 million died in India Sample Registration System, 2017. As per SRS (2010 -13) prematurity, low birth weight (LBW), neonatal infections and birth asphyxia are the main causes of neonatal mortality in India, which can be minimized or prevented by Antenatal Care (ANC) interventions. ANC directly improves the survival and health of newborns by reducing stillbirths and neonatal death. Majority of the newborns and mothers deaths halted directly by determining and managing of issues in earlier period starting from the pregnancy till delivery by ANC.

Antenatal care is essential for both the mother and the unborn child's health. Through this sort of preventative health care, women can learn about safe pregnancy behaviors from competent health experts, have a better understanding of warning signs throughout pregnancy and childbirth, and receive social, mental, and psychological support during this critical phase of their lives. Micronutrient supplements, hypertension medicine to prevent eclampsia, and tetanus vaccinations are also provided to pregnant women during antenatal care. To prevent HIV transmission from mother to child, HIV testing and medicines are provided as part of antenatal care. In malaria-endemic areas, pregnant women are offered drugs and insecticide-treated mosquito nets.

ANC also provides women and their families with information and guidance about how to have a healthy pregnancy, have a safe delivery, and recover after giving birth. Including newborn care, early childhood development, and breastfeeding exclusively, as well as help in making a decision in order to boost pregnancy outcomes in potential pregnancies the end result.

ANC interventions are by and large idea to be compelling in improving maternal and newborn child result.

ANC also prevent the lives of both newborns and mothers by uplifting and establishing good health prior to the birth of baby and during the early postnatal period – the time periods when the mother and baby are most vulnerable.

In this study, Role of ANC in neonatal mortality reduction has been examined by undertaking the review of secondary data related to it as well as looking into the inter-state analysis.

1.3 OBJECTIVES:

- To review different ANC interventions and examine their contribution in terms of reducing neonatal mortality.
- To examine the state wise variations between ANC interventions and neo-natal mortality in India.

2. METHODOLOGY:

This is secondary research and has used following:

- **Selection Criteria –** Full articles on Antenatal Care Interventions in reducing neonatal mortality has taken. Articles selected from 2007 to 2020 time period are selected for the study.
- **Keywords -** Antenatal Care (ANC) intervention, Antenatal Care Visits, TT Immunization, Iron Folic Acid (IFA) tablet.
- **Search Engine –** Google Scholar, PubMed.
- **Study Design – Descriptive Study**
- **Inclusion Criteria –** Women with reproductive age group (15 to 49 years age group), married women, pregnant women and new-borns. Articles in which Antenatal Care (ANC) interventions status and neonatal outcome present are included in the study.
- **Exclusion Criteria -** Articles in which other than Antenatal Care (ANC) interventions status and neonatal outcome are not present has excluded in the study.

3. RESULT:

In India, the ANC intervention has following components

1. Antenatal Care Visits
2. Consumption of IFA (Iron Folic Acid) Tablet
3. TT Immunization

Antenatal Care Visits:

The World Health Organization's most recent guidelines recommend that women have eight ANC visits. At least one ANC appointment with a qualified health professional is attended by 85 percent of pregnant women worldwide and 58 percent attend at least four ANC appointments. In India, around 50% pregnant women receive full antenatal Care visits due to uneven across place of residence, caste and maternal education.

Advantage about Antenatal Care Attendance –

- Help in Reducing Still Birth.
- Helps in reducing Neonatal Mortality.

Reviewed literature highlights a positive association between antenatal visits and reduction in neo-natal mortality. A study which is based on systematic review and meta-analysis has shown a positive effect of ANC follow-up on neonatal health. (1) (2) Another study which is based on survival analysis has similarly manifest the impact of visit intervention in decreasing neonatal mortality. (3) Study which is done in EAG States of India also shown a significant association between antenatal visits and neonatal mortality. (4) Study based on descriptive analysis also shown a notable shift in between ANC visits and reduction in newborn death. (5)

In developing nations, the possibility of newborn mortality was lowered by 34% among newborns whose mothers have attended the ANC. Similar result has observed in low middle-income countries, where women who had begun their visit within the first three months and had minimum four visits during pregnancy has 55% lower risk of neonatal mortality Also, in Empowered Action Group of states of India, pregnancy outcomes and newborn mortality were lower in mothers who got begin their ANC visits in the first trimester. The chances of dying between new-born newborns lower as the frequency of ANC visits increases. In Indonesia also, there is a significant relationion amidst total ANC

visits and new born deaths. Women who had a greater number of antenatal care visits in the third trimester experienced lower neonatal mortality. The proportion of neonatal mortality in the 0–1 visits group was 16/100 live births, but the proportion decreased as the number of visit increased (to 5/100 for the 4 or more visits group). The adjusted ORs for neonatal mortality at each visit category (with reference to 0–1 visit) were 0.76 for 2 visits, 0.54 for 3 visits and 0.31 for 4 visits or more. The trend was statistically significant ($p < 0.01$). In Ethiopia, there is a significant association between antenatal visits and neonatal mortality.. In a study conducted at institutions, new born mortality was 72 percent lower among women who had ANC follow-up compared to women who did not have ANC follow-up.

Consumption of IFA (Iron Folic Acid) Tablet:

More than 40% of pregnant women in the world are anaemic, according to estimates. Iron deficiency is thought to be responsible for at least half of the anaemia burden. Pregnant women require more iron and folic acid to meet both their own and the developing foetus' nutritional demands.

IFA supplementation (100 mg elemental iron and 500 mcg folic acid) should begin after the first trimester, at 14–16 weeks of pregnancy, and continue for at least hundred days, subsequently the same dosage for hundred days after birth of the baby.

Advantage –

- Reduction in Congenital Abnormalities.
- Reduction in anaemia in pregnant women and thus also helps in fetal growth and thus indirectly effects on neonatal outcome.

Study is conducted across India or across world has shown this situation -

A study conducted in Nepal is based on Demographic and Health Surveys has shown that IFA tablets positively lowers the chances deaths of newborns and children under five years of age. [(6)] Another Study, which is done on the Demographic and Health Surveys analysis, also shown the similar result in reducing neonatal mortality. [(7)] A study conducted on randomized trial also shown that IFA supplementation is linked with longer gestation period and lowering in early neonatal mortality. [(8)]

In Nepal, by usage of IFA supplements early neonatal deaths have been reduced by 45%, and total neonatal deaths have been lowered by 42%, thanks to the antenatal period. Similar result has shown in malaria endemic regions also, where neonatal mortality was reduced by taking IFA Supplementation. In China also, IFA has decreased the risk of premature delivery and also early neonatal mortality

TT Immunization:

An estimated 1, 80, 000 babies died from tetanus each year (approximately 5% of all newborn mortality according to 2002 data) and up to 30 000 women worldwide. Each year, 5% of all maternal deaths occur. In the event that the mother has not received the necessary vaccinations. She and her newborn child are both at risk due to the large number of TT vaccine doses. Tetanus vaccine is given at the moment of delivery. All pregnant mothers and their newborns should be vaccinated against tetanus. The vaccine is given to pregnant women to protect them from tetanus and to protect their newborn babies from the disease. Antibody levels against tetanus are higher in people who have been vaccinated.

Study is conducted across India or across world has shown this situation –

The study conducted on India has shown a positive impact of TT immunization in Antenatal period in improving the neonatal survival. [(9)] Another study also shown the similar result in reducing early neonatal mortality. [(10)] Similarly another study concludes the mothers who attended ANC visits, had TT injections has four times less NMR than the mothers who had not gone for any ANC visits and TT injections [(11)]

In ANC interventions, newborn death chances was positively lessen down whose mothers had taken 2 or >2 TT injections. In India, 6% newborn deaths could be attributed to a absence of minimum two TT injections in pregnancy period. Similarly, In Bangladesh, When compared to groups who did not receive prenatal care during pregnancy, women who received prenatal care have an 18 percent decreased risk of having early neonatal mortality, and there is a strong link between receiving TT injection and early newborn mortality. When compared to unvaccinated respondents, those who received TT injection during pregnancy have a 21.0 percent lower chance of developing ENM. According to the findings, a single TT injection given to all pregnant women in Kenya could avert roughly 10% of newborn fatalities

3.1 INTERSTATE ANALYSIS:

Using the NFHS round 5 data, interstate analysis is carried out to know the variation between NMR and ANC Indicators, which includes- percentage of mothers who had at least 4 ANC visits, percentage of mothers whose last birth was protected against neonatal tetanus, percentage of mothers who consumed iron folic acid for 180 days or more when they were pregnant.

The data from the first round of NFHS-5 covering l7 States and 5 UTs of India has been used. In the remaining 14 states/UTs, task for the second phase is presently underway. Therefore has not been included in the analysis.

Table 2.1.1: Level of ANC and NMR across States & UTs.

States and Union Territories (UTs)	ANC INDICATORS			NMR (Neonatal Mortality Rate)
	Mothers had minimum 4 antenatal care visits (%)	Mothers whose last birth has been protected against neonatal tetanus (%)	Mothers consumed iron folic acid for 180 days or more during pregnancy (%)	
Andaman Nicobar Islands	83. 4	90.8	52.1	12.3
Andhra Pradesh	67.5	92.8	41.1	19.9
Assam	50.7	94.5	18.5	22.5
Bihar	25.2	89.5	9.3	34.5
Dadra & Nagar Haveli and Daman & Diu	86.2	84.6	36.2	21.4
Goa	93.0	96.5	65.0	5.6
Gujarat	76.9	89.1	43.2	21.8
Himachal Pradesh	70.3	90.0	43.0	20.5
Jammu & Kashmir	80.9	91.9	15.9	9.8
Karnataka	70.9	93.6	26.7	15.8
Kerala	78.6	95.2	67.0	3.4
Ladakh	78.4	94.2	7.3	11.4

Lakshadweep	**88.3**	**99.4**	**61.7**	**0.0**
Maharashtra	**70.3**	**90.1**	**30.9**	**16.5**
Manipur	**79.4**	**88.9**	**30.3**	**17.2**
Meghalaya	**52.2**	**82.1**	**20.6**	**19.8**
Mizoram	**58.0**	**80.0**	**10.5**	**11.4**
Nagaland	**20.7**	**81.3**	**4.1**	**10.2**
Sikkim	**58.4**	**92.0**	**31.5**	**5.0**
Telangana	**70.4**	**89.6**	**34.4**	**16.8**
Tripura	**52.7**	**94.9**	**8.9**	**22.9**
West Bengal	**75.8**	**94.6**	**30.8**	**15.5**

Table 2.1.1 shows the level of ANC indicators and NMR across 22 states and 5 UTs

- **Andaman Nicobar Island –** In Andaman Nicobar Island, Neonatal mortality rate is 12%. 4 or more ANC visits were reported by 83% of women. 52% swallowed IFA tablets for the newly recommended 180 days or more, and Tetanus toxoid vaccinations were administered to the mother and thus 90% of the most recent births have been protected against neonatal tetanus.
- **Assam -** During the new born period, girls in Assam had a slightly higher mortality rate than boys (in first month after birth 41% of women reported four or more antenatal care visits. IFA tablets were prescribed to mothers in 92% of their most recent births, but only 48 % swallowed them for the commended 100 days or higher than this and they were grabbed by 19% for the freshly commended 180 days or higher than it. Tetanus toxoid vaccinations were administered to the mother and thus 59% of the most recent births have been protected against neonatal tetanus.
- **Andhra Pradesh –** In the course of neonatal period, girls had lower mortality rate than boys in Assam. 68% of women reported four or more antenatal care visits. Mothers received IFA tablets for their most recent births in 94% of cases, but 70% grabbed them for the commended hundred days or more, and only 41% grabbed them for the freshly commended 180 days. Tetanus toxoid vaccinations were administered to the mother and thus 93% of the most recent births has been protected against neonatal tetanus.
- **Bihar** – In Bihar, boys had a slightly higher mortality rate than boys (in first month after birth). 25% of ANC visits were made by pregnant women. IFA medicines

were prescribed to mothers in 74% of their most recent births, but only 18% swallowed them for the commended hundred days or higher than this and only 9% grabbed them for freshly commended 180 days or higher than this. Tetanus toxoid vaccinations administered to the mothers protected 90 % of the most recent births against neonatal tetanus.

- **Dadra & Nagar Haveli, Daman & Diu –** Neonatal mortality rate is 21% in Dadra& Nagar Haveli, Daman & Diu. 86 % of women reported four or more antenatal care visits. 36 % took IFA tablets for the newly recommended 180 days or longer, and Tetanus toxoid vaccinations administered to the mother protected 85% of the most newly born babies from neonatal tetanus.
- **Goa** – In Goa, there are approximately 6 deaths before the age of one year for every 1,000 live births. 93% of women reported antenatal care visits. Mothers received IFA tablets for 99% of their most recent births, but only 88% of them had taken them for commended hundred days or even higher, and 65% swallowed them for freshly commended 180 days or even higher**.** Tetanus toxoid vaccinations administered to the mother protected 97% of the most newly born babies from neonatal tetanus.
- **Gujarat -** Girls mortality rate was on the higher side than boys during the neonatal period. 79% of women had four or more antenatal care visits. IFA supplements were given to mothers in 89% of their most recent births, but only 60% of them took them for commended hundred days or more, and only 43% taken them for freshly commended 180 days or more. Tetanus toxoid vaccinations administered to the mother protected 89% of the most newly born babies from neonatal tetanus.
- **Himachal Pradesh -** During the new born period, boys had a slightly higher mortality rate than boys (in first month after birth). 70% of women reported antenatal care visits. IFA medicines were given to mothers in 97% of their newly born babies, but only 67% grabbed them for the commended hundred days or more and only 43% swallowed them for freshly commended 180 days or more. Tetanus toxoid vaccinations administered to the mother protected 90% of the most newly born babies from neonatal tetanus.
- **Jammu & Kashmir –** In Jammu & Kashmir, estimated 16 deaths before the age of one year per 1,000 live births. 81% of women reported four or more antenatal care

visits. IFA supplements were given to mothers in 73% of their most recent births, but only 30% took them for the recommended 100 days or more, and only 16% took them for the newly recommended 180 days or more. Tetanus toxoid vaccinations given to the mother protected 92% of the most recent births against neonatal tetanus.

- **Karnataka -** During the new born period, boys in Karnataka had a slightly higher mortality rate than boys (in first month after birth) 71% of women reported having four or more antenatal care visits. IFA supplements were given to mothers in 89% of their most recent births, but only 45% used them for the recommended 100 days or longer and only 27% used them for the newly recommended 180 days or longer. Tetanus toxoid vaccinations administered to mothers protected 94% of the most recent births from neonatal tetanus.
- **Kerala -** In Kerala, estimated 4 deaths before the age of 1 year per 1,000 live births. Four or more antenatal care visits were reported by 79% of women. IFA supplements were given to mothers in 98% of their most recent births, but only 80% took them for the recommended 100 days or more, and only 67% took them for the newly recommended 180 days or more. Tetanus toxoid vaccinations given to the mother protected 95% of the most recent births against neonatal tetanus.
- **Ladakh –** In Ladakh, neonatal mortality is 11%. 78% of women reported four or more antenatal care visits. Only 7% of mothers took IFA tablets for the newly recommended 180 days or longer. Tetanus toxoid vaccinations administered to the mother protected 94% of the most newly born babies from neonatal tetanus.
- **Lakshadweep –** In Lakshadweep, neonatal mortality is 0%. 83% of women reported four or more antenatal care visits. 62% of mothers took IFA tablets for the newly recommended 180 days or longer. Tetanus toxoid vaccinations administered to the mother protected 99% of the most newly born babies from neonatal tetanus.
- **Maharashtra -** During the new born period, girls in Assam had a slightly higher mortality rate than boys (in first month after birth). Almost 64% of mothers who gave birth in the five years preceding the poll received antenatal care during the first trimester of pregnancy. 41% of women reported four or more antenatal care visits. IFA medication were given to mothers in 92% of their most recent births, but only 48% swallowed them for the commended hundred days or more and only 19%

grabbed them for freshly commended 180 days. Tetanus toxoid vaccinations given to the mother protected 59% of the most recent births against neonatal tetanus..

- **Manipur -** In Manipur, during the neonatal period, boys had a slightly higher mortality rate than boys (in first month after birth). Four or more antenatal care visits were reported by 79% of women. Mothers received IFA supplements for 93% of their most recent births, but only 52% grabbed them for the purposed hundred days or more, and only 30% grabbed it for the freshly commended 180 days or even higher than this. Tetanus toxoid vaccinations were administered to 89% of the most recent births, protecting them against neonatal tetanus.
- **Meghalaya -** During the new born period, boys had a slightly higher mortality rate than boys (in first month after birth). 52% of women reported four or more antenatal care visits. IFA tablets were given to mothers in 85% of their most recent births, but only 43% swallowed them for the purposed hundred days or more, and only 21% consumed it for the freshly commended 180 days or even higher than this. Tetanus toxoid vaccinations were administered to 82% of the most recent births, protecting them against neonatal tetanus.
- **Mizoram –** In Mizoram, estimated 21 deaths before the age of one year per 1,000 live births. Women accounted for nearly 58% of those who had four or more antenatal care visits. Iron and folic acid (IFA) supplements were given to mothers in 88% of their most recent births, but only 48% swallowed them for the purposed hundred days or higher, and only 11% swallowed them for the freshly commended 180 days or higher than this. Tetanus toxoid vaccinations were administered to 80% of the most recent births protecting them against neonatal tetanus.
- **Nagaland -** During the new born period, boys in Nagaland had a slightly higher mortality rate than boys (in first month after birth). 21% of women reported four or more antenatal care visits. IFA supplements were given to mothers in 68% of their most recent births, but only 10% took them for the recommended 100 days or more, and only 4% took them for the newly recommended 180 days or more. Tetanus toxoid vaccinations were administered 81% of the most recent births against neonatal tetanus.
- **Sikkim –** In Sikkim, estimated 11 deaths before the age of one year per 1,000 live births. 58% of women reported four or more antenatal care visits. IFA supplements

were prescribed to mothers in 94% of their most recent births, but only 55% swallowed them for commended hundred days or higher, and only 32% grabbed them for the freshly commended 180 days or more. Tetanus toxoid vaccinations were administered to 92% of the most recent births, protecting them against neonatal tetanus.

- **Telangana -** During the new born period, girls had a slightly higher mortality rate than boys (in first month after birth). 70% of women reported four or more antenatal care visits. IFA drugs were given to mothers in 91% of their newly born baby, but only 58% grabbed it for the commended hundred days or higher and only 34 swallowed them for the freshly commended 180 days or more. Tetanus toxoid vaccinations were administered to 90% of the most recent births, protecting them against neonatal tetanus.
- **Tripura -** During the new born period, boys had a slightly higher mortality rate than boys (in first month after birth). 53% of women reported four or more antenatal care visits. IFA tablets were given to mothers in 91% of their newly born babies, but only 27% swallowed them for the recommended hundred days or more, and only 9% grabbed them for the newly recommended 180 days or more. Tetanus toxoid vaccinations were administered to 95% of the most recent births, protecting them against neonatal tetanus..
- **West Bengal -** During the new born period, girls in Assam had a slightly higher mortality rate than boys (in first month after birth). 76% of women reported four or more antenatal care visits. IFA) supplements were given to mothers in 96% of their most recent births, but only 63% took them for the recommended 100 days or more, and only 31% took them for the newly recommended 180 days or more. Tetanus toxoid vaccinations were administered to 95% of the most recent births, protecting them against neonatal tetanus.

Observation while analysing Interstate Data of ANC Interventions and NMR in India -

- Bihar has the Highest Neonatal Mortality Rate (34.5%) and Kerala (3.4%) has the lowest NMR and Lakshadweep has zero case of neonatal mortality, hence in Lakshadweep NMR is (0%).

- In Goa, maximum number of mothers had received at minimum 4 ANC visits (93%) and lowest number of mothers received minimum 4 ANC visits in Nagaland (20.7%).
- Maximum number of mothers taken TT Immunization in antenatal period in Goa (96.5%) and in Mizoram lowest number of mothers had taken TT Immunization during antenatal period (80%).
- Maximum number of mothers had consumed IFA for 180 days during their pregnancy in Lakshadweep (61.7%) and lowest number of IFA had consumed by mothers leaving in Nagaland (4.1%).
- In all 22 State and UTs, from all the three antenatal indicators mentioned in the table. Maximum number of mothers had taken TT Immunization during antenatal period and hence, protected against neonatal tetanus. Lowest number of mothers had consumed the IFA tablets for 180 days or more.
- NMR > 21% in Assam, Bihar, Gujarat, Daman & Diu and Dadar &Nagar Haveli and Tripura. In these states; **Antenatal care visits** < 53% except Daman & Diu and Dadar & Nagar Haveli (86.2%) and Gujarat (76.9%) and **IFA consumption** <20% except Daman & Diu and Dadar & Nagar Haveli (36.2%) and Gujarat (43.2%) but **TT consumption** is close to 90%.
- NMR <10% in Goa, Sikkim, Jammu & Kashmir, Kerala and Lakshadweep. In these states; **Antenatal care visits** >78% except Sikkim (58.4 %), IFA Consumption >60%, except Sikkim (31.5%) and Jammu & Kashmir (15.9%) and TT Immunization >90%.

NMR = 22.9% (Maximum NMR – Tripura)

- Percentage of women receive antenatal visits < 60%
- Percentage of women receiving TT Immunization > 90%
- Percentage of women consuming IFA tablets <10%

NMR = 0% (Minimum NMR – Lakshadweep)

- Percentage of women receive antenatal visits >80%
- Percentage of women receiving TT Immunization > 90%
- Percentage of women consuming IFA tablets > 60%

NMR < 10% (Goa, Jammu & Kashmir, Kerala, Sikkim and Lakshadweep)

- Percentage of women receive antenatal visits >78%, except Sikkim (58.4%)
- Percentage of women receiving TT Immunization > 90%
- Percentage of women consuming IFA tablets > 60%, except Sikkim (31.5%), Jammu & Kashmir (15.9%)

NMR > 21% (Assam, Bihar, Gujarat, Daman & Diu and Dadar & Nagar Haveli and Tripura)

- Percentage of women receive antenatal visits <53%, except Daman & Diu and Dadar & Nagar Haveli (86.2%) and Gujarat (76.9%).
- Percentage of women receiving TT immunization is Close to 90%.
- Percentage of women consuming IFA tablets <20% except Daman & Diu and Dadar & Nagar Haveli (36.2%) and Gujarat (43.2%).

4. CONCLUSION:

Neonatal period is the most essential period of new born life because most of the deaths occur in this period. The review of studies suggests that ANC intervention plays a role in reducing the neonatal mortality. Data from recently held round of NFHS has also been used to examine the state-wise variations found in the utilization of these components of ANC and relate it to the neon-natal mortality. The analysis shows that states falling under the top quintile, where the neo-natal mortality is less than 10 per thousand live births, has a very high coverage of TT immunization (above 90%), ANC visits (above 78%, except for Sikkim), and IFA consumption (above 60%, with the exception of Sikkim and J&K). While the states falling under the bottom quintile with neonatal mortality more than 21 per thousand live births, have coverage of TT immunization (close to 90%), but low IFA consumption (less than 20%, except Daman & Diu and Dadar & Nagar Haveli; and Gujarat) and ANC visits (less than 53%, except Daman & Diu and Dadar & Nagar Haveli and Gujarat). Therefore it concludes that the ANC visits, TT immunization and IFA tablets have significant relation with Neonatal mortality. Increase number of ANC could improve nutritional status of the mother, receiving iron and folic acid, TT immunization, and early detection of complications during pregnancy, consequently those could contribute to have low risk of neonatal mortality.

5. LIMITATION:

The study has not used the raw data of the NFHS round five and has relied on the data as published in different states reports of 22 state and 5 Union Territories. Therefore, the study could not undertake detailed analysis and limited itself to the basic descriptive analysis.

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