

EVALUATION OF AYUSH HEALTH CARE UNITS IN UTTARAKHAND

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ABSTRACT

With the advent of NRHM, attempts have been made to bring AYUSH into the mainstream of health care services across the country. From the year 2008-2009, the Uttarakhand state has been pursuing the activities for Mainstreaming of AYUSH under NRHM. Efforts have been made to strengthen AYUSH health care facilities by co-locating them to CHCs, PHCs and Additional PHCs. Appropriate functioning of these units under the mainstreaming component needs to be ensured by various factors, one of them being the availability of adequate infrastructure and logistics. With this background, this evaluation was conducted to explore the gaps in availability of infrastructure and other logistics, and suggest effective measures for the same to provide better services to the community. It was found that doctor's room was available in 81 per cent of the Ayurvedic and 83 per cent of the Homoeopathic health care units of the CHCs. 17 per cent, 27 per cent and 9 per cent of the Homoeopathic units at the CHCs, PHCs and Additional PHCs respectively were also found without any electricity supply at the time of the visit. BP apparatus and stethoscope were found in majority (81%-88%) of the Ayurvedic units. Equipment like oral-thermometer, tongue-depressor, height measuring scale and measuring tape were found in only few (18%-50%) units at all levels. It is suggested that the district and the block-level stakeholders be made well-versed with the vitality of the AYUSH system for smooth functioning of this system under the mainstreaming component of NRHM in the districts and the state at large.

Key words: AYUSH, NRHM, CHC, PHC, Health care, Allopathic hospital.

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The Indian ancient system of medicine is an asset for global health owing to its knowledge of both preventive and curative health care. Considering the size of India's population and its distribution, it's not feasible that the modern health system alone can provide the health care services. The current status of health indicators of India reveal that despite substantial progress made in the area of health, much more needs to be done in this domain. It is therefore, necessary to continue the present policy of having a multi-provider system comprising modern as well alternative systems of medicine in the form of AYUSH.

With a view to integrate AYUSH and bring it into the mainstream of health care services, a centrally-sponsored scheme for development of health care institutions was introduced during the 10th Five-Year Plan. Under the scheme, financial assistance was provided for setting up of AYUSH treatment centres in allopathic hospitals and procurement of drugs and medicines for its dispensaries located in rural and backward areas¹.

While the 10th Five-Year Plan was under implementation, the National Rural Health Mission (NRHM) was launched in April 2005 for a period of seven years (2005-2012). NRHM was launched to address the infirmities and problems across primary health care services and to bring about improvement in the health system and the health status of those who live in rural areas. As one of the conditions to strengthen the public health system at all levels, NRHM aims at revitalizing local health traditions and mainstreaming AYUSH (including manpower and drugs). Mainstreaming of AYUSH systems was proposed to actively supplement the efforts of the allopathic systems¹.

The steps for Mainstreaming of AYUSH under NRHM include establishment of AYUSH OPD clinics in the Primary Health Centres (PHCs) and establishment of AYUSH IPDs in Community Health Centres (CHCs), setting up of AYUSH wings in District Hospitals, supply of essential AYUSH drugs to hospitals and dispensaries, up-gradation of AYUSH hospitals (other than PHCs/CHCs/DHs) at the district/sub-district levels, setting up of specialized AYUSH facilities in Government tertiary care, AYUSH hospitals in Public-Private Partnership (PPP) mode and provision of supporting all these services through setting-up of Programme Management Units (PMUs), Health Management Information System (HMIS) and constitution of Rogi Kalyan Samitis (RKS) for AYUSH.² In the year 2008-2009, activities for Mainstreaming of AYUSH started under NRHM in Uttarakhand State.

Mainstreaming of AYUSH in Uttarakhand

There are 13 districts in Uttarakhand which are grouped into two divisions, Kumaon division and Garhwal division. The Kumaon division includes six districts and the Garhwal division includes seven districts.³

NRHM strategy to streamline AYUSH has been a boon for the State as this has helped in ensuring availability of the medical officers of AYUSH stream in its CHCs and PHCs. This co-location is achieved by posting Ayurveda and Homoeopathy medical and paramedical staff at selected CHCs and PHCs. The co-location aspect has its own advantage as AYUSH systems have not only shared the load of allopathic counterparts but also helped in providing services in the health facilities where no allopathic doctors are available. The State has been pursuing this activity since 2008-09.⁴

However, no effort has ever been made to assess the gaps and deficiencies in this system related to infrastructure, equipment, instruments, and recurring supply. Moreover, how effective these steps have been and what more can be done for further development of this system, still needs to be established. Thus, a review to know how effective this co-location has been in the state, a facility assessment was conducted to assess the existing infrastructure and logistics available at the AYUSH wing co-located at the CHCs, PHCs and additional PHCs.

OBJECTIVE

The objective of the study was to explore the provision and implementation of AYUSH infrastructure under NRHM in the state.

METHODOLOGY

Data were collected from all the 13 districts of Uttarakhand. The team consisting Professor/Assistant Professor, Research Officer/Assistant Research Officer and consultant visited the facilities. At the time of study the total facilities available were 207; out of which 175 were Ayurveda and 32 were Homoeopathy facilities. In all, 155 facilities including 127 Ayurveda and 28 Homoeopathy facilities were visited. Functional health facilities were chosen for the study wherein either an MO (AYUSH) or a pharmacist was posted. Due to difficult hilly terrains, the number of facilities that could be covered in five days in the districts was another criterion that was taken into consideration. These included 32 CHCs (26 Ayurveda and six Homoeopathic units), 64 PHCs (53 Ayurveda and 11 Homoeopathic units)

and 59 additional PHCs (53 Ayurveda and 11 Homoeopathic units). Information with regard to the availability of infrastructure and logistic support was collected. The evaluation survey was conducted in November 2011. A schedule was used to interview the health personnel posted at these facilities and a check-list was developed to assess the availability of infrastructure, OPD and dispensing equipment; and other stationary items. The ethical consents were also taken from the respondents by stating that the purpose of the study and assuring strict confidentiality. Statistical Package for Social Sciences (SPSS) was applied to analyse the collected data.

FINDINGS

Findings on the availability of infrastructure and logistic support are as given below.

Infrastructure

Doctor's room was available in 81 per cent of the Ayurvedic and 83 per cent of the Homoeopathic health care units of CHCs whereas only 62 per cent of the Ayurvedic and 55 per cent of the Homoeopathic health care units of PHCs had doctors room available for its physicians. Nearly the same situation was observed at Additional PHC level also (Table 1).

It was observed that only 69 per cent of the Ayurvedic and 17 per cent of the Homoeopathic units at the CHC level had pharmacy-cum-store room. The situation was worse at the PHC-level where 45 per cent of the Ayurvedic units and only 18 per cent of the Homoeopathic units had pharmacy-cum-store room. On the other hand, 52 per cent of Ayurvedic and 45 per cent of the Homoeopathic health units at the Additional PHC level had pharmacy-cum-store room.

Therapy rooms, kitchen and IPD beds were found in only few (4%-19%) Ayurvedic units out of all the health care units visited.

With regard to other basic facilities, electricity supply was found in almost all the Ayurvedic health care units with an exception of 4-6 per cent at the PHCs and Additional PHCs where there was no electricity supply.

Segregation of bio-medical waste which plays an essential part in maintenance of basic standards for environment was found to be practiced in 34 per cent of the Ayurvedic and 36 per cent of the Homoeopathic units at the PHC level. At

the Additional PHCs, only one-fourth (25%) of the Ayurvedic and 18 per cent of the Homoeopathic units were using colour-coded dustbins for bio-medical waste management. The situation was worse at the CHC-level since none of the Homoeopathic units and only 23 per cent of the Ayurvedic units were segregating the bio-medical wastes.

Signage system which gives the information regarding the availability of Ayurvedic and Homoeopathic health facilities and services at the health care centres was not satisfactory in the visited health care units. Less than half (46%) of the Ayurvedic units at CHCs had signages. However, 67 per cent of the Homoeopathic units had signages. Only, 47 per cent of the Ayurvedic and 36 per cent of the Homoeopathic units in visited PHCs had signages. A similar situation with respect to additional PHCs was observed wherein signages were present only in 18 per cent Homoeopathic and 42 per cent Ayurvedic units.

The situation with respect to Citizen Charter was not different which was displayed in 27 per cent and 33 per cent of Ayurvedic and Homoeopathic health care units respectively in the CHCs. 47 per cent and 36 per cent of the Ayurvedic and Homoeopathic health care units in the PHCs and 31 per cent Ayurvedic and 18 per cent Homoeopathic units in Additional PHCs that were surveyed, had Citizen Charter.

TABLE 1
INFRASTRUCTURE AVAILABILITY

Facility	CHC		PHC		Additional PHC	
	Ayurvedic n=26 (%)	Homeo- pathic (n=6) (%)	Ayurvedic n=53 (%)	Homeo- pathic n=11 (%)	Ayurvedic n=48 (%)	Homeo- pathic n=11 (%)
Doctor Room	21 (81%)	5 (83%)	33 (62%)	6 (55%)	30 (63%)	7 (64%)
Pharmacy-cum- Store	18 (69%)	1 (17%)	24 (45%)	2 (18%)	25 (52%)	5 (45%)
Office-cum-Record room	6 (23%)	1 (17%)	NA	NA	NA	NA
Kitchen	1 (4%)	NA	NA	NA	NA	NA
IPD Beds	5 (19%)	NA	NA	NA	NA	NA
Therapy Rooms	1 (4%)	NA	NA	NA	NA	NA
Electricity Supply	26 (100%)	5 (83%)	51 (96%)	8 (73%)	45 (94%)	10 (91%)

Facility	CHC		PHC		Additional PHC	
	Ayurvedic n=26 (%)	Homeo- pathic (n=6) (%)	Ayurvedic n=53 (%)	Homeo- pathic n=11 (%)	Ayurvedic n=48 (%)	Homeo- pathic n=11 (%)
Segregation of Bio-Medical Waste at Source (Use of Color Coding)	6 (23%)	0 (0%)	18 (34%)	4 (36%)	12 (25%)	2 (18%)
Citizen Charter	7 (27%)	2 (33%)	25 (47%)	4 (36%)	15 (31%)	2 (18%)
Signage	12 (46%)	4 (67%)	26 (49%)	7 (64%)	20 (42%)	2 (18%)

NA - Not Applicable

Equipment

Regarding the availability of equipment at the co-located Ayurvedic units, BP apparatus and stethoscope were found in majority (81%-88%) of them. In nearly half (45%-55%) of the Homoeopathic units located at PHCs and Additional PHCs, even these basic equipment were not present. Weighing machine was present in 65 per cent and 33 per cent of the Ayurvedic and Homoeopathic units at the CHC level respectively. In PHCs, 74 per cent of the Ayurvedic units and only 27 per cent Homoeopathic units had weighing machines and similar situation was observed at the Additional PHC level where 73 per cent of the Ayurvedic and only 45 per cent of the Homoeopathic units had weighing machines (Table 2).

Figures in Table 2 show that equipment like oral-thermometer, tongue-depressor, height measuring scale and measuring tape were found in only few (18%-50%) units at all levels. Moreover, hammer and kharal (Mortar-pestle) were present in only a few units those were surveyed. Imam Dasta (cylindrical utensil made of brass/stone/marble used in preparation of medicines and oils in Ayurveda) was found in all Ayurvedic units co-located at CHCs but only at 4-6 per cent of the Ayurvedic units located at PHCs and Additional PHCs.

With respect to medicine storage and dispensing equipment, the situation was also dismal. Data given in Table 2 show that medicine containers were available only in 31 per cent of the Ayurvedic and 33 per cent of the Homoeopathic units co-located at the CHCs, 53 per cent of the Ayurvedic and 45 per cent of the Homoeopathic units in PHCs and 33 per cent of the Ayurvedic and 18 per cent of the Homoeopathic units at the Additional PHC level. Dispensing equipment like measuring spoon and dispensing cups were present only in a few (6%-23%)

Ayurvedic units co-located at the CHCs, PHCs and Additional PHCs. Vials and bottles necessary for dispensing Homoeopathic medicines were available in a few units co-located at the CHCs, PHCs and Additional PHCs.

TABLE 2
AVAILABILITY OF EQUIPMENT

Equipment	CHC		PHC		Additional PHC	
	Ayurvedic n=26 (%)	Homeo- pathic n=6 (%)	Ayurvedic n=53 (%)	Homeo- pathic n=11 (%)	Ayurvedic n=48 (%)	Homeo- pathic n=11 (%)
B.P. Apparatus	23 (88%)	5 (83%)	43 (81%)	6 (55%)	41 (85%)	6 (55%)
Stethoscope	22 (85%)	5 (83%)	38 (72%)	6 (55%)	31 (65%)	5 (45%)
Thermometer (Oral)	10 (38%)	3 (50%)	20 (38%)	4 (36%)	17 (35%)	5 (45%)
Tongue Depressor	6 (23%)	0 (0%)	14 (26%)	2 (18%)	10 (21%)	2 (18%)
Weighing Machine	17 (65%)	2 (33%)	39 (74%)	3 (27%)	35 (73%)	5 (45%)
Height Measuring Instrument	12 (46%)	0 (0%)	25 (47%)	2 (18%)	24 (50%)	3 (27%)
Measuring Tape	11 (42%)	0 (0%)	23 (43%)	2 (18%)	18 (38%)	4 (36%)
Hammer	2 (8%)	0 (0%)	17 (13%)	2 (18%)	4 (8%)	1 (9%)
Kharal	9 (35%)	1 (17%)	21 (40%)	1 (9%)	15 (31%)	0 (0%)
Imam Dasta	26 (100%)	NA	3 (6%)	NA	2 (4%)	NA
Medicine Containers	8 (31%)	2(33%)	28 (53%)	5 (45%)	16 (33%)	(18%)
Measuring Spoon	4 (15%)	NA	12 (23%)	NA	9 (19%)	NA
Dispensing Cup	2 (8%)	NA	5 (9%)	NA	3 (6%)	NA
Vials and Bottles	NA	4 (67%)	NA	4 (36%)	NA	4 (36%)

NA - Not Applicable

Stationery

Stationery items like prescription slips were available in most (varying between 64% and 100%) of the visited AYUSH health care units those were co located to the CHCs, PHCs and Additional PHCs. However, separate referral slips were found only in a few (ranging between 34% and 64%) Ayurvedic and Homoeopathic health care units. It was also observed that those AYUSH units which did not have prescription slips, preferred using a plain paper (Table 3).

Table 3 also show that OPD-cum-Dispensing registers, Medicine Stock register, Receipt and Dispatch register, Daily Stock register and Attendance register were maintained in most of the health care units that were visited.

TABLE 3
AVAILABILITY OF STATIONERY

	CHC		PHC		Additional PHC	
	Ayurvedic n=26 (%)	Homeo- pathic n=6 (%)	Ayurvedic n=53 (%)	Homeo- pathic n=11 (%)	Ayurvedic n=48 (%)	Homeo- pathic n=11 (%)
Prescription Slips	21 (81%)	5 (83%)	46 (87%)	11 (100%)	38 (79%)	7 (64%)
Referral Slips	8 (31%)	3 (50%)	18 (34%)	7 (64%)	19 (40%)	3 (27%)
OPD-cum-Dispensing Registers	24 (92%)	6 (100%)	49 (94%)	11 (100%)	46 (96%)	11 (100%)
Medicine Stock Register	25 (96%)	6 (100%)	52 (98%)	10 (91%)	47 (98%)	10 (91%)
Receipt and Dispatch Register	25 (96%)	5 (83%)	43 (81%)	7 (64%)	37 (77%)	6 (55%)
Daily Stock Register	18 (69%)	3 (50%)	40 (75%)	8 (73%)	34 (71%)	4 (36%)
Attendance Register	23 (88%)	6 (100%)	47 (89%)	9 (82%)	45 (94%)	10 (91%)

NA - Not Applicable

DISCUSSION

With an increase in community health care requirements along with modern medicine, strengthening of the existing AYUSH system of medicine in India contemplates to be the need of the century. Thus, NRHM has played a vital role, since its inception, to advocate strengthening of AYUSH systems in the state of Uttarakhand as well. With the initiative of relocating some of the non-functional ISM dispensaries to the nearest PHC/CHC, efforts have been made in Uttarakhand state to station at least one wing (either Ayurveda or Homoeopathy) at the level of PHC/CHC/Additional PHC. However, there was no provision of other wings of AYUSH i.e. UNANI and SIDDHA under co-location of AYUSH facilities at CHCs, PHCs and Additional PHCs in the state of Uttarakhand under Mainstreaming of AYUSH.

The presence of basic infrastructure and logistics like stationery and essential equipment was expected to be in accordance with the Government of India (GOI) guidelines so as to ensure better health facilities to the community. On the contrary, in this survey, it was observed that approximately half (40%-50%) of the PHCs and Additional PHCs did not have even a doctor's room for the AYUSH MOs even after three years of implementation of Mainstreaming of AYUSH under NRHM. In some places, the MO (AYUSH) was sitting on the veranda / corridor during the OPD. A similar situation was found with regard to pharmacy-cum-store room and office-cum-record room. Moreover, therapy rooms and kitchen that are essential for Ayurveda units at the CHC level according to the Operational Guidelines, were not found in majority (81-96%) of the Ayurvedic units visited which is a major obstacle in providing system-specific services to the community. A mandate of providing IPD facilities through Ayurvedic units located at CHCs was not being followed in most of the CHCs visited as only 19 per cent of the Ayurveda units had IPD beds. It was also observed during the visits that approximately 10-25 per cent of the health care units were functioning without the basic requirement of electricity. Another factor which could be the reason for lack of awareness in the community regarding availability of AYUSH services was the absence of signages in most of the units co-located at the visited health facilities. Citizen Charter displaying the availability of AYUSH services was also not found in majority of the health units visited. To overcome the infrastructural issues, better coordination between the staff of Allopathic and AYUSH system is required so that the AYUSH counterparts have access to better infrastructural facilities.

In terms of equipment, majority of the AYUSH units at all the levels of health facility i.e. CHC, PHC and Additional PHC had the basic equipment required for the service delivery like BP apparatus, stethoscope, thermometer (oral) and weighing machine. Also, at the facilities where lack of basic equipment was observed, it was stated by the staff that they had to depend on Allopathic counterparts for

these equipment. Provision of more budget for logistics, equipment and other consumables for Mainstreaming of AYUSH under NRHM head in the state may help in overcoming the issue of lack of basic equipment at the co-located Ayurveda and Homoeopathic units.

For smooth and better service delivery at the facility level, the equipment and consumables, required at the Ayurvedic units like dispensing cup, measuring spoon, kharal and at Homoeopathic units like vials and bottles, were adequately provided by the state government.

CONCLUSION

It has been seen from this survey that despite efforts made to strengthen the AYUSH health care facilities under the Mainstreaming component of NRHM in the state, availability of essential infrastructure and logistics was still inadequate at the co-located units of CHCs, PHCs and Additional PHCs. Due to lack of physical arrangement, quality AYUSH health care services had not been executed. This 'not so good' condition of AYUSH systems in the state indicates towards the lack of coordination between the AYUSH and Allopathic counterparts positioned at the CHCs, PHCs, Additional PHCs; and to a certain extent, the ignorance on the part of district and the block-level stakeholders. The district and the block-level stakeholders should be made well-versed with the vitality of the AYUSH system for smooth functioning of this system under the mainstreaming component of NRHM in the districts and the state at large.

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IMPACT OF CLIMATE CHANGE ON HUMAN HEALTH IN INDIA: AN OVERVIEW

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ABSTRACT

Climate change is one of the most important global environmental challenges of the present century. The IPCC report of 2007 concludes that climate change is projected to increase threat to human health, particularly in lower income countries. It will have implications on food production, water supply, air quality, coastal settlements and human health. As two-third of the Indian population depends directly on the climate sensitive sectors like agriculture, fisheries and forests, it is bound to have an adverse impact. The changing climate can affect the basic elements required for maintaining good health: clean air, potable water, adequate food and shelter. Recently, India reported an increase in the incidence of vector-borne diseases, decrease in crop production, more frequent extreme weather events which could be attributed to changing climate. Though India has contributed only 2 per cent of the total carbon emissions from fossil fuel burning over the last 100 years, still it is likely to experience greater effects from the 'extreme weather' events. Heat-waves in Odisha in 1998 and in Andhra Pradesh in 2003 caused an estimated 2000 and 3000 deaths respectively. The Eastern Indian state of Odisha's capital Bhubaneswar has a record with an unusual mercurial rise in summer in the month of June 2005, as the highest temperature rose to 46.3 degree Celsius which was 10 degrees above normal. Climate change is projected to bring changing rainfall patterns, increased temperatures, evaporation, and salinization of water sources through rising sea levels. Over the years, water supplies stored in glaciers and snow cover is projected to decline. This will reduce water availability to populations supplied by melt water from major mountain ranges. Addressing climate change will need promoting mitigation and adaptation strategies without

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hampering economic development, good scientific evidence and coordinated action by multiple stakeholders.

Key words: Climate change, Human health, Water supply, Vector-borne diseases.

Climate Change Over India

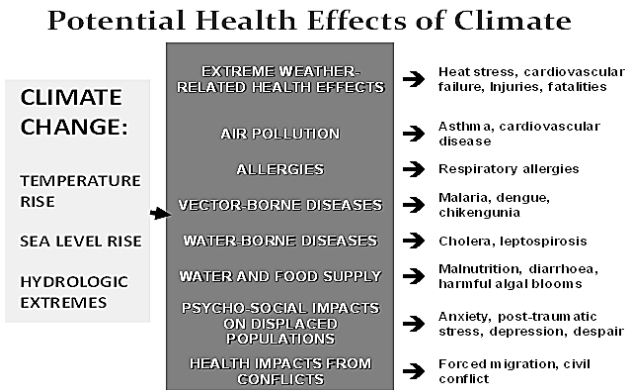
Extreme weather could be a manifestation of global climate change. The United Nation's Inter-governmental Panel on Climate Change¹ has concluded in its fourth assessment report that overall climate change is projected to increase the threat to human health, particularly in lower income populations, predominantly within tropical/sub-tropical countries. India is a large developing country with nearly two-third of the population depending directly on the climate sensitive sectors such as agriculture, fisheries and forests. The projected climate change under various scenarios is likely to have implications on food production, water supply, bio-diversity and livelihoods. The record-breaking rain in the metro city of Mumbai or heat waves in the state of Odisha may not have a direct causal association with the global climate change but at the same time, it cannot be ignored as 'simple local aberrations'. Extreme weather events such as severe storms, floods and drought have claimed thousands of lives during the last few years and have adversely affected the lives of millions; and in terms of economic losses and damage to property.

Human beings are exposed to climate change through changing weather patterns either directly or indirectly through changes in water, air, food quality and quantity, ecosystems, agriculture, livelihoods and infrastructure. In addition to changing weather patterns, climatic conditions affect diseases transmitted through water and via vectors such as mosquitoes. Climate-sensitive diseases are among the largest global killers that can cause excess mortality and morbidity directly or indirectly. Season-wise, maximum rise in mean temperature was observed during the post-monsoon season (0.770C) followed by winter season (0.700 C), pre-monsoon season (0.640C) and monsoon season (0.330C). During the winter season, since 1991, rise in minimum temperature is appreciably higher than that of maximum temperature over northern plains. This may be due to pollution leading to frequent occurrences of fog.² The total numbers of heat wave days have increased from 1971 to 2000. Trends in heavy rainfall events in India show that it has increased in the western coast and few pockets in North, Central, Eastern and the North East.³ A significant increasing trend has been observed in discomfort indices during the last ten days of April and a significant increasing trend has been observed in discomfort indices, relative humidity and maximum temperature during May. Similarly, a significant increasing trend has been observed during the second fortnight of May and first fortnight of June⁴.

Overview of the Health Effects of Climate Change

Global Scenario: Climate change affects health in many ways. This is highlighted by the World Health Organization (WHO) when it chose to mark ‘World Health Day 2008’ with the theme International Perspectives on Global Environmental Change: Protecting Health from Climate Change.” The relationship between climate change and human health is multidimensional. The fourth assessment report of IPCC, 2007 has already identified three areas in which human health has already been affected by climate change as shown in Figure I. These are: (i) Alteration in distribution of some infectious disease vectors, (ii) Seasonal distribution of some allergenic pollen species, and (iii) Increased heat wave related deaths.

FIGURE 1



The effects of climate change on human health are influenced by a variety of pathways and there may be long delays between causes and effects. Various methods have been developed for quantitative estimation of health impacts of future climate change.⁵ WHO has defined a general methodology to quantify the disease burden caused by 26 risk factors at selected time points up to 2030.⁶ In Comparative Risk Assessment (CRA); the major environmental, occupational, behavioural and lifestyle risk factors include smoking, alcohol consumption, unsafe sex, diet, air pollution, water and sanitation, and climate change. However, measurements of climate change and its effects on human health would take several decades as we do not have standardized monitoring methods for long-term measurement of climate sensitive diseases. Also it is difficult to control the effects of natural climate variability over the years. Relatively small, but significant climatic changes that have occurred so far, are poor proxies for the larger changes forecast for the coming decades.⁷

Indian Scenario: The major brunt of global climate change in terms of adverse health impact will be mostly borne by the poor and developing countries, even though the rich and industrialized countries account for maximum greenhouse gas emission.^{8,1} Though India has contributed only 2 per cent of the total carbon emissions from fossil fuel burning over the last 100 years,⁹ still it is likely to experience greater effects from the 'extreme weather' events. Major health effects due to changing climate can be broadly classified (Figure 1) as follows:

- Extreme weather-related health effects
- Air pollution-related health effects
- Water and food-borne diseases
- Vector-borne diseases
- Effects of food and water shortages
- Psycho-social impacts on displaced populations
- Health impacts from conflicts over access to vital resources

Extreme Weather-related Health Effects

Eighteen heat-waves were reported in India between 1980 and 1998, with a heat-wave in 1988 affecting ten states and causing 1300 deaths.^{10,11} Heat-waves in Odisha, India, in 1998, 1999 and 2000 caused an estimated 2000, 91 and 29 deaths respectively¹² and heat-waves in 2003 in Andhra Pradesh, India, caused more than 3000 deaths. In June 2005, there was another record in the Eastern Indian state of Odisha with an unusual mercurial rise in summer, the capital city of Bhubaneswar recorded the highest temperature of 46.3 degree Celsius which was 10 degrees above normal,¹³ leading to a heat wave. Floods are an annual feature in Bihar but the 2004 floods were unique for its severity. The Indian metropolitan city of Mumbai was besieged with India's heaviest downpour of the century in July 2005, killing nearly 600 people. According to the Indian Meteorological department, it was the heaviest ever (83.82 cm) in India of last 100 years, breaking the record of previous highest rainfall in India at Cherrapunjee in Meghalaya recorded on 12 July 1910.¹⁴ On one hand, Mumbai was being flooded; Cherrapunjee which was once well known for being the wettest place in the world received less than average rainfall in June and July with distressing situation subsequently. The record-breaking Mumbai rain or heat waves in Odisha may not have a direct causal association with global climate change but at the same time, it cannot be ignored as 'simple local aberrations.' Populations in high-density urban areas with poor housing will be at increased risk with increasing frequency and intensity

of heat waves, partly due to the interaction between increasing temperatures and urban heat-island effects.¹⁵ Delhi experienced the worst summer in 33 years in 2012. The average maximum temperature in Delhi in the year during May-June has been 41.57 degrees Celsius (106.83 degrees Fahrenheit). What's made it particularly unbearable were the long stretches of 40+ degree days.¹⁶ These extreme weather conditions reported from various parts of India in the recent past could be attributed to global climate change.

Air Pollution-related Health Effects

Concentrations of air pollutants are on rise due to human activities. Air-pollution concentrations are the result of interactions between variations in atmospheric circulation features, wind, topography and energy use.¹ As the changing climate may alter the temperature and humidity, interaction among the pollutants may get modified too as their formation depends on these factors. Some air pollutants demonstrate weather-related seasonal cycles.¹ Increased air temperature can lead to earlier pollen season and altered distribution of allergen and thereby leading to asthma episodes. There is stronger evidence for the health impacts of particulate matters on morbidity and mortality¹, so increasing concentrations would have significant negative health impacts.

The association between daily variation in meteorological conditions and mortality has been described in studies from a wide range of populations in temperate climates.^{17,18} These studies show that exposure to temperatures at either side of a 'comfort range' is associated with an increased risk of mainly cardio-pulmonary mortality. Increase in other disease measures manifested by increased outpatient attendance at hospitals has been associated with extreme temperatures.^{19,20} Cardiovascular disease (CVD) has the best characterized temperature-mortality relationship, followed by respiratory disease and total mortality in temperate countries. These relationships are supported by strong evidence for direct links between high and low temperatures and increased blood pressure, viscosity and heart rate for CVD^{21,22} and broncho-constriction for pulmonary disease.²³ Likewise, seasonal fluctuations have been observed for tropical climates,²⁴⁻²⁸ despite the less-pronounced intra-annual climatological variation that is mainly related to seasonal differences in precipitation. Nevertheless, the number of studies focusing on tropical climates is limited, especially for Asian countries. Tropical countries have been associated with excess summer mortality; this is often explained by a high prevalence of infectious and diarrhoeal disease. India is at a higher risk with wide variation in temperature and higher level of air pollutants. The IPCC fourth assessment report on human health¹ also concludes that the frequency and intensity of heat waves increases the number of deaths and serious illness.

Water and Food-borne Diseases

Climate-change-related alterations in rainfall, surface water availability and water quality could affect the burden of water-related diseases. These diseases can be classified by route of transmission, thus distinguishing between water-borne (ingested) and water-washed diseases (caused by lack of hygiene). Diarrhoeal disease is one of the most important causes of disease burden, particularly in developing countries.²⁹ There is strong evidence that diarrhoea, particularly the one caused by the bacteria and protozoan pathogens which predominate in developing regions, is highly sensitive to variations in both temperature and precipitation over daily, seasonal, and inter-annual time periods.⁷ It is, therefore, very likely that long-term climate change will lead to consistent changes in diarrhoeal rates. Climate change can result in increased temperatures in both ocean water and ambient air. Rise in sea level due to increased temperatures can lead to coastal flooding, which can force the communities to use contaminated water, inadequate sanitation systems, or trigger migration into areas with insecure water and sanitation availability which can lead to the spread of Cholera.³⁰ Warm water, moderate salinity, and number of aquatic invertebrates are the conditions influenced by climate change which promote the growth of Cholera species.

Vector-borne Diseases

Weather affects vector population dynamics and disease transmission, with temperature and humidity considered as key variables. Climatic changes are known to increase the availability of water during monsoon, alter the air temperature besides other changes. Hence, there would be an increase in the population of the vectors in the altered climate.

Clean water is known to promote breeding of vector mosquitoes such as anophelines (Malaria), culex vishnui group (JE vector) and aedes (Dengue, Chikungunya) whereas polluted water bodies promote breeding of culex quiquefasciatus (Filariasis vector). Vector-borne diseases are currently prevalent in the tropics and sub-tropics and relatively rare in temperate zones of India. Experience with mosquito-borne epidemics in the past has indicated that increased water availability especially during post-monsoon period can lead to marked increased population of the vector mosquitoes. Under certain circumstances, it is possible that mosquitoes which do not normally transmit a disease could play a role in transmission of vector-borne disease like Japanese encephalitis (JE), especially if high densities of the particular species occur. As the vector life cycle is strongly influenced by temperature and humidity, an altered climate with higher temperature and humidity will shorten the development period of the vectors leading to larger production of vector population.

In India, unplanned urbanization has also contributed to the spread of Plasmodium vivax Malaria and Dengue¹. A study conducted by the National Physical Laboratory, New Delhi, on the impact of climate change on malaria reveals that the transmission windows (TWs) for malaria are predicted to increase with climate change. Under the projected climate change scenario, the Indian state of Uttar Pradesh will come under the 10-12 months of open transmission window, where as the states of Madhya Pradesh and Jammu and Kashmir will have 7 to 9 months of open transmission window.

Effects of Food and Water Shortages

Rising temperatures and changing patterns of rainfall are projected to decrease crop yields in many developing countries, stressing upon food supplies³¹. Both acute and chronic nutritional problems are associated with climate variability and change. The effects of drought on health include deaths, malnutrition (under-nutrition, protein-energy malnutrition and/or micro-nutrient deficiencies), infectious diseases and respiratory diseases.¹ Malnutrition is considered as the single most important risk factor for health, accounting for an estimated 15 per cent of total disease burden in terms of death-adjusted life-years (DALYs). While multiple biological and social factors influence malnutrition, the fundamental determinant is the availability of staple foods. For the populations that depend on subsistence farming, or do not have sufficient income to buy food, this situation is expected to bring malnutrition. In turn, malnutrition and under-nutrition increase the severity of many infectious diseases, particularly among children. Under-nutrition and related disease is currently the greatest contributor to the global burden of disease, killing over 3.5 million people a year, mostly children in developing countries.³² Millions of more people are projected to become at risk of food insecurity and the health consequences of malnutrition. Increase in global temperature is likely to cause droughts and associated disruptions in agriculture and water supplies.

Drought diminishes dietary diversity and reduces overall food consumption, and may, therefore, lead to micro-nutrient deficiencies. In Gujarat, India, during the drought in the year 2000, diets were found to be deficient in energy and several vitamins. In this population, serious effects of drought on anthropometric indices could have been prevented by public-health measures¹. Developed nations probably have the resources and the infrastructure to adjust, but in the less well-developed nations, it is likely that these effects will result in famines, thereby contributing to malnutrition and increased susceptibility to a variety of infectious diseases.

Psycho-social Impacts on Displaced Populations

Expected increases in the frequency and severity of floods and storms will result in the destruction of homes, agricultural lands, medical facilities and other essential services, impacting particularly on people residing in slums and other marginal living conditions. As the global temperatures rise coupled with stronger storm surges; so will the sea level, eventually placing many thousands of hectares of land under water leading to more frequent and more severe coastal flooding. Much of the India's populations live on coastlines that will be threatened, and as the coastlines disappear, their residents will be forced to migrate. The consequent destruction of homes and communities will eventually force unprotected populations to seek safer ground, often increasing environmental and social pressures in their new locations. Major delta areas of Asia are likely to be subjected to stress associated with sea-level rise, changes in water regimes, saltwater intrusion, siltation, and land loss. Low-lying coastal areas will be at the forefront of impacts; the cities like Mumbai and Chennai have witnessed significant environmental stresses in recent years. There are 13 coastal states and Union territories susceptible to sea-level rise in the country, with about 84 coastal districts affected by tropical cyclones. States like Tamil Nadu, Andhra Pradesh, Odisha and West Bengal, Gujarat and Union Territory of Puducherry are most affected by cyclonic activities.³² Crowding due to population displacement is likely to exacerbate already encountered housing problems in the mega-cities in developing nations. In addition, noise, overcrowding and other possible features of unplanned urbanization may increase the prevalence of mental disorders, such as depression, anxiety, chronic stress, schizophrenia and suicide.¹

Health Impacts from Conflicts over Access to Vital Resources

In the long run, the greatest health risks may not be from natural disasters or disease epidemics, but from the slow build-up of pressures on natural, economic and social systems that sustain health. These are already under stress, particularly in the developing country like India. Climate change is projected to bring changing rainfall patterns, increased temperatures, evaporation, and salinization of water sources through rising sea levels. Over the years, water supplies stored in glaciers and snow cover is projected to decline. This will reduce water availability to populations supplied by melt water from major mountain ranges¹. Climate change-related increases in temperature could increase the rate of snowmelt and reduce the amount of snowfall, if the winter is shortened. If climate change does alter the rainfall pattern in the Himalayas, the impacts could be felt in the downstream states of India resulting in drought like situation. Drought and the consequent loss of livelihoods is also a major trigger for population movements, particularly from

rural to urban areas. With much dependence on natural resources and climate-sensitive sectors such as agriculture, water and forestry, India may face a major threat from scarcity of vital resources.³³

Policy Implications

Precisely at a time when India is confronted with development imperatives, we will also be severely impacted by climate change.³³ With close economic ties to natural resources and climate-sensitive sectors, India may face a major threat,³⁴ and require serious adaptive capacity to combat climate change. With 27.5 per cent of the population still below the poverty line,³⁵ reducing vulnerability to the impacts of climate change is essential.³⁴ In response to the predicted changes in public health due to climate change, our policymakers need to work to strengthen the health care systems along with water and wastewater systems. Adaptation will require diverse strategies like inter-sectoral coordination which could include physical modification to the built environment and improved housing and building standards.³⁶ In order to address some of the predicted changes as well as those are taking place in India in an effective manner, more emphasis is required on the following policies:

- Strengthening health systems and service delivery mechanisms
- Provision of drinking water and sanitation facility to all
- Provision of funding for low income communities with poor sheltering and high exposure/risk to heat and cold waves
- Educating people about climate-related diseases

CONCLUSION

The paper shows that linkages between climate change and human health are complex and multi-layered and predictions of the future health impacts of climate change are still uncertain. Over India, the annual mean temperature has increased in the past hundred years. Projection of the future climate change scenario shows catastrophic events will exhibit an increase in frequency and intensity resulting in enormous impact on human life in terms of death toll and disease epidemic.³⁷ Climate change is happening and emissions are bound to increase due to growing economy of India. Therefore, addressing both mitigation and adaptation is important. Even the developed nations are struggling to cope up with the challenges posed by the changing climate; India needs to put more efforts to counter the same. Considering the increasing trend of impact of climate change on human health, adoption of mitigation measures like strengthening health systems and service delivery mechanisms through early monitoring,

disease surveillance, vector and disease control, and health insurance to counter the same becomes imperative. Investment in research and development, health risk assessment studies, vulnerability mapping studies, establishment of baseline conditions, scenario modeling and adoption of clean development mechanisms, etc. are the need of the hour.

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AN ASSESSMENT OF PHC FACILITY IN DEMOGRAPHICALLY WEAK DISTRICTS OF SOME STATES IN INDIA

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ABSTRACT

The study was undertaken with the objective of taking stock of the existing health facilities at the Primary Health Centre (PHC) level with regard to the available manpower, infrastructure and family welfare services provided by them, and to understand the scope of improvement. Sponsored by the Indian Council of Medical Research, New Delhi; the study covered 379 PHCs from 83 districts (out of the 90 demographically weak districts) from the undivided states of Uttar Pradesh (UP), Madhya Pradesh (MP), Bihar and Rajasthan. Selection of the PHCs was based on the earlier survey carried out in 1993. The information collected in the study related to the coverage parameters, physical facilities, manpower, training status and their performances on which information had also been collected earlier.

It was found that about two-thirds of the PHCs have labour rooms and 40 per cent have operation theatres. As compared to the 1993 PHC facility survey, physical facilities in terms of labour rooms, operation theatres, Government buildings, residential quarters and number of beds has increased in UP and Bihar. One medical officer was available in 70 per cent of the PHCs and at least two medical officers were posted in around 18 per cent of the PHCs. Very few PHCs had three medical officers. The PHCs without any medical officer has decreased in the states of UP, MP and Rajasthan. As compared to the 1993 PHC facility survey, the number of ANMs at PHCs has increased by 13 per cent in Bihar. Number of LHV's has also increased by 15 per cent and 27 per cent in UP and Bihar respectively. Space for outdoor patients was sufficiently available at all the places.

Key words: Primary Health Centre, Medical facility, Manpower, Weak districts.

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Primarily a health center and its sub-centers are intended to provide the health care needs of rural population. The composition of manpower in a primary health centre includes medical officers, block extension educator, one female health assistant, male health worker, pharmacist, a compounder, a driver, a laboratory technician and a class IV employee. It is equipped with a vehicle and necessary facilities to carry out small surgeries. The primary health center deals with medical care, mother and child health care including family planning, safe water supply and basic sanitation, prevention and control of local diseases, collecting statistical information, health education, training of health guides and health workers, and basic laboratory investigations.

OBJECTIVES

The basic objectives of this study were to:

- (i) take stock of the existing health facilities at the PHC level with regard to the available manpower, infrastructure and family welfare services provided by them in the recent period, and
- (ii) to understand the scope of improvement in the services provided at these PHCs.

METHODOLOGY

Sponsored by the Indian council of Medical Research, New Delhi, the study covered 379 PHCs from 83 districts (out of the 90 demographically weak districts) from the undivided states of Uttar Pradesh (UP), Madhya Pradesh (MP), Bihar and Rajasthan. The present study was carried out in the same PHCs which were covered in 1993 facility survey in order to ascertain the change carried out. The methodology of this study has been described in the study report in detail¹. The information collected in the study related to coverage parameters, physical facilities, manpower, training status and their performances on which information was collected earlier.

The study was undertaken in 2010 that covered 379 PHCs which is approximately 15 per cent of the total 3056 primary health centers from 83 districts (out of 90 demographically weak districts) from the undivided states of UP, MP, Bihar and Rajasthan. As per the objectives and study design, 379 PHCs were covered in which 59 were from Rajasthan, 217 from UP, 76 from MP and 27 were from Bihar states. The data was collected by the investigator with the help of a questionnaire circulated through the medical officer. Information on population, sub-centres/ villages attached to the PHC, building position, staff quarters, vehicle, water/ electric supply, OT, IUD room, labour room, laboratory, instruments/equipment;

medical/ paramedical/supporting staff, eligible couples, pregnant women, births, deaths under the PHC area, deliveries, IUD insertion, MTP/sterilization, out/in patient attendance was collected. The information collected in the current study also relates to the information collected in the earlier study of 1993.

Information was also collected from the First-level Referral Units (FRUs) with respect to availability of specialists, blood bank and ambulance. A comparison of these variables was made with that collected in the PHC facility survey conducted earlier in 1993. Analysis of data at two given time-points has been done to see the improvement in services and relating this to the facilities provided under the social safety net.

FINDINGS AND DISCUSSION

The analysis is based on the information collected through the 379 PHCs from these four states. Average population covered in the current study (2010) by the PHCs ranged between 31,300 and 45,000. The number of PHCs and average population covered by the PHCs in 1993 and 2010 are presented in Table 1. It is seen that, all the PHCs in the four states registered an increase in population as compared to 1993 while the average population covered by the selected PHCs in Bihar has become more than double from 20,064 in 1993 to 45,056 in 2010.

TABLE 1
POPULATION COVERED BY THE PHCs IN 1993 AND 2010

State	Number of PHCs	Average population covered	
		2010 Study	1993 Study
Rajasthan	59	31341	19789
Uttar Pradesh	217	43759	28711
Madhya Pradesh	76	33813	19280
Bihar	27	45056	20064
Total	379		

Physical Facilities: It has been observed that about two-thirds of the PHCs had labour room and 40 per cent had been equipped with operation theatres. These facilities were available in more than 70 per cent of the PHCs in Rajasthan, whereas only 15 per cent in Bihar. About 70 per cent the PHCs were functioning in Government buildings, 73 per cent were having bed facilities and 47 PHCs had residential quarters for the staff. As compared to 1993 PHC facility survey, physical facilities in terms of labour room, operation theatre, Government

building, residential quarters and number of beds have increased in UP and Bihar considerably. There has been a ten-fold increase in the number of labour rooms from 1993 to 2010 in Bihar, MP and UP; there has been a four-fold increase in the number of operation theatres in all the states except Bihar which has even less than double the number of OTs between 1993 and 2010. But Bihar has witnessed the highest increase in the number of beds from 1993 to 2010 (Table 2).

TABLE 2
PHYSICAL FACILITIES AVAILABLE IN PHCs DURING 1993 AND 2010 (%)

State	Labour Room		Operation Theatre		Government Building		Residential Quarters		Bed	
	2010	1993	2010	1993	2010	1993	2010	1993	2010	1993
Rajasthan	84.7	21.1	69.5	15.5	81.4	77.9	74.6	50.4	83.1	66.3
U.P.	62.7	6.3	35.0	8.1	59.0	11.4	37.8	16.1	71.9	56
M.P.	81.6	10.3	52.6	11.6	90.8	60.2	81.0	27.1	61.8	13.3
Bihar	37	3.8	14.8	8.3	66.7	38.7	23.8	3.7	100	48.1

Medical Manpower: Data given in Table 3 shows that one medical officer was available in 70 per cent of the PHCs while two medical officers were posted in around 18 per cent of the PHCs and a very few PHCs had three medical officers. Only one-tenth of the PHCs were without any medical officer. The availability of a lady medical officer, medical officers doing leparatomy/caesarean were available in a very few PHCs. The PHCs without any medical officer has decreased in the states of UP, MP and Rajasthan while the number has increased from 12.1 per cent in 1993 to 40.7 per cent in 2010 in the state of Bihar. There has been no considerable increase in the availability of lady medical officers in the states except MP where it has increased from 0.2 per cent in 1993 to 14.5 per cent in 2010. Figures from 1 to 4 also reflect the availability of medical officers and lady medical officers in the PHCs in 1993 and 2010.

TABLE 3
MEDICAL OFFICERS IN 1993 AND 2010 (%)

State	Medical Officers						Lady Medical Officer	
	One		Two		Zero			
	2010	1993	2010	1993	2010	1993	2010	1993
Rajasthan	88.1	79.3	1.7	4.7	6.8	15.9	5.1	5.0
U.P.	68.7	64.1	24.9	15.9	6.5	20.0	1.4	1.3

State	Medical Officers						Lady Medical Officer	
	One		Two		Zero			
	2010	1993	2010	1993	2010	1993	2010	1993
M.P.	67.1	76.2	9.2	0.4	21.1	23.5	14.5	0.2
Bihar	40.7	53.0	18.5	34.8	40.7	12.1	3.7	3.3

FIGURE 1
PHCs WITH TWO MEDICAL OFFICERS (%)

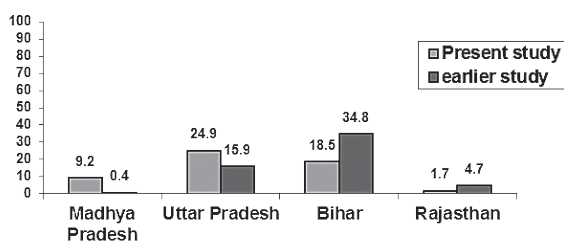


FIGURE 2
PHCs WITH A LADY MEDICAL OFFICER (%)

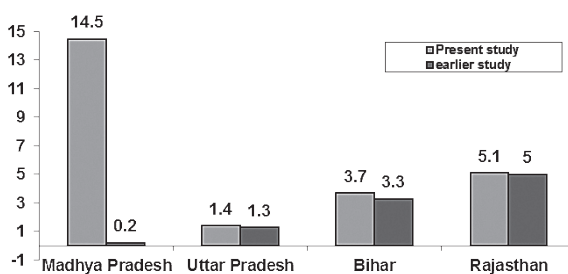


FIGURE 3
PHCs WITH ONE MEDICAL OFFICER (%)

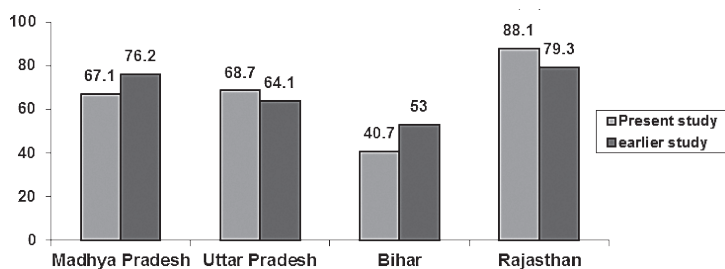
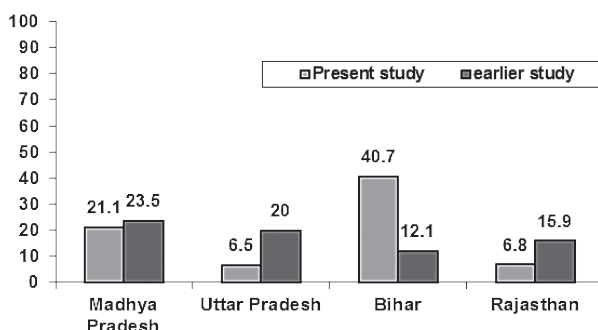


FIGURE 4
PHCs WITHOUT MEDICAL OFFICER (%)



Nursing Staff: In all, 6.8 per cent of the total PHCs in Rajasthan had staff nurse while MP had 31 per cent. 94.9 per cent of the PHCs in Rajasthan had ANMs while the figures show 75.1 per cent in UP, 47.6 in MP and 81.5 in Bihar. With regard to the availability of LHVs in PHCs; Rajasthan, UP and MP have reported a two-fold increase whereas the percentage has increased almost 15 fold from 2.2 per cent in 1993 to 29.6 per cent in 2010. As compared to 1993 PHC facility survey, the number of ANMs at PHCs has increased by 13 per cent in Bihar. Number of LHVs has increased by 15 per cent and 27 per cent in UP and Bihar respectively (Table 4 and Figures 5 and 6).

TABLE 4
EXISTING NURSING STAFF IN 1993 AND 2010 (%)

State	Nurses		ANMs		LHVs	
	2010	1993	2010	1993	2010	1993
Rajasthan	6.8	14.6	94.9	85.7	81.4	42.8
Uttar Pradesh	1.4	3.3	75.1	73.5	30.9	15.9
Madhya Pradesh	31.0	9.7	47.6	72.3	76.2	44.9
Bihar	-	1.7	81.5	68.5	29.6	2.2

FIGURE 5
PHCs WITH ANMs (%)

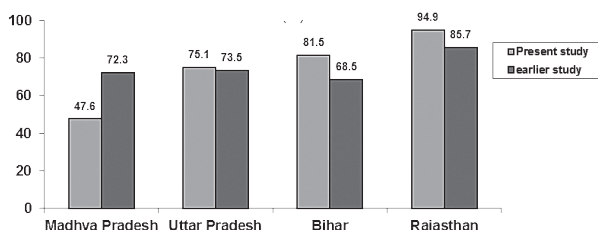
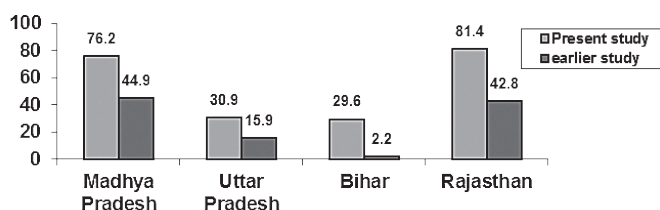


FIGURE 6
PHCs WITH LHVs (%)



Other Physical Facilities: It has been observed that space for outdoor patients was available in more than 90 per cent of the PHCs in all the states. The situation of supply of electricity and water was not good in Bihar and UP. Only 18.5 per cent of the PHCs had electricity supply and 29.6 per cent of the PHCs had water supply in Bihar. It was also seen that only 40.7 per cent and 22.2 per cent of the PHCs in Bihar had latrines and laboratory rooms respectively. With regard to handling emergency cases, vehicle was not available at all the places (Table 5).

TABLE 5
PHYSICAL FACILITIES AT THE PHCs IN 2010 (%)

	Rajasthan	UP	MP	Bihar
Space for O.P.D	98.3	97.7	94.7	92.6
Ward	79.7	55.8	61.8	40.7
Laboratory Room	81.4	43.8	60.5	22.2
Dispensing Room	93.2	81.6	82.9	55.6
Doctors Room	88.1	63.6	81.6	44.4
Store	88.1	75.1	85.5	51.9
Latrines	91.5	71.4	81.6	40.7
Water Supply	89.8	75.1	71.1	29.6
Electricity Supply	93.2	61.3	78.9	18.5
Vehicles (in running condition) (Number)	0		.5	
	1	3.4	2.3	14.5
	≥2		1.9	10.4

	Rajasthan	UP	MP	Bihar
Beds (Number)	0	16.9	28.1	11.8
	1	13.6	2.8	7.9
	2	6.8	22.1	18.4
	3		.5	5.3
	4	8.5	46.1	13.2
	5	15.3		7.9
	≥6	38.3	0.5	35.4

Paramedical staff: The availability of pharmacist was as low as 30 per cent in Bihar. In about one-third of the places in UP and MP, pharmacist was not available; whereas 90 per cent of the PHCs in Rajasthan had a pharmacist. It is also seen that class IV staff were available at all the places except Bihar where there was no class IV staff at one-third places. 20.3 per cent of the PHCs in Rajasthan had no lab technician. 11.1 per cent of the PHCs in Bihar and UP had one male health worker whereas no male health worker was posted in 85.3 per cent and 74.1 per cent of the PHCs in UP and Bihar respectively (Table 6).

TABLE 6
STAFF IN POSITION (%)

		Rajasthan	UP	MP	Bihar
Pharmacist	No	10.2	35.5	35.5	29.6
	≥1	89.8	64.5	64.5	70.4
Health Worker (Male)	No	67.8	85.3	47.4	74.1
	1	23.7	11.1	28.9	11.1
	≥2	8.5	3.8	23.6	14.8
Health Asstt. (Male)					
	No	86.4	81.6	71.1	81.5
	1	13.6	18.4	28.9	18.5
Lab Technician	No	20.3	88.9	73.7	92.6
	≥1	79.7	11.1	26.3	7.4
Class IV Staff	No	8.5	6.5	11.8	33.3
	≥1	91.5	93.6	88.1	66.6

Practice Status: It has been observed that almost all the paramedical staff was trained and carried out all the activities related to IUD, checking blood pressure, practicing ORT, UIP, RCH and ART works in all the states. Table 7 reveals that more than 90 per cent of the paramedical staff was trained in RCH programme and IUD in all the states. No para-medical staff was trained in checking blood pressure in 37 per cent of the PHCs in Bihar. In UP, it was seen, none of the MOs had undergone training in leparatomy/caesarean. It was also seen in Bihar that MOs in 81.5 per cent of the PHCs were not attending normal deliveries and MOs in 96.3 per cent of the PHCs were not attending even leparatomy/caesarean cases.

TABLE 7
PRACTICES CARRIED OUT BY THE STAFF (%)

		Rajasthan	UP	MP	Bihar
Medical Officers Attending Normal Deliveries	None	27.1	71.9	48.7	81.5
	≥1	72.9	28.1	51.3	18.5
Medical Officers Doing Leparatomy/Caesarean	None	96.6	100.0	88.2	96.3
	≥1	3.4		11.8	3.7
Para Medical Staff Trained in IUD	None	3.4	2.3	3.9	.1
	≥1	96.8	97.7	96.0	99.9
Para Medical Staff Carrying IUD works	None	1.7	2.8	5.3	3.7
	≥1	98.4	97.2	94.7	96.2
Para Medical Staff Trained in Checking Blood Pressure	None	1.7	9.7	3.9	37.0
	≥1	98.6	90.4	96.0	62.9
Para Medical Staff Checking Blood Pressure	None	1.7	25.8	7.9	81.5
	≥1	98.5	74.3	91.9	18.5
Para Medical Staff Practicing ORT	None	1.7	3.2	3.9	
	≥1	98.5	96.9	96.0	99.9
Para Medical Staff Working under UIP	None	1.7	2.3	5.3	
	≥1	98.5	97.8	94.8	99.9
Para Medical Staff Treating ART	None	3.4	7.4	11.8	11.1
	≥1	96.8	92.7	87.9	88.8
Para Medical Staff Trained in RCH Programme	None	1.7	3.2	6.6	
	≥1	98.5	96.8	93.4	99.9

Antenatal Care: The number of pregnant women registered with PHCs for ANC, TT, IFA and booster in all the states is given in Table 8. High-risk monitoring was also being done for pregnant women in all these states regularly.

TABLE 8
ANTENATAL CARE OF PREGNANT WOMEN (AVERAGE)

	Rajasthan	UP	MP	Bihar
Pregnant Women Registered with PHC for ANC	771	1218	709	782
Pregnant Women Registered with PHC Received TT1	565	1174	713	660
Pregnant Women Registered with PHC Received TT2/Boosters	737	1127	623	510
Pregnant Women Registered with PHC Received IFA Tablets	685	517	574	199
Number of Mothers Meeting for ORT	233	236	171	412
High Risk Monitoring done for Pregnant Women	43	173	56	23

Management of Delivery: It has been observed that high-risk pregnancies were being managed as well as being referred also by the PHCs in all the states. While UP has managed 306 high-risk pregnancies, the figure was only 2 in the state of Bihar. UP had also reported the highest number of women (116) approaching the institution as referred by the PHCs. Normal deliveries were being conducted in all these states (Table 9).

TABLE 9
DELIVERY DETAILS DURING THE LAST YEAR (AVERAGE)

Delivery Details	Rajasthan	UP	MP	Bihar
Deliveries Conducted in PHC	555	713	570	327
Risk Pregnancies Identified	41	76	66	5
High-risk Pregnancies Managed	10	306	33	2
High Risk Pregnancies Referred	38	59	47	5
NUMBER gone to Institution Referred	34	116	20	

Supply of Medicines: Supply of medicines such as IFA, Vitamin A, Trimethopriml/ Cotrimoxazole, ORS Packets, Injection methergen, Tab. methergen Ergotamine ranged from 50 per cent to 90 per cent in Rajasthan and MP whereas the figures for the same ranged from 8 per cent to 88 per cent in Bihar and UP. The basic medicine like Paracetamol was available in 98 per cent of PHCs in Rajasthan and MP and it was only 70 per cent in Bihar (Table 10).

TABLE 10
ADEQUATE SUPPLY OF MEDICINES (%)

	Rajasthan	UP	MP	Bihar
IFA Tablets (large)	91.5	24.4	78.9	7.4
IFA Tablets (small)	94.9	24.4	80.3	3.7
Vitamin -A (Solution)	98.3	82.0	94.7	85.2
Tab Superstal/Cotrimoxazole	98.3	66.8	89.5	70.4
ORS Packets	93.2	79.7	96.1	88.9
Injection Methergen	49.2	36.4	56.6	29.6
Tablet Methergen (Erodamine)	50.8	34.6	64.5	33.3
Tablet Paracetamol	98.3	85.3	97.4	70.4

Supply of Vaccines and Contraceptives: Table 11 shows that vaccines were available in more than 95 per cent of the PHCs in all the states whereas contraceptives were available in more than 90 per cent of the PHCs in all the states except Bihar (50%). Vaccines and Contraceptives (IUD, oral pills and nirodh) were sufficiently available in all these states.

TABLE 11
ADEQUATE SUPPLY OF VACCINES AND CONTRACEPTIVES (%)

	Rajasthan	UP	MP	Bihar
Supply of Vaccines	96.6	97.2	94.7	100
IUD	98.3	96.8	97.4	40.7
Oral Pills	98.3	97.2	98.7	40.7
Nirodh	96.6	96.8	97.4	59.3

Facilities for antenatal check up: It has been observed that adequate facilities for antenatal checkup such as blood pressure, weight, urine examination, haemoglobin and foetal heart sound) were available in all these states. Availability

of facilities for measuring BP and weight was dismal in Bihar (11.1%) and only 3.7 per cent of the PHCs had facilities for urine and haemoglobin examination.

TABLE 12
FACILITIES FOR ANTENATAL CHECK UP (%)

	Rajasthan	UP	MP	Bihar
Blood Pressure	94.9	70.5	94.7	11.1
Weight	93.2	92.6	94.7	11.1
Urine Examination	69.5	15.7	50.0	3.7
Haemoglobin	66.1	10.6	52.6	3.7
Foetal Heart Sound	94.9	79.3	85.5	18.5

Functioning of Immunization Programme: It has been observed that the basic requirement for storage of vaccines at the PHCs was not available in all these states (Table 13). 77.8 per cent of the PHCs in Bihar had no power supply while 22.2 per cent of the PHCs reported frequent power breakdown. Fixed immunization sessions were being held in all these states regularly.

TABLE 13
FUNCTIONING OF IMMUNIZATION PROGRAMME (%)

		Rajasthan	UP	MP	Bihar
Storage of Vaccines at PHC		69.5	.9	53.9	
Power Supply	Power Supply Mostly Continuous	62.7	11.5	40.8	
	Frequent Breakdown	25.4	54.8	31.6	22.2
	No Power Supply in the PHC	11.9	33.6	27.6	77.8
Fixed Day Immunization Sessions Being Held		96.6	97.7	94.7	100
Immunization Sessions Scheduled Per Month (Average)		31	44	22	49

CONCLUSION

As compared to the 1993 PHC facility survey, physical facilities in terms of labour room, operation theatre, Government building, residential quarters and number

of beds has increased in UP and Bihar. About two-thirds of the PHCs had labour rooms and 40 per cent had operation theatres. With regard to manpower, one medical officer was available in 70 per cent of the PHCs, two medical officers in around 18 per cent of the PHCs, and very few PHCs had three medical officers. The PHCs without any medical officer has decreased in the states of UP, MP and Rajasthan. The number of ANMs at PHCs has increased by 13 per cent in Bihar. Number of LHVs has increased by 15 per cent and 27 per cent in UP and Bihar respectively. Space for outdoor patients was sufficiently available at all the places. Adequate supply of vaccines and contraceptives was also available at the places except Bihar.

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EFFECTIVENESS OF EDUCATIONAL INTERVENTION ON NEONATAL RESUSCITATION AMONG NURSING PERSONNEL

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ABSTRACT

Birth of a child is a special moment of joy for the parents and along with it comes a lot of expectations. However, the first few moments after birth are full of anxiety and rapid physiological adjustments. Most babies go through the transition successfully as a matter of routine; however 10 per cent of babies who do not start breathing immediately and spontaneously result in birth asphyxia and need assistance to initiate breathing. Opportunity lost to provide needed assistance at this time would be a crucial impediment for saving these babies. Timely initiation of neonatal resuscitation has the potential of altering the outcome of intra-partum events. The present Pre-experimental study was conducted at the Trained Nursing Association of India in 2011 among 71 nurses working at nursery and allied units of District and Sub-district hospitals across the country. It assessed the effectiveness of educational intervention in terms of knowledge and skill of nurses on Neonatal Resuscitation. Purposive sampling technique was adopted to select the samples. Tools used for data collection were Structured Knowledge questionnaire and simulated situations with observational checklist. The study findings reflect the need for education to enhance the knowledge and skill of nurses to identify birth asphyxia and its potential complications leading to neonatal mortality during the first few hours after birth. As Practical skills appear to decline faster than theoretical knowledge regular in-service instruction is required every year.

Key words: Educational intervention, Neonatal resuscitation, Nursing personnel, Birth asphyxia.

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INTRODUCTION

When the baby is born, many crucial things happen, enabling the transition to extra uterine life. Changes take place in the lungs to allow breathing and changes in the heart and circulatory system switch off circulation through the placenta and redirect it through the lungs. In some newborns, the changes do not occur smoothly and those babies do not start breathing immediately and spontaneously resulting in birth asphyxia and need assistance to initiate breathing. Birth asphyxia is one of the leading causes contributing to neonatal mortality.¹

The Neonatal mortality rate is used as an indicator of country's social, educational and health care standard.² Out of 130 million infants born each year worldwide, 4 million die in the first 28 days of life. In India, out of 26 million babies born annually, 1.2 million die during the first four weeks, constituting 30 per cent of global neonatal deaths.³ Three-quarters of neonatal deaths occur in the first week, and more than one-quarter occur in the first 24 hours. About 20-25 per cent of neonatal deaths occur as a result of birth asphyxia.^{4,5} It is estimated that each year over a million of children who survive birth asphyxia develop problems such as cerebral palsy, learning difficulty and other disabilities. The main reason for birth asphyxia and other associated problems is poor management during and immediately after child birth. The incidence of birth asphyxia is reported to be higher in developing countries than in the developed.

Neonatal resuscitation has the potential of altering the outcome of intra-partum and post-partum events. However, due to lack of skilled health professionals, appropriate timely action is not taken in many health settings to prevent the incidence.⁶ Lack of competency of health professionals is one of the impediments for saving the asphyxiated babies. Nurses being crucial health care providers available in the unit round the clock at all levels of health care delivery system can contribute significantly in promotion of newborn's health if they have adequate knowledge and skill in provision of newborn care. Thus improving their knowledge and making them competent in provision of resuscitation can help to identify and manage the asphyxiated baby in time and ensure intact survival of newborn baby.^{5,7}

The present study assesses the effectiveness of an educational intervention on Neonatal resuscitation in terms of knowledge and practice of nurses working in Neonatal and Allied units of secondary and tertiary hospitals across the country. The information for this paper has been derived from literature review, policy/programme documents, national level data, state information system, personal experiences of authors.

METHODOLOGY

This pre-experimental study was conducted at the Trained Nurses Association of India (TNAI) New Delhi in 2011 as part of their national workshop on Newborn Care for five days duration. The rationale for selecting this site was availability of the subjects and feasibility of conducting the study. To participate in this study 71 nurses working at nursery, labour room, postnatal ward of secondary and tertiary hospitals across the country were selected as samples by using purposive sampling technique. The inclusive criteria for their selection was that they should be working in newborn and allied health units such as labour room and postnatal ward where newborns are treated and cared for. The study design adopted was one group pre-test – post-test. Tools used for data collection were structured knowledge questionnaire and observational checklist. The Knowledge questionnaire consisted of two Parts. Part-I comprised of demographic variables such as age, gender, educational status, area of work, years of experience in newborn units, knowledge about neonatal resuscitation, any experience of resuscitating a newborn and details regarding formal training or education regarding NRP. Part II consisted of 49 objective type items pertaining to neonatal resuscitation such as initial steps, bag and mask, chest compression, endotracheal intubation, medications, care of pre-term babies and special considerations. Each correct response was awarded one score and incorrect response a score of zero was given. Observational checklist consisted of 33 expected steps pertaining to neonatal resuscitation such as pre-performance steps, initial steps, routine care, positive pressure ventilation, chest compression and medication. For each correct step one score was awarded and for incorrect step a score of zero was given. Maximum marks were 49 on knowledge questionnaire and 33 on observational checklist. . An answer key was prepared to facilitate the correct response. The tools used were validated before administration. The reliability of the structured knowledge questionnaire was established by using Kuder Richardson -20 formula. The reliability coefficient was found to be 0.88. The reliability of the observational checklist was established by using inter rater reliability. The reliability co-efficient was found to be 85 per cent between two observers.

Data Collection Procedure

On day one baseline data with regard to knowledge and practice of nurses with regard to neonatal resuscitation was obtained. On day two, knowledge regarding neonatal resuscitation for management of asphyxiated baby was imparted through lecture-cum-discussion and demonstrations followed by hands on training by using mannequin. The guideline/module developed by National Neonatology Forum, India on Neonatal Resuscitation was used. On the third and fourth day,

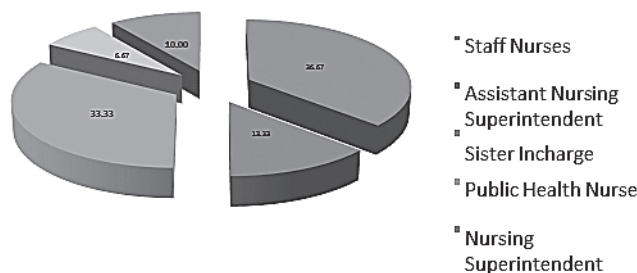
the proceedings of the workshop dealing with other areas of the newborn care proceeded. At the end of the workshop (Day 5) the post test was conducted following the similar sequence followed during the pre-test. The data collected was analyzed using descriptive and inferential statistics.

Ethical Clearance

Before conducting the study, prior approval for conducting the study was obtained from the executive committee of the TNAI. Formal approval was obtained from the coordinator of the workshop. The study samples were explained about the procedure of the study and their consent was obtained. The right of withdrawal and denial from participation was explained to them. Written consent was obtained from the nurses who expressed their willingness to participate in the study.

FINDINGS

FIGURE 1
DISTRIBUTION OF SAMPLES BASED ON DESIGNATION



All participants (71) were working in newborn and allied health units. The sample consisted of staff nurses (36.67%), sister in-charges (33.33%), assistant nursing superintendents (13.33%), public health nurses (6.67%) and nursing superintendents (10.0%).

1. Knowledge of Nurses on Neonatal Resuscitation

TABLE 1
PRE-TEST AND POST-TEST KNOWLEDGE SCORE OF NURSES

Domain	Test	Mean	Median	Range	S.D
Knowledge	Pre-Test	19.11	18.7	5.5-29	5.53
	Post-Test	30.71	31.7	11-37.5	6.74

Data presented in Table 1 indicate that the mean post-test knowledge score (30.71) was higher than the mean pre-test knowledge score (19.11). The post test knowledge scores were more homogeneous (SD 6.74) as compared to the pre test knowledge score.(SD 5.53).

TABLE 2
AREA WISE PRETEST AND POSTTEST KNOWLEDGE SCORE

N=71

Knowledge areas	Max. Score	Pre-test	Post-test	Gain Score
		Mean Score and Mean % Score	Mean Score and Mean % Score	
Initial steps	12	5.27 (43.9)	9.22 (76.8)	3.95
Bag and mask, chest compression and ET intubation	25	9.55 (38.2)	16.15 (64.62)	6.6
Medications and care of pre-term babies and special considerations	12	3.70 (30.83)	4.75 (39.65)	1.05

In pre-test, nurses had less knowledge score (3.70) in the area of medications, care of pre-term babies and special considerations and highest score (9.55) in the area of bag and mask ventilation, chest compression and ET intubation. The area with the lowest mean percentage score indicates the highest deficit area. In the post-test, their mean percentage score in the all the areas was higher, indicating that the educational intervention was effective in enhancing their knowledge on neonatal resuscitation.

TABLE 3
COMPARISON OF OVERALL PRETEST AND POSTTEST KNOWLEDGE SCORE

Knowledge	Mean	MD	SDD	't'
Pre-Test	19.11	11.6	0.21	23.5*
Post-Test	30.71			

df (70)=1.67; * significant (p<0.05)

Table 3 shows the knowledge score of nurses before and after the administration of educational intervention. On an average they had 19.11 knowledge score before

administration of an educational intervention and 30.71 after administration of an educational intervention. It means that they improved from 19.11 to 30.71 on the knowledge score.

In other way it can be interpreted that in pre-test they were able to answer only 19 questions on neonatal resuscitation but in post-test they were able to answer 30 questions. It means after having educational intervention they were able to answer 11 questions additionally. This difference is statistically significant (23.5) at 0.05 level of significance.

2. Skill/Practice of Nurses on Neonatal Resuscitation

TABLE 4
PRE-TEST AND POST-TEST SKILL/PRACTICE SCORE OF NURSES

Domain	Test	Mean	Median	Range	S.D
Skill/Practice	Pre-Test	12.8	13	05-18	2.03
	Post-Test	20.6	19.8	12-29	6.05

Data presented in Table 4 shows that the mean post-test practice score (20.6) was higher than the mean pre-test practice score (12.8). The post-test practice scores were more homogeneous (SD 6.05) as compared to the pre-test practice score. (SD 2.03).

TABLE 5
AREA WISE PRE TEST AND POST TEST PRACTICE SCORE OF NURSES

N=71

Practice areas	Maximum Score	Pre Test	Post Test	Mean % Gain Score
		Mean % Score	Mean % Score	
Pre Performance Steps	2	32.34%	65%	32.66%
Initial steps	4	36.5%	77.5%	41%
Routine Care	14	43.56%	86.45%	42.89%
Positive pressure ventilation	6	40.56%	86.66%	46.1
chest compression	6	49.56%	92.5%	42.94%
Medications	1	50.12%	100%	49.88%

Maximum Score =33

The data in Table 5 indicates that the percentage of practice in each aspects of neonatal resuscitation among nurses before and after administration of an educational intervention. In pre-test lowest mean percentage score was in the area of pre performance steps (32.66%) followed by initial steps (41%) routine care (42.89%), chest compression (42.94%), positive pressure ventilation (46.1%) and medications (49.88%). In post-test, in all aspects of neonatal resuscitation practice nurses improved their practice after administration of educational intervention.

TABLE 6
COMPARISON OF OVERALL PRETEST AND POSTTEST SKILL/PRACTICE SCORE

Practice	Mean	MD	SDD	't'
Pre-Test	12.8		2.03	
Post-Test	20.6	7.8	6.05	17.53*

df(70)=1.67; * significant (p<0.05)

Table 6 shows the practice score of nurses before and after administration of an educational intervention. On an average they had 12.8 practice score before administration of educational intervention and 20.6 after administration of educational intervention. It means that they improved from 12.8 to 20.6 on the practice score.

In other way it can be interpreted that in pretest they were able to practice only 12 steps of neonatal resuscitation but in posttest they were able to perform 20 steps. After having educational intervention they were able to perform 8 steps additionally. This difference is statistically significant (17.53) at 0.05 level of significance.

DISCUSSION

Adequate knowledge and skill of health professionals is essential for improving the neonatal outcome. Training programmes is the key strategy in promotion of health care services. The findings of the present study suggest the need for implementation of comprehensive training programme on NRP to improve the practices of immediate newborn care in labour room. Regular training of nurses may possibly have positive effect in reducing undesirable health events especially in resource constrained settings. The findings of study is in line with the study conducted by Nakakeeto et.al to determine effectiveness of training nursing personnel and its effect on the outcome of neonate delivered.⁸

The present result is consistent with Bann CM, Carlo WA, Chomba E and Patel D et.al who conducted a study to assess the educational impact of neonatal resuscitation program concludes that the neonatal resuscitation education has the potential to substantially improve knowledge, skill and self-efficacy of staff nurses on neonatal resuscitation.^{9,10}

1. Assessment of Knowledge of Nurses Before and After Administration of Education

While comparing the nurses' knowledge on neonatal resuscitation before and after administration of an educational intervention it was observed that in all aspects of neonatal resuscitation nurses had improved their knowledge after administration of an educational intervention. In pre-test the nursing personnel had knowledge deficit in the areas of medications and care of preterm babies and special considerations, followed by Initial steps and bag and mask ventilation and ET intubation which is similar to the study conducted by Ogulesi T, et.al reported that the knowledge of the nurses regarding neonatal resuscitation was poor.¹¹

After the administration of educational intervention the knowledge in all the areas had significantly increased. These findings are consistent with the study conducted by Waldemar A. Carlo et al (2009) on educational impact of neonatal resuscitation. They found that after training, written scores (knowledge evaluation) improved from $57\% \pm 14\%$ to $80\% \pm 12\%$ (mean $\pm$ SD; $P < .0001$).

2. Assessment of Skill/Practice of Nurses Before and After Administration of Education

Before administration of an educational intervention their overall practice score on an average was 45.58 per cent in neonatal resuscitation with the deficit in the area of pre performance steps. The findings are consistent with the study conducted by Shanta Chandrasekaran (2010) on Awareness of basic life support among medical, dental, nursing students and doctors. Their study findings revealed that out of 1,054 responders, none of them had complete knowledge of BLS.¹³

After administration of an educational intervention their overall practice score on an average was 85.45 per cent in neonatal resuscitation. The maximum mean percentage score was in the area medication (100%) The findings are consistent with the study conducted by Laurel Bookman et al (2010) on Educational impact of a hospital-based neonatal resuscitation programme in Ghana Resuscitation.¹⁴ In all aspects of neonatal resuscitation, the nursing personnel had improved

their practice after administration of an educational intervention. The maximum mean percentage gain was in the area medication (49.88%) and the lowest mean percentage gain was in the area of pre performance steps (32.66%). The findings are consistent with the study conducted by Opiyo N et al. (2008) on “Effect of Newborn Resuscitation Training on Health Worker Practices in Pumwani Hospital, Kenya”. They found that the trained providers demonstrated a higher proportion of adequate initial resuscitation steps compared to the control group (trained 66% vs control 27%; risk ratio 2.45, [95% CI 1.75–3.42], $p < 0.001$, adjusted for clustering).¹⁵

CONCLUSION

Health professionals involved in direct care of newborns should be equipped with adequate knowledge and skill in neonatal resuscitation. Neonatal resuscitation should be an integral part of continuing education for all personnel involved in newborn and obstetrical care because it improves both tested knowledge and performance. As practical skills appear to decline faster than theoretical knowledge, regular in-service instruction is required at least every year.

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