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DETERMINANTS OF DIARRHOEA AMONG CHILDREN BELOW FIVE YEARS OF AGE IN PAKISTAN: A CASE STUDY OF PUNJAB PROVINCE

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Abstract

Diarrhoea is the second leading cause of child death worldwide. This study investigated the determinants of diarrhoea among children under five years of age in the province of Punjab, Pakistan. A sample of 26,079 children below the age of five was drawn from the Pakistan Social and Living Standards Measurement Survey (PSLM) 2014-15. The chi-square test and multiple logistic regression were carried out to identify the determinants of diarrhoea. It was concluded that district, region, age, immunization, roofing material of the house and transport used to reach the nearest health unit were significantly associated with diarrhoea. Age of child, source of drinking water and region were significant predictors of diarrhoea among children under five years of age.

1. Introduction:

Diarrhoea is an infectious disease which can be characterized by abnormally loose and watery stools. It should not be confused with continuous passing of stools of normal consistency as breastfed babies often pass loose pasty stools that can be considered normal. An estimated number of diarrhoeal cases is two billion across the world each year whereas 1.9 million children aged below five years die of this disease in developing countries (Gill, 2017). In under developed countries of the world, the leading cause of morbidity and mortality in children is the diarrhoeal disease. Acute diarrhoea results in death in a few hours after the onset of the disease if proper health care is not provided to such children. Certain household practices that include failure to breast feed exclusively for the first 6 months of life, drinking water that is contaminated with fecal bacteria, using infant feeding bottles, failure to observe the rules of hygiene such as storing cooked food at room temperature, improper disposal of feces (including infant feces) and not washing hands properly after defecation hygienically increase the risk of diarrhoea in children. (Rhamses, 2015). It was observed in Ethiopia that hand washing methods of the mothers/care takers, water source and per capita water consumption of the households, educational status of the mothers and residence significantly predict diarrhoea in children under five (Angesom, 2015).

Diarrhoea is one of the most common diseases in Pakistan. The disease is more prevalent in children, especially the children below five years of age become victims of diarrhoeal disease. The common causes which led to diarrhoea in Pakistan are viral infections, pollution, food poisoning and environmental effects. (Asma, 2014).

About 53,300 children in Pakistan die from diarrhoea each year. Diarrhoea is more common among children in the age group of 6-11 months. Among the four provinces of Pakistan, the prevalence of diarrhoea is highest in KPK province which is 28% followed by Sindh, Punjab and Baluchistan with 23%, 22% and 12% respectively (Pakistan Demographic and Health Survey, 2013). The percentage of diarrhoeal children under 5 years of age in Pakistan is 9 percent in 2014-2015. Eleven percent children under 5 years of age in Balochistan were suffering from diarrhoea in 2014-2015 making it the province with the highest percentage whereas only six percent were having the disease in Sindh, hence the lowest percentage in this province. The other two provinces, Punjab and KPK, have 9 percent and 10 percent diarrhoeal children respectively (PSLM 2014-15).

Numerous studies had been conducted in the past to find incidence and prevalence of diarrhoeal disease, explore risk factors and suggest protective measures against the disease. Children belonging to the families using unimproved sources of drinking water are at a higher risk to suffer from diarrhoeal diseases. Improper disposal of waste and no latrine facility substantially increase the chances to suffer from the disease (Dessalegn, Kumie and Tefera, 2011). Children who are below two years of age are at an increased hazard of developing the disease (Arif and Naheed, 2012; Komarulzaman, Smits and Jong, 2014). Those children who are not immunized or only partially immunized are more likely to develop diarrhoea compared to their peers (Shazma, Naz, Haq, Shah and Jahan, 2016).

Most of the studies conducted in the past have focused on the onset and prevalence of diarrhoea whereas this study has focused on the association and prediction of diarrhoea.

2. Materials and Methods

The Pakistan Social and Living Standards Measurement Survey 2014-2015 conducted by the Pakistan Bureau of Statistics comprising data about living standards of 67,726 households of the four provinces of Pakistan was used for this study and a sample of 26,079 households of the Punjab province was selected for analysis that was 38.5% of the total data. The inclusion criteria for sample lection were the data about children aged below five years and the factors relating diarrhoea. Child age was calculated on the basis of year and month of birth. Pakistan Bureau of Statistics used the stratified two-stage sampling design to collect the data. The variables considered in the study were occurrence of diarrhoea, region, district, child immunization, residential occupancy status, roofing material of the house, source of drinking water, toilet facility, Time to reach the nearest source of drinking water, Transport used to reach the nearest drinking water, Time to reach the nearest health clinic / hospital facility, Transport used to reach the nearest health clinic/hospital facility, Time to reach the nearest Basic Health Unit and age. SPSS 21 and Excel 2013 were used to analyze the secondary data. The chi square test was applied to assess the relationship between diarrhoea and its risk factors. The primary objective of this research was to predict the occurrence of diarrhoea on the basis of a number of associated factors and hence multiple logistic regression was carried out to identify the significant determinants of diarrhoea.

Table 1: Percent distribution of diarrhoeal and non-diarrhoeal children

Variables	**Diarrhoea (Percentage)**	
	Yes (%)	**No (%)**
Region		
Urban	20.6	16.7
Rural	79.4	83.3
Immunization		
Yes	98.7	97.8

No	1.3	2.2
Residential Occupancy Status		
Owner occupied (not self-hired)	88.5	88.7
Owner occupied (self-hired)	0.4	0.3
On rent	3.9	3.8
Subsidized rent	0.3	0.3
Without rent	6.8	6.9
Roofing material of the house		
RCC/RBC	10.3	13.6
Wood/bamboo	20.9	21.8
Sheet/iron/cement	0.6	1.1
T-R/Garder/Wood	67.3	62.3
Other	0.9	1.2
Age		
Less than or equal to 1	20.0	14.8
Between 1 and 2	30.0	19.3
Between 2 and 3	21.9	20.2
Between 3 and 4	17.5	23.2
Between 4 and 5	10.7	22.5
Source of drinking water		
Unimproved	2.9	3.6
Improved	97.1	96.4
Toilet facility		
No	24.5	24.6
Yes	75.5	75.4
Time to reach the nearest source of drinking water		
0-14 minutes	97.4	97.6
15-29 minutes	1.5	1.7
30-44 minutes	0.8	0.5
45-59 minutes	0.0	0.1

60+	0.3	0.2
Transport used to reach the nearest drinking water		
On foot (No transport)	98.3	98.4
Mechanized	1.1	1.2
Non-mechanized	0.6	0.4
Time to reach the nearest health clinic/hospital		
0-14 minutes	50.7	50.7
15-29 minutes	35.5	34.2
30-44 minutes	10.1	11.0
45-59 minutes	2.1	2.2
60+	1.6	1.9
Transport used to reach the nearest health clinic/hospital		
On foot (No transport)	59.5	61.7
Mechanized	37.3	34.7
Non-mechanized	3.2	3.7
Time to reach the nearest Basic Health Unit		
0-14 minutes	34.6	36.6
15-29 minutes	44.2	43.2
30-44 minutes	14.9	14.8
45-59 minutes	3.8	3.0
60+	2.6	2.4

2. Results

Figure 1 is a map of the province of Punjab showing the district wise percentages of children suffering from diarrhoea. There are seven districts where the percentage of children suffering from diarrhoea is 7% or below, 24 districts where it is from 7.1% to 13% and 5 districts where the percentage is between 13.1% and 26%.

District Wise Map of Punjab Pakistan

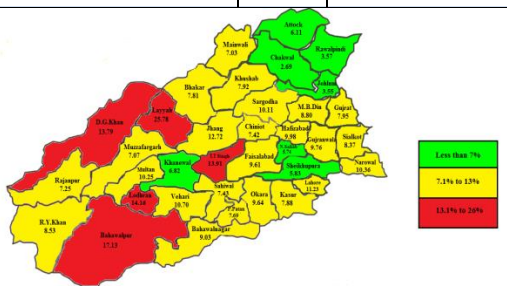

Figure 1: District Wise Map of Punjab Pakistan Showing Percentage of Children Suffering from Diarrhoea in Each District

Immunization factor has a direct relationship with diarrhoea as 98.7% of the children who had diarrhoea were immunized. Taking into account the residential occupancy status, 88.5% of the children whose residential occupancy status is owner occupied (not self-hired) suffered more from diarrhoea as compared to self-hired, on rent, subsidized rent and without rent. Housesholds having the roof material as T-R/Garder/Wood had 67.3% children suffering from diarrhoea as compared to those having other roof materials. The households using unprotected water points as sources of drinking water had 2.9% cases of childhood diarrhoea. Also, 50 % diarrhoeal cases were reported among the children under 2 years of age.

Table 2 shows that district, region, children immunization, roofing material of the house, transport used to reach the nearest health clinic / hospital facility and age appeared to be significantly associated with the occurrence of diarrhoea.

Table 2: Bivariate Analysis

Variables	χ^2
Region	25.317**
District	442.036**
Children Immunization	9.580**
Residential Occupancy Status	0.439
Roofing material of the house	36.314**
Time to reach the nearest source of drinking water	7.743
Transport used to reach the nearest source of drinking water	2.096
Time to reach the nearest health clinic/hospital facility	4.815
Transport used to reach the nearest health clinic / hospital facility	8.347*
Time to reach the nearest Basic Health Unit	8.225
Age	359.754**
Source of drinking water	3.005
Toilet facility	0.011

*P<0.05, **P<0.01

The estimated odds of suffering from diarrhoea for children living in urban areas are 1.372 times the estimated odds for those living in rural areas.

The children falling into the age categories of 2-3 years, 3-4 years and 4-5 years are 0.786, 0.543 and 0.344 times less likely, respectively, to have diarrhoea compared to infants.

The likelihood of having diarrhoea in children residing in houses consuming water from improved sources is 1.281 more compared to those using unimproved water sources.

Table 3: Logistic Regression

Variables	**B**	**Significance (p-value)**	**Odds Ratio**
Region			
Urban	.316	.000	1.372
Toilet Facility			
Yes	-.091	.070	.913
Age Category			
Less than or equal to 1 year		.000	
Between 1 and 2 years	.116	.059	1.123
Between 2 and 3 years	-.241	.000	.786
Between 3 and 4 years	-.610	.000	.543
Between 4 and 5 years	-1.066	.000	.344
Source of Drinking Water			
Improved	.248	.045	1.281
Constant	-2.117	.000	.120

4. Discussion

This study aimed at examining factors significantly affecting the occurrence of diarrhoea in Pakistan's most populous and prosperous province. The highest percentage of childhood diarrhoea was reported in Layyah district whereas the lowest in Chakwal district. Urban or rural residence was significantly associated with the onset of diarrhoea. Immunizing children against diarrhoeal diseases was found to be another factor having

a significant association with diarrhoea. Roofing material of the house and transport used to reach the nearest health clinic/hospital facility were observed to have significant associations with diarrhoea. The maximum hazard of suffering from diarrhoea was investigated in children who were under two years of age. Besides, age of child, region and source of drinking water turned out to be significant predictors of diarrhoea in the province. Infants are more prone to suffer from diarrhoea compared to older children. Children living in urban areas have more exposure of diarrhoea due to overcrowded communities that leads to prevalence of the disease in those areas. Studies conducted by Arif and Naheed, 2012, and Komarulzaman, Smits and Jong, 2014 are in agreement with the conclusion that age significantly predicts diarrhoea in children.

5. Conclusion

Diarrhoea is one of several major causes of morbidity and mortality among children in Pakistan. It was concluded in this study carried out for Punjab province that region, district, children immunization, roofing material of the house, transport used to reach the nearest health clinic/hospital facility and age are significantly associated with diarrhoeal disease while age, source of drinking water and region are significantly predicting the onset of diarrhoeal disease in children under five years of age in the province of Punjab, Pakistan.

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