Major Activities of the Centre during January – June, 2015

1. NRHM-PIP Monitoring work has been done in allotted districts of Telangana, Andhra Pradesh, Karnataka and Goa states. Funded by the Ministry of Health & Family Welfare, Government of India, New Delhi.
2. Endline Household Survey for the Project Sukshema on Maternal, Neonatal and Child Health (MNCH): Institute initiated a Household survey funded by Karnataka Health Promotion Trust, Bangalore in March, 2015. 60 Field Investigators have been appointed for a period of 3 months after one week in-house training. Study covers rural areas of 8 districts of North Karnataka. Field data collection has been completed in June, 2015 covering around 5000 households and Ever Married Women between 15-34 years.
3. Dr. Jyoti S. Hallad, Director and Dr. Shriprasad H. Joint Director, attended the Annual Action Plan meeting of PRCs for the year 2015-16 held at Institute for Social and Economic Change, Bangalore.
4. Dr. Jyoti S. Hallad, Director, presented a paperon "Health Status and Health Care Management among Older Adults with Migrant Children in Urban India" co-authored by Ajay Bailey and K. S. Jamesat the workshop "Ageing, Health and Social Care in India and Europe" held at The Hague, The Netherlands during 28-30 June, 2015.
5. Dr. Shriprasad H. Joint Director, attended the Dissemination of DLHS-4 key findings at Ahmedabad Management Institution, Ahmedabad, Gujarat.
6. Dr.Shriprasad H., Joint Director, published a Book on "Performance Analysis of PHCs in Dakshina Kannada District", Road Trust Publications, Mysore.
7. Dr.Shriprasad H., Joint Director, published an article on "Transforming Rural Urban Health Gaps in India: Facts and Concerns" in an edited publication on "Transforming India in 21st Century; Perspectives, Challenges and Policy Implications" edited by Dr.LeelaAppaji and Dr.Diryabs, Govt College for Women, Mandya.

JSS INSTITUTE OF ECONOMIC RESEARCH
VIDYAGIRI, DHARWAD-580 004, KARNATAKA, INDIA

Volume 1 **Number 1** **July 2015**

ISSN : .....

IER JOURNAL OF HEALTH AND DEMOGRAPHY

ARTICLES

JSS INSTITUTE OF ECONOMIC RESEARCH
VIDYAGIRI, DHARWAD-580 004, KARNATAKA, INDIA

Volume 1 Number 1 July 2015

IER JOURNAL OF HEALTH AND DEMOGRAPHY

ARTICLES

Childhood Illness and Association with Household Food Security: Evidence from Cross-sectional Study

Sanjit Sarkar[1] andChander Shekhar[2]

Abstract: *The relationship between childhood illness and household food security is not well clarified. This study aims to understand the association between these two using a cross sectional study (N=485) in resource-poor setting of West Bengal. Study shows that out of 485 children assessed, 12 % and 23% children had experienced diarrhea and fever respectively in the 2 weeks preceding the interview. Prevalence of diarrhea and fever is significantly and negatively associated with the age of the child (p=0.00). Household food insecurity is significantly associated with the childhood illness due to poor in access to hygienic sanitation and heath care utilization.*

Introduction:

Childhood illness is now a foremost concern of public health. Diarrhea and fever are two major infectious diseases to contribute in childhood morbidity and illness. Diarrhea is a second leading cause of childhood mortality worldwide, account for 1 in every 9 child death. Diarrhoeal disease alone amounts to an estimated 4.1% of the total DALY global burden of disease. It is estimated that 9.9 % of the 7.6 million deaths among children below 5 years of age in 2010 caused due to diarrhea (Liu*et al*. 2012). Children in developing countries are the worst affected, suffering from an average of 2.9 episodes of diarrhea per year (Walker *et al*. 2012). In developing countries, diarrhea accounted for 21% of all death among children under-five years of age (WHO, 2007). In addition, 25 to 75 % of all childhood diseases were caused due to diarrhoeal disease and it is accounted for about 14 % of outpatient visits, and 16% of hospital admissions (Ketsela, 1991). Though infant morality in India has declined in the last few decades but childhood illness remains a leading cause of child death, especially in the infant period. Diarrhea is the third leading cause of childhood mortality in India, and is responsible for 13% of all death per year in children under 5 years of age (Lakshminarayanan and Jayalakshmy, 2015).

SanjitSarkar Doctoral Fellow, IIPS Mumbai, ChanderShekharProfessorDepartment of Statistics and Mathematical Demography IIPS, Mumbai

Prevalence of diarrhea and fever are very important from child health perspectives. They are associated with child nutrition, level of anaemia and growth-flattering among children. Studies show that current diarrhea, current fever and a history of diarrhea in the previous seven days are associated with an increased risk of anaemia(Semba *et al*. 2008). Weisz et al. shows that diarrheal disease and fever are inversely associated with changes in height-for-age z-score, mid-upper arm circumference z-score, and weight-for-age z-score (Weisz *et al.*2011).Household food insecurity may increase the risk

[1]Sanjit Sarkar, Doctoral Fellow, IIPS, Mumbai. [2] Chander Shekar, Prof. Dept. of Fertility Study, IIPS, Mumbai.

of childhood illness (Anderson *et al*. 2012) through the pathway of poor access of hygiene sanitation, poverty, clean drinking water, and low utilization of heath care practices. Good child care practices, immunization, household hygiene and sanitation are important factors that determine the childhood illness like diarrhea and fever (Choube *et al.*2014). Ghosh*et al'*s finding identifies five major behavioural and child care practices that determine the childhood diarrhea, include bottle feeding, non-use of soap for cleaning feeding container, water storage in wide-mouthed container, use of pond water for the same and indiscriminate disposal of children's stool (Ghosh et al. 1997). Poor knowledge about child care practices among mother is also a cause of childhood diarrhea and fever (Mane *et al.*2012).

Data and Methodology

A cross-sectional study was undertaken in Bankura district of West Bengal during the month of Januarry – May in 2013. The study conducted on 485 households selected from eighteen villages of two bolcks, namely Sonamukhi Block and Borjora Block. A structured questiniour was used to collect the information. Food securities among rural households were address using '*food security core survey module*', which constitutes to a series of 18 questions about conditions and behaviours that characterize households when they are having difficulty meeting basic food needs.All eighteen questions were coded into binary form either affirmative (1= event occurred) or negative (0= event didn't occur)and summed up to form a scale, which score ranges from zero to eighteen indicating food secure to severely food insecure.Based on their food security scale scores, households are classified into four categories as “food secure”, “Food insecure without hunger”, “Food insecure with hunger (moderate)”, “Food insecure with hunger (severe),”The scale reliability was examined using Cronbach's alpha value (Cronbach's alpha=0.77).Household nutritional security was measured in terms of calorie, protein and fat deficiency. First, household's nutritional intake (calorie, protein and fat) was derived from household's consumed foods for thirty days of period using nutrition conversion factors. Secondly, household's nutrition requirements were calculated using the ICMR recommended nutritional norms. Then, household's actual nutrition intake was compared with the nutrition requirement of that household for each of the nutrition i.e. calorie, protein, and fat. Household that consumes less amount of nutrition than their required amount of nutrition categorised as nutritionally deficient. The study also collected information about the childhood illness and immunization coverage of the sampled children. To understand the child health care practice and childhood illness, information were collected from the children of aged 06 months to 59 months. One eligible child was interviewed from each of the sample households. Childhood illness was assessed by asking the questions of if the children suffered with the diarrhea or fever in the past two weeks of the survey. Apparently, vaccination coverage and immunization coverage of the children was also recorded. Immunization refers to the preventive care or the process whereby a child is made immune or resistant to an infectious disease. Information on child immunization was collected from immunization card provided by their mother, if

during the survey or in the absence of immunization card information was gathered from mother's recall. According to the guidelines developed by the WHO. Children are considered fully immunized when they receive a vaccination against tuberculosis (BCG); three doses of diphtheria, whooping cough (pertussis), and tetanus (DPT) vaccines; three doses of poliomyelitis (polio) vaccine and one dose of the measles vaccine by the age of twelve months. BCG should be given at the birth or at first clinical contact, DPT and polio require three vaccinations at approximately 4, 8, and 12 weeks of age, and measles vaccine should be given at age 12 months or soon after reaching 9 months of age. WHO also recommended that child should be vaccinated with at least two doses of Vitamin-An apart from above mentioned vaccines. First dose of vitamin-A should be given within age 06-11 months and second dose should be given within 12-59 months but with an interval of 4-6 months between two doses.

Household socio -demographic and economic indicators included in this study are age (06-11; 12-23; 24-35; 36-47; 48-59), sex (male; female), religion (Hindu; Muslim), caste (SC; ST; OBC;GEN), monthly per capita expenditure (MPCE), of the household. The present study followsthe National Sample Survey (NSS) concept of the MPCE where total monthly expenditure incurred by the household was divided by its size to arrive at MPCE. Then, MPCE values are categorised into five equal quintiles to represent the household's level of living. To understand the association between childhood illness and other socio-demographic and economic variables of the household chi-square test (^{2}) was performed. Analyses were carried out in STATA 12.

Results

Child Illness and Immunization Coverage

Table 1 shows that fever was more common among the children of under-five of age than diarrhea. Nearly 23 percent children were suffered with fever in the last two weeks of the survey whereas only 12 percent children were suffered with diarrhea in that same reference period. Child health care practices also appeared to be quite satisfactory among the sampled children. Nearly 67 percent children were given 'colostrum' milk during first few days after the birth. Vaccination coverage almost found universal, except Vitamin A. More than half of the children (67 percent) were given 'colostrum' milk during first few days after birth. Almost all the children were received BCG and polio dot immediately after the birth. Every nine children of ten received at least three dots of polio and three dots of DPT. Nearly 91 percent children immunised against measles. But immunization coverage of vitamin- A is quite low. More than half of the children did not receive even one dose of vitamin-A. About 88 percent children aged 12-59 months were found full immunized, who received one dose of BCG, three doses of DPT and polio and one dose of measles.

Table 1.A Summery Profile of Children'sIllness and Immunization Coverage (N=485).

Child Illness and Health Care Practices	Percent	Numbers
Current Heath Status		
Children had Diarrhea	11.75	57
Children had Fever	22.89	111
Child Immunization		
Child fed 'colostrum' milk secreted during first few days after birth	66.67	314
Child received BCG vaccination	99.79	484
Child received polio vaccine in the first two weeks after birth	97.73	473
Child received at least three dots of polio	91.53	443
Child given three DPT injections	90.52	439
Child received MEASLES	90.93	441
Child received Vitamin A dose	42.06	204
Child full immunised (N= 413)	87.89	363

Socio-Demographic Differentials of Child Illness

Table 2 shows that proportion of children under five who suffered with Diarrhea and Fever in the last two weeks of survey by selected social, demographic and economic characteristics. Result shows that proportion of children who suffered with diarrhea and fever significantly varies with the age of children. Diarrhea (26 percent) and fever (44 percent) both are found highest among children who are in the age group in 06-11 months. Diarrhea is found lowest among children of aged 36-47 months, only three percent children were suffered with diarrhea in the last two weeks of survey. Children of age 48-59 months showed lowest proportion (nine percent) who suffered with fever in the last two weeks of survey. Overall, fever is found to be more common than the diarrhea among children in all the age groups. There is no such significant sex and religious differentials in the occurrence of diarrhea and fever among children. Though prevalence of diarrhea and fever are higher among Scheduled Caste and Scheduled Tribe's children compared to Other Backward Caste and General category's children but they are not statistically significant. Children belonging to lowest MPCE group show highest prevalence of suffering with diarrhea and fever. There prevalence decreases with the increase level of MPCE groups. But this difference also not significant statistically.

Table 2: Prevalence of Diarrhea and Fever among Children by Selected Socio Demographic and Economic Characteristics

Socio Demographic and Economic characteristics	Diarrhea		Fever	
	Percent	χ^2; (p value)	Percent	χ^2; (p value)
Age (in Months)				
06 - 11	26.39	χ^2 =28.0044; (p=0.000)	44.44	χ^2= 32.1229; (p=0.000)
12 - 23	16.3		23.7	
24 - 35	7.78		25.56	
36 - 47	3.45		17.24	
48 - 59	5.94		8.91	
Sex				
Male	11.86	χ^2 = 0.0055; (p=0.941)	22.03	χ^2 = 0.1894; (p=0.663)
Female	11.65		23.69	
Religion				
Hindu	11.29	χ^2= 0.2916; (p=0.589)	22.04	χ^2= 0.5880; (p=0.443)
Muslim	13.11		25.41	
Caste				
SC	14.39	χ^2 = 3.4667; (p=0.325)	26.62	χ^2 = 2.1248; (p=0.547)
ST	14		23	
OBC	6		24	
General	10.2		19.9	
MPCE Groups				
1st Quintiles	16.49	χ^2= 3.8965; (p=0.420)	28.87	χ^2= 2.8506; (p=0.583)
2nd Quintiles	12.37		20.62	
3rd Quintiles	12.37		19.59	
4th Quintiles	9.28		22.68	
5th Quintiles	8.25		22.68	

Association with Child Illness and Household Food Security

Prevalence of diarrhea and fever varies with the household's food and nutrition security status. Table 3.a showed that prevalence ofdiarrhea and fever among under aged five children were highest in the 'food insecure with hunger' households. In the food secure households, ninepercent children were suffered with diarrhea and 21 percent were suffered with fever whereas prevalence of diarrhea and fever among children were 17 percent and 29 percent in the food insecure with hunger households. It is also shown in table 3b that prevalence ofdiarrhea and fever among children varies with the household's nutritional security status. Diarrhea among children was higher in the calorie deficient households and fever was higher among calorie sufficient households, though these differences were not statistically significant. Result indicated that higher prevalence of diarrhea among children were significantly associated with the protein deficient (p=0.034) and fat deficient (p=0.046) households.

Table 4 reveals the child health care and immunization coverage by household's food security status. Analysis indicates that 'colostrum' milk feeding practices among children during first few days after birth were highest in the food secure households (77 percent) compared to food insecure (65 percent) and food insecure with hunger households (63 percent). BCG vaccination coverage and polio vaccination immediately after birth were almost universal irrespective to the household's food security status. Percent of children who received at least three dots of polio, as recommended by WHO were lower in the food insecure with hunger households (87 percent) compared to food secure households (96 percent). Similarly, percent of children who were given three DPT injections were found lower in the households which categorised as 'food insecurity with hunger' compared to the 'food secure' households. A similar trend observed in measles vaccinations as well. Child immunization coverage against vitamin-A dose was significantly low even in the food secure households. Fifty percent children of food secure households were immunised against vitamin-A, whereas immunization coverage against vitamin-A, in 'food insecure' and 'food insecure with hunger' households were 42 percent and 38 percent respectively. Result also indicates that full immunization among children, as recommended by WHO, decreases with the line of household's tough food insecurity condition. Almost 91 percent children of aged 12 -59 months were fully immunised in food secure households but this proportion decreased to 86 percent in food insecure households and 74 percent in food insecure with hunger households.

Table 3.a: Childhood Illness by Household's Food Security Status

Household's Food Security Status	Diarrhea		Fever		N
	Percent	χ^2; (p value)	Percent	χ^2; (p value)	
Food Secure	9.28	χ^2=6.1384; (p=0.046)	20.62	χ^2=6.1998; (p=0.045)	97
Food Insecure	8.92		18.78		213
Food Insecure with Hunger	16.57		29.14		175

Table 3.b: Childhood Illness by Household's Nutritional Deficiency Status

Household's Nutritional Deficiency	Diarrhea		Fever		N
	Percent	χ^2; (p value)	Percent	Chi2; (p value)	
Calorie Deficient					
Yes	12.93	χ^2= 1.6497; (p= 0.199)	20.98	χ^2=2.5455; (p=0.111)	348
No	8.76		27.74		137
Protein Deficient					
Yes	14.44	χ^2=4.4992; (p=0.034)	20.58	χ^2= 1.9511 ; (p=0.162)	277
No	8.17		25.96		208
Fat Deficient					
Yes	13.42	χ^2= 3.9768; (p=0.046)	20.82	χ^2= 3.5633; (p= 0.059)	365
No	6.67		29.17		120

Table 4: Child Health Care and immunization coverage by Household's Food Security Status

Child Heath Care and immunization	Household Food Security Status		
	Food Secure	Food Insecure	Food Insecure with Hunger
Child feeded 'colostrum' milk secreted during first few days after birth	76.84	64.88	63.16
Child received BCG vaccination	100	100	99.43
Child received polio vaccine in the first two weeks after birth	98.97	99.53	94.86
Child received at least three dots of polio	95.88	93.4	86.86
Child given three DPT injections	94.85	93.9	84.00
Child received MEASLES	95.88	93.43	85.14
Child received Vitamin A dose	50.52	41.78	37.71
Child full immunised	90.72	85.92	74.29

* Full immunization among children who have completed 12 months. So, 72 children who did not complete 12 months of age excluded during the calculation of full immunization.

Discussion and Conclusion

The present study shows that about 12 percent children suffered with diarrhea and 23 percent suffered with fever in the past two weeks period of the survey. Prevalence of fever is higher among children compared to the prevalence of diarrhea because the study was conducted during the winter season and research evidences that fever prevalence increases slightly in the cool season (Soenarto *et al.* 2009). Prevalence of diarrhea and fever among children are significantly higher in the lower age groups. Other studies also find that younger children are more likely to suffer with diarrhea and fever in compared to older children (Semba *et al.*2008). Younger children are more susceptible in diarrheal infection and fever due to their immature immune system and immune deficiency to resistance against bacterial infections, which occur from the contaminated food or drinks. Furthermore, younger children are more likely to be infected with the rotavirus, a common cause of diarrhea in infants (Soenarto, et al., 2009)The study reveals that prevalence of diarrhea and fever among children are positively associated with the household food insecurity status. The present study shows that mother's knowledge about child care practices and child immunizations vary with household food security status. This study shows that mother's knowledge and child immunizations are better in the food secure household. Thus, it is explicable that poor child care knowledge and low utilization of child immunization services by food insecure household are major cause for higher prevalence of diarrhea and fever in these households compared to food secure households. Apart from these, chronic household food insecurity arises due to poverty often restricts the household from access to adequate nutrition, health, purified water, hygienic sanitation (Ajao *et al.* 2010), which increase the risks of childhood illness in food insecure household.

In conclusion, findings reveal that household food insecurity is positively associated with the

prevalence of diarrhea and fever among children in the last two weeks of survey. In relation to nutritional deficiency, prevalence of diarrhea is found significantly higher in protein deficient and fat deficient households. Prevalence of fever among children is not significantly associated with the household nutrition deficiency status. Prevalence of diarrhea and fever among children increases significantly in the lower age of children. Child immunization coverage, particularly BCG and polio, is almost universal even in the critically food insecure household. More than 80 percent children in 'food insecure with hunger' household are immunized against three DPT injections and measles, and a significant proportion of children are fully immunized. Immunization against vitamin A is very low, 50 percent children in 'food secure' household and only 37 percent in 'food secure with hunger' household are immunized against vitamin A.

Reference:

Ajao, KO, E.O. Ojofeitimi,A.A. Adebayo,A.O. Fatusi and O.T. Afolabi (2010) Influence of Family Size, Household Food Security Status, and Child Care Practices on the Nutritional Status of Under-five Children in Ile-Ife, Nigeria,*African Journal of Reproductive Health,* Vol 14, No 4, pp123-132.

Anderson, L, A. Tegegn, F. Tessema, S. Galea, and C. Hadley (2012) Food insecurity, childhood illness and maternal emotional distress in Ethiopia, *Public Health Nutrition,* Vol 15, No 4, pp 648-55.

Choube, A, S. Baha, A. Srivastava, and M. Sharma (2014) Knowledge and child care practices regarding childhood diarrhoea- A cross sectional study,. *Indian Journal of Community Health,* Vol 26 No 3, pp 285- 291

Elizabeth, A, and S. Raj (2012) Impact of Bio-social Factors on Morbidity Among Under-Five Children in Odisha, *Health and Population Perspectives,* Vol 35, No 4, pp 176-192.

Ghosh, S, P. Sengupta, S. Mondal, M. Banu, D. Gupta, and B. Sircar (1997) Risk behavioural practices of rural mothers as determinants of childhood diarrhoea, *Journal of community Disease,* Vol 29 No 1, pp 7-14.

Ketsela, T (1991) Knowledge and practice of mothers/caretakers towards diarrhea and its treatment in rural communities in Ethiopi, *Eth Med J,* Vol 29 No 4.

Lakshminarayanan, S. and R. Jayalakshmy (2015) Diarrheal diseases among children in India: Current scenario and future perspectives, *J Nat Sc Biol Med,* Vol 6 No 1, pp 24-28.

Mihrete, T, G. Alemie, and A. Teferra (2014) Determinants of childhood diarrhea among underfive children in Benishangul Gumuz Regional State, NorthWest Ethiopia. *BMC Pediatrics,* Vol 14, pp 1-9.

Siziya, S, A. Muula, and E. Rudatsikira (2013) Correlates of diarrhoea among children below the age of 5 years in Sudan,*African Health Sciences, Vol 13,* No 2, pp 376-383.

Soenarto, Y, A. Aman, A. Bakri, H. Waluya, A. Firmansyah, M. Kadim et al (2009) Burden of Severe Rotavirus Diarrhea in Indonesia, *The Journal of Infectious Diseases,* Vol 200 , No 1, pp 188–94.

Tolossa, D., & Tafesse, T. (2008). *Linkages between Water Supply and Sanitation and Food Security :A case study in four villages of East Hararghe zone, Oromia region.* Addis Ababa, Ethiopia: College of Development Studies, Addis Ababa University.

Walker, C, J. Perin, M. Aryee, C. Pinto, and R. Black, (2012) Diarrhea incidence in low- and middle-income countries in 1990 and 2010: a systematic review, *BMC Public Health,* Vol 12 pp 220

Weisz, A, G. Meuli, C. Thakwalakwa, I. Trehan, K. Maleta, and M. Manary (2011) The duration of diarrhea and fever is associated with growth faltering in rural Malawian children aged 6-18 months, *Nutrition Journal* , pp- 10-25.

World Health Organization (2007) *Water, sanitation and hygiene: Public Health and the Environment.* Geneva: World Health Organization.

Demographic Transition in Gujarat: An Overview

Sunil Rajpal[1] Indira Dutta[2]

Abstract : *The inevitable changes in age composition of population with the demographic transition open a significant debate in the field of demographic studies. On the basis of simple conceptual framework; with the help of simple controlled charts and tables this paper attempts to highlight recent changes in demographic indicators for Gujarat. It also focuses on the implications of those major demographic changes. Evidences show that achievement of state is commendable as far as fertility reduction is concerned. It is also interesting to see that the fertility reduction has embraced all sections of the society irrespective of economic, social or cultural differences. The state, thus, would achieve a replacement level of fertility in the very near future. Another challenge for Gujarat will be the expected increase in the old age population which more than doubles during the 15 year period. The proportion of old age population will become more than 10 per cent of the total population by 2016. This calls for paying attention on existing and future social security measures.*

Introduction

It is a worldwide experience that socio-economic development is closely associated with the pace of demographic transition. Demographic transition is the single most important feature for understanding the prospects of development in developing economy like India. The demographic transition represents both huge past achievements of the country, as well as substantial changes that lie ahead (Bhat and Rajan, 1992). It provides an important overarching framework for the study of much of the India's socio-economic development. The demographic transition has largely been responsible for the process of urbanisation- a fact that deserves much greater recognition. Furthermore, the demographic transition allows us to make some comparatively firm statements about where the country is going. India's demographic transition, therefore, is an immensely important subject (Gowariker, 1984).In past few decades there have been significant changes in the demographic structure of almost all the states in India. Also the growth in India is unevenly distributed among the states (Bhat and Rajan, 1992).

There is no difference of opinion that in recent years Gujarat has shown rapid growth and development in both social and economic era. In past few decades Gujarat has achieved remarkable progress in the area of economic growth and physical infrastructure, as it ranks second in industrialization , third in terms of urbanization and ranks fifth richest state (in terms of per capita income) among major states in India (Bagchi, Das, Chattopadhyay 2005). Gujarat has undisputedly proved the possibility of high performing demographic indicators within the context of high performing social and economic variables. Therefore, this paper looks at the experience in Gujarat. It tries to capture the progress of different demographic indicators in the state during the last quarters of a century.The main thrust of this article is to review the major changes in demographic indicators and to chalk out tentative implications of those changes in Gujarat, especially during 1981 to 2011 on the basis of data made available.

[1]Research Scholar, Centre for studies in Economics and Planning, Central University of Gujarat, sunilrajpal27@gmail.com

[2] Associate Professor, Centre for studies in Economics and Planning, Central University of Gujarat, indirabdutta@gmail.com.

In the present study, changes in demographic profile of the state have been traced taking into account fertility, mortality and growth in population. The idea behind this lies in the fact that these three parameters determine the size and distribution of population in geographical area for many years to come (Mulay, 1999). However, due to limited data availability migration has not been considered for analysis and taken as exogenous variable. Hence for any future planning trends in these variables are monitored. In addition to this, these parameters enter into the broad definition of economic development as crucial input variables and hence various governments eagerly seek improvement in the performance of these variables.

Therefore following are the main objectives of this study:

- To highlight the pattern of demographic changes in Gujarat since last four decades.
- To identify the possible expositions and probable implications of observed demographic changes in Gujarat.

Data Sources and Methodology

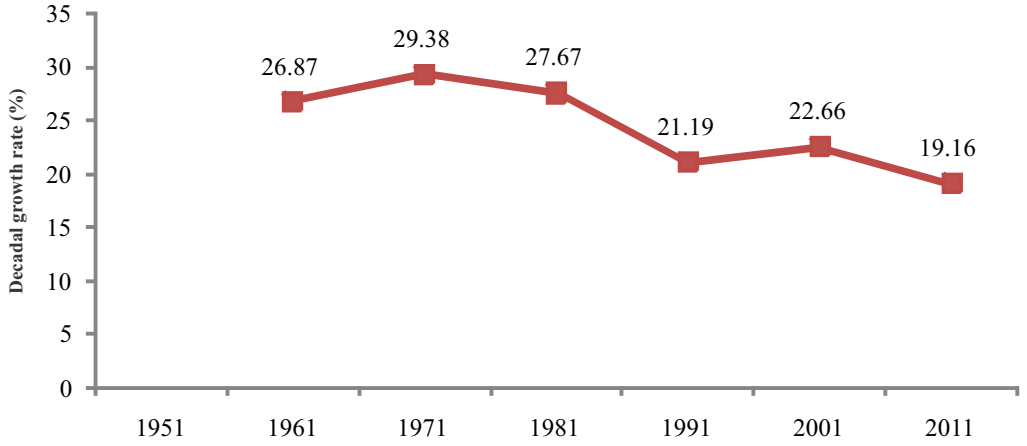
The present study is a quantitative and analytical research method based on secondary information. The area of study taken into consideration is Gujarat as it is one of the highest performing states in terms of economic growth in past recent years. The data on census is available on a decennial basis. Sample registration system gives annual series This paper is based, for the most, on well-known existing data sets; census, sample registration systemof data on demographic indicators like fertility and mortality for the last 30 years

Changes in Demographic Profile of State

Growth of Population

The decadal growth rate of population in Gujarat since 1950 is depicted in Figure 1; it can be observed from the figure that the growth rate of population in Gujarat has declined significantly from 26.87% in 1961 to 19.6% in 2011. However, there has been slight increase in growth rate of population between 1991 and 2001 from 21.19% to 22.6%.This increase in population growth rate was majorly due to high in migrants in Gujarat mainly for business and education purpose. Since independence, major decline in population growth rate in Gujarat occurred in the period from 1981 to 1991 i.e. from 27.67% to 21.19%. The reduction in growth rate of approximately 6.46% shows high declining trend. In comparison to India's growth rate of population which was just declined by 0.88% approx. during same period of time, which shows that the state's population growth rate was much higher than all over India's growth rate.

Fig 1: Population Growth in Gujarat (1951-2011)



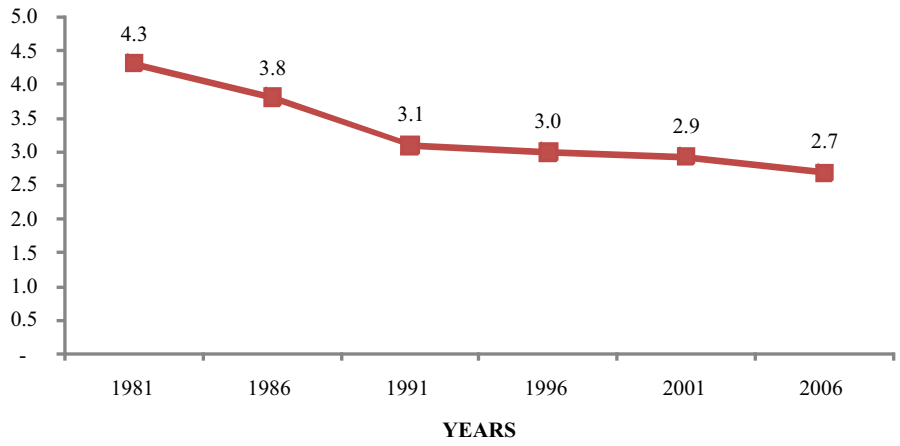
Source: *Census of India*

The growth of population is the result of basic processes of births, deaths and migration. Interstate migration can also alter the population scenario. According to the 2011 census, the population of Gujarat was provisionally enumerated to the 6.04 crores at 0.00 hours on 1st March, 2011. The population of the state recorded an increase of 19.17 per cent between 2001 and 2011 which is more repaid than the population of the country as a whole (17.64 per cent).

Pace of Fertility Transition

Since the introduction of Sample Registration Data in the second half of the 1960s, there is fairly large information on the levels of fertility in India. However, there is certain amount of scepticism on the quality of estimates of fertility particularly in the initial years. The analysis, Nevertheless, is carried out without making any adjustment.

FIGURE: 2
Total Fertility Rate in Gujarat (1981 -2006)



Source: Compiled from *SRS Bulletins.*

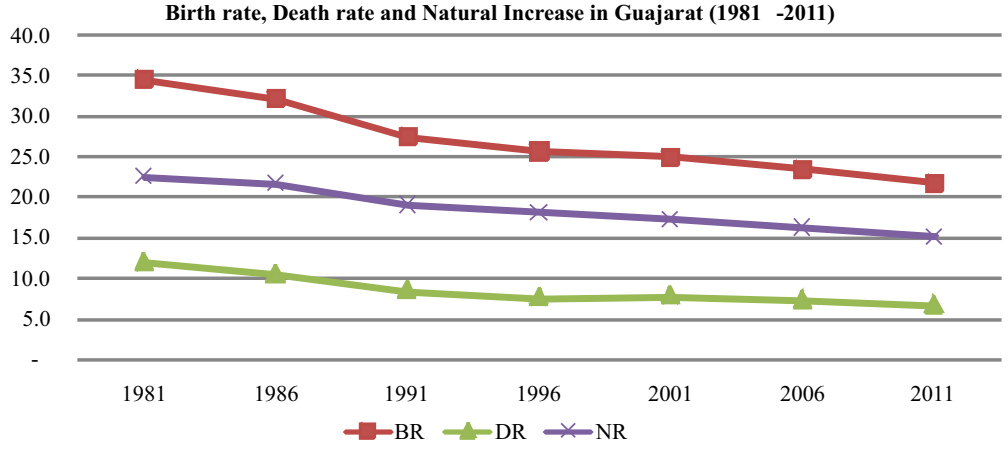
The trend in TFR of the state since 1971 is depicted in Figure 2. The TFR has fallen from nearly 4.3 children per woman in the early 1978s to 2.7 children by 2006, a decline to the tune of 2 children per woman during the 25 year period. Of these two child decline per woman within a span of 25 years, more than one child decline is accounted during the last decade from 1987 to 1997. It shows the rapidity in the pace of fertility decline since the mid-1980s.

Table 1: Sterilizations and IUD Insertions in Gujarat; 1970-71 to 2008-09

YEAR	Total Sterilization	IUD Insertions
1970-71	94	9
1980-81	201	41
1981-82	237	46
1982-83	241	63
1983-84	236	112
1984-85	257	214
1985-86	334	291
1986-87	260	288
1987-88	277	319
1988-89	241	359
1989-90	237	357
1990-91	241	452
1991-92	257	349
1992-93	257	349
1993-94	287	430
1994-95	301	474
1995-96	280	452
1996-97	243	409
1997-98	242	402
1998-99	250	413
1999-00	260	414
2000-01	254	411
2001-02	255	403
2002-03	272	422
2003-04	263	414
2004-05	278	426
2005-06	280	466
2006-07	268	464
2007-08	310	495
2008-09	325	591

The decline in fertility in the state was largely attained through contraceptive use and particularly through female sterilisation. It is estimated that about 60 per cent of the married women are currently using contraceptive methods, mainlythe female sterilisation. Consequently, the wide difference in fertility usually observed between different social and economic classes is only marginally present in the case of Gujarat. Table 1 shows the trend in sterilization and IUD insertions in Gujarat from 1971. It is evident from the table that use of both sterilization and IUD insertions has been increased very rapidly since 1970. This reflects the wide spread awareness about contraception among the people. This is the main reason why transition in fertility occurred almost parallel to mortality transition.

Figure: 3
Birth rate, Death rate and Natural Increase in Guajarat (1981 -2011)



Source: Compiled from *SRS Bulletins*

Figure 3 presents the trend in crude birth rate, crude death rate and natural growth rate (birth rate death rate) in the state since the early 1980s. Interestingly, both birth rate and death rate nearly show a declining trend since the 1980s. It is evident from the figure that the pace of fertility decline during 1986 to 1990 is highest. Although mortality has been declining even during this period the pace of fertility decline outstripped the mortality decline resulting a significant decline in the natural increase of population.

Mortality Trends

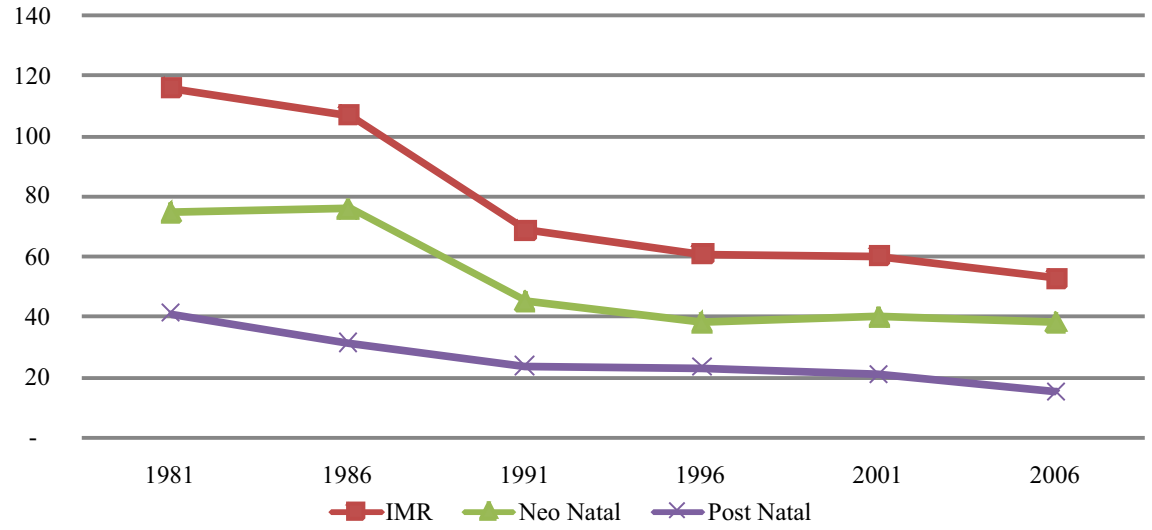
Mortality transition in India as a whole began far earlier than the fertility decline. With a progressive control of cholera and plague epidemics after 1921, the mortality rate dropped considerably in the country (Visaria and Visaria 1994). This, as already stated, resulted in a widening gap between fertility and mortality decline leading to a rapid pace of population growth. Figure 2 indicates a consistent decline in mortality throughout the last quarter of the century in Gujarat. As a result of the mortality transition, remarkable progress has been achieved in attaining an increased life expectancy of the people. The life expectancy at birth which was around 49 in the early 1970s has increased to nearly 62 during 1992-96 periods. The life expectancy was favourableto females even in the 1970s.

Infant Mortality

An important measure to understand the mortality transition is considered to be the levels of infant mortality. All the more, infant mortality is also recognised as a sensitive measure to understand the health status of the population. Infant mortality is also often used as an excellent indicator to assess the overall socio-economic development of a particular geographical region. The reduction in the infant mortality rate has been one of the priority health goals of both national and state governments in India. There had been some sharp decline in infant mortality in the state. Figure 4 depicts trends in infant mortality, Neo natal and Post natal mortality over the period 1981-2006. From around mid-1980s, considerable decline is observed in IMR. This was nearly halted around 185 to 1990 and then picked up later. It can be observed from the figure 4 that Infant mortality rate has been declined more than since 1981. This shows a vast improvement in health status of females. However, the present level of infant mortality (53 per 1,000 live births in 2006) is relatively high compared to Kerala (12) which has the lowest infant mortality level in India (Rajan, 1990). This relatively high infant mortality exists despite the fact that there has been a substantial decline in the fertility rate in the state particularly from the mid-1980s.

Infant mortality can be decomposed into two components; neonatal and post neonatal mortality primarily based on the cause of infant death. The infant deaths in the neonatal period (first 28 days) result from endogenous factors related to mother. The post neonatal mortality, (29 days to one year) on the contrary, occurs due to exogenous components viz., the larger environment.

Figure 4: IMR, Neo natal and Post natal mortality in Gujarat (1981-2006)



Source: Compiled from *SRS Bulletins*

Evidences show that the decline in post neonatal mortality has been quite consistent in the case of Gujarat over the last 25 years. It continues to decline and its present level (15) is quite lower than the all-India average (25.1) in 2006. The reduction in post-neonatal mortality is primarily due to great emphasis recently placed on controlling two major killers among children such as diarrhea and acute respiratory infections. In contrast, neo natal mortality is quite high in the state. There is no significant

decline in neo natal mortality since 1996 which reflects the poor socio-economic and health status of the mothers in the state. Although simple medical intervention could bring down the post neonatal mortality substantially, the same could not be replicated in the case of neonatal mortality.

To conclude, although the overall mortality level is low, the efforts of the state to attain a reasonable level of infant mortality decline along with fertility decline have not met with success. It is also observed that the major part of infant death is now occurring in neonatal stage which has direct link with mother's health.

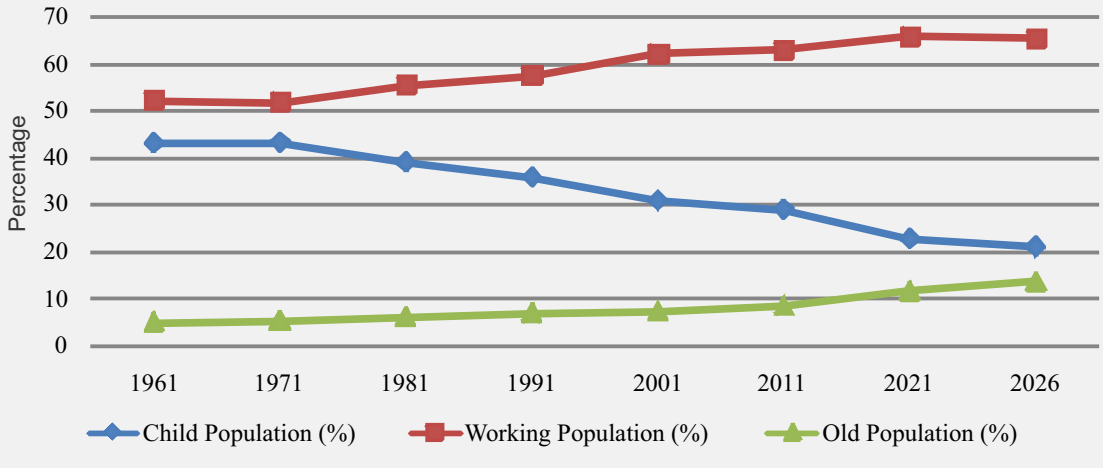
Demographic Window of for Gujarat: When it starts and how long it will continue?

In order to predict the time period for which the Gujarat will have demographic window of opportunity, the basic links between broad age structures (i.e. child/youth; working; old age), has been analyzed based on census population projection 1996- 2026 (based on census 1991). Due to the lack of proper availability of data, the projected data is used from 1996 to 2026 and until 1995 actual data has been taken into account for interpretation.

In the figure 5, decadal change in percentage share of three major age groups i.e. child population (0-14 yrs.), working age population (15-59 yrs.) and old population (60 yrs. and above) have been shown. It is evident from the figure that, child population is continuously decreasing since 1971. The important point to observe is that the decline in child population is not slight one; in fact after 1971 the percentage decline in child population is much rapid. Contrary to this, if we look at old age population, its share is continuously increasing since 1971, from 5 % to approximately 12%. This bracket is further expected to increase in coming future.

The percentage of working age population is increasing till 2021 and thereafter it is showing a declining path. Due to limited availability of authenticated projected population data till 2026, the time interval taken is not uniform (2021-2026).

Fig: 5: Percentage of child, working and old population in Total population, Gujarat; 1961-2026



Note: 1961-2011 shows actual values and 2012-2026 shows projected values (based on 2001 Census). Old age population also includes those persons whom age is not stated. Due to data constraint time interval taken is not uniform.

Source: Census of India, (1961-2011).

According to the trend observed among three age groups since 1961 up to 2026 (projected data), Gujarat's demographic window of opportunity will last for coming 15 to 20 years only, as old age population is taking pace and sooner this old age population will take over the child population. Therefore, rapid and vast development in Gujarat can be attributed with this bulge in working age population which Gujarat is enjoying past three decades.

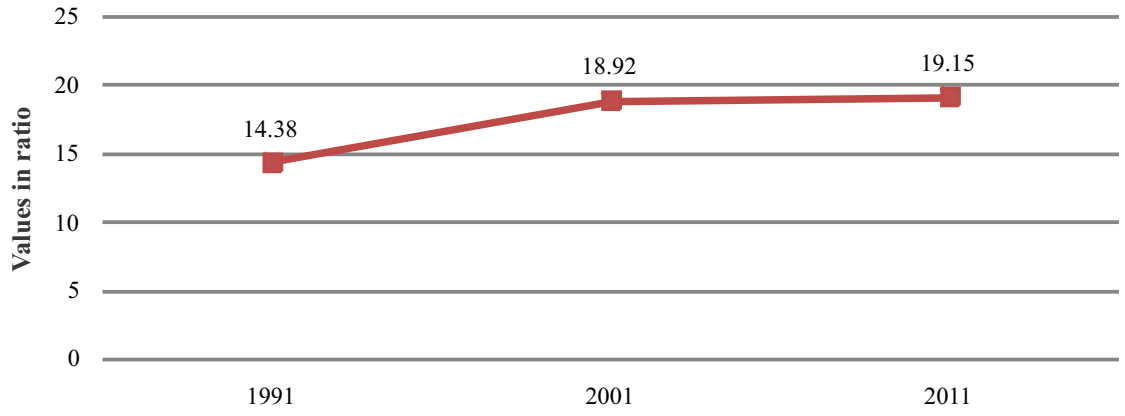
Is Gujarat Able to Reap Demographic Dividend

For assessing that how much Gujarat is able to reap from its demographic dividend major socio-economic factors such as Employability, education and health is to be analyzed. This will help to figure out the challenges that Gujarat has to face in order to utilize its demographic dividend.

Employability

Although, Gujarat have experienced rapid economic growth and urbanization in last few decades, still there is lot of potential in the form of working age population which is not utilized. If we look at total employment availability (private + public), from 1985 up to 2005, more or less it is constant around 17,00,000 which clearly indicates that overall there is no significant increase in employability of the state.

Fig: 6:Trends of Ratio of Working Age Population to Total jobs in public private sector in Gujarat; 1991 -2011



Source: Compiled from www.indiastat.com

A better way to understand the relation between pace of employment opportunities and available working age population is to figure out the trend of the ratio of working age population is to total jobs in public/private sector. In simple words, it shows how much jobs (public + private) are available per working age person in Gujarat. Figure 6 shows that the ratio of working population is to total jobs in Gujarat from 1991 have been increasing only. Most importantly the rate of increase is very high during 1990 to 2000 i.e. after the policy of LPG. This raises the questions on the employability of the state as the ratio is rising consistently from past few decades. It can also be interpreted from the above analysis

that, according to the availability of demographic bonus in the form of bulge of working population, Gujarat can perform much better in terms of both economic and social aspect as compared to present scenario.

Education

According to Census, 2011, literacy rate in Gujarat is estimated about 71.3% which is above overall literacy level of India. But here we are more concerned about the age specific literacy and mainly with adult literacy. Adult literacy is important because it plays an important role in transforming the youth into efficient workforce.

Health

For assessing health briefly we have taken morbidity indicators. Table 2 presents the analysis of selected health indicators for adult population of Gujarat.

Table: 2: Selected Health Indicator's status, Gujarat

Health Indicator	Status
Life expectancy (2010)	67 years
Estimated HIV Cases Registered in Gujarat as on 30/09/2012 (Nos.)	80594
Estimated No. of Persons per 100,000 suffering from Asthma	1979
Estimated No. of Persons per 100,000 suffering from Tuberculosis	438
Estimated No. of Persons per 100000 suffering from Malaria	4449
No. of Medical Institutes (2007-08)	1504

Source: Compiled from Directorate of Census, Govt. of India

Increase in length of life may not be beneficial for economic growth, therefore in order to have a detail assessment, focus on overall quality of life including morbidity indicators and other specific indicators are also required. Table 2 shows the status of degenerated diseases which mainly affects the middle and old ages of human life. From the table it is clear that Gujarat is having a having a huge burden of these diseases. Large numbers of cases of long lasting diseases like HIV/AIDS, Tuberculosis, Malaria etc. This can be a potential hindrance in harnessing the anticipated demographic dividend in Gujarat

Implication of Recent Demographic Changes

The main macro demographic effect that comes through the demographic transition usually is reduction in population growth rate and resultant changes in the age structure of the population. These changes, however, are not sudden. The population growth does not respond to demographic changes in the short term. Even after the fertility decline an increase in the number of births can still occur as the women who are already born in the past pass through the prime reproductive ages. Further, declining

[3] Adult literacy means literacy in 15 to 59 years. It plays a vital role in converting the child population into effective workforce.

fertility would result in less number of people in the young ages. This would result in higher proportion of old age people. This is generally known as population ageing. The state machinery needs to be prepared to take care of old people and its associated socio-economic problems.

Coming to the implications, higher levels of infant mortality confront a challenge; the overall mortality rate is not significantly high. Therefore, the declining fertility along with increasing life expectancy is going to be a major challenge as far as social and welfare policies are concerned. This is particularly important for a state eagerly looking forward to 2020 when the people are expected to lead a healthy and productive life.

Secondly, there would also be shift in the size and proportion of labour force in the state as TFR is will be near to replacement (2.1) in coming decade. This will have major implications for the economic growth and standard of living of the people. However, it is difficult to predict what impact (negative or positive) the transition will have on the economy. It would, therefore, be interesting to see the expected changes in both labour force and old age proportion in Gujarat in the coming decades.

The third major challenge will be the marked increase expected in the old age population which more than doubles during the 15 year period. The proportion of old age population will become more than 10 per cent of the total population by 2016. In addition to this the median age of the population of Gujarat will be round about 35 years in 2026-2030 (Census, 2001). As the present old age security measures are scanty, how far the state would be able to allocate an increasing share of resources in this sector is going to be crucial.

Conclusion

The analysis of demographic transition in Gujarat, thus, brings out several interesting dimensions of the transition for the present and in the years to come. The achievement of state is commendable as far as fertility reduction is concerned. According to the progress in population indicators during past half century, Gujarat is at the end of third phase and will soon enter to the fourth stage of transition with almost parallel fertility and mortality rate. This can be closely attributed with the increasing median age (35 years by 2030, Census 2001) of the population of Gujarat. However, there has been remarkable transition in fertility and mortality indicators in past half century. It is also interesting to see that the fertility reduction has embraced all sections of the society irrespective of economic, social or cultural differences. The state, thus, would achieve a replacement level of fertility in the very near future. The mortality transition in the state began earlier than the fertility transition. Although the overall mortality level is low the present level of infant mortality is comparatively high. A major part of infant mortality is now explained by neonatal mortality (28 days). Oddly, neonatal mortality has not recorded any marked decline even with dramatic decline in fertility level. The main causes of neonatal deaths are usually associated with mother specific factors. Given the poor social and health indicators of women in the state, major strides in infant mortality is unlikely to be achieved without addressing the overall socio-economic and health status of the women particularly the nutritional levels.

Additionally, it has been found that Gujarat has been experiencing demographic bonus in the form of bulge of working age population since last three decade. The commencement of demographic window of opportunity in Gujarat is approximately 30 years earlier than is projected to be beginning in India. India will be experiencing demographic bonus from 2015 till 2040 (Goli and Pandey, 2014), whereas evidences shows that Gujarat has been enjoying bulge in working age population since 1981 and will experience decline in working age population after ten to fifteen years. This calls for attention of policymakers that until 2026 some of the strict measures in the areas of employment, education and health should be taken in order to fully exploit the window of opportunity and to prepare for the heavy burden of old age population in future.

In addition to this, increase in life expectancy and improvement in mortality indicators exposes that state will sooner have increase in old age population which alarms the government policies regarding social security measures.

References:

Arokiasamy, P. (2009) Fertility decline in India: Contribution by uneducated women using contraception, *Economic and Political Weekly*, Vol. 45, No. 30, pp. 55-64.

Basu, A.M. (2011) Demographic dividend revisited: The mismatch between age and economic activity based ratios, *Economics and Political weekly,* Vol. 46, No. 39, pp. 53-58.

Bhat, P.N and Rajan, I (1990) Demographic transition in Kerala revisited,*Economics and political weekly*, Vol. 25, No.35, pp. 1957-1980.

Census of India (1991) Population projections for India and states 1996-2016, New Delhi, office of Registrar General.

Census of India (1991) Social and cultural tables, Director of census operations, Gujarat.

Census of India (1981) Social and cultural tables, Series-5, Director of census operations, Gujarat.

Census of India (1971) General Economic tables, Directorate of census operations, Gujarat.

Census of India (1961) General Economic Tables, Superintendent of census operations, Gujarat.

Family Welfare Programme in India (1990) Year book 1989-1990, Ministry of health and family welfare, Department of family welfare, Government of India, New Delhi.

Family Welfare Programme in India (1987) Year book 1986-87, Ministry of health and family welfare, Department of family welfare, Government of India, New Delhi.

Gould, W.T.S. (2009) Population and development, London: Routledge

IIPS and Macro Internationals. (2005-06). National Family Health Survey, Ministry If Health Family Welfare, Government of India.

Majumdar, P.K. (2010) Fundamentals of demography, New Delhi: Rawat Publications

Visaria, L. (2014) Population, Educationand Development,*Economic and Political Weekly,* Vol. 69, No. 45, pp.38-43.

Age Structure Shift and Economic Development in South India

C M Lakshmana

Abstract: The recent decline of fertility in India has been witnessed major changes in the age structure. As a result, this has also experienced on the economic development in the last two decades. Increased household income has impact to more savings and investment and eventually it contribute to the national growth. In view of this, the main objective of the paper is to analyze the recent experience of demographic change i.e., fertility decline and its consequential relationship of G.D.P growth looking in four south Indian states of Andhra Pradesh, Karnataka, Tamil Nadu and Kerala. The available Census Data have been used to investigating the problem. It has found that the reduction in dependency ratio together with the increase in the proportion of working-age population in the total has significantly improved the GDP growth rate in Tamil Nadu and Kerala. However, it is vice versa in case of Andhra Pradesh and Karnataka.

Introduction

There have been conflicting views about the relationship between population growth and development. However, some pessimists like Ehrlich (1968), Coale and Hoover (1958) have argued that population has negative consequences for development. On the other hand, optimists have contended that population pressure invokes technological changes leading to positive growth in the economy (Boserup and Easter 1981; Simon, 1986). However, a study based on cross-country evidence concluded that there was no systematic evidence of either positive or a negative impact of population growth on economic growth (Kuznets, 1966). However, there was no unanimity in the views expressed by scholars. A study conducted by the National Research Council in 1986 concluded that a slower population growth would be beneficial for development for most developing countries; and it emphasized that the relationship between population and development was contextual.

Several studies (Andersson 2001; Mason 1988; Asian Development Bank, Bloom and Williamson 1997) have reported that shift in age structure would have significant impact on economic growth through household savings and investments have influenced to the national growth. During the early stages of demographic transition there would be large young and aged population and small working aged population. As a result, per capita income growth would decline as there would be relatively few workers and savers, but when the transition is over, the old age dependency ratio would rise and the income growth would deteriorate (Bloom and Williamson 1997).

However, according to conventional wisdom, during the period of window of opportunity invoked by the 'demographic transition' particularly decline in the dependency ratio and increase in the working-age population, there would be reduced social sector expenditure due to lower demand for health care services from the smaller young and old aged populations as well as reduced demand for educational services due to decline in the proportion of school aged population. Thus, the demographic bonus is likely to contribute partly to the growth of national economy (Birdsall and Nancy 1998). However, the present paper mainly deals the fertility decline and its impact on age structure shift across southern states on one hand, and how the reduction of dependency ratios (both children and elderly) has caused to economic development on the other.

*C. M. Laxmana, Head/Associate Professor, PRC, ISEC, Bangalore.

Data and Methods

The data sources for the study are: Census of India, Sample Registration System (SRS) and indiastat.com website. In order to know the age structure change in southern states available census data for the various years have been collected and categorized into different age groups. Further, to discuss the changing age structure shift and its impact on economic development in relation with dependency ratio and GSDP growth rate in southern states of India appropriate measures have been used to study the economic development. Dependency ratios for younger (0-14) and older 60 +) age groups have been calculated by obtaining the available age wise population data sets from census reports for the various years. The changing view of demographic scenario and its impact on economic development has been discussed for the study.

Fertility Decline and Age Structure Change

The fertility rate (TFR) of India in the year 1981 was 4.5; it decreased to 2.68 by 2001 and further declined to 2.3 by 2011 (SRS). However, the TFR level in southern states of India has been always below the national average. This could be seen in Fig 1. Over the years, the country has witnessed for remarkable changes in the sphere of socio-economic development, which in turn helped to achieve our demographic goals. Increased women education, awareness about family planning methods which are focused by the Department of Health and Family Welfare had certainly caused to control population growth. This has been further facilitated to reach the expected demographic goals of the country. For instance, most of the states in southern, western, and some states in northern region have already reached to the replacement level of TFR and the rest of the states are being underway. However, due to the regional variations in social, economic and demographic factors across southern states have made the age structure change at different levels (Lakshmana C.M. 2012).

In India, increased working age population and the resulted economic development has been well documented (James 2008, Bloom D.E., 2011, Vasundhra Thakur, Kartik Roy, Hans Bloom Quist and Cal Clark, 2012, World Bank 2013). For instance, the proportion of children in the age-group 0-14 declined drastically in all four southern states. The decline however was slightly lower in Tamil Nadu than the other states such as Karnataka, Kerala and Andhra Pradesh. But at the same time rapid decline of TFR has caused to negative increase of youth population in the total population (age group 15-29) in Tamil Nadu and Kerala. The decline in the proportion of youth population in total was relatively high at minus 5.7 per cent in Kerala and minus 2.1 per cent in Tamil Nadu.

In contrast interestingly, there was being positive increase of youth population during the same period in Andhra Pradesh with 2.1 per cent and 1 per cent in Karnataka. Changes in the proportion of younger adults in total population; surprisingly, all the southern states have registered increase in various degrees. Though, the increase in the proportion of younger adults was almost identical at 5 percentage points in all the southern states excepting Kerala, the increase being 7.2 percent in Kerala. In regard to the proportion of adults (45-59) in the total was the highest in Kerala (6.6 per cent) followed in Tamil

Nadu (4.7 per cent), Karnataka (4.5 per cent) and Andhra Pradesh (3.1 per cent). Statistically, the proportion of working population in the total was the highest in Kerala during the period under review, this has reflected on the socio- economic development. It means, higher the proportion of working age population would be shown as higher level of economic development. It has witnessed in Kerala and Tamil Nadu. But, increased proportion of elderly in total population in the respective states seems to have negated the benefits. This is because the early demographic transition i.e., Kerala achieved the replacement level fertility in 1998, followed by Tamil Nadu in 2000, Andhra Pradesh in 2002 and later stage it was witnessed (2006) in Karnataka. Hence, these factors had their own impact on population change as well as in development scenario across the southern states.

Dependency Ratios v/s GSDP growth Rate

Figure 2 elucidates that growth rate of gross state domestic product (GSDP) at constant prices for India, during the period of 1994-95 to 2000-2001 was 6.16 per cent; it slightly increased to 7.87 per cent in the period 2001-2002 to 2009-2010. During the period of 1994-1995 to 2000-2001 all southern states except Karnataka had witnessed below national average of GSDP growth rate. But, the trend was reversed during the next period of 2001-2002 to 2009-2010 with the national average of 7.87 per cent. Increased GSDP during this period was similar in Karnataka and Andhra Pradesh. But, in case of Tamil Nadu and Kerala was different. It means the growth rate of GSDP was almost similar during the previous period; but when the demographic transition started to influence economic development, the southern states began to take rapid strides in the path of social and economic development (Vasundhra Thakur, 2012).

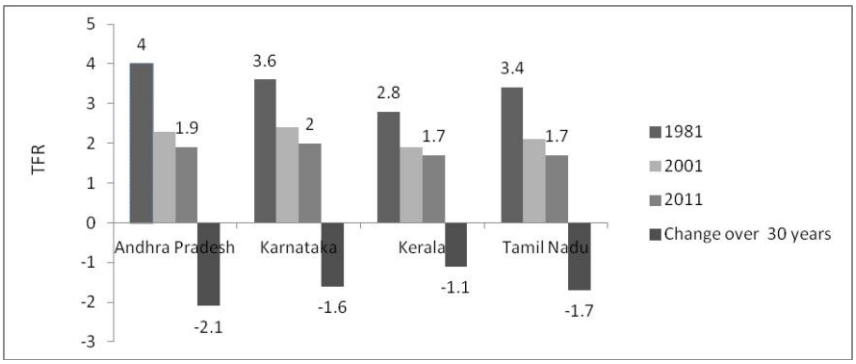


Fig 1: Fertility Decline in Southern states of India (1981-2011)

In India, age structural shift became apparent in the post liberal period; its genesis can be traced to the demographic transition that came about in the earlier decade of 1981-1991. Hence, age structural change was not considered as factor that could affect the economy and society, during the earlier period (pre- liberalization period i.e. 1971-1981). To identify and evaluate the linkages between age structural

change and economic development in the southern states, we had focus on the changing proportion of working-age population in total population of India. Figure 3 provides statistical details of the change. The percentage share of working age population in total population in both Karnataka and Andhra Pradesh in 2001 was identical at 60 per cent. On the other hand, the pertinent figure was higher by 3 percent in Kerala (63 percent) and by 4 percent in and Tamil Nadu (64 percent).

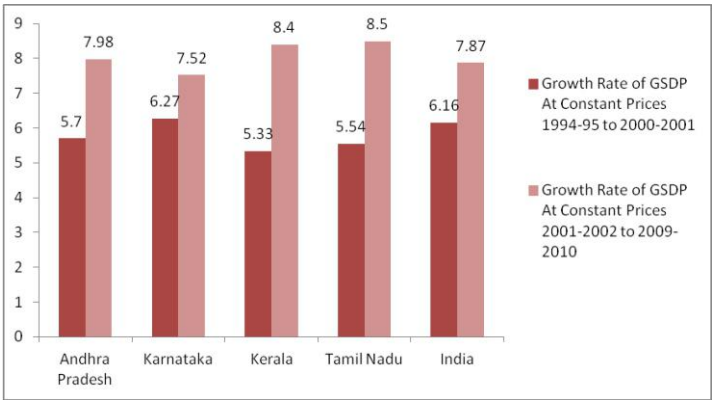


Figure 2: Growth Rate of GDP/GSDP in Southern States of India

Interestingly, in the later stages, there were huge differences in the growth of GSDP, and as well as in the age structural transition not only in the southern states but in the entire country. Thus, the size of working age population between the years 2001 and 2011 was 5 per cent in both Andhra Pradesh and Karnataka (2011). In contrast, increase in the proportion of working age population in total between the year 2001 and 2011 was marginal at 3 per cent in Tamil Nadu and Kerala. There was considerable variation in increase of working population across the southern states in the decade 1991 to 2001. But, interestingly the effect of demographic shift was not only felt in Kerala and Tamil Nadu but also in Karnataka and Andhra Pradesh albeit in varying degrees. This has certainly helped to accelerate economic development by promoting earnings and savings through household level initiatives across the states. It needs to be borne in mind that increase in working age population is not a burden on the economy but a sign of accelerating economic development. But, progressive India should utilize the benefit in a proper way to the sustainable development, for the welfare and well-being.

Figure 3 further elucidates the relationship between dependency ratio and the GSDP growth rate in the southern states in recent decades of development. In 2001 there were higher number of children per 100 working age population (15-59) in Andhra Pradesh and Karnataka, which makes the dependency ratio in these states 53. This ratio was comparatively less in Tamil Nadu and Kerala. The dependency ratio of children was 41 and 42 respectively in Kerala and Tamil Nadu as of 2001. However, it is worth noting here that demographic dividends which is evident in India during the post liberalization period, has also been caused to rapid changes in population in general and age structure changes in particular. As a result there have been major changes during the decades of 1991-2001 and 2001-2011. The

changes are visible in the entire country, but their significance is more in the southern states. During the period between 1991-2011, the dependency ratio (number of children dependent on 100 workers/earners of age 15-59) in Andhra Pradesh and Karnataka witnessed a higher reduction of 13 points. The corresponding figure for both Kerala and Tamil Nadu was 10 points.

Reduction in the dependency ratio of children across the southern states during the demographic transition that occurred during the period 2001-2011 was very surprising for several reasons. Reduction in dependency ratio of children was higher in Andhra Pradesh and Karnataka than in Tamil Nadu and Kerala. However, it should be borne in mind that demographic shift had set in much earlier in Kerala and Tamil Nadu, unlike in Andhra Pradesh and Tamil Nadu, and therefore the reduction seen in the dependency ratio in these states during the decade 2001-2011 is not very surprising. For example Kerala had achieved the replacement level TFR (2.1) in 1998, followed by Tamil Nadu in 2000, Andhra Pradesh in 2002 and Karnataka in 2006. Therefore, the decrease in dependency in southern states can be explained in terms of the demographic shift taken place in the respective states. Various socio-economic and demographic reasons can cited as reason for the higher dependency ratio (5 points) in Andhra Pradesh and Karnataka, vis-à-vis Tamil Nadu and Kerala. The variations in dependency ratio have been causing variation in GSDP growth in the respective states.

If we look into the relationship between reduction in dependency ratio and GSDP growth rate during the period from 2001-2002 to 2009-2010 across the southern states of India, it can be seen that GSDP growth was higher in Tamil Nadu and Kerala, growth rate being 8.5 and 8.4 respectively. The rate of GSDP growth was slightly lower in Karnataka and Andhra Pradesh during the decade under review. From the overall sequence of GSDP growth across southern states, it can concluded that the reduction in dependency ratio together with the increase in the proportion of working-age population in the total has significantly improved the, as GSDP rate in both Tamil Nadu and Kerala. The relatively higher fertility rate, comparatively higher dependency ratio an and average size of working age population in Karnataka and Andhra Pradesh have had considerable impact on growth of GSDP as well as state income in these states. On the word, one can conclude that the demographic dividend derived through age structure transition has been accelerating economic development in the southern states, albeit with inter-state and inter-regional disparities. For instance, the demographic change and consequent age structure transition was greatly helpful to economic development in Tamil Nadu and Kerala, but in Karnataka and Andhra Pradesh, the impact of demographic transition on economic development was not as impressive as in Tamil Nadu and Kerala.. The pace of demographic transition needs to increase throughout the country to bring the backward states to the level of southern states. And, among southern states, Karnataka and Andhra Pradesh need to be brought on par with Kerala and Tamil Nadu, in the matter of demographic transition and resultant economic development.

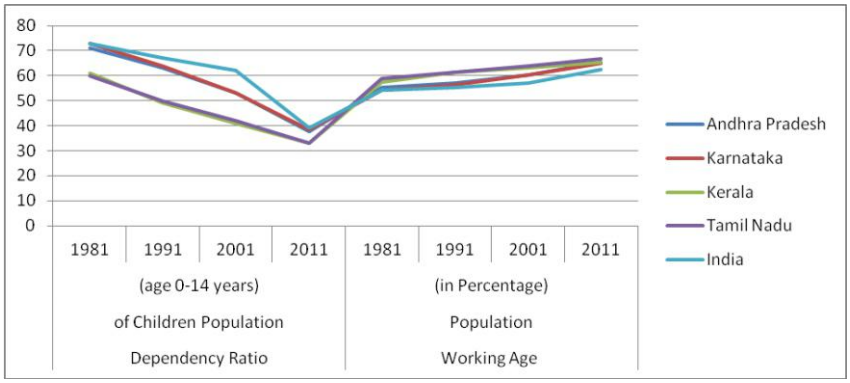


Figure 3: Dependency Ratios and Working Age Population in Southern States of India

Conclusion

From the overall sequence of GSDP growth across southern states confirms that the reduction in dependency ratio together with the increase in the proportion of working-age population in the total has significantly improved the, as GSDP rate in both Tamil Nadu and Kerala. The relatively higher fertility rate, comparatively higher dependency ratio an and average size of working age population in Karnataka and Andhra Pradesh have had considerable impact on growth of GSDP as well as state income in these states. The demographic change during the period under review has been provided the 'window of opportunity' but at the same time there could be a period of turbulence in economic growth due to increase in the proportion of elderly population both in absolute and proportionate terms. Hence this period could involve several challenges such as the need for provision of better medical care and social security to the elderly population in the society. Increased older dependency ratio demands more social expenditure on geriatric care in Kerala and Tamil Nadu.

References

Andersson, B. Scandinavian (2001). Evidence on Growth and Age Structure, Regional Studies, 35 (5), 2001.

Asian Development Bank (1997). Emerging Asia: Changes and Challenges, Asian Development Bank, 1997.

Bloom, D.E. and Williamson, J.G. (1997). Demographic Transition and Economic Miracles in Emerging Asia. Working Paper 6268, Cambridge, M.A. NBER.

_____ (2011). Population Aging: Factors, Challenges, and Response. Program on the Global Demography of Aging Working Paper Series No. 71.

Birdsall and Nancy (1978). Analytical Approaches to the relationship of Population Growth and Development. Population and Development Review, 3(1 and 2), March-June, 63-102.

Boserup and Easter (1981). Population and Technological Change: A Study of Long-term Trends.

Chicago University Press, Chicago.

Coale, A.J. and Hoover, E.M. (1958). Population Growth and Economic Development in Low- Income Countries: A Case Study of India's Prospects. Princeton University Press, New Jersey.

Ehrlich, P.R (1968). The Population Bomb, Ballentine, New York.

James (2008). "Glorifying Malthus: Current Debate on Demographic Dividend in India"

Economic and Political Weekly. June 21. Vol. 43, No. 25, 63-69.

Kartik Roy, Hans Bloom Quist and Cal Clark (2012). "Economic Development in China, India and East Asia "Managing Change in the Twenty First Century, Edward Elgar Publishers, United Kingdom.

Kuznets, S. (1966). Modern Economic Growth: Rate, Structure and Spread, Yale University Press, New Haven.

Mason (1988). A. Savings, Economic Growth and Demographic Change, Population and

Development Review, Vol. 14.

Vasundhra Thakur (2012). The Demographic Dividend in India: Gift or Curse? A State level analysis on differing Age Structure and its Implications for India's Economic Growth Prospects. Working Paper series 2012, No. 12-128.

World Development Report (2013). World Bank.

Effect of Maternal Education on Under-Nutrition of Children in Nepal

Ramesh Babu Kafle

Abstract: *This paper studies variation in under-nutrition of under-five children measured by stunting, wasting and underweight for selected demographic and socio-economic characteristics and net effect of maternal education on under-nutrition of children in Nepal by using data from Nepal Demographic and Health Survey-2011.Maternal education has significant gross negative impact on under-nutrition of children. After controlling for other study variables, itdoesnot remain a significant predictor of nutritional status of children, but household wealth index retained its significance. Role of maternal education is attenuated by economic factors. Negative association between maternal education and under-nutrition of children is not a conclusive causal relationship.*

Introduction

Nutritional status of population and especially that of children is a precondition for national development and also an indicator of well-being of people. 'Adequate nutrition is essential in early childhood to ensure healthy growth, proper organ formation and function, a strong immune system, and neurological and cognitive development' **(United Nations Children's Fund, World Health Organization and World Bank, 2012)**. It is commonly accepted that nutritional status is a multidimensional phenomenon, broadly decided by intake of protein, energy and other micronutrients. Inadequate nutrition in childhood causes children to have less than optimal physical and mental development and cognitive growth. Early ages are often manifested by protein-energy and micronutrient deficiencies which interfere with optimal growth. The protein energy under-nutrition is generally manifested in poor gains in height, weight, and circumference of mid-arm and head **(Panagariya 2013)**.

Globally, among the children under-five years of age, 26 percent are stunted, 16 percent are underweight and eight percent are wasted **(United Nations Children's Fund, World Health Organization and World Bank, 2012).** Burden of under-nutrition is uneven across the globe; 90 percent of stunted children belong to Asia and Africa regiononly. Moreover, 'childhood nutrition is the underlying cause of an estimated 35 percent of all deaths among children under five years of age' **(WHO, 2012: pp12).** Among the eight Millennium Development Goals (MDGs), the first goal of eradication of extreme poverty and hunger and the fourth related to child survival are directly related to the nutritional status of children. Apart from these two goals, the effect of childhood nutrition on health and cognitive development may also impede the goals of achieving universal primary education, promotion of gender equality and empowerment of women and improvements of maternal health.

Nutritional status of under-five children is a comprehensive measure of overall child health. Under-nutrition and over-nutrition both are indicators of ill health. Indicators based on height-for-age Z-score- Stunting, weight-for-height Z-score- Wasting and weight-for-age Z-score- Underweight are

[1]The author is Assistant Professor at Centre for Population and Development (CPAD), Purbanchal University, Biratnagar, Nepal; currently a Ph. D. scholar at Jawaharlal Nehru University, New Delhi and can be reached at rbkafle@gmail.com or ramesh76_ssf@jnu.ac.in.

widely used to assess under-nutrition of children. Stunting indicates status of chronic under-nutrition, wasting indicates acute under-nutrition and underweight signifies both chronic and acute under-nutrition.

Nutritional status of children is outcome of whole social process operated with multifaceted inputs in it. Many of them are operating in household level and are within the grasp of household decision, which, again depends upon many circumstances. The nutritional content of foods given to the child is dependent on the economic status of the family, food culture and the way of taking care of child. Similarly, breast feeding influences nutritional status of children and is also influenced by many cultural, behavioral and modernization factors. Child health and survival is mainly determined by the social and economic resources in the child's family; and all the proximate determinants of child health are influenced by socio-economic variables and have an overall impact on child health **(Mosley and Chen, 1984).** Among the socio-economic variables parents' education and especially that of mother may have substantial bearing on shaping health and nutritional status of children. But women's education is not isolated; rather it is confounded by many other factors like economic status, overall position of women in the society and cultural factors.

Abundance of literature documents positive impact of maternal education on child health (**Jain, 1994; Medrano et al., 2008; Kravdal, 2004)**. Educated women acquire and also transmit better ideas and skills regarding the knowledge on germs and sanitary food-handling practices so that children may receive appropriate and sufficient food in their home and timely medical care when they fall sick **(Ware, 1984)**. This may lead to better nutritional status of children.

Many authors discuss the way how maternal education affects children's health. **Joshi (1994)** argues that mother's education has two types of effect: skill acquisition and identity acquisition. Both these skill acquisition and identity acquisition have impact on health behavior change in terms of use of medical services and also changes in household health behavior. Educated women attain certain behavioural tendencies in school that lead to changes in their health care behaviour, which ultimately has a positive impact on child nutrition and health.

Sandiford et al. (1995) argue that mother's formal education is important for promoting child health and this is independent of other social and economic advantages and wealth and other factors like household water supply and sanitation cannot attenuate the effect of mother's education on malnutrition. But wealth and education themselves are interrelated on one hand and household wealth status itself has an important role to shape nutritional status of children.

Although**Desai and Alva (1998)**found a positive correlation between children's health markers based on height-for-age and maternal education in many developing countries, they could not establish a causal mechanism between these two. **Medrano et al. (2008)** also concluded that children with more educated mothers have a better health status measured by height-for-age indicator.

Education of mothers may also have some negative consequences on child health. More educated

women are more likely to participate in labour force outside home, thus leading to reduction in time allocated for child care at home, a reduced duration they breast fed and less chances of treatment in case child falls sick and finally have negative impact on the nutritional status and overall health of children. Women's education also brings changes in the societal attitudes towards women's work and more women can go for modern sector jobs of their choice. But their children should be managed to be taken care by some alternative mechanism. This situation would have negative consequences for breast feeding as well as child care. For example, working women in South India breastfed for shorter duration and spent fewer hours on child care leading to higher morbidity rates for their children than for the children of non-working women (**Sivakami, 1997)**.

Anthropometric measurements taken in the Demographic and Health Surveys provide an opportunity to assess the nutritional status of children in terms of the standard indicators of stunting, wasting and underweight. As maternal education is one of the predictors of overall child health, it can be thought to have effect on nutritional status of children. Therefore, the extent of under-nutrition of under-five children can be studied under the framework which considers maternal education as one of the socio-economic variables to have an impact on child nutrition.

Nutritional status of children in Nepal

Nepal is country with poor nutritional status of under-five children. The most common form of malnutrition in Nepal is protein-energy malnutrition. But, successive Demographic and Health Surveys in Nepal show a fair decline in the proportion of under-nourished children in the last decade. The proportion of stunted children in 2001 was 57, which declined to 49 in 2006 and further to 41 in 2011. Similarly, proportion of underweight children was 43 in 2001; it declined to 39 in 2006 and reached to 29 in 2011. But, wasting has not shown a regular pattern of decline, which remained 11, 13 and 11 in 2001, 2006 and 2011 respectively **(MOHP [Nepal], New Era, and ICF international Inc., 2012).** Government of Nepal has set target to achieve proportion of underweight children aged 6-59 months to 27 percent, stunted to 28 percent and wasted to five percent by 2015 to meet the Millennium Development Goals **(NPC, 2010 and MOHP, 2012)**. It seems that, Nepal is very close to achieve the set target but it never means the nutritional status of under-five children is better.

In order to address the under-nutrition problem in young children, government has implemented Community Infant and Young Child Feeding Programme, Community Management of Acute Malnutrition and hospital based nutrition management and rehabilitation **(MOHP, 2012).**

Objectives

To study variation in under-nutrition of under-five children in Nepal by stunting, wasting and underweight for selected demographic and socio-economic characteristics one of the objectives. Next objective is to examine the net effect of maternal education on nutritional status of under-five children.

Data and methods

Source of data is Nepal Demographic and Health Survey-2011. This national representative survey has taken anthropometric measurement for children of age under five years of those households which were selected for men's sample. Children's data file has been used for analysis. The flagged observations with unusual measurements are not considered in the analysis. The study sample consisted of 2380 children who were born within the five years preceding the survey.

Nutritional status of a child can best be evaluated only through proper medical examination. However, methods are developed based on simple observation of most prominent manifestations of under-nutrition so that nutritional status of children can be assessedeasily from survey data. The simplest calculations are based on height and weight measures of children. One of the most commonly used standard to analyse nutritional status of children is the 'new growth standards', published by the WHO in 2006. These new standards for growth of children were generated through data collected in a Multicentre Growth Reference Study, which describes how children should grow in an optimal condition. This methodology is based on common standard of height and weight for all populations to determine the cut-points for height and weight based under-nutrition measures. Critics of this methodology are made on the ground that it ignores the differences in height and weight gain due to genetic, environmental, cultural and geographical factors **(Panagariya 2013)**. **Panagariya (2013)** argues that the methodology has overestimated the extent of under-nutrition in India and also suggested for different growth standards at national or regional level. However, due to lack of such national or regional level standards, present paper uses the same growth standards that have been suggested by WHO in 2006.

According to the new growth standards, there are three indices that are expressed in standard deviation units from the Multicentre Growth Reference Study median. Children with height-for-age Z-score below 'minus two standard deviation from the median of the WHO reference population' are considered 'Stunted'. Similarly, children with weight-for-height Z-score below 'minus two standard deviation from the median of the WHO reference population' are considered 'Wasted' and those whose weight-for-age Z-score is below 'minus two standard deviation from the median of the WHO reference population' are considered 'Underweight'. Three indicators: whether a child is stunted, underweight or wasted are used to study under-nutrition of children. All three dependent variables are dichotomous in nature. Age, sex, birth order, last birth interval and mother's current age are demographic variables considered to study nutritional status of children. Similarly, rural/urban residence, ecological region, development region, working status of women and household wealth index are the socioeconomic variables included in analysis. Wealth index makes better use of existing DHS data to determine a household's relative economic status. It is constructed by applying Principal Component Analysis

(PCA) method to assign weights for different items considered for index construction. A standardized index value for each sampled household is constructed. Quintiles are made based on the distribution of household population **(Rustein and Johnson, 2004).**

Bivariate analysis has been carried out to study the differentials of under-nutrition of children by selected demographic and socio-economic characteristics. Logistic regression has been used to find the net effect of maternal education on child under-nutrition.

Scope and Limitations

This paper has limited scope which covers study of under-nutrition based only on the three indicators: stunting, wasting and underweight. It does not cover other health indicators like incidence of communicable and infectious disease and anemia. Variables on breastfeeding and the feeding practices are not included in analysis. Similarly, indicators related to mother's nutritional status are also not considered.

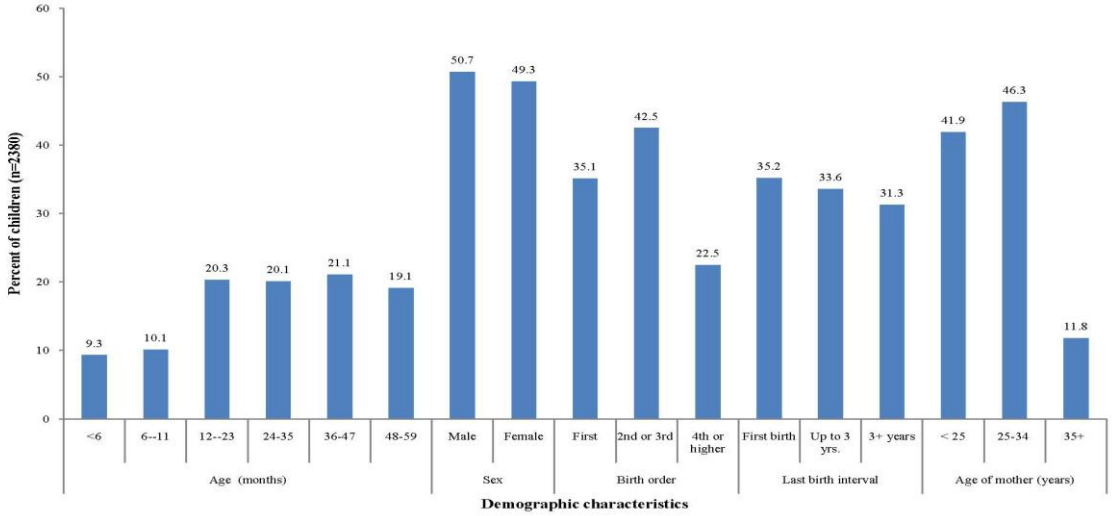
Results

The first part shows the distribution of under-five children by their selected demographic characteristics and other selected socio-economic characteristics pertaining to their mother and household. The Figure-1 shows that distribution is almost uniform in terms of age in years and sex. Some 35 percent children are first born, 42 percent are of second or third order and remaining are of higher order. Every one in three children is born within a birth interval of less than three years.

Among those under-five children, a large proportion (42 percent) at the time of survey belongs to mothers in the age group below 25 years. These are those mothers who have given births in relatively younger age. Also, 12 percent children belong to mothers of age more than 35 years.

Women's educational status has been measured in three categories: no education, with 1-9 years of education and 10 or more years of education. Some 49 percent children belong to mothers with no education and only 14 percent of them belong to mothers with higher education. On working status, women are classified as not working, working in agriculture sector and working in non-agricultural sectors. Generally, those who work in agriculture sector are either not paid or low paid and paid in cash or kind or both. Those in non-agricultural sector of job consists of professionals, clerical workers, other skilled or unskilled manual workers and working in other service sector in which women have more chance of being paid in cash and paid more. Majority (60 percent) children belong to mothers who are working in agriculture sector and some 28 percent non-workers. Under-five children are predominately from rural residence (91 percent), a maximum (25.6 percent) of them belong to the poorest category.

Figure-1: Percent distribution of children under five year's age by various demographic characteristics



The three distinct ecological belts are clubbed into two categories because of very small frequency in Mountain region. The two regions: 'Mountain and Hills' and 'Plain' are different in terms of climatic condition, type of food produced and many other cultural practices. There are 47 percent children in Mountain and Hill region and 53 percent in Plain region. Among the five development regions, the highest proportion (32 percent) of children belong to the eastern development region and the lowest proportion (11 percent) belong to the far western development region.

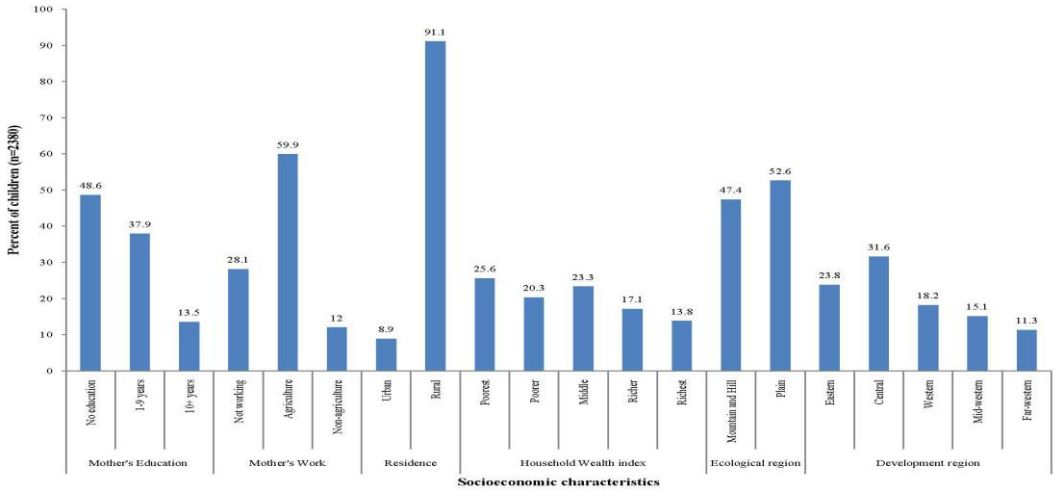


Table-1 gives the proportion of under-nourished children based on the cut point 'minus two standard deviation from median of the WHO new standard' by different demographic characteristics. In Nepal, around 40 percent children are stunted, 29 percent are underweight and 11 percent are wasted. This means the proportion of healthy or over-nourished under-five children in Nepal is 60 percent when analysed by height-for-age; 71 percent when measured by weight-for-age and 89 percent when measured by weight-for-height.

Stunting increases by age, becomes the most prevalent in age group 36-47 months and then lowers to some extent in the age 48-59 months and the association is significant. Underweight and wasting also show significant association with age showing a bit different pattern. The extent of underweight is observed to be the maximum in the age 24-35 months and it remains almost same thereafter, that of wasting becomes the maximum in age 6-11 months and declines thereafter. Both underweight and wasting are significantly associated with age. There appear no significant sex differentials in under-nutrition of children in Nepal. Little variation that appears in percentage of stunting among boys and girls is insignificant. In respect of all the three indicators of under-nutrition, birth order of child is found to have significant positive association.

Table-1: Percent of under-nourished children under five years according to stunting, underweight and wasting by selected demographic characteristics

Characteristics	Stunted	Underweight	Wasted	Number of children
Age of child (month)				
<6	19.9	18.1	10.9	221
6-11	15.8	21.7	20.4	240
12-23	34.3	30.0	16.7	484
24-35	52.2	31.5	7.5	479
36-47	53.2	31.1	7.4	502
48-59	42.4	29.8	7.3	453
χ^2	*169.8****	*21.88***	*57.4****	
Sex of child				
Male	42.2	29.2	11.9	1208
Female	39.3	27.9	10.0	1173
χ^2	*0.87*	*0.46*	*2.3*	
Birth order				
First	32.5	21.8	8.7	835
Second or third	37.7	27.8	11.3	1011
Fourth and higher	53.1	40.4	13.9	534
χ^2	*48.2****	*56.0****	*8.9**	
Last birth interval (month)				
First birth	35.1	22.0	8.7	837
Up to three years	48.7	35.3	12.1	799
More than three years	36.9	28.7	12.2	744
χ^2	*36.5****	*35.5****	*6.7**	
Age of mother (years)				
Below 25	36.8	24.5	9.7	996
35-34 years	40.2	30.5	11.7	1103
35 years or more	52.7	35.6	12.1	280
χ^2	*22.9****	*16.9****	*2.5*	
All children	**40.3**	**28.6**	**10.9**	**2380**

*Note: Percentage in each cell is strictly for under-nutrition; the value when subtracted from 100 gives the proportion of children who are either normal or overweight. Here, * denotes p<0.05, ** denotes p<0.01 and *** denotes p<0.001.*

In case of birth interval, first born children are least prone to be under-nourished. Besides this, length of birth interval is found to have negative association with proportion under-nourished in terms of

stunting and underweight; and for wasting, the proportions are almost same. Birth interval is significantly associated with all three indicators of under-nutrition. The first child is generally valued more, better cared and might have less chance to be under-nourished. Mothers of higher age have children with higher proportion of stunting, underweight and wasting and the association is significant except for wasting.

Table-2: Percent of under-nourished children under five years according to stunting, underweight and wasting by selected socio-economic characteristics

Characteristics	Stunted	Underweight	Wasted	Number of children
Education				
No education	47.2	37.8	13.3	1157
1-9 years	36.6	22.1	8.4	902
10+ years	25.2	13.4	9.7	321
χ^2	*58.5****	*102.8****	*13.0***	
Working status				
Not working	33.3	24.2	10.9	669
Work in agriculture	46.0	33.5	11.4	1425
Work in other sector	28.0	14.0	9.1	286
χ^2	*50.6****	*53.0****	*1.27*	
Type o f place of residence				
Urban	27.0	16.1	8.5	211
Rural	41.5	29.8	11.2	2169
χ^2	*16.9****	*17.5****	*1.4*	
Wealth index				
Poorest	56.2	40.4	12.3	608
Poorer	45.3	32.0	11.6	483
Middle	35.0	28.5	13.0	555
Richer	30.0	21.9	8.1	406
Richest	25.0	10.1	7.6	328
χ^2	*125.3****	*108.3****	*10.7**	
Ecological region				
Mountain and Hill	43.6	27.7	10.6	1128
Plain	37.2	29.2	11.2	1252
χ^2	*10.1***	*0.64*	*0.18*	
Development region				
Eastern	36.7	25.6	10.2	567
Central	37.5	28.8	11.4	752
Western	38.0	22.6	10.8	434
Mid-western	49.9	36.8	11.1	359
Far-western	46.1	32.7	10.8	268
χ^2	*23.8****	*24.2****	*0.51*	
All children	**40.3**	**28.6**	**10.9**	**2380**

*Note: Percentage in each cell is strictly for under-nutrition; the value when subtracted from 100 gives the proportion of children who are either normal or overweight. Here, * denotes p<0.05, ** denotes p<0.01 and *** denotes p<0.001.*

Table-2 shows the variation of under-nutrition in terms of the three study indicators by selected socio-economic characteristics. Maternal education is found to be significantly negatively associated with

the three indicators. Among mothers with no education, 47 percent children are stunted whereas; the value goes down to 25 percent for mothers with at least ten years of schooling. Similarly, proportion of underweight children declines from 38 percent for mothers with no education to 13 percent for mothers with at least 10 years of education. Among uneducated mothers, 13 percent have their children wasted but the value declines to 10 for mothers with higher education.

Among different working categories of women, children whose mothers are working in agriculture sector are most disadvantaged in terms of nutrition in all three indicators. Working status is significantly associated with stunting and underweight but not with wasting. Working in other sectors like some professional or clerical job or service sector might be well paid, with relatively better wealthy and educated also and their children have lower chance of getting under-nourished. Similarly, not working women have plenty of time to look after their young children leading to a better nutritional status. Women in agriculture have to do almost every kind of household works apart from their involvement in agriculture works and may not get adequate time for their child care thus influencing child nutrition negatively.

Although the sample consisted of children predominately from rural area, urban children are more benefitted to have better nutritional status as compared to those of rural counterparts. Household wealth index, which has been considered a proxy for economic status of the family, has very clearly significant negative association with stunting, underweight and wasting. The highest proportion of under-nourished children belongs to the poorest strata of the society. The proportions of stunted, underweight and wasted children in the poorest wealth index category are 56, 40 and 12 respectively and those for the richest category are 25, 10 and 7.6 respectively. Children belonging to the poorest and poorer strata are less likely to be better fed due to lack of resources thus aggravating the chances of under-nourishment among children. Being wealthy is a precondition for managing better food stuffs but not sufficiently a condition that guarantees quality food intake.

Only stunting is significantly associated with ecological region of residence; showing a higher proportion of undernourished children in Mountain and Hills than in Plain region. A significant variation among development regions inunder-nutrition in terms of stunting and underweight is observed. Mid-western and far-western regions are relatively backward as compared to other regions in terms of overall socio-economic developments and more children are found chronically under-nourished in those regions. The highest proportion of stunted (50 percent) and underweight (37 percent) children in mid-western development region are observed. Variation in wasting is insignificant among development regions.

After analysing variations in the three indicators of under-nutrition, multivariate analysis has been performed to study the net effect of mother's education on child under-nutrition. For this, a new dichotomous variable has been constructed by using status of stunting, wasting and underweight. A child who is either stunted or wasted or underweight is considered 'under-nourished' and assigned '1' whereas children with none of the three characteristics are considered 'nourished' and assigned '0'. This dichotomous variable showed 49.2 percent children under-nourished and 50.8 percent children nourished or over-nourished. The idea is to capture all under-nourished children whether acutely or

chronically, in terms of any one of the three indicators. Based on the dichotomous dependent variable, logistic regression was run first by considering maternal education alone as independent variable. This shows gross effect of maternal education on nutritional status of children. Since women's education is not an isolated factor, but entangled with and shaped by various socioeconomic factors, second regression model is run considering all socio-economic variables in the model, from which net effect of maternal education on nutritional status of children when other socio-economic factors are controlled could be assessed.Inthe third model, apart from socio-economic variables, selected demographic variables are also included to see the net effect of maternal education on under-nutrition of children after controlling for socio-economic and demographic factors. Sex of the children has not been used in the analysis because of its insignificant association with the indicators of nutritional status of children. Age of mother, age of child, birth order and the last birth interval are the covariates and all other variables in the model are categorical.

Age of child is one of the important demographic variables to influence nutritional status of children. Differences in kinds of food intake of children and the food provided to them by their age creates the age differential in nutritional status. This is further affected by breast feeding practice. Also, mother's age at child birth has association with nutritional status of child. Children born to the mothers of extreme ages of reproductive life span are more prone to be under-nourished. Similarly, children of higher birth order means there are already more children in the family and there may be higher chances of resource scarcity in the family, thus leading to poorer nutritional outcome of children. Children with shorter last birth interval are also more likely to be under-nourished because of maternal factors. The mother might not have acquired full strength to bear next child but had given birth to next child soon thereby jeopardizing health of both mother and child.

Nutritional status of children is reflected by overall development level of the community. Therefore, variables like place of residence (rural/urban), ecological region and development regions are believed to have bearings on nutritional status of children and are included in the analysis. In Nepal, Mid-western and Far Western regions are relatively backward in development. Also included in the analysis are the wealth index and women's working status. Women's working status is largely determined by their educational attainment. This will have an impact on child nutrition from different perspectives. Women not working outside home might allocate more time in caring their children thus having positive impact on nutritional status of children. Those women who work outside home especially in formal sector allocate relatively less time for child rearing and if there is no sufficient support system for child care, nutritional status gets adversely affected. Also, the chances of reduced frequency and duration of breastfeeding for working mothers cannot be ruled out. Therefore women's working status has been considered as one of the confounding variables in the analysis. Household wealth is the most important economic variable affecting nutritional status of children. It is associated to food supply, its quality and adequacy, all having bearings on nutritional status of children. On the other hand, education and wealth are also associated. Hence, household wealth index is taken as a representative of economic variables to have an influence on child nutrition.

Table-3 shows the odds ratios with significance level for various categories of the independent

variables in the three models. The first model clearly shows that, if not controlled for other socioeconomic and demographic variables, maternal education has significant negative impact on under-nutrition of under-five children. With reference to the mothers with no education, the odds that the child is under-nourished are declined by 0.61 times for women with 1-9 years of education and by 0.38 times for women with at least 10 years of education. This indicates a positive gross impact of mother's education on nutritional status of children.

In the second model, together with maternal education, type of place of residence, ecological region, development region, working status and the wealth index are incorporated. In this model, the effect of maternal education on under-nutrition has been weakened to some extent after controlling for these variables but the odds ratios for education still remained significant at increased level of significance. The main factor that mediated the effect of maternal education is the wealth index for which the odds ratios are significant. Other variables in the model did not show significant odds ratios.

Table-3: Odds ratios for children under five years being undernourished for mother's education and selected socio-economic and demographic characteristics

Socio-economic characteristics	Odds ratio		
	Model-I	Model-II	Model-III
Education			
No education (Ref.)			
1-9 years	0.61***	0.78*	0.8
10+ years	0.38***	0.7*	0.7
Working status			
Not working (Ref.)			
Work in agriculture		1.1	1.17
Work in other sector		0.9	0.8
Type o f place of residence			
Urban (Ref.)			
Rural		1.17	1.16
Wealth index			
Poorest (Ref.)			
Poorer		0.67**	0.70*
Middle		0.53***	0.60**
Richer		0.38***	0.47***
Richest		0.35***	0.49**
Ecological region			
Mountain and Hill (Ref.)			
Plain		1.1	1.19
Development region			
Eastern (Ref.)			
Central		1.0	1.1
Western		1.0	1.14
Mid-western		1.1	1.1
Far-western		1.0	1.1
Age of mother			**0.98**
Age of child			**1.02*** **
Birth order			**1.15****
Last birth interval			**0.99**
Constant	**1.33*** **	**1.47**	**0.96**
-2LL	**3230.4**	**3150.6**	**2014.7**

*(Here, * denotes p<0.05, ** denotes p<0.01 and *** denotes p<0.001)*

In this model, as compared to children with uneducated mother, the odds are 0.78 and 0.7 times less for children with mother's education 1-9 years and at least 10 years for being under-nourished indicating significant positive impact of maternal education for the betterment of nutritional status of children, controlling for other variables. Similarly, with reference to the children belonging to the poorest wealth index category, the odds ratios gradually but significantly decline to 0.35 for the children in the richest wealth index category. The result shows that maternal education and the household wealth index interact each other to have an impact on nutritional status of children.

In the third model, it is found that there is no significant net effect of maternal education on under-nutrition of children while controlling for other demographic and socio-economic variables. The odds ratios for education in the third model did not change much as compared to those of second model but lost their significance. But the wealth index has retained its significance after controlling for demographic and socio-economic variables. Age of child and birth order showed significant net effect of very small magnitude on child under-nutrition. With reference category of children in the poorest wealth index strata, the odds ratios decline gradually but significantly up to the richer category to 0.47 and to 0.49 for the richest category. Finally, wealth index appear to have stronger influence than maternal education to have an impact on nutritional status of under-five children.

Discussion

Under-five children in Nepal have poor nutritional status in terms of chronic under-nutrition. Stunting in Nepal is quite high (40 percent) than the world average (26 percent). A substantial variation in the extent of under-nutrition exists within country in different regions, by different socio-economic characteristics and different demographic characteristics. Maternal education, which showed a significant negative impact on child under-nutrition, gradually loses its significance in presence of other socio-economic and demographic variables.

As **Sandiford et al. (1995)** indicated, mother's formal education is important for promoting child health and this is independent of other social and economic advantages and wealth. But the situation is bit different in Nepal. Wealth index, which is proxy of economic status of the family, attenuated the effect of maternal education on nutritional status. This might have been observed due to the fact that this paper has used only one component of child health that is based on anthropometric measures and not considered a comprehensive child health indicator. Another study made by **Desai and Alva (1998)** also found that children's height-for-age is closely linked to mother's education but introduction of variables reflecting family socioeconomic background attenuates these effect. Results of present study are in the same line of this study. More elaborately, they argue that because of the effect of maternal education on children's survival probability, the sample of living children over-represents children of educated mothers and consequently, the effect of maternal education is likely to be slightly underestimated. **Mazumdar (2010)** highlights the influence of poverty in worsening malnutrition, leading to unequal nutritional outcomes among children in India and states that poverty alone explains more than half of the inequality in under-nutrition, which justifies the linkage between poverty and

nutrition. In context of such strong linkage of poverty and under-nutrition, the role of maternal education is likely to be attenuated by economic factors in Nepalese setting too, which is comparable to that of India. The significant association between maternal education and nutritional status of children does not lead to conclude a causal relationship between these two variables. Further in-depth study is desirable to study the mechanism of action through which the other socio-economic factors attenuate the effect of maternal education on nutritional status of children.

Conclusion

In context of such strong linkage between poverty and under-nutrition, the role of maternal education to influence nutritional status of children is likely to be attenuated by economic factors in Nepalese setting. The significant association between maternal education and nutritional status of children does not lead to conclude a causal relationship between these two variables.

References

Desai, S. and S. Alva (1998):"Maternal education and child health: is there a strong casual relationship?"*Demography*, 25(1), 71-81.

Jain, A. K. (1994):"Maternal education and child care," *Health Transition Review*, 4(2), 199-206.

Joshi, A. R. (1994):"Maternal schooling and child health: preliminary analysis of the intervening mechanisms in rural Nepal, *"Health Transition Review*, 4(1), 1-28.

Kravdal, Øystein (2004):"Child mortality in India: the community-level effect of education," *Population Studies*, 58(2), 177-192.

Mazumdar, S. (2010): "Determinants of inequality in child nutrition in India," *Asian Population Studies*, 6(3), 307-333.

Medrano, P., C. Rodriguez and E. Villa (2008): "Does mother's education matter in child's health? Evidence from South Africa," *South African Journal of Economics*, 76(4), 612-627.

Ministry of Health and Population (MOHP) [Nepal], New ERA, and ICF international Inc. (2012): *Nepal Demographic and Health Survey 2011*. Kathmandu, Nepal: Ministry of Health and Population, New ERA, and ICF international, Calverton, Maryland.

Ministry of Health and Population (MOHP) [Nepal] (2012): *Annual Report, Department of Health Services 2010/2011*. Government of Nepal, Ministry of Health and Population, Department of Health Services, Kathmandu.

Mosley, W. H. and L. C. Chen (1984): "An analytical framework for the study of child survival in developing countries," *Population and Development Review*, 10 (Supplement: Child survival strategies for research), 25-45.

National Planning Commission [Nepal] (2010): *Nepal Millennium Development Goals Progress Report 2010*. National Planning Commission, Kathmandu, Nepal.

Panagariya, A. (2013): "Does India really suffer from worse child malnutrition than Sub-Saharan Africa?," *Economic& Political Weekly*, 48(18), 98-111.

Rutstein, S. O. and K. Johnson (2004): *The DHS Wealth Index, DHS Comparative Reports No. 6.* Calverton, Maryland: ORC Macro.

Sandiford, P., J. Cassel, M. Montenegro and G. Sanchez (1995): "The impacts of women's literacy on child health and its interaction with access to health services," *Population Studies*, 49(1), 5-17.

Sivakami, M. (1997):"Female work participation and child health: an investigation in rural Tamil Nadu, India," *Health Transition Review*, 7(1), 21-32.

WHO (2012): *World Health Statistics 2012: Part-I: Health Related Millennium Development Goals*. World Health Organization.

United Nations Children's Fund, World Health Organization, The World Bank (2012): *UNICEF, WHO and World Bank Joint Child Malnutrition Estimates.* UNICEF, New York; WHO, Geneva; The World Bank, Washington, DC.

Ware, H. (1984):"Effects of maternal education, women's roles, and child care on child Mortality," *Population and Development Review*, 10(Supplement: Child Survival: Strategies for Research): 191-214.

Female's Occupation and Facility Based Delivery in Nepal: Role of Free Maternity Care

Komal Prasad Dulal

Abstract: *The purpose of this study is to analyse the effects of free maternity care policy's to increase facility based delivery in Nepal. The result is based on the analysis of net effects of socio-economic and demographic variables before and after policy executed in Nepal. For this purpose, two NDHS women's data file of 2006 and 2011 are used and analysed using Logistic regression. The result shows that some socio-economic variables which are more effective to induce facility based deliveries in 2006 became insignificant and some of the socio-economic variables' effect cancelled out when the free maternity policy executed in Nepal. The gross effects of female's working status reduces after the policy came into execution however controlling socio-economic and demographic variables the net effects remains unchanged. The role of programme was found to be effective.*

***Key Words**: Maternal Health, Facility Based Delivery, Female Working Status*

Introduction

At this time, Nepal is paying more concern to involve more and more number of female through creating new jobs or including them in vacant posts as Nepal interim constitution 2006 also talks on this line. The provision, though started late, might be due to the programmes of action of world fourth women conference stressed on not to have discriminatory work towards female especially in work sector (UNFPA, 2007).

Nepal Demographic Health Surveys have captured some information about the female economic role. Analysis of question on whether they were working in the seven days preceding the survey or had worked in the 12 months before the survey shows that about seven in ten women were currently employed and another one in ten was not employed but had worked sometime during the past 12 months in 2006 but the share of female involvement has decline by 5 per cent in 2011.Similarly, Agriculture is the dominant sector of the economy of Nepal, and most employed persons work in the agricultural sector nonetheless the sector itself is in subsistence level. The survey also revealed that 7 per cent of employed women are manual workers (skilled and unskilled), while 4 per cent are in professional, technical, and managerial fields. Sales and services is an emerging sector in Nepal. Women's involvement in this sector has increased from 7 per cent in 2006 to 12 per cent in 2011.This shifting in nature of female's occupation and involvement in non-agriculture might have affected on their health seeking behaviour to remain healthy for active involvement in economic sector.

Government of Nepal displays its great concern to reduce high Maternal Mortality Ratio (MMR) into the level as set by the international community. FacilityBased Delivery (FBD) in the past was perceived that the service is basically for elite class people and also is the women's affairs to take care in own home. Even developed countries' women perceived that home is the best place for delivery (NPEU, 2010).Many women in developing countries are still assisted at delivery either by traditional

*Komal Prasad Dulal, Assistant Professor at Centre for Population & Development, Purbanchal University, Nepal..

births attendants, relatives or compel to deliver without support of any member of their family.Female education, Role of media, place of residence, health seeking behaviour and the use of family planning devices are significantly important for FBD (Elo 1992; Raghupathy 1996;Shariffand Singh 2002;Paul and Rumsey 2002; Obermeyer, 1993,Ahmed S. and W. Henry Mosley, 2002;Gage and Calixte, 2006). Conversely, several studies show a strong negative association between birth order and the use of health care services (Celikand Hotchkiss 2000; Sharma et.al. 2007). However, a study in Bangladesh indicated that type of assistance utilized at delivery does not differ significantly with the age of the mother (Paul and Rumsey 2002).

A study in Ghana, concentrated to find the reason for institution delivery, stresses on wealth status and highlighted the result that husband and wife's involvement in economic activities is the predictor of FBD(Banermanet et.al.2008).But, the study from India stresses on both income and cultural factors(Munjal et al 2009).Here, out of pocket expenditure (OOPE) is the indication for FBD for which household income is most required. Mohanthy and Shrivastav (2012) have revealed that National Rural Health Mission of India reduced the OOPE in public health sector which has contributed to increase FBD. This is clear indication of policy intervention to increaseFBD.JananiSurakshaYojna (JSY) of India, which provides the cash soon after FBD to support on their direct and indirect cost, also has resulted increased FBD(Devedasan et.al. 2008).It can, therefore, be inferred that policy can breakdown various compulsions in home delivery and encourageFBD to some extent. But, it takes long time to get full success even if dramatic changes occurred in socio-economic sectors. As inferred from many researches, FBD incorporates some integrated costs that are to be borne by attendees of pregnant women.An Ethiopian study has also ravelled out that higher income family has highest proportion ofFBD than national average (Teferra et.al.2012).Similarly, a study by Adamson (2008) also shows that the odds of having FBD increased by 1.49 times as compared to Below Poverty Line (BPL) card holder. This result also alarms some extend the necessity of family income to get FBD.

Moreover, it can be concluded from all these review works, FBD is a cost associated event. Therefore, the family which can bear the associated cost, when they leave home to get health facilities, canonly be reported in health institution. But, the birth is almost universal in all family despite their family profound income source. When the government bring the policy to cut-off all costs that are associated during FBD, still there might be some other factors that restrict couples not to go for receiving FBD. This indicates that there are some barriers for FBD. This does not mean that free maternity care services do not influence FBDs. The current 17 percentage point increment during 2006-2011 in Nepal might be due to the current free maternity care policy. Nepal government brought another policy to bear some transportation cost to support with a small amount of money(DoHS 2005).Still, there was not so much improvement seen after this policy came into execution. The revised version of programme was brought in 2009 and now FBD is free of cost. These kinds of services are available in most of the health institution (hospitals, Primary Health Care Centres and some birthing centres) covering some community and private institution (DoHS 2009). In this scenario, it is expected that

there should be no such differences in receiving service despite female's different occupation. However, Female occupation gives greater command over autonomy and decision making, the earning that comes from female mostly goes for child and her own health care (Basu and Basu 1991). According to this argument, all employed female are expected to go for FBD. Therefore, this study primarily aims to investigate the effects of female occupation on FBD by comparing two Nepal Demographic Health Survey (NDHS) that are taken simply because the survey in 2006 did not cover the free maternity services and the last one is for the time that covers the services. Along with the main explanatory variable, there are some socio-economic variable which also affects the FBD as found in different studies despite the free maternity services came intoexecution. The effects of these variables are to be compared and analysed.

Objectives: The general objective of this paper is to study about the effects in FBD before and after execution of free maternity service policy. Some specific objectives include:

- To find the gross and net effects of women's employment status on FBD.
- To analyse the effects of women's occupational involvement on FBD before and after free maternity service programme launched in Nepal.
- To analyse the effects of selected socio-economic and demographic variables and their role before and after free maternity service policy.

Data and the Methods

Two years' survey data, NDHS-2006 and NDHS-2011, files have been used for the analysis. These surveys have captured 10793 and 12674 all women of reproductive age (15-49 years) respectively in 2006 and in 2011.Out of them, only 4006 and 4104 currently married women in the age group 15-49 who have given birth to last child during the five years earlier the respective survey are covered here for the analysis. The sampling and other procedure can be observed in detail through NDHS-2006 and NDHS-2011 full report, available freely and also downloadable. For the Dependent variable, FBD is newly constructed and has made dichotomousby those who have given last birth in health institution and is coded as '1'for response *yes* and those who have given birth elsewhere than health institution is coded as '0'.Here, health institute covers all type of health institute either government or non-government and irrespective of level of maternity care provided by them. Women and husband's education and employment level, birth order, media exposure, use of family planning, place of residence, development regions, age of women, ANC visitetc. are taken as independent variables by changing its categories of its own for this research paper. Association of predictor variables and the outcome variables are observed by using chi-square test and then binary logistic regression has been used for getting gross and net effects. Different models are constructed to see the effects of female occupation on FBD. Final conclusions are made on the basis of comparing with different models.

Results

Facility Based Delivery: Before and during Free Maternity Care Service period

Table 1 and 2 shows the distribution of currently married women who have FBD or not in their last birth by some selected background characteristics. Ithas been observed that the highest percentage (27) of women of age less than 20 had utilized FBD in 2006 whereas only 14 per cent of age 30 plus had the same experience in the same survey year. Conversely, the proportion has been observed double in survey year-2011for the same age category than the survey year-2006. The result is significantly associated in both the survey. Similarly, FBD in the Terai region has increased significantly in 2011 than 2006. Similarly, about 41 percent women whose husband's educational level was at School Leaving Certificate (*SLC; equivalent to Matriculation in India)* and above had utilized FBD to their last child in 2006 and the proportion has increased to 64 percent in 2011.The proportion hassignificantly increased in other educationallevel too. The percentage of women in higher education has also increased from 5 percent to 15 percent during the period and this might have played significant role to increase the utilization of FBD in 2011. But, it is more rationale to check the effects of increase in education statistically. When looked into Table 2 as compared to Table 1, all remainingcovariates, for instance, mass media exposure, development region, place of residence and working status of women, ANC visit and even in birth order, are significant and has increased the proportion of FBD in latest survey-2011.Thesepositive results can be said to be as a result of free maternity scheme that was brought in 2009 by government of Nepal. Still, the change in some socio-economic sector might have equally played the important role to go for the utilization of FBD in Nepal.

Female OccupationandFacility Based Delivery

As mentioned earlier that this study tries to analyse the situation of FBD before and after the free maternity policy executed by Government of Nepal, model 1inTable 3describes that the odds of using FBD among the women involved in agricultural sector reduces by 0.2 times than the women who are not working. But, it increases by 1.43 times among the women who are involved in non-agricultural sector. This gross effect is highly significant in 2006. Conversely, the result is insignificant in 2011.The reason behind the situation might be due to the execution and implementation of free maternity services. It is because;FBD in 2006 was believed to be costlier. Only women from good household income were getting service at that time. On the other hand, this perception gradually declined after the execution of free maternity policy even though, the result is not tested with the question on *"Didwomengo for FBD due to free maternity services"*. This part of analysis remained unexplained in this analysis.

The model 2 is the net effect of female's occupation on FBDby controlling other variables. The odds of using FBD by women working in agriculture sector reduces by 0.413 times than the women who were

not working in 2006, after controlling other variables. Then again, the result is insignificant among the women working in non-agriculture sector both in NDHS-2006 and NDHS-2011.Whereas, comparing the result of Model-2 and Model-4 of the same Table-3, the reduction inFBDamongwomen working in agriculture sector is no more different after controlling other variables in both reference periods.One important mechanism forsuch result is free maternity care that was executed since 2009 which also tried to cover all women despite their occupation. Another, important things to be considered here is thatat the time of delivery, the use ofFBD is generally decided by the other member of the family no matter women working in earning sector or not. Although, it can be expected that female earnings can support the expenditure that generally happens during the hospital stay than no earnings until the attendants return home,the result is not in the line as expected as there is no variation among the working women when free maternity service came into execution in Nepal.

Net effects of Some Socio-economic Variables

The model 2 and model 4 are constructed through the same kinds of variables at two different time periods. This is done here to see the effects of these variables in changing context of maternity care in Nepal. Comparing the model 2 and model 4, the net effects of female working status in 2006 and 2011 are both remained unaltered.In 2006, the odds of usingFBDamong women who are literate to class 1-9 and also women having SLC (*School Leaving Certificate equivalent to matriculation or class 10*) and above were 1.65 times and 3.25 times respectively increased as reference to women having no educationby controlling other variables. But, this kind of female's own education's effects on FBDhas declined to some extent and limited to1.48 and 2.30 times respectively in 2011.This is due to the reason that Illiterate females who were lessapplicable to get FBDin 2006 were more benefittedwhen free maternity services initiated in 2009.But, effects of female education on FBD does not abolish after 2009 in case of free maternity services. However, means of transportation and other health complications, order of birth etc. would only be the problems in the latter's case.The Odds of FBDamong women whose husbandshave higher education level is 1.92 times higher than women whose husbands have no any education in 2011, which is just reversed than 2006.This might be due to increased level of consciousness among educated husband.

While analysing the effects on FBDas per existed region yetin Nepal, keeping Eastern Development Region(EDR) as reference category, the oddsof using FBD in CDR increased to 1.8 times and 1.15 times in MWDR in 2006.However, there are no such chances in other regions despite the availability of health systemsfor FBD.Lack of awareness, Observation of disease on time and economic factors are the some of the reasons why the only two regions showed the significant result in that particular year. Notably, there was no such any effect on different development regions of Nepal in 2011.The reason for this might be due to initiating free maternity service throughout the country at once. When government brought the policy to provide free maternity services, thenecessary improvement in

infrastructure and manpower, training etc. went during the due time and there is no such a large improvement in adding the number of beds in any of the hospitals. However, during the time there was acceptable number of facilities available in the Terai region. Terai region as compared to mountain/hilly region had no such probability of reporting delivery at health institution promptly. The significant result of Terai region could have two reasons. First, Terai region has manageable accessibility with increased transportation. Second, the availability of manpower who likes to stay and provide services in the Terai region compared to mountain/hill region. In the meantime, government tried to recruit some health manpower but process could not get consolidated. Therefore, the result of Terai region improved better than other two remaining regions in 2011.Rural area is almost lack of services in the past but after the new health policy adopted by the government, there are well established and round-the year functional health services targeting to rural people especially in maternity care. So, the odds of using FBD among the women living in rural areas as compared to urban areas reduced from 0.42 times to 0.32 times during the two reference periods. Urban centric health facilities might have resulted this.Women of higher birth order generally do not like to report in health institution until she faced major complications during childbirth or several complications faced during ANC visit. The result shown in Table 3explains that the odds of usingFBDamong women having 2-3 births reduced by 0.45 times and 0.32 times in 4 plus birth as compared to first birth in 2011.Conversely, it was 0.35 times and 0.27 times less chance of having FBD among women of same categories in 2006, after controlling all other variables.There might be the impact of free maternity services and availability of the services in the nearby region. Visit to health institution for antenatal check- up in any health institution has been increased since a decade ago and now 85 per cent of pregnant women have visited the institution for at least a visit. This has direct linked to motivateFBD once a pregnant female gets reported to health institution for ANC. Therefore, the odds of FBD among women having at least one ANC visit is 4.2 times than among those who have no ANC visit in 2011which was only 3.7 times in 2006. Age above 30 had significant chance of having FBDbut the result in 2011 is not significant. Media exposure had significant result both in partial and full utilisation in the year 2006however the odds in using FBD among the both partial and full exposure have declined in 2011.

Discussion and Limitations

The study on female occupation and its effects on Facility Based Delivery, based on two consecutive Nepal Demographic Health Surveys,is tried to concentrate on the basis of some variables along with female's work participation sector. It is argued thatthere should not be any such obstacles for getting FBDafter execution of free maternity services and targeting to reduce the inherent cost that lies on receiving FBD. Furthermore, the variation in between working and not working women should slowly minimised hoping that only the person who can spend will go to the hospital for deliverydeleted completely.

Now, Nepal's female labour force participation is in changing phase from agriculture to non-agriculture. Employed women always try themselves to maintain good health because of continuing their job.This notionwill lead them to have good habits of health seeking before some severity occurs. Female in agriculture should do hard work as a result of which the health situation may worsen severely. If the delivery is not reported at health institution that may lead many health problems; not only of her own but also of the newly born babies, dueto lack of maintaining good sanitation and identification of problems associated during the period.

After the execution of free maternity care services by government of Nepal, it is expected that the present variation of FBD among women of working categories should be minimised slowly and there should not be any variation in the long run when we took working status as explanatory variable. The effective implementation of the programme in a democratic manner also depends on the existing socio-economic situation of the place. This part of analysis can further be done in depth. Facility based delivery is also associated with some medical reason such as previous birth/still birth, abortions,caesarean section, pregnancy complication etc. But, this study has left to address such issues and is taken as the limitation of the study.

Conclusion

Facility based birth is the ultimate goal of government and the international community to make a safe and conducive milieu to get medical assistance that required for the newly born baby and the mother because still most of the maternal death occurred in and around due time of child birth.Two important things to be considered here is thatthe First-agriculture sector of Nepal is not more industrialized than other developing countries and the women working in this sector are only for the subsistence level. So, involving in agriculture sector would no more matters for good household economy. The Second-this analysis has not been investigated in detail on the characteristics of female in not working category. Women from good economic family backgrounds do not like to work in general but can have better life and experience of better health facilities utilization than women in the other profession. Therefore, female'soccupation has no more supportive for FBD. But, this does not mean to discourage the increasing female work participation in Nepal. In this way, It can be concluded that despite bringing and implementing the free maternity services in Nepal, the role and effectiveness of some socio-economic and demographic determinants should not be ignored.As maternity is the special situation in each of the family, association of maternity with other factors, besides female's sole economic role are to be addressed with specific programme. The transition situation of Nepalese women to get involve in income generating work may not be as important forFBDif the current free maternity would reach to lower strata of the people in their own village. Moreover, increasing number of birthing centre in rural village and some incentives provided to female community health workers by the local authority for helping women to reach health institution for delivery may support to produce better result in Nepal.

References

Adamson, Paul C, et al. (2012). "Are marginalised women being left behind? A population based study of facility based deliveries in Karnataka, India," *BMC Public Health*, 12:30.

Ahmed, Saifuddin and W. Henry Mosley. (2002). "Simultaneity in the Use of Maternal Child Health Care and Contraceptives Evidence from Developing Countries," *Demography* 39(1): 75-93.

Bannerman, M, E.O.Tawiah,and D.Badasu. (2008). "Why some women deliver in Health Institution and others do not: A cross- sectional study of married woman in Ghana, 2008," *African Journal of Reproductive Health*, 16(3): 36-47.

Basu,A. and K. Basu. (1991). "Women's Economic Roles and the child Health: The case of India", *Health Transition Review*,1(1):83-103.

Celik, Y and D.R Hotchkiss. (2000). "The socio-economic determinants of maternal health care in Turkey," *Social Science and Medicine* 50:1797-1806.

Devadasan, N, et al. (2008). "A conditional cash assistance programme for promoting Facility based deliveries among poor in India: Process Evaluation results," *Studies in HSO&P*, 24: 257-273. (Access through www.itg.be on 20/04/2013).

DoHS. (2005). *Operational Guidelines on Incentives for Safe Delivery Services 2062*, Nepal: Department of Health Services, Family Health Division, Ministry of Health and Population.

DoHS. (2008). *Operational Guidelines on Safe motherhood programme 2065 BS*, Nepal: Department of Health Services, Family Health Division, Ministry of Health and Population.

Elo, IT. (1992). "Utilization of maternal health care services in Peru: the role of women's education," *Health Transition Review* 2(1): 49-68.

Gage, Anastasia J and Marie GuirleneCalixte. (2006). "Effects of the Physical Accessibilityof Maternal Health Services on their Use in Rural Haiti," *Population Studies* 60(3):271-288.

Lincove J.A. (2008). Growth, Girls' Education and female labour: A Longitudinal Analysis,"*The Journal of Developing Areas*, 41(2): 45-68.

Ministry of Health and Population. (2007). *Nepal Demographic and Health Survey 2006*,Population Division, Ministry of Health and Population, Government of Nepal, Kathmandu, Nepal and Macro International, Maryland Calverton, USA.

Ministry of Health and Population. (2011). *Nepal Demographic and Health Survey 2011*,Population Division, Ministry of Health and Population, Government of Nepal, Kathmandu, Nepal and Macro International, Maryland Calverton, USA.

MohantySK, and A.Srivastav. (2012). "Out of Pocket expenditure on facility based delivery inIndia," *Health Policy and Planning,* Oxford University Press, PP: 1-16.

Munjial, M,P.Kaushik, and S.Agnihotri. (2009). "A Comparative Analysis of Institution and Non-facility based Deliveries in a village of Punjab," *Health and Population: Perspective and Issues*, 32(3): 131-140.

National Perinatal Epidemiology Unit. (2010). *"Delivered with care: a national survey ofwomen's experience of maternity care 2010",* NPEU: University of Oxford.

Obermeyer, CM. (1993). "Culture, maternal health care and women's status: a comparison of Morocco and Tunisia," *Studies in Family Planning* 24(6):354-365.

Paul, BK & DJ Rumsey. (2002). "Utilization of health facilities and trained birth attendantsfor childbirth in rural Bangladesh: an empirical study," *Social Science and Medicine* 54:1755-1765

Raghupathy, Shubhana. (1996). "Education and the use of maternal health care in Thailand,"*Social Science Medicine* 43:459-471.

Shariff, A & G Singh. (2002). *"Determinants of Maternal Health Care Utilization in India:Evidence from a Recent Household Survey,"* NCAER, New Delhi.

Sharma, SK, Y. Sawangdee, & B Sirirassamee. (2007). "Access to health: women's status and utilization of maternal health services in Nepal," *Journal of Biosocial Science, Cambridge* 39:671-692.

Teferra,et.al. (2012). "Institutional Delivery service Utilization and associated factors among mothers who gave birth in the last 12 months in Sakela District, North West Ethiopia: Community based Cross Sectional Study," *BMC Pregnancy and Child Health* 12: 74.

United Nations. (1995). "*Summary of the programme of Action of the International Conference on Population and Development*," New York: United Nations.

United Nations Population Fund. (2007). "*Gender equity and empowerment in Nepal*,"Kathmandu, Nepal: United Nations Population Fund.

Tables

Table 1: Cross tabulation showing the association between Facility Based Delivery and some selected variables, NDHS-2006

Variables	Facility based Delivery,2006		Number	X^2
	Not in Health Institution	In Health Institution		
Current Age				
Less than 20	72.6	27.4	321	32.85***
20-29	80.6	19.4	2525	
More than 30	85.9	14.1	1117	
Ecological Region				
Mountain	93.1	6.9	335	59.874***
Hill	76.7	23.3	1634	
Terai	83.4	16.6	1994	
Husband Education				
No Education	92.2	7.8	949	290.622***
Class 1-9	83.3	16.7	2355	
SLC and above	59.4	40.6	660	
Female Education				
No Education	91.6	8.4	2367	467.35***
Class 1-9	73.0	27	1330	
SLC and above	40.5	59.5	200	
Mass Media Exposure				
Not Exposed	95.9	4.1	882	563.106***
Partial Exposed	87.4	12.6	2034	
Full Exposed	57.6	42.4	1042	
Development Region				
EDR	83.5	16.5	856	111.722***
CDR	73.2	26.8	1297	
WDR	82.8	17.2	727	
MWDR	84.8	15.2	506	
FWDR	92.4	7.6	578	
Place of Residence				
Urban	49.5	50.5	517	401.43***
Rural	86.2	13.8	3446	
Working Status				
Not Working	63.6	36.4	773	464.05***
Agriculture	89.8	10.2	2822	
Non-agriculture	54.9	45.1	368	
ANC Visit				
No visit	96.2	3.8	1041	202.06***
At least One Visit	76.2	23.8	2922	
Birth Order				
First Order	65	35	1047	296.85***
2-3	83.6	16.4	1752	
4+	93.1	6.9	1163	
Use of Family planning Method				
Not Using any Method	84.7	15.3	2380	40.182***
Using any Method	76.7	23.3	1582	

Table 2: Cross tabulation showing the association between Facility Based Delivery and some selected variables, NDHS-2011

Variables	Facility Based Delivery		Number	X^2
	Not in Health Institution	In Health Institution		
Current Age				
Less than 20	45.6	54.4	333	93.99***
20-29	59	41	2619	
More than 30	71.8	28.2	1152	
Ecological Region				
Mountain	79.1	20.9	302	72.225***
Hill	65	35	1645	
Terai	56.4	43.6	2156	
Husband Education				
No Education	81.8	18.2	878	445.13***
Class 1-9	65.4	34.6	2176	
SLC and above	36.4	63.6	1049	
Female Education				
No Education	79.1	20.9	1844	614.06***
Class 1-9	55.4	44.6	1637	
SLC and above	25.2	74.8	623	
Mass Media Exposure				
Not Exposed	80.2	19.8	1144	476.445***
Partial Exposed	60.6	39.4	2457	
Full Exposed	23.5	76.5	503	
Development Region				
EDR	56.9	43.1	988	27.625***
CDR	61.2	38.8	1286	
WDR	59.6	40.4	806	
MWDR	67.6	32.4	590	
FWDR	68.1	31.9	433	
Place of Residence				
Urban	25.4	74.6	413	252.43***
Rural	65.5	34.5	3691	
Working Status				
Not Working	43.7	56.3	1145	458.52***
Agriculture	75.3	27.9	2388	
Non-agriculture	39.7	60.3	569	
ANC Visit				
No visit	92.1	7.9	617	286.541***
At least One Visit	56.1	43.9	3456	
Birth Order				
First Order	40	60	1293	453.60***
2-3	65.4	34.6	1879	
4+	83.4	16.6	933	
Use of Family planning Method				
Not Using any Method	62.5	37.5	2469	2.853
Using any Method	59.9	40.1	1634	

Table 3: Odd ratio showing the gross and net effects of female employment status and some socio demographic variables with Facility Based Delivery, Result of Logistic Regression, NDHS-2006, and of NDHS-2011, Nepal.

Variables	Categories	Based on NDHS, 2006		Based on NDHS 2011	
		Model 1	Model 2	Model 3	Model 4
		Odds Ratio	Odds Ratio	Odds Ratio	Odds Ratio
Female Working Status	Not working®				
	Agriculture	0.199***	0.413***	0.255***	0.418***
	Non-agriculture	1.433**	0.904	1.178	0.858
Female Education	No Education®				
	Class 1-9		1.650***		1.479***
	SLC and above		3.253***		2.302***
Husband's Education	No Education®				
	Class 1-9		1.292		1.401**
	SLC and above		1.320		1.925***
Development region	EDR®				
	CDR		1.819***		0.989
	WDR		1.071		0.957
	MWDR		1.515*		1.119
	FWDR		0.755		0.986
Ecological Region	Mountain®				
	Hill		1.638		1.298
	Terai		1.424		1.667**
Place of Residence	Urban®				
	Rural		0.417***		0.324***
Birth order	First order®				
	2-3		0.356***		0.450***
	4+		0.267***		0.321***
ANC visit	No visit®				
	At least one visit		3.682***		4.181***
Current Age	Less than 20®				
	20-29		0.93		0.791
	30 plus		1.991**		1.011
Media Exposure	Not exposed				
	Partially Exposed		2.618***		1.324**
	Full exposed		4.773***		2.663***
Constant		**0.571**	**0.050**	**1.290**	**0.431**
-2Log Likelihood		**3379.73**	**2586.70**	**5008.45**	**4133.59**

*®=Reference category, ***=p<0.001, **=p<0.01 and *=p<0.05*

Note: EDR=Eastern Development Region, CDR=Central Development Region, WDR= Western Development Region, MWDR= Mid-western Development Region, FWDR= Far Western Development Region