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# FACTORS HINDERING THE TREATMENT OF EBOLA VIRUS DISEASE IN WEST AFRICA

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**Abstract**

The complex nature of Ebola epidemic ongoing in West Africa has brought up a lot of reviews on the causes of Ebola virus disease (EVD) spread and factors hindering the fight against EVD. Here we reviewed different Ebola epidemic chronologically and by population affected. Since recent outbreak in West Africa in December 28, 2013 in Guinea and its spread to neighbouring countries with fatality case rate of 25% to 90% and over 5000 people infected, efforts have been made to curb the disease spread by various government organisations and non-government organisations. We made use of data collected by various organisations working to treat the victims of EVD and working towards controlling the spread of EVD such as world health organisation and Centre for disease control, it is from the data collected that mathematical models are used to assess the impact of the disease in the west African region and globally. The work elaborated factors militating against the curbing of the spread of EVD in west Africa such as; Superstitious belief of the communities affected by EVD, poor economy in the region affecting health infrastructure, lose border control in the west African region, shortage of health workers fighting the epidemic, poor handling of patients and corpses by the affected community members. This work points out the progress made to curb the spread of EVD; diagnosis and treatment of EVD, precautions, health awareness on the epidemic, vaccine trials and polices put in place to stop the spread of Ebola virus disease.

Keywords: Ebola Virus Disease, epidemic, mathematical models, west Africa, data collection, superstitious belief, poor infrastructure, shortage of health workers, border control, vaccine trials, policies, health awareness, diagnosis and treatment.

## INTRODUCTION

Ebola Virus disease was previously known as Ebola haemorrhagic fever. This virus is transmitted to individuals from wild animals and birds (bats); it then spreads from human to human contact.

According to World Health Organisation the average fatality rate of Ebola Virus Disease is 50% and the fatality case rates have varied from 25% to 90% in various epidemic of Ebola Virus Disease.

The first outbreak of Ebola Virus Disease took place in Central African region but most recent and ravaging outbreaks are taking place in West African region. The Ebola Virus Disease which is an acute haemorrhagic fever disease is often untreated and does not have a known vaccine to prevent this disease. The first Ebola Virus Disease was discovered in 1976 in Nzara, Sudan and Yambuku Congo; subsequently it occurred in areas around Ebola River from which the Virus took up its name from. Ever since then there has been episodes of Ebola Virus Disease epidemic in Central Africa and East Africa but most current epidemic with the highest fatality rate so far recorded in the world broke out in March 2014 in Guinea and the outbreak has been considered most complicated Ebola outbreak since the inception of Ebola Virus Diseasein 1976.

The West African Ebola Virus Disease epidemic which broke out in Guinea in March 2014 affected countries which share common boundaries with Guinea and these countries include Sierra Leone and Liberia. Also there was one air traveller from Liberia who brought EVD to Nigeria and another one traveller from Guinea brought EVD to Senegal by road. According to WHO, Guinea, Sierra Leone and Liberia have been mostly affected by EVD since history.

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On August 8th World Health Organisation Director-GeneralMargaret Chen declared EVD epidemic anoutbreak which must be considered as a public health Emergency of international concern.

Ebola virus belongs to virus family Filoviridae and have sister viruses like the Cueva viruses and Marburg viruses. There are 5 species of Ebola virus identified so far: Zaire Ebola virus, Bundibugyo Ebola virus, Sudan Ebola virus and Thai forest Ebola virus. Africa have experienced large outbreaks ofBundibugyo Ebola virus, Zaire Ebola virus and Sudan Ebola virus and currently the most adverse and complicated Ebola epidemic in West Africa since 2014 till date has been identified to belong to the Zaire Ebola virus species.

According to Centre for Disease Control the natural reservoir host of Ebola virus is unknown but according to evidence, similar viruses are animal-borne and bats are most probable reservoirs. In 2014 and early 2015 the West African Ebola virus disease outbreak had a total weekly case incidence which increased from 35 to 65 new cases in Guinea. At a certain point there were 76 new confirmed cases in Sierra Leone while Liberia continued to show low case incidence (CDC Feb 2015).

**Transmission and Risk of Exposure**

Fruit bats are the most known natural Ebola virus host. Other suspected hosts are Chimpanzees, Gorillas, monkeys, forest Antelopes and Porcupines found most especially in the rainforest (WHO 2015).

Ebola is spread through human to human contact by direct human contact. Ebola is found in human blood, secretions, organs and every other body fluid.

Health workers and care givers of infected persons with EVD have been mostly exposed to EVD. Burial ceremonies have also exposed people to EVD due to close contact with an infected corpse.

It is also known that people that have recovered from EVD remain infectious because their blood, semen and breast milk will still contain the virus. It takes 7 weeks after recovery from the illness for the Ebola virus to clear from the human system.

**Symptoms of Ebola Virus Disease**

The incubation period of Ebola virus is 2 to 21 days (3 weeks). Humans are not infectious till they begin to exhibit symptoms. Symptoms of EVD include; fever, tiredness, body pains, headache and sore throat and unfortunately these symptoms mimic other common illnesses in Africa such as malaria, typhoid fever. This is followed by vomiting, diarrhoea, rashes, symptoms of impaired kidney and liver function, and in some cases, both internal and external bleeding (e.g. blood oozing from the gums and blood in the stool). Laboratory findings include low white blood cell and platelet counts.

**Diagnosis**

It can be difficult to differentiate EVD from other infectious diseases such as malaria, typhoid fever and meningitis. Diagnostic confirmation of Ebola virus infection can be made using the following investigations: antibody-capture enzyme-linked immunosorbent assay (ELISA), antigen-capture detection tests, serum neutralization test, reverse transcriptase polymerase chain reaction (RT-PCR) assay, electron microscopy, virus isolation by cell culture.

Samples from patients are considered extreme biohazard risk; laboratory testing on non-inactivated samples should be conducted under maximum biological containment conditions (CDC 2014).

**Treatment and Vaccines**

Supportive care-rehydration with oral or intravenous fluids and treatment of specific symptoms, improves survival. There is no proven treatment available for EVD. However, some of the potential treatments involving blood products, immune therapies and drug therapies are currently being evaluated. No licensed vaccines are available yet, but 2 potential vaccines are undergoing human safety testing.

**Prevention and Control**

EVD outbreak control depends on applying a package of interventions such as case management, surveillance and contact tracing, a good laboratory service, safe burials and social mobilisation. Community engagement is the key to successfully control of outbreaks. Raising awareness of risk factors for Ebola infection and protective measures

that individuals can take is an effective way to reduce human transmission. Risk reduction messaging should focus on several factors:

Reducing the risk of wildlife-to-human transmission from contact with infected fruit bats or monkeys/apes and the consumption of their raw meat. Animals should be handled with gloves and other appropriate protective clothing. Animal products (blood and meat) should be thoroughly cooked before consumption.

Reducing the risk of human-to-human transmission from close contact with people with Ebola symptoms, particularly with their bodily fluids. Gloves and appropriate personal protective equipment should be worn when taking care of ill patients at home. Regular hand washing is required after visiting patients in hospitals, as well as after taking care of patients at home.

Epidemic containment measures including prompt and safe burial of the dead, identifying people who may have been in contact with someone infected with Ebola, monitoring the health of contacts for 21 days, the importance of separating the healthy from the sick to prevent more spread, the importance of good hygiene and a clean environment.

**METHODOLOGY**

This paper was written based on the information and indices gathered from world health organisation, centres for disease control and prevention and other news agencies.

Blood test for Ebola such as antibody-capture enzyme-linked immunosorbent assay (ELISA) ,antigen-capture detection tests, serum neutralization test, reverse transcriptase polymerase chain reaction (RT-PCR) assay, electron microscopy, virus isolation by cell culture has been used to diagnose Ebola virus disease and this had been approved by World Health Organisation. This has been used to identify patients. Currently Ebola testing needs a laboratory analysis of the blood for the fragments of Ebola virus genetic materials; it can take 12 to 24 hours to have a correct diagnosis. Rapid blood test for Ebola has also been approved by World Health Organisation.

Corgenix a US based company has developed the ReEBOV Antigen Rapid Test and trials in parts of West Africa have shown 92% success testing rate. The World Health Organization said: "While less accurate, the antigen test is rapid, easy to perform and does not require electricity ".

Dr Ben Neuman, a lecturer in virology at the University of Reading, said: "The new test could help to quickly confirm outbreaks in remote areas without the need to send samples to a testing clinic and wait for results (BBC News 27 Feb 2015). "The new test isn't about saving the lives of infected people, but it can help in the long run by making it easier and quicker to detect Ebola outbreaks."

**FINDINGS**

In December 2013 in Guinea a girl known as Emile Ouamouno who was just two years old living in the village of Meliandou began suffering from a fever, headache and bloody diarrhoea. His family did all they could to save her life but the boy died after a few days his 3 year old sister Philomene and her mother Sia whom was pregnant died also. This was how the outbreak started and killed more than 10000 people subsequently.

It is believed that it was in the village of Meliandou in Guinean forest region which was popular for palm cultivation and processing that Ebola virus disease started and might have been attracted from the fruit bats carrying the virus.

Due to the porous land border crossing system, EVD spread across into Liberia and Sierra Leone.

During that period, health workers did not understand the illness so the hospitals became infectious areas.

Sierra Leone's first diagnosed case was a pregnant woman that was admitted in a hospital in Kenema district on 24th May 2014. The woman had attended the funeral of a well-known traditional healer. The healer was treating Ebola patients whom came from Gueckedou region of Guinea before she died. It was found out that 13 more people who attended the same burial died of the same virus.

According to the WHO 2015 and BBC 27 Nov.2014 "quick investigations by local health authorities

suggested that participation in that funeral could be linked to as many as 365 Ebola deaths".

Subsequently EVD spread into Freetown the capital of Sierra Leone which was overcrowded and got out of control.

Lack of human resources and standard health facilities have limit the fight against Ebola in Liberia, Guinea and Sierra Leone.

The first case in Liberia at the border region was officially confirmed on 23 March 2014 by World Health Organization (WHO). In August 2014 the virus took hold of Monrovia the capital of Liberia in a popular densely populated area called Montserrado district.

Throughout September, Liberia was reporting over 200 new cases per week.

By 23rd September 2014 the world health organisation reported that 61 health workers had already died of Ebola Virus Disease in Sierra Leone alone.

On October 19th 2014 WHO reported that 95 health workers had died in Sierra Leone again.

By February 2015, Guinea, Liberia and Sierra Leone had already lost 490 health workers out of the affected 837 health workers (The economist. 2015).

According to World health Organisation, Ebola deaths Figures up to 12-15 February 2015; 9,380 deaths - probable, confirmed and suspected. (Includes one in the US and six in Mali) 3,900 Liberia 3,408 in Sierra Leone, 2,057 in Guinea and 8 in Nigeria.

**CONCLUSION**

Mistrust, rumour and confusion about the pattern of infection of EVD paved way for Ebola virus Disease spread and other speculations had it that the western world scientists genetically engineered the virus and spread it in Africa to de-popularize the continent. Other people believed it was a repercussion of war crimes committed during Liberian and Sierra Leonean war times.

People trusted alternative medicine practitioners better than the health workers that came to salvage the situation initially. The society believed so much in the tradition of looking after their sick relatives without minding the consequences of the infection and the society had so much respect for their burial rites irrespective of the cause of death.

Another factor was low use of condoms in sex practices and the Ebola virus thrives in spermatozoa and even seven weeks after curing a patient from Ebola virus disease.

There was lack of basic infrastructure in the region due to long term post war effects, corrupt government, and poverty. These infrastructures include Hospitals, equipment to transport sick people, electricity, assessable roads and potable water to practice good hygiene all these factors contributed to the spread of Ebola virus disease in the affected Africa region.

There were lack of health workers in the region and the Health workers in the region did not understand the disease when it first struck the area and the health workers lacked the preparedness to tackle the epidemic.

There is decline in Ebola virus disease because of improved contact tracing and earlier case identification and improved community engagement with better emergency response.

On 29 April 2015 a total of 33 cases of EVD occurred during the week;Forecariah in Guinea and Kambia in Sierra Leone had 25 cases (76%) of all confirmed cases (WHO Ebola situation report-29 April-2015).

On 6 May 2015 a total of 18 confirmed cases of EVD occurred in the week, Guinea had 9 cases and Sierra Leone had 9 cases (WHO Ebola situation report-6-May-2015).

The Control of outbreak of EVD is dependent on intervention package which includes case management, surveillance and contact tracking, good laboratory service, good burial practice and public awareness.

The community is the key factor to controlling EVD and their involvement in controlling EVD outbreak

leads to success. Community involvement encompasses; community engagement which involves awareness campaign on factors spreading EVD and necessary measures to prevent EVD.

Wild animals should be handled with gloves and cooked properly before human consumption. Infected patients must be isolated, handled with gloves and protective wears without exposing any part of their body

Hands should be washed with running water and soap regularly. Infected and dead corpses should be buried deep down the soil or better still, cremated.

People suspected to have EVD by showing symptoms or that have been in contact with Ebola victims should be quarantined and watched for 21 days for symptoms EVD.

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# USE OF "M" TECHNOLOGY IN PUBLIC HEALTH: INVESTIGATION OF OUTBREAK OF HEPATITIS E IN SARASPUR WARD OF AHMEDABAD CITY, GUJARAT, INDIA

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**Abstract**

Developing countries have documented outbreaks of various infectious diseases including Hepatitis E (HEV). HEV is transmitted through feco-oral route. Ahmedabad is city located in Gujarat state which is in western part of India, it has reported outbreak of HEV in November 2014. We investigated the outbreak based on m-technology with an aim to develop and test technology to assist in disease surveillance, recognize early warning signals and identify Hot Spots of the outbreak. All cases of HEV reported by the system and applying snow ball sampling, 218 cases were investigated. Data was collected in Open Data Kit (ODK) installed in android based application having google interface. Data on signs and symptoms of disease, time of investigation, diagnosis, hospitalization, co-morbidities was gathered. Descriptive analysis revealed secondary attack rate ranged from 12.5% to 75%. Male were affected more in young age groups while it was reverse in later age groups. The outbreak pattern suggested point source single exposure outbreak. Hot spots and clustering of cases were identified by geo visualization to assist in targeted interventions. "m technology" can provide quick quality data and can assist in prediction of further outbreaks. Spatial analysis of hot spots and clustering of cases by m-technology can be a promising tool for monitoring and surveillance of routine data and can assist in investigation of outbreaks.

Keywords: Hepatitis E, m technology, Outbreak investigation and GIS mapping

## INTRODUCTION

Although India is in the phase of epidemiological transition in terms of burden of disease, it is still combating with various communicable diseases such as malaria, typhoid and hepatitis, leptospirosis, acute diarrheal disease, and tuberculosis etc.[1] Ministry of Health and Family Welfare, Government of India have implemented various programs which are focused on each of these disease to prevent its further spread among the population, still sudden outbreaks of diseases like malaria, jaundice, dengue, chickengunia remains an unsolved issue and thus, contribute to be the major public health issue.[2]

Disease outbreaks especially water born and mosquito borne diseases are more common in the urban area and to be more precise in urban slums.

Rapid rise in the population and compact infrastructure are factors responsible for poor slum dwellings. It has been a daunting task for the local government to ensure proper water, sanitary facilities and maintaining clean surroundings in slums. Viral hepatitis caused by A and E viruses is the major public health problem in India. Out of six different types of viral hepatitis known (A, B, C, D, E and G), Hepatitis E virus is the agent responsible for the outbreak of the disease in developing countries.[5] During December 1955 – January 1956 Delhi reported the first epidemic of Hepatitis E in India. After that it gradually increased across Indian Subcontinent.[4] Since 1976 there were seven outbreaks of Hepatitis E reported from Ahmedabad City.[5] Virus of Hepatitis E is transmitted by fecooral route often through water or food supply contaminated by feces.[5, 8, 9] The incubation period of the following exposure

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to HEV ranges from three to eight weeks, with a mean of 40 days.[6] In India, Integrated Disease Control Program (IDSP) monitors, reports and tracks specific disease outbreaks. IDSP carry surveillance on paper based survey system, which has weekly online reporting system where they publish weekly reports on their website.[3] Paper based survey system are often time consuming and are also at higher chances of creating human errors while managing data. For the country like India, where population rise is rapid along with the change in other demographical variables, quick surveys need to be performed by minimizing all possible human errors.

Mobile communication has become mainstream. It is the most successful and certainly the most rapidly adopted new technology in the world, more than one of every three people worldwide possesses a mobile phone.[11] The unprecedented reach of mobile and use of innovations on mobile technologies as well as advancements in these innovative application to address health priorities has evolved into a new field of e health, known as m Health.[12]

According to the International Telecommunication Union (ITU), there are now over 5 billion wireless subscribers; over 70% of them reside in low- and middle income countries. Despite this, higher income countries show more m health activity than so lower income countries and still not being used in surveillance, raising public awareness and decision support system.[12]

Developing countries lack adequate surveillance system, they still continue old methods of disease surveillance which are mainly carried out on paper based surveys which lacks real time data updates. Requirement of effective surveillance is inevitably increasing. If some innovative steps are taken to improve the disease surveillance system then, It will also help in increasing government capacity in developing countries like India, to better monitor emerging and seasonal outbreaks in resourceful and active manner than previous methods.[13] A study from Nakuru, Kenya demonstrated that mobile phones were useful in facilitating communication and decision-making. It helps to quicker communication and easier access to information in an emergency. Such use of mobile phones could especially benefit India, where frequently populations have to face epidemics.

Using the emerging trend of m health, disease surveillance of HEV outbreak was carried out in early November 2014, when vernacular print media started reporting of possible outbreak of HEV in Saraspur ward of north zone of the city of Ahmedabad in Gujarat state. Indian Institute of Public Health Gandhinagar in collaboration with local self-government undertook investigation and surveillance of the HEV outbreak along with detail geo-visualization of the outbreak to identify the hotspots GIS map that can be used for prevention of the further out break.

**Study Site**

Study was carried out in Ahmedabad City, Gujarat, India. Population of the Ahmedabad City is 7.2 million.[16] Ahmedabad city is divided into six zones north zone, south zone, west zone, east zone, central zone and new west zone. About 90% of the population receives drinking water supply from Ahmedabad Municipal Corporation (AMC). Saraspur is located in north zone of the city which covers the area of 1.96 sq kms have 24 chawl clusters in the area.[17] Many of the newly added areas in the city have PVC water pipelines lines. In compact area like north zone distance between water lines and drainage lines are very less. Although AMC has a set mechanism for allotment of new water connections but illegal water connections, electric motoring during and off the water supply, over flowing drains and open nicks with lack of drains are challenges faced by AMC.

Along with the media reporting we also reviewed IDSP 46$^{th}$ week report, which consist Disease surveillance data of second week of November. IDSP reported 80 positive cases of hepatitis E, Cases were reported from nani vasan sheri of Saraspur ward located in north zone of Ahmedabad. District Rapid Response Team (RRT) also visited the affected area. House to house survey was also carried out by IDSP team followed with chlorination of the water of the affected area. After a week of surveillance vernacular newspaper was still reporting higher number of cases of HEV outbreak. Moreover, Ahmedabad Municipal

Corporation also continued reporting new HEV Cases. Thus, looking to this an attempt was made to carry out disease surveillance using mobile application, weekly reporting of surveillance data was the main cause of missing out the new cases which results in slow reporting of the cases.

**METHODOLOGY**

A formal permission was sought from AMC to provide list of cases recorded by their surveillance system until November 2014. A survey tool was designed using Open Data Kit (ODK) application which was then interfaced with google platform and further transferred to mobile phone which is known as ODK collect application installed in android application. Information was collected using mobile phone with an android system. After collecting all the information, data was gathered and survey results were stored in ODK aggregate. The survey tool consisted the questions based on socio-demographic profile of cases, sign & symptoms, onset, progression of disease, geo mapping the cases and identify hotspots. This tool was pretested before using it at field level. All the data collectors were also trained to use the application before handling the application for surveillance. Snow ball sampling was further used to find all the missed cases.

Data collectors collects information from the individual cases separately in the ODK format and send it to ODK aggregate which is a centralized could-based data base.

Randomly six samples of tap water were also collected from those pols that reported highest number of HEV cases. Further, this data stored in the arggegate cloud based data storage and was exported into a excel sheet in xml file format. Data in xml file format was then exported to SPSS v16, a statistical software, where it was analysed for getting statistical results. (refer to figure 1).

**RESULTS**

A total of 217 cases were identified from surveillance system of AMC, following permission from them, IIPHG identified 27 more cases of HEV during the period of surveillance. Overall, 243 cases were identified, out of which cases 25 cases were lost to follow up mainly due to migration or because of locked houses or wrong address. However, the survey team could identify 218 cases, which showed confirmed HEV cases.

The Index case of HEV was first documented by IIPHG on 29th November 2015 however the last case documented was on 5th Dec 2014, It apparently shows a classical point source single exposure epidemic, where all the cases were in the range of one incubation. The cases increased and decreased sharply and there was no secondary wave until January 2015. (refer to fig. 2)

There were 130 households with only one case, whereas there were 12 households where there were two cases and 16 households where number of cases were three and there were only 4 households where there were 4 cases who were having disease. Overall there were around 88 households with more than one case in the household. The Secondary Attack Rate ranged from 12.5% to 75%. For technical reasons the SAR were calculated at household level.

Out of total cases 192 (88%) were notified to the AMC during their surveillance while 26 (12%) were newly diagnosed but were not notified in the AMC list. There were around 49% of the cases were male and another 51% of the cases were female.

Cumulatively majority of the cases were below the age of 30 years (66.5%), as per gender distribution 49% were male while rest were female. It was found that the mean age of participants was 28 ± 14.2 years. The mean age of the male participants was 25 ± 13.8 years while the mean age of female participants was 30.8 ± 14.1 years. Out of total males, 26.42 % of the total males were less than 15 years where as amongst females maximum belonged to the age group 16-20 years (18.75%). (refer to table. 1)

As per the residence of the cases, majority of the cases in the present study were from non-slums (84.4%), whereas only 15.14% were from notified slums as per the AMC. All the subjects included in the study were inquired about clinical presence of the symptoms who were infected with HEV. It was found that most of the subjects had abdominal pain (26.51%) on the onset of the disease, while other subjects had combination of two or more signs and symptoms such as Fever and abdominal pain

(31.50%), dark urine and abdominal pain (5.51%) and so on. (refer table 2).

More than half of the cases (55.5%) visited health care facility within the period of one to two days after occurrence of symptom. It was noticed that female were more concern about early diagnosis as percentage of female cases who have visited doctor within the period of one to two days were higher (56.25%) than male (54.72%) cases. About 22.64% were male and 16.07% were female who visited health care facility on the day when symptom appeared. Thus, when data was further analyzed to know the average number of days delayed in diagnosing a disease then it was found that, there was delay of 2days, mean 1.94±1.90 SD. (refer table 3)

Occurrence of the symptoms and visiting health care facility doesn't solve the problem, for accurate diagnosis laboratory tests are mandatory for further confirmation of the disease. Liver function tests was carried out if a doctor suspects HEV to patient with the disease specific signs and symptoms.

In the study population it was found that 68.81% of the cases have undergone laboratory investigations on the same day when they were diagnosed for the disease, out of them percentage of the female (69.64%)

were higher than that of male (67.92) cases. Alertness about the disease was higher among few cases, it may be due to already existing case in the household and suspecting its contagiousness. There were 3.57 % of female and 1.89% of the male who have undergone laboratory investigation before visiting health care facility. There were only 3% of the people who delayed their lab investigation by more than one week. Mean delay in diagnosing a disease in number of days and lab tests investigations were found out to be 0.52±1.39 SD. (refer table 4). Out of 218 total cases found, 66.51% cases were below the age of 30 years and only 33.48% of the cases belong to more than 30 years of age group. There were total 137 out of 218 cases who were not hospitalized after their diagnosis and lab test confirmation. Out of these 137 cases,

17.52% of the cases were below the age of 15 years, 16.06% were within the age group of 21 to 25 years, and 18.98% were of the age group of more than 46 years while rest cases belong to other age groups (refer table 6)

Sixty nine cases out of 218 were hospitalized for a week , where 21.74% of the cases belong to the age group of 26 to 30 years of age followed with 18.84% in the age group below 15 years, 15.94% in the age group between 16 to 20 years, 13.04% belong to the age group of 21 to 25 years while others belong to more than 30 years of age group, but the number of cases were not as higher as number of cases in less than 30 years of age group.

There were about total 12 cases out of 218 who were hospitalized for more than a week, out of them 25% of the cases belong to the age group of less than 15 years, between 16 to 20 years and between 21 to 25 years. There were only 3 cases who were hospitalized for more than a week above the age of 30 Years. (refer table 6) Out of total 218 cases, there were 48.62% male and 51.38% were female, from 137 cases who were not hospitalized 55.07 % were male and 44.93 percentage were female. Cases who were hospitalized for more than a week were 12 where 50 % were male and 50% were female. (refer table 7)

**DISCUSSION**

Present study documented surveillance of HEV outbreak, which was carried during the period of November to December 2014 in Saraspur block of Ahmedabad City with the use of m based technology. In India disease survaillance is carried out under Integrated Disease Survaillance Program (IDSP) which have weekly reporting system, in their report of 46$^{th}$ week of survaillance it has shown that, there were 80 cases detected with Hepatitis E disease.[18] District RRT team also visited the affected area and also provided symptomatic treatment to all the detected cases, moreover, chlorination of the water was also done.[3] This might be one of the reason for adequate chlorine levels as documented by IIPHG after IDSP surveillance,. Although, the cholrine content of the water can not be the primary preventive measure to control the incidence of the HEV outbreak, hence, despite of the water clorination carried out by RRT team of IDSP, the incidence of the cases still did not stopped.[14] It was observed that the number of cases infected with the

HEV do not have wide difference when compared from 2008 to 2014. In 2008, during the HEV outbreak in urban slum of Girdharnagar Ahmedabad, there were 233 positive cases.[5] In 2012, when Gujarat Cancer Society, carried out the outbreak investigation of HEV in urban slum region, they found 255 positive cases of HEV.[4] But, the cases investigation showed more number of cases in non slum region compare to urban slums

This study also showed a classical point source epidemic, where all the cases were in one incubation period. In the previous studies also, the epidemic of hepatitis E occurs in the unimodal outbreak with a single peak suggestive of single point source, common vehicle epidemic.[5]The incidence of the disease was observed more among the population belonging to the age below 30 years, while the incidence was lower among the population of the age group higher than 30 years. This epidemiological feature is similar to that observed in the previous reports on hepatitis E outbreak , where it was observed that younger population is affected more than the older one.[4-5]

Secondary attack rate amongst the households of population ranged from 12.5% to 75%. Which means that there were around 22% of the household had secondary or tertiary or quaternary cases which were found during the outbreak of the disease. Number of female who were diagnoised with positive HEV were more than the number of male. Previous studies showed lower secondary attack rate than the present one.[4] The most common symptom noticed was fever along with abdominal pain (32%) population. There were few cases who were aware about the symptoms of Hepatitis, before appearance of symptoms they themselves went for laboratory investigation before diagnosing of the disease by the physician.

Such action on individual part clearly shows concern on how the city people who repeatedly experienc the disease outbreaks. Looking on to the technical aspect of collecting disease surveillance data on mobile based application compare to paper based survey, it can be clearly concluded that the m based application can collect data more quickly as it does not involve one major step of data entry of the data. Data once entered in mobile just has to be exported to other applications or softwares in computer after converting the file, which hardly takes few seconds. With the help of mobile based application collected 218 cases in a period of one week while IDSP collected data of only 80 cases. This clearly defines the quick reporting of surveillance data with the use of mobile based application. Follow up of the cases becomes easy and quick. Chances of missing out cases becomes almost negligible. As the process of collecting and analyzing the information from the participatory systems become more refined, along with increasing penetration of sophisticated tools such as cellular phones as used in the systems described here, it can create even greater opportunities to gather more detailed structured data for public health reporting.15 There is a urgent need for nationally representative technology based surveys and getting a better picture of the epidemiological situation of hepatitis in India. Lastly India should also focus on technology based capacity building of its medical staff including nurses and field staff going for disease surveillance, which would be helpful in excuting the program in more effective way, which can help in quick reporting and quick control in the spread of the disease.

**RECOMMENDATIONS**

This mobile based disease surveillance system can be adopted in collaboration with the IDSP cell. ODK enabled devices can be provided to the field workers going to collect surveillance data. As the system utilizes completely free software, its implementation has the minimal cost and thus it is cost effective. Places where the mobile phone is not in propoer network, data can be kept saved in the mobile phone which can be further trnasferred through USB or it can also be sent later once the mobile phone is under the coverage of the network. In addition to the disease survellance tool this can be use also as disease reporting tool, this system could be used for a disease reporting tool for the health care monitoring.

**FIGURES**


**Figure.1:** Process of preparing *a* survey form, collecting data and storage of data

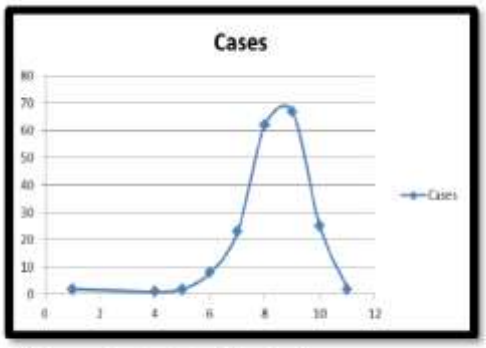


**Figure. 2:** Epidemiological curve number of cases

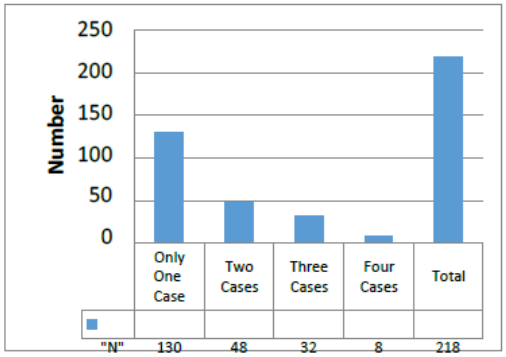


**Figure 3:** Number of cases per households of

**TABLES**

*Table 1: Distribution of study population as per the Age group and Gender*

| AGE-GROUP | Gender | | Total |
|---|---|---|---|
| | Male (%) | Female (%) | |
| ≤15 | 28 (26.42) | 12 (10.71) | 40 (18.35) |
| 16 to 20 | 17 (16.04) | 21 (18.75) | 38 (17.43) |
| 21 to 25 | 22 (20.75) | 12 (10.71) | 34 (15.60) |
| 26 to 30 | 16 (15.09) | 17 (15.18) | 33 (15.14) |
| 31 to 35 | 3 (2.83) | 12 (10.71) | 15 (6.88) |
| 36 to 40 | 6(5.66) | 10 (8.93) | 16 (7.34) |
| 41 to 45 | 2(1.89) | 9 (8.04) | 11 (5.05) |
| ≥46 | 12 (11.32) | 19 (16.96) | 13 (5.96) |
| Total | 106 (100) | 112 (100) | 218 (100) |

*Table 2: Distribution of Symptoms in the study population*

| Symptoms | Number | % |
|---|---|---|
| Fever + Body Ache + Abdominal Pain | 16 | 4.20 |
| Fever + Abdominal Pain | 38 | 9.97 |
| Fever + Dark Urine | 20 | 5.25 |
| Dark Urine + Abdominal Pain | 21 | 5.51 |
| Dark Urine only | 54 | 14.17 |
| Fever + Abdominal Pain | 120 | 31.50 |
| Abdominal Pain alone | 101 | 26.51 |
| Others | 11 | 2.89 |
| Total | 381 | 100.00 |

*Table 3: Distribution of the study population and their delay in access to health care and laboratory investigation for confirming the disease*

| Sr. No | Number of days | Male (%) | Female (%) | Total (%) |
|---|---|---|---|---|
| 1 | Primordial Access to Health care facility | 0 (0) | 0 (0) | 0 (0) |
| 2 | Went to Health care facility on the day of appearance of any symptom | 24 (22.64) | 18 (16.07) | 42 (19.27) |
| 3 | Went to Health care facility within 1 to 2 days of symptoms appear | 58 (54.72) | 63 (56.25) | 121 (55.50) |
| 4 | Went to Health care facility within 3 to 4 days of symptom appear | 12 (11.32) | 22 (19.64) | 34 (15.60) |
| 5 | Went to Health care facility within 5 to 6 days of symptom appear | 5 (4.72) | 6 (5.36) | 11 (5.05) |
| 6 | Went to Health care facility with in after a week of symptoms occurrence | 7 (6.60) | 3 (2.68) | 10 (4.59) |
| | Total | 106 (100) | 112(100) | 218 (100) |

*Table 4: Distribution of study population and their delay in access to health care facility and onset of symptoms (in days)*

| Sr. No | Variable | Male (%) | Female (%) | Total (%) |
|---|---|---|---|---|
| 1 | Primordial Lab test for Liver function tests even before the onset of any symptoms | 2 (1.89) | 4 (3.57) | 6 (2.75) |
| 2 | Lab test for Liver function tests on the same day of suspected clinical diagnosis | 72 (67.9) | 78(69.6) | 150(68.81) |
| 3 | Lab test for Liver function tests 1 to 2 days after diagnosis by health care profession | 23 (21.7) | 23(20.5) | 46 (21.10) |
| 4 | 3 to 4 days after diagnosis by health care profession | 6 (5.66) | 5 (4.46) | 11 (5.05) |
| 5 | 5 to 6 days after diagnosis by health care profession | 2 (1.89) | 0 (0.00) | 2(0.92) |
| 6 | Delayed by more than a week by health care profession | 1 (0.94) | 2 (1.79) | 3(1.38) |
| Total | | 106 (100) | 112 (100) | 218 (100) |

*Table 5: Distribution of Study Population as per the history of Hospitalization*

| AGE_GROUP | Not Hospitalized % | < 1 wk (%) | >1wk (%) | Total (%) |
|---|---|---|---|---|
| ≤15 | 24 (17.52) | 13 (18.84) | 3(25) | 40 (18.35) |
| 16 to 20 | 24 (17.52) | 11 (15.94) | 3 (25) | 38 (17.43) |
| 21 to 25 | 22 (16.06) | 9 (13.04)* | 3 (25)* | 34 (15.60) |
| 26 to 30 | 17 (12.41) | 15 (21.74) | 1 (8.33) | 33 (15.14) |
| 31 to 35 | 7 (5.11) | 8 (11.59) | 0 (0) | 15 (6.88) |
| 36 to 40 | 8 (5.84) | 7 (10.14) | 1 (8.33) | 16 (7.34) |
| 41 to 45 | 9 (6.57) | 2 (2.90) | 0 (0) | 11 (5.05) |
| ≥46 | 26 (18.98) | 4 (5.80) | 1 (8.33) | 31 (14.22) |
| Total | 137 (100) | 69 (100) | 12 (100) | 218 (100) |

**Three individuals were hospitalized at the time of survey*

*Table 6: Distribution of study population as per gender and history of hospitalization*

| Gender | Not Hospitalized **(%)** | < 1 wk (%) | >1wk (%) | Total **(%)** |
|---|---|---|---|---|
| Male | 62 (45.26) | 38 (55.07) | 6 (50)* | 106 (48.62) |
| Female | 75 (54.74) | 31 (44.93) | 6 (50)* | 112 (51.38) |
| TOTAL | 137 (100) | 69 (100) | 12 (100) | 218 (100) |

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# ASSESSMENT OF SOLID WASTE MANAGEMENT FINAL TREATMENT IN SHENDI TOWN, RIVER NILE STATE SUDAN

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**Abstract**

This paper reports the finding of community based cross sectional study conducted to assess solid waste management final treatment in Shendi city, in order to regulate the services of solid waste management in the city. Specifically it aims to know methods used to dispose solid waste in Shendi city, determine options to be deal with when there is absence of locality truck, and determine the potential impact which might be associated with condition of this waste. Multistage stratified system of proportional allocation sampling was followed to select the samples units from the households. Questionnaire, observations and interviews were used with household to collect the data of this study. Data was analyzed using computer using both Microsoft Excel and Statistic Package for Social Sciences program (SPSS).The main results showed that Most of the population depend on locality trucks for their solid waste transportation (54%), while 26% transported their solid waste by cart, beside 17% of them used other options including left on street ,drains and burns. The study also revealed several ideas towards improvement of solid waste management where 28%of the population believes that they need new concept ,while 24% think that they can improve it via giving attention to solid waste management, while the opinion of 20% of them to form new independent body ,beside, 18% requested to share with private sectors The study conclude that population know that an open burning is the dominant method used in final disposal site in the study area creating health problems, that it may provide breeding sites for insect and it can cause a risk to public health.

Keywords: Solid waste, Final treatment, Potential Impact, Shendi city

## INTRODUCTION

Environment can be defined as the aggregate of all the external conditions and influences affecting the life and development of Persons ‘organization and society (W.H.O 2002).Environmental health has been defined by world Health organization (W.H.O) as the ecological balance that must exist between man and his environment in order to ensure his well being which concerns the " whole man" not only his physical health ,but also his mental health and the optimum social relations within his environment. In the same way it concerns the ‘whole environment ,from the individual human dwelling to the entire atmosphere. Solid waste is non.-liquid waste generated in homes ,workshops , farms ,industries and else (W.H.O 2002).The unsanitary disposal of solid waste generates health problems. Leach ate from landfills can pollute ground water and this is a major health concern. Rain penetrates the soil covering solid waste in land fills, thus contribute to ground water pollution problem. Organic materials can become food and ‘or breeding site for flies and rats ‘creating vectors for many diseases. Additionally, solid waste can cause fire , flooding and dangerous situation when there is lack of waste management (W.H.O 2002). The management dilemma of solid waste has been recognized and tackled seriously worldwide.

However, in developing countries the problem is still hindered by social and economic predicaments and priorities. In our country , the generation of solid wastes has become increasingly an important environmental issue over the last decade, due to the escalating growth in population s and the changing life Style, leading to new trends of un sustainable consumption Patterns Concomitant with inflation in waste production (Basil 2004).

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Solid waste collection ,transportation and disposal constitute the most substantive means for cleaning which became the predominant in environmental sanitation (Khartoum cleaning project 2005).Most human activities create waste. the majority of these waste are not ,in themselves, potential threat to health but their current management can help to minimize or avoid associated risks .

**PROBLEM STATEMENT**

Fate of solid waste starts from generation, collection, transportation and final disposal and shown obviously in direct disposal by open dumping left un collected and at river side's or disposed in open area. (Abu Obeida, 2010). Shendi town is of 9000 houses which are distributed in twenty nine Blocks (districts) , only twenty-four Blocks are covered with solid waste services (Shendi, locality2011).The town produces forty five tons of waste daily, only eighteen tons (40%) of this amount is collected and transported to burning Area which represent the final disposal area of the town, it is located about 2 km. from the residential area.(Shendi Locality.2011)

**MATERIALS & METHODS**

This observational community based cross sectional study was conducted in Shendi city, the capital of Shendi locality , River Nile State at north of Sudan. A multistage stratified system of proportional allocation sampling was followed to select the sample units from household. The required sample size was determined using the formula:

$n = \{ 2\sigma^2 (Z_\theta + Z\ p)^2 \} / d^2$

Where $\sigma = 7.14$

$Z_\theta$ = the value of standard normal variable corresponding to 95% confidence level = 1.96

Z p = is the false negative probability = 1.282

d = is the smallest difference we wish to detect = 3

Sample size of 119 households was appointed accordingly. The amount of average per capita solid waste production estimated by collecting the waste generated in the selected sample units once a day at fixed time for 8 successive days to allow variation in waste generation over a week.

Also solid waste segregation was conducted, that separates the waste into different types and put it into different Buckets for weigh measurement. The weight of each type was measured and recorded it in the data sheet. For safety and a ethical consideration we disposed and dump all the samples of the waste properly and clean the equipment used for its measurement and segregations. Also the below tools were used to collect the data of this study:

- An interview was done with locality Public Health Officers.
- Questionnaire : standard questionnaire was designed for found heads of households of both class two and three.
- Observations: data about sanitation status 'presence of solid waste facilities was collected through researcher observation.
- An intervention to collect waste generated from targeted households was done once a day at fixed time for8successive days to allow variations in types and composition of waste generation over a week

**Data analysis**

Data was analyzed using computer, both Microsoft Excel and Statistic Package for Social Sciences program (SPSS), and the results were presented by percentage tables, cross tables and other statistical test of the significance between different factors were examined.

**RESULTS**

*Table1: shows the mean of transportation of solid waste of different residential class levels in Shendi town:*

| Methods of improvement for solid waste management | Second Class | | Third Class | | Total | |
|---|---|---|---|---|---|---|
| | Frequency | % | Frequency | % | Frequency | % |
| Form new independent body | 02 | 05 | 22 | 27 | 24 | 20 |
| need new concept | 08 | 22 | 25 | 30 | 33 | 28 |
| Share private sectors | 05 | 13 | 17 | 21 | 22 | 18 |
| Give attention | 15 | 41 | 13 | 16 | 28 | 24 |
| Others | 07 | 19 | 05 | 06 | 12 | 10 |
| Total | 37 | 100 | 82 | 100 | 119 | 100 |

*Table 2: Shows possible improvement to solid waste management in different residential class levels in Shendi town*

| Methods of improvement for solid waste management | Second Class | | Third Class | | Total | |
|---|---|---|---|---|---|---|
| | Frequency | % | Frequency | % | Frequency | % |
| Form new independent body | 02 | 05 | 22 | 27 | 24 | 20 |
| need new concept | 08 | 22 | 25 | 30 | 33 | 28 |
| Share private sectors | 05 | 13 | 17 | 21 | 22 | 18 |
| Give attention | 15 | 41 | 13 | 16 | 28 | 24 |
| Others | 07 | 19 | 05 | 06 | 12 | 10 |
| Total | 37 | 100 | 82 | 100 | 119 | 100 |

*Table 3: Shows Population knowledge of solid waste final disposal location in different residential class levels in Shendi town*

| Final disposal site | Second Class | | Third Class | | Total | |
|---|---|---|---|---|---|---|
| | Frequency | % | Frequency | % | Frequency | % |
| Far away from the town | 27 | 73 | 35 | 43 | 62 | 52 |
| Near resident area | 04 | 11 | 11 | 13 | 15 | 13 |
| In the town | 00 | 00 | 06 | 07 | 06 | 05 |
| don't know | 06 | 16 | 30 | 37 | 36 | 30 |
| Total | 37 | 100 | 82 | 100 | 119 | 100 |

*Table 4: Shows Population knowledge of methods of solid waste final disposal in different residential class levels in Shendi town*

| Final disposal methods | Second Class | | Third Class | | Total | |
|---|---|---|---|---|---|---|
| | Frequency | % | Frequency | % | Frequency | % |
| Sanitary land filling | 00 | 00 | 00 | 00 | 00 | 00 |
| Spread on land | 03 | 08 | 18 | 22 | 21 | 18 |
| Incineration | 10 | 27 | 04 | 05 | 14 | 12 |
| Open burning | 13 | 35 | 34 | 41 | 47 | 39 |
| Others | 11 | 30 | 26 | 32 | 37 | 31 |
| Total | 37 | 100 | 82 | 100 | 119 | 100 |

## DISCUSSION

Most of the population depend on locality trucks for their solid waste transportation (54%), while 26% transported their solid waste by cart, beside 17% of them used other options including left on street ,drains and burns,(table, 1). Due to previous facts the local health authorities tend to concentrate their limited services mainly in the central districts which have better access. in this context the study showed several ideas towards improvement of solid waste management where 28%of the population believes that they need new concept ,while 24% think that they can improve it via giving attention to solid waste management, while the opinion of 20% of them to form new independent body ,beside, 18% requested to share with private sectors ,( table, 2) .These because there is no sustainable system of solid waste management applied in the study area ,and the locality have become economically constrained in offering efficient management of municipal solid waste and now more willing to embrace new idea that can improve the situation

The study showed that 52% of the population know that the final disposal site is located far away from the town , while 30%of them don't know and 13% think that the location of final disposal site is near residential area (table 3).In this context 39% of the population know that an open burning is the dominant method used in final disposal site in the study area while 12% of them thought that the method used is land spreading (table 4), an open dumping was an old method correlate without regard to safety ,health or esthetic . And applied without proper environmental pollution control and monitoring, if one would have a look, he could have observed uncompleted burning remains, which pollute environment, harbors insect and rodent (appendix 2).

All types of solid waste were collected and mixed together and transported to final disposal site without weighbridges facilities, this can't give correct picture of waste generation quantity, area and source of such solid waste (appendix No.2)

## RECOMMENDATION

Government of local authorities must developed and adopt an action plan of solid west management, River Nile state should made sufficient funding available for solid west management and crud dump open burning site must be replaced by sanitary landfills.

## ACKNOWLEDGMENT

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**APPENDIX**

Figure 1: Map of Shendi town (the study area)

Figure 2: Plates, Final disposal area of Shendi town (an open burning is the main method used)

Figure 3: Disposal of waste in absence of the truck (Outside on the street near houses)

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# ANALYSIS OF CHILD ANTHROPOMETRIC INDICATORS AND THEIR RESPECTIVE DETERMINANTS IN INDIA

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**Abstract**

With the MDG's set to expire this year (2015), the achievements in the progress of child health indicators in India has failed to distribute the fruits of the development evenly among the States and also within states; as in one State performing well in one indicator and not in another indicator. The main objective is to identify the predictors of child under nutrition and to analyze the differences in the impact of determinants across the three indicators and between States. With NFHS 3 data, the SUR technique is used to improve the efficiency of regression estimates as one hand errors in the measurement in individual height for age and weight for age and weight for height is likely to be correlated (contemporaneous correlation) and on the other hand other household level omitted variables for a child belonging to the same household could also be correlated. Breusch-Pagan LM Diagonal *Covariance Matrix Test* was used to check the appropriateness of SUR model. Different regressors are found to be significant for three indicators. The CDF plot indicates there is a clear convergence after the threshold point. The outcome of ICDS adoption varies across wealth groups where from the poorest to richest category, median is increasing as a step function. Since nutrition depends on various factors, the linkage of nutrition with sanitation policies, environment policies, agriculture related policies and infrastructure is extremely needed to address under-nutrition.

Keywords: Child under-nutrition stunting, underweight, wasting, seemingly unrelated regression, India

## INTRODUCTION

Once child health is considered as an end in itself then any health outcome variable based on child health automatically becomes a significant component for economists and policy makers to assess the triumph or malfunction of the various policy interventions. Infants and young children are more susceptible to infections and providing a disease free environment both from a preventive and curative sense is a major public health priority for any nation. Child's height and weight or the nutritional status can be viewed as an outcome of the health production function (Becker, 1964 and Grossman, 1972) where the inputs include intake of nutrients and diet patterns (Bhagowalia, 2010; Smith *et al.*, 2012; Martorell & Young, 2011.) exposures to infections (Ramachandran & Gopalan, 2009), genetic dispositions (Currie & Moretti, 2007 and Ackerson *et. al*, 2009) and access to health care (Mosley & Chen, 1984).

Socio-economic inequalities in health outcomes are becoming the emerging area of research in health literature which ultimately affects the economic growth of the country. In spite of tremendous progress the gains and deprivations are unevenly distributed among the countries. In South Asia moderate and severe stunting is around 38% in 2012 and in Latin America it is around 11%. Some 6.6 million children under 5 years of age died in 2012, mostly from preventable causes (UNICEF, Every Child Counts, 2014). India continues to have high levels of malnutrition in some regions while in regions that have shown reductions in the past three to four decades have somewhat stagnated and slow changes are being observed (IFPRI, The Challenge of Hidden Hunger Report, 2014 and IPPR Report of Tackling Poverty, Hunger and Malnutrition, 2014).

Child undernutrition places a massive burden on the macro economy and also it is a pressing alarm being addressed by the government, and it is prominent to note according to the Summary report of Progress towards Meeting the MDG's, 2012, the child malnutrition target only has a small likelihood of being met in India, further increasing the severity of the situation. With the prevailing measures and methodologies, various research studies have estimated the

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most powerful indicators of child health such as *underweight, stunting and wasting,* which embraces the child level variables, household characteristics, parental (mother and father) characteristics and policy related variables. The methodologies for defining child health outcomes are new and still in development. Major approaches which have been used in the literature are factor analysis (Menon, et al., 2000); cluster analysis, and linear regression techniques, index methodologies (Radhakrishnan & Ravi, 2004; Svedberg, 2007, Kanjilal, *et al.*,2010); Concentration indices (Arokiasamy & Pradhan, 2011, Majumdar,2010), child under nutrition index, composite index, infant and feeding index (Menon *et. al,* 2000; Svedberg, 2007 Ghaiha *et. al,* 2012) and multilevel analysis (Subramanian *et. al,* 2009) .) However, there are very few studies in the empirical literature on child developmental outcomes that consider a unified approach which combines all the important indicators of child growth in particular or child health in general (Ghaiha *et. al,*2012 and Bhangura, 2014) It has been observed that different indicators of child health outcomes like mortality, morbidity or undernutrition as well as its different components like perinatal or neo-natal mortality; stunting or underweight respond to some common interventions but are also quite varied in its temporal changes across different geographical reasons (Viswanathan, 2014b). Such an uneven nature of progress has been rather pronounced for a country like India and evidence based policy making with a unified approach becomes an important tool of analysis for assessing the overall child growth pattern by considering the child's health as a composite indicator.

The objective of this study is to assess the nutritional outcomes of children in India using an empirical framework that not only gives scope for individual assessment but also considers child as a single unit. This is possible using the econometric technique of Seemingly Unrelated Regressions (SUR) by estimating a set of equations jointly, with each representing an anthropometric indicator. More importantly, the aim is also to focus on an important policy intervention viz, Integrated Child Development Services (ICDS) in India on these different indicators while also trying to understand (and control for) several other factors that are likely to influence child growth. The study hopes to provide further insights towards reduction in undernutrition among young children in India.

The next section discusses the data and methodology. Section 3 discusses the main findings of this study and the last section briefly concludes this studies.

## DATA AND METHODOLOGY

The study uses the third wave of the National Family Health Survey for the year 2005-06 (IIPS, 2007). This is a nationally representative survey of households (104302) which has anthropometric data for the children(51,555) aged 0-59 months, where 19483(38%) are the urban household children and 32043(67%) are the rural household children and the most recent survey on child nutrition indicators that covers all the states of India with a wide range information on socio-economic aspects. In spite of a vast literature on child nutrition using this database, there are several issues of relevance that are open to as mentioned in the objective of this paper.

*The SUR (Seemingly Unrelated Regression) model*

This model proposed by Zellner (1962) is used for this study wherein a three-equation system with dependant variables such as HAZ (height for age), WAZ (weight for age) and WHZ (weight for height) for children is specified. The method allows for potentially different set of explanatory variables and hence enriches the analysis further. The z-score is adjusted for sex, age and measurement and how far or close the child is to the median value of the WHO reference standards (2006).[i]The model is represented as : $\boldsymbol{Y = X\beta + U}$

with

$$\begin{bmatrix} \boldsymbol{Y}_1 \\ \boldsymbol{Y}_2 \\ \boldsymbol{Y}_3 \end{bmatrix}_{3Cx1} = \begin{bmatrix} \boldsymbol{X}_1 & \boldsymbol{0} & \boldsymbol{0} \\ \boldsymbol{0} & \boldsymbol{X}_2 & \boldsymbol{0} \\ \boldsymbol{0} & \boldsymbol{0} & \boldsymbol{X}_3 \end{bmatrix}_{3Cxk} \begin{bmatrix} \boldsymbol{\beta}_1 \\ \boldsymbol{\beta}_2 \\ \boldsymbol{\beta}_3 \end{bmatrix}_{kx1} + \begin{bmatrix} \boldsymbol{U}_1 \\ \boldsymbol{U}_2 \\ \boldsymbol{U}_3 \end{bmatrix}_{3Cx1}$$

$\mathbf{Y}_1$ is HAZ (height for age), $\mathbf{Y}_2$ is WAZ(weight for age), $\mathbf{Y}_3$ is WHZ(weight for height); $\mathbf{X_i}$ is the vector of child level, parental level and household level characteristics as well as policy relevant and regional variables for the $i^{th}$ anthropometric indicator thus allowing for different set of explanatory variables $(k_i)$ for the different equations. The vector $\boldsymbol{\beta_i}$ are the different coefficients to be estimated with $k_1$, $k_2$ and $k_3$ coefficients for the respective equation such that the total number of coefficients is $k= k_1+k_2 +k_3$. $\boldsymbol{U}$ is the vector of residuals $E(\mathbf{U})=\mathbf{0}$; $E(\boldsymbol{UU'})=\boldsymbol{\Omega}=\boldsymbol{\Sigma}\otimes\boldsymbol{I}$ with $\boldsymbol{\Sigma}=\sigma_{ij}$, where $\sigma_{ij}=E(\boldsymbol{U}_i\boldsymbol{U}_j')$, $i,j=1,2,3$. If $c_l$ is the $l^{th}$ child in the sample, then this correlation structure assumes that the errors are correlated across the indicators for each child but uncorrelated across different children where C the total number of children in the sample.

X is a vector which comprises of the explanatory variables. The model is distinct from OLS as the explanatory variables are not same for all the system of equations and the error terms will be correlated across equations and SUR model requires the sample to be same for each equation. The model was estimated with common set of child variables (child age, gender, birth size, birth order, vaccination, incidence of fever, cough, diarrhea and policy variables) in each of the indicators while parental and

household variables varied across the indicator equations. Along with a brief discussion about the nature of these variables, the next section discusses the findings of the model estimation,

## RESULTS

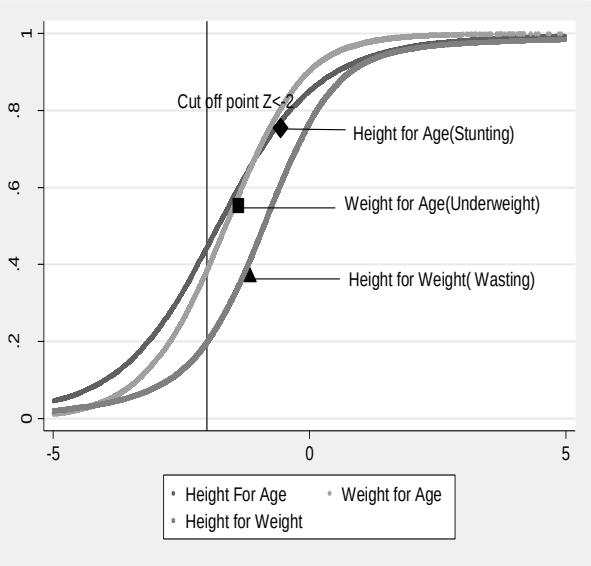


Figure 1: Cumulative Distribution Function (CDF) plots of z-scores for height for age, weight for age and weight for height ( All- India)

Figure 1 shows the Cumulative Distribution Function (CDF) of the z-scores of height for age, weight for age and weight for height for children aged 0-5 years in India. As it is well known, if the z-score is below -2 (x-axis values) then the child is considered undernourished and the CDF gives the proportion of children (y-axis values) who are below a certain z-score value. As can be observed from the figure, the stunting rates are far higher than the underweight rates and wasting.

*Table 1: Estimation Results of Seemingly Unrelated Regression Model*

| Dep Var: z-score of | | Stunting | Underweight | Wasting |
|---|---|---|---|---|
| ***Child Characteristics*** | | | | |
| *Age* | | -0.0199*** | -.0103*** | -.0379*** |
| *Birth size: Very Large ref* | | | | |
| | Larger than avg | -.164** | -.162*** | -0.331 |
| | Average | -.188*** | -.215*** | -0.203 |
| | Smaller than average | -.384*** | -.483*** | -0.195 |
| | Very small | -.436*** | -.617*** | -0.539 |
| *Birth order: 1child ref* | | | | |
| | 2 child | -.0987*** | -.0889*** | -0.18 |
| | >3 child | -.145*** | -.159*** | -.358** |
| *Any vaccination: No ref* | | | | |
| | Yes vaccinated at least two | -0.0272 | -0.0264 | -2.7*** |
| | One vaccination | -.0881* | -0.0433 | -1.92*** |
| *Fever: No ref* | | | | |
| | No | 0.0388 | .151*** | .36* |
| *Diarrhoea: No ref* | | | | |
| | No | .0934** | .0887*** | .494** |
| *Cough: No ref* | | | | |
| | No | -0.048 | -.0889*** | 0.248 |
| ***Mother Characteristics*** | | | | |
| *Quintiles of Mother height: Group 1 ref* | | | | |
| | Group 2 | .254*** | .196*** | -0.0357 |
| | Group 3 | .416*** | .314*** | -0.018 |
| | Group 4 | .532*** | .407*** | 0.0663 |
| | Group 5 | .738*** | .571*** | 0.246 |
| *Mother BMI: <18.5 ref* | | | | |
| | 18.5- 24.9 | .164*** | .299*** | .319** |
| | 25.0-29.9 | .275*** | .55*** | .896*** |
| | >30 | .281*** | .58*** | 0.572 |
| *Breastfeed: Never ref* | | | | |
| | <3moths | .405*** | .215*** | 3.11*** |
| | 3-6 months | .301*** | 0.0517 | -0.506 |
| | >6 months | -0.11 | -.0908* | -.765** |

| Dep Var: z-score of | | Stunting | Underweight | Wasting |
|---|---|---|---|---|
| Mother Characteristics (Contd.) | | | | |
| Age of mother at first birth: 11-14 years ref | | | | |
| 15-19 | | 0.0788 | 0.0237 | 0.06 |
| >19 | | .139* | 0.0303 | -0.00431 |
| Mother Working: No ref | | | | |
| Yes | | -.0795*** | -.0379* | 0.134 |
| Household Characteristics | | | | |
| Wealth Status: Poorest Ref | | | | |
| Poor | | .131*** | .105*** | 0.0727 |
| Middle | | .224*** | .196*** | 0.0315 |
| Richer | | .323*** | .29*** | 0.0491 |
| Richest | | .516*** | .448*** | 0.318 |
| Sanitation: open defecation ref | | | | |
| Flush | | .192*** | .173*** | |
| Pit | | .144*** | .0744* | |
| Others | | 0.033 | .2*** | |
| Quality of water: Untreated ref | | | | |
| Treated Water | | .897*** | | |
| Fuel: Dirty fuel ref | | | | |
| Clean Fuel | | .0945*** | .0962*** | |
| Constant | | -1.96*** | -1.85*** | 2.54*** |
| Number of Obs. | | 40288 | 40288 | 40288 |
| R-square | | 10 | 15 | 3 |
| RMSE | | 1.955 | 1.319 | 8.719 |

legend: * p<.05; p**<.01; *** p<.001

A negative coefficient implies that the particular variable increases a child's risk for undernutrition and a positive coefficient suggests that the variable can improve a child's nutritional status since z-score is the deviation from the reference mean as a proportion of the reference standard deviation. For the categorical variables, wherever applicable, the worse off category was considered as the reference category so that if significant the dummy variables for the other better off categories would have a positive sign.

**Child Characteristics:** As age increases, stunting, underweight and wasting increases thereby indicating growth faltering (Rehman, et al., 2009; Shrimpton, et al., 2008; and Sullivan & Goulet, 2010). Both birth order and birth size are significant and the negative coefficient implies that as birth size decreases stunting and underweight are on the rise but the impact is more prominent on underweight as birth size proxies for birth weight which has a lot of missing observations in the data. Birth order primarily reflects the impact of reduced care and nutritional input given to later born children which could be due to limited resources among the economically weak households. Recently, studies have also shown that cultural practices could determine later born girls to be more undernourished than older girls due to son preference in the India (Jayachandran & Pande, 2014; Panigrahi & Das, 2014). The study also finds that children born later are more stunted and underweight and the gap is rather pronounced for birth order greater than two. Immunity to diseases preventable through vaccination has a pronounced effect on wasting, limited effect on stunting and no effect on underweight. Short-term morbidity like fever, diarrhea, and cough impact weight gain the most and is expected as weight is a short-term indicator of nutritional status. However, frequent incidence of diarrhea has an impact on stunting, corroborating the findings from earlier studies (Chambers & Von Medeazza, 2013).

**Mother characteristics:** Mother's characteristics capture the intergenerational transmission of anthropometric status (Balhotra & Rawlings, 2012) as well as the impact of feeding and care practices on child's growth (Menon, et.al, 2000).

***Mother's nutritional and health status:*** Mother's height and BMI both have a strong effect on reducing stunting and underweight. If the mother had her first child during her teens then this affects HAZ alone indicating that longer-term nutrition of the child is more affected than other

indicators. Early child birth affects the overall nutritional status of the mother (Viswanathan, 2014a) thereby affecting the nutritional status of the children she gives birth to. If the mother lost a child (focusing on prenatal, neonatal or infant mortality) it will affect the nutritional status of the future offspring and this was also included to capture intergenerational transmission where it increases the risk of underweight.

***Feeding and Care Practices:*** Breastfeeding has a stronger impact on HAZ than on WAZ/WHZ. WHO recommends the feeding of child solid foods should start when the child is 6 months old along with breastfeeding, the survey collected information about whether the mother gave liquid food, solid food such as non- veg, vegetables and other dairy products. Children who were supplemented with these at least two food groups which were grouped from animal protein, legumes, vitamin A rich foods and other dairy products from their six months along with breastfeeding are less malnourished than those who are not. Participation of the mother in the labour market increases the level of undernourishment of her child thereby showing that the income effect due to her earnings overshadows the quality of care that a mother may be able to provide due to her presence at home all through the day during early years of child growth, in the absence of formal or informal child-care options and the burden of child care falling primarily on the mother than on the father. Feeding and care practices will also be influenced by mother's education level. Undernourishment levels are lower for children whose mother has some education with higher secondary and above level of education having substantial impact. In the Indian context it is observed that women with no education or less education participate in the labour market than with middle or high levels of education (Josey, 2011). Consequently we see that labour market participation and employment show different kinds of impact. Once could also interact these two variables to see if the non-linearity shows up differently and will be attempted in a later study.

In Table 1 we observe that mother's nutritional status captured by her height and BMI levels has a strong impact on child's nutritional status capturing the impact of intergenerational transmissions. Breastfeeding has an impact on undernourishment but the effect is more significant for HAZ than for other indicators. If the mother is employed in the labour market then it lowers the child's nutritional status implying that this affects the time given for early child-care care perhaps in the absence of formal or informal child-care options and the burden of child care falling primarily on the mother than on the father. We also find that if the mother has not had early child birth or not lost a child early on, or if she feeds other food supplements focusing on dietary diversity, or if she is better educated then they have significant positive impact on the child's nutritional status. These results are not reported here for shortage of space. Most of often it is noted that height (HAZ) of the child or long-term nutritional status is impacted by these variables.

**Household Characteristics:** Economic status, socio-demographic variables like caste, religion and household size as well as access to basic amenities, like sanitation, safe drinking water and less polluting cooking fuels are all considered as household characteristics.

Economic status is captured through a categorical variable with five categories as the data set does not provide income or consumption expenditure. This categorical variable is constructed based on the possession (or not) of several consumer durable goods combined into a wealth index using Principal Component Analysis. The first principal component is then ranked in an increasing order and households with the bottom 20% values are considered as 'poorest', the next 20% values are 'poor; and so on with the top 20% values as the 'richest' household. Compared to children in the lowest economic strata, all the others have better HAZ and WAZ values while WHZ is not affected at all by economic status.

Among the social status variables caste has a significant impact as socially disadvantaged groups have been marginalized and discriminated historically even though economic status has been controlled for. Underweight is more likely among scheduled tribe children while stunting is more among Scheduled Caste children compared to the remaining social groups. Varied dietary habits, socio-cultural practices across different religious groups and discrimination against some religions could reflect in poorer nutritional status for their children compared to those from other religious groups (SCR, 20076). Our results do not show variations in growth patterns across religious groups. Sanitation in terms of open defecation, use of untreated drinking water by the household, use of fuels like wood, charcoal and cow-dung for cooking adversely affect the growth pattern of children. These variables influence the environmental conditions thereby creating disease-prone environment- the former two for illnesses like diarrhea and fever while the latter for respiratory illness. In most cases one observes the impact to be more on HAZ and WAZ than on WHZ.

With respect to demographic variables such as family size, place of living, the results shows that the rural children are in the risk of severe stunting so there is a remarkable difference between rural and urban areas. If the family size is more than 6 then the risk of undernutrition increases.

Since the incidence of diseases spreads through open defecation and usage of unsafe drinking water, fuel consumption it will affect the weight because of morbidity, so variables of *basic amenities* like quality of water,

sanitation(Deaton & Spears, 2013), dirty/clean fuel was added to the underweight and stunting equations and these variables are significant and those children who are using flush toilet and drinking treated safe water and less exposed to dirty fuel are at the lower risk of under nutrition. The gender of the household head implies the women headed families children are facing higher risk of malnutrition than the male headed families.

One of the main interests of this study is to assess the impact of a child development scheme in place in India for more than two decades though had a very varied presence across the country and has been made mandatory by judicial and legislative interventions more recently. Integrated Child Development Services (ICDS) is supposed to be made available to poorer regions and among poorer households and has been shown to perform better in the southern parts of the country. To incorporate this selection problem, usage of ICDS by the child is interacted with wealth status of its household and the coefficients shows expected positive sign for the poorest(0.638) and negative sign(-0.15) for the richest. Without interacting these two variables if one includes only use (or non-use) of ICDS, we find that the coefficients are negative indicating that those with lower nutritional status access ICDS. Figures 2a and 2b shows the inequality in HAZ by wealth groups for the Western and Southern regions of India respectively. These two regions have been selected because the Southern region performs well in terms of ICDS and Western region happens to be worse. And moreover, this comparison has been done only for stunting to highlight the fact that appropriate young child feeding practices even among the highest wealth quintile are extremely poor which badly affects physical growth (World Bank Report, Nutrition in India, 2014). The horizontal line in the middle indicates the median. Without ICDs, median HAZ differs across wealth groups being the lowest for the poorer households. With ICDs, median stunting increases as a step function in Western region. In southern region, even though the access is higher, there exists a problem in program implementation because it is actually not helping the poor as it intends to do so.

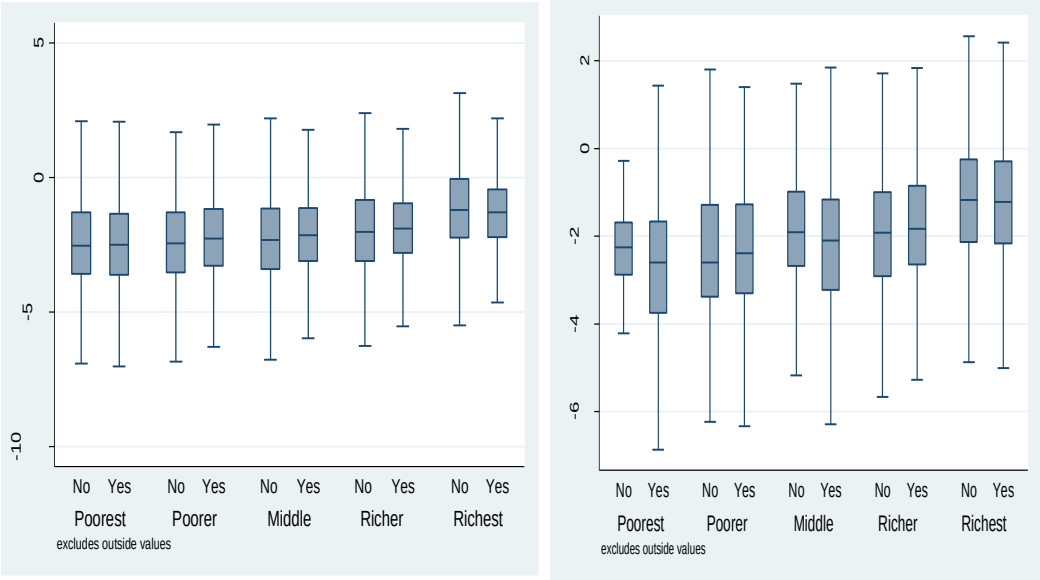


Figure 2: Impact of access to ICDS on HAZ in Western and Southern Region

## CONCLUSION

This study examined the determinants of nutritional indicators with the help of SUR technique for children aged 5 and under in India. We find support for the fact that the joint estimation of these three indicators show that the factors affecting anthropometric status of children do vary. The fact that older children loose out more than younger ones, mothers who are undernourished and less educated and less empowered, poverty, poorer access to amenities like clean water, sanitation and less polluting cooking fuels show that there is a lot of scope for public health intervention. This has to come both in terms of investment in improving the quality of facilities provided as well as improving the access and usage of these facilities by creating awareness. A major limitation of this study is in the use of a decade old data in the absence of a representative national level data on nutrition and child growth. In the last decade India has shown tremendous improvements in its economic growth and this should have had a trickle-down effect. However, this growth has mainly come in the non-agricultural sector and how this uneven

growth would have impacted inequality in access to resources and amenities and hence child growth remains a matter of guess. If ICDS services are complemented with better water, sanitation and other environment policies, more lives of children can be saved and the impact of ICDS could have a long term effect.

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[i] Z-score is commonly used to define stunting, underweight and wasting rates as per WHO standards. A child is said to be moderately stunted or wasted or underweight if the z - score value is less than -2 or below and severely stunted if the z- score value is less than -3 or below.

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# A PILOT STUDY OF THE PERCEPTIONS ABOUT HEALTH CARE SERVICES PROVIDED BY MYANMAR'S PUBLIC HOSPITALS AMONG MYANMAR NATIONALS LIVING IN BANGKOK, THAILAND

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**Abstract**

The provision of health care services is a major concern in every country and has a key impact on every nation's population. Hospitals play a vital role not only in promoting and protecting peoples' health but also are one of the foremost providers of health care to the public. The purpose of the study is to investigate how Myanmar nationals, who now live in Bangkok, Thailand, perceive and respond to the issue of the quality of health care services provided by Myanmar's public hospitals since little is known about perceptions to health care services among Myanmar nationals. The pilot study was conducted using a convenience sampling technique through self-administered questionnaires that assessed four key aspects with 27 items using a five Likert scale, measuring perceptions about hospitals, doctors, nurses and overall satisfaction with the health care services provided. The responses (N=40) were analysed by using both descriptive and inferential statistics. When comparing the groups regarding hospital admission, the one-way ANOVA test revealed that people previously admitted to Myanmar's public hospitals were more likely to perceive positively the public hospitals' willingness to solve their health problem, the doctors and nurses' competence, attention, professionalism and showed high level of satisfaction with provided healthcare services more than the others. The present study will be helpful to healthcare providers needing to understand patient's preferences and how previous experience of health systems can impact those perceptions, which helps to understand patients likely satisfaction levels with and confidence in the hospital health sector in Myanmar.

Keywords: perception, Myanmar public hospitals, Myanmar nationals.

## INTRODUCTION

Health is defined as is a state of complete physical, mental and social well-being and not merely absence of disease or infirmity (World Health Organization, 2005). The provision of health care services is a major concern in every country and has a key impact on every nation's population. Quality in health care services is at the forefront of professional and managerial attention because it is considered as the means to achieve competitive advantage and long-term profitability as well as achieve suitable health outcomes for consumers (Purcărea et al., 2013). Hospitals play a vital role not only in promoting and protecting peoples' health but also are one of the foremost providers of health care to the public.

Hospitals are complex structures of man, machine and management where quality of end results depends upon many factors including quality treatment, safety and satisfaction of patients, efficiency of system, professionals and staff (Singh, 2012).

Patients nowadays are more aware and more quality conscious than before as they reason that a high level of quality can translate into patient satisfaction and this is important for health care providers as they deal with life (Adebiyi & Olonade, 2014). For example,

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when a patient goes to a hospital, he or she expects good communication with doctors, nurses and officers, hopes equity and respect for his or her beliefs and feelings, wants service quality given in a friendly and human way, wish for effective solutions to his or her problems in a short time (Oguzhan, Bebitglu & Ustu, 2004).

In Myanmar, the Ministry of Health is responsible for comprehensive health care that provides preventive, curative and rehabilitative services to raise the health status of the population (www.moh.gov.mm). Due to foreign sanctions, the barring of NGO provision of health services, and the lack of government investment in healthcare, Myanmar's public health system was in a shambles as the country's healthcare system was ranked the second worst in the world by the WHO in 2000 (Shobert, 2013). However, "The new government has announced a series of reform measures to effect changes in all political, economic and social spheres. But the most important measures to improve the general health status of the country are both internal and external. Increased spending on health from both internal and external sources and other reform measures to be taken by the government would greatly improve the government's objective of uplifting the health status of all citizens" (Ingber, 2012).

Traditionally, health care quality has been assessed from the viewpoint of health care providers, care takers and government and the health related statistics over a period of time have neglected the patients' perspective that may result in reducing the reliability and significance of quality assessment (Narang, 2010). "In every country, there is opportunity to improve the quality and performance of the health-care system, as well as growing awareness and public pressure to do so. Working through the process will create a new agenda for change, which focuses on improving the quality of the health system"(World Health Organization, 2006). Modernisation of health care systems and associated advances in evidence-based healthcare has raised expectations of improvements in the quality of care (Sheldon, 2005). Although many empirical studies have been performed for evaluating the quality of health services in many countries, little is known about perceptions to health care services among Myanmar nationals. Moreover, by observation, many patients from Myanmar now travel and are admitted to hospitals in Bangkok, Thailand. The main question is why do they come for treatment in Bangkok and what similar kind of health care services are offered in public hospitals in Myanmar? To understand this, the present study will focus on examining the quality of healthcare services provided in public hospitals since hospitals are secure places for patients as well as the general public. The main goal of this research is to study how people perceive healthcare services and what kind of influential factors will lead their perceptions about healthcare services provided in Myanmar public hospitals in order to improve the quality of health care services.

## METHODOLOGY

A total of 50 Myanmar nationals, who now live in Bangkok, Thailand participated in this survey. The pilot study was conducted using a convenience sampling technique through self-administered questionnaires. Participants were asked to complete and 40 participants, which is a 80 percent response rate as a whole, returned completed the self-administered questionnaires. Responses were assessed on four key aspects with 27 items using a five Likert scale, measuring perceptions to hospitals, doctors, nurses and overall satisfaction with the health care services provided. The data collected was analyzed by using both descriptive and inferential statistics. The inferential statistics was done by using one-way ANOVA test that measured significant mean differences among the above-stated four key aspects of Myanmar public hospitals' health care services classified by hospitals, doctors, nurses and overall satisfaction with the health care services provided by group of people regarding different type of hospital admission. We applied the BEST mean range (Best, 1970) in the interpretation of this study. These are as follows:

*Table 1: Criteria of class interval mean range for this study*

| | | |
|---|---|---|
| 1.00-1.49 | 1 | Strongly disagree |
| 1.50-2.49 | 2 | Disagree |
| 2.50-3.49 | 3 | Neutral |
| 3.50-4.49 | 4 | Agree |
| 4.50-5.00 | 5 | Strongly agree |

In order to avoid the absence of responses in this study, the following options were included: 7 = do not know; 8 = refuse to answer; 9 = question does not apply and were assigned as missing data.

## RESULTS

*Table 2: Overall descriptive statistics on health care services*

| Key aspects of health care services | Mean | Std. deviation | Conclusion |
|---|---|---|---|
| Hospitals | 2.4156 | .6485 | Disagree (1.50-2.49) |
| Doctors | 2.5821 | .6417 | Neutral (2.50-3.49) |
| Nurses | 2.5483 | .6731 | Neutral (2.50-3.49) |
| Overall satisfaction | 2.5000 | 1.0622 | Neutral (2.50-3.49) |

Table 2 shows the overall mean for the four different key aspects of health care services stating the range of the mean score. Among them the last three key aspects showed a high mean score of (2.50-3.49) while the first key aspect showed a mean score range of (1.50-2.49). However, it indicates that the higher the mean, the more likely participants are to think about their openness to Myanmar public hospital health care services.

Note: the following group categories shall apply to Table 3 to 6.

0= previously not admitted to both public & private hospitals
1= previously admitted to public hospitals
2= previously admitted to private hospitals
3= previously admitted to both public & private hospitals

*Table 3: ANOVA test for perception about doctors by groups*

| Perception about doctors | Group | Mean | Std. deviation | F-statistic (p-value) |
|---|---|---|---|---|
| professionalism | 0 | 2.1333 | .6399 | 2.866(**.048**) |
| | 1 | 3.1667 | .7528 | |
| | 2 | 2.6667 | .7071 | |
| | 3 | 2.6000 | .9661 | |
| helpful doctors | 0 | 2.6667 | .7238 | 1.963(.137) |
| | 1 | 3.3333 | 5.640 | |
| | 2 | 2.6667 | .5000 | |
| | 3 | 2.5000 | .84984 | |
| immediate care | 0 | 1.9333 | .7037 | 2.150(.111) |
| | 1 | 2.8333 | .4083 | |
| | 2 | 2.4444 | .7265 | |
| | 3 | 2.4000 | 1.0750 | |
| competence | 0 | 2.4000 | .7368 | 3.218(**.034**) |
| | 1 | 3.1667 | .4083 | |
| | 2 | 2.8889 | .6009 | |
| | 3 | 2.9000 | .3162 | |
| attentiveness | 0 | 1.8667 | .7432 | 2.972(**.045**) |
| | 1 | 3.0000 | .8944 | |
| | 2 | 2.6667 | 1.0000 | |
| | 3 | 2.4000 | .9661 | |
| respectful doctors | 0 | 2.4667 | .7432 | 1.507(.229) |
| | 1 | 3.1667 | .7528 | |
| | 2 | 2.6667 | .7071 | |
| | 3 | 2.4000 | .8433 | |

Table 3 shows mean scores of each item of perception about doctors at Myanmar public hospitals. Mean comparisons showed that people previously admitted to Myanmar's public hospitals have high mean score than other groups in all six variables of doctors. One-way ANOVA test also showed that there is a significant relationship between groups and the three different items of health care services. This suggests that people previously admitted to Myanmar's public hospitals were more likely to perceive positively doctor's professionalism, competence and attentiveness than others ($p<.05$).

*Table 4: ANOVA test for perception about nurses by groups*

| Perception about nurses | Group | Mean | Std. deviation | F-statistic (p-value) |
|---|---|---|---|---|
| professionalism | 0 | 2.3333 | .6172 | 3.603(**.023**) |
| | 1 | 3.5000 | 1.0488 | |
| | 2 | 3.1111 | .9280 | |
| | 3 | 2.7000 | .8233 | |
| helpful doctors | 0 | 2.5333 | .8338 | 1.248(.307) |
| | 1 | 3.1667 | .7528 | |
| | 2 | 2.5556 | .7265 | |
| | 3 | 2.4000 | .8433 | |
| immediate care | 0 | 2.0000 | .6547 | 1.859(.154) |
| | 1 | 2.2667 | .5164 | |
| | 2 | 2.6667 | .7071 | |
| | 3 | 2.4000 | 1.0750 | |
| competence | 0 | 2.4000 | .6325 | 3.293(**.031**) |
| | 1 | 3.1667 | .7528 | |
| | 2 | 2.7778 | .6667 | |
| | 3 | 3.1000 | .5677 | |
| attentiveness | 0 | 1.8000 | .7746 | 3.323(**.030**) |
| | 1 | 3.0000 | .8944 | |
| | 2 | 2.6667 | 1.0000 | |
| | 3 | 2.4000 | .9661 | |
| respectful doctors | 0 | 2.4667 | .8338 | .976(.419) |
| | 1 | 3.1667 | .9832 | |
| | 2 | 2.7778 | .4410 | |
| | 3 | 2.6667 | 1.1180 | |

Table 4 shows the different groups of people and their responses to the nurses in Myanmar public hospitals. Among the group categories, it can be seen that people previously admitted to Myanmar's public hospitals have the highest mean score for the majority of variables. When comparing groups, using a one-way ANOVA test, the results indicated that people previously admitted to Myanmar's public hospitals are more likely to perceive positively nurses' professionalism, competence and attentiveness than others (p<.05).

*Table 5: ANOVA test for overall satisfaction with health care services in Myanmar public hospitals by groups*

| Satisfaction with health care services | Group | Mean | Std. deviation | F-statistic (p-value) |
|---|---|---|---|---|
| Overall satisfaction with health care services | 0 | 1.9333 | .9612 | 4.644(.008) |
| | 1 | 3.8000 | .8367 | |
| | 2 | 2.8889 | .9280 | |
| | 3 | 2.4000 | .9661 | |

Table 5 shows the difference of mean for overall satisfaction with health care services by different groups. It shows that people previously admitted to Myanmar's public hospitals have a higher mean score than others and also indicates that people previously admitted to Myanmar's public hospitals are more likely to respond positively to overall satisfaction with health care services in Myanmar public hospitals.

The differences of means in Myanmar public hospital health care services by different groups were discussed. One-way ANOVA test is significant for only one variable which indicates people previously admitted to Myanmar's public hospitals were more likely to perceive positively the public hospitals' willingness to solve their health problem compared to others (p<.05) (Table does not show).

## DISCUSSION

This study investigated how Myanmar nationals, who now live in Bangkok, Thailand, perceive and responds to the issue of the quality of health care services provided by Myanmar's public hospitals. The four key aspects of perceptions to hospitals, doctors, nurses and overall satisfaction with the health care services provided were measured as an initial assessment. Comparing the doctors and nurses' services by groups (based on type of hospital admission), one-way ANOVA test showed a significant mean difference among the groups and suggested that people previously admitted to Myanmar's public hospitals were more likely to perceive positively doctors and nurses' professionalism, competence and attentiveness than others(p<.05). For the different responses for the Myanmar public hospital health care services with respect to different groups, one-way ANOVA test is significant for only one variable. However, the result again indicated that people previously admitted to Myanmar's public hospitals were more likely to perceive positively the public hospitals' willingness to solve their health problem compared to others (p<.05). It may be because of inadequate health facilities, unhygienic hospital environment, poor services… etc. As a result, patients are more likely to have a lack of trust in treatment which discouraged those visiting public hospitals in Myanmar.

## CONCLUSION & RECOMMENDATIONS

In Myanmar, updated information on health care services has been missing over the time. Moreover, authorities from health sector may not be aware whether public hospitals meet certain level of patients' satisfaction. As a result, people are taking treatment at overseas hospitals rather than to access public hospital health care services in their home country. To understand the issue more, the primary purpose of this study is to investigate how Myanmar nationals, who now live in Bangkok, Thailand, perceive and responds to the issue of the quality of health care services provided by Myanmar's public hospitals. It suggests that people previously admitted to Myanmar's public hospitals were more likely to perceive positively the public hospitals' willingness to solve their health problem, the doctors and nurses' competence, attention, professionalism and showed high level of satisfaction with provided healthcare services more than others. In addition, the results of this study suggest that further studies needed to be examined in timely manners for the improvement of healthcare services offered by public hospitals in Myanmar.

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# THE RIGHT TO HEALTH IN INTERNATIONAL LAW: CONTESTATIONS OF ITS COHERENCE AND THE ARGUMENT OF NON-JUSTICIABILITY IN NIGERIA

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**Abstract**

The right to health in international law has been characterised by the extremes of great enthusiasm and optimism by proponents and deep indifference and pessimism by opponents who doubt that the concept is coherent, definable, politically viable, economically sustainable or justiciable. As such, the discourse occupies a highly contested space in international human rights law and its implementation is a matter of much disagreement for advocates and opponents at the international and domestic level. In view of this situation, this paper aims to achieve three main objectives: first, to identify and present in a coherent manner the key questions/issues that have defined the character and content of the body of work on the right to health in international law; second, to clarify the contentious issues in theory and praxis that have more or less informed (and continue to do so) the trajectory in which the right to health currently travels; and third, to identify how the claim of indeterminacy in the international framework on the right to health has provided an opportunity for countries like Nigeria to refrain from engaging with that right in their domestic system. The overarching argument here is that as a result of the contestations that have characterised the right to health discipline in the international system, successive administrations in Nigeria have wittingly or unwittingly been armed with (more or less) powerful arguments which have been used to deprive Nigerian citizens of the benefits of the right to health in the domestic system of Nigeria.

Keywords: Right to health, international law, justiciability, Nigeria, theory, praxis.

## INTRODUCTION

This paper makes the claim that successive administrations in Nigeria have not had compelling reasons to implement the right to health in the country's health system because of controversies which characterise claims about the right to health in international law. In support of this hypothesis, four key arguments are advanced: firstly, that the formulation of the right to health in international law is without a consistent account of its meaning and content; secondly that this has made claims about the right to health controversial and difficult to substantiate; thirdly, this has further led to a weak monitoring regime in the international system; and finally, this failure to resolve the debate about the meaning and content of the right to health has resulted in far more deleterious consequences for domestic systems such as Nigeria.

The paper is structured into five parts, excluding this introductory section. Part two examines the argument that the formulation of the right to health in international law is without a consistent account of its meaning and content. Part three addresses the claim that the controversy about the meaning and content of the right to health has made it a difficult right to substantiate. Part four considers how this development has resulted in a weak monitoring regime in the international system. Part five examines how the failure to resolve the debate about the meaning and content of the right to health has resulted in far more grave consequences for the domestic system of Nigeria. Part six concludes the paper argument that the reason why the claim of a non-justiciable right to health continues to gain traction in Nigeria is because of the unresolved situation of that right in international law.

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**The Right to Health lacks a Consistent Meaning in International Law**

The right to health does not have a consistent meaning in international law. This is because all the international instruments which define the right couch it in different ways, investing on it different meanings and consequences. To illustrate this point, table 1 below presents a summary of the definitions of the right to health offered by the Constitution of the World Health Organization (WHO); Art 25 of the Universal Declaration of Human Rights (UDHR); Art 12 of the International Covenant on Economic Social and Cultural Rights (ICESCR); Art 12 of the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) and Art 24 of the Convention on the Rights of the Child (CRC).

*Table 1: Summary of the Definition of the Right to in International Instruments*

| | |
|---|---|
| Preamble to the WHO Constitution | …state of complete physical, mental and social well-being and not merely the absence of disease or infirmity… (WHO, 1946). |
| Art 25 UDHR | …right to a standard of living adequate for health and well-being of a person and his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control (Universal Declaration of Human Rights, 1948). |
| Art 12 ICESCR | …the right of everyone to the enjoyment of the highest attainable standard of physical and mental health (International Covenant on Economic, Social and Cultural Rights, 1966). |
| Art 12 CEDAW | …appropriate measures to eliminate discrimination against women in the field of health care in order to ensure, on the basis of equality of men and women, access to health care services, including those related to family planning (Convention on the Elimination of All Forms of Discrimination Against Women, 1981). |
| Art 24 CRC | …the right of the child to the enjoyment of the highest attainable standard of health and to facilities for the treatment of illness and rehabilitation of health. State Parties shall strive to ensure that no child is deprived of his or her right of access to such health services (Convention on the Rights of the Child, 1989). |

**Claims about the Right to Health are Difficult to substantiate**

Claims about the right to health are difficult to substantiate as a result of the inconsistency of its meaning in international law. A multitude of interpretative dilemmas have arisen from the formulation of health, and the right to health, respectively, in international law. For instance, the formulation of health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" and "the enjoyment of the highest attainable standard of health" as a fundamental right of every human being (WHO, 1946) has given rise to questions such as: What is the meaning of the highest attainable standard of health? What is the meaning of health? Does it extend to the social determinants of health? What obligations flow from the requirement that states recognise the right to health? Are the measures required to fulfil these obligations universal or do they differ between states? What is the minimum core of the right to health? To what extent should states be responsible for ensuring the health of an individual in the home, workplace, and general community? To what extent must states prevent threats to an individual's health from non-state actors? Is privatization of health care services compatible with the right to health? Is the right to health justiciable? To what extent must intellectual property rules be designed to maximise access to medicine and medical services? (Tobin, 2012)

Two distinct approaches to these interpretative dilemmas are evident in the literature. The first responds to questions on the meaning and content of the right to health by focusing on its praxis. Scholars like (Daniels, 1985), (Kass, 1981) and others who favour this approach tend to substitute WHO's definition of health with one which they feel is more in accord with "medical research, education, knowledge and practice." (Tobin, 2012) The second approach (which is only beginning to take hold) focus attention on the theoretical basis of the right to health. Scholars like (Ruger, 2006) and others who favour this approach have done considerable work in formulating a theory of the right to health.

**A Weak Monitoring Regime in International Law**

A number of mechanisms have been developed in international law to monitor the implementation of the right to health. However, these mechanisms have not been as effective as they ought to be in making states implement that right in their domestic system because of the disagreements which continue to characterise claims about the right to health. These mechanisms include the Universal Periodic Review (UPR) of the Human Rights Council, Treaty-based bodies responsible for each of the treaties on the right to health (see Table 1 above), and regional human rights bodies responsible for implementation of regional treaties on the right to health (see Figure 1 below).

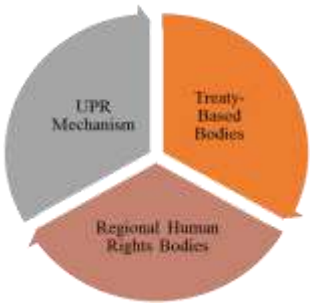


Figure 1: International Mechanisms for Monitoring the Implementation of the Right to Health

A manifestation of this problem is seen in the way these mechanisms are very slow to bring about any changes to domestic policy on the right to health. When states are subjected to the scrutiny of these mechanisms and recommendations are proffered which require states to give meaning to the right to health in their domestic systems, many states (Nigeria inclusive) simply ignore these recommendations and no changes are effected.

**The Consequences of the Controversy on the Right to Health in Nigeria**

The failure to resolve the debate about the meaning and content of the right to health has not benefited domestic systems like Nigeria where health outcomes are very poor. Whereas the health system of Nigeria would have greatly benefited from the prioritisation of health in government policy and action, lack of engagement with the right to health, which would have provided the basis for such prioritisation, has resulted in a highly dysfunctional health system with consistently poor health outcomes. The evidential basis for the above claim is provided by several indicators, three of which are examined here, namely: the maternal mortality rate; health financing by government; and out-of-pocket health expenditure by households.

With respect to the maternal mortality rate, a cross-country comparison has been made in this paper of Brazil, India, South Africa, Sri Lanka and Nigeria for the period 1995 to 2008. The trend indicates that within this period, Nigeria has had a significantly higher rate of maternal mortality than all the other countries mentioned. Although a steady decline in the maternal mortality rate of Nigeria is noticed, it is still significantly higher than the situation in the other countries. See the Chart in Figure 2 below which provides illustration of this phenomenon.

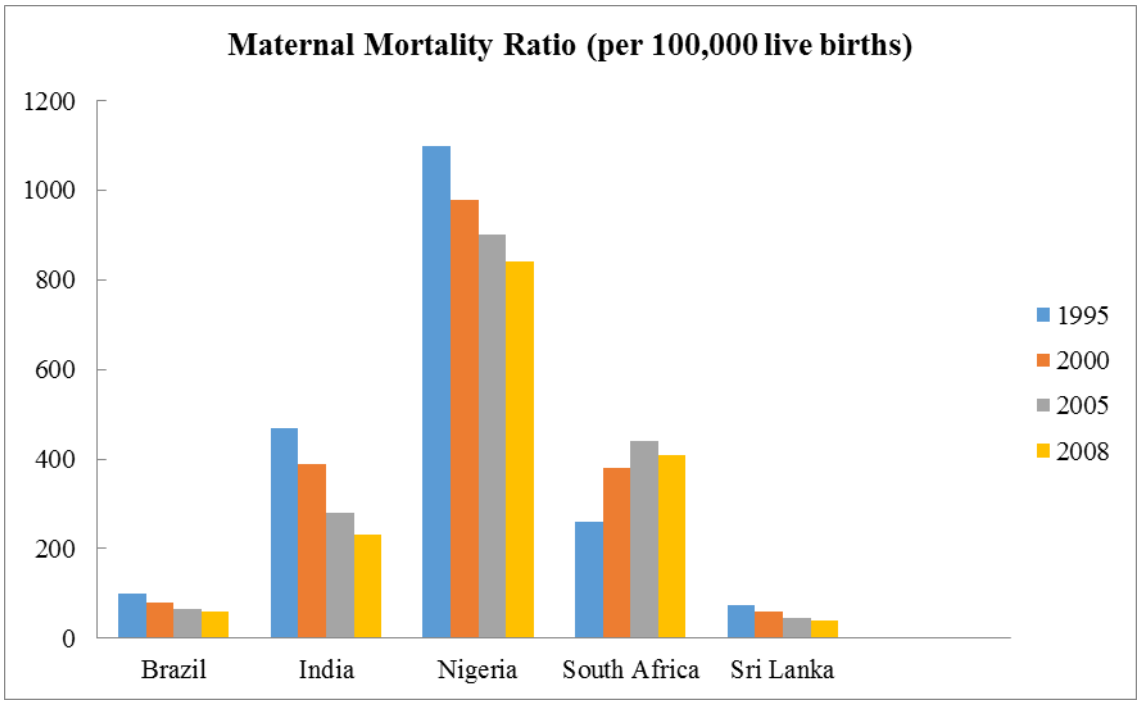


Figure 2 (Source: WHO Global Health Expenditure Database)

With regards to health financing by government, which measures the general government expenditure on health, this indicator shows how much, per capita, is being committed to health care (WHO, 2011). It is an important measure of the priority government gives to health in any domestic system. A cross country comparison was carried out of Brazil, India, South Africa, Sri Lanka and Nigeria on this indicator. The comparison covers the period 2009 to 2013. The result shows that within this period, Nigeria has consistently maintained the lowest general government expenditure per capita. Only India comes close to achieving this poor record. See Figure 3 below for further illustration.

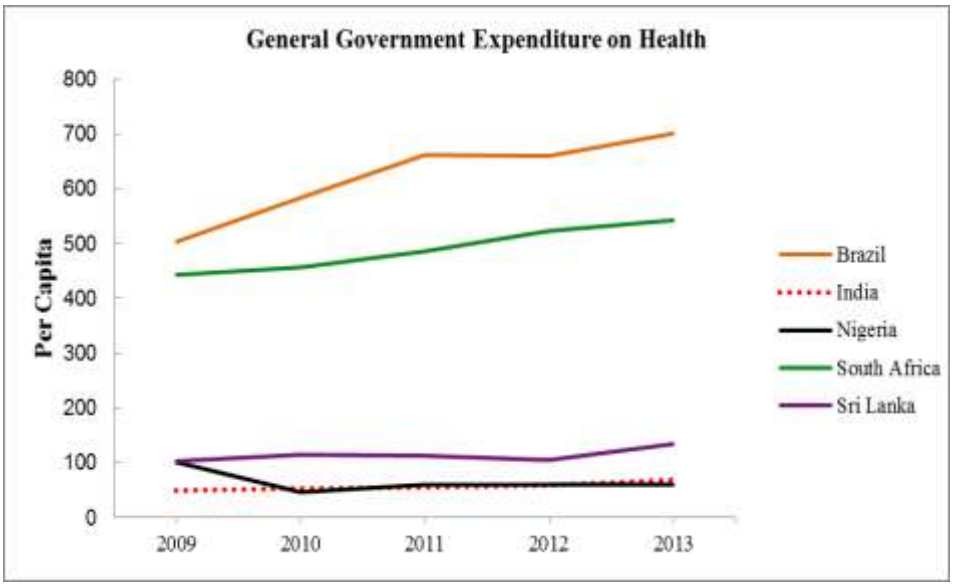


Figure 3(Source: WHO Global Health Expenditure Database)

Finally, out-of-pocket expenditure by households is a core indicator of health financing systems which contribute to understanding the relative weight of direct payments by households in total health expenditures. High out-of-pocket payments for health are strongly associated with catastrophic and impoverishing spending. As such it is a key support for equity and planning processes (WHO, 2011).

An analysis of the situation of out-of-pocket expenditure in Brazil, India, South Africa, Sri Lanka and Nigeria has been undertaken in this paper. The period covered by the analysis is 2009 to 2013. The findings indicate that Nigeria has the highest percentage of out-of-pocket expenditure as a percentage of total health expenditure (WHO, 2011). Further illustration is provided by figure 4 below.

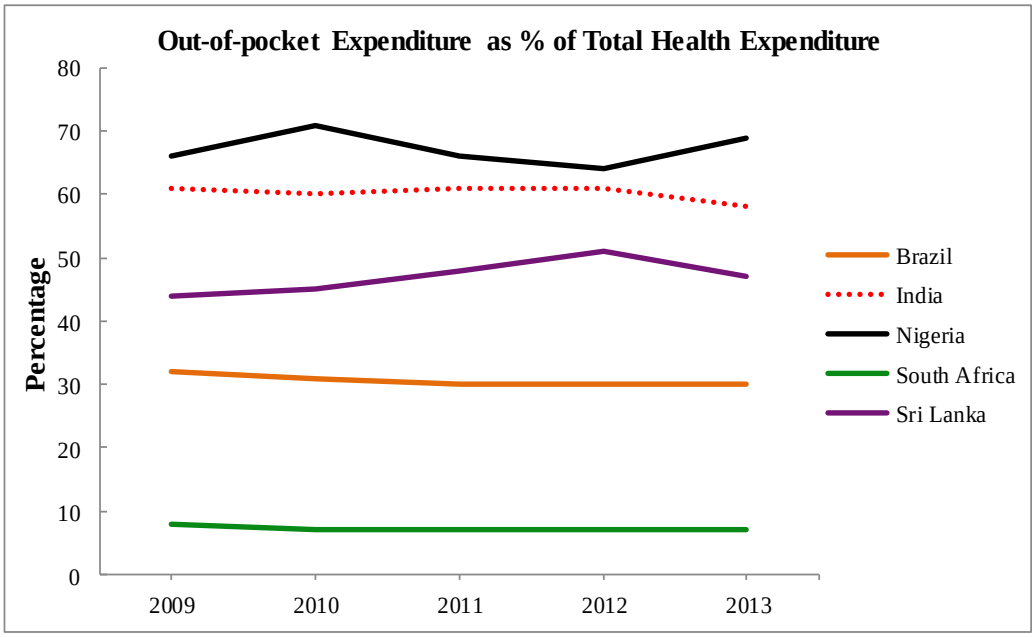


Figure 4 (Source: WHO Global Health Expenditure Database)

## CONCLUSION

In concluding this paper, the question is posed: What are claims about the right to health really all about? It is argued that this is the question which ought to be addressed in arriving at a meaning of the right to health. This will serve as a precursor to the specification of its content. For this to happen, a theory of the right to health is needed. Those who dismiss the right to health sometimes refer to the absence of a theory as a basis for doing so (Hunt, 2007). It is for this reason that the contribution of the likes of (Ruger, 2006) is very important. As she offers, as "the beginnings of a theory of the right to health" the formulation that the right to health is a "…demand for equity in health and the need for the internalisation of public moral norms to progressively realise this right" (Ruger, 2006).

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# THE DYNAMICS OF A CHANGING HEALTH PATTERN: SOME DISTURBING ISSUES

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**Abstract**

As a recent article in the *New England Journal of Medicine* makes it evident, we seem to be living in a medical education bubble market. Moreover, as explored and pointed out by the *Lancet* and innumerable research works and huge number of activist groups, there is occurring a paradigmatic shift from the state-owned, public health-based *preventive* as well as low-tech programs to the corporate, individual health-based and high-tech *curative* programs. Graduates coming out from a great heterogeneity of medical colleges greatly share the psyche of buyer-seller philosophical position. I would try to address how to transcend this *Bharat-India* divide in health care. As methodology, I have done a literature survey of all sorts and made use of the reports of objective field surveys of rural as well as urban population and health care facilities, with trained personnel existing mainly in West Bengal. The conception of public health differs from individual clinical health in a significant way that the former is embedded in community life with its own characteristic cultural specifics and somewhat against the medicalization traits. These lesssons are not learnt exactly in the curricula of medical colleges. When a doctor takes into account the dynamics of a population's life and its changing patterns seriously, an honest approach to render assistance to population and health will come in the offing. Moreover, while addressing the basic questions of philosophical position of *public health* – taking into account peoples' community belonging, religious beliefs, shared livelihood, social assistance, to name only a few – must be differentiated from the philosophical position of *individual clinical health*.

Keywords: Public health, clinical health, curative programs, community, cultural specifics, Bharat-India divide.

## INTRODUCTION

To any lay eyes it becomes quite visibly evident that over the years there is a sharp decline in the state health system (barring a few) and a stupendous rise in the growth and development of private hospitals and so called five star clinics in india. Most intriguingly, public health is provided by the state health system of India. The same is true for most of the countries. Notably, while *curative* health (of whatever price it may be) is the sole objective of these private hospitals and clinics, the delivery of both preventive and curative health, remain the objective of public health programs.

A few years ago, it was observed in an important journal that health care delivery in many countries has expanded over the past 150 years from a largely social service delivered by individual practitioners to an intricate network of services provided by teams of professionals. The problems of increasing resource consumption, financial constraints, complexity, and poor system design that have emerged as consequences of these changes have exacerbated many of the ethical tensions inherent in health care and have created new ones.[i] It was eventually accepted by the Tavistock Group – "Over the past 150 years, health care delivery has expanded from what was largely a social service provided by individual practitioners, often in the home, to include a complex system of services provided by teams of professionals, usually within institutions and using sophisticated technology."[ii] This declaration made a distinction between "individual" (or, clinical) and "public" health, which I believe, is of much importance. In my paper I shall try to focus on three fundamental issues and nuances related to public health in India.

First, I try to show how the 1978 slogan of "Health for All by 2000 A.D" emerging out of the Alma Ata Declaration (International Conference on Primary Health Care) gradually metamorphosed into "universal access to health care" and what consequences it did yield.

Second, how a deep distinction remains between "individual or clinical" health and "public" health and we should be careful to this distinction. Moreover, I try to show how all our medical curricula are devoted to the production of capable clinical health practitioner, not one dedicated to public health.

Third, taken the above two factors together into account, we should ask to know how it helps us to understand the divide between metropolitan India and the vast non-metropolitan rural *Bharat*.

**Elaborating the Issues: First Question**

To start with, the Alma Ata Conference (1978) on Primary Health Care was a visionary stepping towards a world where health became the concern of the state. Health was an achievable right and "to do" duty. The ocnference was held from 6th to 12th September, 1978.[iii] It was jointly sponsored by WHO and UNICEF. 134 countries, 67 international organizations and a good number of NGOs participated in the conference. It was held under the aegis of Dr. Halfdan Mahler, the then Director General of WHO. This conference also reflected his philosophical and ideological position to an extent. The 1st declaration was – "The Conference strongly reaffirms that health, which is a state of complete physical, mental and social wellbeing, and not merely the absence of disease or infirmity, is a fundamental human right and that the attainment of the **highest possible level of health is a most important world-wide social goal** whose realization requires the action of many other social and economic sectors in addition to the health sector." [Emphasis added]

Never before, though somewhat utopian it may sound, was so emphatically pronounced that "highest possible level of health is a most important world-wide social goal" and its realization depended on many a number of extra-medical and extra-health social, political, economic and cultural factors. In the 5th clause, it was explicitly stated – "Governments have a responsibility for the health of their people which can be fulfilled only by the provision of adequate health and social measures. A main social target of governments, international organizations and the whole world community in the coming decades should be the attainment by all peoples of the world by the year 2000 of a level of health that will permit them to lead a socially and economically productive life. Primary health care is the key to attaining this target as part of development in the spirit of social justice."

Quite importantly, as military conflicts and incessant wars among countries dry up resources for a given period, this declaration aimed towards a peaceful world. As a result of military armament and conflicts, there remains very little to invest in the growth, promotion and extension of health and "comprehensive primary health care." It was clearly enunciated, "An acceptable level of health for all the people of the world by the year 2000 can be attained through a fuller and better use of the world's resources, a considerable part of which is now spent on armaments and military conflicts. A genuine policy of *independence, peace, détente and disarmament* could and should release additional resources that could well be devoted to peaceful aims and in particular to the acceleration of social and economic development of which primary health care, as an essential part, should be allotted its proper share." [Emphasis added]

We can safely assume at this juncture that there were three or four fundamental and core arguments worked upon throughout this document – (1) attainment of health and extension of primary healthcare have been succinctly defined and elaborated; (2) primary healthcare was specifically suggestive of "comprehensive health care", not "selective primary health care", as was propounded later on; (3) the onus of promoting and ensuring health for all citizens, as viewed in the declaration, remains with the state and government, not entrusted with the "free market"; and (4) health is a right of citizens of all societies across the globe.

Summarily, the declaration gave birth to a new vision of health and determination to overcome challenges confronting its materialization. Moreover, this was a

priod when "cold war" was not over, and the world was neither unipolar too.

Around the same period of the Alma Ata conference, a number of important articles, analyses and commentaries appeared in the *New England Journal of Medicine*, *Wall Stree Jornal* and other international conferences. In 1977, Allan Enthoven prepared a plan "A National Health Insurance Proposal Based on Regulated Competition in the Private Sector", which was later published under the title "Consumer-Choice Health Plan (in two parts)" in *New England Journal of Medicine* in 1978 in 23rd March and 30th March issues of the journal. Prior to this plan, in 1965, Medicare and Medicaid – third party insurance-based healthcare – were adopted by the US government. Later on, echoing his earlier views, Enthoven unequivocally stated, "The main thing that I had in mind was to open up the *market* to the alternative delivery systems, including new models not yet invented, a market in which *consumers* would be fully cost-conscious at the margin." (Keynote Address for the Conference "Consumer choice in health care: the right choice?", Erasmus University, Rotterdam, 30 November 2006)

According to an estimate published in an article in the *Wall Street Journal* (27 December 1979), the net earnings of health care corporations with public stock shares rose by 30-35% in 1979 and were expected to increase another 20-25% in 1980. In 1979, more than $15 billion was expended only for laboratory investigations in the US, and this expenditure was anticipated to rise by 15% annually at a compound rate.[iv] In the same article, Relman let us know, "In theory, the free market should operate to improve the efficiency and quality of health care… *We Americans believe in private enterprise and the profit motive*."[v] [Emphasis added]

In 1979, Walsh and Warren published an article with the title "Selective Primary Health Care".[vi] In their paper, Walsh and Warren quoted the then World Bank president Robert McNamara to have said, "How then, in an age of diminishing resources, can the health and well-being of those "trapped at the bottom of the scale" be improved before the year 2000?"[vii] Moreover, according to them, as resources available for health programs are usually limited, "the provision of *comprehensive health care* to everyone in the near future remains unlikely."[viii] [Emphasis added]

At this juncture, it must be remembered that if the idea of "health" is to be substituted with the idea of "health care" as "consumer-choice", and, additionally, if to be placed in the currents of free market, two pre-conditions should be fulfilled. These are – first, instead of depending on local and indigenous resources, health care must be technologically driven, and, second, the concept of "comprehensive primary health care" must give way to "selective primary health care". Following the atomic explosion and technology used for this purpose, very advanced and high-efficiency technology like nuclear accelerator, CT scanner, MRI and others were already in possession of American giant companies. If these could be successfully applied in the realm of medicine and health and exported, there would come up the most assured area of profit, as expressed by Relman. Substituting the idea of "comprehensive primary health care" by the idea of "selective primary health care" would meet out this purpose. Elsewhere, Relman let us know that in the late 1970s US has been already in possession of more than half the scanners in the world. Moreover, as Relman commented policy should be taken "that would strengthen free market forces and allow for allocation by pricing."[ix]

A few caveats may be raised here. In 1982, Oscar Gish published his review paper "Selective Primry Health Care: Old Wine in New Bottles".[x] In his paper he critiqued Walh and Warren on two basic issues – (1) "the lack of analytical rigor" of the paper, and (2) "they slip over from 'health care' to 'health services', which differ especially if they are to be 'comprehensive'."[xi] In another research paper "selective PHC (SPHC) approach" was found to have been "favorably received by the World Bank and UNICEF, USAID and the Ford and Rockfeller Foundations. WHO, on the other hand, has warned against it."[xii] The paper stressed that development debate had shifted from a technocratic preoccupation with investment as the key to everything, to one which focused on the nature of poverty.[xiii]

Summarily, there is no easy going for SHPC which has been adopted and being implemented by most of the countries of the world to a great extent.

**The Second Issue: "Clinical Health" Vs. "Public Health"**

In an important article in *NEJM*, it has been asked "Are We Living in a Medical Eduction Bubble Market?"[xiv] The authors argued that in medicine, students buy their education from medical schools and residency programs (which pay wages that are lower than the value of the work that residents provide in return). This education is transformed into skills and credentials that are then sold to patients in the form of services. So long as it is believed that patients, or whoever purchases health care on their behalf, will keep paying more and more for physicians' services, students and trainees should be willing to pay more and more for the education that enables them to sell those services. Finally, they conclude, "That bubble will burst when potential students recognize that the costs of training aren't matched by later returns. Then the optometry bubble may burst, followed by the pharmacy and dentistry bubbles. At the extreme, we will march down the debt-to-income-ratio ladder, through psychiatrists to cardiologists to orthopedists . . . until no one is left but the MBAs."[xv]

Against the background of such an economic scenario, what could we expect from the bright medical graduates and post-graduates? One reflective essay asked. "What was the effect on us, as persons and as physicians, of the model of detachment that we saw around us in dealing with this profound human event?"[xvi] In their opinion "both the formal curriculum — what was overtly taught in the classroom and in structured settings on the wards — and the informal or "hidden" curriculum" prevent students becoming a healer. Rather, foremost is their tendency to avoid the sadness, hopelessness, and helplessness they had associated with dying persons is replaced by a sense of the approachability of the dying, an interest in the medical, psychosocial, and spiritual aspects of "the case," and a belief in the possibility of doing good work through such encounters. Unfortunately, "hidden curriculum" of contemporary medicine "especially the hurried, disease-centered, impersonal, high-throughout clinical years" still tends "to undermine the best intentions of students and faculty members and the best interests of patients and families."[xvii] In US, the presence of SHPC and insurance-based health economics lead researchers to a dissenting note, "We find it terribly and tragically inhumane that Mr. Davis and tens of thousands of other citizens of this wealthy country will die this year for lack of insurance."[xviii]

Public health, in sharp contrast to clinical or individual health, is an altogether different philosophical question. It demands introspection for cultural competence, respect for shared community bonding and values, religious proclivities and beliefs, gauging local resources and indigenous health patterns and, above all, an understanding of the person-community-interdependence-healer paradigm of health. Disease-centered learning and clinical detachment are almost irrelevant here and go contrary to the driving force of the spirit of public health.

Efficient public health programs, not the pursuit of any clinical health practice, may even be an abating factor in riot-affected areas. Roemer describes his own experience in the aftermath of serious outbreak of riot in Watts area of Los Angeles, Calfornia, in 1965, "I was appointed a public health consultant to the commission and, among other things, recommended the establishment of three or four community health centers for general ambulatory health care at "locations of greatest poverty" in the riot area."[xix] Moreover, over-dependence on conventional health practice and profit-oriented medical practice may be counterproductive in some aspects. Reviewing Cuban health system, a recent observation finds, "For a visitor from the United States, Cuba is disorienting…Cuban health care system also seems unreal. There are too many doctors. Everybody has a family physician. Everything is free, totally free — and not after prior approval or some copay. The whole system seems turned upside down. It is tightly organized, and the first priority is prevention. Although Cuba has limited economic resources, its health care system has solved some problems that ours has not yet managed to address."[xx]

**The Third Question: *Bharat*-India Divide**

A few years ago, one article in the the *Lancet* commented, "We live in an almost $100 trillion economy; therefore $2–3 billion committed as innovative, flexible, responsive, transparent, and accountable funds for comprehensive disease control should be considered a modest yet highly cost-effective mechanism for alleviating the poverty of people in the bottom billion."[xxi]

But in a recent article it is shown that "According to the latest figures in "India: Malnutrition Report", available at the World Bank's South Asia website, 48% of children in India under the age of five are stunted, 43% are underweight, and more than one in four infants are born with a low birth weight."[xxii] Further, rural children do much worse than urban children in stunting in West Bengal, but not in child wasting. This essentially implies that the long-term health of children is considerably *worse in rural areas compared to that in urban areas. Both stunting and wasting rates diminish as households become richer.* [Emphasis added]

In another research paper, it has been pointed out, "the proportion of sub-centers without electricity and running water facility was 28.5% and 27.8% respectively as on March 2010. The respective proportion for PHCs was 14.2% and 12.4%. The number of PHCs and CHCs not working as per the IPHS (Indian Public Health Standards) norms was 11.8% and 16.6%. This proportion is of the existing PHCs and CHCs and not that of the required strength, which means that de facto number of functioning PHCs and CHCs gets further reduced by 11.8% and 16.6%."[xxiii] The paper reports that the rural population in the country stood at 833 million as per the 2011 census. This implies that there were only 42,584 doctors (much less than the number of medical graduates passing each year) available through the peripheral health services to ensure the health of 833 million Indians living in the rural areas. This amounts to a doctor – patient ratio of 1: 19561.4 for the rural areas as compared to the overall doctor patient ratio for the country that stood at 1: 2000. According to the authors, 'New Economic Policies' (NEP), that has reigned supreme over the last two decades, increasingly legitimized healthcare as a source of profit rather than a welfare obligation of the State towards the people. It is not that private healthcare came into being with the initiation of these policies. Indeed, the preeminent healthcare institutions constituted of the publically funded government medical colleges in the country directly fed into the large pool of private healthcare practitioners rather than recruit or train them for managing the rural healthcare system of the country.[xxiv]

One study published in the *Lancet* observed, "71% of health spending is out of pocket, and, every year, such expenditure forces 4% of the population into poverty. On the whole, the absence of adequately trained health-care providers in public and private sectors is a major cause for concern."[xxv] The article contends that The number of health workers per 10 000 population in urban areas (42) is more than four times that in rural areas (11·8). The number of allopathic doctors per 10 000 people is more than three times larger in urban areas (13·3) than in rural areas (3·9), and for nurses and midwifes (15·9 in urban areas *vs* 4·1 in rural areas). The shortage of health workers in rural areas is because of both the disinclination of qualifi ed private providers to work there and the inability of the public sector to attract and adequately staff rural health facilities. Many health workers prefer to work in urban rather than rural locations because, in urban areas, they can earn a better income, can work more eff ectively (because of better access to, for example, equipment and facilities), have good living conditions, and have safe working and living environments, and because their children can have better education opportunities.

Moreover, many doctors, nurses, and technicians emigrate from India, which contributes to the country's shortage of health workers. Indian doctors constitute the largest number of foreign trained physicians in the USA (4·9% of physicians) and the UK (10·9% of physicians), the second largest in Australia (4·0% of physicians), and third largest in Canada (2·1% of physicians). Migration seems to be substantially higher for graduates from the best medical colleges. The results of a study at India's premier medical college between 1989 and 2000 showed that 54% of graduates left the country; most went to the USA. Little private sector oversight has

led to practices that are detrimental to the quality of care. Evidence suggests that doctors in the private sector prescribe more drugs than do those in the public sector. Registered medical practitioners prescribe more drugs and antibiotics than do qualifi ed physicians. Caesarean sections were done three times more often in private hospitals than in public hospitals. Furthermore, untrained physicians and nurses were practicing in private hospitals.[xxvi]

**SUMMATION**

Finally, the paper concludes, "The education and training of health workers, particularly doctors and nurses, need to be oriented towards the public health needs of the country, particularly those of underserved areas and populations. Health workers in India receive little training to work in underserved areas. Faculty development programmes for more relevant curricula and teaching–learning programmes are therefore important. Continued education, accredibility, and regulation are urgently needed to improve provider quality. This calls for improved governance and draws attention to the failure of regulatory organisations such as the professional medical and nursing councils to implement such measures. Political will is needed to implement necessary legislations because opposition from organised and powerful professional groups (such as medical, nursing, and other professional councils) exists."[xxvii]

I also belong to the same opinion.

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# QUALITY OF PARENTING AND EFFECTIVENESS OF AN EDUCATIONAL INTERVENTION TO IMPROVE PARENTING AMONG PARENTS OF 13-15 YEAR OLD SCHOOL GOING ADOLESCENTS IN JAFFNA DISTRICT

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**Abstract**

World Health Organisation (WHO) identified parenting intervention as the first strategy to improve adolescent health. The objectives of the study were to develop and validate a tool to describe parenting in selected dimensions, to describe parenting and its associated factors among parents of 13 to 15 year old schooling adolescents and to assess the effectiveness of a parenting intervention. The study comprised of three components. Component one developed and validated a self administered tool to describe the patterns of parenting- Parenting Patterns Questionnaire (PPQ) by, item selection, expert consensus and item analysis. In the component 2, a descriptive cross sectional study was carried out among 1863 schooling adolescents, in 97 clusters, by multi stage cluster random sampling probability proportionate to student population in different types of school and age group. In the third component, a Parenting Education Package was designed and a randomised control trial was conducted to assess the effectiveness of intervention with a sample of 73 parents each group. The data analysis was done using SPSS 15. The PPQ is a reliable and valid tool to assess parenting in selected dimensions (connection, control and respect) in Jaffna district. According to PPQ, parenting was good among 23.1% of parents. Factors such as age and sex of the child, educational level and occupation of parents, substance use of fathers and domestic violence were associated with quality of parenting. Improvement was achieved in parenting by intervention in 3 month period.

Keywords: Parenting, adolescent health, parenting interventions.

## INTRODUCTION

Parenting is defined as rearing of a child or children especially the care, love and guidance given by the parent (American Heritage Dictionary 2009). It is a construct which cannot be defined easily and is understood by different cultures differently. Parenting is predominantly seen as a task about the socialization of the children within the community that considers children in relation to their families, neighbourhood and the wider community (White 2005).

Parenting usually involves biological parents but teachers, carers, nurses and others can fulfill parenting tasks (Long 1996). Parenting is a multi dimensional topic which is molded by many cultural and social issues, but the basic principles of good parenting practices remain same among different societies (Schwartz-Kenney et.al 1999).

Parenting is culturally related and the perceptions of children are also different from culture to culture. Studies highlight important parenting differences between European and Asian Americans (Van and Russel 2010). Parenting is assessed usually by the

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way the good parenting is defined by Western culture. In the United States what most people consider as 'good parenting' is based on middle class European American behaviours (Van and Russel 2010). Even though in the Western culture authoritative parenting is seen as likely to promote adolescent's wellbeing, it is not necessarily more beneficial than authoritarian parenting which is practised by much Asian culture (Russel et al 2010). In addition the children's perception or understanding of good parenting or the support and love from the parents, is also different culture to culture.

Among Sri Lankan Tamil families, family interests are prioritised over individual interests (Sivarajah 1998, Kendall 1989). The advice on child rearing is obtained by older relatives and friends.

The main dimensions of parenting identified by the WHO (2007) are 'Connection (love)' which is an emotional bond between parent and child, 'Behaviour control which includes regulation, monitoring, structure and limit – setting, encompasses parents' actions aimed at shaping or restricting adolescents' behaviours, 'Respect for individuality ( respect)' which involves allowing the adolescent to develop a healthy sense of self, apart from his or her parents, 'Modeling for appropriate behavior ( model)' which includes modeling according to the social norms and culture and 'Provision and protection (provide)' which refers to parents' provision of the resources that they can and seeking out resources when they can't.

One old method of classification of parenting was according to the parenting styles by Baumarind (1966). She identified 3 parenting styles depending on responsiveness and demanding;Authoritative, Authoritarian and Permissive parenting styles. On the other hand Maccoby and Martin (1983) have expanded these three into four parenting styles; authoritative, authoritarian, permissive and neglectful styles.

Authoritative parenting style is characterised by high parental responsiveness and high parental demands. In Authoritarian parenting style the parent is demanding but not responsive. The parent is responsive but not demanding in permissive style. The parent is neither responsive nor demanding in neglectful style. Numerous studies show that authoritative style brings good outcomes among adolescents (Sanavi et al 2013, Strafstrom 2014, Hoffman and Bahr 2014) while some other researchers have found out that, in some cultures and ethnicities (Asian American families) authoritarian style may be associated with more positive child outcomes than Baumrind expects (Santrock 2007).

Socio demographic, economical and environmental factors related to parents and family and maternal depression distort the parenting severely (WHO 2007). Among the factors, culture, educational level, occupation and substance use of parents and domestic violence and economic status of family are important.

**Adolescents and Parenting Global situation**

Adolescence is a transition period between childhood and adulthood which extends from age 10 to 19 years (WHO 2007). According to WHO definition, the early adolescent period is between ages 10 and 13, mid adolescent between ages 14 and 17 and late adolescent between ages 18 and 19. Nearly 1.2 billion people in the world fall in this age group and the majority is living in developing countries (Yakandawala Ranatunga 1999).During this period dramatic physical and psychological changes are taking place and they physically and psychologically mature and develop their own identity. Many of the adolescents try to escape from the environment centered on home (controlled by their parents) and to enter a new world of freedom with company of peers. Experimentations and adoption of behaviours initiate during this period, may cause threat to their future life UNICEF 2004).

Globally main health problems of adolescents include early pregnancy and child birth, HIV, violence, alcohol and drugs, road traffic accidents, malnutrition and obesity, less exercise, and tobacco use (WHO 2014).

Parenting is the single most important variable involve in childhood illnesses, accidents, teenage pregnancy, substance misuse, child abuse, juvenile crime and mental illness (Masud 1998).

**Sri Lankan situation**

In Sri Lanka adolescents account for 3.7 million, which is 19.7% of the population and out of them 73% are attending schools (UNICEF 2004). In the

national survey carried out in 2004 (UNICEF), level of life skills, factors affecting life skills, substance abuse knowledge on reproductive health, sexual behavior, sexual abuse and vulnerability to STDs, HIV/AIDS of adolescents between ages 10 and 19 were found remarkably high.

**Parenting assessment and Education / Interventions**

The assessment of parenting is done using different terminology such as quality of parenting assessment, parenting capacity assessment, parenting competence assessment, etc. Whatever the term is used, the ultimate objective is to assess whether the parenting provides the safe and good psychosocial environment to the children

The challenge identified in most of the assessments is the validity. The recommended way to assess parenting capacity is to use combination of methods such as using tools and interviews and to take context into consideration (White 2005). Even though the assessment is difficult, parenting programmes proved effective in much literature (Kevin et al 2013).

The WHO (2014) identified that programmes to help strengthen ties between adolescents and their families are important. The WHO (2007) established stronger evidence base now, for interventions, to avert behaviours that undermine health have to be directed both to adolescents themselves and to the environments in which they live, grow and learn.

A parent education program is a course that can be followed to correct and improve a person's parenting skills. Such courses may be general, covering the most common issues parents may encounter, or specific, for infants, toddlers, children and teenagers. Even though parenting is an inborn art the interventions prove improvements in parents' and children's well being.

Worldwide the programmes are delivered in different modes such as short courses conducted in children centres, schools etc, education by phone, online courses, individual discussions for different length of period depending on the context. Most of the times, after the interventions the post interventional assessment is conducted immediately and follow – up assessment (to assess the sustainability) 10 weeks after the intervention and the results showed improvement of parenting skills and practices (Directory of local parenting programmes2009.

## METHODOLOGY

The study was carried out in Jaffna district in Northern Province of Sri Lanka. It caters about 600,000 residential populations and around 140,000 of adolescents (Statistical Hand book 2010). The total student population in Jaffna district is 128,430 (Ministry of Education 2012).The study population comprised of students aged 13-15 years attending schools in Jaffna district. There were 9327, 10155 and 10283 students in grades 8, 9 and 10 respectively in 2013(Northern Education Sector Vital statistics 2012). There were 44 Type I AB schools, 48 Type IC schools and 152 Type II schools. It was a descriptive cross sectional study with an intervention study component.

Phase I of the study was development and validation of a questionnaire to describe the patterns of parenting among parents of 13-15 year old school going adolescents in Jaffna district.

Phase II of the study was a descriptive cross sectional study to describe the patterns of parenting and the socioeconomic, demographic and environmental factors associated with parenting among parents of 13-15 year old schooling adolescents in Jaffna district, using the instrument developed in phase I.

Phase III was a randomized controlled trial, to assess the effectiveness of an intervention to improve the parenting.

The phase I of the study consisted of two steps

- Development of the scale (Parenting Patterns Questionnaire (PPQ).
- Validation of the scale

The development of the scale, Parenting Patterns Questionnaire (PPQ) was done in four stages.

- **Stage I:** Devising a range of items suitable for the preliminary draft of the PPQ from literature and by generating new items by Focus Group Discussions and In Depth Interviews

- **Stage II:** Formulation of items and response categories for the preliminary draft of the PPQ.
- **Stage III:** Pre test of the questionnaire
- **Stage IV:** Application of item reduction procedures (reliability analysis) to select the most suitable set of items for the final draft of the PPQ that will contribute to a good internal consistency

All the stages in the instrument development and validation process were designed according to the guidelines proposed by Streiner and Norman (2003). The summary of the development and validation of PPQ is shown in table 1.

*Table 1: The summary table showing steps of development and validation of PPQ*

| Steps | Procedure of steps | Participants |
|---|---|---|
| Step I- Devising the items | Selection of suitable items from existing instruments by an opinion survey among a panel of experts (item list 1) ↓ Generation of new items using FGDs and IDIs with relevant people (item list 2) ↓ Common item list (50 items) | A consultant community physician, a consultant psychiatrist, a psychologist, a sociologist, an educationist and a 2 religious leaders<br>Adolescents, parents, school principal, psychologist, counselling teacher, a sociologist and a religious leader. |
| Stage II:<br>Development of the preliminary draft of PPQ | Common item list (50 items) ↓ (Expert panel & establishment of judgemental validity) ↓ Preliminary draft of the PPQ (35 items) ↓ Formulation of subscales and response categories and scoring ↓ Pre-testing ↓ | A consultant community physician, a consultant psychiatrist, a psychologist, a sociologist, an educationist<br>Tamil speaking students from Kilinochchi district |
| Stage III:<br>Development of the final draft of PPQ | Item analysis ↓ Final draft of PPQ (27 items) | Sample from the students of age 13,14, 15 from Kilinochhci district |

In the descriptive cross sectional study (phase II) the patterns of parenting in selected dimensions and to identify the socioeconomic, demographic and environmental characteristics associated with parenting were described.

The study instrument was a self administered questionnaire, developed and validated by the Principal Investigator (PI). It comprised of two components; first component to gather the socioeconomic, demographic and environmental characteristics which is associated with parenting and the second to describe the patterns of parenting - Parenting Patterns Questionnaire (PPQ).

**Sample size calculation**

Sample size was calculated by using the following formula (Lwanga and Lameshow 1991) as it is a prevalent study (1).

$$\text{Sample size (N)} = \frac{Z^2 \times P(1-P) \times D}{d^2}$$

Z = 1.96 (standard normal deviation for % α error)

d = the degree of precision desired for margin of error was set at 0.05

Since there were no previous studies in this nature expected proportion with 'good parenting' is regarded as 50%

P = Expected proportion of parents with good parenting practices = 50%

D= Design effect.

b = Number in the cluster

Substituting the values in the above formula gives

N= 384

This sample was selected using multi stage cluster sampling method proportionate to the size of the student population in grade 8, 9, and 10 and Type I AB, Type IC and Type II schools. As cluster sampling method was used the clustering effect was overcome by multiplying by design effect.

Calculating the design effect also is done according to the paper on simplified general method of cluster sampling by (Bennet et. al 1991).

D= 1+ (b-1) rho

rho = 0.2 ; b=20

D= Design effect

b= cluster size

rho= measure of degree of homogeneity of study units within the cluster

Usually in a community based study rho ranges from 0.1 to 0.4 (Moser and Kalton 1971). As this is a school study the previous studies were looked for a suitable value for "rho" and design effect. Researchers used 0.2 for "rho" and got design effect of 4.8 (Amarasinghe 2000) for a similar study population and similar sampling method and design effect 4 was used by Wijeratne (2012) for a similar study. To select a large enough sample size to overcome the design effect, 4.8 was gained substituting 0.2 to "rho".

D= 1+ (b-1) rho

rho = 0.2 ; b=20

D= 1+ (20-1) x 0.2 = 4.8

Effects due to cluster sampling method will be

overcome by making a correction for design

effect. N = 384 x 4.8 =1843.2

A non response rate of 5% (92) was added to sample size.

Total sample = 1843+92 = 1935

Approximately a sample of 1935 schooling adolescents was needed for the study.

A classroom from grades 8, 9, 10 was considered as a cluster as almost all of the 13, 14, and 15 year old students are studying in grades 8, 9, and 10. The study comprised of clusters of 20 students each, because usually in Jaffna district, most of the classrooms consisted 20 students.

Total Number of clusters to be studied = 1935 / 20 = 97

As it is a school based study and it has to cover whole Jaffna district multi - stage stratified cluster sampling method was chosen (Hulley & Cummings 1998). Stratification was done according to the proportion of student population for each type of school and each grade under each type of the school.

The stratification was done according to the type of schools (1AB, 1C and type II), probability proportionate to the size of the population in grades 8, 9 & 10, in each type of school and number of clusters in each type of school were decided in Table 2

*Table 2: Sample technique and the number of clusters*

| Student Population (No of Clusters )<br>School type<br>Grades | Type1AB | Type 1C | Type 2 | Total |
|---|---|---|---|---|
| Grade 8 | 4252 (14) | 2044 (6) | 3031(10) | 9327 (30) |
| Grade 9 | 4293 (14) | 2073 (7) | 3789 (12) | 10155 (33) |
| Grade 10 | 4507 (15) | 2152 (7) | 3624 (12) | 10283 (34) |
| Total | 13052 (43) | 6269 (20) | 10444 (34) | 29765 (97) |

(Source: Northern Province Educational Sector Vital Statistics 2012).

The phase III of the study was completed in two stages.

- Development of the parental Educational Package (PEP)
- Randomized control trial to assess the effectiveness of the PEP.

A comprehensive education package (PEP) on "parenting", based on the findings of the study, was designed. The aim of the PEP was to educate the parents about the nature of adolescents by educating them about the brain development of adolescents and how to handle them by making them understand the current problems of adolescents in the local context.The PEP included a VCD with undesirable and desirable behaviours captured from Tamil movies, a CD with few interviews with adolescents and a leaflet to educate the parents with 3 workshops to parents.

**Sample size:**

According to the formula described by Pocock (1983) the required number of study participants in each group, n, was calculated as follows (2).

$n = \{p_1 (100- p_1) + p_2 (100- p_2)\}/ (p_1- p_2)^2 \quad X\ f_{(\alpha,\beta)}$

$p_1$ = proportion of parents with improved parenting quality in the control group after intervention period.

$p_2$ = proportion of parents with improved parenting quality in the intervention group after intervention period.

$\alpha$ = the level of significance used for detecting a difference set at 0.05 between intervention group and control group

1- $\beta$ = the degree of certainty that the difference ($p_1$- $p_2$), if present, would be detected or the power set at 0.80

f = a function of $\alpha$ and $\beta$ and equals to 7.9 when $\alpha$ is 0.05 and $\beta$ is 0.2

With the existing literature and the expert opinion 35 % improvement was expected in parenting as the intervention is done to a group parents with good, moderate and poor parenting. In the control group 5% improvement was expected in parenting.

Following values will be taken for $p_1$ and $p_2$

$p_1$ = 0.05 (a reduction of parents with poor parenting by 5% in the control group)

$p_2$ = 0.35 (a reduction of parents with poor parenting by 35% in the control group)

Thus the final calculated sample size is 24.

As the study was carried out by cluster sampling, the sample size was multiplied by design effect to overcome the cluster effect. Design effect was taken as 2 as only one type of school is included in the trial.

Therefore the final sample size was

N= 24 x 2 = 48

48 study participants were allocated to each group.

10% was added to the sample size for non response (non availability for the assessment after intervention and also parents will not attend the intervention.)Therefore, the final sample size in each group consists of 53.Two Type IC schools from different zones were selected and all the parents were given parental education for the intervention school and other one was kept as control school.

**DATA ANALYSIS**

Depending on the scores for PPQ the parents were categorised into good, moderate and poor for each dimension of parenting as in phase 2. Chi square test was used to find the associations of the factors with parenting. The proportions were calculated for pre intervention and post intervention and were compared to intervention and control groups separately by using Mc Nemar's test.

**RESULTS**

**Results of the Phase I**

***Reliability of PPQ***

The reliability of the PPQ was confirmed by assessing the internal consistency and the test-retest reliability of the instrument. Internal consistency of the scale was assessed using Cronbach's alpha. An alpha value of 0.7-0.9 was considered as evidence to support good internal consistency of the instrument (Streiner & Norman, 2003). The results of internal consistency of the PPQ is shown in Table 3.

*Table 3: Measures of Internal consistency of PPQ*

| Measure | No. of items | Cronbach's alpha Value | Mean inter item correlation |
|---|---|---|---|
| Subscale 1 | 15 | 0.801 | 0.211 |
| Subscale 2 | 06 | 0.800 | 0.381 |
| Subscale 3 | 06 | 0.845 | 0.477 |
| Whole scale | 27 | 0.805 | 0.139 |

All the subscales were found to have alpha values above 0.8, signifying high internal consistency. The overall PPQ also has an alpha value of 0.805.

The test-retest reliability of the instrument was measured by re-administering the instrument after two weeks from the initial administration, to a group of 30 children (which includes grade 8, 9, 10 and IAB, IC, type II) who were selected for the validation study. Good correlations were demonstrated for all three sub scales of PPQ and for the overall PPQ (>0.7). These results indicated that the PPQ has satisfactory repeatability.

Three forms of judgmental validity (Face validity, content validity and consensual validity of the PPQ) were established during the process of item generation. In addition, a qualitative validation (construct validity) was carried out as described in section 3.1.1.2.5, which further confirmed the validity.

**Results phase II**

A sample of 1976 eligible schooling adolescents aged 13-15 years were selected for the study, by cluster sampling method from the schools in the Jaffna district. All the parents of the selected children (1976) and all the children (1976) were sought for the consent; of them 44 parents and 16 children did not consent to participate in the study and 12 children were absent on the data collection day. Thus the non response rate was 3.72%. In addition 41 questionnaires were removed from analysis due to incompleteness. Thus, 1863 adolescents participated in the study were analysed.

**The socio demographic characteristics of the parents**

The mean age of mothers and fathers were 37.99 and 43.23 years respectively. Majority (99.7%) of the parents belonged to Tamil ethnicity and to Hindu religion. Of the parents alive , 17.4% (n=322) of mothers and 15.8% (n=279) fathers were educated up to tertiary level while 11.9% of mothers and 13.5% fathers studied up to primary only. Of the mothers approximately three quarter (n=1427, 77.3%) were house wives and one fifth (n=347, 18.8%) were either managers or professionals. Of the fathers 18.4% (n=324) were either managers or professionals while one quarter (n=454, 25.8%) were elementary

occupation holders. Majority (n= 1691, 90.8%) of the families, the income was less than Rs. 50000/= per month among those 60.5 % (n= 1127) was under Rs. 25000/=. Among the fathers 8.5% had a habit of alcohol intake more than 3-4 times per week and 14.2 % were smokers. Of the families of the participants, there was physical violence between parents among 90 % of the families.

**Patterns of parenting**

The patterns of parenting derived by each item of PPQ are described by means of components related to the selected parenting dimensions; connection, control and respect. The 'Connection' is described by questions related to provision of advice and guidance, time spent for child, understanding of the child, praising the child, gives attention to the child, having open communication with child, supports the child in school work. The 'Control' is described by questions related to the monitoring and consistent control. The 'Respect' is described by questions related to ridiculing of the child, embarrasses the child in public, expects too much from the child, comparing the child with some body, ignoring the child, not respecting the child as a person. The patterns of parenting is summarised in Table 4.

*Table 4:Distribution of the study sample by patterns of parenting*

| Measures | Always / every day | | Frequently/sometimes | | Rarely/never | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| Chat with the child | 1295 | 69.5 | 470 | 25.3 | 42 | 2.3 |
| Quality time spent with child | 728 | 39.1 | 700 | 37.6 | 435 | 23.4 |
| Understanding of the child | 1125 | 60.38 | 416 | 22.32 | 322 | 17.28 |
| Discuss about the child's problems | 1008 | 54.1 | 550 | 29.6 | 305 | 16.3 |
| Inspection of the school work | 994 | 53.4 | 606 | 30.2 | 263 | 14.4 |
| Substance use | 218 | 11.7 | 339 | 18.2 | 1306 | 70.1 |
| Child abuse | 308 | 16.5 | 422 | 22.7 | 1133 | 60.8 |
| Advice on Physical changes during adolescence | 303 | 16.3 | 426 | 22.8 | 1134 | 60.9 |
| Advice on Reproductive health issues | 307 | 16.5 | 394 | 21.2 | 1162 | 62.4 |
| Advice on Information Technology | 797 | 42.8 | 635 | 34.0 | 430 | 23.1 |
| Advice on Religious involvement | 1453 | 78.0 | 327 | 17.5 | 83 | 5.5 |
| Advice on Cultural values | 1100 | 59.0 | 545 | 29.3 | 218 | 11.7 |
| Enquiring about the time spent outside | 514 | 27.6 | 758 | 40.7 | 591 | 31.8 |
| Habit of informing the place the child going | 1255 | 67.4 | 415 | 22.2 | 193 | 10.4 |
| Knowledge of child's friends | 545 | 29.3 | 674 | 37.2 | 624 | 33.5 |
| Ridiculing the child by words | 158 | 8.5 | 393 | 21.1 | 1312 | 70.4 |
| Punishing the child | 611 | 32.8 | 733 | 39.5 | 519 | 27.9 |

| | | | | | | |
|---|---|---|---|---|---|---|
| physically | | | | | | |
| Embarrasses the child in public | 130 | 7.0 | 351 | 18.8 | 1382 | 74.2 |
| Comparing the child with some body | 293 | 15.7 | 606 | 32.5 | 964 | 51.8 |
| Expects too much from the child | 145 | 7.8 | 342 | 18.3 | 1376 | 73.9 |
| Not respecting the child's feelings | 154 | 8.3 | 351 | 18.9 | 1358 | 62.9 |

The level of parenting quality was assessed using the new instrument Parenting Patterns Questionnaire (PPQ). The instrument consisted of 27 items with a 5-point rating scale for each item which ranged from 1-5. The total PPQ score was calculated by summing up the scores of individual items and a higher value was thought to represent a good quality of parenting. Thus, the range of possible values for the parenting score was 27- 135.

The parenting received by the children was classified in to 3 levels: good, average and poor. The cut off thresholds for the different levels were determined based on the expert opinion. Each subscale and the whole scale were given separate cut off values. The values were decided by the expert panel according to the rate of scoring of the items and the number of items in each scale. The scores for each scale is presented in Table 5 in the following manner.

*Table 5:Cut off for the quality of each dimension of parenting and for overall parenting*

| Quality Scale | Good (>= number of items x 4 | Average ( number of items x 4 through number of items x 3 | poor(< number of items x 3) |
|---|---|---|---|
| Connection | >= 60 | 45 to 60 | < 45 |
| Control | >=24 | 18 to 24 | <18 |
| Respect | >=24 | 18 to 24 | <18 |
| Whole | >=108 | 81 to 108 | <81 |

The distribution of the levels of parenting in each subscale and the whole scale is given in table 6.

*Table 6: Distribution of the study sample by quality of parenting*

| Quality Parenting scales | Good No | % | N=1863 Average No | % | Poor No | % |
|---|---|---|---|---|---|---|
| Scale 1 connection | 954 | 51.2 (48.8 - 53.9) | 612 | 32.9 (30.7- 35.0) | 297 | 15.9 (14.2-17.6) |
| Scale 2 control | 442 | 23.7 (21.8-25.7) | 614 | 33.0 (30.9-35.2) | 807 | 43.3 (41.1-45.6) |
| Scale 3 Respect | 920 | 49.4 (47.1-51.7) | 448 | 24.0(22.2-26.0) | 495 | 26.6 (24.6-28.7) |
| Overall | 430 | 23.1(21.2-25.0) | 1152 | 61.8 (59.7-63.9) | 281 | 15.1 (13.4 - 16.6) |

Little less than half (43.3%) of the parents are poor in control dimension of parenting and nearly quarter (26.6%) of them are poor in respect dimension. The overall parenting is good among 23.1 % of parents and moderate in 61.8% of them.

**The factors associated with parenting**

The relationship between parenting quality and selected variables were studied, in order to identify

the factors that are associated with parenting quality. For the analytic purposes to apply the statistical tests moderate and good parenting were amalgamated as satisfactory and poor was considered as it is.

The independent variables also were amalgamated whenever necessary for analysis and to locate the significant variation between groups

The parenting quality was found significantly associated with the educational level of the parents ($p<0.001$), occupation of parents ($p<0.01$), family income ($p<0.05$), and substance use by father ($p<0.01$), and intimate partner violence ($p<0.01$).

**Effectiveness of intervention**

The proportion of satisfactory and poor parenting was compared before and after the intervention for each dimension and for the overall parenting using McNemar's test.

The parents in intervention group, have shown a significant improvement ($P<0.05$) in all three dimensions and in overall parenting.

**DISCUSSION**

This study has developed and validated a tool to describe parenting patterns in Jaffna district Sri Lanka which is a purely Tamil community and described the parenting with an assessment of effectiveness of a parenting intervention.

The PI has developed and validated the PPQ for schooling adolescents of age 13 -15 years, in Jaffna district, according to the steps described by Strainer and Norman (2003).The newly developed tool, PPQ, has shown good internal consistency (Cronbach's alpha >0.7), test - retest reliability (Pearson's Correlation Coefficient > 0.9) and validity. Development of the questionnaire was mainly done by devising the items from the existing tools in literature and generation of new items from the FGDs and IDIs. Same procedure was followed by researchers in Western countries in development and validation of parenting scales (David et al 1993, Campis et al 1996, Larios et al 2009). Sri Lankan researchers also followed the same procedures in development of tools for different purposes (Fernandopulle 2000, Wijesekara 2003, Amarasinghe 2011 , Wijeratne 2012, Hettiarachchi 2013).

According to PPQ among 23.1% (CI : 21.2-25.0) of parents, overall parenting was good and among 51.2% (CI : 48.8 - 53.9), 23.7% (CI: 21.8-25.7) and 49.4% (CI: 47.1-51.7) of parents, parenting was good in 'connection', 'control' and 'respect' dimensions respectively.

Nearly 74 % of the parents (at least one parent) spends a quality time (without involving in any other task) while 11.2 % reported that the parents didn't spend a quality time at all. Of the adolescents 82.7 % of the children agree that at least either of their parents understand them but little more than two thirds of adolescents (70.2%) reported that either of their parents had open communications with them according to the current study. Little more than half of the parents (54%) participate in the school and educational activities of the children. Nearly half of the parents (55%) monitor the day to day activities of the children and nearly two thirds of the parents monitor the child's friends. According to the current study, more than 60% of adolescents didn't get any advice on physical changes during adolescence, sexual and reproductive health or child abuse from at least one of their parents. Regarding electronic communications (mobile phones, computers, face book) 42.8 % of the families, at least one parent advise very frequently. According to the children 59% of the parents discuss related to the cultural values and 78% encourage the children to involve in the religious activities. Similar findings like current study were derived in a study (UNICEF 2004) in Sri Lanka in which 54.6% of youth from Jaffna district felt that the families were intimate and close to them and 60.5% reported as they considered family as a refuge for a problem. Further, 33.5% of them thought that they could depend on their families and 47.4% admitted that they like to spend time with families. The study further demonstrated that 4% of adolescents reported serious problems with their families. Further, 28.8% reported that parents support their decisions and 37.5% likes to share their personal matters with parents, among them 32.8% with mothers. Findings from Lukumar (2006) also were similar in which 60.6% of adolescents reported that their parents support for their educational decisions.

The results revealed that less than one fifth of the parents advise very frequently regarding substance use (11.7%) and majority (70.1%) didn't advise at all or advise rarely. Either of the parents advises about physical changes during adolescence for 16.3% of adolescents and about sexual and reproductive health during adolescence for 16.5% and more than 60% of

adolescents didn't get any advice on these issues from at least one of their parents. Further, the current study revealed that only 16.5% of adolescents were advised frequently about child abuse by at least one of their parents and 60.8 % of the adolescents were not advised at all or advised rarely. Regarding electronic communications (mobile phones, computers, face book) 42.8 % of the families at least one parent advise very frequently. According to the children 59% of the parents discuss related to the cultural values and 78% encourage the children to involve in the religious activities.

Findings from the current study regarding the reproductive and sexual education is consistent with the findings by UNICEF (2004) in which nearly 70% of 10-13 year olds were not aware of the physiological changes taking place in their bodies during this period and less than 25% of 14-19 year olds could answer correctly for the questions on possibilities and risks of conception. The findings in the study by UNICEF (2004) further revealed that more than quarter of early adolescents was aware of sexual abuse. The study further found out that about 10% of early adolescents and 14 % of mid and late adolescents in school, admitted to have been sexually abused sometime in their lives.

Among the families, in 29.6% of families either of the parents verbally abuses the child and 72.4 % punishes them physically. Nearly one fourth (25.8%) of the children reported that they were embarrassed by their parents in public and nearly half (48.2%) reported that either of the parents compared them with others. Nearly one fourth of the children reported that either of the parents expects too much from them (25.1%) and didn't respect their feelings (27.2%). Similar findings were received by Lukumar (2006) who found 77.2% of adolescents were physically punished and 34.6% were verbally abused. But corporal punishments by parents among children of 12 year old school going adolescents (Zoysa 2004), was 15% in Gampaha district. The difference clearly shows the difference, in the acceptability of physical punishments by culture. Regarding this aspect, it is good to remember the research about Jaffna culture by Sivarajah (1998). He mentioned in his study that the strict control is practised by the parents of Jaffna and the children are expected to obey whatever the parents wish. The FGDs by the author in the current study also revealed the same in which the children showed a positive attitude towards being punished by the parents.

The parenting quality was found significantly associated with the educational level and occupation of parents, family income, and substance use by father, and Intimate Partner Violence. The 'connection' dimension of parenting was significantly associated with the educational level and occupation of parents, family income and the age of the child. The 'control' dimension of parenting was significantly associated with the educational level and the occupation of parents, substance use by father, Intimate Partner Violence and sex of the child

The 'respect' dimension of parenting was significantly associated with the educational level and occupation of parents, substance use by father, Intimate Partner Violence, family income and sex of the child

The FGDs with parents revealed that due to foreign money from the relatives who visit Jaffna after the war period, the adolescents' taste is changed. According to the parents and the key informants the priority towards the education is diverted towards the things for entertainment like hand phones, computers, motorbikes etc. They further mentioned that while some children are able to get foreign money from their relatives some others have no access as such. The children, who have no access for these things, tend to select wrong ways to get those items. The parents and experts feel that sudden entry of these sophisticated life style after a restricted life during war period also, a reason for the adolescent issues. Even though the fear of parents that the adolescents may join the militant groups (Lukumar 2006) is not there at present, still some parents are not daring enough to control the children. In an IDI, a school principal said that some parents secretly ask the principal and teachers to control their children as they are afraid to control because of the fear that the children may leave the family. Though the parents want a well behaving child, their priority is, not to lose the child. Parents and key informants stressed the need of interventions to parents to educate to set limits while proving their affection towards the children and to respect the children's autonomy. Same time they prefer education to the children to make them understand the importance and affection of a

parent. Most of the adolescents appreciate their parents and their love towards them, in the FGDs with adolescents. Most of the adolescents accept that the physical punishments are practised by the parents to discipline them. But they were not willing to accept the verbal abuse, comparison with others and punishments in front of others

The intervention for parents has shown improvement in overall parenting and in all three dimensions.

## LIMITATIONS

The tool (PPQ) was developed for the Tamil community in Jaffna district. Therefore it cannot be used in rest of the country without validation. The design of the study was cross sectional descriptive. Therefore temporal relationship of the associated factors with parenting quality cannot be predicted. As it is a descriptive study (without comparison groups) regression analysis couldn't be done. Therefore the interpretation and conclusion of the associated factors have a limitation.

The findings cannot be generalised to the rest of the country as it was conducted in Jaffna district.

- Only the students present at the school on the day of data collection were included in the study. The absentees on the data collection were not included in the study and parenting patterns they receive may be different from those who were regularly attending the school.
- As the data was collected from the adolescents, accuracy of data related to socio economic factors can be a limitation. In addition all the associated factors cannot be asked from the children due to ethical reasons. In addition, as the parenting patterns were gathered from the children, perceptual bias has to be considered as a limitation.

## CONCLUSIONS

- The newly developed tool by the PI called Parenting Patterns Questionnaire (PPQ), can be considered as a valid and reliable measure of the parenting patterns and the parenting quality in Jaffna district.
- The overall parenting quality was found good among 23.1% of the parents in Jaffna district and it is poor among 15.1 % of the parents according to the PPQ.
- The parenting quality was found significantly associated with the educational level of the parents , occupation of parents , single parent family, family income, substance use by father, and intimate partner violence.
- The modes, duration follow up period of intervention all over the world found numerous. Variations occur from context to context. The parenting education package with components of CD,VCD, leaflet and workshop was designed with the help of literature review and the experts and the intervention was carried out by the PI. The intervention for parents has shown improvement in parenting in connection and control dimensions and in overall parenting in 3 months time.

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# COMPARATIVE STUDY OF COVERAGE, QUALITY, AND EQUITY OF REPRODUCTIVE AND ADOLESCENT HEALTHCARE INTERVENTIONS AT DISTRICTS OF WEST BENGAL

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**Abstract**

Reproductive and adolescent life-stages of any female are most vulnerable to diseases but often ignored for proper healthcare in most of the developing countries. The objectives of the study are assessment of change in coverage, quality, and inequity of reproductive and adolescent healthcare interventions at districts of West Bengal in India in between 2007-08 and 2012-13; evaluation of change in services at healthcare delivery points in between 2007-08 and 2012-13; and development of district ranking tables based on their performance on 2012-13.Major healthcare interventions for these stages are reduction of unmet need for family planning, enhancement of current use of family planning methods, increase of awareness regarding RTI/STI and HIV/AIDS etc. For this study, data were obtained from two nationally representative surveys, 4th round (2012-13), and 3rd round (2007-08) of District Level Household and Facility Survey. These surveys have been organized by Ministry of Health and Family Welfare, Government of India. Descriptive statistics were used for this analysis. Interventions like usage of modern types of family planning methods, consumption of pills, usage of condom, awareness of RTI/STI and HIV/AIDS have improved in West Bengal since 2007-08.On the same time, rate of unmet need of family planning, male and female sterilization rate, IUD insertion rate have deteriorated. There are huge disparities among districts' performances on interventions. Jalpaiguri, Paschim Medinipur, Koch Bihar, Purba Medinipur have shown very satisfactory coverage rate for majority of interventions. But quality and coverage of interventions are very poor at Nadia, North 24 Parganas, Uttar Dinajpur, Dakshin Dinajpur, Hugli, and Maldah districts. This paper summarizes the findings based on analyses of the above facts.

Keywords: Reproductive and adolescent healthcare interventions, coverage, quality, equity, West Bengal.

## INTRODUCTION

In presence of officials of 189 countries at the Millennium Summit of United Nations (UN), eight targets were set up to eradicating extreme poverty, upholding human dignity, and abolishing inequity in basic human rights such as health, education etc. and those targets were titled as Millennium Development Goals (MDGs). Reduction of child mortality, improvement of maternal health, and combating with sexual diseases were considered as central goals among the prescribed eight MDGs(United Nations, 2013).

Many scientists and epidemiologists have advocated 'Life Course Theory' for years as the course of action for proper health of mother and child. Even as early as in 1930s, German and British scientists have revealed that the condition a child spent in its early years had a great impact later in her adult age(Russ, Larson, Tullis, & Halfon, 2014). But the concept was overshadowed for years by simple biomedical model. Again in 1980s, eminent epidemiologists like Barker, Wadsworth, and others have again proved the importance of life course approach for improvement of maternal and child health(Barker, Osmond, Golding, & Al., 1989). In the year 2000,

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Dr. Halfon and his colleagues have proposed Life Course Health Development (LCHD) model(Halfon, Inkelas, & Hochstein, 2000). As per LCHD model, social, psychological, and environmental factors faced by any child at her early age even at fetal age could have a great impact of that on her later adult life.

According to LCHD model, adolescent stage of a female has been regarded as the most critical but best period among whole life span for starting of proper healthcare interventions. Early starting of healthcare can really help to reduce Maternal Mortality Rate (MMR) and Infant Mortality Ratio (IMR)(Shlafer et al., 2014).This is not only the transition phase between childhood and adulthood. Along with astonishing physical changes, a teenager can feel amazing development in their social, emotional, and cognitive understanding too (Resnick, 2005). People within this age group are very prone to acute illness due to environmental conditions as well as their behaviors too. Use of tobacco, lack of physical activity, unprotected sex, exposure to violence leading to unintended pregnancy, early pregnancy and childbirth, Human Immunodeficiency Virus (HIV) and other sexually transmitted diseases, malnutrition, substance abuse, injuries etc. are very common symptoms observed in youth. According to WHO, 50 percent of HIV infected people in this world are below the age of 25 years and among them 60 percent belong to developing countries. They have also revealed that young women are more vulnerable to diseases than young men(WHO & UNAIDS, 2002).Now over a quarter of the world's population are within the age group of 10-24 years and India has the largest (243 million) number of adolescents comprising one-fourth of the country's population.

Designing proper healthcare interventions and spreading them up to the reach of unprivileged, needy group of people is the extreme need of the hour for achieving MDGs and also for making a healthy and better future generation.The following interventions have been determined indispensable for adolescent and reproductive age group (15-24 years) by Ministry of Health and Family Welfare, Government of India. These are reduction of unmet need (total, spacing, and limiting), increase of usage of family planning methods (any methods, modern methods), and enhancement of awareness about Human Immunodeficiency Virus (HIV), Acquired Immunodeficiency Syndrome (AIDS), Reproductive Tract Infections (RTIs), and Sexually Transmitted Infections (STIs)(Ministry of Health and Family Welfare. Government of India, 2013).

"Unmet need" for family planning refers as the proportion of married or fecund women who want to space/limit their pregnancy but not using any contraception(Ashford, 2003). For years, authorities are using "Unmet need" as a benchmark for designing family planning programmes. Major disadvantages of not using any contraceptive are unintended pregnancy with forced abortion, premature baby with low birth weight, maternal and child loss, pregnancy wastage etc. and sometime unsafe abortions lead to reproductive tract infections.

According to UNAIDS, India was the 3$^{rd}$ largest country with 2.1 million HIV effected people till the end of 2013. According to National AIDS Control Organization, majority of the new infections have been seen with youth age less than 25 years and among them young females are more vulnerable than young males.

India is the first country in the world to launch Family Planning Programme in 1952 to exercise control over fertility. During Fifth Five Year Plan (1974-79) maternal, child, and nutrition were added with family planning programme and named it as child survival and safe motherhood programme (CSSM). In 1997, reproductive tract infection and sexually transmitted disease programmes were associated with CSSM and renamed as Reproductive and Child Health (RCH). Finally in 2005, Ministry of Health and Family Welfare has launched National Rural Health Mission (NRHM) to enhance availability, accessibility, and quality of healthcare services especially for the underprivileged section of the society(Bhattacharya & Haldar, 2014). A three-tier healthcare delivery framework has been set up for properly spreading of healthcare interventions to every corners of the country. Those are family and community level healthcare delivery, outreach or sub center level healthcare delivery, and clinical level healthcare delivery. At family and community level, trained

health workers visit to houses in their community to dissipate knowledge on health behaviors, to promote usage of health facilities, and to dispense basic health products. They are known as Accredited Social Health Activists (ASHA). Health Sub Centers are the first contact point at grass root level after community reach. As per population norms, there shall be one SC established for every 5000 population in plain areas and for every 3000 population in hilly/tribal/desert areas. As per Rural Health Statistics Bulletin, 2012 there were total 147069 SCs functioning in India(Ministry of Health and Family Welfare. Government of India, 2012). Clinical level healthcare delivery point is divided into first referral units i.e. Primary Health Centers (PHCs) and higher referralunits i.e. Community Health Centers (CHCs), Sub-Districts hospitals, District Hospitals, and Medical Colleges. PHCs cover 30000 populations in plain area and 20000 populations in hilly, tribal or difficult areas. Each PHC supervise 6 SCs in its proximity. CHCs cover 80000 populations and 120000 populations in plain and in hilly areas respectively. Four PHCs are included under each CHC.

In this paper we have studied coverage, quality, and inequity of adolescent and reproductive healthcare interventions at districts of West Bengal. West Bengal is one of the major states in eastern India having an area of 88,752 sq. km. There were 9.13 crores population in West Bengal as per Census 2011 and Maternal Mortality Ratio (MMR) and Infant Mortality Rate (IMR) are 117 per 100000 (Register General India, 2012) and 31 per 1000 live births (Register General India, 2013) respectively. There are total 10356 SCs, 909 PHCs, and 348 CHCs functioning in West Bengal(National Rural Health Mission, 2013). Objective of this paper is divided into three parts. In first part, coverage, quality, and inequity of adolescent and reproductive healthcare services have been studied at districts of West Bengal in between 2012-13 and 2007-08. In second, transformation of three-tier healthcare delivery system at districts of West Bengal has been analyzed in between 2007-08 and 2012-13 and at last, performance based ranks were calculated for all districts based on three categories, family planning condition, knowledge on sexually transmitted diseases, and availability of basic facilities at household and healthcare centers for better understanding of strength and weakness of each district.

## DATA AND METHODOLOGY

Data used for analysis in this paper were obtained from two nationally representative surveys, 4th round (2012-13), and 3rd round (2007-08) of District Level Household and Facility Survey (DLHS). 1st round of the survey was started in 1998-99. Then second, third, and fourth round surveys were conducted on 2002-03, 2007-08, and 2012-13 respectively. These surveys were organized by Ministry of Health and Family Welfare, Government of India to gain insights about quality and coverage of maternal and child healthcare services along with condition of healthcare delivery points at districts level in India. In this paper we have analysed adolescent and reproductive services, especially 15-24 years, in West Bengal. Variables analysed in this paper were usage of family planning methods, unmet need (total, spacing, and limiting), awareness regarding RTI/STI and HIV/AIDS, condition of household facilities, presence of healthcare facilities at community level, SCs, PHCs, and CHCs. There are total 19 districts in West Bengal. Since Kolkata is a metro city with many private healthcare providers, we have considered data of 18 districts for this analysis. Bivariate data analysis technique has been used to determine progress in coverage and equity of adolescent and reproductive healthcare services in West Bengal between 2007-08 and 2012-13. Finally ranking of the districts has been calculated.

## RESULTS

### Unmet Need of Family Planning

The results shown in Table 1 give us an idea about the percentage rate of total unmet need, unmet need for spacing, and unmet need of limiting at districts of West Bengal as on 2007-08, and 2012-13. Total unmet need is the sum of unmet need of spacing and unmet need of limiting. Average rate of total unmet need of West Bengal was 11.30 per cent and 12.31 per cent as on 2007-08 and 2012-13 respectively. Unmet need of family planning has increased with time. Along with average, inequity among districts has also deteriorated in West

Bengal in between 2007-08 and 2012-13. On 2007-08, the difference between maximum unmet need and minimum unmet need was 12.2 percent but on 2012-13 the same has increased to 19per cent. Unmet need for spacing and limiting have also increased by time. At Purba Medinipur,total unmet need was lowest (4.3 percent)andat Jalpaiguri, Koch Bihar, and Paschim Medinipur, total unmet need was around seven percent but the rates were too high at North 24 Parganas (23.3 percent), Hugli (20.1 percent), and Nadia (19.1 percent) district on 2012-13.

**Usage of Family Planning Methods**

The outcome in Table 2 illustrate data on percentage of usage of any family planning methods, usage of modern family planning methods, percentage of female sterilization, and percentage of male sterilization at districts of West Bengal on 2007-08 and 2012-13. Average rate of usage of any family planning methods in West Bengal increased slightly from 71.66percent on 2007-08 to 71.72percent on 2012-13. Difference among maximum usage and minimum usage has also reduced by time. Both at Purba Medinipur (79.4per cent) and Paschim Medinipur (79.4per cent), the usage rates of any family planning methods were maximum. Average rate of usage of modern family planning method was 57.86percent and 53.57percent as on 2012-13 and on 2007-08 respectively. The usage rate was maximum at Bankura district (68.5 percent) and minimum at Uttar Dinajpur district (42.7percent) as on 2012-13. Puruliya district has seen the maximum change in usage since 2007-08. By this course of time, difference among districts regarding usage of modern methods has reduced and both maximum usage rate and minimum usage rate have improved since 2007-08. Average rate of female sterilization has decreased in West Bengal from 34.98percent on 2007-08 to 32.61percent on 2012-13.Maximum rate of female sterilization has been observed at Barddhaman district (46.3percent) on 2012-13. Female sterilization rateswere quite high at Bankura (46.2per cent), Puruliya (42.5per cent), and Birbhum (39.6per cent) districts too. But both maximum rate and minimum rate of female sterilization have reduced on 2012-13 since 2007-08. Average male sterilization rate in West Bengal has also reduced to 0.46per cent as on 2012-13 from 0.63per cent on 2007-08. In many districts like Maldah, Murshidabad, South 24 Parganas, and Purba Medinipur, male sterilization rates were zero per cent on 2012-13.

**Current usage of modern family planning methods**

Table 3 shows district wise usage of modern family planning techniques such as pills, IUD, and condom in West Bengal on 2012-13 and 2007-08. Average rate of usage of pills in West Bengal was 18.01percent on 2012-13 and the same was 13.79percent on 2007-08. Not only average value, the maximum value and minimum value of usage of pills at districts have also increased by time. Usage of pills was maximum at South 24 Parganas (33.3per cent) on 2012-13. Maldah district has seen the maximum change in usage since 2007-08. The lowest usage of pill was observed at Puruliya district (10per cent). Usage of IUD has reduced in 10 districts among 18 in West Bengal in between 2007-08 and 2012-13. Average rate of insertion of IUD in West Bengal was 0.68per cent on 2007-08 and the rate was reduced to 0.49per cent on 2012-13. As per IUD insertion rate, maximum and minimum insertions have been seen at Darjeeling and Maldah districts respectively. Average rate of usage of condom has increased in West Bengal. On 2007-08 it was 3.13per cent only and the same became 6.13per cent on 2012-13. As on 2012-13, the maximum rate of usage of condom was observed at Haora (9.9per cent) district and the lowest was noticed at Birbhum (2.8per cent) district. Both maximum value and minimum value have increased in 2012-13 with respect to 2007-08 but inequity among districts has increased too.

**Quality of Family Planning Services**

Results of Table 4 reveal the quality of family planning services at districts of West Bengal on 2007-08 and on 2012-13. Quality of family planning services have been measured considering following factors: percentage of non-users advised by health personnel about family planning methods, users who received follow up services for sterilization and IUD within 48 hours, and post-partum adoption of family planning for sterilization. Average percentage of non-users advised by health personnel about family planning methods has reduced from 22.16per cent on 2007-

08 to 20.24per cent on 2012-13 in West Bengal. Even in due course of time, range has increased from 17.90per cent to 22.30per cent. At Purba Medinipur district, the percentage was as low as 8.70 percent on 2012-13. Average percentage of users who received follow up services for sterilization and IUD within 48 hours has also declined from 55.65per cent on 2007-08 to 46.46per cent on 2012-13. Inequity among districts has also increased significantly because range value was 33.00per cent on 2007-08 but it has increased to 49.40per cent on 2012-13. Haora, Bankura, and South 24 Parganas have seen maximum declinein services in between 2007-08 and 2012-13. Least follow up service has been observed at South 24 Parganas (22.5 percent) as on 2012-13. Average percentage of post-partum adoption of family planning for sterilization has increased in West Bengal. On 2007-08, the percentage rate was 46.42per cent and the same has become 68.05per cent on 2012-13. Inequity among the districts has also decreased since 2007-08. The percentage of post-partum adoption of family planning for sterilization at Hugli and Maldah were 82.3per cent and 80.9per cent respectively. There were seven districts Darjeeling, Jalpaiguri, Birbhum, Nadia, North 24 Parganas, Haora, and Purba Medinipur where post-partum adoption of family planning rates were more than 70per cent. Percentage of post-partum adoption has improved most at South 24 Parganas since 2007-08.

**Awareness of RTI/STI and HIV/AIDS**

Table 5 illustrates the awareness of RTI/STI and HIV/AIDS at districts of West Bengal on 2007-08 and 2012-13. Average percentage rate of awareness regarding RTI/STI in West Bengal was 34.1per cent in 2007-08 and it has increased to 39.14per cent in 2012-13. But within this period, inequity regarding awareness of RTI/STI has also increased from 34.1per cent to 70.9per cent. At Koch Bihar 83.3per cent women were aware of RTI/STI whereas only 12.4per cent women of Bankura have heard of RTI/STI as on 2012-13. Average percentages of women in West Bengal who have heard of HIV/AIDS was 63.08per cent on 2012-13. The same was 49.93per cent on 2007-08. At Koch Bihar (90.9 percent), the awareness rate was maximumas on 2012-13.Even at districts like Haora (89.1per cent), Darjeeling (86.5per cent), Murshidabad (84.1per cent), Uttar Dinajpur (83per cent), and Jalpaiguri (80.1per cent), the percentage rates were quite satisfactory too. Average rate of women who have any symptoms of RTI/STIin West Bengal has also reduced from 26.63per cent on 2007-08 to 14.67per cent on 2012-13. Average percentage of women underwent test for detecting HIV/AIDS in West Bengal has increased from 2.01per cent on 2007-08 to 9.26per cent on 2012-13. Maximum percentage of women of Darjeeling (17.9 percent) has undergone for test on 2012-13. Districts like Puruliya (14.4per cent), Purba Medinipur (14.3per cent), North 24 Parganas (12.6per cent), Koch Bihar (10.2per cent), and Murshidabad (10per cent) have observed more than 10per cent of women who underwent test for detecting HIV/AIDS on 2012-13. Since 2007-08, all 18 districts in West Bengal have seen improvement in percentage of women who underwent test for HIV/AIDS.

**Household Facilities**

The data showed in Table 6 illustrates the availability of household facilities like electricity, drinking water, toilet, and clean cooking fuel at districts of West Bengal on 2007-08 and 2012-13. In West Bengal, average 88.60per cent households were having electricity as on 2012-13 and the ratio was 51.01per cent on 2007-08. Simultaneously, inequity among districts has also reduced notably. There was electric facility in more than 80per cent of households of all districts of West Bengal as on 2012-13. Average percentage of improved source of drinking water was 90.41per cent as on 2007-08 and by 2012-13 it has also increased to 95.59per cent. At Hugli and Haora district, 100per cent households had improved source of drinking water as on 2012-13. Average percentage of households who had access to improved toilet facility has increased to 71.31 percent on 2012-13 from 53.98 percent on 2007-08. Even inequity among districts had also reduced from 82.80per cent to 52.70per cent by this period. Usage rate of clean cooking fuel is still very low in West Bengal. On 2007-08, only average 11.42per cent households were using clean fuel for their cooking andon 2012-13, the rate has improved to 31.73per cent only.

**Facilities at village level**

Table 7 shows the availability of facilities at villages of West Bengal. Availability of ASHA workers at villages and number of Village Health Nutrition and Sanitation Committee (VHNSC) both have increased on 2012-13 than on 2007-08. Average percentage of villages having ASHA worker was 12.91 percent on 2007-08 and increased to 87.08 percent on 2012-13. Number of villages with SC within 3km. and PHC within 10 km. has also improved since 2007-08.

**Service Facility at Healthcare Centers**

Data of availability of service facilities at health centers at districts of West Bengal is shown in Table 8. Availability of Auxiliary Nurse Midwives (ANM) has improved notably at districts of West Bengal. Previously on 2007-08, around 90% SCs were having ANM and on 2012-13 the average has increased to around 99%. Inequity among districts has also reduced significantly from 26.80per cent on 2007-08 to 3.50per cent on 2012-13. Average percentage of additional ANM in SCs has also improved at districts of West Bengal. Availability of male health workers in SCs have reduced by time. On 2007-08, average percentage of male worker at SCs was 41per cent but on 2012-13 it became 20.96percent. Presence of lady officers at PHCs was very unsatisfactory. Only at Hugli district, 73.4 percent PHCs were having lady officers as on 2012-13 and on the opposite side many districts were not having any lady officers at their PHCs. The scenario was same with the number of obstrecian/gynecologists at CHCs. As on 2012-13, the average rate was only 15.02per cent and difference between maximum and minimum value was 42.11per cent. Availability is still manageable at Nadia (42.1per cent), North 24 Parganas (37.9per cent), Haora (33.3per cent), South 24pargana (32.4per cent) districts butat districts like Koch Bihar, Uttar Dinajpur, Dakshin Dinajpur, and Bardhaman, there were no any obstrecian/gynecologists in whole district.

**Ranking of districts**

The Results in Table 9 show ranks of districts in West Bengal based on the performance on unmet need and family planning, awareness on RTI/STI and HIV/AIDS, and availability of facilities at households and health centers as on 2012-13. Unweighted value of factors related to unmet need, usage of family planning techniques, and quality of family planning services of each district were added and then districts were ranked sequentiallybased on calculated results. The same procedure was followed for other two categories too.Dakshin Dinajpur, Jalpaiguri, Paschim Medinipur, Bankura, and Purba Medinipur were top five districts based on the performance on unmet need and usage of family planning techniques and least performing districts were Uttar Dinajpur, North 24 Parganas, Nadia, Murshidabad, and South 24 Parganas. Based on awareness regarding RTI/STI and HIV/AIDS, top performing districts were Koch Bihar, Murshidabad, Jalpaiguri, Darjeeling, and Purba Medinipur and least performing districts were Puruliya, Dakshin Dinajpur, Birbhum, Nadia, and Bankura. Scarcity of both basic household facilities and adolescent and reproductive healthcare facilities have been noticed at Uttar Dinajpur, Bankura, Puruliya, Bardhaman, Dakshin Dinajpur, and Murshidabad districts.

**DISCUSSION**

In this paper we have studied coverage, quality, and inequity of adolescent and reproductive healthcare interventions at districts of West Bengal on 2007-08 and on 2012-13. Percentage of unmet need of family planning has deteriorated in West Bengal. Significant improvement has been observed on usage of modern family planning techniques. Still numbers of users are very less. Proportion of adoption of family planning post-partum has improved in West Bengal but advisory service on family planning methods and after sterilization follow service quality has deteriorated in between 2007-08 and 2012-13. Awareness regarding RTI/STI and HIV/AIDS has increased notably in West Bengal. Even number of people underwent for HIV test has also improved significantly. On the basis of performance table, Uttar Dinajpur, Bankura, and Puruliya district should get extra care from authority. Infrastructural facility at these districts was really very poor. Availability of facilities at household as well as at health centers was quite satisfactory at North 24

Parganas, Nadia, Hugli, and Haora districts but coverage and quality of adolescent and reproductive interventions at these states were very disappointing.

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**APPENDIX**

*Table 1. Percentage of Unmet need for family planning at different districts of West Bengal as on 2007-08 and 2012-13*

| | Unmet Need for Family Planning (%) | | | | | |
|---|---|---|---|---|---|---|
| | Total unmet need | | Unmet Need for spacing | | Unmet Need for limiting | |
| Districts | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) |
| Darjeeling | 16 | 12 | 4.5 | 2 | 11.5 | 10 |
| Jalpaiguri | 6.4 | 11.8 | 3.7 | 3.7 | 2.7 | 8.1 |
| Koch Bihar | 7 | 9.3 | 2.1 | 3.8 | 4.9 | 5.5 |
| Uttar Dinajpur | 11.9 | 19.6 | 4.8 | 8.1 | 7.1 | 11.5 |
| Dakshin Dinajpur | 14.3 | 9.9 | 5.4 | 3.4 | 7.9 | 6.5 |
| Maldah | 15.7 | 18.3 | 5.9 | 6.3 | 9.8 | 12 |
| Murshidabad | 10.3 | 10.6 | 5 | 3.8 | 5.3 | 6.8 |
| Birbhum | 15.9 | 8.1 | 5.2 | 3.1 | 10.7 | 5 |
| Barddhaman | 7.7 | 8.8 | 3.1 | 2.5 | 4.6 | 5.3 |
| Nadia | 19.1 | 7.4 | 6.8 | 1.9 | 12.3 | 5.5 |
| North 24 Parganas | 23.3 | 11.1 | 7.6 | 2.6 | 15.7 | 8.5 |
| Hugli | 20.1 | 9.3 | 7.1 | 3.2 | 13 | 6.1 |
| Bankura | 8.8 | 12.1 | 4.6 | 4.3 | 4.2 | 7.8 |
| Puruliya | 10.4 | 17.2 | 4.4 | 6.8 | 6 | 10.4 |
| Paschim Medinipur | 7.5 | 9.2 | 4 | 3.2 | 3.5 | 6 |
| Haora | 10.8 | 8.4 | 4.8 | 2.7 | 6 | 5.7 |
| South 24 Parganas | 12.1 | 9.1 | 5.2 | 3.8 | 6.9 | 5.3 |
| Purba Mednipur | 4.3 | 11.2 | 1.7 | 3.5 | 2.6 | 7.7 |
| Average | 12.31 | 11.30 | 4.77 | 3.82 | 7.48 | 7.43 |
| Max | 23.3 | 19.6 | 7.6 | 8.1 | 15.7 | 12 |
| Min. | 4.3 | 7.4 | 1.7 | 1.9 | 2.6 | 5 |
| Range (Max.-Min. Value) | 19 | 12.2 | 5.9 | 6.2 | 13.1 | 7 |

**Source:** Calculation based on DLHS data.

*Table 2. Percentage rate of use of any family planning method, modern family planning method, female sterilization, and male sterilization at districts of West Bengal as on 2007-08 and 2012-13 ( Source: Calculation based on DLHS data)*

| | Current use of Family Planning Methods (%) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Any method | | Any modern method | | Female sterilization | | Male sterilization | |
| Districts | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) |
| Darjeeling | 68.5 | 72.4 | 55.5 | 57.8 | 28.6 | 37.4 | 0.2 | 1.2 |
| Jalpaiguri | 78 | 72.7 | 65.9 | 53.1 | 35.1 | 31.5 | 4.2 | 2.5 |
| Koch Bihar | 76.4 | 76.5 | 58.6 | 56.8 | 33.6 | 37.6 | 0.5 | 1.6 |
| Uttar Dinajpur | 62.9 | 54.9 | 42.7 | 34.7 | 22.2 | 22.1 | 0.1 | 0.2 |
| Dakshin Dinajpur | 72.9 | 73.1 | 57.5 | 54 | 32 | 33.1 | 0.2 | 0.7 |
| Maldah | 68.4 | 62 | 53 | 42.6 | 20.8 | 28.3 | 0 | 0.5 |
| Murshidabad | 67.9 | 72.7 | 51.1 | 54 | 32.3 | 42.3 | 0 | 0.3 |
| Birbhum | 69.1 | 74.8 | 63.2 | 62.6 | 39.6 | 43.7 | 0.3 | 0.6 |
| Barddhaman | 76.9 | 73.4 | 65.6 | 62.2 | 46.3 | 43 | 0.1 | 0.3 |
| Nadia | 64.7 | 75.2 | 49.6 | 47.2 | 28 | 33.2 | 0.1 | 0.1 |
| North 24 Parganas | 62.2 | 70.3 | 46.1 | 45.7 | 20.2 | 23 | 0.5 | 0.1 |
| Hugli | 68.2 | 77.9 | 57.3 | 58.1 | 39.3 | 42.3 | 0.6 | 0.8 |
| Bankura | 76.3 | 72.5 | 68.5 | 63.8 | 46.2 | 51.2 | 0.3 | 0.5 |
| Puruliya | 72.8 | 58.1 | 60.1 | 44.9 | 42.5 | 35.7 | 0.2 | 0.4 |
| Paschim Medinipur | 79.4 | 78.3 | 68.4 | 66.4 | 39.1 | 49 | 0.6 | 0.6 |
| Haora | 73.1 | 75.4 | 58.1 | 52.1 | 31.8 | 27.7 | 0.3 | 0.1 |
| South 24 Parganas | 73.8 | 75.5 | 59.8 | 51.3 | 20.1 | 21.7 | 0 | 0.5 |
| Purba Mednipur | 79.4 | 74.1 | 60.5 | 56.9 | 29.2 | 26.9 | 0 | 0.4 |
| Average | 71.72 | 71.66 | 57.86 | 53.57 | 32.61 | 34.98 | 0.46 | 0.63 |
| Max | 79.4 | 78.3 | 68.5 | 66.4 | 46.3 | 51.2 | 4.2 | 2.5 |
| Min. | 62.2 | 54.9 | 42.7 | 34.7 | 20.1 | 21.7 | 0 | 0.1 |
| Range (Max.-Min Value) | 17.2 | 23.4 | 25.8 | 31.7 | 26.2 | 29.5 | 4.2 | 2.4 |

*Table 3. Percentage rate of use of modern family planning techniques (Pill, IUD, and Condom) at districts of West Bengal as on 2007-08 and 2012-13*

| Districts | Usage of modern family planning techniques (%) | | | | | |
|---|---|---|---|---|---|---|
| | Pill | | IUD | | Condom | |
| | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) |
| Darjeeling | 18.4 | 12.5 | 1 | 1.7 | 6.8 | 4.8 |
| Jalpaiguri | 17.2 | 14.9 | 0.3 | 0.6 | 9.1 | 3.2 |
| Koch Bihar | 17.5 | 14.7 | 0.2 | 0.5 | 6.8 | 2.1 |
| Uttar Dinajpur | 15.1 | 8.9 | 0.2 | 0.2 | 4.7 | 2.9 |
| Dakshin Dinajpur | 19.8 | 16.1 | 0.4 | 0.7 | 4.9 | 3.4 |
| Maldah | 23.4 | 10.1 | 0.1 | 0.7 | 8.3 | 2.7 |
| Murshidabad | 13.6 | 7.9 | 0.3 | 0.3 | 4.7 | 2.9 |
| Birbhum | 19.8 | 15 | 0.6 | 0.4 | 2.8 | 2.4 |
| Barddhaman | 14.1 | 14.4 | 0.3 | 0.8 | 4.3 | 3.7 |
| Nadia | 14.9 | 10.5 | 0.8 | 0.5 | 5.7 | 2.5 |
| North 24 Parganas | 18.8 | 17.3 | 0.5 | 1.2 | 6.1 | 3.7 |
| Hugli | 11.3 | 10.5 | 0.7 | 0.3 | 5.5 | 3.6 |
| Bankura | 16.1 | 9.4 | 0.5 | 0.9 | 5.4 | 1.5 |
| Puruliya | 10 | 6.2 | 0.8 | 0.6 | 6.5 | 1.9 |
| Paschim Medinipur | 20.1 | 13.9 | 0.3 | 0.6 | 8.3 | 1.7 |
| Haora | 15.3 | 16.5 | 0.6 | 0.8 | 9.9 | 6.8 |
| South 24 Parganas | 33.3 | 23.6 | 0.7 | 0.5 | 5.5 | 4.1 |
| Purba Mednipur | 25.5 | 25.8 | 0.5 | 1 | 5.1 | 2.4 |
| Average | 18.01 | 13.79 | 0.49 | 0.68 | 6.13 | 3.13 |
| Max | 33.3 | 25.8 | 1 | 1.7 | 9.9 | 6.8 |
| Min. | 10 | 6.2 | 0.1 | 0.2 | 2.8 | 1.5 |
| Range (Max.-Min. Value) | 23.3 | 19.6 | 0.9 | 1.5 | 7.1 | 5.3 |

**Source:** Calculation based on DLHS data.

*Table 4. Quality of family planning services at districts of West Bengal as on 2007-08 and 2012-13*

| | Quality of Family Planning Services (%) | | | | | |
|---|---|---|---|---|---|---|
| | Non-users ever advised by health personnel to adopt any family planning method | | Users who received follow-up services for sterilization and IUD within 48 hours | | Post-partum adoption of Family Planning for sterilization | |
| Districts | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) |
| Darjeeling | 22.5 | 19.9 | 57.6 | 51.8 | 73.8 | 44.3 |
| Jalpaiguri | 14.5 | 20.8 | 44.4 | 52.4 | 72.2 | 32.5 |
| Koch Bihar | 16 | 31.4 | 38 | 48.7 | 66.6 | 48.1 |
| Uttar Dinajpur | 18.7 | 25.5 | 49.3 | 42 | 47.5 | 56.7 |
| Dakshin Dinajpur | 31 | 19.4 | 71 | 50 | 68.1 | 28.1 |
| Maldah | 14.9 | 25.8 | 71.2 | 44.6 | 80.9 | 62.9 |
| Murshidabad | 25.1 | 21.4 | 43.1 | 48 | 62.9 | 37.2 |
| Birbhum | 21.4 | 16.7 | 46 | 69.4 | 72.3 | 48.6 |
| Barddhaman | 19.7 | 13.6 | 37.9 | 55.6 | 57.4 | 49.4 |
| Nadia | 25 | 27.3 | 36.9 | 60.6 | 76.4 | 48.5 |
| North 24 Parganas | 22.7 | 15.4 | 56.5 | 63 | 72.9 | 65.7 |
| Hugli | 28.3 | 24.4 | 31.6 | 50.2 | 82.3 | 42.8 |
| Bankura | 14.3 | 31.5 | 42.4 | 75 | 69.8 | 66.1 |
| Puruliya | 29.5 | 20.6 | 51.1 | 72 | 54.8 | 56.3 |
| Paschim Medinipur | 16.6 | 25.5 | 39.1 | 53 | 67.7 | 33.1 |
| Haora | 18.7 | 21.9 | 25.8 | 71.2 | 78.7 | 62.6 |
| South 24 Parganas | 16.7 | 17.9 | 22.5 | 48.5 | 74.2 | 18.8 |
| Purba Mednipur | 8.7 | 19.8 | 71.9 | 45.7 | 46.4 | 33.8 |
| Average | 20.24 | 22.16 | 46.46 | 55.65 | 68.05 | 46.42 |
| Max | 31.00 | 31.50 | 71.90 | 75.00 | 82.30 | 66.10 |
| Min. | 8.70 | 13.60 | 22.50 | 42.00 | 46.40 | 18.80 |
| Range (Max.-Min. Value) | 22.30 | 17.90 | 49.40 | 33.00 | 35.90 | 47.30 |

Source: Calculation based on DLHS data.

*Table 5. Percentage rate of awareness of RTI/STI and HIV/AIDS at districts of West Bengal as on 2007-08 and 2012-13 (Source: Calculation based on DLHS data)*

| Districts | Women who have heard of RTI/STI | | Women who have heard of HIV/AIDS | | Women who have any symptoms of RTI/STI | | Women who know the place to go for testing of HIV/AIDS | | Women underwent test for detecting HIV/AIDS | |
|---|---|---|---|---|---|---|---|---|---|---|
| | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) |
| Darjeeling | 57.1 | 31.8 | 86.5 | 81.5 | 12.8 | 25.5 | 44 | 47.8 | 17.9 | 5.1 |
| Jalpaiguri | 63.1 | 37.2 | 80.1 | 56.4 | 19.7 | 25.5 | 56.9 | 46.4 | 9.5 | 1.6 |
| Koch Bihar | 83.3 | 24.2 | 90.9 | 37.4 | 12.7 | 32.1 | 62.3 | 45.7 | 10.2 | 1.3 |
| Uttar Dinajpur | 53.5 | 21.8 | 83 | 25.2 | 10 | 23.9 | 36.4 | 31.8 | 8.7 | 2 |
| Dakshin Dinajpur | 27.1 | 38.6 | 42.3 | 46 | 9.6 | 25.2 | 23.9 | 59.8 | 4 | 2.4 |
| Maldah | 58.3 | 24.3 | 79.5 | 20.8 | 34.5 | 30.8 | 19.5 | 32.8 | 5.3 | 1.1 |
| Murshidabad | 77.1 | 33.4 | 84.1 | 40.2 | 12.8 | 31.2 | 47.9 | 39 | 10 | 1.2 |
| Birbhum | 17.2 | 44.4 | 31.7 | 60.7 | 22.1 | 25.9 | 18.4 | 47.3 | 8.2 | 3.1 |
| Barddhaman | 22.9 | 38.2 | 47.3 | 49.5 | 15.5 | 22.5 | 36.4 | 32.6 | 9.2 | 1.5 |
| Nadia | 14.5 | 55.9 | 34.8 | 60.7 | 19.8 | 27.5 | 18.4 | 45.2 | 5.1 | 0.9 |
| North 24 Parganas | 19.7 | 54.8 | 43.4 | 67 | 24.7 | 23.5 | 41.1 | 35.2 | 12.6 | 7.4 |
| Hugli | 18.2 | 35.2 | 65.7 | 72.9 | 9.6 | 26.4 | 28.9 | 29.4 | 9.4 | 1 |
| Bankura | 12.4 | 29.7 | 41.5 | 28.1 | 6.1 | 18.8 | 23.6 | 28 | 2.9 | 1.6 |
| Puruliya | 13 | 22.8 | 32.7 | 18 | 7.5 | 21.2 | 46.2 | 23.7 | 14.4 | 2.3 |
| Paschim Medinipur | 55.1 | 27.4 | 70.6 | 48.7 | 13.1 | 40.7 | 57.6 | 26.2 | 7.8 | 0.9 |
| Haora | 36.1 | 42.2 | 89.1 | 70.3 | 3.5 | 25.2 | 14.7 | 38 | 8.4 | 1.7 |
| South 24 Parganas | 21 | 26.5 | 53.7 | 53.2 | 12.1 | 27.9 | 47.7 | 47.2 | 8.7 | 0.7 |
| Purba Mednipur | 55 | 38 | 78.5 | 62.2 | 18 | 25.5 | 39.4 | 18.4 | 14.3 | 0.4 |
| Average | 39.14 | 34.80 | 63.08 | 49.93 | 14.67 | 26.63 | 36.85 | 37.47 | 9.26 | 2.01 |
| Max | 83.3 | 55.9 | 90.9 | 81.5 | 34.5 | 40.7 | 62.3 | 59.8 | 17.9 | 7.4 |
| Min. | 12.4 | 21.8 | 31.7 | 18 | 3.5 | 18.8 | 14.7 | 18.4 | 2.9 | 0.4 |
| Range (Max.-Min. Value) | 70.9 | 34.1 | 59.2 | 63.5 | 31 | 21.9 | 47.6 | 41.4 | 15 | 7 |

*Table 6. Percentage rate of availability of household facilities at districts of West Bengal as on 2007-08 and 2012-13 (Source: Calculation based on DLHS data)*

| | Household Facilities | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Having electricity | | Improved source of drinking water | | Having access to improved toilet facility | | Use clean fuel for cooking | |
| Districts | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) |
| Darjeeling | 95.8 | 82.4 | 79.6 | 73.4 | 76.4 | 69.6 | 48.2 | 35.5 |
| Jalpaiguri | 82.9 | 51.6 | 87.4 | 69.9 | 76.8 | 56.9 | 33.1 | 16.6 |
| Koch Bihar | 86.4 | 28.2 | 98.6 | 94.1 | 87.9 | 66.1 | 40.8 | 8 |
| Uttar Dinajpur | 84.3 | 36.6 | 95.8 | 99.3 | 56.5 | 29.2 | 28.9 | 6.1 |
| Dakshin Dinajpur | 85.5 | 39 | 99.6 | 98.9 | 69.6 | 34.5 | 29 | 6.8 |
| Maldah | 88.7 | 35.8 | 91.4 | 74.9 | 74.8 | 29.8 | 35.8 | 6.6 |
| Murshidabad | 86.5 | 46.7 | 99.5 | 99.9 | 62.2 | 46.6 | 20.6 | 5.5 |
| Birbhum | 93.3 | 43.3 | 96.9 | 91.5 | 54.6 | 24.3 | 28.4 | 5.8 |
| Barddhaman | 89.2 | 65.1 | 97.5 | 94.7 | 64.4 | 55.2 | 21.7 | 11.2 |
| Nadia | 88.3 | 49 | 99.5 | 99.8 | 82.9 | 80.7 | 20.5 | 9.6 |
| North 24 Parganas | 92.4 | 73.8 | 99.7 | 99.8 | 89.4 | 92 | 40.2 | 25.9 |
| Hugli | 91.8 | 81.6 | 100 | 99.3 | 79.4 | 79.8 | 37.9 | 21.6 |
| Bankura | 84.8 | 39.4 | 95.1 | 89.8 | 47.7 | 16 | 27.4 | 4.1 |
| Puruliya | 81.6 | 27.5 | 85.9 | 60 | 36.7 | 10 | 25.2 | 4.6 |
| Paschim Medinipur | 89.6 | 44.8 | 94.7 | 82.5 | 69.3 | 44.7 | 34.2 | 3.6 |
| Haora | 96.9 | 75.7 | 100 | 99.7 | 84.4 | 78.8 | 41.3 | 22.7 |
| South 24 Parganas | 84.2 | 53.4 | 99.9 | 100 | 82.1 | 64.6 | 30.5 | 8.6 |
| Purba Mednipur | 92.6 | 44.3 | 99.6 | 99.9 | 88.6 | 92.8 | 27.4 | 2.8 |
| Average | 88.60 | 51.01 | 95.59 | 90.41 | 71.32 | 53.98 | 31.73 | 11.42 |
| Max | 96.90 | 82.40 | 100.00 | 100.00 | 89.40 | 92.80 | 48.20 | 35.50 |
| Min. | 81.60 | 27.50 | 79.60 | 60.00 | 36.70 | 10.00 | 20.50 | 2.80 |
| Range (Max.-Min. Value) | 15.30 | 54.90 | 20.40 | 40.00 | 52.70 | 82.80 | 27.70 | 32.70 |

*Table 7. Percentage rate of availability of healthcare facilities at villages in districts of West Bengal as on 2007-08 and 2012-13 (Source: Calculation based on DLHS data)*

| | Health programmes at village level | | | | Accessibility of health facility (%) | | | |
|---|---|---|---|---|---|---|---|---|
| | Percentage of villages having ASHA | | Percentage of Villages having Village Health Nutrition and Sanitation Committee | | Villages with Sub-Health Centre within 3 km | | Villages with PHC within 10 km | |
| Districts | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) |
| Darjeeling | 64.7 | 33.3 | 29.4 | 6.1 | 82.4 | 84.9 | 73.5 | 72.7 |
| Jalpaiguri | 80 | 24.4 | 60 | 12.2 | 0 | 90.2 | 68 | 90.2 |
| Koch Bihar | 92 | 15.63 | 20 | 31.1 | 96 | 88.9 | 88 | 91.1 |
| Uttar Dinajpur | 88 | 15.9 | 12 | 6.8 | 96 | 90.9 | 84 | 77.3 |
| Dakshin Dinajpur | 80 | 27.9 | 0 | 2.3 | 92 | 83.7 | 92 | 79.1 |
| Maldah | 88 | 13 | 28 | 2.2 | 88 | 89.1 | 92 | 93.5 |
| Murshidabad | 84 | 13.6 | 20 | 11.4 | 100 | 79.6 | 88 | 86.4 |
| Birbhum | 76 | 26.1 | 44 | 23.9 | 100 | 84.8 | 92 | 89.1 |
| Barddhaman | 94.1 | 18.8 | 35.3 | 62.5 | 79.4 | 93.8 | 85.3 | 81.3 |
| Nadia | 88.6 | 5.1 | 34.1 | 28.2 | 90.9 | 84.6 | 93.2 | 89.7 |
| North 24 Parganas | 92 | 13 | 48 | 39.1 | 96 | 91.3 | 84 | 87 |
| Hugli | 100 | 0 | 52.9 | 21.2 | 91.2 | 93.9 | 97.1 | 84.8 |
| Bankura | 96 | 8.7 | 36 | 21.7 | 91.2 | 69.6 | 96 | 89.1 |
| Puruliya | 84 | 0 | 20 | 2.2 | 80 | 77.8 | 76 | 77.8 |
| Paschim Medinipur | 92 | 12.2 | 28 | 16.3 | 84 | 73.5 | 88 | 85.7 |
| Haora | 96 | 0 | 20 | 28 | 96 | 92 | 100 | 92 |
| South 24 Parganas | 76 | 4.8 | 4 | 4.8 | 96 | 95.2 | 88 | 92.9 |
| Purba Mednipur | 96 | 0 | 24 | 22.5 | 96 | 87.8 | 100 | 91.8 |
| Average | 87.08 | 12.91 | 28.65 | 19.03 | 86.39 | 86.20 | 88.06 | 86.19 |
| Max | 100 | 33.3 | 60 | 62.5 | 100 | 95.2 | 100 | 93.5 |
| Min. | 64.7 | 0 | 0 | 2.2 | 0 | 69.6 | 68 | 72.7 |
| Range (Max.-Min. Value) | 35.3 | 33.3 | 60 | 60.3 | 100 | 25.6 | 32 | 20.8 |

*Table 8. Percentage rate of availability of healthcare facilities at healthcare centers in districts of West Bengal as on 2007-08 and 2012-13*

| | SCs with ANM | | SCs with male health worker | | SCs with additional ANM | | PHCs having Lady Medical Officer | | CHCs having Obstetrician/Gynaecologi | |
|---|---|---|---|---|---|---|---|---|---|---|
| Districts | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) | DLHS-4 (2012-13) | DLHS-3 (2007-08) |
| Darjeeling | 96.9 | 100 | 45.4 | 71.4 | 46.9 | 6.1 | 16.7 | 16.7 | 16.7 | 27.3 |
| Jalpaiguri | 100 | 73.2 | 53.3 | 56.1 | 43.3 | 19 | 7.1 | 6.7 | 7.1 | 7.7 |
| Koch Bihar | 100 | 97.7 | 33.3 | 25.6 | 63 | 1 | 7.1 | 5.7 | 0.0 | 8.3 |
| Uttar Dinajpur | 100 | 92.9 | 8 | 23.8 | 44 | 0 | 0 | 0 | 0.0 | 22.2 |
| Dakshin Dinajpur | 100 | 90.5 | 8 | 45.2 | 88 | 1 | 12.5 | 7.1 | 0.0 | 0.0 |
| Maldah | 100 | 93 | 15.4 | 41.9 | 84.6 | 0 | 0 | 7.7 | 12.5 | 12.5 |
| Murshidabad | 96.5 | 95 | 20.7 | 35 | 71.4 | 0 | 0 | 20 | 11.1 | 7.4 |
| Birbhum | 100 | 91.1 | 12 | 44.4 | 88 | 1 | 0 | 5.6 | 10.5 | 21.1 |
| Barddhaman | 96.9 | 81.8 | 21.2 | 51.5 | 59.4 | 0 | 0 | 15.8 | 0.0 | 17.2 |
| Nadia | 100 | 83.8 | 30.2 | 62.2 | 79.1 | 1 | 11.8 | 0 | 42.1 | 28.6 |
| North 24 Parganas | 100 | 95.7 | 15.6 | 30.4 | 59.4 | 0 | 50 | 6.3 | 37.9 | 13.6 |
| Hugli | 100 | 91.2 | 6.3 | 29.4 | 40.6 | 1 | 73.4 | 4.5 | 15.8 | 11.8 |
| Bankura | 100 | 93.3 | 6.3 | 37.8 | 40.6 | 0 | 9.1 | 4.4 | 4.5 | 4.5 |
| Puruliya | 100 | 83.7 | 39.1 | 51.2 | 78.3 | 0 | 20 | 5.6 | 9.5 | 5.3 |
| Paschim Medinipur | 100 | 89.6 | 8 | 43.8 | 92 | 0 | 12.5 | 14.8 | 13.8 | 17.2 |
| Haora | 100 | 88 | 28 | 20 | 52 | 0 | 9.1 | 27.3 | 33.3 | 26.7 |
| South 24 Parganas | 100 | 94.7 | 11.1 | 39.4 | 70.4 | 0 | 0 | 16.7 | 32.4 | 3.3 |
| Purba Mednipur | 100 | 84.4 | 15.4 | 28.9 | 80.8 | 0 | 11.1 | 20 | 23.1 | 8.3 |
| Average | 99.46 | 89.98 | 20.96 | 41.00 | 65.66 | 1.67 | 13.36 | 10.27 | 15.02 | 13.50 |
| Max | 100.00 | 100.00 | 53.30 | 71.40 | 92.00 | 19.00 | 73.40 | 27.30 | 42.11 | 28.57 |
| Min. | 96.50 | 73.20 | 6.30 | 20.00 | 40.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Range (Max.-Min. Value) | 3.50 | 26.80 | 47.00 | 51.40 | 51.40 | 19.00 | 73.40 | 27.30 | 42.11 | 28.57 |

Source: Calculation based on DLHS data.

*Table 9. Ranks of Districts in West Bengal based on the performance on unmet need and family planning, awareness on RTI/STI and HIV/AIDS, and availability of facilities at households and health centers as on 2012-13*

| Rank | Unmet need and Family Planning | Awareness on RTI/STI and HIV/AIDS | Availability of Facilities at Households and Health Centers |
|---|---|---|---|
| 1 | Dakshin Dinajpur | Koch Bihar | North 24 Parganas |
| 2 | Jalpaiguri | Murshidabad | Hugli |
| 3 | Paschim Medinipur | Jalpaiguri | Nadia |
| 4 | Bankura | Darjeeling | Haora |
| 5 | Purba Mednipur | Purba Mednipur | Purba Mednipur |
| 6 | Maldah | Paschim Medinipur | Koch Bihar |
| 7 | Puruliya | Maldah | Paschim Medinipur |
| 8 | Barddhaman | Uttar Dinajpur | Maldah |
| 9 | Birbhum | Haora | Birbhum |
| 10 | Darjeeling | South 24 Parganas | Jalpaiguri |
| 11 | Koch Bihar | North 24 Parganas | South 24 Parganas |
| 12 | Haora | Hugli | Darjeeling |
| 13 | Hugli | Barddhaman | Murshidabad |
| 14 | South 24 Parganas | Puruliya | Dakshin Dinajpur |
| 15 | Murshidabad | Dakshin Dinajpur | Barddhaman |
| 16 | Nadia | Birbhum | Puruliya |
| 17 | North 24 Parganas | Nadia | Bankura |
| 18 | Uttar Dinajpur | Bankura | Uttar Dinajpur |

Source: Calculation based on DLHS data.

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# MEASLES IMMUNIZATION COVERAGE CONCERNING ELIMINATION SETTINGS IN RIVER NILE STATE 2014, SUDAN

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**Abstract**

Measles disease considered as one of the most serious childhood diseases worldwide, Sudan started measles elimination activities since 2004 .Therefore, remarkable progress noted in morbidity and mortality reduction of the disease. A descriptive cross sectional facility and community based study was carried out in Shandi and Almatama localities in River Nile state in Sudan through the period from November 2012 to February2015.This study aims to assess the ongoing activities concerning measles elimination including measles converges in routine program, supplementary immunization activities (SIAs). WHO standard of 30 clusters immunization survey sampling was applied for both localities to assess immunization coverage through examine the immunization status of 840 children. The study revealed that, measles's first dose coverage (MCV1) was (93.8% - 91.9%) in Shendi and Almatama localities, measles's second dose coverage (MCV2) was (84.8% - 86.2%) in Shendi-Almatama localities, the post measles SIAs survey coverage was (91.9% - 87.7 %) in shendi & Almatama localities comparing with (101% -98.7%) as administrative coverage. Moreover, educated mothers were more likely to have their children immunized than mothers who had no education and rural areas had the highest coverage rates compared with urban and slum areas. In conclusion ,the study recommended that, National immunization program should conduct a periodic immunization surveys especially in high risk groups To obtain high level of first and second doses of measles coverage as well as focus on improving the quality of supportive supervision.

Keywords: measles, immunization, elimination.

## INTRODUCTION

Measles is a one of the most infectious and severe diseases of childhood and remains an important cause of morbidity and mortality in children in developing countries. In recent years, with the support of WHO and UNICEF, countries have accelerated their efforts to reduce measles morbidity and mortality both through increasing routine measles coverage and conducting periodic supplementary immunization activities (campaigns). In the period 2000–2007, these accelerated measles activities led to a 74% reduction in estimated global measles mortality (90% in the Eastern Mediterranean and 89% in the African regions). In addition, high coverage of two doses of measles vaccine (delivered through routine programs with or without supplementary campaign strategies) has virtually eliminated measles from the western hemisphere since November 2002.

The current goals in the six regions for measles are elimination in the regions of the Americas (AMR), Eastern Mediterranean (EMR), Europe (EUR) and Western Pacific (WPR) and, mortality reduction in AFR. Due to the success of the measles mortality reduction and elimination efforts thus far through the Measles Initiative and related WHO-UNICEF efforts, WHO has raised the question of feasibility of possible new goals such as the eradication of measles or further significant reductions in measles mortality [(1)].

The fourth Millennium Development Goal (MDG 4) aims to reduce the under-five mortality rate by two-thirds between 1990 and 2015. Recognizing the potential of measles vaccination to reduce child mortality, and given that measles vaccination

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coverage can be considered a marker of access to child health services, routine measles vaccination coverage has been selected as an indicator of progress towards achieving MDG 4 [(2)].

In Sudan, several measles outbreak were reported before introducing the vaccine in 1985, and measles was considered as one of the morbidity and mortality cause among under five years, after starting measles elimination strategies in 2004, dramatically decreasing of morbidity and mortality of measles cases were reported because of conducting SIAs and increasing in routine immunisation activities. During 2004, 2005 the number of cases were 10131, 1374, while only 228 cases were reported in 2006 (95% reduction from 2004) .Sudan also experienced several outbreaks in different regions because of accumulation of susceptible population [(7)].

## MATERIAL AND METHODS

### Study area

Shendi & Almatama localities are a part of River Nile state in North Sudan and they were one province in past, River Nile state bounded by Khartoum state to the south, northern state to the North, Gadarif state to the east and Kordufan state to the west .Shendi and Almatam localities are locating in the southern part of River Nile state they bounded by Aldamar locality to the North, Khartoum state to the South, Kassala state to the East and Northern Darfur state to the West .The total area of the tow localities is **76243** Km². The area of Shandi and Almatam localities divided to 347 catchment areas in EPI planning system including rural and urban site, each catchment area determined by borders and targets. The total estimated population is (454956) presented as (305931) for Shendi and (149025) for Almatam with total of (90991) households.

### Sampling

WHO recommended 30-cluster EPI Coverage survey methodology was followed and adapted to assess immunization coverage in this study.

- Total numbers of 30 clusters were randomly selected from each locality to complete 60 clusters (30 clusters from Shendi & 30 clusters from Almatama)
- From each cluster we selected 7 children aged (12 – 23 month) for first and second measles doses and 7 children aged (9 month to 15 years ) to examine the last supplementary immunisation activities campaign .
- Total converge of sentinel surveillance sites (12sites) were visited including priority (high, medium &low) and WHO adapted structural questionnaire were used.
- Two EPI head office and operation officers including the surveillance officer.
- All clinicians working in the 3 hospital in both localities were selected during the period of the study.

| Subject | Sample size | Note |
|---|---|---|
| Child 12 -23 month | 210 + 210 = 420 Shendi +Almatama | Total of 840 Children |
| Child 9month – <15 year | 210 + 210 = 420 Shendi +Almatama | |

### Selection of the Clusters

The catchment areas (Blocks or villages) list was obtained as sampling frame in order to select the 30 clusters for each locality. Then random simple sample was applied to select the 30 cluster from each locality and reserve list was devolved to provide option in case of any missing in the cluster like inaccessibility or community rejections.

### Selection of the Households (Sample Units)

- The first house visited in each cluster was selected at random using existing listings of household names, official maps; in case of the listing not available the map of the catchment area was used to determine the first house.
- Systematic random sample was applied for listed the households to select the 7 children for MV1 and 7 children for MV2. The sample interval was obtained

by divided the total numbers of households over the number of child intend to select etc:

$$\text{Sample interval} = \frac{\text{total numbers of households in the cluster}}{\text{7(number of sample unit)}}$$

- In areas where no listing for the households, the sketch map of the area was obtained and divided the catchment area into 4 sectors. Then, Random selection of one sector was applied, the data collectors stand at the centre of the sector and spin a bottle/pen and chosen the first house in the direction pointed as the starting point of the survey.
- The next or second household was selected by directing to right side and after count the number of sample interval.

$$\text{Second households} = \text{first household} + \text{sample interval}$$

**Selection of Eligible Children (Sample Subjects)**

***Inclusion criteria***

Any child aged between 12-23 month (for routine immunisation) and 9month - <15 years (for measles campaign) living in the study area and took his/her vaccine shot inside the study area.

***Exclusion criteria***

- Any child coming from outside the study area and took his /her vaccine shot from outside or partially vaccinated in study area.
- Any child has measles vaccine sensitivity disease or has reasons for not completing the course.
- Any eligible child hasn't got person to give information about vaccine status during the time of data collecting should be discarded .(caregiver should the mother, father or any other family members up to 18 years )

## DATA COLLECTION AND ANALYSIS

Data was collected by using WHO adapted Structure questionnaires**.** Pretesting and Questionnaires validation was apply before the survey. Characteristics of households, mothers and all children aged 9 months through 15 years in each household included in the sample were collected. All data collected from the questionnaires were coded, checked and cleaned before entering, and analyzed by entering to computer using the statistical package for social science program (SPSS). The pilot study was conducted by distributing the questionnaire to the parents in (*kawthar hara*) at (shendi locality) prior to the main study. Tables and figures used to present the results. The WHO standards cut-off was used to compare the elimination performance indicators in addition to significant tests like chi-square test.

**Ethical clearance for the study**

The survey conducted in accordance with the national policies on ethics for surveys involving human subjects. The proposal was passed by the faculty of public health and faculty of post graduate in Shendi University. Then, the data collection started after taken consent from shendi locality health authority, Almatama locality and children caregiver.

## RESULTS AND DISCUSSION

In the present study and according to the 30 cluster survey conducted in the study area, the measles's first dose coverage was (93.8% - 91.9%) with an Average of (92.8%) [CI 95%] in Shendi and Almatama localities respondents. This coverage represents the routine coverage for children below one year. The measles's second dose coverage for children aged 18-24 months was (84.8% - 86.2%) [CI 95%] in Shendi-Almatama localities .Additionally the reported coverage was (89.7%) from EPI 2013 report [(6)]. However, this average doesn't meet the WHO standard criteria to eliminate measles disease; there is still a large gap to achieve (95%) coverage. The left-out rate of MCV1 was considered as the key reason for measles prevalence in the younger age-group of (8 to 12 months). These results indicate the need to accelerate the improvement of the age-appropriate immunization rates for MCV1and MCV2. (Providing the first dose of measles vaccine to successive cohorts of infants 95% and Ensuring that all children have a second opportunity for measles vaccination95%) [(10)].

The post measles SIAs survey overage were (91.9% - 87.7 %) Average (89.8%) [CI 95%] in shendi & Almatama localities comparing with (101% -98.7%)

Average (99.8%) as administrative coverage , and this is reflects a poor quality of SIAs performance considering the importance of achieving high SIAs performance to increase the cohort immunity by decreasing the numbers of susceptible children with providing the second measles dose opportunity as well as the second doses of routine immunization (A second dose of measles vaccine, available through good quality supplemental immunization that reduces the proportion of susceptibility in a given population quite rapidly, this prevents measles outbreaks in the context of high routine immunization coverage, which further can help to eliminate indigenous measles transmission) [(62)].

Although the reported coverage is high, the study also showed poor immunization cards record keeping available for performance among respondents (15.2% - 20.5%) [Average 17.9%] in shendi & Almatama localities .The reasons behind unavailability were : lose through carelessness by the holders (lost) (52%) and (12%) had never been received an immunization cards for their child , consequently this decreases the opportunity of tracking immunization status among the target children in case of outbreak, immunization survey for elimination purpose or even travelling .The health workers in immunization site need to focus on the importance of keeping immunization cards in safe places (An immunization card keeps track of the immunizations**.** It is very important the cards should be kept in a safe place. Immunization records may be required for school, work, or travel. They may be needed if an outbreak occurs to provide proof of protection) [(63)]and this is in agreement with the study done in Yemen and it showed poor performance regarding availability of immunization cards [(8)].

Educated mothers were more likely to have their children immunized than mothers who had no education. Mothers with secondary and higher education had a great chance for full immunization than more than half of the illiterate respondents who had unvaccinated children (Table 35) and this is in line with study carried out in southeast Asian [(68)],.and study conducted in Tanzania which found that (a child whose mother had completed primary or had not attended school was three times more likely to have a low uptake than a child whose caretaker had completed secondary school ) [(9)].

Substantial differences in vaccination status rates were found for children in urban and rural areas. Rural areas had the highest coverage rates compared with urban and slum areas. This is probably partly due to the general distribution of immunisation services strategy because they depend on mobile team in rural area and that may boost access opportunity and diminish dropout rate, this result disagrees with previous study done in Sudan and found that (Mothers of children from urban areas reported correct vaccination more than mothers of children in rural areas ) [(10)] and also dissimilar with another study accomplish in Uganda and found that (58% of children in urban areas were fully immunized compared to 53% of children in rural areas.) [(11)].

## RECOMMENDATIONS

National immunization program should conduct a periodic immunization surveys especially in high risk groups To obtain high level for first dose of measles coverage vaccine for children between (9month -18 month ) on the way to elevate the immunity level and decrease the numbers of susceptibility among targeting groups, National immunization program, as well as intensive health education required to reduce the drop- out rate and defaulters .

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