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An Analysis of Performance of Maternal and Child Healthcare Variables in India

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Abstract

Since maternal and child health plays very crucial role in the development process of a nation; performance of healthcare variables has its own importance. The present study attempt to analyse the performance of maternal and child health variables in India by using secondary data in order to present it through an empirical evidence. We have employed the T-test to investigate the performance of health care variables in selected Indian states. The annual data of major 15 states on MCH variables is analysed. Selected states have been divided into 2 groups on the basis of IMR. The main findings of this study show the performance of healthcare indicators is poor in the states where IMR is more than 40 because of lack of awareness, traditional healthcare practices, low level of education among women, and poor living standard.The study recommends that government should focus on the healthcare sector to improve the performance of healthcare variables.

Keywords: Maternal Healthcare, Child Healthcare, Performance, Healthcare Variables, T-test, India, Burden of Disease; Empirical Evidence; Variables.

Introduction

India is lower middle income country with a huge burden of population and poverty. India is growing tremendously since the last two decades and has had an average growth rate of 7 percent. In spite of such economic growth, it seems that the maternal and child mortality remains very high in the country (Economic Survey of India, 2017). Standard of maternal and child health in India is very low as compared to some of our neighboring countries like Bangladesh and Nepal. As per to the WHO, Under 5 mortality rate in India, Nepal and Bangladesh is 52.7, 41.1 and 39.7 respectively. India has 35 states each of which has its own government and there is a huge inter-state diversity on the basis of economic and political ground. India failed to achieve its MDG's relating to maternal and child health. Thus this study tries to examine the performance of maternal and child health care variables in India.

The burden of disease in some developing countries, stands as a barrier to economic development and therefore must be addressed effectively in a development strategy (WHO, Commission on Macroeconomics and Health, Sachs, 2001).Good health, especially women and child health contributes to the production of productive services because the better the state of health, the more time available for income generating activities. So, health care of every individual especially for women and child is very important for the overall economic development of a nation. According to Amartya Sen (2014), health care is not something that is supported by economic growth but it is something that supports economic growth. Health care means not only medical care but also all other pro preventive care aspect too.The report by the High Level Group on the Lisbon Strategy for Growth and Employment (2004) states that health and health care play a major role in generating productive workforce, employment, social cohesion and hence economic growth. Out-of-pocket expenditure is very low in India as compared to developed and some developing countries and it dominates the cost of financing health care. Health care can be improved by implementing good health care policies, good political economy, and reduction in poverty, increasing employment, good public information and communication system.

Maternal and child health forms a very crucial element of the health status of a country. In general, developing countries have a poor maternal and child health status and India is no exception to this trend, as is revealedfrom various government reports that not only maternal health

status is poor in developing countries, but also child health status is very poor. In terms of maternal and child status huge differences exist between developing and developed nations. According to world health statistics, everyday about 800 women lose their lives due to complications regarding pregnancy and child birth. The extent of maternal and child health problems in India is enormous. India accounts for almost 19 percent of all live births and 27 per cent of maternal deaths worldwide (Ramasubhan and Jejeebhoy, 2000). Each year about 136,000 maternal deaths and almost one million newborn deaths take place in India (WHO, 2005). Apart from maternal and newborn deaths, there is also the incidence of other complications of pregnancy, such as morbidity and birth-related disorders.

With the growing population in India and its states the provision of public health care has also increased, though there are considerable disparities across the states. Ensuring equal access to health care in every part of the country, to assured good quality health status for all is imperative. In India health care has an unusual mix of public and private health care that generates a political economy which makes the health care sector purchasing power dependent. In a country like India, majority of people struggle under severe poverty conditions and do not have enough purchasing power even to attain an adequate nutritional level. According to Rapid Survey on Children conducted in 2013-14, 29.4 percent of all children below the age of five years are underweight and National Family Health Survey (NFHS) reveals that 52 percent of all women are anemic. This humanitarian destruction is not just a loss for the person of a nation but also a tragedy for the world as a whole. A healthy and developed society cannot be built on the decay of hunger, malnutrition and ill health. Health care is a very important element to raise the health standard of the people of a nation which ultimately would raise human capabilities, efficiency in work which is needed for the overall growth and development of a country. The improvement in maternal and child health status results in improvement in national income, reduction in poverty. In rural India health care is mainly dependent upon the traditional cure for many years and health is neglected which reduces their working capacity.

While the huge work has been done on maternal and child health care on both national and international level, there have been very few studies that focus on the performance of healthcare variables among Indian states. The objective of this paper is to analyse the performance of maternal and child health care variables by using the t-test. For thatwe divide the selected states into 2 groups on the basis of IMR. IMR is one of the most sensitive healthcare indicators. IMR represents the utilization of healthcare services in a country. Before completing the first year of life, children may get affected by various infectious diseases. Though most of these diseases are preventable if diagnosed on time. Thus IMR is also a reflection of mother health. Low IMR means women enjoy a sound health standard. We use sample registration system (SRS) as a data source.

Aim of the Study

The present study aims to analyse the performance of maternal and child health variables in India. The study uses secondary data in order to present as empirical evidence. T-test has been employed to investigate the performance of health care variables in selected Indian states. The annual data of major 15 states on MCH variables is analysed.

Review of Literature

Despite the importance of this subject in attaining health standard goalsand in formulation of health policy, the volume of existing literature on this crucial topic is scarce in the context of India (Soumitra Ghosh, 2014). Performance of Healthcare variables can be understood with the status of utilization of healthcare services in Indian states.The health of the mother is clearly related to the health of the child. A malnourished mother is likely to result in malnutrition in the young infant (Gulnawaz Usmani, 2016). Antenatal care is crucial for the birth of a healthy baby. One in five women in India receives no antenatal care (Rapid Survey on Children, 2013-14). This shows that there is some lacuna in terms of utilization of health care services. Some states such as Kerala, Goa, Tamil Nadu performing well in providing maternal and child health care whereas, hand states like Uttar Pradesh, Bihar, Madhya Pradesh, show lower levels of utilization (Soumitra Ghosh, 2014).

Improving the health standard is one of the major task of almost all developing countries for a very long time (WHO, 2000). Lack of healthcare infrastructure and facilities makes the health standard more dubious in India (Usmani G, 2017). The National Family Health Survey (NFHS 2005-06) shows sharp regional and socio-economic differences in health standards, the poor and the less developed states bearing the excessive burden of mortality. High rates of infant mortality and U5MR are, in general, inversely associated with financial status (Subramanian, et. Al. 2006, Gwatkin, 2000;).

Most of the factors affecting utilization of health care services are related to accessibility in terms of skilled doctors and health attendants, medical cost, quality of service and distance (Thoa NT et. Al 2013). Key indicator for analysing performance of healthcare services is access to essential drugs. Lack of drugs and other equipment's and high cost of drugs are factors that can influence the healthcare seeking behavior among individuals especially poor (Sule SS et. al., 2008).

Methodology and Data source

To analyze the performance of maternal and child healthcare variables we use independent t-test and f-testthat determines whether there is a statistically significant difference between the means in two unrelated groups.A paired t-test can be used to test that means of two methods are equal. Rejection would indicate a systematic bias for one assessment method to be greater than the other. While non-rejection might suggest equality of means, which is desirable, it doesn't rule out a large difference

between the 2-methods (Maki E. 2014). A study conducted by Farough A. and Valmohammadi C. in 2015 used t-test for analyzing the performance of ISO 9001 certified hospitals by dividing hospitals into certified and non-certified hospitals.

The major 15 states of the study divided into two groups according to the infant mortality rate. The first group consists of 8 states having infant mortality rate of up to 40 percent per thousand live births such as Andhra Pradesh, Gujarat, Karnataka, Kerala, Maharashtra, Punjab, Tamil Nadu and West Bengal (table 2).

Table 1: Group of states having infant mortality rate of up to 40 per thousand live births

Variable	X (ANC)	X (U5MR)	X (MMR)	X (ID)	X (NNM)	X (UW)	X (FV)	X (CIM)	X (PNC)	X (IMR)
AP	94	41	92	91.1	27	29.4	46	74.1	79.9	39
GUJ	88.2	45	112	87.9	28	37.1	45.2	56.2	47.5	36
KAR	93.7	35	133	92	23	22.7	55	79.4	75.6	31
KER	96.2	12	61	99.4	7	28.9	75.3	83	94	12
MAH	92.4	26	68	90.3	18	36.1	58.8	77.4	77.1	24
PUJ	86.5	31	141	80.4	17	34.4	60.1	78.6	15.6	26
TN	98.2	23	79	99.3	15	31.5	80.9	76.3	94.7	21
WB	98.3	35	113	76.3	22	34.3	64.3	75.2	9.1	31
Count	8	8	8	8	8	8	8	8	8	8
Mean	**93.44**	**31**	**99.88**	**89.5**	**19.63**	**31.8**	**60.7**	**75.03**	**61.69**	**27.5**
S.D.	**4.33**	**10.54**	**29.6**	**8.13**	**6.89**	**4.73**	**12.6**	**8.09**	**33.78**	**8.67**

Source: Rapid Survey on Children, 2013-14

The second group consists of the 7 states together with the all India level such as Assam, Bihar, Haryana, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh and India as well which are having IMR more than 40 per thousand live births (table 3).

Table 2 Group of states having infant mortality rate more than 40 per thousand live births.

Variable	Y (ANC)	Y (U5MR)	Y (MMR)	Y (ID)	Y (NNM)	Y (UW)	Y (FV)	Y (CIM)	Y (PNC)	Y (IMR)
ASM	93.2	73	300	74.2	29	22.3	31.4	55.3	7	54
BR	84.7	54	208	65.3	28	22.2	32.8	60.4	6.4	42
HAR	80.7	45	127	76.4	28	33.6	65.3	70.7	23.5	41
MP	75.4	69	221	78.1	39	18.5	40.3	53.5	60.3	54
ORS	92	66	222	81.3	39	25.2	51.8	62	10.5	51
RAJ	82.2	57	244	82.7	35	16	26.5	60.7	9.5	47
UP	61.5	64	285	62.1	37	23.3	23	47	12.1	50
IND	85.2	49	167	78.7	29	30	43.5	65.3	39.3	40
Count	8	8	8	8	8	8	8	8	8	8
Mean	**81.86**	**59.63**	**221.75**	**74.8**	**33**	**23.8**	**39.3**	**59.36**	**21.08**	**47.38**
S.D.	**10.06**	**9.94**	**57.05**	**7.42**	**4.99**	**5.74**	**14**	**7.34**	**19.33**	**5.76**

Source: Rapid Survey on Children, 2013-14

The healthcare variables taken into consideration are antenatal care (ANC), under-five mortality rate (U5MR), maternal mortality rate (MMR), institutional deliveries (ID), neo-natal mortality (NNM), under-weight children (UWC), full vaccination (FV), complete immunization (CI), post-natal care (PNC) within 24 hours of delivery, infant mortality rate (IMR).

The mean (μ) and standard deviation (S.D.) of healthcare variable are calculated for both the groups. In the study, X is assigned to the group first and Y is assigned for the group second. The number of population framework is, n= 16 and the number of independent variables is 2, as the framework is divided into 2 parts, and thus the number of degree of freedom is f=n-2, hence f= 14.

In table 4.1, a test of variance between the healthcare variable is computed and it is accepted at 5% significance level (α).

The null hypothesis for the analysis is as follows,

Ho: there is no significant variation in the mean of level of maternal and child healthcare variable between the groups X and Y, i.e.

Ho: **μ**x = **μ**y (at 5% significance level)

The alternative hypothesis for the analysis is as follows,

H1: **μ**x ≠ **μ**y (at 5% significance level)

The results of t-test are hereby computed and tabulated in table 1.

Results

As per the result, t-value for ANC is 2.9915 and it is significant at 5% level. It is found that the value of mean for X is 93.43 and for Y it is lower i.e. 81.86. The standard deviation for group X (4.32) is less than half for Y (10.05). Since there is no difference of means of ANC between the two groups, Ho is rejected. So the t-test value under equal variances is rejected for ANC i.e. the null hypothesis that there is no difference of the mean of healthcare variable between the two groups is rejected.

The mean of U5MR is 31 for the first group (X) and it is 59.62 for second group (Y). The value of S.D. for X is (10.54) and for Y it is (9.94). As per the t-test result, t-value is -5.5874 and it is significant at 5% level. It means the null hypothesis that there is no difference of the mean of U5MR between the two groups is rejected.

The mean of MMR for X group is 99.87 and for Y group means value is 221.75 which is much higher than group X. The value of standard deviation of MMR is (29.59) for the group X whereas it is (57.05) for Y. Hence t-test of the mean difference of MMR of the two groups of states under equal variance assumption has been taken into consideration. As per the t-test result, t-value is -5.364 and it is significant at 5% level. Hence the null hypothesis of no difference of the mean of MMR between the two groups is rejected.

The mean value of institutional deliveries is 89.58 for the group X and for group Y mean value is 74.85 which are much less than the first group X. The standard deviation for X is (8.13) and for Y it is little less i.e. (7.41). Hence the t-value of the t-test of the mean differences between the two groups under equal variance has been taken into consideration. As per t-test result, the t-value is 3.7874 ad it is significant at 5% level. Hence the null hypothesis of no difference of the mean of institutional deliveries between the 2 groups is rejected.

Table 3: Independent t-test of Health Variables

healthcare Variables	μ (S.D.)		T- Value	P (t)	Ho
	X	Y			
ANC	93.43 (4.32)	81.86 (10.05)	2.9915	0.009	R
U5MR	31 (10.54)	59.62 (9.94)	-5.5874	0.0001	R
MMR	99.87 (29.59)	221.75 (57.05)	-5.364	0.0001	R
ID	89.58 (8.13)	74.85 (7.41)	3.7874	0.002	R
NNM	19.62 (6.88)	33 (4.98)	-4.4558	0.0005	R
UW	31.8 (4.73)	23.88 (5.73)	3.0149	0.0094	R
FV	60.7 (12.68)	39.32 (14.06)	3.194	0.0065	R
CI	75.02 (8.08)	59.36 (7.34)	4.0576	0.0012	R
PNC	61.68 (33.77)	21.07 (19.33)	2.9519	0.0105	R
IMR	27.5 (8.66)	47.37 (5.75)	-5.4065	0.0001	R

R= rejected, A= accepted; Detailed analysis result has been attached in annexures.

The mean of NNM for X is 19.62 and for Y it is 33.0 which are much higher than the first group X. The standard deviation of NNM for the first group X is (6.88) while for group Y standard deviation value is (4.98) which is closer to the first group. T-value of the mean difference of equal variance assumption of the 2 groups has been taken into consideration. As per the result, the t-value is -4.4558 and it is significant at 5% level. Thus the null hypothesis that there is no difference of the mean of NNM between the two groups is rejected.

For group X of under-weight children, the mean value is 31.8 and for second group Y mean value is 23.88. The standard deviation value for the group X and Y are (4.73) and (5.73) respectively. The f-test of equal variances between the mean of the 2 groups is accepted at 5% level of significance. Hence the t-value for the 2 groups of equal variance assumption has been taken into consideration. As per the result, t-value is 3.0149 and it is significant at 5% level of significance. It means the null hypothesis that there is no difference of the mean of underweight children between the two groups is rejected.

The mean of group X of full Vaccination (FV) is 60.7 and for Y it is 39.32. For X standard deviation is 12.68 and 14.06 are for group Y. Hence the t-test value (t =3.194) has been taken into consideration and accepted as significant at 5 percent level. Thus the null hypothesis that there is no difference of the mean of full vaccination between the groups is rejected.

The mean value of complete immunization (CI) for the first group X is 75.02 and for the second group, the value of mean is 59.36. The standard deviation varies from (8.08) for the first group to (7.34) for the second group. Hence the t-test of equal variance between two groups has been considered. As per the t-test result t –value is 4.0576 and it is insignificant at 5% level. Thus the null hypothesis that there is no difference of mean between the two groups is rejected.

The mean of PNC for the first group is higher than the second group and in case of standard deviation, it is same. The mean and standard deviation for group X are 61.68 and 33.77 and for group Y it is 21.07 and 19.33 respectively. As per the result, t-value is 2.9519 and it is insignificant at 5%

level. It means the null hypothesis that there is no difference of the mean of PNC between the 2 groups is rejected.

The mean of IMR for the first group is almost half to the second group and in case of standard deviation; it is higher for the first group. The mean and standard deviation for the group first (X) is 27.5 and 8.66 and for the second group (Y) it is 47.37 and 5.75 respectively. Hence the t-test of mean differences of the 2 groups under equal variance assumption has been taken into consideration. As per the result t-value is -5.4065 and it is insignificant at 5% level of significance. Thus the null hypothesis that there is no difference of the mean of IMR between the two groups is rejected.

Conclusion

The above-explained result found that there is a difference between the mean of healthcare indicators in group one and group two. As mentioned earlier the states in group one are those have IMR of less than 40 per thousand live births and group two belong to states those have IMR of more than 40 per thousand live births. The performance of healthcare indicators is low in the states where IMR is more than 40 because of lack of awareness, traditional healthcare practices, low level of education among women, and poor living standard.

Group Y contains states where the population is very high, per capita income is below the national average, lack of public healthcare infrastructure, low level of education especially among women etc. These factors become hindrance in the utilization of ante-natal care (ANC) because people thought that it is not very useful. All the healthcare variables have more or less same pattern of utilization even in the poorer states to those states where living standard and per capita income is high.

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