

Factors Affecting High Infant Mortality in Rajasthan

**A Capstone Project submitted to
Johns Hopkins Bloomberg School of Public Health & IIHMR University
in partial fulfillment of the requirements for
the award of the degree of
Master of Public Health**

by

(Nikky Ramawat)
MPH - Cohort III (2015-17)

**Under the guidance of
(Dr Nutan Prabha Jain, Professor)**

October 2016

Contents

1	Introduction.....	4
a)	Background.....	4
2.	Justification/ Rationale for the Study.....	7
3	Objectives	8
4	Methodology	8
5	Data Analysis	9
6	Review of literature on Factors Affecting Infant Mortality:.....	15
7	Conclusion	23
	References.....	24

List of Tables

	Table Title	Page no.
Table 1	Distribution (Grouping) of States according to their level of Infant mortality rates .	11
Table 2	Distribution (Grouping) of States according to their literacy rates	12

List of Figures

	Figure Title	Page No.
Figure 1	Trend in IMR, India and Rajasthan, 2013:	10
Figure2	Rajasthan : Infant Mortality Rate by Place of resident and by sex of infant:	13
Figure3	Rajasthan: Infant Mortality Rate by sex (male and female):	15

1 Introduction

a) Background

One of the sustainable development goal is to reduce deaths of newborns and child below age of 5 that by 2030 All countries are trying to reduce neonatal mortality rate by 12 per 1,000live birth and below 5 mortality rate to 25per 1,000 live birth.¹⁶ To achieve this goal countries are making cost effective strategies with the help of international agencies and NGO's for more resources to be directed to health sector.

According to the child health program in India “A child has a right to survival begins before a child is born”.¹ The government of India states that a child life begins after twenty weeks of conception. Hence the right to survival is inclusive of the child rights to be born. ¹

The child health programme under the National Health Mission (NHM) broadly integrate interventions that improve child survival and addresses factors contributing to infant and under-five mortality. ⁷

According to the National Health Mission, following key interventions are being implemented to decrease the mortality rate of children across all the States of the country:

- i. Promotion of Institutional Delivery through Janani SurakshaYojana(JSY): For reducing maternal and neonatal mortality NFHS Promoting Institutional delivery by skilled birth attendant.⁸

- ii. NHM provide services for care of unwell new-borns like Special New Born Care Units (SNCUs), New Born Stabilization Units (NBSUs) and New Born Care Corners (NBCCs).⁸
- iii. Management and Training: NHM has conducted various training for doctors, nurses and ANMs so that they can diagnose and manage the care of children and mother during and after the pregnancy. These trainings are on included Management of Neonatal and Childhood Illnesses (IMNCI), Navjaat Shishu Suraksha Karyakram (NSSK), Skilled Birth Attendance (SBA), Life Saving Anaesthesia Skills (LSAS), Comprehensive Emergency Obstetric Care (CEmOC), Basic Emergency Obstetric Care (BEmOC), etc.⁸
- iv. Malnutrition Management: NHM has established Nutritional Rehabilitation Centres (NRCs) for management of severe acute malnutrition.
- v. Promoting breast feeding and Infant and Young Child Feeding (IYCF) practices with the help of public health system.⁸
- vi. Universal Immunization Programme (UIP): Proper vaccination protects children against many dangerous diseases such as Tuberculosis, Diphtheria, Pertussis, Polio, Tetanus, Hepatitis B and Measles. Infants are thus immunized against seven vaccine preventable diseases every year. The Government of India supports the vaccine programme by supply of vaccines and syringes, Cold chain equipment and provision of operational costs.⁸
- vii. Janani Shishu Suraksha Karyakaram (JSSK): give the rite to all pregnant women delivering in public health institutions to completely free and no expense delivery including Caesarean section.⁸ NHM offers services like free medicines , diagnostics, blood and food, in addition to free transport from home to institution in JSSK program.⁸

- viii. Home based new born care (HBNC): NHM provide HBNC with the help of ASHA. The target of HBNC is to get better new born practices in the society⁸
- ix. Mother and Child Tracking System (MCTS): In Rajasthan a name based Mother and Child Tracking System (Pregnancy and Child Tracking System – PCTS in Rajasthan) has been declared which is web based system to ensure registration and tracking of all pregnant women and new born babies so that provision of regular and complete health care can be ensured⁸.
- x. A division on child health by Ministry of Health & Family Welfare (MOHFW) has been developed for operational guideline of Child Death Review (CDR) was circulated on 18th September, 2014.¹ CDR is being implemented across the country for the corrective action for implementation of Child Health Interventions as per detailed review of causes of death (birth complications and septicaemia) and reason for delay if any for Neonate, Infant and Child deaths. ¹ The important causes of death among infants are prenatal conditions (46%), respiratory infections (22%),diarrheal disease (10%), other infectious and parasitic disease (8%) and congenital anomalies(3.1%).⁷

Infant mortality can be defined as deaths of young children, typically those less than one year of age is called as Infant mortality and it is measured by the *infant mortality* rate (IMR), which is the number of deaths of children under one year of age per 1000 live births.

According to Alderman & Behrman(2004) “Infant mortality rate (IMR), a measure of child survival, is considered to be one of the strongest indicators of a country’s wellbeing, as it reflects

social, economic and environmental conditions in which children (and others in society) live, including their health care.”²

Now a day's IMR is an accepted as global indicator of health and socioeconomic status of a given population.⁵ It is indicated that without proper health needs and unfavorable environmental factors there is high IMR. UNICEF states that infant mortality rate is certainly one of the most expressive indices of development concept; The child mortality can be decreased by increased and improved way of living.⁵ The rise of IMR is due to dissatisfied hygienic requirements; and unfavorable environmental factors.

Since 2004, India has not experienced an impressive decline in infant mortality. From 58 deaths per 1000 live births in the 2004 to 40 deaths per 1000 live births in 2013. In Rajasthan infant mortality rate is 47 deaths per 1000 live births in 2013.⁹

2. Justification/ Rationale for the Study

Refer to the 12th Five Year Plan and keeping in view the recent infant mortality rate of decline of 5 per cent per year, India is projected to have an IMR of 36 by 2015 and 32 by 2017. While Rajasthan need to achieve 30 by 2017.¹⁵ It is only one year remained to reach the target. A high IMR can indicate unmet health needs and unfavorable environmental factors.⁶

As per NHM document as of June 30, 2015 a total number of pregnant women were 1877000 in Rajasthan. Keeping in view IMR 47 in Rajasthan, there are chances to lose 88,219 children in one year (NHM).

To review the literature for finding out the factors of infant mortality is very important. If we do not identify the factors of infant mortality, Rajasthan will lose so many children.

3 Objectives

The major objective is to decrease infant mortality in Rajasthan.

The specific objectives are:

- a) To study the current status of infant survival at national, state and district level.
- b) To review the factors affecting infant mortality which may be relevant in Rajasthan.

4 Methodology

This is a review study of infant mortality in Rajasthan. However, it was difficult to find out a specific study on Rajasthan infant mortality. Therefore key words used for internet surfing are determinants of infant mortality, factors of infant mortality, child mortality, annual health survey for IMR, Sample registration survey for IMR, low birth weight, early childhood marriage, National and rural health mission for child mortality, Child right and child policy.

A total of 15 documents were reviewed. Out of 15 documents, 3 were research papers, 6 reports; 4 articles and 3 journals which are International journal of innovative research and science, Iranian journal of pediatrics and IOSR journal of dental and medical science.

5 Data Analysis

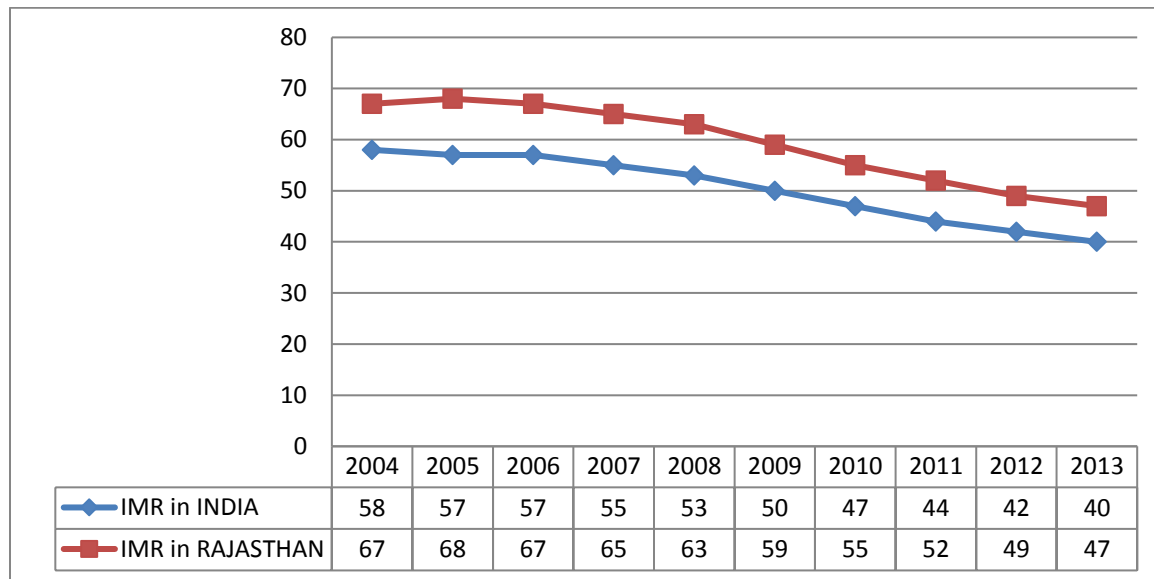
Infant mortality data was analyzed at the national, state (Rajasthan only) and at the level of districts of the Rajasthan (Annex 1)

Figure 1 shows a declining trend of infant mortality in Rajasthan and India from 2004 to 2013. But the declining rate of infant mortality was very slow. After 2006 both India and Rajasthan showed continuous decline in infant mortality till 2013. IMR of Rajasthan has shown a decline from 67 deaths per 1000 live births in the year 2004 to 47 deaths per 1000 live births in the year 2013. The percentage decline in IMR is 18% in last 1 decade in India and 20 % in Rajasthan.⁹

IMR for India declined more from year of 2008 to 2009 and from 2009 to 2010. In 2008 IMR for India was 53, in 2009 it was 50 and in 2010 it was 47.

IMR for Rajasthan declined more from 2008 to 2009 (63 to 59) then 2009 to 2010 (50 to 47). IMR in Rajasthan declined very slow from 2011 to 2013 than 2009 to 2010.⁹

Figure 1: Trend in IMR, India and Rajasthan, 2013:



Source: SRS(<http://www.censusindia.gov.in/>)

The infant mortality rates are showing declining trend and have dropped across states over the years, there still remains a lot of variability across the states. In order to have a better understanding of the reasons for the variations and to identify the specific factors operating on infant all the 28 states were grouped into three categories as Low, Medium and High mortality group of states according to their level of infant mortality rates as per the Sample registration survey.

Table 1 shows that out of 28 states 18 states have infant mortality rate 39 or below, while seven states have high mortality rate (46-54). States like Madhya Pradesh (54); Assam (54), Odessa (51), Uttar Pradesh (50), Meghalaya (47), Rajasthan (47), Chhattisgarh (46) have higher IMR.

Seventeen states fall in low infant mortality group which are Jammu & Kashmir (37), Jharkhand(37),Gujarat (36), Himachal Pradesh (35),Mizoram (35), Arunachal Pradesh(32),West Bengal (31), Karnataka (31),Punjab(26), Tripura (26), Delhi (24), Maharashtra(24), Sikkim(22), Tamil nadu(21), Nagaland (18), Kerala (12), Manipur (10), and Goa (10).

Table 1: Distribution (Grouping) of States according to their level of Infant mortality rates (SRS 2013)

High Mortality Group (more than 42)	Medium Mortality Group (39 to 42)	Low Mortality Group (Less than 39)
7 States	3 States	18 States
Madhya Pradesh (54); Assam (54); Odisha (51) , Uttar Pradesh (50) Meghalaya (47), Rajasthan (47), Chhattisgarh (46)	Bihar (42) Haryana (41) Andhra Pradesh (39)	Jammu & Kashmir (37) Jharkhand (37) Gujarat (36) Himachal Pradesh(35) Mizoram (35) Arunachal Pradesh(32) West Bengal (31) Karnataka (31) Punjab (26) Delhi (24) Maharashtra (24) Tripura(26) Sikkim (22) Tamil Nadu (21) Nagaland (18) Kerala (12) Manipur (10) Goa (10)

Source: http://www.censusindia.gov.in/vital_statistics/SRS_Bulletins/SRS%20Bulletin%20-September%202014.pdf

It clearly shows from table 1 and 2 that in most of the states, IMR is affected by literacy rate. States which are having higher literacy rate showed low infant mortality, except some states.

Some states had low literacy rate showing more infant mortality. High mortality group of states like Madhya Pradesh, Uttar Pradesh, Rajasthan and Chhattisgarh have low literacy rate except Assam and Odisha have medium literacy rate but showing high IMR.. Low mortality group of states like Himachal Pradesh, Gujarat, Kerala, Tamil Nadu, Delhi, Goa, Manipur, Nagaland and Sikkim have high literacy rate except West Bengal, Punjab and Karnataka which comes in low IMR group but have medium literacy rate.

Some states like Jammu & Kashmir, Jharkhand, and Arunachal Pradesh have low IMR but their literacy rate is also low, there may be other factors which affect the IMR.

Table 2: Distribution (Grouping) of States by literacy rates, 2011

High Literacy Group (More than 79%)	Medium Literacy Group (71% to 78%)	Low Literacy Group (Below 71%)
12 states	8 states	8 states
Kerala (93.91%) Mizoram (91.58%) Tripura (87.75%) Goa (87.40%) Delhi (86.34%) Himachal Pradesh (83.78%) Maharashtra (82.91%) Sikkim (82.20%) Tamil Nadu (80.33%) Nagaland (80.11%) Manipur (79.85%) Gujarat (79.31%)	West Bengal (77.08%) Punjab (76.68%) Haryana (76.64%) Karnataka (75.60%) Meghalaya (75.48%) Odisha (73.45%) Assam (73.18%) Chhattisgarh (71.04%)	Madhya Pradesh (70.63%) Uttar Pradesh (69.72%) Jammu & Kashmir (68.74%) Jharkhand (67.63%) Andhra Pradesh (67.4%) Rajasthan (67.6%) Arunachal Pradesh (66.95%) Bihar (63.8%)

Source: (https://en.wikipedia.org/wiki/Indian_states_ranking_by_literacy_rate)

Infant mortality in Rajasthan:

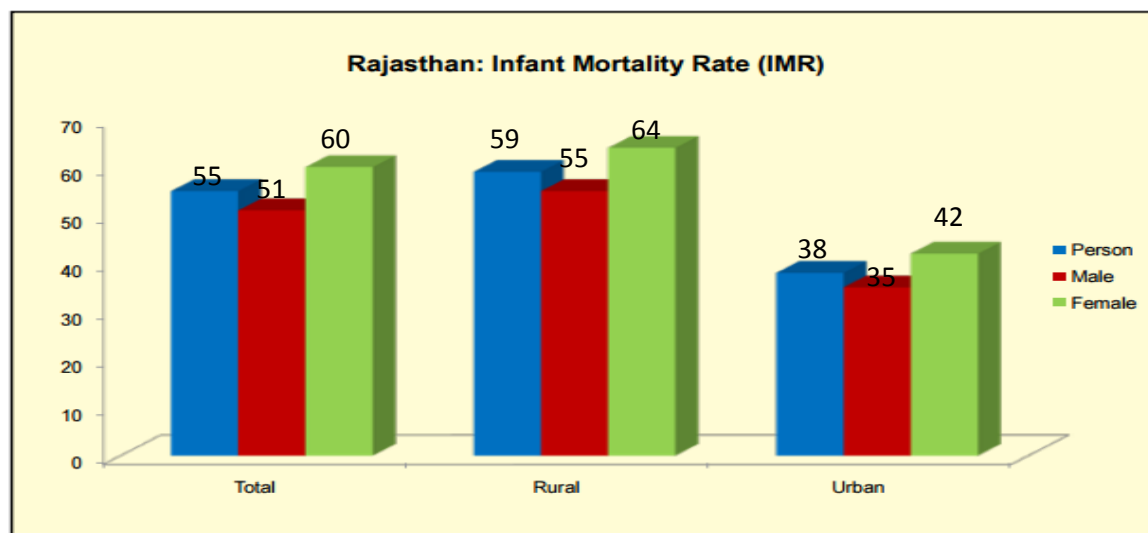
A district-wise analysis of IMR as per the Annual Health survey (AHS 2012-13) shows 55 IMR at the state level while SRS 2013 shows 47 (Annex 2). It is important to note the SRS methods

are for estimating IMR at the state level while AHS is designed to calculate district level estimates. Among the districts of Rajasthan, Jalore has the highest IMR which is 72 infant deaths per 1000 live births and Kota has the lowest IMR i.e. 36 infant deaths per 1000 live births in 2012-2013. Jaipur as a capital city has an IMR of 50 as per AHS 2012-2013 report.⁹

A similar analysis of grouping the states was done for Rajasthan also. However, all the districts of Rajasthan comes in high mortality group in which IMR is more than 42 except Kota.⁹

Figure 2 shows that there is a huge gap in the infant mortality rate in the rural and urban areas at the state level. While the urban infant mortality rate is 38 in 2013 and rural IMR is 59 per 1000 live births. There can be many reasons

Figure 2: Infant Mortality Rate by Place of residence and sex of infants in Rajasthan



Source: Annual Health Survey 2012-2013

for this discrepancy such as:

Institutional mechanism like hospitals and bias against the girl child are the factors contributing to high mortality in rural areas.

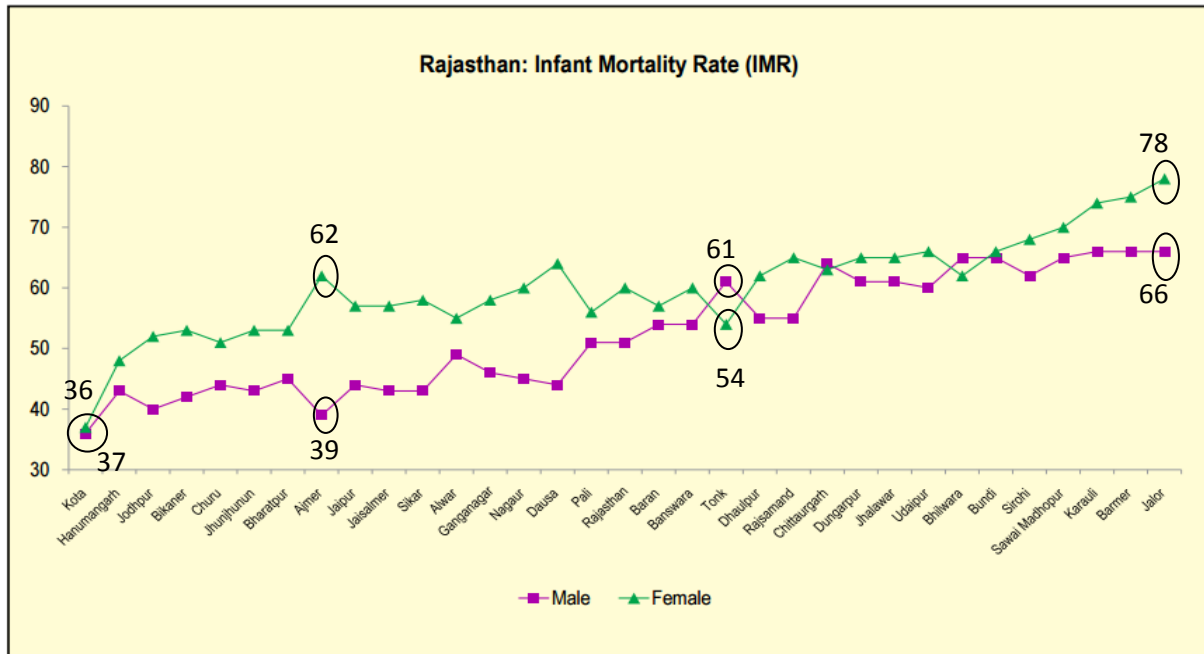
In urban areas, people go for pre-natal tests to get rid of unwanted' children (girls) while in rural areas post delivery deaths are higher due to bias against girl child.

Hygiene level and sanitation facilities are much higher in urban areas in comparison to the rural areas.¹⁰ Also education level is more in urban areas which increase the prenatal and post natal care of children as people are aware of the use and requirement of antenatal check-ups. Medical facilities in the rural areas are also one of the major reasons of this discrepancy.¹⁰ A further district-wise analysis does not reflect upon the same. Rural areas have higher infant mortality (73 Jalor) than urban areas (70 Karauli).⁹

Figure 3 shows clearly that highest female IMR is of Jalor i.e. 78 per 1000 live births and lowest is of Kota i.e. 37 per 1000 whereas average of Rajasthan is 60 per 1000 and the highest male IMR is of Jalor i.e. 66 per 1000 live births and lowest is of Kota i.e. 36 per 1000 whereas average of Rajasthan is 51.

In Ajmer district, there is a huge gap between IMR of males and females. IMR for males is 39 and for females is 62 (Fig 3). On the positive side, there is also a district which has a less gap between IMR of males and females like Kota, where IMR for males is 36 and for females is 37. Only in Tonk district, the IMR for males is more than IMR for females. IMR for males in Tonk district is 61 and IMR for females is 54 per 1000 live births.⁹

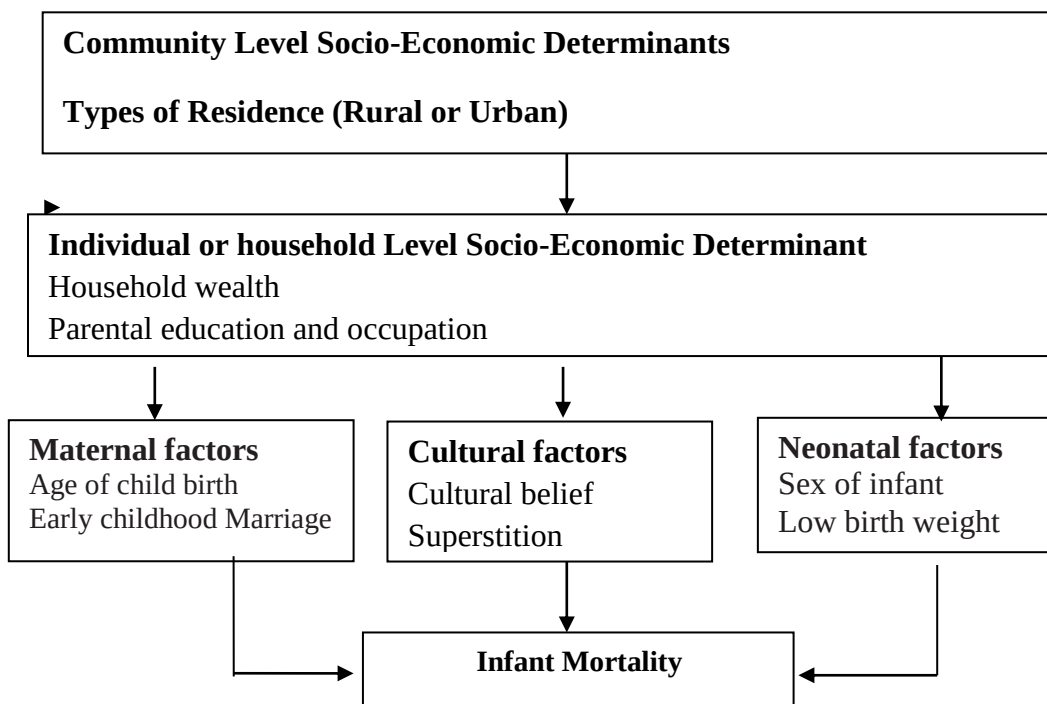
Figure 3: Infant Mortality Rate by District and sex of infants in Rajasthan



Source : Annual health survey 2012-2013.

6 Review of literature on Factors Affecting Infant Mortality:

The literature review is presented following a framework on factors of infant mortality:



Accordingly reduction in mortality was notably greater in the younger age groups than in the older age groups. A variety of factors affecting infant mortality are classified as biological, socio-economic and cultural.¹⁴

The infant mortality is grouped into two categories. The first category consists of those infants who die before they complete 28 days of life.¹⁴ It is known as neonatal mortality. The other category consists of those infants who die between 28 days and 365 days of their life which is called as post neonatal deaths.¹⁴ Factors, which affect neo-natal deaths, are indigenous and factor those which affect post neonatal deaths are exogenous.¹⁴

Endogenous Factors (Genetic Factors):

The biological factors related to the formation of the fetus in the womb is called as endogenous factors. The important biological factors affecting fetal and neo-natal infant mortality rates are the age of the mother, the birth, prematurely, weight at birth and the fact of multiple births.¹⁴

According to studies that younger mother at the age of 19 or below 19 are at higher risk of foetal and neo-natal mortality rates at the first parity and for the first birth order.¹⁴ In Rajasthan, there are many cases of early childhood marriage due to rural belief system. The important factor is maturity of an infant in affecting neo-natal and infant mortality rates. Also, the weight of the baby at birth is also an important factor affecting neo-natal and post neo-natal mortality. With the increase in birth weight it was found that the changes of survival also increased (optimum birth weight ensuring survival being 3.5 kg to 4 kg).¹⁴

When an infant is born, if the weight of infant is less than 2.5 kg then the mortality rate is rapidly increasing due to decreasing weight. If the weight of an infant is less than 1kg then most of infants will die. Normal-birth-weight infant compared to those with low weight at birth are almost 40 times more likely to die in the neonatal period. The relative risk of neonatal deaths is almost 200 times greater than the normal weight birth child for the infants with very low weight. Infant mortality due to low birth weight is usually a direct cause from other medical complications such as preterm birth, poor maternal nutritional status, lack of prenatal care, maternal sickness during pregnancy, and an unhygienic home environment.

As per AHS 2012-2013 results, about 36 per cent infants in Rajasthan were found low birth weight (less than 2.5 kg). Among all the districts of Rajasthan, the percentage of low birth weight in Karauli (55.9%), Baran (53.3%), Jhalawar (52.8%), Dhaulpur (52.3%), Sawai Madhopur(51.4%), Bhilwara(45.9%), Chittaurgarh(45.5%) and Barmer(45%) are highest in the state.

Exogenous Factors

These are the external factors which include social, cultural, and economic factors affecting infant mortality particularly during the post neo-natal period. One of the major causes of high infant mortality in rural areas is the lack of availability of medicines.¹⁴ Most of the infant deaths are due to communicable diseases such as diarrhea and pneumonia, etc.¹⁴

Socio-economic-cultural factors for Infant Mortality

Early marriage

In Rajasthan with high IMR, marriages below 18 years inspite of enforcement of Child Marriage Act, (2006) defining the legal marriage age is more than 41% in Rajasthan. Rajasthan is the only state in the country where the mean age at marriage for girls is lower than the legal age at marriage.

Mother which give birth to the infant under the age of 18 years are 60% more likely to die in their first year than to mother above 19 years. If the children survive, they are more likely to suffer from low birth weight, malnutrition and late physical and other development.

The state government is trying to stop such evil practices in state but then also this practices are going on in state. Among all the districts, the percentage of child marriages (below 18 years for female) in Bhilwara (37%), Dausa (30.8%), Tonk (29.1%), Rajsamand (28.7%), Bundi (28%), Chittaurgarh (25.6%) , and Jhalawar (21.6%) and are the highest in the state.⁹

(See: annexure 3 for district wise percentage of early child hood Marriage for female below 18 year and infant mortality rate in Rajasthan (AHS 2012-2013))

Age of Pregnancy:

This is one of the most important reason that adolescent mothers (age of 14 to 18 year) have higher likelihood of underweight born having more susceptibility to infections and in absence of proper treatment likelihood of death is high.¹² There should be focus more on delaying marriage age following if not delaying the age at first birth among those married early.

Different studies have focused that the case of low age at marriages, premature births and frequent low spaced births following low birth weight whose likelihood of deaths during infancy is high. The risk factors for low birth weight is high among poor socioeconomic community, very young maternal age, poor diet (inadequate calorie intake, nutritional deficiencies of iron and zinc), and infections. The women empowerment is directly associated with her education and type of work she perform.¹²

Mother's Education:

Education is one of the most important factor for proper development of family and child. In Rajasthan, where girls education is not at proper level it becomes important that the basic girls education should be considered as one of the most powerful factors that influence infant mortality and fertility. Caldwell (1979) has argued that those mother which are educated they can provide proper health care to the infants, so education has direct effect on improved child care over child mortality.¹³ Mothers who are more educated tend to get married in proper age, this in turn delays pregnancy. Various studies conducted showed that an educated mother has more knowledge about nutrition, health care and hygiene of the infant (for example washing and feeding practice, taking better care of the sick child, immunization etc).¹³

Mothers who are educated they get married at higher ages (above 25 years) and do not follow all odd cultural practice and these are expected to utilize more and more of **mother and child health (MCH)** care services as compared to those mothers which are younger and middle aged. Contrary to this, the younger mothers are obviously of early age marriage group who are

expected to belong to poor economic families, comparatively of lower level education and may have poor child health services utilization thereby experiencing higher IMR. MCH services utilization has its direct impact on IMR. There is large differences in MCH utilization by urban and rural people, educated women, religion, economic status and region were reported.¹²

Economy of house hold (wealth index)

One of the major factors which directly affect the child health is economic factor. Increasing wealth level had shown decreasing hazard of death during infancy, although IMR was similar among children belonging to families of poorest, poorer and middle class families but among richer and richest, hazard rate was lesser by 30% and by about 50%.³ The reason behind is richer and richest class have better nutrition, better use of mother and child health care services and better treatment in case of any infection or disease. Poor health indicators and high mortality have been established as the outcome of poor social and economic status, low female independence, besides the poor health service performance and lower use of maternal and child health services

Work status of mother:

Every family growth depends on the income which it earns. The working women have two types of affects on mortality. The working mother has to work outside the house due to which they cannot give proper caring to their infants which affects the health of infant and their survival rates.¹³ The dual burden of outside work and household work can reduce the time available for childcare activities like lack of feeding, especially breast feeding early in life.¹³ The other affect

can be, working outside the home leads to higher family income and gives the mother a modern outlook, both of which could increase the probability of survival.¹³

Birth order and Birth spacing:

The risk of infant mortality is low amongst mothers with birth order 2-3 and low amongst birth interval of greater than two years. The higher mortality risk among first child birth could be related with the early child birth trends resulting to more chances of underweight that leads to frequent infections and ultimately die in absence of proper treatment. Further, utilization of maternity services even in low spaced children can reduce IMR.

Birth order and birth spacing are significantly associated with neonatal deaths and infant mortality. To combat the high IMR and maternal deaths, the move on Janani Suraksha Yojana (JSY), a cash incentive scheme launched by the Government of India appears beneficial for the poor.¹²

Cultural Practices:

Cultural practices are based on tradition and beliefs imparted to people by their forefathers

In the rural area villagers they don't want to become modern according to going era of health care. The main cause due to which villagers don't accept the modern and new medical facilities is unfamiliarity and the lack of awareness. Cultural Practices are mostly based on 'superstition' and villager belief system. The cultural practices and their superstitions which are followed in rural areas of Rajasthan, Haryana and Madhya Pradesh are :

- a. Praying for the male child, who they believe alone can help them absolve all their earthly sins is universal among all villagers.¹¹
- b. Early marriages are common in villages.
- c. Young married women are always in community and family pressure to conceive early after marriage. This results into mortality or low birth weight babies.¹¹
- d. Older women claim that they can predict the sex of the baby in the womb. They predict that if the pregnant women are extremely hungry, then the baby in the womb will be a girl and so they suggest the pregnant woman to kill infant with the help of dais quacks.¹¹
- e. Immunization and vaccination of pregnant women and child is avoided. In villages the anganvadies provide Iron tablets and Folic acid tablets, but the pregnant women throw them thinking that it is not good for health.¹¹
- f. Villagers thought colostrums is dangerous for child due to the milk will curdle in the baby stomach due to which they do not allow new born to breast fed for a minimum of 6 to 7 days and a maximum of even 10 to 12 days.¹¹
- g. A mixture with honey with water or sugar is fed to the baby with unsterilized swab or cloth.¹¹
- h. Pregnant women are allowed to drink pinch of milk with tea or coffee, as they think that it will form puss in mothers body which will be dangerous for baby.¹¹

7 Conclusion

India and Rajasthan both are showing continuously declining trend of infant mortality from 2004 to 2013. However, the decline rate is very slow.

Of the factors contributing to infant mortality, there are a mix of social, cultural, economic factors were found besides the biological and physical factors.

To relationship between the infant mortality and particular socio-cultural factors a further in-depth study can be done using statistical analysis.

However, improving literacy rates, especially girls' education, so that age at marriage will increase in Rajasthan may help in reducing infant mortality rate. With the help of increase in education, there is a chance that there may be a change in the attitude towards early childhood marriage so that there is a less chance of early pregnancy which will lead to less cases of infants with low birth weight. So IMR can be reduced further.

References

- 1 Child health program in India http://nrhm.gov.in/images/pdf/media/publication/brief-note-on-child-health/Brief_note_on_Child_Health.pdf
- 2 MDG4: reduce child mortality
<http://www.unfpa.org.br/lacodm/arquivos/mdg4.pdf>
- 3 Kapoor,S.,(May 2011).Infant Mortality Rates in India:District Level Variations and Correlations.
- 4 Khanna,A.,Gupta,P.,Gupta.,S.D.(2009).Changes in IMR in Rajasthan Over 25 years,32(2)105-111.
- 5 Mehrjoodfard,H.,Namakin,K.,Sharifzadeh.G(2008).An Epidemiological Study on Infant Mortality and factors affecting it in Rural areas of Birjand,18(4) 334-342.
- 6 Majumder,R.,Lahiri,S.,Roy,H.,Chakorborty,N.,Kaviraj,S(March 2004). Study of infant Mortality in rural Block of West Bengal,India,13(3) 24-26.
- 7 National Health Mission
<http://nrhm.gov.in/nrhm-components/rmnch-a/child-health-immunization.html>
- 8 Press Information of India ministry Of Family and health Welfare Measures Taken to Reduce Infant mortality(2 December 2014)
<http://pib.nic.in/newsite/PrintRelease.aspx?relid=112332>
- 9 Rajasthan

http://www.censusindia.gov.in/vital_statistics/AHSBulletins/AHS_Factsheets_2012-13/FACTSHEET-Rajasthan.pdf

- 10 Sharma.A.,Choraria.P.,(January 2016).Statistical Analysis of Rural-Urban Infant Mortality Rate in Rajasthan,5(1).
- 11 Socio Economic Determinant behind Infant Mortality and child Mortality
http://planningcommission.nic.in/reports/sereport/ser/stdy_immm.pdf
- 12 Shil,A.,Puri.P.,Mishra.A.,Mishra.N.Rabindra.,(15January2016).Determinants of Infant Mortality in India.
- 13 SRS bulletin Sample Registration system in India
http://www.censusindia.gov.in/vital_statistics/SRS_Bulletins/SRS%20Bulletin%20-September%202014.pdf
- 14 Talukdar,D.,Barman,N.,(2014).Socio-Demographic Factors Affecting Infant Mortality Rate in Assam,3(5).
- 15 Twelfth Five Year Plan 2012 to 2017 Social sector.
http://planningcommission.gov.in/plans/planrel/12thplan/pdf/12fyp_vol3.pdf
- 16 UN Sustainable Development Summit 2015
<http://www.who.int/mediacentre/events/meetings/2015/un-sustainable-development-summit/en/>

Annex

Anne 1:

The year wise data of IMR of various states of India in 2004 to 2013 is as under:

States/UTs	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
India	58	58	57	55	53	50	47	44	42	40
Andhra Pradesh	59	57	56	54	52	49	46	43	41	39
Assam	66	68	67	66	64	61	58	55	55	54
Bihar	61	61	60	58	56	52	48	44	43	42
Chhattisgarh	60	63	61	59	57	54	51	48	47	46
Gujarat	53	54	53	52	50	48	44	41	38	36
Haryana	61	60	57	55	54	51	48	44	42	41
Jharkhand	49	50	49	48	46	44	42	39	38	37
Karnataka	49	50	48	47	45	41	38	35	32	31
Kerala	12	14	15	13	12	12	13	12	12	12
Madhya Pradesh	79	76	74	72	70	67	62	59	56	54
Maharashtra	36	36	35	34	33	31	28	25	25	24
Odessa	77	75	73	71	69	65	61	57	53	51
Punjab	45	44	44	43	41	38	34	30	28	24
Rajasthan	67	68	67	65	63	59	55	52	49	47
Tamil Nadu	41	37	37	35	31	28	24	22	21	21
Uttar Pradesh	72	73	71	69	67	63	61	57	53	50
West Bengal	40	38	38	37	35	33	31	32	32	31
Arunachal Pradesh	38	37	40	37	32	32	31	32	33	32
Delhi	32	35	37	36	35	33	30	28	25	24
Goa	17	16	15	13	10	11	10	11	10	9
Himachal Pradesh	51	49	50	47	44	45	40	38	36	35
Jammu & Kashmir	49	50	52	51	49	45	43	41	39	37
Manipur	14	13	11	12	14	16	14	11	10	10
Meghalaya	54	49	53	56	58	59	55	52	49	47
Mizoram	19	20	25	23	37	36	37	34	35	35
Nagaland	17	18	20	21	26	26	23	21	18	18
Sikkim	32	30	33	34	33	34	30	26	24	22

Tripura	32	34	36	39	34	31	27	27	28	26
---------	----	----	----	----	----	----	----	----	----	----

Source: SRS from 2004 to 2013

<https://community.data.gov.in/infant-mortality-rate-major-factors-in-its-reduction/>

Annex 2:

District wise Infant Mortality Rate by Place of Residence and sex of infant in Rajasthan (AHS 2012-2013):

State/District	Total			Rural			Urban		
	Person	Male	Female	Person	Male	Female	Person	Male	Female
Rajasthan	55	51	60	59	55	64	38	35	42
Ajmer	50	39	62	58	46	72	35	24	45
Alwar	52	49	55	53	50	57	38	34	41
Banswara	57	54	60	57	54	61	NA	NA	NA
Baran	55	54	57	54	54	53	66	50	84
Barmer	70	66	75	71	66	76	58	56	61
Bharatpur	49	45	53	50	46	55	43	40	47
Bhilwara	64	65	62	68	69	67	42	46	37
Bikaner	47	42	53	56	49	63	32	27	36
Bundi	65	65	66	72	72	71	38	34	42
Chittaurgarh	63	64	63	68	69	67	37	34	40
Churu	38	44	51	52	49	55	35	30	40
Dausa	53	44	64	54	46	65	38	25	52
Dhaulpur	58	55	62	62	58	66	NA	NA	NA
Dungarpur	63	61	65	63	60	66	NA	NA	NA
Ganganagar	52	46	58	57	52	63	36	31	42
Hanumangarh	45	43	48	48	46	51	34	35	33
Jaipur	50	44	57	61	54	68	40	34	46
Jaisalmer	50	43	57	52	45	60	37	31	42
Jalor	72	66	78	73	67	80	45	46	45
Jhalawar	63	61	65	66	65	68	39	36	42
Jhunjhun	48	43	53	50	45	56	39	35	42
Jodhpur	46	40	52	53	45	60	33	29	36
Karauli	69	66	74	69	64	76	70	79	58
Kota	36	36	37	46	45	47	26	27	26
Nagaur	52	45	60	55	48	63	36	26	47
Pali	54	51	56	57	56	59	37	31	44
Rajsamand	59	55	65	63	57	70	NA	NA	NA
Sawai Madhopur	67	65	70	71	69	74	50	47	54
Sikar	50	43	58	52	46	61	42	34	50
Sirohi	65	62	68	69	67	71	35	22	50
Tonk	57	61	54	66	69	64	26	34	16
Udaipur	63	60	66	67	63	71	44	46	41

Source: Annual health survey 2012-3;

Annex3 : District wise percentage of Early Marriage for female below 18 year and Infant Mortality Rate in Rajasthan (AHS 2012-2013):

State/District	Percentage of Early marriage for female (below 18 year)	IMR
Rajasthan	14.3	55
Ajmer	16.3	50
Alwar	14.6	52
Banswara	10.2	57
Baran	12.3	55
Barmer	13.3	70
Bharatpur	8.7	49
Bhilwara	3.7	64
Bikaner	6.7	47
Bundi	27.5	65
Chittaurgarh	25.6	63
Churu	10.5	38
Dausa	30.8	53
Dhaulpur	11.8	58
Dungarpur	5.9	63
Ganganagar	3.1	52
Hanumangarh	7.2	45
Jaipur	11	50
Jaisalmer	8.6	50
Jalor	9.2	72
Jhalawar	21.6	63
Jhunjhunun	5.5	48
Jodhpur	11.4	46
Karauli	17	69
Kota	7.2	36
Nagaur	15.4	52
Pali	17.3	54
Rajsamand	28.7	59
Sawai Madhopur	23.7	67
Sikar	9.1	50
Sirohi	7.4	65
Tonk	29.1	57
Udaipur	17.4	63

Source: http://www.censusindia.gov.in/vital_statistics/AHSBulletins/AHS_Factsheets_2012-13/FACTSHEET-Rajasthan.pdf