Mr. B. I. Pundappanavar, attended ten days workshop on Research Methodology organized by CMDR, Dharwad, sponsored by ICSSR, New Delhi during 16-25 January, 2019.

Mr. B. I Pundappanavar, and Mrs. Ragini Itagi disseminated the key findings of the study on HMIS infrastructure and quality of HMIS data to all the M and E oﬃcers and State Data Manager of Karnataka at SIHFW, Bangalore, on 7/02/2019.

Mr. H. R. Channakki, Field Investigator of the Centre awarded Doctoral Degree in Commerce from Kannada University, Hampi.

Dr. Shriprasad H., published an article entitled 'Hygiene knowledge imparting approach among students and basic sanitation conditions at government schools- an empirical study' in International Journal of Economics and Social research Vol 8 (4) December 2018.

Mr. Javeed A. Golandaj and Dr. Jyoti S. Hallad, published an article- Levels, trends and socio-economic correlates of Cesarean section deliveries- District level analysis in Karnataka, India, in Journal of Health Research, Vol.33, Issue 4.

Following 4 papers are presented in the national seminar on "Population Dynamics in India and Its Implications on Health and Environment", jointly organized by IIPS, Mumbai and NIRD&PR, Hyderabad, during March 07-09, 2019 in Hyderabad.

 a. Mr. K G Kallihal, - "Availability and Utilization of AYUSH Services in Udupi district of Karnataka State".
 b. Mr. C. N. Noolvi, - "Childhood Morbidity and Treatment cost among Slum Dwellers: Findings from a Twin City Survey".
 c. Dr. H. R. Channakki,- "Living Arrangements and Health Seeking Behaviour of Elderly People in Dharwad District".
 d. Dr.Rajarama KET, - "Awareness and Coverage of Health Insurance Schemes in Urban and Rural Areas of Dharwad district: A Micro level Study".

Dr.Rajarama K.E.T., attended two weeks training on 'General Management for Scientists' organised by Administrative Staﬀ College of India, Hyderabad on behalf of Ministry of Science and Technology, Government of India, New Delhi during 18-29 March, 2019.
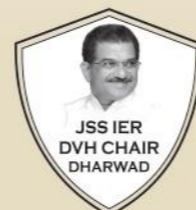
Dr.Jyoti S. Hallad worked as a Ph.D. Examiner and attended viva-voce on 28.03.2019 at IIPS, Mumbai.

ISSN : 2454-9207

IER JOURNAL OF HEALTH AND DEMOGRAPHY

RESEARCH ARTICLES

IER Journal of Health and Demography

ARTICLES

Organisational effectiveness of child immunisation efforts in India: Evidence from National Family Health Survey, 2015-16

*Aalok Ranjan Chaurasia

Abstract

This paper analyses the organisational effectiveness of child immunisation efforts in India based on the latest data from National Family Health Survey (2015-16). The paper observes that child immunisation efforts in India are organisationally ineffective in influencing the full immunisation coverage rate at the national level and in most of the districts of the country primarily because of the poor capacity-efficiency of child immunisation services. The paper concludes that improving the organisational effectiveness of child immunisation efforts can contribute substantially towards improving child immunisation coverage in India. The paper calls for a change in the organisation of child immunisation services in the country to improve the organisational effectiveness of child immunisation efforts in order to achieve the goal of universal child immunisation.

Key Words: India, States, Districts, Child Immunisation, Organisational Effectiveness, Needs-effectiveness, Capacity-efficiency.

Introduction

The full immunisation coverage rate in India is only 62 per cent (Government of India, 2017) which is amongst the lowest in the world (Restrepo-Méndez*et al*., 2016). The National Health Policy 2017 aims at a full immunisation coverage rate of 90 per cent by 2025 (Government of India, 2017). To achieve this goal, the full immunisation coverage rate in India must increase by at least 30 percentage points between 2015 and 2025. However, the full immunisation coverage rate increased by only 18 percentage points between 2005-06 and 2015-16 according to the National Family Health Survey. The poor performance of immunisation efforts in India may be judged from the fact that the country could not achieve full immunisation coverage rate of at least 90 per cent at the national level and 80 per cent in every district by 2010 as articulated in the Global Immunization Vision and Strategy 2006-2015 (WHO, 2005).

It is highly unlikely that, with the current rate of progress in child immunisation, the country will be able to achieve the full immunisation coverage rate of at least 90 per cent as articulated in the National Health Policy 2017.

The history of planned child immunisation efforts in India dates back to 1978 when the Expanded

* MLC Foundation and Shyam Institute 82, Aradhana Nagar, Bhopal, MP-462003
India, E-mail: aranjan@shyaminstitute.in

Programme of Immunisation (EPI) was launched (Sokhey, 1988). In 1985, EPI was expanded into Universal Immunisation Programme (UIP) and was accorded the status of the National Technology Mission in 1986 to reduce infant and child mortality and realise the goal of 'Health for All' by 2000 (Lahariya, 2014; Government of India, 1985; 1988; 2005). In 1992, UIP was subsumed into the Child Survival and Safe Motherhood (CSSM) Programme while the pulse polio campaign was launched in 1995 to eradicate poliomyelitis. In 1997, CSSM Programme was expanded into the Reproductive and Child Health (RCH) Programme which became the lead programme of the National Rural Health Mission (NRHM), launched in 2005 (Government of India, 2005). In 2013, the National Urban Health Mission (NUHM) was launched and NRHM and NUHM were combined to constitute the National Health Mission. In 2014, the Mission Indradhanush was launched which aimed at immunising, by 2020, all children under two years of age and all pregnant women (Government of India, 2015). However, despite all these initiatives and efforts, the long-cherished goal of universally immunising all children to protect them from six vaccine preventable diseases – tetanus, diphtheria, pertussis, poliomyelitis, measles and tuberculosis – still eludes India.

Child immunisation efforts may be viewed as an organisation in which inputs are purposely provided to achieve specific goal – fully immunising children to protect them from vaccine preventable diseases. As such, organisational effectiveness of these efforts plays an important role in the realisation of the goal for which these efforts have been institutionalised. Organisation effectiveness reflects the effectiveness of the efforts in achieving the outcomes that these efforts intend to produce – fully immunising all children against the six vaccine preventable diseases (Etzioni, 1964). Organisational effectiveness may also be defined in terms of performance accountability or the extent to which these efforts achieve specified level of progress towards its goal (Herman and Renz, 2008; Mitchel, 2012). Organisational effectiveness reflects the capability of an organisation to achieve its outcomes (Steers, 1975; Zammuto, 1982; Gibson *et al*., 2000) and may be analysed through at least four perspectives - 1) goal attainment perspective (Etzioni, 1964; Price, 1968); 2) system resource perspective (Yutchman and Seashore, 1967); 3) internal process or strategic constituencies perspective (Nadler and Tusman, 1980); and 4) competing values perspective (Cameron, 1984). The goal attainment perspective is the most popular one (Etzioni, 1964; Molnar and Rogers, 1976; Perrow, 1961; 1970; Price, 1972). Organisational effectiveness, in this perspective, is measured in terms of accomplishment of ends rather than means (Perrow, 1961). The systems resource perspective recognises that any organisation is essentially a system composed of many interrelated sub-systems (Kast and Rosenzweig, 1985). The strategic constituencies perspective focusses on satisfying demands of those constituencies that support the organisation (Pfeffer and Salanick, 1978; Keeley, 1978). Finally, the competing values perspective assumes that there is "no best" criteria and so the organisational effectiveness can be assessed in many ways (Quinn and Rohrbaugh, 1981).

Although, child immunisation has always been at the centre of efforts to improve health of children and thereby reduce child mortality in India, yet, low level of full immunisation coverage rate as revealed through different nationally representative household surveys raises concerns about the organisational effectiveness of child immunisation efforts in the country. There are many studies that have analysed the progress of child immunisation in India in varied regional, social, economic and cultural settings (Gupta, 1989; Sokhey, 1990; Patowary *et al*., 1990; De, 2002; Choi and Lee, 2006; Gatchell *et al*., 2008; Corsi et al, 2009; Phukan *et al*., 2009; Sahu, 2010; Laxminarayan and Gangully, 2011; Kumar and Mohanty, 2011; Mathew, 2012; Singh, 2012; Vikarm *et al*., 2012; Prusty and Kumar, 2014; Bhatnagar *et al*., 2015; Shrivastawa *et al*., 2015; Devsenapathy *et al*., 2016). However, organisational effectiveness of child immunisation efforts has rarely been the focus of attention of the research on child immunisation in India. It may be argued that poor organisational effectiveness of child immunisation efforts may be an important reason behind the persistence of low full immunisation coverage rate in India. An assessment of the organisational effectiveness of child immunisation efforts in India, therefore, merits an empirical investigation.

In this paper, we measure and analyse the organisational effectiveness of child immunisation efforts in India and in its constituent states/Union Territories and districts through the goal attainment perspective or from the perspective of full immunisation coverage rate as articulated in the National Health Policy 2017. The analysis reveals that there is substantial scope of improving the organisational effectiveness of child immunisation efforts in the country. The analysis also reveals that organisational effectiveness of child immunisation services varies widely across states/Union Territories and districts. The paper argues that improving the organisational effectiveness of the child immunisation efforts is necessary to realise the full immunisation coverage rate of 90 per cent as articulated in the National Health Policy 2017.

The paper is organised as follows. The next section outlines the analytical framework while the third section describes the data used. The analysis is based on the data available through the latest National Family Health Survey, 2015-16. A brief synopsis of inter-district and inter-state/Union Territory variation in the full immunisation coverage rate is given in the fourth section of the paper. The fifth section analyses the organisational effectiveness of child immunisation efforts following a decomposition approach while the last section summarises the main findings of the analysis and puts forward a set of recommendations for accelerating the progress towards universal child immunisation in the country.

Analytical Framework

The performance of child immunisation services is commonly measured in terms of the full immunisation coverage rate. A child is classified as fully immunised if it has received BCG, three doses

each of DPT and OPV and one dose of Measles vaccines within the first year of life (WHO, 2001). The full immunisation coverage rate is then the proportion of children who have been fully immunised during their first year of life. From the measurement perspective, full immunisation coverage rate is measured in terms of the proportion of children aged 12-23 months who are fully immunised. The goal effectiveness of child immunisation services (*GE*) is then the full immunisation coverage rate or the proportion of children aged 12-23 months who are fully immunised. When all children aged 12-23 months are fully immunised, *GE*=1 and this is the ultimate goal of child immunisation services. When no child aged 12-23 months is fully immunised, *GE*=0. The higher the *GE*, the higher the goal effectiveness of child immunization services.

The goal effectiveness of child immunisation services is determined by two components. The first component is related to reaching all children as soon as they are born while the second component is related to following all new born in their first year of life and vaccinating them as per the vaccination schedule. From the organisational perspective, the first component is termed as the needs effectiveness (*NE*). If child immunisation services are able to reach all children as soon as they are born, then, obviously, *NE*=1. On the other hand, if child immunisation services are not able to reach any child as soon as it is born, *NE*=0. On the other hand, the second component of the goal effectiveness of child immunisation services is related to the capacity of child immunisation services to follow all those children who are within the reach of the services and to fully vaccinate them according to the immunisation schedule. This component of child immunisation services is termed as the capacity efficiency (*CE*). If child immunisation services are able to fully vaccinate all those children who are within the reach of these services then, obviously, *CE*=1. If child immunisation services are not able to fully vaccinate any of those children who are within the reach of the services, then, obviously, *CE*=0.

More specifically, suppose that there are *N* live birth in a community in a given time period and child immunisation services are able to reach only *R* of these live births then *NE* of child immunisation services is defined as

$$NE = R/N.$$

Now if child immunisation services are able to fully immunise *F* children out of *R* children in their first year of life, then *CE* of child immunisation services is defined as

$$CE = F/R.$$

Obviously

$$GE = F/N = (F/R)*(R/N) = NE*CE$$

Which means that to achieve *GE*=1, it is imperative that *NE*=1 as well as *CE*=1. It is also obvious that *GE*<1 only when either *NE*<1 or *CE*<1 or both which means that child immunisation services can be goal effective (*GE*=1) only when these services are needs effective (*NE*=1) as well as capacity efficient

(*CE*=1). This implies that the progress towards the goal effectiveness of child immunisations services should be analysed in terms of the progress in terms of the needs- effectiveness and the progress in terms of the capacity efficiency of child immunisation services. The above considerations outline a two-dimensional framework of analysing the organisational effectiveness of child immunisation services.

It may be argued that both *NE* and *CE* and hence *GE* are influenced by factors endogenous and factors exogenous to child immunisation services. If NE_x is the needs-effectiveness and CE_x is the capacity efficiency attributed to factors exogenous to child immunisation services, then the goal-effectiveness attributed to factors exogenous to child immunisation services GE_x can be calculated as

$$GE_x = NE_x * CE_x$$

and then the goal effectiveness attributed to factors endogenous to child immunisation services or the organisational effectiveness of child immunisation services may be defined as

$$OE = GE/GE_x$$
$$OE = (NE*CE)/(NE_x*CE_x) = (NE/NE_x)*(CE/CE_x)$$
$$OE = OE_n*OE_c$$

where OE_n is the organisational effectiveness of child immunisation services in the context of needs-effectiveness while OE_c is the organisational effectiveness in the context of capacity-efficiency. Child immunisation efforts are organisationally effective only when *OE*>1; the higher *OE* the greater the organisational effectiveness of these services.

The above framework requires estimation of NE_x and CE_x which can be estimated by regressing *NE* and *CE* on a set of variables exogenous to child immunisation services but which influence needs-effectiveness and capacity efficiency of child immunisation services. The regression model that has been used for the purpose is of the form:

$$Y = 1 + \exp\left(\sum_{i=1}^{7} b_i X_i\right)$$

where *Y* is either *NE* or *CE* and X_i is a set of exogenous variables which influence needs-effectiveness and capacity-efficiency of child immunisation services.

Operationalisation of the above analytical framework requires estimation of needs effectiveness and capacity efficiency of child immunisation services. The needs effectiveness of child immunisation services is measured in terms of the proportion of children 12-23 months of age who have received BCG. According to the immunisation schedule, BCG vaccination signals the start of the immunisation process that lasts for one year. The proportion of children who has received BCG vaccination actually

implies child immunisation services are able to reach this proportion of new born. If all new born have received BCG then the needs effectiveness of child immunisation services is one. If this proportion is less than 1 then this implies that immunisation services are not able to reach all new born in a particular area during a given time period. In such a situation, the child immunisation services can never be goal effective.

The capacity efficiency of child immunisation services, on the other hand, is measured in terms of the ratio of the number of children aged 12-23 months fully immunised to the number of children aged 12-23 months who have received BCG. Child immunisation services are capacity efficient only when they are able to fully vaccinate all those children who have received the BCG vaccination. It can be shown that the full immunisation coverage rate is the product of the proportion of children aged 12-23 months who have received BCG and the ratio of the number of children aged 12-23 months fully immunised to the number of children aged 12-23 months who have received BCG.

Data

The analysis is based on the data available through National Family Health Survey (NFHS), 2015-16. Details about the survey are given elsewhere (IIPS and ICF, 2017). The survey covered more than 600 thousand households in the country and identified almost 48 thousand children aged 12-23 months. Based on the immunisation status of these children, the proportion of children who had received BCG and the proportion of children who were fully vaccinated have been calculated for the country, for its states and Union Territories and for 640 districts as they existed at the time of the survey irrespective of the source of immunisation. The proportion of children aged 12-23 months who received BCG and those who were fully immunised obtained from the household survey are influenced by both factors endogenous and factors exogenous to child immunisation services. There are many factors that are exogenous to child immunisation services which influence immunisation coverage and hence needs effectiveness and capacity efficiency of child immunisation services. We have selected the following seven exogenous variables are used:

1.   Population sex ratio measured in terms of the ratio of female to male population (X_1).
2.   Children below five years of age whose birth was registered (X_2).
3.   Households with any usual member covered by a health scheme or health insurance (X_3).
4.   Women with 10 or more years of schooling (X_4).
5.   Women aged 20-24 years who were married before reaching 18 years of age (X_5).
6.   Urban population as proportion to the total population (X_6).
7.   Population who is neither Scheduled Castes nor Scheduled Tribes as proportion to the t o t a l population (X_7).

The selection of the exogenous variables was based on two considerations. The prime consideration in the selection of the indicator was the availability of the estimate of the indicator for all 640 districts of the country. At the same time, the relevance of the variable in deciding the immunisation coverage was also taken into consideration. For example, the most frequently cited factor influencing child immunisation is the education of the mother. Similarly, immunisation coverage rates have been found to be higher in urban than in rural areas. On the other hand, social class variation in the immunisation coverage is also well-known. The health-seeking behaviour of the community also has an impact on immunisation coverage and households with any usual member covered by a health scheme or health insurance is a reflection of the health seeking behaviour of the household.

Another reason for selecting the seven variables to estimate needs effectiveness and capacity efficiency of child immunisation attributed to factors exogenous to child immunisation services is the wide variability in these seven variables across 640 districts of the country. Since the goal effectiveness of child immunisation services was also found to vary widely across the districts, it was hypothesised that a part of the inter-district variation in the goal effectiveness of child immunisation services may be attributed to the inter-district variation in the seven exogenous variables identified above. Controlling these variations was therefore deemed necessary to measure the organisational effectiveness of child immunisation services that is attributed to the factors endogenous to these services only.

Results

Goal Effectiveness of Immunisation Services: According to NFHS-4, the goal effectiveness of child immunisation services in India was 0.62 around 2015-16 which means that around 62 per cent children aged 12-23 months were fully immunised. This goal effectiveness was the result of a needs-effectiveness of 0.92 and a capacity efficiency of 0.68 (Table 1). Among states/Union Territories, the goal-effectiveness was the highest in Puducherry but the lowest in Nagaland. In four states/Union Territories, it was less than 0.50 but at least 0.80 in eight states/Union Territories. Puducherry is the only state/Union Territory where the goal-effectiveness of child immunisation services was more than 0.90 according to NFHS-4. Among districts, goal-effectiveness ranged from 0.07 in district Balrampur of Uttar Pradesh to 1 in district Kapurthala of Punjab. There were only 34 (5.4 per cent) districts where the goal-effectiveness was at least 0.90 but less than 0.60 in 275 (43.3 per cent) districts (Figure 1).

The needs-effectiveness and the capacity-efficiency of child immunization services also varies widely within the country. The needs-effectiveness was the lowest in Nagaland but 1 in Goa and Lakshadweep meaning that child immunization services in Goa and Lakshadweep were able to reach every new born. In majority of the states/Union Territories, the need effectiveness is more than 0.90 but in Arunachal Pradesh, Mizoram and Nagaland, it is less than 0.80. Similarly, there are only 80 districts where the needs-effectiveness of child immunisation services is 1 and in 70 per cent districts, more than 0.90.

However, in 31 districts, the needs-effectiveness was less than 0.7 which means that a substantial proportion of new-borns in these districts were beyond the reach of the child immunisation services according to NFHS-4.

The capacity-efficiency of child immunisation services presents a different picture. The national average was only 0.68 and ranged from 0.49 in Dadra and Nagar Haveli to 0.91 in Puducherry. There are only five states/Union Territories where the capacity efficiency was at least 85 per cent. Similarly, there are only 47 (7.4 per cent) districts where capacity-efficiency was at least 0.90. In 88 (13.6 per cent) districts, it ranged between 0.8-0.9 (Figure 3) but in 372 (58 per cent) districts, it ranged below 0.70. The low capacity efficiency is primarily responsible for the low goal-effectiveness of child immunisation services in the country. The capacity-efficiency of the child immunisation services is the lowest in district Balrampur of Uttar Pradesh. Moreover, district Longleng in Nagaland is the only other district where the capacity-efficiency of child immunisation services was estimated to be less than 0.20.

Figure 1: Goal-effectiveness of child immunisation services in districts of India
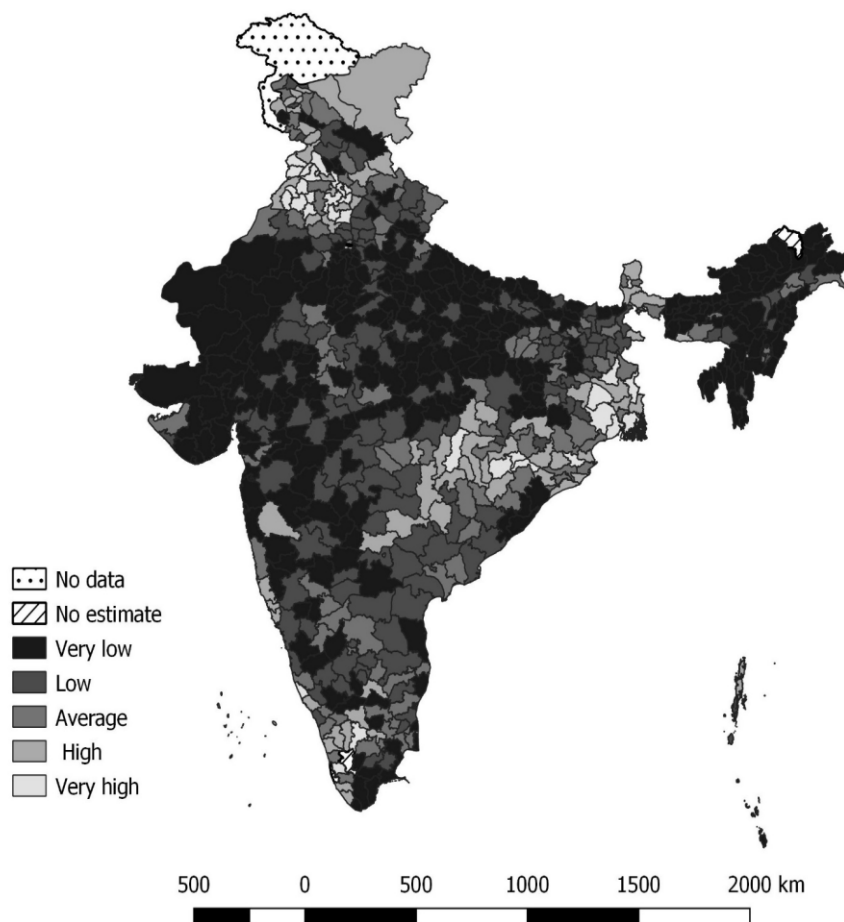
Figure 2: Needs-effectiveness of child immunisation services in districts
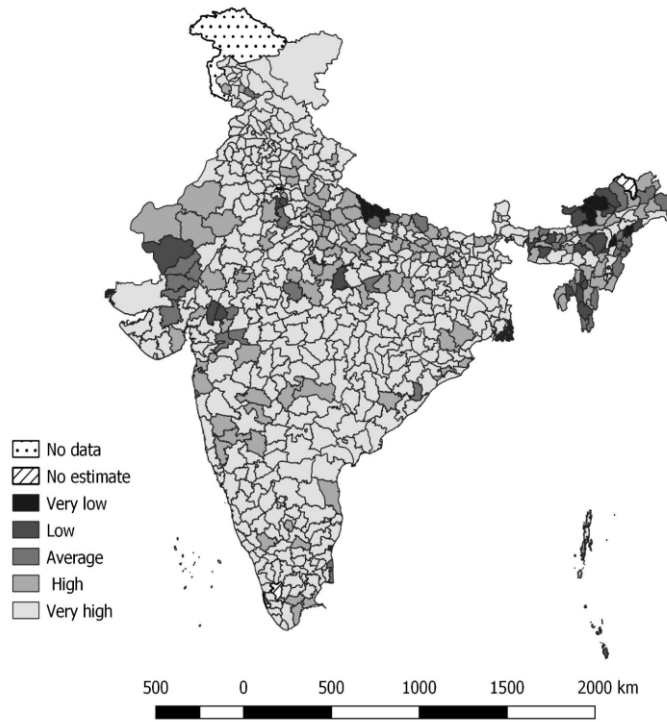
Figure 3: Capacity-efficiency of child immunisation services in districts
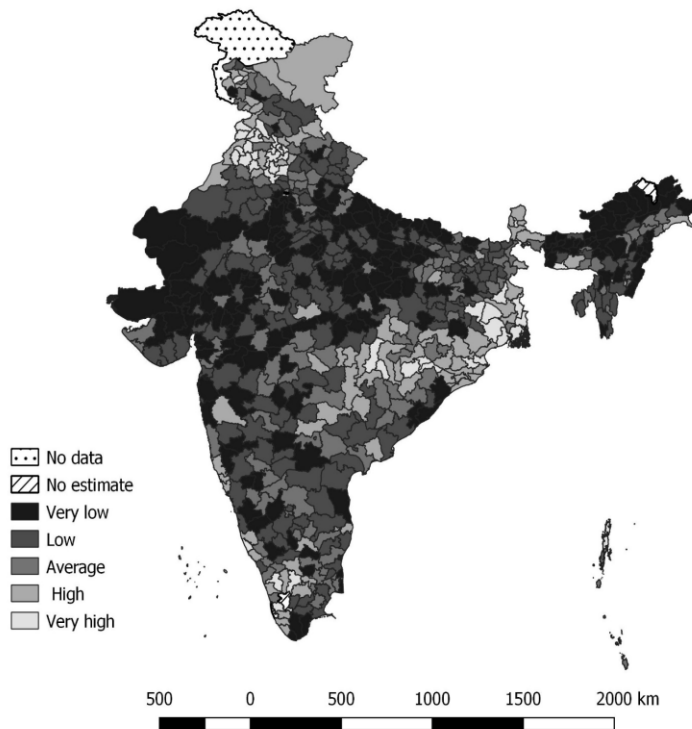
Table 1
Immunisation coverage in India and states/Union Territories, 2015-16

Country/State	Children aged 12-23 months who received		Goal-effectiveness GE	Needs-effectiveness NE	Capacity-efficiency CE
	BCG	All basic vaccinations			
India	91.9	62.0	0.620	0.919	0.675
Andaman & Nicobar Islands	87.4	73.2	0.732	0.874	0.838
Andhra Pradesh	97.3	65.3	0.653	0.973	0.671
Arunachal Pradesh	70.9	38.2	0.382	0.709	0.539
Assam	82.3	47.1	0.471	0.823	0.572
Bihar	91.7	61.7	0.617	0.917	0.673
Chandigarh	95.9	79.5	0.795	0.959	0.830
Chhattisgarh	98.4	76.4	0.764	0.984	0.776
Dadra & Nagar Haveli	88.9	43.2	0.432	0.889	0.486
Daman & Diu	84.3	66.3	0.663	0.843	0.787
Delhi	94.7	66.4	0.664	0.947	0.701
Goa	100.0	88.4	0.884	1.000	0.884
Gujarat	87.9	50.4	0.504	0.879	0.574
Haryana	92.8	62.2	0.622	0.928	0.671
Himachal Pradesh	94.8	69.5	0.695	0.948	0.734
Jammu & Kashmir	95.6	75.1	0.751	0.956	0.786
Jharkhand	95.8	61.9	0.619	0.958	0.646
Karnataka	92.5	62.6	0.626	0.925	0.676
Kerala	98.1	82.1	0.821	0.981	0.836
Lakshadweep	100.0	86.9	0.869	1.000	0.869
Madhya Pradesh	91.6	53.6	0.536	0.916	0.585
Maharashtra	90.0	56.3	0.563	0.900	0.625
Manipur	91.2	65.9	0.659	0.912	0.722
Meghalaya	86.0	61.5	0.615	0.860	0.715
Mizoram	75.3	50.5	0.505	0.753	0.671
Nagaland	68.4	35.7	0.357	0.684	0.522
Odisha	94.1	78.6	0.786	0.941	0.835
Puducherry	99.9	91.3	0.913	0.999	0.914
Punjab	98.2	89.1	0.891	0.982	0.907
Rajasthan	88.8	54.8	0.548	0.888	0.617
Sikkim	98.9	83.0	0.830	0.989	0.839
Tamil Nadu	94.9	69.7	0.697	0.949	0.734
Telangana	97.4	68.1	0.681	0.974	0.699
Tripura	82.4	54.5	0.545	0.824	0.661
Uttar Pradesh	87.6	51.1	0.511	0.876	0.583
Uttarakhand	92.9	57.7	0.577	0.929	0.621
West Bengal	97.5	84.4	0.844	0.975	0.866

Source: IIPS and ICF (2017) and author's calculations

Table 2
Goal-effectiveness, needs-effectiveness and capacity-efficiency of child immunisation services in districts of India, 2015-16

	Goal-effectiveness *GE*		Needs-effectiveness *NE*		Capacity-efficiency *CE*	
	Number	%	Number	%	Number	%
Very poor (< 0.600)	275	43.0	8	1.3	189	29.5
Poor (0.600-0.700)	150	23.4	23	3.6	183	28.6
Average (0.700-0.800)	103	16.1	34	5.3	128	20.0
High (0.800-0.900)	73	11.4	120	18.8	88	13.8
Very high (≥0.900)	35	5.5	450	70.3	47	7.3
No data	5	0.8	5	0.8	5	0.8
N	640	100.0	640	100.0	640	100.0

Source: Author's calculations

Organisational Effectiveness of Child Immunisation Services: In order to estimates of the organisational effectiveness of the child immunisation efforts, we have regressed the observed needs-effectiveness (NE) and the capacity-efficiency (*CE*) of child immunisation services on the seven exogenous factors described above to obtain needs-effectiveness (NE_x) and capacity-efficiency (CE_x) attributed to factors exogenous to child immunisation services using the district level data. Results of the regression analysis are presented in table 3. The inter-district variation in the needs-effectiveness is found to be statistically significantly associated with the inter-district variation in four variables – proportion of births registered, proportion of households with any usual member covered by a health scheme or health insurance, Proportion of population neither Scheduled Castes nor Scheduled Tribes and proportion of women with at least 10 years of schooling. On the other hand, the inter-district variation in the capacity efficiency is found to be statistically significantly associated with all the seven exogenous variables. The coefficient of determination (R^2)has however not been found to be large. This is expected as both needs-effectiveness and capacity efficiency are influenced by factors endogenous to child immunisation services. Based on the results of the regression analysis, estimates of NE_x and CE_x were calculated for every district and for every state/Union Territory and for the country. Using estimates of NE_x and CE_x organisational effectiveness in terms of needs-effectiveness (OE_n), capacity-efficiency (OE_c) and goal-effectiveness (*OE*) is calculated.

Table 3
Results of the regression of *NE* and *CE* on seven exogenous variables

	Exogenous variables	Needs-effectiveness	Capacity-efficiency
1	Births registered	-0.961	-0.873
2	Women aged 20-24 years married before 18 years of age	ns	0.989
3	Households with a member covered by health scheme/insurance	-0.552	-0.412
4	Non-Scheduled Castes/Tribes population	-0.905	-0.261
5	Urban population	ns	0.480
6	Women having at least 10 years of education	-0.681	-0.621
7	Population sex ratio	ns	0.825
	Constant	-0.981	-1.235
	R^2	0.149	0.238

Estimates of *OE*, *OE* and *OE* for India and states/Union Territories are presented in table 4. When *OE*<1, the goal effectiveness of child immunisation services is less than the goal-effectiveness determined by the exogenous factors which implies that child immunisation services are organisationally ineffective in terms of increasing the goal-effectiveness of child immunisation services (*GE*) above the goal-effectiveness attributed to factors exogenous to these services (*GE_x*). The table suggests that for the country as a whole and in most of the states/Union Territories, child immunisation services are organisationally ineffective in the context of full immunisation coverage rate or the proportion of children aged 12-23 months fully immunised. The organisational effectiveness of child immunisation services is found to be the highest in the Union Territory of Lakshadweep where observed goal-effectiveness of child immunisation services was more than 34 per cent higher than the goal-effectiveness determined by factors exogenous to child immunisation services. In West Bengal and Puducherry also the organisational effectiveness of child immunisation services may be termed as substantial. However, in other states where child immunisation services are organisationally effective, the contribution of these services in increasing goal-effectiveness (*GE*) above the goal-effectiveness determined by exogenous factors (*GE_x*) is less than 20 per cent. It is obvious that improving the organisational efficiency of child immunisation services in the country can contribute significantly in improving the goal effectiveness of these services as reflected through the full immunisation coverage rate in children aged 12-23 months.

Table 4
Organisational effectiveness of the child immunisation efforts in India and states/Union Territories, 2015-16

Country/State	Organisational effectiveness in the context of		
	Goal effectiveness OE	Needs-effectiveness OE_n	Capacity-efficiency OE_c
India (IN)	0.930	0.977	0.952
Andaman & Nicobar Islands (AN)	0.985	0.914	1.078
Andhra Pradesh (AP)	0.915	1.018	0.899
Arunachal Pradesh (AR)	0.611	0.780	0.783
Assam (AS)	0.692	0.874	0.792
Bihar (BI)	1.165	0.996	1.170
Chandigarh (CD)	1.115	1.002	1.113
Chhattisgarh (CH)	1.068	1.043	1.024
Dadra & Nagar Haveli (DA)	0.622	0.930	0.669
Daman & Diu (DD)	0.929	0.903	1.029
Delhi (DE)	0.950	0.995	0.955
Goa (GO)	1.179	1.042	1.132
Gujarat (GU)	0.720	0.927	0.777
Haryana (HA)	0.838	0.977	0.857
Himachal Pradesh (HP)	0.893	0.994	0.898
Jammu & Kashmir (JA)	1.085	1.023	1.061
Jharkhand (JH)	1.161	1.050	1.105
Karnataka (KA)	0.861	0.971	0.887
Kerala (KE)	1.014	1.012	1.002
Lakshadweep (LA)	1.343	1.101	1.220
Madhya Pradesh (MA)	0.859	0.990	0.868
Maharashtra (MH)	0.802	0.948	0.846
Manipur (MN)	1.076	0.999	1.077
Meghalaya (MY)	0.968	0.957	1.011
Mizoram (MZ)	0.744	0.821	0.907
Nagaland (NG)	0.640	0.789	0.812
Odisha (OR)	1.143	1.005	1.138
Puducherry (PD)	1.216	1.038	1.172
Punjab (PU)	1.145	1.032	1.110
Rajasthan (RA)	0.969	0.966	1.003
Sikkim (SI)	1.101	1.045	1.054
Tamil Nadu (TA)	0.869	1.011	0.860
Telangana (TE)	0.969	0.991	0.978
Tripura (TR)	0.802	0.877	0.914
Uttar Pradesh (UP)	0.850	0.952	0.893
Uttarakhand (UT)	0.828	0.987	0.839
West Bengal (WB)	1.290	1.031	1.251

Source: Author's calculations

The organisational effectiveness of child immunisation efforts in the context of goal effectiveness (OE) is determined by the organisational effectiveness in the context of needs-effectiveness (OE_n) and organisational effectiveness in the context of capacity-efficiency (OE_c). For India as a whole, both OE_n and OE_c are less than one which means that child immunisation services in the country are organisationally ineffective in the context of both reaching all live births and fully immunising those live births which are within the reach of these services. On the other hand, there are only 14 states/Union Territories where child immunisation services are organisationally effective in the context of needs effectiveness (OE_n>1) but in 18 states in the context of capacity efficiency (OE_c>1). More specifically, there are only 13 states/Union Territories where child immunisation services are organisationally effective in the context of needs effectiveness as well as capacity efficiency. The organisational effectiveness of child immunisation services in the context of needs-effectiveness is the highest in the Union Territory of Lakshadweep where the observed needs-effectiveness of child immunisation services (NE) is more than 10 per cent higher than the needs-effectiveness attributed to factors exogenous to these services (NE_x). On the other hand, organisational effectiveness in the context of capacity efficiency is the highest in West Bengal where the observed capacity efficiency of child immunisation services (CE) is more than 25 per cent higher than the capacity efficiency determined by exogenous factors (CE_x).

Child immunisation services are found to be organisationally effective in only 279 (44 per cent) districts of the country (Figure 4). There are, however, only 172 (27 per cent) districts where GE>GE_x by at least 10 per cent. The organisational effectiveness of child immunisation services is found to be relatively the best in district Dumka of Jharkhand where GE is estimated to be around 88 per cent higher than GE_x. In 107 (16.7 per cent) districts GE>GE_x but the difference between the two is only marginal. In terms of OE_n, child immunisation services are organisationally effective in 336 (52.5 per cent) districts but there is no district where NE is higher than NE_x by at least 10 per cent. On the other hand, in terms of capacity-efficiency, child immunisation services are found to be organisationally effective in 280 (43.8 per cent) district only. There are only 63 (9.9 per cent) districts where the organisational effectiveness of the child immunisation services in the context of capacity efficiency appears to be substantial as the observed capacity efficiency (CE) is found to be higher than capacity efficiency attributed to exogenous factors (CE_x) by at least 20 per cent.

Figure 4: Organizational effectiveness of child immunisation efforts in districts

Legend:
- No data
- No estimate
- Ineffective
- Marginally effective
- Moderately effective
- Highly effective
- Very highliy effective

500   0   500   1000   1500   2000 km
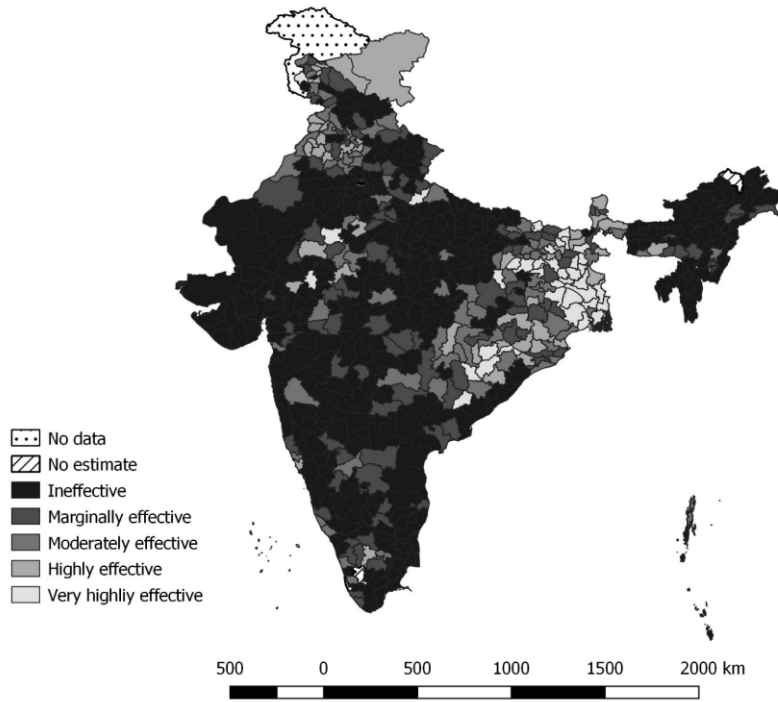
Figure 5: Inter-district variation in Oe_n

Legend:
- No data
- No estimate
- Ineffective
- Marginally effective
- Moderately effective
- Highly effective
- Very highliy effective

500   0   500   1000   1500   2000 km
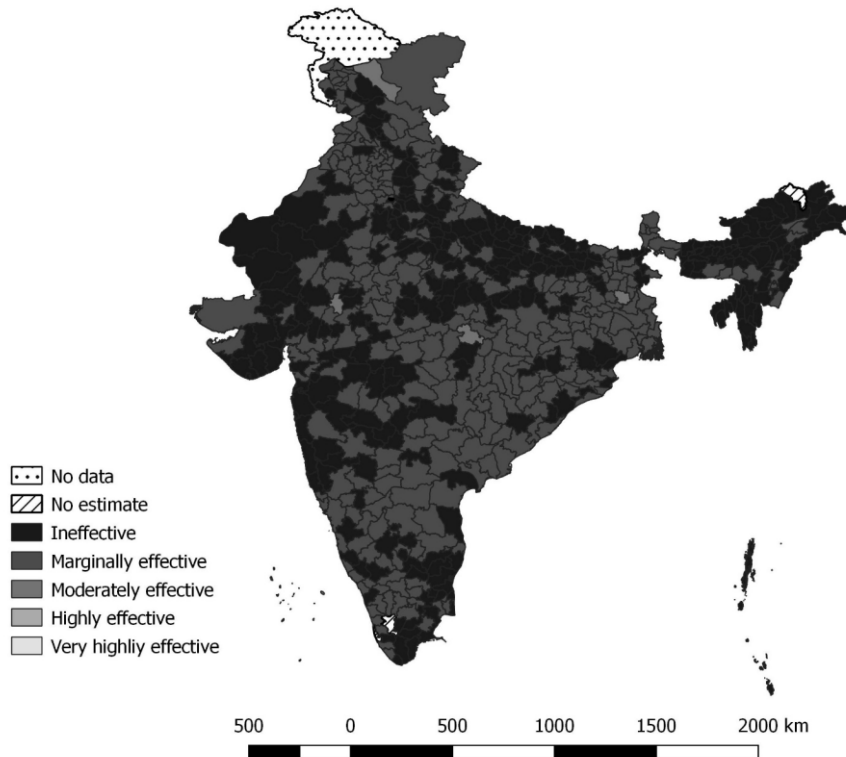
Figure 6: Inter-district variation in Oe$_c$
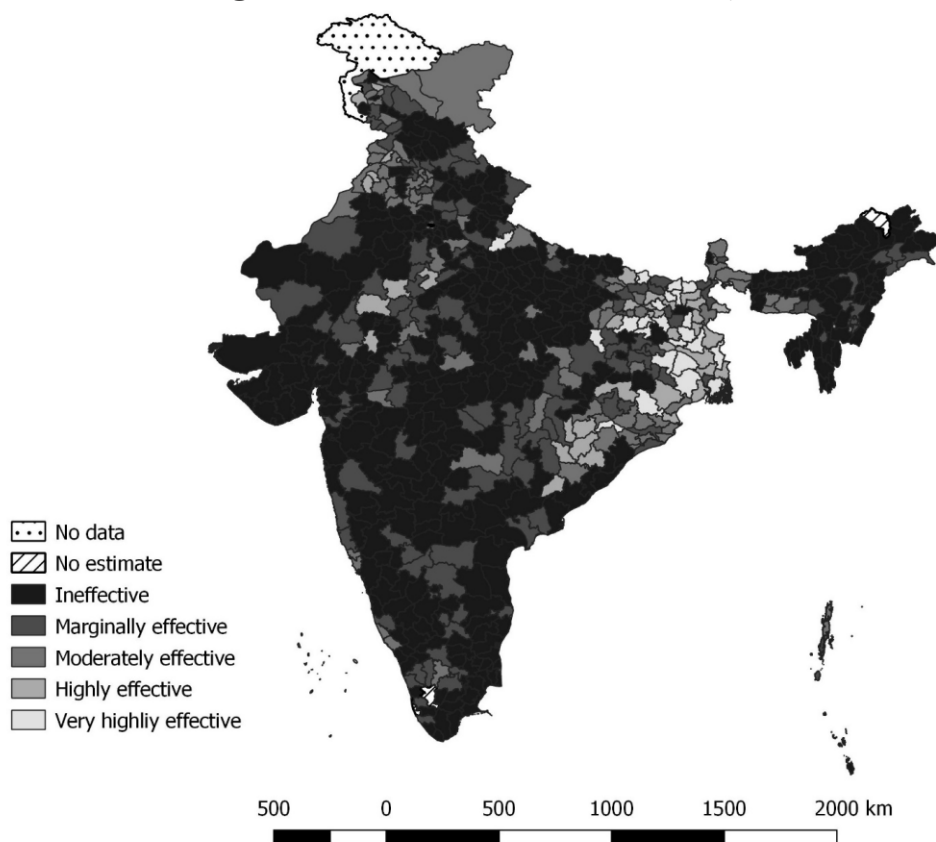
Table 5
Organisational effectiveness of the child immunisation efforts in districts of India, 2015-16

Organisational effectiveness	Number of districts					
	Goal-effectiveness OE		Needs-effectiveness OE_n		Capacity-efficiency OE_c	
	Number	%	Number	%	Number	%
Ineffective (≤1.0)	356	55.6	294	45.9	355	55.5
Marginally effective (1.0-1.1)	107	16.7	336	52.5	131	20.5
Moderately effective (1.1-1.2)	83	13.0	5	0.8	86	13.4
Highly effective (1.2-1.3)	49	7.7	0	0.0	39	6.1
Very highly effective (≥1.3)	40	6.3	0	0.0	24	3.8
No data	5	0.8	5	0.8	5	0.8
N	640	100.0	640	100.0	640	100.0

Source: Author's calculations

Table 6
Classification of districts by organisational effectiveness in needs-effectiveness and in capacity-efficiency

Organisational effectiveness in needs-effectiveness (OE_n)	Organisational effectiveness in capacity-efficiency (OE_c)					Total
	Ineffective	Marginally effective	Moderately Effective	Highly effective	Very highly effective	
Ineffective	220	45	19	5	5	294
	34.4	*7.0*	*3.0*	*0.8*	*0.8*	*45.9*
Marginally effective	134	86	66	32	18	341
	20.9	*13.4*	*10.3*	*5.0*	*2.8*	*53.3*
Moderately effective	1	0	1	2	1	5
	0.2	*0.0*	*0.2*	*0.3*	*0.2*	*0.8*
Highly effective	0	0	0	0	0	0
	0.0	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Very highly effective	0	0	0	0	0	0
	0.0	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
No data						5
						0.8
Total	355	131	86	39	24	640
	55.5	*20.5*	*13.4*	*6.1*	*3.8*	*100.0*

Source: Author's calculations

There are only 220 (34.6 per cent) districts where child immunisation services are found to be organisationally ineffective in the context of both needs-effectiveness and capacity-efficiency (Table 6) whereas in 206 (32.4 per cent) districts, they are organisationally effective in both. This leaves 209 (33.0 per cent) districts where the organisational effectiveness of child immunisation services is different in the context of needs-effectiveness and in the context of capacity-efficiency. In 135 (21.3 per cent) districts, child immunisation services are organisationally effective in the context of needs-effectiveness but not in the context of capacity-efficiency. This leaves only 74 (11.7 per cent) districts where child immunisation services are organisationally effective in the context of capacity-efficiency but not in the context of needs-effectiveness.

Discussions and Conclusions

The latest data available through the National Family Health Survey, 2015-16 suggest that child immunisation services in India have largely been organisationally ineffective in realising the long-

cherished goal of universal immunisation of children. This is so when a huge amount of resources in terms of money, manpower and physical infrastructure and facilities have been devoted to these services. It is estimated that the expenditure on India's Immunisation Programme was more than 34465 million Rupees in 2012 which was projected to have increased to 94510 million Rupees in 2017 (Chatterjee *at al*., 2016). However, the performance of these services remains far from satisfactory in terms of the goal-effectiveness. The present analysis highlights the need to improve the organisational effectiveness of child immunisation services so that these services can make significant contribution to increasing their goal effectiveness.

The far from satisfactory organisational effectiveness of the child immunisation services is primarily due to factors endogenous to these services. There is, however, little evidence about the administrative capacity and organisational efficiency of child immunisation services which largely determine the organisational effectiveness. There are many studies that have analysed the impact of exogenous factors on child immunisation performance (Laxminarayan and Ganguly, 2011; lumar and Mohanty, 2011; Mathew, 2012; Shrivastwa et al, 2015) but an analysis of the administrative capacity and organisational efficiency of child immunisation services has rarely been undertaken in India. The present analysis shows that there is considerable scope for improving the organisational effectiveness of child immunisation services which may have a telling impact on the performance of child immunisation services in the country. It is in this context that an assessment of the administrative capacity and organisational efficiency of child immunisation services, especially, at the district level is the first requirement.

An important limitation of the present analysis is that it tells little about the factors that may be responsible for the poor organisational effectiveness of child immunisation services. This requires analysing the organisational effectiveness through system resource perspective or through strategic constituencies perspective. Such an analysis, however, is hindered by the non-availability of necessary data which, itself, is a reflection of the poor organisational effectiveness of these services. In any case, an understanding of factors endogenous to child immunisation services that influence the performance of these services is the need of the time.

An important issue in improving the organisational effectiveness of child immunisation services is to separate these services from the health care delivery system. It is argued that the health care delivery system has traditionally been designed to respond to medical needs of a self-presenting individual (Bar-Yam, 2006). In such a system, attention to preventive health care like immunisation which is necessarily repetitive and large scale in nature, may lead to ineffectiveness and inefficiency as has been observed in the present analysis. One way of improving the organisational effectiveness of child immunisation efforts, therefore, is to separate child immunisation services from the health care

delivery system so that they can adapt to specific organisational needs of child immunisation. The public health care delivery system in India is essentially normative in its organisation but, to be organisationally effective, child immunisation services must be adaptive in nature. If child immunisation services remain normative in their organisation, then their effectiveness in improving the goal effectiveness is bound to remain poor. In any case, the present analysis highlights the need of an organisational change in child immunisation services in the country. The child immunisation essentials may constitute the basis for such as organisational change (United States Agency for International Development, 2003). It is important that the current organisation of child immunisation services is assessed within this framework to provide the basis for the much-needed organisational change. This assessment process is carried out at the local level where all child immunisation related planning, monitoring and evaluation are actually carried out. The first step, therefore, is to decentralise planning, programming and monitoring and evaluation of these services.

References

Bar-Yam, Y., (2006), "Improving the effectiveness of health care and public health: a multi scale complex system analysis", *American Journal of Public Health,* Vol, 96 No. 3, pp. 459-466.

Bhatnagar, P., Gupta, S., Kumar, R., Haldar, P., Sethia, R., Bahl, S., (2015)," Estimation of child vaccination coverage at state and national levels in India", *Bulletin of World Health Organization,* Vol. 94, pp. 728-734.

Cameron, K.S., (1984), "The effectiveness of ineffectiveness", in Staw, B.M. and Cummings, L.L (Eds) *Research in Organisational Behaviour* 6, pp. 235-85.

Chatterjee, S., Pant, M., Haldar, P., Aggarwal, M.K., Laxminarayan, R., (2016), "Current costs and projected financial needs of India's Universal Immunization Programme", *Indian Journal of Medical Research*, Vol. 143, pp. 801-08.

Choi, J.Y., Lee, S-H., (2006), "Does prenatal care increase access to child immunization? Gender bias among children in India". *Social Science and Medicine*, Vol. 63, pp.107–117.

Corsi, D.J., Bassani, D.G., Kumar, R., Awasthi, S., Jotkar, R., Kaur, N., Jha, P., (2006),"Gender inequity and age appropriate immunization coverage in India from 1992 to 2006",*BMC International Health and Human Rights,* Vol. 9(Suppl 1), pp. S3-S14.

De, P., Bhattacharya, B.N., (2002) "Determinants of child Immunization in four less developed states of North India", *Journal of Child Health Care*, Vol. 6, pp. 34–50.

Devasenapathy, N., Ghosh, J.S., Sharma, S., Allen, E., Shankar, A.H., Zodpey, S., (2016), "Determinants of childhood immunisation coverage in urban poor settlements of Delhi, India: a cross-sectional study", *BMJ Open*, Vol. 6, pp. e013015.

Etzioni, A., (1964), *Modern Organisations*, Englewood Cliffs, N.J, Prentice Hall.

Gatchell, M., Thind, A., Hagigi, F., (2008), "Informing state-level health policy in India: the case of childhood immunizations in Maharashtra and Bihar", *Acta Paediatrica*, Vol. 97, pp.124–126.

Gibson, J.L., Ivancevich, J.M., Donnelly, J.H. Jr., (2000), *Organizations: Behavior, Structure,*

Process. 10th edition. London, McGraw Hill.

Government of India, (1988), *National Mission on Immunisation*. New Delhi, Ministry of Health and Family Welfare.

Government of India, (2005), *National Rural Health Mission*. New Delhi, Ministry of Health and Family Welfare.

Government of India, (1985), *Towards Universal Immunisation by 1990*. New Delhi, Ministry of Health and Family Welfare.

Government of India, (2015), *Mission Indradhanush. Operational Guidelines*. New Delhi, Ministry of Health and Family Welfare.

Government of India, (2017), *National Family Health Survey-4 2015-16. India Fact Sheet*. New Delhi, Ministry of Health and Family Welfare.

Government of India, (2017), *National Health Policy 2017*. New Delhi, Ministry of Health and Family Welfare.

Gupta, J.P., Murli, I., (1989), *National Review of Immunisation Programme in India*. New Delhi, National Institute of Health and Family Welfare.

International Institute for Population Sciences (IIPS) and ICF, (2017), *National Family Health Survey (NFHS-4), 2015-16: India*. Mumbai, International Institute for Population Sciences.

Kast, F.E., Rosenzweig, J.E., (1985), *Organisation and Management: A Systems and Contingency Approach*. New York, McGraw Hill.

Keeley, M., (1978), "A social-justice approach to organisational evaluation",*Administrative Science Quarterly*,Vol. 23, pp. 272-92.

Kumar, A., Mohanty, S.K., (2014) "Socio-economic differentials in childhood immunization in India, 1992–2006", *Journal of Population Research*, Vol. 28, pp. 301–324.

Lahariya, C., (2014),"A brief history of vaccines and vaccination in India",*Indian Journal of Medical Research*, Vol. 139, pp. 491-511.

Laxminarayan, R., Ganguly, N.K., (2011), "India's vaccine deficit: why more than half of Indian children are not fully immunized, and what can-and should-be done", *Health Affairs (Millwood)*. Vol. 30, pp. 1096–1103.

Mathew, J.L., (2012), "Inequity in childhood immunization in India: a systematic review", *Indian Pediatrics*, Vol. 49, pp. 203–223.

Molnar, J.H., Rogers, D.C.,(1976), "Organisational effectiveness: an empirical comparison of the goal and system resource approaches", *Sociological Quarterly*,Vol. 17, pp. 401-13.

Nadler, D.A., Tusman, M.L., (1980), "A congruence model for organisational assessment", in Lawler, E., Nadler, D.E., Cammann, C., (eds) *Organisational Assessment: Perspectives on the Measurement of Organisational Behaviour and the Quality of Working Life*. New York, Wiley. 1980.

Patowary, A.C., Jaiswal, O.N., Sunder Lal, Govila, A.K., Pratinidhi, A., Sharma, A.R., et al., (1990) "Coverage evaluation survey of immunization in eleven states of India", *Indian Journal of Community Medicine*, Vol. 15 pp. 222-228.

Perrow, C., (1970), *Organisational Analysis: A Sociological Review*. Belmont, California, Wadsworth.

Perrow, C., (1961),"The analysis of goals in complex organisations",*American Sociological Review,* December, pp. 854-66.

Pfeffer, J., Salanick, G.R., (1978) *The External Control of Organisations: A Resource Dependence Perspective*. New York, Harper Row. 1978.

Phukan, R.K., Barman, M.P., Mahanta, J., (2009), "Factors associated with immunization coverage of children in Assam, India over the first year of life", *Journal of Tropical Pediatrics*, Vol. 55, pp. 249–252.

Price, J.L., (1972), *Handbook of Organizational Measurement*. Lexington MA, DC Health and Company.

Price, J.L., (1968) The study of organisational effectiveness. *Sociological Quarterly*, Vol. 13, pp. 3-15.

Prusty, R.K., Kumar, A., (2014),"Socioeconomic dynamics of gender disparity in childhood immunization in India, 1992-2006",*PLoS One,*Vol. 9, pp. e104598.

Quinn, R.E., Rohrbaugh, J. A., (1981), "Competing values approach to organisational effectiveness", *Public Productivity Review*, Vol. 5, pp. 122-40.

Restrepo-Méndez, M.C., Barros, A.J.D., Wong, K.L.M., Johnson, H.L., Pariyo, G., França, G.V.A., et al., (2016) "Inequalities in full immunization coverage: trends in low- and middle-income countries", *Bulletin of World Health Organization*, Vol. 94, pp. 794-805.

Sahu, D., Pradhan, J., Jayachandran, V., Khan, N., (2010), "Why immunization coverage fails to catch up in India? A community-based analysis", *Child Care Health Dev,* Vol. 36, pp. 332–339.

Shrivastwa, N., Gillespie, B.W., Kolenic, G.E., Lepkowski, J.M., Boulton, M.L., (2015), "Predictors of vaccination in India for children aged 12–36 months", *American Journal of Preventive Medicine*, Vol. 49, Supplement 4, pp. S435-S444.

Singh, A., (2012), "Gender based within-household inequality in childhood immunization in India: changes over time and across regions", *PLoS One,*Vol. 7, e35045.

Sokhey, J., (1988), *National Immunisation Programme*. New Delhi, National Institute of Health and Family Welfare. National Health Programmes Series 1.

Sokhey, J., (1990),"The immunisation programme in India",*Indian Journal of Community Medicine*, Vol. 15, pp. 163-172.

Steers, R.M., (1975), "Problems in the measurement of organizational effectiveness", *Administrative Science Quarterly*, Vol. 20, pp. 546–558.

United States Agency for International Development (USAID), (2003), *Immunisation Essentials. A Practical Field Guide*. Washington DC, United States Agency for International Development.

Vikram, K., Vanneman, R., Desai, S., (2012), "Linkages between maternal education and childhood immunization in India", *Social Science and Medicine,* Vol. 75, pp. 331–339.

World Health Organization, (2005), *GVIS: Global Immunization Vision and Strategy*. Geneva, World Health Organization. 2005.

Yutchman, E., Seashore, S., (1967), "A system resource approach to organisational effectiveness", *American Sociological Review*, Vol. 32, pp. 891-903.

Zammuto, R.F., (1982), *Assessing Organizational Effectiveness: Systems Change, Adaptation, and Strategy*. New York, State University of New York Press.

Factors Affecting Antenatal Care in Bangladesh:
A Multilevel Logistic Regression Analysis

Tapan Kumar Roy* and Md. Mamunur Rashid**

Abstract

Antenatal care (ANC) includes care during pregnancy, should begin from the early stages of pregnancy. ANC is a key strategy for reducing maternal and neonatal morbidity and mortality rates because adequate utilization of antenatal health care services is associated with improved maternal and neonatal health outcomes. In this study, an attempt has been made to identify the risks factors affecting antenatal care in Bangladesh utilizing data from the Bangladesh Demographic and Health Survey (BDHS) 2014. Bivariate and multi variate analysis have been conducted using a sub-sample of women who receive antenatal care at the survey time. In bivariate analysis, the chi-square test of independence was implemented. For multi variate analysis, the logistic regression and multilevel logistic regression method were used to assess the factors associated with antenatal care in Bangladesh. We have found that place of residence, education, wealth index, division, sanitation facility and watching TV of the pregnant woman play significant role on the number of antenatal visits. A financial problem about the importance of ANC was the most common reasons for irregular ANC visits. This study will help policy makers to address the reproductive health services to those women who were identified in the analysis as being at increased risk for antenatal care in Bangladesh especially for rural vulnerable poor women.

Introduction

Bangladesh has achieved remarkable progress in healthcare and health status in spite of an environment of rapid economic development and associated positive changes in demographic development, poverty reduction and human traditional lifestyle (Khan et al., 2011). But, there are lacking health care services and utilization of various public health determinants. Despite excellent maternal-child-health services coverage in the few past decades, progress in public health indicators and determinants are stagnant condition –'"(Pulok et al., 2016). The development of public health indicators such as antenatal care, age at marriage, healthcare facility for recent child, ideal number of children, underweight and overweight over time show a slight upward trend in the past few decades. Antenatal care (ANC), along with family planning, skilled delivery care and emergency obstetric care, is a key element of the package of services aimed at improving maternal and newborn health. Antenatal

*Professor, Department of Population Science and Human Resource Development, Rajshahi University, Bangladesh, Email: roy.tapan@gmail.com;

**Research Student, Department of Population Science and Human Resource Development, Rajshahi University, Bangladesh Email: ps.ru.mamun@gmail.com;

care is the care a pregnant woman requires in order to ensure a healthy pregnancy and safe childbirth. It is well recognized that good antenatal care improves maternal, perinatal and neonatal outcomes (Khatun and Khatun, 2018). A pregnant woman is supposed to have regular check-ups with a midwife or a doctor who specializes in pregnancy and birth. These check-ups are called antenatal visits. Antenatal care is viewed as an important point of contact between health workers and women and an opportunity for provision of health education including how to detect pregnancy complications and development of a birth plan to ensure delivery at a health facility (Pell et al., 2013). It is concerned with adequate care in order to be effective. Guidelines have been developed to provide guidance on adequate initiation of care, number of visits and content of routine care. Antenatal care, a pregnancy related services provided to pregnant women by health professionals, is among the Millennium Development Goal (MDGs) 4 and 5, the major interventions which is aimed at preventing neonatal death and maintaining the health of the women during pregnancy. It is very important to pregnant women as it helps prevent mother and child mortality, prevent complications help foster a good relationship between the husband and wife, mother and child and father and child (Cumber et al., 2016). The purpose of antenatal care is to monitor and improve the well-being of the mother and fetus, detect complications, respond to women's complaints, prepare for birth, and promote healthy behaviors (Yeoh et al., 2016).

In Bangladesh, antenatal care usually refers to pregnancy related care provided by a health provider either in a medical facility or at home (Kabir and Khan, 2013). ANC from skilled providers at health facilities is a priority in ensuring and enriching maternofetal health. More importantly, timely and appropriate ANC practices has life-saving potential for mother and child .The benefits of ANC visits include nutrition and health checks, opportunity to detect pregnancy risks, counselling and support for women and their families, and a higher likelihood of delivery in the presence of skilled birth attendants leading to lower maternofetal deaths Yaya et al., 2017). Pregnancy related complications kills a large percentage of pregnant mothers in Bangladesh. About 12,000 pregnant women die each year in Bangladesh due to pregnancy related complecations and studies conducted on antenatal care in Bangladesh reveals, the frequency of antenatal care visits is lower for women belonging to poor families(Amrin, 2016). These complications can be managed and treated if timely and appropriate care is sought from facilities with necessary skilled care providers. Bangladesh has made a significant improvement towards achieving the Millennium Development Goal (MDG) target the 5 of 75% reduction in the maternal mortality ratio between 1990 and 2015 (Shahjahan et al., 2012). Therefore, this study was conducted to assess the factors that determine the use of ANC services in Bangladesh.

Methods

For this study, Bangladesh Demographic and Health Survey (BDHS) 2014 data have been used. According to BDHS 2014, the selected public health indicator antenatal care was extracted from the BDHS data. In this analysis, 4389 women who had most recent child have been considered from 17863 women of BDHS. In this study, bivariate analysis was constructed to explore the relationship between antenatal care and some selected socioeconomic and demographic variables. Chi-square test was used to detect the influential factors within antenatal care from the constructed bivariate tables. Multivariate analysis such as logistic regression and multilevel logistic regression were used to assess the factors associated with antenatal care.

Results

In this section, the selected variables for the study sample has been discussed. The selected variables are women's age, women's education, wealth index, residence, division, type of sanitation facility, household size, frequency of watching television and sex of the household head. Percentage distribution and confidence interval are presented in the table 1.

The result shows that women's age is categorized as three groups as less than 25 years, 25-34 years and 35-49 years. The result indicates that the majority of (54.9%, CI: 52.76-56.41) women are less than 25 years, 39.2 percentage belong to 25-34 years and only few (5.9%) women are aged 35-49 years.One half of the women have formal education either primary or secondary and over (28.9% from primary and 57.7% from secondary and higher). The confidence interval for primary is 27.2-30.54 secondary education is 45.39-49.98 and higher secondary education is 8.31to 10.56.

It shows that women who are ever been married, 68.0% lived in rural area, while the remainder live in urban area. The result indicates that 11.8 percent women live in Barisal and 19.0%, 17.8%, 12.0%, 12.1%, 12.3%, and 15.1% women live in Chittagong, Dhaka, Khulna, Rajshahi, Rangpur and Sylhet.The 39.9% women come from poorest wealth index and 40.9% women come from richest wealth index. The confidence interval for poorest and richest are 36.65 to 42.73 and 37.41 to 44.14 respectively.

Women's household size is categorized as two groups as less than six member and greater than or equal to six member. The result indicates that the majority of women's household size (51.0%) are less than six member. The result indicates that majority of women's family (91.0%) are male household head and 9% percent belong to female household head. The confidence interval for male and female household head are 85.61 to 96.31 and 7.98 to 11.21 respectively. Over two-thirds of women (67.9%) are pit latrine, 16.3% belong to flush as well as 15.8% belong to others.

Table 1: Percentage distribution of selected characteristics, Bangladesh Demographic and Health Survey, 2014

Covariates	Frequency	Percentage	Confidence Interval	
			Lower	Upper
Women's age				
<25 years	2409	54.9	52.76	56.41
25-34 years	1719	39.2	38.43	41.83
35-49 years	261	5.9	4.42	6.98
Women's education				
No education	593	13.5	12.0	15.61
Primary	1267	28.9	27.2	30.54
Secondary	2123	48.4	45.39	49.98
Higher Secondary	406	9.3	8.31	10.56
Wealth Index				
Poorest	1752	39.9	36.65	42.73
Middle	844	19.2	17.39	22.06
Richest	1793	40.9	37.41	44.14
Residence				
Urban	1406	32.0	30.71	34.71
Rural	2983	68.0	66.12	70.31
Division				
Barisal	516	11.8	10.31	14.24
Chittagong	834	19.0	18.43	21.56
Dhaka	780	17.8	16.83	19.54
Khulna	525	12.0	10.71	14.31
Rajshahi	531	12.1	11.45	13.57
Rangpur	541	12.3	10.43	14.98
Sylhet	662	15.1	12.55	17.66
Type of sanitation facility				
Flush	717	16.3	14.37	18.81
Pit latrine	2980	67.9	61.54	72.43
Others	692	15.8	13.32	17.83
Household size				
≥6 member	2190	49.0	47.31	52.43
<6 member	2239	51.0	47.52	54.89
Frequency of watching TV				
Not at all	1807	41.2	38.31	43.76
< 1 time/week	388	8.8	6.9	10.89
≥ 1+ time/week	2194	50.0	48.21	54.74
Sex of the household head				
Male	3993	91.0	85.61	96.31
Female	396	9.0	7.98	11.21

Table 2 presents the bivariate analysis of the socioeconomic and demographic characteristics among ever married women who receive antenatal care. In this study, antenatal care varied significantly with some of the socio-demographic variables.

The result exhibits that women's education has an impact on antenatal care. Women with no formal education (14.5%) are less likely to receive antenatal care than women with higher level of education (65.3%). This shows that antenatal care increases with education.

Wealth index has a significantly impact on antenatal care. Women belong to poorest wealth index (18.5%) have less likely to receive antenatal care than women belong to richest wealth index (47.8%). Whereas, socioeconomic variables are positively related with antenatal care.

The result also shows that antenatal care vary with urban-rural residence and antenatal care is higher in urban area (45.4%) than rural area (25.5%) in Bangladesh. Division has a significant impact on antenatal care. Women belong to Rangpur division are more likely to receive antenatal care than women belong to Sylhet division.

Women with used flush sanitation (51.0%) are more likely to receive antenatal care than women with used others (26.4%).Household size has a significant impact on antenatal care. Women with greater than or equal to six member (30.5%) are less likely to receive antenatal care than women with less than six member (33.3%). Women with no watching TV (18.2%) are less likely to receive antenatal care than women with greater than one or more (44.1%).

Table 2: Percent distribution of married women aged 15-49, who receive antenatal care according to selected socio-demographic characteristics.

Characteristics	Antenatal Care		P-value
	<4	**4+**	
Women's age			
<25 years	68.0	32.0	
25-34 years	67.7	32.3	0.515
35-49 years	71.3	28.7	
Women's education			
No education	85.5	14.5	
Primary	78.5	21.5	0.000
Secondary	63.4	36.6	
Higher Secondary	34.7	65.3	
Wealth Index			
Poorest	81.5	18.5	
Middle	74.1	25.9	0.000
Richest	52.2	47.8	

Residence			
Urban	54.6	45.4	0.000
Rural	74.5	25.5	
Division			
Barisal	74.0	26.0	
Chittagong	71.9	28.1	
Dhaka	64.4	35.6	0.000
Khulna	59.2	40.8	
Rajshahi	69.5	30.5	
Rangpur	56.6	43.4	
Sylhet	78.4	21.6	
Type of sanitation facility			
Flush	49.0	51.0	
Pit latrine	71.4	28.6	0.000
Others	73.6	26.4	
Household size			
≥6 member	69.5	30.5	0.046
<6 member	66.7	33.3	
Frequency of watching TV			
Not at all	81.8	18.2	
< 1 time/week	73.2	26.8	0.000
≥ 1+ time/week	55.9	44.1	
Sex of the household head			
Male	68.4	31.6	0.152
Female	64.9	35.1	

In multivariate analysis, the relative importance of all variables has to be examined simultaneously by prominent multivariate technique such as logistic regression. It can provide information of how important each variable is by itself. Antenatal care during pregnancy is considered as the dependent variable and it is coded as 1 if a mother receives antenatal care from medically trained providers, otherwise it is 0 who does not receive any antenatal care. The result of logistic regression analysis is presented in the table 3.

The result exhibits that urban women are 1.4 times more likely to receive ANC from medically trained providers than rural women. The similar pattern is exhibited in bivariate analysis.

Education has a significant effect on the likelihood of receiving antenatal care. Women with primary education, women with secondary education and women with higher secondary education have the 1.4 times higher, 2.3 times higher and 5.04 times higher respectively likely to receive antenatal care than women with no education. As the women's economic condition increases, the receiving antenatal care increases. Women with richest wealth quintal have 1.7 times higher odds of receiving antenatal care

than women belong to poorest wealth quintal.

Women with frequency of watching TV greater than one or more are 1.7 times more likely to receive antenatal care than women with no watching TV. Women with used pit latrine and others are 20% and 28% lower likely to receive antenatal care than women with used flush.

Women who live in Rangpur and Khulna are 2.3 times and 1.6 times more likely to receive antenatal care than women who live in Barisal. From above discussion, we see that rural and poorest disparities were more pronounced than urban and richest disparities. We also observe that richest-poorest disparities were more pronounced than urban-rural disparities.

From calculation we see that the value of Nagelkerke R^2 is 0.207 which means that the model accounts for 20% of the variability in the dependent variable.

Table 3: Result of single logistic regression model on antenatal care

Variables	Categories	Coefficient (β)	Standard Error(S.E)	Significant	Odd Ratio	95% CI	
						Lower	Upper
Age	<25	-	-	-	1.00	-	-
	25-34	.014	.075	.850	1.014	.876	1.175
	35-49	.134	.168	.425	1.143	.822	1.590
Education	No	-	-	-	1.00	-	-
	1-5	.371	.143	.010	1.450	1.095	1.919
	6-10	.850	.138	.000	2.340	1.787	3.065
	11+	1.618	.172	.000	5.045	3.600	7.070
Division	Barisal	-	-	-	1.00	-	-
	Chittagong	-.149	.138	.282	.862	.658	1.130
	Dhaka	.127	.140	.364	1.135	.863	1.493
	Khulna	.490	.145	.001	1.632	1.227	2.171
	Rajshahi	.034	.150	.821	1.035	.770	1.389
	Rangpur	.844	.144	.000	2.326	1.752	3.087
	Sylhet	-.167	.151	.271	.846	.629	1.139
Frequency of watching TV	Not at all	-	-	-	1.00	-	-
	< 1 time/week	.203	.138	.142	1.225	.934	1.605
	≥ 1+ time/week	.534	.092	.000	1.705	1.425	2.041

Sex of the household head	Male	-	-	-	1.00	-	-
	Female	.238	.122	.051	1.268	.999	1.611
Type of sanitation facility	Flush	-	-	-	1.00	-	-
	Pit latrine	-.233	.104	.025	.792	.646	.972
	Others	-.332	.136	.015	.718	.550	.937
Place of residence	Rural	-	-	-	1.00	-	-
	Urban	.345	.082	.000	1.411	1.202	1.658
Wealth index	Poorest	-	-	-	1.00	-	-
	Richest	.550	.093	.000	1.733	1.446	2.078
Household size	≥6 member	-	-	-	1.00	-	-
	<6 member	.081	.073	.270	1.085	.939	1.253

Table 4 shows that the correct and appropriate determinants of antenatal care has been found considering data hierarchy using two-level random intercept binary logistic regression. The result exhibits that rural women are 36 percent lower likely to receive antenatal care than their urban counterparts. The similar pattern of the result is exhibited in single level logistic regression analysis. Education has a significant effect on the likelihood of receiving antenatal care. Receiving antenatal care increases with education. Women with primary education, women with secondary education and women with higher secondary education have the 1.6 times higher, 2.5 times higher and 4.8 times higher respectively likely to receive antenatal care than women with no education.

Women who watched TV had 1.6 times more likely to receive antenatal care than women with no watching TV. Women with used pit latrine and others are 27% and 33% lower likely to receive antenatal care than women with used flush.

The multilevel result indicates that women who live in Rangpur and Khulna are 2.3 times and 2.0 times more likely to receive antenatal care than women who live in Barisal. Families those have female household head are 1.5 times more chances of receiving antenatal care than women families who had household head.

Women having normal weight have 1.5 times likely to receive antenatal care than underweight women. However, overweight women have 2.4 time higher odds to antenatal care than underweight women.

In those analysis, significant community effects are found which indicates that the respondents from different communities with same set of characteristics will exhibit different influences on antenatal care visits. The results of two-level random intercept binary logistic regression further suggests that if the random effect is considered then the model gives better insight. It helps to explain some unexpected result that are observed in single level model. The variation in the communities which bring the difference in the outcomes.

Table 4: Results of two-level logistic regression on antenatal care according to some socio-demographic covariates.

Covariates	S.E	Odds Ratio	P-value	95% CI	
				Lower	Upper
Education					
No	-	1.00	-	-	-
Primary	0.307	1.614	0.012	1.111	2.345
Secondary	0.466	2.515	0.000	1.748	3.618
Higher Secondary	1.308	4.814	0.000	3.154	7.348
Division					
Barisal	-	1.00	-	-	-
Chittagong	0.206	0.962	0.860	0.632	1.466
Dhaka	0.292	1.386	0.122	0.916	2.096
Khulna	0.443	2.035	0.001	1.328	3.119
Rajshahi	0.287	1.273	0.284	0.818	1.982
Rangpur	0.510	2.337	0.000	1.523	3.586
Sylhet	0.256	1.098	0.687	0.695	1.736
Frequency of watching TV					
Not at all	-	1.00	-	-	-
< 1 time/week	0.218	1.238	0.226	0.876	1.749
≥ 1+ time/week	0.204	1.668	0.000	1.312	2.120
Sex of the household head					
Male	-	1.00	-	-	-
Female	0.220	1.511	0.005	1.135	2.011
Type of sanitation facility					
Flush	-	1.00	-	-	-
Pit latrine	0.910	0.726	0.011	0.567	0.929
Others	0.109	0.663	0.013	0.479	0.916
Place of residence					
Urban	-	1.00	-	-	-
Rural	0.076	0.638	.000	0.504	0.808
Body mass index					
Underweight	-	1.00	-	-	-
Normal	0.193	1.590	0.000	1.252	2.018
Overweight	0.346	2.400	0.000	1.809	3.185
Random effects variance					
1.539 (highly significant at 1%)					

Discussion

In this study, the risk factors of antenatal care in Bangladesh have been observed by using BDHS 2014 data. The results indicate that the prevalence of antenatal care has slightly increased in the recent survey although antenatal care in Bangladesh is still low and it increases little bit.

Socioeconomic conditions affecting antenatal care have been investigated using logistic regression and multilevel logistic regression analysis to find out the effects of each of the factors net of the effects of other covariates in this analysis. Several study findings provide that some socioeconomic characteristics such as place of residence, education, division and wealth index are significant associated with antenatal care (Jahan and Jahan, 2016). The significant differences in antenatal care in Bangladesh that emerged by residence suggest that antenatal care services need to be expanded or improved in rural area. A cross-sectional descriptive study had been done in Nepal on the antenatal care services among women of reproductive age found that family income, ethnicity, age, maternal education, occupation of both parents, type of family were strongly associated with the use of ANC services. These Results were obtained by the frequency distribution and cross-tabulation of the variables. Significant difference was also observed between the religionand attendance of ANC services (Pandey and Karki, 2014).

Education has emerged as important predictor for increasing antenatal care. Antenatal care is less among illiterate and lower educated women compared to women who had higher level of education. Women who had no education or primary education are less likely to receive antenatal care than women with higher level of education. Another study showed that significant association was found between level of education of respondents under study and their attendance/utilization with $p<0.05$. This showed that mother's education has a positive impact on utilization of ANC (Onasoga et al., 2012). Utilization of 4+ ANC has increased by about 26% between the year 1994 and 2014 in Bangladesh. Higher level of education, residing in urban region and richest wealth quintile were found to be significant predictors (Rahman et al., 2017). The result of our study showed that living condition of the mothers was the most important strongest influential factor for the ANC service received. Mothers in poor live setting is less likely to received ANC services than that of rich. This finding is consistent with the others findings in Bangladesh (Hossain et al., 2015). Difference also observed among the mothers in rural and urban area. This is due to the improved medical facilities in urban area with good transportation system (Arthur, 2012). The findings of present study is consistent with the others findings in Vietnam (Tran et al., 2012).

Conclusion

The present study highlights the relationship with antenatal care and socioeconomic factors. This study also investigates the important risk factors that affect the antenatal care. Antenatal care in Bangladesh is still low and it increases little bit. Therefore, improvement of the socio economic status of the mothers must be intensified in order to increasing ANC services. It can be recommended that, female education must be strengthened to enhance antenatal health care behavior of women. Moreover special focus is needed to target women, especially on those who are from lower wealth quintiles. For improving women empowerment appropriate steps also should be considered. Researchers and policymakers can use this study as a tool to understand the current scenario of ANC utilization of Bangladesh and for any possible intervention aimed at reducing maternal mortality.

References

Amrin, A. (2016), "An Analysis of the Status of Antenatal Care in Bangladesh ", 25 December, available at: http://ijsrm.humanjournals.com/an-analysis-of-the-status-of-antenatal-care-in-bangladesh/ (accessed 29 September 2018).

Arthur, E. (2012), "Wealth and antenatal care use: implications for maternal health care utilisation in Ghana", *Health Economics Review*, Vol. 2, p. 14.

Cumber, S.N., Diale, D.C., Stanly, E.M. and Monju, N. (2016), "Importance of Antenatal Care Services to Pregnant Women at the Buea Regional Hospital Cameroon", *Journal of Family Medicine and Health Care*, Vol. 2 No. 4, p. 23.

Hossain, M.K., Islam, M.R., Khan, M.N. and Ali, M.R. (2015), "Contribution of Socio-Demographic Factors on Antenatal Care in Bangladesh: Modeling Approach", *Public Health Research*, Vol. 5 No. 4, pp. 95–102.

Jahan, M. and Jahan, E. (2016), "Socio-demographic determinants influencing antenatal care seeking behaviour among women in Bangladesh: an application of factor analysis", *International Journal of Community Medicine and Public Health*, Vol. 3 No. 4, pp. 925–930.

Kabir, R. and Khan, H.T.A. (2013), "Utilization of antenatal care among pregnant women of arban slums of Dhaka City, Bangladesh", *IOSR Journal of Nursing and Health Science*, Vol. 2, pp. 15–19.

Khan, M.M.H., Krämer, A., Khandoker, A., Prüfer-Krämer, L. and Islam, A. (2011), "Trends in sociodemographic and health-related indicators in Bangladesh, 1993-2007: will inequities persist?", *Bulletin of the World Health Organization*, Vol. 89 No. 8, pp. 583–593.

Khatun, M.A. and Khatun, S. (2018), "Maternal' Awareness of Antenatal Care on Impact of Mothers' and Newborn Health in Bangladesh", *Open Journal of Nursing*, Vol. 08, p. 102.

Onasoga, A, O., Afolayan, A, J., Oladimeij and D, B. (2012), "Factors influencing utilization of antenatal care services among pregnant women in Ife Central Lga, Osun State Nigeria", *Advances in Applied Science Research*, Vol. 3 No. 3, available at: http://www.imedpub.com/abstract/factors-influencing-utilization-of-antenatal-care-services-among-pregnantrnwomen-in-ife-central-lga-osun-state-nigeria-16156.html (accessed 29 September 2018)

Pandey, S. and Karki, S. (2014), "Socio-economic and Demographic Determinants of Antenatal Care Services Utilization in Central Nepal", *International Journal of MCH and AIDS*, Vol. 2 No. 2, pp. 212–219.

Pell, C., Meñaca, A., Were, F., Afrah, N.A., Chatio, S., Manda-Taylor, L., Hamel, M.J., et al. (2013), "Factors Affecting Antenatal Care Attendance: Results from Qualitative Studies in Ghana, Kenya and Malawi", *PLOS ONE*, Vol. 8 No. 1, p. e53747.

Pulok, M.H., Sabah, M.N.-U., Uddin, J. and Enemark, U. (2016), "Progress in the utilization of antenatal and delivery care services in Bangladesh: where does the equity gap lie?", *BMC Pregnancy and Childbirth*, Vol. 16, available at:https://doi.org/10.1186/s12884-016-0970-4.

Rahman, A., Nisha, M.K., Begum, T., Ahmed, S., Alam, N. and Anwar, I. (2017), "Trends, determinants and inequities of 4+ ANC utilisation in Bangladesh", *Journal of Health, Population, and Nutrition*, Vol. 36, available at:https://doi.org/10.1186/s41043-016-0078-5.

Shahjahan, M., Chowdhury, H.A., Akter, J., Afroz, A., Rahman, M.M. and Hafez, M.A. (2012), "Factors associated with use of antenatal care services in a rural area of Bangladesh", *South East Asia Journal of Public Health*, Vol. 2 No. 2, pp. 61–66.

Tran, T.K., Gottvall, K., Nguyen, H.D., Ascher, H. and Petzold, M. (2012), "Factors associated with antenatal care adequacy in rural and urban contexts-results from two health and demographic surveillance sites in Vietnam", *BMC Health Services Research*, Vol. 12, p. 40.

Yaya, S., Bishwajit, G., Ekholuenetale, M., Shah, V., Kadio, B. and Udenigwe, O. (2017), "Timing and adequate attendance of antenatal care visits among women in Ethiopia", *PLOS ONE*, Vol. 12 No. 9, p. e0184934.

Yeoh, P.L., Hornetz, K. and Dahlui, M. (2016), "Antenatal Care Utilisation and Content between Low-Risk and High-Risk Pregnant Women", *PLOS ONE*, Vol. 11 No. 3, p. e0152167.

Functioning of ASHAs and Client's Perspective about Services Delivery: An Assessment in High Focus Districts of Madhya Pradesh

Reena Basu[*], Jyoti Tiwari[**], Raghubansh Mani Singh[***], Niklesh Kumar[****] &Nikhilesh Parchure[*****]

Abstract

Accredited Social Health Activist (ASHA) has been placed as the first port of call for any health-related demands of deprived sections of the population, especially women and children. One of the key components of the National Rural Health Mission is to provide every village in the country with a trained female community health activist ASHA. It is envisaged that ASHA would receive performance-based compensation for promoting variety of primary health care services in general and reproductive and child health services in particular. A field-based study was undertaken to assess the status of implementation of ASHA programme in two high focus tribal dominated districts of Mandla and Sheopur in Madhya Pradesh. The study attempted to ascertain ASHA's knowledge, training and skillsin educating, counseling and providing services in maternal & child health issueslike Home Based Newborn Care (HBNC) and national health programmes at the village level. A semi-structured interview schedule was used for 40 ASHAs mothers in Mandla and Sheopur districts. Findings indicate that ASHAs have made inroads in providing services in the local community. However, retention levels on HBNC care is low in spite of majority ASHAs having received module 6 & 7 training. HBNC which requires retention of vital new born care practices is low among most ASHAs. Low levels of literacy among ASHAs in Sheopur district is a major impediment. Their registers too are mostly being filled and updated by relatives or the visiting ANM. Record keeping by ASHAs also needs special training and monitoring. For interface of ASHAs with mothers, 209 recently delivered women were interviewed in the two districts. Mothers have mostly reported that most of the ASHAs helped in delivery and immunization. But many other activities like promotion of awareness on hygiene and sanitation, counseling on family planning was limited. In High Priority Districts (HPDs) like Sheopur due to non-availability of Block Community Mobilisers and ASHA Sahyoginis monitoring is poor. Mentoring Group for Community Action (MGCA) which was formed for constant monitoring and handholding has been discontinued. Supportive supervision and quality monitoring by ASHA Sahyogis, BCMs, MGCAs will provide adequate impetus to the programme. The level and quality of services expected from ASHAs do not match their skills and this requires reassessment of selection process of ASHAs. It is suggested that separate training modules for ASHAs with different levels of education needs evolving, to elicit optimum performance and effective service delivery.

Key Words: Accredited Social Health Worker, VHNSC, MGCA, ASHA Sahyogi

[*]Assistant Director, [**] & [*****]Research Investigator, [***] & [****]Field Investigator Population Research Centre Dept. of General & Applied Geography, Dr.Harisingh Gour Vishwavidyalay, Sagar (MP)

Introduction

Accredited Social Health Activist (ASHA) is a health activist spreading awareness on health concerns and promoting change in health related practices.Selected from the village itself and accountable to it, the ASHA will be trained to work as an interface between the community and the public health system who will create awareness on health and its social determinants and mobilize the community towards local health planning and increased utilization and accountability of the existing health servicesfor every village with a 1,000 population. This was aimed to provide primary medical care, advice the villagers on sanitation, hygiene, antenatal and postnatal care, escorting expectant mothers to hospital for safe delivery etc. ASHAs play a central role in facilitating Village Health, Nutrition and Sanitation Committees (VHNSCs), working in close conjunction with the Anganwadi Workers (AWWs), ANMs and other local level functionaries. ASHAs have got special recognition as community health activist.

A series of rapid appraisals in different areas of the country including, Lucknow (2007-08), Gorakhpur (2008-09), and Rewa (2008-09) have highlighted that majority of them were not aware about their role in changing the behaviour about infant feeding family planning, child marriage, girl education, hand washing and sanitation.The home or community based maternal and child health models have been experimented across the globe and deemed successful in low resource settings (Dynes et. al. 2011). In India, a field trial was undertaken in Gadchiroli, Maharashtra for seven years (1996-2003) and it has displayed that effect of home-based neonatal care on management of sepsis and neonatal mortality have been encouraging (Bang et.al.1999). A study of 150 ASHAs was conducted at Palghar Taluka in the Thane district of Maharastra to understand their knowledge about child care. The study found that among the trained ASHAs lacunae in their knowledge regarding various aspects of child health morbidity were observed. It suggested that monthly meetings can be used as a platform for the reinforcement along with periodical refresher training conducted for ASHAs. (Shrivastava & Shrivastava, 2012).

The ASHA programme has been implemented in MP in 2005 to check infant and maternal mortality which is among the highest in the country. There is a large network of ASHAs in the state across all 51 districts. Therefore, it was pertinent to carry out this study in high priority districtsto ascertaintheir reach in the local community and their preparedness to provide essential services.

Objectives

The paper attempted to assess the status of implementation of ASHA programme in two high focus tribal dominated districts of Mandla and Sheopur. The primary objectives were:

- Ascertain knowledge, skills of ASHAs and services rendered by them in maternal and child health, home based new born care and other health issues.
- Outline client perspective on services provided by ASHAs.

- Identify the challenges in implementation of ASHA scheme and suggest ways for strengthening the programme.

Methodology

Study gathered a mix of both quantitative and qualitative information. Both qualitative and quantitative data collection techniques were used in two high focus Scheduled Tribe dominated districts of Mandla (Jabalpur health division) and Sheopur (Chambal health division). Data collection tools were developed, pre-tested and administered, comprising variables like training and compensation payments to the ASHA, providers' view about actual status of implementation of scheme was also ascertained. This study aims at understanding the preparedness of ASHAs in providing essential services and is exploratory in nature.

Total seven blocks in Mandla district and three in Sheopur were selected after discussions with the district programme management units in the respective districts. Total 37 villages were selected for the study (Mandla:18; Sheopur: 19). Overall 40 ASHAs were interviewed from these two districts (Mandla: 18; Sheopur: 22). A separate group discussion was conducted with ASHAs in Mandla district to explore their opinion onlarger issues. In the two districts 209 clients (recently delivered women) were interviewed (Mandla: 120; Sheopur: 89) through a semi-structured interview schedule to know their opinion regarding different types of MCH and other health services provided by ASHAs.

Socio-Demographic profile of ASHAs

The socio-demographic profile of 40 interviewed ASHAs of Mandla and Sheopur districts including age, literacy, and marital status are given in the section below. Figure 1 shows that that one-fourth ASHAs each belong to the age group of 24 -29 and 30-34 years (Mandla: 33yrs av. age; Sheopur: 38 yrsav.age). In Mandla district a greater number of ASHAs have completed 8th class(18) and 16 ASHAs have even studied up to 10th class. In comparison ASHAs of Sheopur district have mostly studied upto class five (Fig. 2). Majority ASHAs in the two districts are married and three-fifths belong to BPL category. All the ASHA's interviewed are Hindus, two-fifths belong to ST category, and 31 percent are OBCs. Majority, (71 percent) ASHAs have joined between the years 2005-09 mainly in Mandla district. But more ASHAs (13) in Sheopur district have joined during the years 2010-14.

Fig 1. Age distribution of ASHAs

Fig 2. Literacy level of ASHAs
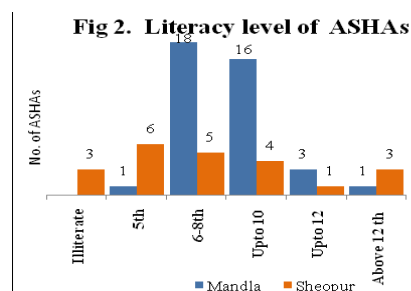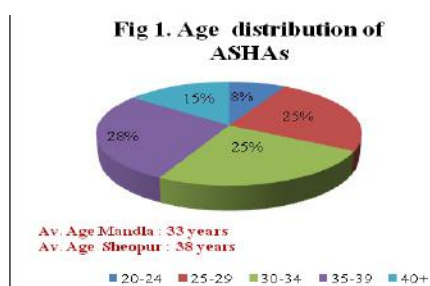
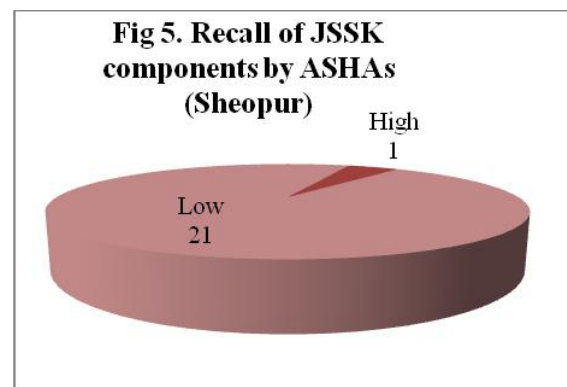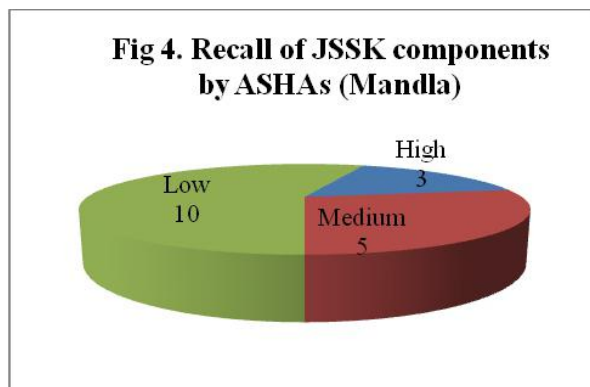## ASHA Selection and Training

All ASHAs of Mandla district and majority in Sheopur district were selected by their local gram sabhas. Majority of them were residents of their village. All interviewed ASHAs in the two districts have received training. All ASHAs of Mandla and nearly three-fourths (73 percent) in Sheopur district have received module 6-7 training. (Fig. 3).

Fig 3. ASHAs trained in module 6 & 7
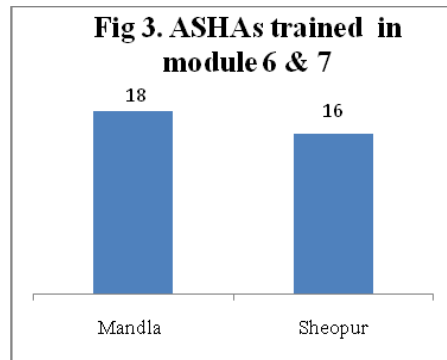
Knowledge of MCH & Health Issues

ASHAs in the two districts were asked about their awareness, about JSY and JSSK, micro-birth plan, delivery complications and place of referral, number of visits paid after delivery for post-natal care. Their responses are presented in the section below.

Knowledge of JSSK: Regarding JSSK and JSY all 18 ASHAs of Mandla and 12 ASHAs of Sheopur district knew about it by name. Figure 4 shows that a greater number of ASHAs of Mandla district could recall about JSSK components as compared to those in Sheopur district (Fig.5). ASHAs who recalled 4-5 of the JSSK components were considered 'high', those who recalled '3' were considered average and those who recalled 1-2 were considered low on spontaneous recall. However, no association was seen between literacy level and recall of ASHAs.

Fig 4. Recall of JSSK components by ASHAs (Mandla)

Fig 5. Recall of JSSK components by ASHAs (Sheopur)

Fig 6. ASHAs' Knowledge of Micro-Birth Plan
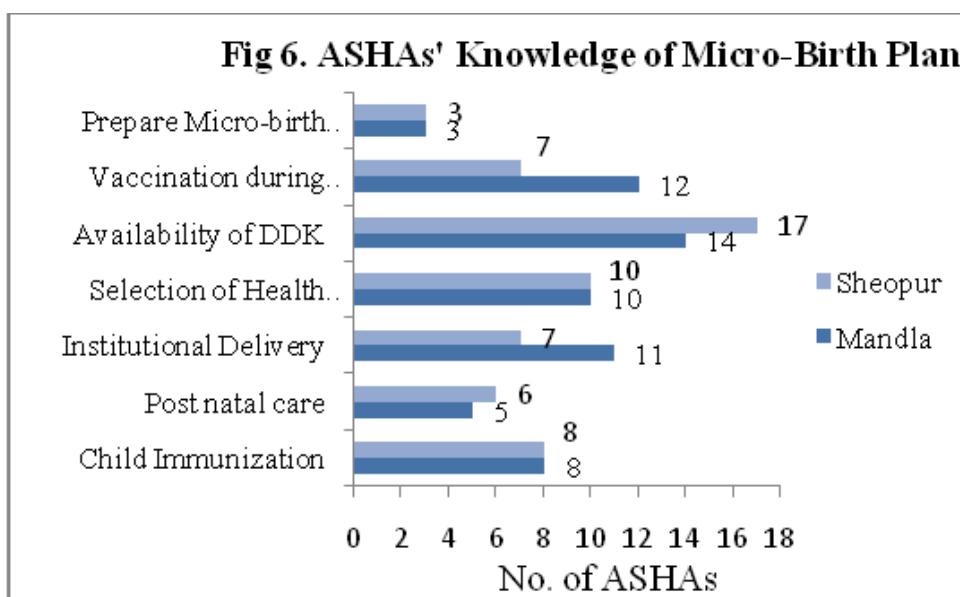
Knowledge of Birth Planning: As seen in Fig. 6 only three ASHAs each are aware of the term micro-birth planning in the two districts. Except for availability of Disposable Delivery Kits (DDK) only half or less than half of the ASHAs could specify about different activities to be undertaken for micro-birth planning of the new born. Most of the responses were elicited through intense probing.

Knowledge about Symptoms of Pregnancy Complications: Figure 7 shows that ASHAs have reported about swelling of hands and feet as a major symptom of pregnancy related complicationin the two districts (Mandla: 68 percent; Sheopur:73). Other symptoms mentioned by less than half of the ASHAs were eclampsia, blurred vision, dizziness and high blood pressure, vomiting, no movement of foetus, dysuria and weight loss.The retention and recall capacity of ASHAs regarding these essential symptoms is limited.

Fig 7. ASHAs' Knowledge about Pregnancy Complications
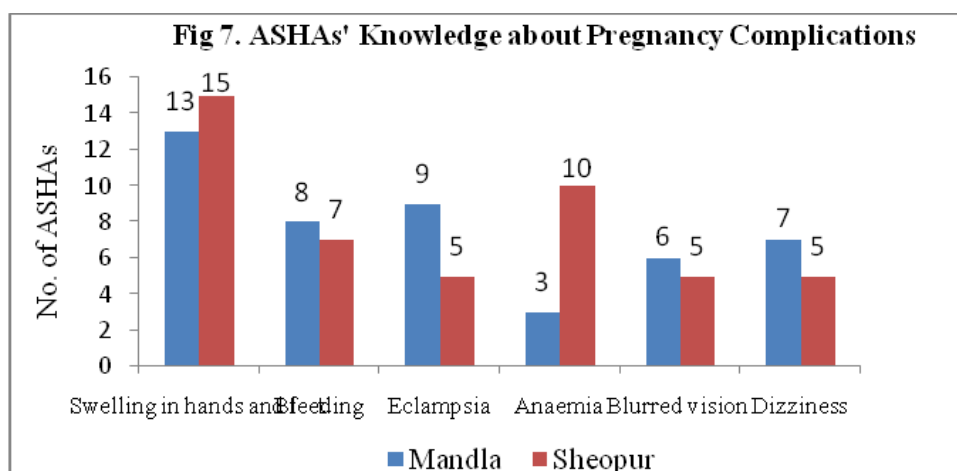
Table 1: Advise and Services Rendered by ASHAs

Different Services	Mandla	%	Sheopur	%	Total	%
Eligible Couple Survey	17	94.4	15	68.2	32	80.0
Adolescent Counselling	14	77.8	14	63.6	28	70.0
Prenatal Care Registration	15	83.3	17	77.3	32	80.0
ANC/PNC Check up	18	100.0	16	72.7	34	85.0
Help in pregnancy complications	11	61.1	15	68.2	26	65.0
Assist in delivery	13	72.2	18	81.8	31	77.5
Immunization	14	77.8	18	81.8	32	80.0
Family planning	15	83.3	16	72.7	31	77.5
Malaria slide	15	83.3	17	77.3	32	80.0
Blindness control	9	50.0	8	36.4	17	42.5
TB treatment	11	61.1	15	68.2	26	65.0
Iron Pills	14	77.8	15	68.2	29	72.5
Reporting of Maternal Death	9	50.0	13	59.1	22	55.0
Identify malnourished children	12	66.7	17	77.3	29	72.5
Assist in transport	14	77.8	12	54.5	26	65.0
Postnatal care	11	61.1	13	59.1	24	60.0
Other	9	50.0	5	22.7	14	35.0
Total	**18**		**22**		**40**	

Advice and Services Rendered by ASHAs

Table 1 shows advice and services rendered by ASHAs regarding different health issues in the local community. Majority ASHAs stated ANC and PNC checkups (85 percent) eligible couple survey (80 percent), prenatal care registration (80 percent) assisting in immunization services (80 percent), preparing malaria slide (80 percent), helping in delivery (78 percent), providing family planning services (78 percent), identifying malnourished children (73 percent), provide iron pills (73percent), TB treatment (65 percent) help in pregnancy complications, and assist in arranging transport postnatal care. ASHAs also provided serviceson different aspects of national programmes.

Table 2: ASHA Performance on Key MCH Issues in Mandla and Sheopur Districts

Performance on Key MCH Issues	Mandla (N=18)		Sheopur (N=22)	
	Min.	Max.	Min.	Max.
No. of pregnant women	1	21	1	19
Children below 1 year	3	63	2	110
No. of Women received vaccination	01	10	2	18
No. of Child Vaccination	02	30	03	35
Institutional Delivery	01	46	05	40

Home Delivery	01	06	01	15
Referred Delivery Complications	01	16	01	05
Assisted in Getting transport	02	30	02	40
Maternal Deaths	01	01	01	02
Infant deaths	01	02	01	03
Accompanied Institutional Del.	01	42	01	40
Accompanied late night Del.	01	20	01	38
No. of marriage registration	01	12	01	11
Eligible Couple for FP	03	85	03	143
Sent women to private hosp. for del.	01	04	02	03
Accompanied neonates and infants with complexities/ danger to health facility	01	10	01	01
BCG vaccination for children delivered at home	01	06	01	15
Identified malnourished children	01	05	01	10
Sent children to NRC	01	05	01	14
last 1month #last 1 year				

Table 2 shows the different type ofservicesprovided by ASHAs of all visited villages in the two districts. The minimum and maximum range in performance indicate two things, one is that either the population size of some villages are larger and the number of cases attended by ASHAsvary from village to village orsome ASHAs are proactive in their community in providing services for which they have been selected.

Post-natal &HBNC Services: Post-natal services provided at home as reported mainly by ASHAs included advise on breast feeding at regular intervals, recommend mothers for proper eating of nutritious food, maintaining cleanliness and providing IFA tablets. Taking temperature, keeping baby warm, using hot water, was reported by ASHAs ofMandla district (Fig.8). Except for advice about breast feeding at regular intervals, less than half of the ASHAs could state about the other post-natal &HBNC services provided by them. Most of the responses were elicited through intense probing of ASHAs.

Fig 8. Postnatal Services Provided by ASHA
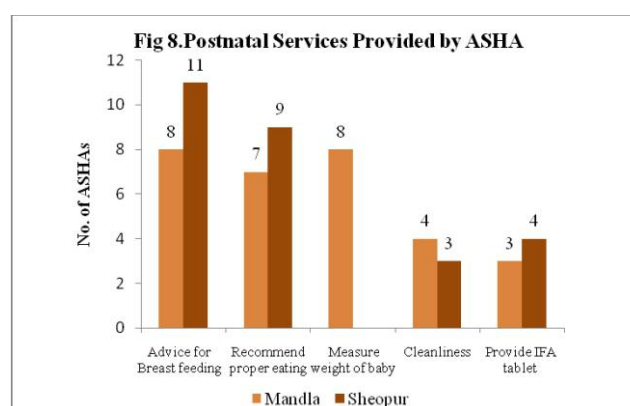
Table 3: Type of Registers maintained by ASHAs

Table 3: Type of Registers maintained by ASHAs			
Types of Registers	**Mandla**	**Sheopur**	**Total**
Four Registration	17	12	**29**
Vaccination Register	12	10	**22**
Eligible couple register	12	5	**17**
Meeting register	11	5	**16**
ANC register	7	7	**14**
Village healthregister	4	8	**12**
Population survey register	9	1	**10**
Stock register	6	2	**8**

Register Maintenance: Table 3 shows that village health register is being maintained by ASHAs both in Mandla and Sheopur districts although in Mandla only a little more than half the ASHAs have confirmed it. More ASHAs in Sheopur district affirmed about receiving training to fill registers than in Mandla district. Nearly all ASHAs of Mandla reported filling theregister by themselves but in Sheopur ASHAs confirmed that due to lack of comprehension their register entries were made by spouses, children and ANMs. Majority ASHAs in the two districts said that they received incentives for correct filling up of registers. The registers mainly maintained by them were eligible couple registration, four registration (birth, death, marriage), vaccination, meeting, ANC, VHR, population survey and stock register. Register maintenance of different types was more explicitly explained by ASHAs of Mandla in comparison to those of Sheopur.

Observations during the study show that some of the registers were not available at the time of ASHA interview and those which were made available were not properly maintained. It was also observed that most ASHAs did not have printed registers with them. They informed that they purchased registers from their own pocket.

Challenges in Service Delivery

All ASHAs in the two districts were asked about the challenges they faced inservice deliver and the suggestions they would like to give to improve service delivery. The challenges and suggestions are given in Box 1. It may be mentioned that seven ASHAs of Mandla and 13 in Sheopur district said that they did not face any problems in service delivery. Not receiving incentives timely and the issue of fixed honorarium were discussed broadly.

Box 1. Challenges Faced by ASHAs and Suggestions Given

Challenges Faced	Suggestions Given
• Incentives not received timely • GAKs are not available in villages • Janani Express facility is not available • Not able to fill registers properly • Difficult to motivate village people for vaccination • Lack of facility for food and stay in hospitals • Problem in opening account for beneficiary • Beneficiaries do not get JSY incentives on time • Difficulty in motivating women for FP • Difficulty in motivating women for inst. delivery	• Fixed honorarium for ASHAs • Timely payment of incentives • JE facility must be readily available Fully equipped GAK • Drugs should be timely provided • TA must be provided for attending meetings • More orientation regarding work and latest health programmes.

Views of Group Discussion

- "*Hum ko her do-teen mahney bad training milneechayyeyJis se hum auracchaakamkarsaktey hey*"(We should be given training in every two or three months so that we can work better
- "*Baarbaarprashikshan se humnegrehbhentke bare meiseekhahum aabswasthykendremeiprasavkeliyekehtehein*"(Wehave learnt about home visit and motivate women fordelivery at health facility).
- " *Humko meeting me aanekeliyerashimilnichhaheye*". *(*We should get TA for attending meetings).
- "*Hamarisunwaikeliye koiuparadhikarihonachahiyehai*".*(*There should be grievance redressal system for us).
- "***Maandeyaur voucher kevisheyke bare meinprashikanchahiye***"*(*Training in voucher and honorarium is necessary).

Clients perspective

Table 4: Background Profile of Respondents in Mandla and Sheopur Districts

Background Profile			Mandla		Sheopur		Total	
			N-120	%	N-89	%	N-r209	%
Religion		Hindu	118	98.3	89	100.0	207	**99.0**
		Muslim	1	0.8	0	0.0	1	**0.5**
		Christian	1	0.8	0	0.0	1	**0.5**
Caste		SC	1	0.8	30	33.7	31	**14.8**
		ST	88	73.3	24	27.0	112	**53.6**
		OBC	31	25.8	32	36.0	63	**30.1**
		Other	0	0.0	3	3.4	3	**1.4**
HH Belong to BPL Category		Yes	75	62.5	38	42.7	113	**54.1**
		No	45	37.5	51	57.3	96	**46.0**

Type of House	Kuccha	108	90.0	45	50.6	153	**73.2**
	Semi-pucca	6	5.0	21	23.6	27	**12.9**
	Pucca	6	5.0	23	25.8	29	**13.9**
Main source of Lighting for HH	Other	2	1.7	0	0.0	2	**1.0**
	Kerosene Gas Oils	27	22.5	12	13.5	39	**18.7**
	Electricity	91	75.8	77	86.5	168	**80.4**
Main source of Drinking Water for HH	Spring River/Stream pond/Lake Dam Rain	1	0.8	0	0.0	1	**0.5**
	Public Tap Hand Pump/ Bore/well	102	85.0	49	55.1	151	**72.2**
	Piped/ Hand Pump/Borewell / Well into premises	17	14.2	40	44.9	57	**27.3**
Type of Toilet Facility	No facility/Bush/Field Other	79	65.8	54	60.7	133	**63.6**
	Shared Public pit toilet/latrine	1	0.8	0	0.0	1	**0.5**
	Shared Public flush toilet Own Pit toilet/latrine	10	8.3	3	3.4	13	**6.2**
	Own flush toilet	30	25.0	32	36.0	62	**29.7**
Type of Fuel used for Cooking	Wood Crop residues Dung cakes Coal/coke/lignite	114	95.0	77	86.5	191	**91.4**
	Electricity /Liquid petroleum gas (LPG) Bio-gas	6	5.0	12	13.5	18	**8.6**
Separate room for kitchen	Yes	78	65.0	24	27.0	102	**48.8**
	No	42	35.0	65	73.0	107	**51.2**
Own house	Yes	108	90.0	83	93.3	191	**91.4**
	No	12	10.0	6	6.7	18	**8.6**
Own livestock	Yes	91	75.8	50	56.2	141	**67.5**
	No	29	24.2	39	43.8	68	**32.5**

Total 209 mothers who had delivered in the last one year prior to the survey were interviewed. Almost all the respondents are Hindus except one Muslim and one Christian family in Mandla district. Among respondents, ST caste is predominant in Mandla (73 per cent) and SC in Sheopur district (36 per cent). Majority (91 per cent) of the respondents in the two districts are residing in their own houses. Majority respondents in Mandla district reside in kutchcha houses (90 per cent). Whereas in Sheopur district half the respondents reside in kutchcha, about one-fourth in semi-pucca houses and more than one-fourth in pucca houses (Table 4). Electricity is available in more than three-fourths (76 per cent) and four-fifths households in Mandla and Sheopur districts respectively. In contrast more than three-fifths households (64 percent) do not have access to toilet facilities in the two districts.

Twenty percent respondents were married below 18 years of age. More than two-thirds respondents were married between 18-20 years of age. Mean age at marriage of respondents is 18.5 years (Mandla: 19.1; Sheopur: 17.7 years).

Standard of living score was computed and households of respondents are grouped into quartiles. More than one-third respondents (36 per cent) in the two districts belong to the lowest quartile, nearly half (48 percent) belong to the second quartile, and only six percent belong to the fourth quartile (Table 5). More than half the respondents said that their families belong to the BPL category.

Table 5: Standard of Living Scores of Respondents of Mandla and Sheopur districts

| SLI Score	Number	Percent
<= 14	75	35.9
15-27	101	48.3
28-40	20	9.6
>41	13	6.2
Total	209	100.0

Services Received by Clients/ Respondents

Out of 209 mothers who had delivered in the last one year prior to the survey, 180 mothers were interviewed (103 mothers in Mandla and 77 in Sheopur). Advice and services given by ASHAs are presented in this section. It may be mentioned at the outset that 14 percent clients in the two districts (Mandla: 17; Sheopur: 12) stated that the ASHA did not provide any services to them.

Advice/Counselling Received on MCH Issues: ASHAs are expected to provide both advice and MCH services in their respective villages. All 180 clients in Mandla and Sheopur districts were asked about different advice received. Pregnant women in households which ASHA visited received ANC advice (51-54 per cent), advice for immunization during pregnancy (73-77 per cent), advice on child immunization was reported (49-58 per cent) in the two districts. PNC advice was reported by 12-24 per cent women in Mandla and Sheopur districts. Advise about diet, malnourishment of children birth and death registration advice was also received by them. But advise by ASHA about danger signs during pregnancy were reported by hardly 9-11 percent respondents in the two districts (Table 6).

Table 6: Advice Received on MCH Issues from ASHA

Advise Received	Mandla (%) (N=103)	Sheopur(%) (N=77)
ANC advice during pregnancy	54	51
Immunization advice on pregnancy	73	77
Danger sign of pregnancy	9	11
Advice of Diet	63	69
Post natal care	12	24
Child Immunization	49	58
Malnutrition of the children	6	10
Family Planning information	23	5
Birth/Death Registration	20	3
Other	13	6

Fig 9. MCH Services received by Clients
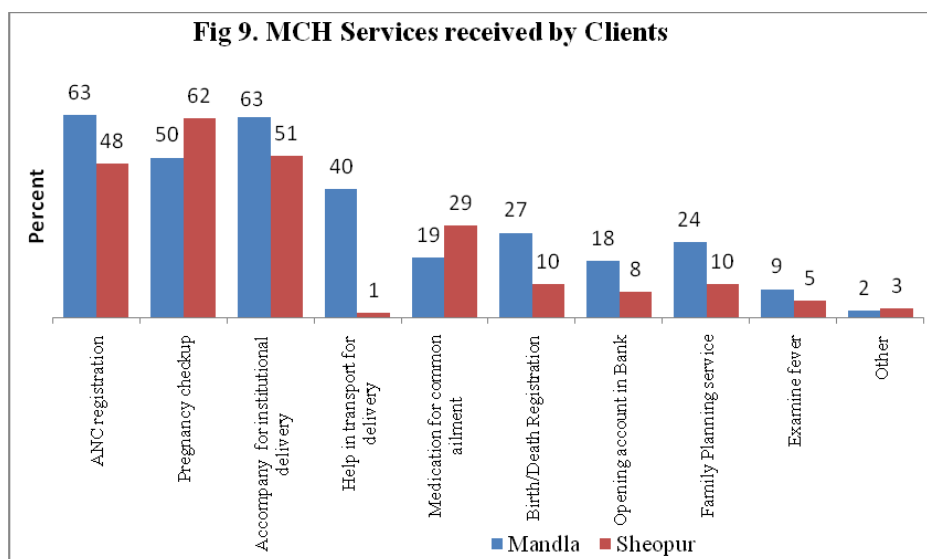
MCH Services Received from ASHAs: Respondents reported about ANC services (48-63 percent), pregnancy checkup (50-63 percent), accompanying by ASHAs for institutional delivery (51-63 percent) in the two districts. In Mandla district 40 percent respondents received help from ASHA for arranging transport. Respondents have also stated that ASHAs provided services for family planning, birth and death registration, and medication for common ailment. Sixtyseven and 78 percent respondents in Mandla and Sheopur districts respectively were accompanied for ANC services by ASHAs (Fig.9). Three fifths to four fifths respondents received ANC services from ASHA during 1st, 2nd & 3rd trimester of pregnancy. Eight respondents in Mandla and one in Sheopur district reported of pregnancy complications and some of them reported that ASHA took them to the health facility and if required managed transport for them. Transport was requisitioned mostly in Mandla district.

Fig 10. Purpose of Visiting Respondents
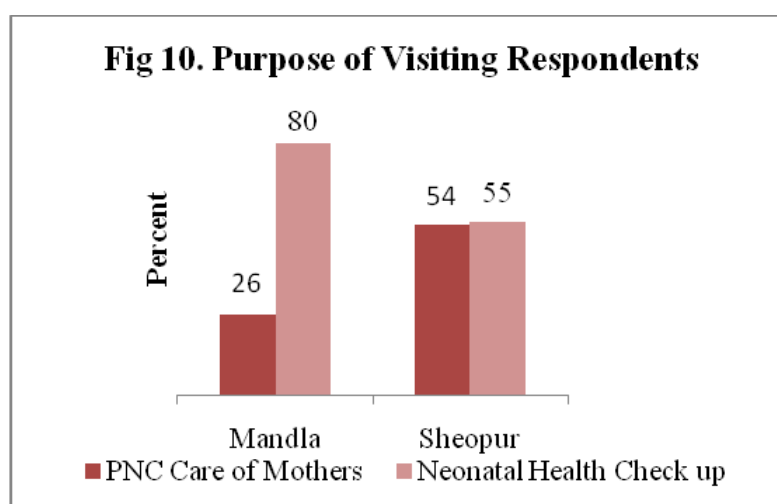
Delivery Services: Out of total institutional deliveries 72 respondents in Mandla and 28 in Sheopur district were accompanied by ASHAs for institutional delivery. Total 154 respondents in both Mandla and Sheopur districts received home visit by ASHA within 45 days after delivery.

Postnatal Services: During home visits ASHAs mainly brought thermometer, weighing scale and some charts and booklets. During these visits ASHAs mainly asked them about their health, whether they had fever, and advised them about the type of food. Excessive bleeding and abnormal secretions were also discussed. Sixty one and 54 respondents in Mandla and Sheopur districts respectively received advise to eat four meals per day, provide warmth to the baby (Mandla: 28 ; Sheopur: 22) and 15 respondents in Mandla and 13 in Sheopur district received advise to visit hospital in case of excessive bleeding. However, 17 and 25 respondents in Mandla and Sheopur respectively said that ASHA did not carry anything during home visit.

Table 7: HBNC visits by ASHA

HBNC visits	Mandla N=88	Sheopur N=66
0-7 days	68	53
Upto 14 days	45	45
Upto 21 days	37	34
21 days and above	17	5

HBNC Visits: Eleven respondents in Mandla and six in Sheopur received a visit within the first 24 hours of delivery. In Mandla 68 and in Sheopur district 53 mothers received a visit within seven days after delivering a child. Forty five mothers each in the two districts reported a visit upto 14 days. Upto 21 days, 37 and 34 mothers received a home visit for neo- natal care in Mandla and Sheopur districts respectively. But upto the stipulated 45 days hardly 17 and five mothers received a home visit in Mandla and Sheopur districts respectively (Table 7). The frequency of visits reduced with passing number of days.

Table 8: HBNC kit, medicines and accessories available for ASHAs

Medicines and Accessories	Mandla (N=18)	Sheopur (N=22)
HBNC kit received	15	12
Necessary supply of medicines	16	20
ASHA's Uniform	18	18

HBNC kit was available with majority ASHAs (15) in Mandla district but in Sheopur it was available

with only half the ASHAs. In the HBNC kit mainly baby weighing machines, warm bags and blankets and thermometers. Supply of medicines was adequate in both the districts (Table 8).

Eighty percent mothers spoke about neo-natal health checkup by ASHA during home visit in Mandla and more than half the mothers in Sheopur district received a home visit for either health check up or neonatal health checkup or both. About one-fifth ASHAs of Mandla did not remember receiving any advice from ASHAs. Respondents in the two districts were asked whether they suffered from any health problems in 45 days after delivery. Four respondents in Mandla district and two in Sheopur faced health problems. Only one respondent in Sheopur district was referred to CHC/ PHC for treatment ASHA (Table not given).

Neonatal Care Advise & Services: The respondents in the two districts were asked about neonatal services provided by ASHAs during home visit. Care of cord, weight measurement and temperature was mainly reported by mothers in the two districts. In Mandla district five, and in Sheopur 10 neonates and infants faced problem within 45 days. Table 9 shows the advice received by mothers in the two districts. Breast feeding within an hour, breast feeding for six months, inspect child feeding, applying nothing on the cord, detailed vaccination planand visiting hospital in case of health problem were differentadvice received by mothers from ASHAs in the two districts. One child in Sheopur district was referred to SNCU Sheopur on advice of ASHA.

Table 9: Advice Given for New born Care to Respondents

Advice Given for New born Care	Mandla (%) (N=88)	Sheopur(%) (N=66)
Breast feeding within an hour	57.9	65.1
Breast feeding for six months	68.2	65.1
Inspect child feeding	32.9	33.3
Vaccination Details	27.3	48.5
Apply nothing on the Cord	20.5	27.3
Visit hospital in case of health problem	29.5	16.6
Danger sign in Newborn	9.1	3.0

Conclusions

The study has highlighted that ASHA programme has made inroads in the local community. ASHAs as grass roots worker have facilitated services in institutional deliveries, MCH and national programmes. It is significant that all ASHAs in Mandla and majority in Sheopur district have received module 6&7 training to expedite the process of communitisation. But ASHAs have not been able to fully internalize and utilize vital components of modules, which is reflected in poor knowledgeof ASHAs regarding identification of danger signs of pregnancy and importance of home visits. In many cases they have

reported of multiple casual home visits for few minutes, not using paper formats and not being able to fill them properly. On the positive side, respondents have not reported about ASHAs taking bribes, or asking for money in lieu of services provided for any type of services provided. ASHAs need active support of ANMs for hands on training during home visits. ASHA incentives which at times are irregular or do not match the number of services provided and this needs immediate attention. In High Priority Districts (HPDs) like Sheopur due to lack of appointment of Block Community Mobilisers and ASHA Sahyogis monitoring is poor, which must be ensured for smooth and effective implementation of the programme. Mentoring Group for Community Action (MGCA) which was formed for constant monitoring and handholding has been discontinued and needs to be revived. The level and quality of services expected from ASHAs do not match their skills and this requires reassessment of selection process of ASHAs. It is suggested that different levels of training for ASHAs having different educational capabilities should be envisaged to elicit optimum performance and effective service delivery. Minimum level of qualification must be fixed. ASHA from adjoining villages fulfilling education/training needs should be given priority. This will help in stabilizing service delivery in the villages.

Recommendations

- ASHAs are proactive in the local communities training needs to be strengthened to elicit effective performance.

- Separate training modules for ASHAs with different levels of education, needs evolving to elicit optimum performance and effective service delivery.

- Continuous practice in HBNC themes through hand holding and demonstration by ANMs will help to improve quality of services being provided.

- Supportive supervision and quality monitoring by ASHA Sahyogis, BCMs, MGCAs will provide adequate impetus to the functioning of ASHAs.

- Disbursement of timely incentives without delays must be prioritized, and travelling allowances must be provided for multiple meetings held at block headquarters.

References

Bang AT, Bang RA, Baitule SB, Reddy MH and Deshmukh MD (1999). Effect of home-based neonatal care and management of sepsis on neonatal mortality: Field trial in rural India. *Lancet;*1999 Dec 4;354(9194):1955-61.

Dynes M, Rahman A, Back D, Moran A, Rahman A, Pervin J, Yunus M, Rashid MH, Gazi T, Biswas KK, Buffington S, Patterson JM and Sibley L (2011). Home-based life-saving skills in Matlab,

Bangladesh; a process evaluation of a community-based maternal child health programme *Midwifery.*2011 Feb;27(1):15-22. doi: 10.1016/j.midw.2009.07.009. Epub 2009 Sep 2627.

NIHFW, UNFPA&BRD Medical College Gorakhpur (2008-09):A study of interface of Asha with the Community and the Service Providers in Eastern Uttar Pradesh*(Gorakhpur Report)*pp1-40.

Shrivastava SR and Shrivastava PS (2012). Evaluation of trained Accredited Social Health Activist (ASHA) workers regarding their knowledge, attitude and practices about child health, *Rural and Remote Health* 12: 2099, Oct;12(4):2099. Epub 2012 Dec 3.

UNFPA, SIHFW & NIHFW (2007-08).Assessment of the Functioning ofASHAs under NRHM in Uttar Pradesh *(Lucknow Report)*pp1-37.

UNFPA, SS Medical College& NIHFW(2008-09).A Study for Assessing Birth Preparedness and Complication Readiness Intervention in Rewa District of Madhya Pradesh*(Rewa Report)*pp1-34.

Healthcare Utilization and Economic Support among the Elderly in India: A Comparative Study of Maharashtra and Kerala State

Kisan Algur[*] & Suhas Dhumal[**]

Abstract

Aim: To study the health care utilization and economic support of elderly in developed states of India (Kerala and Maharashtra).

Data and Methods: For this study, The National Sample Survey Office (NSSO)-71st round for the year 2014, data was used to analysis purpose with the help of descriptive statistical methods like univariate and bivariate statistical methods.

Result: As older people have limited regenerative abilities and are more susceptible to disease, syndrome, and sickness as well affected by the several social issues. Therefore, there is a need to see the differentials of healthcare utilization and economic support of the elderly in most developed states of India. This study reveals that the several national schemes, which are available in Kerala but it is missing in Maharashtra. The underlying factor can be the coverage of government funded insurance schemes that have been reported as 3.1 percent in Maharashtra and 36.6 percent in Kerala. Percentage of the elderly who are entirely dependent upon others among them health care utilization and economic dependency is higher in Maharashtra which is 56 percent and 47 percent in Kerala.

Conclusion: Healthcare utilization and spending among entirely dependent female seem to be higher than male. The government policies should give more importance to the aged women regarding their health care expenditure on services and health seeking behavior. Other factors also play a vital part in the health status of the elderly such as an active partner, place of residence and educational attainment.

Keywords: Elderly, Economic Sustenance, Healthcare Utilization

Background

Aging is universal and appears to be irreversible in both developed and developing countries, However, it accounted that the less developed regions are aging faster than, the more developed areas. The number of aperson aged65 or older in the world is likely to expand from a projected 495 million in 2009 to 974 million in 2030 (UN-2009). Older people mostly have limited regenerative abilities and are more susceptible to disease, syndromes, and sickness when compared to younger adults. They are also affected by other social issues such as retirement, loneliness, and ageism as well. Little mirrors the economic insecurity or no permanent income of elderly; the increased morbidity at later ages has enlarged the health care expenditure of old. The study has found that the 41 percent elderly population

*Ph.D. Scholar & ** PG Student *International Institute for Population Sciences (IIPS), Govandi Station Road, Deonar, Mumbai-40008, Maharashtra, India. Email (kdalgur90@gmail.com, suhasdhumal1989@gmail.com)*

had fallen sick in the last six months, and ailments included diarrhea, cold, pain in lower limbs and weakness.

The economic insecurity is mirrored by little or no permanent income of elderly, the increased morbidity at later ages has improved the health care expenditure of old. Given the fact that the public spending and insurance coverage on health is low in India, the health spending is mostly met by the household. In the context of changing demographics, increased non-communicable diseases, and increased Medicare cost, the health expenditure is expected to grow in future years and may push families and individuals to poverty trap (Garg and Karan 2009; Peter *et al*., 2001). India is in the early phases of startingmanagement programs to provisionan aging population and many Indians have inadequate access to health care, and with increased figures of older people, stresses on the health scheme will increase (Yip & Mahal, 2008; WHO, 2012).Less than 10 percent of the Indian population has health insurance (either public or private), and roughly 72 percent of all health care spending is an out-of-pocket expenditure. India's aging population is particularly at risk, as it excepted from the medicalassurance scheme for the deprived, which covers only those aged 65 or younger (Arokiasamy *et al*., 2011).

The information the monthly per capita household health spending of older households is significantly higher than non-elderly families in India. The study has found that the increased economic insecurity, decreasing familial support and falling health, increased morbidity and increased the health care expenditure of elderly. The research has suggested to improved access to health insurance and public spending on geriatric care to decrease the out-of-pocket outlay on health care of among aged in India. (Mohanty*et al*., 2014).

According to India's National Policy on Older Person, (Govt. of India, 1999), a senior citizen is defined as elderly as that person who is 60 years and above. Therefore, an upcoming primary issue of this century in India and all the developing countries will be the aging of the population as inevitable Consequence of demographic transitional phases which they are supposed to go through. A significant proportion of the elderly are aware of social security schemes such as the Indira Gandhi National Old Age Pension Scheme (IGNOAPS) and the India Gandhi National Widow Pension Scheme (IGNWPS) while awareness of the Annapurna Scheme is somewhat limited (40 percent). More than 70 percent of the elderly is aware of the IGNOAPS and the IGNWPS. The awareness level is about 10 percent higher among men than women are for the IGNOAPS and the Annapurna schemes. Although the elderly belonging to BPL households are the primary target for these social security Schemes, slightly more Elderly in non-BPL Households than aged in BPL families are aware of all three Schemes. More than 85 percent of the elderly in Himachal Pradesh, Kerala, Punjab, and Odisha are aware of the IGNOAPS while awareness is lowest in West Bengal at only 58 percent (United Nation Population, 2012).

Need for the Study

Most of the literature indicates that there is a need to examine regional differentials of health care utilization and healthcare dependency among elderly for expansion of social and community services enhancement in their availability and use by eliminating socio-cultural, economic, and physical barriers and making the services client oriented and user-friendly. There is no study has done to the comparative study of the healthcare utilization and economic dependency for healthcare of elderly among the social and economically developed states of India.

Data Source and Methodology

One of the vital components of the schedule was dedicated to collect information that was relevant to the determination of the prevalence rate of different diseases among various age-sex groups in the several regions of the country. The schedule 25 of the 71st round follows a stratified sample design with weights. The data used in this study taken from Schedule 25 of the 71st round of NSSO. Data extracted in STATA software and cross-tab and chi-square analysis computed in SPSS software for all objectives of the study. Foranalysis, we are considering all adults aged 60 years and above in this study. In this paper, the word elderly. The percentage distribution for the respondent aged 60 and above in context to various dependent variables has been calculated using cross tabulate and chi-square test analysis to show the prevalence of the health care utilization and economic support among the elderly population in India. However the comparison between the healthcareuse and expenses of two states (Maharashtra and Kerala).

Result and Discussions

The Healthcare Utilization and Awareness among Elderly in India

It has been reported that elderly prefer going to the private hospital to seek health care services and similar services. It has been found that around 73 percent of the people use thePublic hospital to meet their needs. The significant ailments seen among the elderly are cardiovascular 27 percent, Muscular skeleton 18 percent, Endocrine nutrition 17 percent, and Respiratory 11 percent, etc. comparing the males and females, it can be seen that the males have a higher percentage of diseases. As the theory implies, marriage has a significant role to play in the healthcare and exactly being a partner in old age. From the analysis, it has also come up that those persons who are currently married 73.7 percent have a lower proportion who take health services from thepublic or private hospital than those who have never been married 90.03 percent. It is true that from a patient's out-of-pocket expenditure perspective, the net outflow is much lower in the public hospital 27.3 percent than private ones 72.7 percent.

However, from the health system, itsrequirements to be distinguished that this does not routinely translate into lower cost of service distribution in the public sector, compared to the private sector. The stated reason through the literature has been shown as through several initiatives have been done by the government, but there are various loopholes in the health system of the nation such as poor infrastructure, low salaries of the doctors and other health professionals, lack of workforce, etc. Thus, it is essential to understand why there is so much dependency to use the private sector that is having four times high charges regarding seeking health care.

Table 1: Percent distributions of elderly, who are different type of ailments by background characteristics

Background Characteristics	Infection	Endocrine Nutritional	Psychiatric Neurological	Cardio Vascular	Respiratory	Gastro Intestinal	Muscular Skeletal	Others	Total
Sex*									
Male	9.6	19.6	4.6	25.9	11.7	5.5	13.8	9.4	4966
Female	8.4	15.4	4.1	27.4	9.5	4.2	21.0	9.9	5272
Age *									
60-64	10.9	21.1	4.9	26.2	8.1	4.1	18.0	6.6	3363
65-69	8.0	18.9	3.6	26.0	11.7	6.0	17.0	8.7	2670
70-74	7.0	13.1	4.2	28.7	10.8	4.1	18.0	14.2	2069
75-79	8.5	14.2	4.3	25.2	15.0	5.6	15.4	11.9	1017
80+	9.8	11.7	4.6	27.4	10.7	4.8	19.0	12.0	1139
Marital status*									
Never married	9.2	11.8	7.7	12.4	1.5	0.6	34.0	22.8	82
Currently married	9.0	19.1	3.9	26.9	10.3	5.4	15.6	9.8	6478
Widowed	9.1	14.3	4.8	26.8	11.1	4.1	20.5	9.2	3636
Divorced/separated	0.7	47.7	12.1	12.4	4.0	1.2	6.6	15.4	42
Religion*									
Hindu	9.3	16.4	4.7	26.7	10.7	4.8	17.8	9.5	7836
Muslim	7.7	17.2	3.3	23.6	12.5	6.1	19.6	10.0	1309
Others	7.9	25.3	2.3	30.3	6.2	2.9	13.8	11.3	1093
Caste*									
ST	16.9	8.3	9.0	15.4	9.8	5.6	24.6	10.5	482
SC	11.6	16.7	4.5	19.6	12.1	3.9	20.5	11.1	1358
OBC	9.3	17.4	3.8	26.8	10.5	4.9	18.0	9.2	4285
OTHER	6.8	18.5	4.4	30.4	10.0	5.0	15.3	9.7	4113
Education *									
Not literate	12.0	10.9	4.5	20.1	13.0	6.2	23.3	10.1	4356
Literate formal Schooling	6.2	23.4	4.2	32.8	8.2	3.5	12.3	9.3	5882
Residence*									
Rural	11.8	11.2	4.6	23.2	12.5	6.0	20.7	9.9	4857
Urban	4.7	26.9	3.8	32.1	7.4	3.0	12.7	9.5	5401
Total	**(9)**	**(17)**	**(4)**	**(27)**	**(11)**	**(5)**	**(18)**	**(10)**	
N	**680**	**1919**	**577**	**2914**	**1086**	**458**	**1537**	**1067**	**10238**

Sources: National Sample Survey (NSS-71 round)

Note: *** - significant at 1 l.o.s. Note: [Others- Cancer, Blood Diseases, Eye, Ear, Skin, Genito-Urinary, Obstetric, Injuries]

The Healthcare Consumption by Elderly in India

In this chapter, importance has been given to understand the spending pattern of the elderly towards their health seeking behavior. The section has explained that the total percent of thecovered elderly population is 23.2 in urban areas and 18.7 percent in the rural areas. The majority of the aging have been covered under the government funded insurance schemes with (17.2%), where the rural (17.8%) is higher than the urban (15.9). Whereas, it should also be pertinent to note that the percentage of those not covered is estimated to be 79.8 percent in the study. Even having a higher proportion in the rural areas which is 81.3 percent than the urban 76.8 percent.

The requirement is to implement insurance services by the "Employee supported Health Protection" and a broader intervention by the insurance companies to reach elderly throughout the country irrespective of education qualification, place of residence, employment status, etc. In considering the importance of the health insurance schemes in the life of the elderly, it should also be noticed that more than 50 percent of the aged are entirely dependent on others. Where females are having a higher percentage than the males,and in rural areas, there is enormousproportion than the urban. The education has shown some better results for the elderly, but that is also negligible to mention as againa significant chunk are entirely dependent upon others.

Table 2: Percent distributions of elderly state of economic independence

Background characteristics	Not dependent on others	Partially dependent others	Fully dependent others	Total
Sex*				
Male	45.3	22.1	32.5	14395
Female	11.8	18.2	69.9	14438
**Age ** **				
60-64	35.3	21.7	43.0	10126
65-69	29.5	21.9	48.6	7979
70-74	23.2	17.9	58.9	5357
75-79	20.8	19.4	59.8	2565
80+	12.0	13.1	74.9	2806
Marital status*				
Never married	29.4	13.8	56.8	217
Currently married	35.6	21.8	42.6	18912
Widowed	15.1	17.2	67.6	9585
Divorced/separated	18.6	24.6	56.8	119

Religion*				
Hindu	28.6	20.5	50.9	22912
Muslim	24.6	18.7	56.7	3241
Others	28.4	17.6	54.0	2680
Caste*				
ST	25.3	26.0	48.8	2508
SC	27.9	22.9	49.2	4132
OBC	26.5	21.4	52.1	11567
OTHER	31.1	16.0	52.9	10626
Education *				
Not literate	19.3	20.7	60.0	14391
Literate formal Schooling	39.6	19.4	41.0	14442
Residence*				
Rural	26.6	21.4	52.0	15646
Urban	31.5	17.3	51.1	13187
Total	**-0.3**	**-0.2**	**-0.5**	
N	7591	5863	15379	28833
Sources: National Sample Survey (NSS-71 round)				
*Note: *** - significant at 1% l.o.s.*				

Comparison between the Healthcare Utilization of Two States (Maharashtra and Kerala)

Kerala and Maharashtra are the two developing nations of the country;also, Kerala is the state with a maximum number of elderly population. Hence, it is necessary to understand their utilization and healthcaredependancy , and thus a comparison has been made with another state "Maharashtra" for a comprehensive analysis. On comparing all the health related schemes available in developed states such as Kerala, Haryana, and Punjab, many of them lack in the state of Maharashtra. About the Utilization of the health care services, elderly in Maharashtra seek health services from the Public hospitals rather than the private hospitals. Health services utilization in Kerala has been reported with 36 percent in Kerala, on the other hand in Maharashtra elderly population using the private hospital is only 25.4 percent only. Kerala has given a remarkable result regarding coverage of the insurance schemes with 36.6 percent through government funded insurance plans, for same in Maharashtra has been reported as only 3.1 percent.

The apparent reason for the same has been mentioned in other literature has been theavailability of various schemes in the state of Kerala. The percentage of those not covered by any projects in Kerala is only 59.4 percent whereas in Maharashtra the rate is too high with 90.5 percent. It can be seen the difference between the states, though both are considered to be developed. Hence, it can also be said that economic development may not be necessarily leading to better health, social and cultural development is vital too.

Table 3: Percent distributions of elderly level of care in public and private hospital

Background Characteristics	Kerala		Maharashtra	
	Public Hospital	Private Hospital	Public Hospital	Private Hospital
Residence*				
Rural	65.4	34.6	76.6	23.4
Urban	62.3	37.7	71.1	28.9
Sex*				
Male	58.3	41.7	73.5	26.5
Female	68.4	31.6	75.4	24.6
Age *				
60-64	67.5	32.5	73.1	26.9
65-69	62.0	38.0	74.0	26.0
70-74	58.8	41.2	87.6	12.4
75-79	75.7	24.3	63.7	36.3
80+	57.2	42.8	70.2	29.8
Marital status*				
Never married	26.3	73.7	86.1	13.9
Currently married	60.1	39.9	72.5	27.5
Widowed	70.7	29.3	77.1	22.9
Divorced/separated	95.1	4.9	0.0	0.0
Religion*				
Hindu	64.5	35.5	74.5	25.5
Muslim	71.4	28.6	80.6	19.4
Others	56.1	43.9	67.6	32.4
Caste*				
ST	73.3	26.7	96.7	3.3
SC	77.7	22.3	80.7	19.3
OBC	66.0	34.0	67.8	32.2
Others	57.8	42.2	74.7	25.3
Education *				
Not literate	73.4	26.6	76.7	23.3
Literate formal Schooling	62.0	38.0	72.4	27.6
Total	**64%**	**36%**	**74%**	**26%**
Sources: National Sample Survey (NSS-71 round)				
*Note: *** - significant at 1% l.o.s.*				

Conclusion

The present paper has attempted to analyse the difference between two developed states of India on elderly health status from the utilization and economic dependency perspective. In the study, it has found that the senior citizens need special needs and concern through the condition of the female as compared to the male is penniless by self-perception about the health, economic and social dependency and various ailments. Based on the literature review and through the NSSO data 71st round it has been identified that several national schemes which are available in Kerala and other developed states such as Haryana and Punjab but these are missing in Maharashtra. With a leading number of elderly in the country,i.e., in Kerala, it has also estimated that the number of cases is higher in Kerala than Maharashtra.

Concerning same, ailments such as those due to infection and muscular skeletal Maharashtra are having a higher percentage when compared to Kerala.Another exciting output of the paper is that people in Kerala are keener to use private hospitals as their end concerning health-seeking behavior.The health services among the old age and the other age groups are utilized mostly in the private hospitals, unlike the oldage in Maharashtra. In Maharashtra, it has estimated that 74.6 percent of the elderly have opted for public hospitals whereas, 64 percent of the aged have reported for using public hospitals in Kerala state. The underlying factor can be the coverage of government funded insurance schemes, which have been reported as 3.1 percent in Maharashtra and 36.6 percent in Kerala. The interesting fact is that a higher coverage of government-funded insurance plans there is still less utilization of public hospitals. Also, it should understand that in Kerala percentage of people covered by the government-funded insurance plan is found more among the illiterate people and among rural areas whereas the situation is vice versa in Maharashtra state. Percentage of the elderly who are entirely dependent upon others is higher in Maharashtra, which is 56 percent and 47 percent in Kerala. It is essential to understand that the percentage of the wholly dependent female is more significant in Maharashtra,i.e., 72 percent. Other factors also play a vital part in the health status of the elderly such as an active partner, place of residence and educational attainment.

References

Alam, M. (2004), "Ageing, old age income security and reforms: An exploration of Indian situation", *Economic and Political Weekly*, pp.3731-3740.

Arokiasamy, P., Bloom, D., Lee, J., Feeney, K. and Ozolins, M. (2011), "Longitudinal aging study in India: vision, design, implementation, and some early results", *Program on the Global Demography of Aging*.

Arokiasamy, P., Bloom, D., Lee, J., Feeney, K. and Ozolins, M. (2012). "Longitudinal aging study in India: Vision, design, implementation, and preliminary findings", In *Aging in Asia: findings from new and emerging data initiatives*. National Academies Press (US).

Bharati, K. and Singh, C., (2013), "Ageing in India: Need for a Comprehensive Policy", *IIM Bangalore Research Paper*, (421).

Bloom, D.E., (2011), "India's baby boomers: dividend or disaster?", *Current History*, *110*(735), p.143.

Bloom, D.E., Canning, D. and Fink, G., (2010), "Implications of population ageing for economic growth", *Oxford review of economic policy*, *26*(4), pp.583-612.

Bloom, D.E., Mahal, A., Rosenberg, L. and Sevilla, J., (2010), "Economic security arrangements in the context of population ageing in India", *International Social Security Review*, *63*(3–4), pp.59-89.

Boersch-Supan, A.H. and Ludwig, A. (2010), *Old Europe ages: reforms and reform backlashes* (No. w15744). National Bureau of Economic Research.

Bose, A. and Shankardass, M.K. (2004). *Growing old in India: voices reveal, statistics speak*. BR Publishing Corporation.

Garg, C.C. and Karan, A.K., 2008. Reducing out-of-pocket expenditures to reduce poverty: a disaggregated analysis at rural-urban and state level in India. *Health policy and planning*, *24*(2), pp.116-128.

He, W., Sengupta, M. and Velkoff, V.A. (2005), "De− Barros, KA. 65+ In the United States", *Washington, DC: US Census Bureau*.

Kinsella, K. and Velkoff, V.A. (2001), "An Aging World: 2001", US Census Bureau. *International Population Reports*.

Maharana, B. and Ladusingh, L. (2014), "Gender disparity in health and food expenditure in India among elderly", *International Journal of Population Research*, *2014*.

Mohanty, S.K., Chauhan, R.K., Mazumdar, S. and Srivastava, A. (2014), "Out-of-pocket expenditure on health care among elderly and non-elderly households in India", *Social indicators research*, *115*(3), pp.1137-1157.

Nipun, A., Prakash, S., Kumar, S.A. and Danish, I. (2015), "Healthcare services Utilization by Geriatric population in Rural Area of District Bareilly", *India Int J Curr Microbiol App Sci*, *4*(5), pp.720-7.

Razdha Parveen. (2015), "Aging and Older People: Problem and Prospects", *International Journal of Research*, Vol.2, 5, 2015.

Registrar General, Census of India, (2001), *Socioeconomic Tables*, Office of the Registrar General, Government of India, New Delhi.

Shoven, J.B. ed. (2011), *Demography and the Economy*. University of Chicago Press.

Tandon, S.L. (2001), *Senior Citizens: Perspective for the New Millennium* (Vol. 2). Reliance Publishing House.

United Nation Population, (2012), *Building Base Knowledge Base on Population Aging in India*, New Delhi 110003: United Nation Population Fund.

United Nations, (2007), *World Population Aging 2007,* Department of Economic and Social Affairs: Population Division.

United Nations, (2009a), *Opportunities and challenges for an aging world*, AARP United Nations Briefing Series.

Musculoskeletal Disorder among Municipal Sanitary Worker in Varanasi, India

Manish Singh* and Laishram Ladusingh**

Abstract

Aim: The aim of this study is to investigate the factors associated with musculoskeletal disorder among sanitary workers, working under Varanasi Municipal Corporation, Varanasi, India.

Subjects and methods: The study has two group of municipal sanitary worker, first is waste collector group and second is sewage worker. A cross sectional study design was adopted for the study by using standard Nordic musculoskeletal and general health questionnaire. Varanasi Municipal Corporation divides the city into 90 wards, 14 sub-zones and 5 zones. Selection of 11 wards has been done by using PPS sampling technique and after complete enumeration the sample size comes out to be 275.

Results: Results from bivariate analysis suggest that sewage workers (86%) are at more risk of having MSD as compared to waste collector (82%). The result from logistic regression analysis indicates that age, use of alcohol, and perceived health condition were statistically significant with any musculoskeletal disorder while other covariates like education, working experience, and standard of living index etc. were less significant with MSD.

Conclusion: Neck and shoulder were most affected body regions in both the groups' i.e. waste collector and sewage workers.

Key words: Musculoskeletal disorder (MSD), Municipal sanitary worker, Prevalence, Nordic musculoskeletal.

Introduction

Manual handling of solid waste and its disposal is a physically demanding job that can result in a number of morbidities like musculoskeletal disorders, respiratory complaints, skin diseases, asthma, eye irritation, tuberculosis, and hypertension. A cross-sectional study on street sweepers of the Municipal Corporation of Greater Mumbai and waste pickers near the Deonar dumping ground of Mumbai showed a higher prevalence of MSDs among those two groups as compared to the control group. Among the street sweepers, the affected body parts were shoulders (32%), wrists/hands (29%), elbows (27%), and neck (17%). The prevalence of these MSDs was found to be lower in the control group (11%, 19%, 9% and 11%) as was the overall prevalence of MSDs (55% among the control group as compared to 79% among the waste pickers). Both the studies (Salve and Chokhandre, 2016; Singh and Chokhandre, 2015) showed that older age and longer work duration are significant risk factors for

*Ph.D. Candidate, International Institute for Population Sciences, Govandi Station Road Deonar Mumbai, 400088, India, manishsingh.iips@gmail.com

**Vice chancellor, Bodoland University, Assam, India, ladusingh2010@gmail.com

MSDs. Previous studies on occupational health risks among welders and auto repair mechanics shows a high prevalence (98% and 87% respectively) of MSDs among them due to the nature of their work. Results from the analysis indicate that manual handling of heavy tools, bending forward, and loading of materials cause MSD (Gbiri et al., 2012;Nasaruddinet al., 2014). A series of literature from various sources has identified the potential risk factors causing MSDs. These factors are age, gender, education, manual handling of materials, bending posture, hands above the knee level, long working hours, working in shifts, job experience, and body mass index (BMI) (Iridiastadi, 2007; Widiaet al., 2016; Baqar et al., 2015; Setoodeh et al., 2014; EkpenyongandInyang, 2014). A study on saw mill workers, dental hygienists, brick kiln workers, and workers in the metal industries – mainly iron and aluminum – found increased risk of MSDs among the workers (Qutubuddin et al., 2013; Hayes et al., 2013; Inbaraj et al., 2013; Aghilinejad et al., 2012; Mathew, 2014). A few studies have shown mental health, job stress, psychosocial factors, high work load, and time pressure to be associated with musculoskeletal complaints (Salve and Chokhandre, 2016; Mathew, 2014).

Materials and methods

Sample Size Determination: To determine the sample size, the study used the prevalence (56%) of musculoskeletal disorders from a paper published in the International Journal of Environmental Health Engineering, Volume 2, Issue 3, May-June 2013. The name of the research article (Jayakrishnan et al., 2013) is "Occupational health problems of municipal solid waste management workers in India." The formula used for determining the sample size was n= $[(Z\alpha)^2*p*q*Deff]/[d^2*r]$, where n=Sample size required, p= Estimated prevalence in population, q= 1-p, z= z value (1.96 at 5% level of significance), Deff= Design effect, r= Response rate, d= Margin of error. With p=0.56, q=0.44, Zα=1.96, Deff=1.25, d=0.07, r=0.9, the sample size came out to be 268. The study decided to select 11 census wards from three different sections to get a sufficiently large sample size.

Study design: According to Census 2011, the city of Varanasi is divided into 90 census wards. The Varanasi Municipal Corporation divides the city into 5 zones andthese are further divided by the Nagar Nigam into 14 sub-zones. JalKal, which is responsible for maintaining water supply and sewer system in Varanasi, divides the city into the same 5 zones but only 11 sub-zones. Stratified cluster sampling was used as the sampling design for the study. A total of 11 census wards were selected from the ghat area (two wards), the non ghat area (two wards) and the core city (seven wards), using the Probability Proportional to Size Sampling Technique. All sanitary workers of the selected census wards (see fig.1) were taken as respondents for the study. The names of the selected census wards from each of the three areas are given below.

Ghat Side Area: Kamaeshwarmahadev (41), Dashashwamedh (74)

Non Ghat Side Area: Tulsipur (12), Newada (28)

Core city Area: Chaukaghat (11), Naria (32), khojawa (43), Daranagar (51), Luxa (60), Lallapurakala (73), asania (85)

FIG-1: STUDY AREA IN VARANASI

MAP NOT TO SCALE
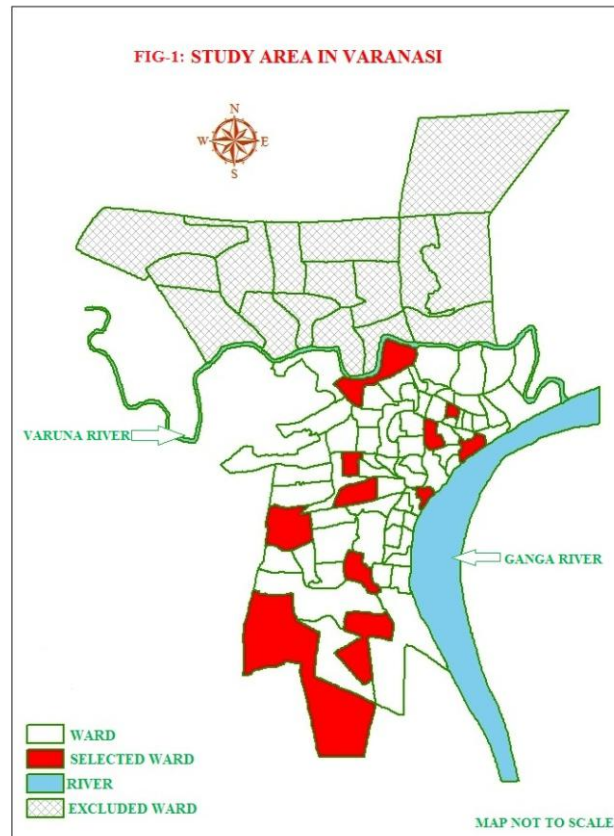
*Statistical tools***:** The data collection was completed during November-February 2015-16 by using a standardized Nordic musculoskeletal questionnaire (Kuorinka et al., 1987), and the results were summarized into descriptive statistics. Principal component analysis (PCA) was used to create a standard of living index (SLI) by using household assets like pressure cooker (no=0, yes=1), mobile phone (no=0, yes=1), cot / bed (no=0, yes=1), LPG connection (no=0, yes=1), hot plate (no=0, yes=1), electric fan (no=0, yes=1), dining table (no=0, yes=1), color television (no=0, yes=1), mixer-grinder (no=0, yes=1), bicycle (no=0, yes=1), motorcycle / scooter (no=0, yes=1) bank account (no=0, yes=1), sofa set (no=0, yes=1), refrigerator (no=0, yes=1), geyser (no=0, yes=1), and washing machine (no=0, yes=1).Cronbach's alpha (C-α) (GliemandGliem, 2003) was used to test the reliability of the questionnaire with the following rules of thumb: "C-α > .9 – Excellent, C-α > .8 – Good, C-α > .7 – Acceptable, C-α > .6 – Questionable, C-α > .5 – Poor, and C-α < .5 –Unacceptable". Chi-square test and binary logistic regression analysis were used to determine the association between musculoskeletal disorders and other factors. The data entry was completed in CSPro 6.1, and the analysis was done in IBM SPSS Statistics 22.

Results

Table1 shows the socio-economic and demographic characteristics of the municipal sanitary workers under the Varanasi Municipal Corporation, Varanasi city India. The workers included two groups, namely waste collectors and sewage workers. After the complete enumeration of 11 census wards, the sample size came out to be 224 for the waste collectors and 51 for the sewage workers. The mean age of the respondents was 37 years, with one-third of the respondents being less than or equal to 30 years of age, and around 67% of the respondents being more than 30 years of age. Most of the respondents were male (84%). Since these workers belong to the lowest socio-economic stratum, almost half of them were illiterate (50%). Only 33% of the respondents had a permanent job, while the remaining 67% were temporarily employed or were working as daily wages workers. About 47% of the respondents had a working experience of less than 10 years, while the remaining 53% had an experience of more than 10 years. About 79% of the respondents reported drinking alcohol during work time, but only 30% of them reported to be smokers. The principal component analysis technique was used to create a standard of living index on the basis of household assets of the respondents. Cronbach's alpha was used to test the reliability of the questionnaire. The value of Cronbach's alpha was 0.756, which means that the questionnaire was acceptable. Table 1 also shows that 32% of the respondents belonged to the upper quartile and the same number of respondents belonged to the lower quartile. Data was also collected for the perceived health of the respondents. Around 32% of them reportedly were in good health, while 68% were reportedly in poor health.

Table1: Percent distribution of municipal workers by some selected background characteristics in Varanasi City, India, 2015-16.

Background Characteristic	Percent (%)	Number(N)
Age (In Yrs.) Mean±S.D (37.03±11.97)		
≤30	32.7	90
>30	67.3	185
Sex		
Male	83.6	230
Female	16.4	45
Education		
Illiterate	50.2	138
Literate	49.8	137
Type of Worker		
Waste Collector	81.5	224
Sewage Worker	18.5	51

Type of Job		
Permanent Job	66.9	184
Temporary Job	33.1	91
Personal Protective Equipment (PPE)		
YES	53.5	147
NO	46.5	128
Working Experience (In Yrs.) Mean±S.D (13.51±9.24)		
≤10	46.5	128
>10	53.5	147
Alcohol Use		
Yes	79.3	218
No	20.7	57
Smoked tobacco		
Yes	29.8	82
No	70.2	193
Standard of living index (SLI) (Cronbach's alpha=0.756)		
Lower	32.0	88
Middle	36.0	99
Upper	32.0	88
Perceived Health Condition		
Good	31.6	87
Poor	68.4	188
Total	100	275

Table 2 shows the prevalence of the MSDs among the two groups of sanitary workers, namely waste collectors and sewage workers. A standardized Nordic musculoskeletal questionnaire was used to collect data on three-month prevalence of MSDs and nine affected body areas, including the neck, shoulder, elbows, wrist/hand, upper back, lower back, hips/thighs, knees, and ankles/feet. The value of Cronbach's alpha for the musculoskeletal questionnaire was 0.819, which shows that the questionnaire was good. The overall prevalence of MSDs was higher among the sewage workers (86.3%) as compared to the waste collectors (82.1%). Among waste collectors, neck (84.2%) was the most affected body part, followed by shoulder (83.2%). On the other hand, among the sewage workers, shoulder pain was higher (72.7%), followed by neck pain (70.5%). Upper and lower back (43.7%) and hip/thigh (47.8%) were the least affected body parts among the waste collectors, while they were highly affected body parts (61.4%, 65.9% and 56.8%) among the sewage workers.

Table 2: Prevalence of musculoskeletal disorder among municipal sanitary workers in the past 3 months. (Cronbach's alpha=0.819)

Health problems	Waste Collector		Sewage Worker	
	Percent	Number	Percent	Number
Musculoskeletal Disorder (Any)			χ^2=0.50 , p=0.479	
Yes	82.1	184	86.3	44
Total		224		51
Neck			χ^2=4.49 , p=0.034	
Yes	84.2	155	70.5	31
Shoulder			χ^2=2.52 , p=0.112	
Yes	83.2	153	72.7	32
Elbows			χ^2=0.04 , p=0.836	
Yes	63.0	116	61.4	27
Wrist/Hand			χ^2=1.07 , p=0.301	
Yes	52.7	97	61.4	27
Upper Back			χ^2=2.82 , p=0.093	
Yes	47.3	87	61.4	27
Lower Back			χ^2=4.93 , p=0.026	
Yes	47.3	87	65.9	29
Hips/Thigh			χ^2=1.15 , p=0.284	
Yes	47.8	88	56.8	25
Knees			χ^2=0.48 , p=0.489	
Yes	64.7	119	59.1	26
Ankles/Feet			χ^2=1.46 , p=0.227	
Yes	72.8	134	63.6	28
Total		184		44

Results from the logistic regression analysis have been shown in Table 3 and are arranged by selected background characteristics and nine affected body sites. Age is one of the most important demographic variables affecting the occurrence of musculoskeletal disorders among sewage workers. A statistically significant association of MSDs was found among workers who were more than 30 years old (OR 2.48, p=0.10), with the most affected body part being ankles/feet (OR 2.71, p=0.05). Education was found to play a crucial role in determining MSDs, with statistically significant increased odds ratios for workers having no education with respect to elbows (OR 2.48, p=0.01), wrist/hand (OR 3.22, p=0.01), upper back (OR 3.72, p=0.01), lower back (OR 5.47, p=0.01), hips/thighs (OR=3.18, p=0.01), knees (OR 1.77, p=0.10), and ankles/feet (OR 1.85, p=0.10). For sewage workers, a significant positive association was found for wrist/hand (OR 2.03, p=0.10), upper back (OR 3.31, p=0.01), lower back (OR 4.68, p=0.01), and hips/thighs (OR 2.15, p=0.10). No statistically significant difference was found between permanent and temporary workers. Also, the use of personal protective equipment did not show any positive association with MSDs. The risk of having a MSD increases with working

experience. Workers who had a working experience of more than 10 years were more likely to have upper back (OR 2.55, p=0.05) and lower back pain (OR 2.27, p=0.05).

Alcohol increased the risk of MSDs overall (OR 2.96, p=0.01), whereas the habit of smoking affected lower back pain (OR 3.13, p=0.01). It was found that workers with a medium standard of living experienced a high chance of having upper back (OR 3.42, p=0.01) and lower back pain (OR 3.46, p=0.01). Information collected on the perceived health condition of the sanitary workers revealed a highly positive significant association for workers with poor health conditions (OR 3.00, p=0.01). The affected body regions were neck (OR 2.99, p=0.05), shoulder (OR 3.22, p=0.05), upper back (OR 2.29, p=0.10), and hips/thighs (OR 2.57, p=0.05). Results from the analysis indicate that as the health of the workers deteriorated, the chance of MSDs increased drastically.

Table3: Binary logistic regression model estimates the odds ratios and confidence intervals for musculoskeletal complaints and nine effected body parts among municipal workers in VMC, Varanasi city, India, 2015-16

Background characteristic	ANY		NECK		SHOULDER		ELBOWS		WRIST/HAND	
	OR	95% C.I.	OR	95% C.I.	OR	95% C.I.	OR	95% C.I.	OR	95% C.I.
Age (In Yrs.)										
≤30®										
>30	2.48*	(0.91-6.79)	2.05	(0.71-5.95)	1.61	(0.59-4.43)	1.07	(0.44-2.60)	1.72	(0.71-4.15)
Education										
Literate®										
Illiterate	1.08	(0.46-2.53)	1.48	(0.67-3.30)	1.06	(0.48-2.34)	2.48***	(1.33-4.63)	3.22***	(1.72-6.04)
Type of Worker										
Waste Collector®										
Sewage Worker	1.21	(0.42-3.50)	0.49	(0.20-1.22)	0.69	(0.28-1.71)	1.16	(0.53-2.52)	2.03*	(0.92-4.49)
Type of Job										
Temporary Job®										
Permanent Job	0.97	(0.38-2.49)	0.97	(0.40-2.38)	0.87	(0.37-2.06)	0.84	(0.43-1.66)	1.28	(0.65-2.51)
Personal Protective Equipment (PPE)										
NO®										
YES	1.45	(0.69-3.05)	0.85	(0.38-1.90)	0.68	(0.31-1.50)	0.68	(0.36-1.30)	1.05	(0.56-1.97)
Working Experience (In Yrs.)										
≤10®										
>10	1.38	(0.52-3.70)	0.78	(0.30-2.03)	1.61	(0.65-4.02)	1.22	(0.59-2.55)	1.08	(0.52-2.23)
Alcohol Use										
No®										
Yes	2.96***	(1.26-6.94)	0.93	(0.30-2.91)	0.43	(0.13-1.45)	0.47	(0.18-1.21)	0.57	(0.23-1.39)
Smoked tobacco										
No®										
Yes	0.98	(0.40-2.42)	0.57	(0.26-1.25)	1.03	(0.46-2.30)	1.17	(0.61-2.25)	1.33	(0.70-2.56)
Standard of living index (SLI)										
Upper®										
Middle	0.63	(0.23-1.72)	0.98	(0.36-2.70)	0.97	(0.35-2.67)	1.14	(0.50-2.58)	1.34	(0.60-2.98)
Lower	1.32	(0.46-3.75)	1.33	(0.52-3.38)	0.97	(0.39-2.40)	0.73	(0.36-1.49)	0.67	(0.33-1.35)
Perceived Health Condition										
Good®										
Poor	3.00**	(1.22-7.39)	2.99**	(1.21-7.39)	3.22***	(1.29-7.99)	1.79	(0.80-4.02)	1.23	(0.55-2.77)
®=Reference category, *p<0.10,**p<0.05 ,***p<0.01, OR=Odds Ratio										

Table3: Continue.....

Background characteristic	UPPER BACK		LOWER BACK		HIPS/ THIGH		KNEES		ANKLES/ FEET	
	OR	95% C.I.	OR	95% C.I.	OR	95% C.I.	OR	95% C.I.	OR	95% C.I.
Age (In Yrs.)										
≤30®										
>30	1.83	(0.68-4.92)	2.29	(0.82-6.37)	1.5	(0.60-3.75)	1.92	(0.82-4.50)	2.71**	(1.10-6.70)
Education										
Literate®										
Illiterate	3.72***	(1.89-7.31)	5.47***	(2.61-11.49)	3.18***	(1.67-6.05)	1.77*	(0.94-3.36)	1.85*	(0.94-3.64)
Type of Worker										
Waste Collector®										
Sewage Worker	3.31***	(1.35-8.13)	4.68***	(1.81-12.13)	2.15*	(0.94-4.92)	0.81	(0.38-1.76)	0.57	(0.25-1.28)
Type of Job										
Temporary Job®										
Permanent Job	0.75	(0.37-1.53)	1.44	(0.68-3.06)	1.35	(0.68-2.68)	1.38	(0.70-2.73)	1.45	(0.69-3.04)
Personal Protective Equipment (PPE)										
NO®										
YES	1.00	(0.50-2.00)	0.78	(0.38-1.60)	0.62	(0.32-1.20)	0.85	(0.45-1.61)	0.79	(0.40-1.54)
Working Experience (In Yrs.)										
≤10®										
>10	2.55**	(1.15-5.65)	2.27**	(0.99-5.20)	1.21	(0.58-2.55)	0.93	(0.45-1.90)	0.61	(0.28-1.35)
Alcohol Use										
No®										
Yes	0.47	(0.18-1.26)	0.50	(0.18-1.36)	0.78	(0.31-1.95)	1.38	(0.58-3.27)	2.34*	(0.98-5.61)
Smoked tobacco										
No®										
Yes	1.65	(0.81-3.39)	3.13***	(1.44-6.80)	1.23	(0.63-2.41)	1.15	(0.59-2.23)	0.76	(0.38-1.53)
Standard of living index (SLI)										
Upper®										
Middle	3.42***	(1.41-8.30)	3.46***	(1.36-8.81)	1.27	(0.56-2.89)	0.75	(0.33-1.72)	0.58	(0.24-1.39)
Lower	0.75	(0.35-1.59)	0.71	(0.33-1.54)	0.61	(0.29-1.25)	0.49**	(0.24-1.01)	0.63	(0.29-1.39)
Perceived Health Condition										
Good®										
Poor	2.29*	(0.93-5.69)	1.51	(0.59-3.87)	2.57**	(1.09-6.05)	1.33	(0.60-2.94)	0.94	(0.41-2.15)
®=Reference category, *p<0.10,**p<0.05 ,***p<0.01, OR=Odds Ratio										

Discussion

The objective of this study was to investigate the prevalence of MSDs among municipal sanitary workers in the Varanasi municipal corporation, Varanasi India. Municipal sanitary workers consisted of two groups, namely waste collectors (224) and sewage workers (51). The independent variable used in the study were age, education, type of worker, type of job, personal protective equipment, working experience, use of alcohol, smoking, a standard of living index, and perceived health condition. All the independent variables were more or less statistically significantly associated with MSDs except for type of job and use of personal protective equipment. This may be because permanent and temporary workers have the same kind of job exposure, same working conditions, and the same kind of exposure to hazardous work. Bivariate analysis shows that 46.5% of the workers did not use any personal protective equipment. Those who were found to use them were using traditional equipment, which was not capable of protecting them from the dangers of hazardous waste.

It was found that more than half of the workers do not use any personal protective equipment at their workplaces. Those that do make use of old or primitive methods, such as tin plates, small brooms and bamboo sticks, which do not provide adequate protection from risks and hazards. It is recommended that the workers are issued modern tools and equipment (gumboot/safety shoes, coat, hand gloves, mask, carbolic soap, towel, rain suit, reflecting jacket, cap, safety belt etc.). It is also suggested that Varanasi Municipal Corporation trains the workers in the proper use of these equipment. The overall prevalence of MSDs among waste collectors was found to be 82.1%, which is lower (90.8%) as compared to the prevalence found by the study conducted by Reddy and Yasobant (2015). A study conducted by Giri et al. (2010) found a lower back pain prevalence of 68% among sewage workers, which is close to the findings of the present study (66%). Another study by Tiwari (2008) on sewage workers showed neck, upper back and lower back pain to the extent of 52.4%, 54.8% and 72.8% respectively, whereas the current study shows a higher prevalence at 70.5%, 61.4% and 66% respectively. The present study shows that prevalence of upper and lower back pain among waste collectors to be at 47.3%, which is close to what was found by a study conducted in Palestine (Milhem, 2004) (45.7%) among municipal waste collectors. Recently, two studies (Salve and Chokhandre, 2016; Singh and Chokhandre, 2015)conducted in the city of Mumbai – the economic capital of India and also one of its largest cities – found a lower prevalence of MSDs among waste pickers (79%) and street sweepers (shoulder 32%) as compared to the present study. This is because Varanasi is one of the oldest inhabited cities in the world as a result of which its streets are very narrow. It is difficult to collect garbage with machines, and all the collection depends on the physical power of the workers. On the other hand, Mumbai is a modern city with wide roads and equipped with modern equipment like automated hydraulic trucks, two wheeled containers, etc.

In many developing countries including India (Reddy andYasobant, 2015), solid waste collection is done manually, which requires heavy physical activity such as lifting, carrying, pulling and pushing. This may be the cause of a high prevalence of MSDs in these countries. A high prevalence of MSDs among waste collectors has been reported in Egypt (Abou-ElWafa et al., 2012), Palestine (Milhem, 2004), Nigeria (Inyang, 2007), Iran (Mehrdad et al., 2008), and India (Reddy andYasobant, 2015). These workers also belong to the lowest socio-economic stratum, and have low educational levels, insufficient income and large families.

In India, the working conditions of these workers are unfavorable, and they mainly belong to the scheduled caste communities (Salve and Chokhandre, 2016), which were previously considered untouchable and historically assigned cleaning work. The present study too found more than 90% of the workers to belong to the scheduled caste communities (table not shown).

Results from the present study indicate that age was statistically significant with MSDs, meaning that

with the advancement of age, the risk of MSDs increased, which has also been confirmed by other studies (Salve and Chokhandre, 2016; Singh and Chokhandre, 2015; Reddy and Yasobant, 2015). The present study found that workers aged 30 years or more were 2.5 times more likely to have MSDs. A similar result was found by a study conducted among municipal solid waste workers of Chennai (OR 2.75 25-35 years) (Reddy and Yasobant, 2015). The Chennai study also found that workers who had less education and belonged to the lower wealth quintile had a greater chance of developing MSDs, which has been found in the present study too. Less educated workers lack knowledge regarding the ideal posture to maintain while working. A series of studies (Salve and Chokhandre, 2016; Singh and Chokhandre, 2015; Reddy and Yasobant, 2015)in India have suggested that long working experience is a significant predictor of increased likelihood of contracting MSDs. A study conducted by Singh and Chokhandre (2015)found increased odds ratio workers a having working experience of more than 10 years, particularly for the upper back (OR 3.28, $p<0.01$), the lower back (OR 2.99, $p<0.01$), and the knees (OR 2.27, $p<0.01$). Similar results were found in the present study, in that workers with a working experience of more than 10 years were found to have increased odds ratio, particularly for upper back (OR 2.55, $p=0.05$) and lower back pain (OR 2.27, $p=0.05$).

In India, a study (Singh et al., 2012) done in small scale forging units in Ludhiana and Jalandhar found a significant association between the prevalence of MSDs and drug addiction habits like alcoholism and smoking. The present study also found that alcohol consumption and the habit of smoking increased the risk of MSDs. The study found high prevalence of substance use among workers. There must be a focused effort at raising awareness of the dangers of substance use. A dedicated health education program for the sanitary workers is a necessity.

Conclusion

The bivariate analysis suggests that sewage workers are more at risk of having MSDs as compared to waste collectors. Neck and shoulder were the most affected body regions among both the groups. Bivariate logistic regression analysis suggests that age, education, working experience, use of alcohol, smoking, standard of living, and general health condition were positively associated with MSDs. On the other hand, the use of personal protective equipment and type of job did not show any association with MSDs.

List of abbreviations

MSD: Musculoskeletal Disorder

OR: Odds Ratio

VMC: Varanasi Municipal Corporation

BMI: Body Mass Index

PPS: Probability Proportional to Size

PCA: Principal component analysis

C.I.: Confidence Interval

PPE: Personal Protective Equipment

SLI: Standard of living index

Limitation of the study

The study was self-reported in nature; so there is a possibility of over- and underestimation of the prevalence of MSDs. Also, we did not have any measurement scale for measuring the intensity of the pain or discomfort.

References

Abou-ElWafa, H.S., El-Bestar, S.F., El-Gilany, A.H. and Awad, E.E.S., (2012). Musculoskeletal disorders among municipal solid waste collectors in Mansoura, Egypt: a cross-sectional study. *BMJ open*, *2*(5), p.e001338.

Aghilinejad, M., Javad Mousavi, S.A., Nouri, M.K. and Ahmadi, A.B., (2012). Work-related musculoskeletal complaints among workers of Iranian aluminum industries. *Archives of environmental & occupational health*, *67*(2), pp.98-102.

Baqar, M., Arslan, M., Jamil, N. and Zahid, H., (2015). Prevalence of Work-Related Musculoskeletal Symptoms (WMSS) among the Motorcycle Mechanics of Lahore, Pakistan. *Iranian journal of public health*, *44*(12), pp.1708-1709.

Ekpenyong, C.E. and Inyang, U.C., (2014). Associations between worker characteristics, workplace factors, and work-related musculoskeletal disorders: a cross-sectional study of male construction workers in Nigeria. *International Journal of Occupational Safety and Ergonomics*, *20*(3), pp.447-462.

Gbiri, C.A., Osho, A.O. and Olumiji, A., (2012). Prevalence, pattern and impact of work-related musculoskeletal disorders on functional performance of welders in a nigeria rural-urban center. *Journal of Occupational Health and Epidemiology*, *1*(2), pp.87-94.

Giri, P.A., Kasbe, A.M. and Aras, R.Y., (2010). A study on morbidity profile of sewage workers in Mumbai city. *International Journal of Collaborative Research on Internal Medicine & Public Health*, *2*(12), pp.450-463.

Gliem, J.A. and Gliem, R.R., (2003). Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for Likert-type scales. Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education.

Hayes, M.J., Smith, D.R. and Taylor, J.A., (2013). Musculoskeletal disorders and symptom severity among Australian dental hygienists. *BMC research notes*, *6*(1), p.250.

Inbaraj, L.R., Haebar, O.J., Saj, F., Dawson, S., Paul, P., Prabhakar, A.K.P., Mohan, V.R. and Alex, R.G., (2013). Prevalence of musculoskeletal disorders among brick kiln workers in rural Southern India. *Indian journal of occupational and environmental medicine*, *17*(2), p.71.

Inyang, M., 2007, August. Health and safety risks amongst the municipal solid waste collectors in Port Harcourt Metropolis of the Niger Delta Region of Nigeria. In *International Conference "Waste*

Management, Environmental Geotechnology and Global Sustainable Development (Vol. 7, p. 58).

Iridiastadi, H., (2007). Prevalence of Musculoskeletal Symtomps among Indonesian Workers: A Preliminary Study. In *Pan-Pacific Conference on Occupational Ergonomics. Thailand.*

Jayakrishnan, T., Jeeja, M.C. and Bhaskar, R., (2013). Occupational health problems of municipal solid waste management workers in India. *International Journal of Environmental Health Engineering*, *2*(1), p.42.

Kuorinka, I., Jonsson, B., Kilbom, A., Vinterberg, H., Biering-Sørensen, F., Andersson, G. and Jørgensen, K., (1987). Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. *Applied ergonomics*, *18*(3), pp.233-237.

Mathew, L., (2014). Influence of Job Stress on Musculoskeletal Disorders Among Employees in Construction Industries in Kerala. *IJETT*, *17*(8), pp.361-68.

Mehrdad, R., Majlessi-Nasr, M., Aminian, O. and Malekahmadi, S.S.F., (2008). Musculoskeletal disorders among municipal solid waste workers. *ActaMedicaIranica*, pp.233-238.

Milhem, A.K.M., (2004). Investigation of occupational health and safety hazards among domestic waste collectors in Bethlehem and Hebron Districts. *Nablus: An-Najah National University.*

Nasaruddin, A.F.A., Tamrin, S.B.M. and Karuppiah, K., (2014). The prevalence of musculoskeletal disorder and the association with risk factors among auto repair mechanics in klang valley, Malaysia. *Iranian Journal of Public Health*, *43*(Supple 3), pp.34-41.

Qutubuddin, S.M., Hebbal, S.S. and Kumar, A.C.S., (2013). An ergonomic study of work related musculoskeletal disorder risks in Indian Saw Mills. *Journal of Mechanical and Civil Engineering*, *7*(5), pp.7-13.

Reddy, E.M. and Yasobant, S., (2015). Musculoskeletal disorders among municipal solid waste workers in India: A cross-sectional risk assessment. *Journal of Family medicine and Primary care*, *4*(4), p.519.

Salve, P.S. and Chokhandre, P., (2016). Assessing the exposure of street sweeping and potential risk factors for developing musculoskeletal disorders and related disabilities: a cross-sectional study. *BMJ open*, *6*(12), p.e012354.

Setoodeh, H., Nazaripoor, E., Haghayegh, A. and ShabanSarvestani, S., (2014). Risk Assessment of Musculoskeletal Disorders and Determination of the Associated Factors among Workers of a Dairy Products Factory. *Journal of Health Sciences & Surveillance System*, *2*(4), pp.134-139.

Singh, J., Kocher, G. and Lal, H., (2012). Musculoskeletal disorder among workers in small scale forging industry. *International Journal of Applied Research in Mechanical Engineering*, *2*(2), p.52.

Singh, S. and Chokhandre, P., (2015). Assessing the impact of waste picking on musculoskeletal disorders among waste pickers in Mumbai, India: a cross-sectional study. *BMJ open*, *5*(9), p.e008474.

Tiwari, R.R., (2008). Occupational health hazards in sewage and sanitary workers. *Indian journal of occupational and environmental medicine*, *12*(3), p.112.

Widia, M. and Dawal, S.Z.M., (2016). The relation of risk factors and musculoskeletal discomfort among manual material handling workers in Malaysian automotive industries. *Malaysian Journal of Public Health Medicine*, (1), pp.124-133.

Popular Articles
Alzheimer's Disease; Symptoms and Treatment

She was one of the most successful prime ministers of a country which had colonised a large part of the world. She was known to take very tough decisions, she knew the state craft at the tip of her fingers but there came a stage when she had to be reminded as to who she was and what she had to do throughout the day. Who are we talking of? is she a fictional character? No she is someone who lived in flesh and blood, not so long ago. That is Margaret Thatcher who suffered from Alzheimer's disease during the last few years of her life. Alzheimer's disease (also called dementia of the Alzheimer's type) is a type of dementia found in the elderly, usually appearing during the 60s and 70s. Occasionallyit may start during the 40s or 50s. Millions of people are afflicted with this disease worldwide. A person with this disease shows impairment in memory – inability to learn new information and also inability to recall previously learned information, accompanied by inability to recognize or identify objects, disturbance in planning, organizing, impaired motor functioning and impaired language abilities. In advanced stages they may not be able to feed, bath or dress themselves. They may wander away from home and get lost. This disorder is characterized by multiple cognitive deficits that develop gradually and steadily. Social impact of the disorder is in terms of withdrawing from social life as they start losing interest in others. The symptoms are more as the day advances and that is why it is also referred to as "sundowner syndrome". A person may live upto eight to ten years after the onset of the disorder. As the disorder develops they start losing the ability to recognize their family members. In the final stages they will not be able to recognize themselves in the mirror and this is called prosopagnosia.

Causes and Treatment

It is a progressive disease and the main cause of Alzheimer's dementia, according to many researches, is the protein build up in the brain leading to formation of plaques and neurofibrillary tangles because of which neural communication is hampered and hence the deterioration. Per se there is no cure for this disease. Treatment mainly focuses on helping patients cope with the continuing loss of cognitive skills and helping caregivers cope with the stress of caring for the affected person. One of the important aspect of any treatment plan is to adapt the living situation to the needs of the person with the disorder.

Prevention of the Disorder

Though there are no known preventive methods, some of the researches report that one of the ways by which Alzheimer's disease can be prevented is by keeping oneself physically and mentally active. Yoga is proved to be an effective way for prevention.

Author: Manjula M.Y., Professor, department of Psychology, CHRIST college (Deemed to be University), Bengaluru. Former dean for PG studies, SDM autonomous college, Ujire, Dakshina Kannada district, Karnataka.

Social Health and Life-style Manifestation

Health is one of the basic necessities of human life. Human body's efficiency always depends of stable health. Health and illness of a society depends on the relationship to social institutions such as the family, work, school, caste and religion Health, or lack of health, was once simply attributed to biological or natural conditions. Many studies demonstrated that the spread of diseases is heavily influenced by the socioeconomic status of individuals, ethnic traditions or beliefs, and other cultural factors. Medical research may collect data on a disease; a sociological perspective of an illness would provide insight on what external factors caused the demographics that contracted the disease to become ill.

Social Epidemiology

In recent time the study of social epidemiology also gained more prominence in the study of health and illness. It highlights how social problems are connected to the health of different populations. These epidemiological studies show that the health problems, for example, of developed countries vary greatly from those of developing countries. Some diseases, like cancer, are universal. But others, like obesity, heart disease, respiratory disease, and diabetes are much more common in high-income countries, and are a direct result of a sedentary lifestyle combined with poor diet. High-income nations also have a higher incidence of depression. In contrast, low-income nations suffer significantly from malaria and tuberculosis. Wallace Huffman and his fellow researchers concluded that several socio-economic factors are contributing to the rise in obesity in developed countries. They are: a) Improvements in technology and reduced family size have led to a reduction of work to be done in household production. b) Unhealthy market goods, including processed foods, sweetened drinks, and sweet and salty snacks are replacing home-produced goods. c) Leisure activities are growing more sedentary; for example, computer games, web surfing, and television viewing. d) More workers are shifting from active work (agriculture and manufacturing) to service industries. c) Increased access to passive transportation has led to more driving and less walking. These factors found more and more in cities and metros as well as in rural areas in our country. Today's younger generations resemble these conclusions. One of the recent additions to health concerns are today's young or so called networked generation's sleep hygiene. It means the lifestyle and sleep habits that contribute to sleeplessness or insomnia. Dreadful habits and software working conditions can lead to sleeplessness include inconsistent bedtimes, lack of exercise, late-night employment, napping during the day, and sleep environments that include noise, lights, or screen time .

Author: Shaukath Azim, Professor, department of Sociology, Karnatak University, Dharwad

Globalization of Ill-health

Mood disasters, rather than mental disorder are also increasing. Our What-sapped and face booked generation greatly affected by these latest developments. Consumption of advertised food than home food is modern day avatar especially among children. Globalization of ill-health is spreading very fast. One of the notable trends regarding health is mobility of village girls to urban centres. Hitherto they were very well nourished in their respective places. But sudden in-flow of girls especially in search of higher degrees, job opportunities, and draught conditions pushed them to urban areas. But low level of food and the lack of nutritious consumption made these girls to prone various diseases and poor immunes. Most of the malls now-a-days crowded by young girls. These girls certainly affected by 'mall-nutrition'. Another problem of ill-health is hidden huger. According to Global Hunger Index(2014) hidden huger has become a major cause for ill-health and under-nutrition among children. Hidden hunger is a form of under-nutrition that occurs when intake and absorption of vitamins and minerals (such as zinc, iodine, and iron) are too low to sustain good health and development. Factors that contribute to micronutrient deficiencies include poor diet, increased micronutrient needs during certain life stages, such as pregnancy and lactation, and health problems such as diseases, infections, or parasites. On the whole due to poor social health status, the social order and functioning of society is being disrupted frequently.

Limiting our materialist demand, physical activeness, balanced diet, balanced mind, coming out of sedentary life-style and stress free attitude are the key factors boosting the social health and overall social welfare.

Diabetic Retinopathy; Clinical Changes and Treatment

Diabetes Mellitus is one of the common diseases in India. Diabetes leading to change in the nerve layer called retina in the eye is known as diabetic retinopathy. Diabetic retinopathy remains the leading cause of blindness among diabetic patient. Its prevalence is up to 40 per cent that means some form of diabetic retinopathy (DR) changes are seen in 40 per cent of diabetics. It is sight threatening in up to 10 per cent. The severity is more common in type 1 than in type 2 diabetes mellitus.

Risk Factors

About 40 per cent of diabetes patients who develop DR will have some risk factors like: duration of diabetes, more the number of years a person has diabetes more the risk of developing DR. Similarly, poor control of diabetes, pregnancy with diabetes, Hypertension, Nephropathy (diabetic kidney disease) and others like hyperlipidemia, smoking, obesity and anemia etc can increase the rate of changes occurring in DR. More number of risk factors a person is having more the risk of blindness.

Clinical Manifestations

Patients with diabetes more than 10-15 years will have some minute DR changes. If the patient has good control of diabetes he may not develop any vision problems. If the person has risk factors, changes will be occurring very fast and vision problems can start within five to ten years of diabetes. There are different grades in diabetic retinopathy (DR), ranging from mild DR to severe DR.

Following pictures show some of the DR changes in retina. If the changes occur within the circle called macula will produce vision problems.The part of retina within yellow circle is the most important part of retina;changes occurring in this area are the commonest cause for decreased vision in diabetes.
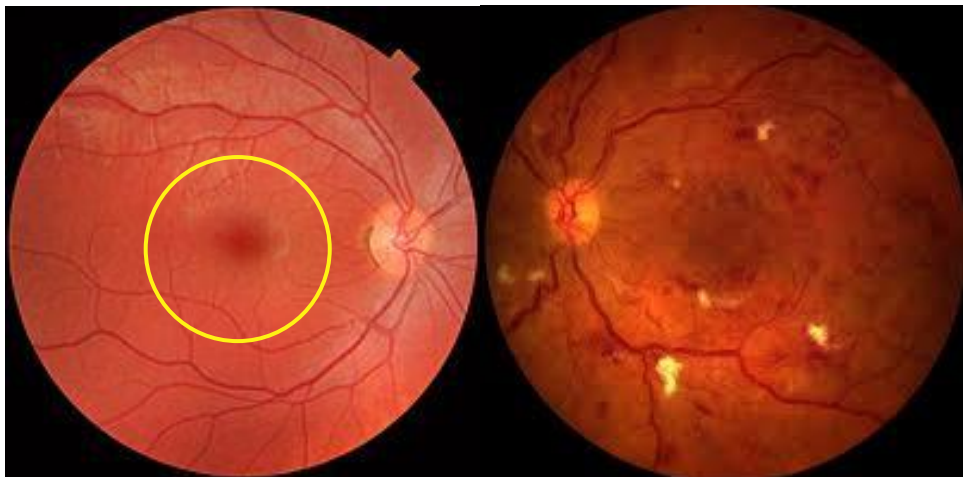
Author: Dr. Shankargouda Patil, Professor and Head, Dept. of Ophthalmology, SDM University, Dharwad.

Most of the time patients with DR are asymptomatic and are diagnosed on routine examination. The earliest visual disturbance in mild to moderate DR may be central blurring of images, waviness of objects or central dark spots or letters may appear distorted. This is due to swelling or bleeding or accumulation of blood contents in the macular area of retina.

Normal   Macular pathology
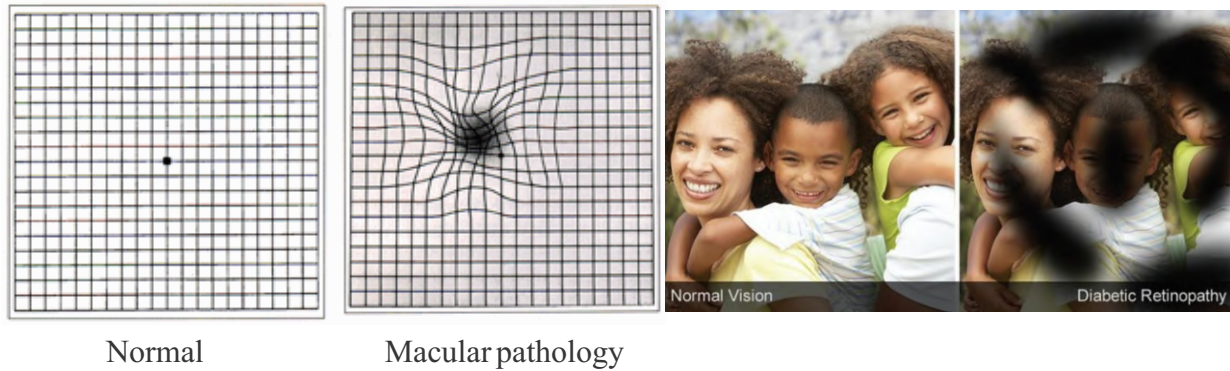
Sometimes the patient may come with sever DR. That is with sudden loss of vision due to severe bleeding in the eye because of rupture of newly formed vessels which are abnormal. Retinal detachment may occur due to development of fibrosis. Newly formed vessel can also cause glaucoma which is very difficult to treat. Following pictures show of severe DR.
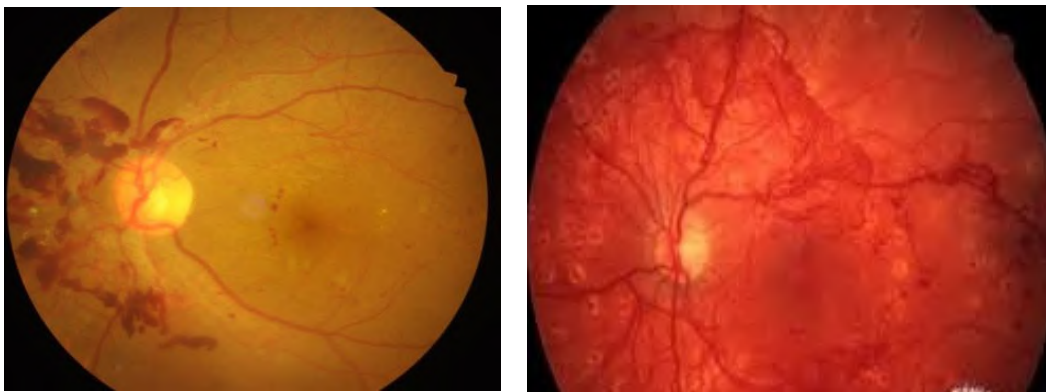
Neovascularization of Disc

Once DR is detected further investigations like fluorescein angiography, OCT and other tests will tell about severity and extent of disease, which also help in planning treatment and future observation.

Line of Treatment.

The first important treatment is strict control of diabetes with medicines as told by physician and healthy life style.

Second important thing is regular follow-up with eye specialist, who can detect early changes in retina

and treat accordingly. The follow-up can vary from once a year to every three month depending on severity of DR.

Most of the time mild to moderate DR may not require any treatment except diabetes control but if macula is affected even mild to moderate DR needs to be treated with laser or injections in the eye and rarely surgery. All severe DR need definite treatment with laser or injections or surgery, sometimes all three can be needed. One important thing patients with DR should remember is once visual problems start not all will get back vision with treatment, but still they must be treated to retain existing vision and to avoid complications like retinal detachment, glaucoma. When DR is not controlled the treatment cost will keep increasing. Hence strict control of blood sugar and healthy life style are the only thing which may help in preventing DR.

Never miss a follow-up with eye specialist.

Health for All: Ayushman Bharat Initiative

Although India is making a credible upward development in the economic arena in the world, we have been left far behind as far as the healthcare of citizen is concerned. India is placed at the 33rd position from the bottom among the 195 countries in health ranking which is done based on death rates due to 32 treatable diseases. The basic reasons for such a pathetic condition is that people in general are not afford for health care services. In India, major share of the treatment cost is borne by the individuals and government support is limited only to get primary care. Almost 70 to 80 percent of the treatment cost in the country is borne by the people from their pocket. According to an estimation, this kind of situation is pushing the 38 million middle income families below the poverty line every year. Therefore, such context calls for some sort of healthcare support from the government to safeguard the population, especially the weaker sections. The Sustainable Development Goals set by the United Nations also emphasises that the developing countries should provide health protection to its population to effectively face the medical emergencies.

In order to ensure Universal Healthcare (UHC) and to effectively address issue of increasing medical cost, the Government of India has launched a comprehensive mega health protection scheme "*Ayushman Bharat*" on September 23, 2018. The scheme is aimed to facilitate the poor and vulnerable population to access the healthcare particularly the secondary and tertiary care for their health shocks and to reduce the out of pocket spending (OOPS). The scheme has two components namely, health and wellness centres (HWCs) and Pradhan Mantri – Jan Arogya Yojana (PM-JAY).

Health and Wellness Centres: The first component of the Ayushman Bharat focuses on primary healthcare to the population which is being ensured through the establishing 1,50,000 HWCs across the country in a phased manner by upgrading the selected sub-centres to Health and Wellness Centres(HWCs). All the envisaged centres will be operationalized by the end of the year 2022. It addresses preventive, promotive and curative care services at the primary level. It provides maternal and child health services, non-communicable diseases, elderly care, palliative care, including essential drugs and diagnostic services and referral service. It is expected that the HWCs would reduce the load on government hospitals so that they can focus on secondary and tertiary care. The centre is headed by a Mid-Level Officer who has undergone a training in a 6 months certification programme in community medicine and two multipurpose health workers (male/female) who act as supportive staff.

Author: Dr Rajarama K E T, Assistant Director, JSS Institute of Economic Research, Population Research Centre, Dharwad, Karnataka.

Pradhan Mantri –Jan Arogya Yojana (PM-JAY): The second part of the Ayushman Bharat- Pradhan Mantri –PM-JAY, is one of the most ambitious healthcare programmes ever launched, expected to cover 10.74 crore families. In terms of population coverage, it will be 50 crore people and about 44 percent of India's population. The PMJAY ensures cashless secondary and tertiary care up to 5 Lac rupees to the poor and deprived families and identified occupational categories of urban workers' families through a network of public and private empanelled hospitals. There is no cap on size or age of family members. It covers both pre-existing diseases as well as new illness from the day one of enrolment in the scheme. The admitted patients are entitled to get cost of hospital room, pre and post hospitalization costs, drugs diagnostics, procedures and fixed transportation allowance payable from home to hospital. About 1350 medical procedures and interventions are covered, whose prices are set by the government on a pan India basis and being implemented by over 13,000 private hospitals across the country in addition to the government hospitals. The beneficiaries will get personalized letter of enrolment with unique family code after enrolment in the scheme. The premium will be paid jointly by the central and state governments in the ratio of 60:40. It will be in the range of Rs. 450 to 1300, varying across the states. In order to facilitate the beneficiaries, 4000 Pradhan Mantri Aarogya Mitras (PMAMs) have been trained and positioned at different hospitals across India. The eligible families can make online enrolment under the scheme by producing their ration cards and Aadhar card in any government hospitals or civil service centres. Middle class families whose annual household income is less than 500000 rupees can also enrol under the scheme of co-payment basis (70%:30 %). About 10 lakh patients have been benefited from the scheme after launching the programme.

Challenges: The scheme of this magnitude would be a challenging to implement in a short time. The government needs to build enormous infrastructure, train several thousand of healthcare personnel, and ensure the required amount of fund flow to the programme. There exists a large gap among the general population in the awareness of the programme, which is required to be addressed. Further government should properly be conveyed to the community that the duping individuals will liable to punish. It is worth mentioning here that not only poor but even a significant proportion of the middle income families too slip into the below poverty line when someone in the family fall into serious illness and get hospitalized. Therefore, government should come out with some sort of health protection schemes which cover the health insurance of the middle income families like the earlier Yashasvini scheme in Karnataka. Otherwise, they can reduce the co-payment ratio of non BPL beneficiaries from the existing 70: 30 percent to 60:40 percent.

It is certainly a gamechanging programme for weaker sections in the country and can potentially change the face of the medical service in India. Let us hope the government will effectively implement the programme and save the poor families from the impoverishment due to high payment made on medical emergencies.
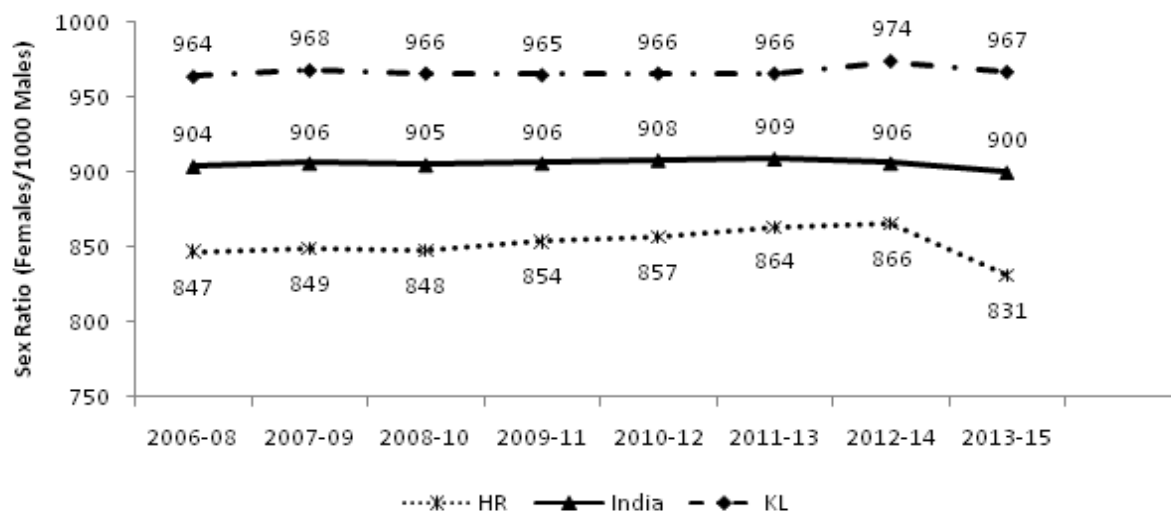
Current Statistics

Figure 1: Sex Ratio at Birth (Females per 1000 Males) – India & Larger States, SRS, 2013-15.
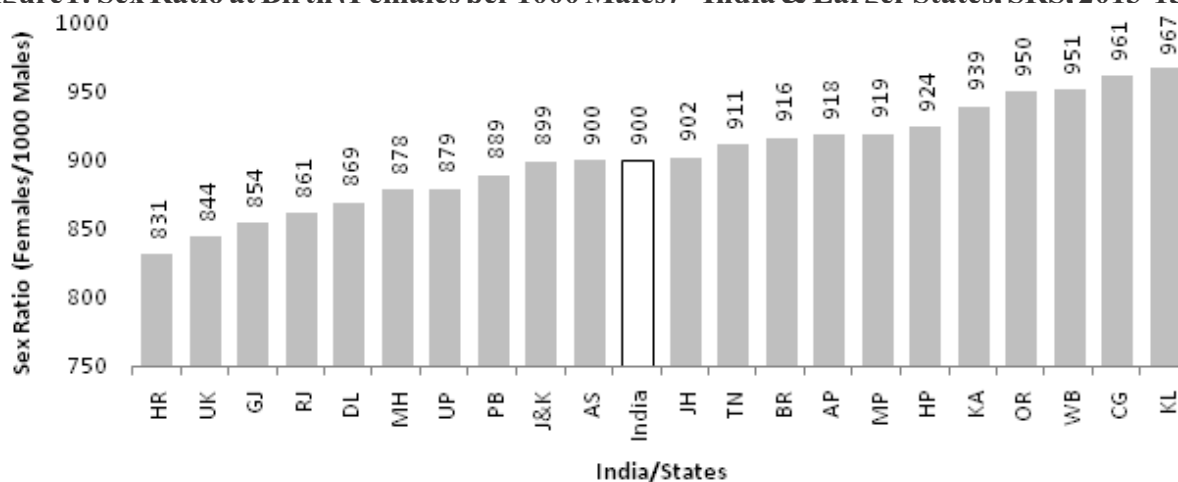
Note: Sex ratio at birth in India is defined as number of females per 1000 males. AP=Andhra Pradesh; AS=Assam; BR=Bihar; CG=Chhattisgarh; DL=Delhi; GJ=Gujarat; HR=Haryana; J&K=Jammu & Kashmir; JH=Jharkhand; KA=Karnataka; KL=Kerala; MP=Madhya Pradesh; MH=Maharashtra; OR=Odisha; PB=Punjab; RJ=Rajasthan; TN=Tamil Nadu; UP=Uttar Pradesh; UK=Uttarakhand; WB=West Bengal.

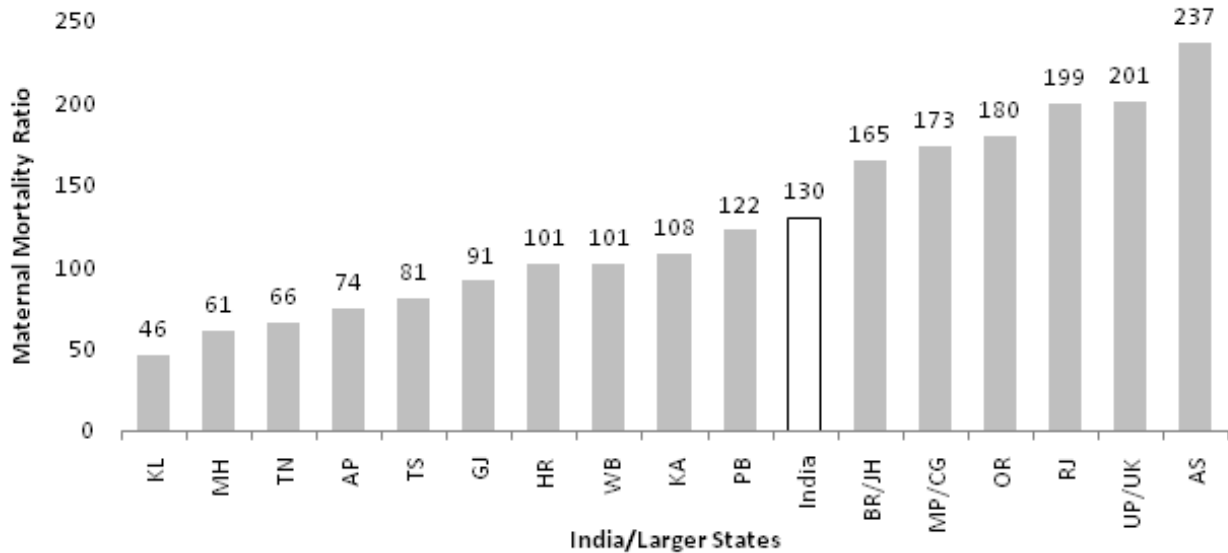**Source:** Sample Registration System.

Figure 2: Trend in Sex Ratio at Birth (Females per 1000 Males): India, Haryana, and Kerala, SRS, 2006-08 to 2014-16.

Note: Sex ratio at birth in India is defined as number of females per 1000 males.
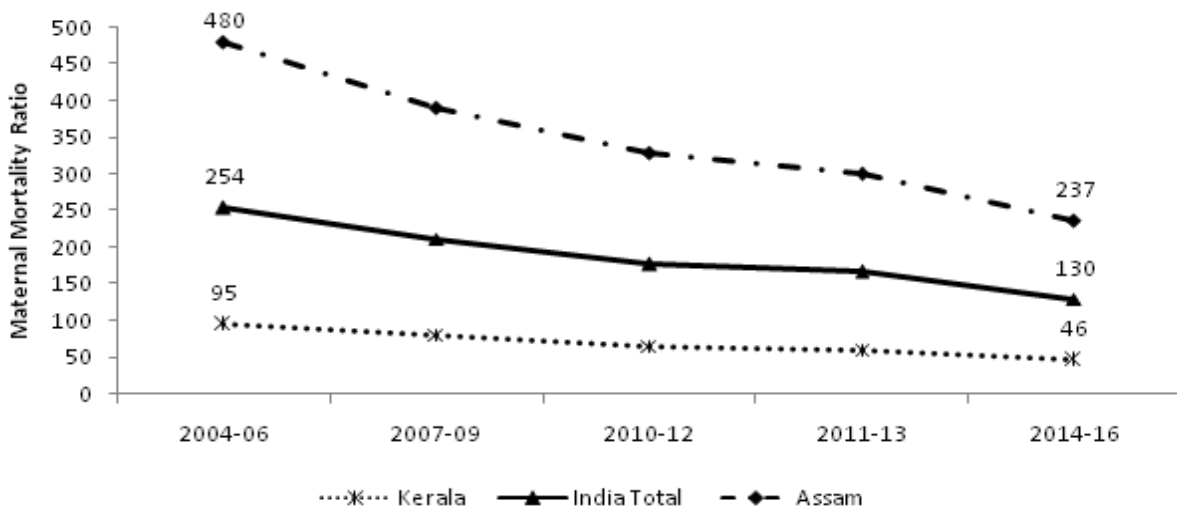**Source:** Sample Registration System.

Figure 3: Maternal Mortality Ratio (per 100000 live births): India & Larger States, SRS, 2014-16.

Note: The maternal mortality ratio (MMR) is the ratio of the number of maternal deaths during a given time period per 100,000 live births during the same time-period. AP=Andhra Pradesh; AS=Assam; BR=Bihar; CG=Chhattisgarh; GJ=Gujarat; JH=Jharkhand; KA=Karnataka; KL=Kerala; MP=Madhya Pradesh; MH=Maharashtra; OR=Odisha; PB=Punjab; RJ=Rajasthan; TN=Tamil Nadu; UP=Uttar Pradesh; UK=Uttarakhand; WB=West Bengal.
Source: Sample Registration System.

Figure 4: Maternal Mortality Ratio (per 100000 live births): India, Assam, and Kerala, SRS, 2004-06 to 2014-16.

Note: The maternal mortality ratio (MMR) is the ratio of the number of maternal deaths during a given time period per 100,000 live births during the same time-period.
Source: Sample Registration System.