ASSOCIATION OF SOCIO-DEMOGRAPHIC FACTORS WITH DIARRHEA IN CHILDREN LESS THAN FIVE YEARS: A SECONDARY ANALYSIS OF MULTIPLE INDICATOR CLUSTER SURVEY SINDH 2014

Muhammad Irfan¹, Syed Mustansir Hussain Zaidi², Hira Fatima Waseem³

¹Biostatistician, Department of Statistics, Liaquat National Hospital and Medical College, Karachi, Pakistan.
²Head of Department, Department of Statistics, Liaquat National Hospital and Medical College, Karachi, Pakistan.
³Lecturer, Department of Research, Dow University of Health Sciences Karachi, Pakistan.

Correspondence: Muhammad Irfan. Cell: 0346-3073572, Email: irfanzafar892@gmail.com

Abstract

Background: Diarrhea founds to be the major cause of morbidity and mortality in children less than five years. Various factors are associated with diarrhea but socio-demographic factors are the main key elements, which associated with diarrhea.

Methods: This study was examined association of socio-demographic factors with diarrhea in children less than five years of age of Sindh, Pakistan, using data from the Multiple Indicator Cluster Survey (MICS) conducted from January 2014 to August 2014. Data were collected for 18,108 children in whom 16,449 children had complete data of demographic variables being included in the analysis. Bivariate analysis was done using Pearson's Chi square test and multivariate analysis being done using binary logistic regression.

Results: We found increased risk of diarrhea among children lives in rural areas while household wealth index quintile was also associated with diarrhea. Children in the poor, middle and fourth wealth index quintiles being at increased risk of diarrhea compared to children in the richest wealth index quintile. The highest risk of diarrhea was found for the child having mother with no education as well as children aged 12-23 months.

Conclusion: Age of child, mother education and wealth index found significant with diarrhea while Male children, child aged 12-23 months, child with no mother education, child from rural areas and child from poor households found with high risk of diarrhea.

Keywords: Diarrhea, factors, less than five years, children.

Introduction

Diarrhea is a major cause of morbidity and mortality among children less than 5 years.¹ More than 10 million children die each year in world, of which about 1.5 million die from diarrhea.²,³ Around 16% of deaths due to diarrhea in children under 5 years from which most of these deaths occur in developing countries. These deaths are avoidable by the existing interventions.⁴ Diarrhea continues to be a leading cause of child morbidity and mortality in the developing countries.⁵

Diarrhea accounted for 700,000 deaths in children under five years of age worldwide which make it the second leading cause of child mortality.⁶ The highest rates of child mortality reported in Sub-Saharan Africa and Southeast Asia.⁶ According to Pakistan Demographic and Health Survey 2012-13, 23% of under five children had Diarrhea in past 2 weeks of survey.⁷ This rate was highest (35%) among children 6-11 months old.⁷

MICS 2003 reports 12% of children below the age of 5 years in the two weeks prior to the survey, varying from highest 23% in Nawabshah to lowest 5-7% in Jacobabad, Tharparkar and Larkana.⁸ In urban areas the rate of Diarrhea was found 10% while in rural areas it was reported 13%.⁸ Various socio-demographic factors found as risk factor for diarrhea among children which include age, gender, residency, mother education, and household economic status.⁹ Although many studies has been conducted in developed and developing countries to identify risk factors of diarrhea but most of them were based on small community based studies. Hence, the aim of this study was to assess the socio-demographic factors associated with diarrhea using a Multiple Indicator Cluster Survey (MICS) in Sindh.

Methodology

The MICS, whose methodology is described in elsewhere in detail, ¹⁰ was conducted across Sindh by
the Bureau of Statistics, Planning & Development Department, Government of Sindh in collaboration with support from Pakistan Council of Research in Water Resource (PCRWR) and the United Nations Children’s Fund (UNICEF) from January 2014 to August 2014. Complete Data were collected for 18,108 households. MICS Sindh data set for Children less than 5 years was obtained from UNICEF. Analysis was done for 16,449 children having complete data. Missing and DK (Don't Know) data were removed before performing analysis. Analysis was done by using SPSS version 21. Variables were defined based on MICS-5. Bivariate analysis was done using Pearson’s Chi square test while multivariate analysis was done using binary logistic regression. Significant variables were included in Multivariate analysis. Level of significance was set at 0.05.

Results
Out of 16,449 children, 51.4% were male and 48.6% were female. 9.8% were in age group <6 months, 10.7% in 6-11 months, 18.9% in 12-23 months, 18.6% were in 24-35 months, 21.5% were in 36-47 months and 20.5% were in 48-59 months. Most of the children (61.3%) were from rural areas. 65.6% children of illiterate mothers. It was also found that 2.8% children were never ever breastfeed. About 9.7% of children whose households dispose feces unsafely (left in open). Past 2 weeks prevalence of diarrhea among children was found 28.5% in our data set. Socio-demographic characteristics of Children are presented in Table-1.

Table-1: Characteristics of Children Age <5 years

| Characteristics             | n(%)      |
|-----------------------------|-----------|
| Gender of Child             |           |
| Male                        | 8461 (51.4) |
| Female                      | 7988 (48.6) |
| Age of child (months)       |           |
| <6                          | 1610 (9.8)  |
| 6-11                        | 1757 (10.7) |
| 12-23                       | 3115 (18.9) |
| 24-35                       | 3062 (18.6) |
| 36-47                       | 3531 (21.5) |
| 48-59                       | 3374 (20.5) |
| Area of residence           |           |
| Urban                       | 6369 (38.7) |
| Rural                       | 10080 (61.3) |

Use of ORS was found most common treatment for children with diarrhea. It was also found that male faced more attention for treatment of diarrhea as compared to female children as presented in Figure-1 and Figure-2.
Diarrhea rate was (52%) in male and (48%) in female children. Prevalence of Diarrhea was found slightly more (4%) in males as compared to females. Diarrhea rate was higher among children aged 12-23 months (26.4%). Majority (97.1%) of children aged less than two years were ever breastfed. The highest diarrhea rate (32%) was among children from the poorest wealth index quintile while the lowest rate (7.5%) was in children from households with the richest wealth index quintile. Significant association of diarrhea was found with age of child, mother’s education and wealth index as presented in Table-2.

| Characteristics              | Diarrhea n (%) | P-Value |
|------------------------------|----------------|---------|
| Gender of Child              |                |         |
| Male                         | 2437(52)       | 0.367   |
| Female                       | 2226(48)       |         |
| Age of child (months)        |                |         |
| <6                           | 478(10.3)      | <0.01   |
| 6-11                         | 954(16.3)      |         |
| 12-23                        | 1239(25.4)     |         |
| 24-35                        | 902(19.2)      |         |
| 36-47                        | 763(16.3)      |         |
| 48-59                        | 543(11.6)      |         |
| Ever breastfed               |                |         |
| Yes                          | 3292(97.1)     | 0.647   |
| No                           | 98(2.9)        |         |
| Area of residence            |                |         |
| Urban                        | 1307(38.4)     | 0.825   |
| Rural                        | 1576(61.6)     |         |
| Mother’s Education           |                |         |
| None                         | 3131(66.8)     | <0.01   |
| Primary                      | 711(15.2)      |         |
| Middle                       | 220(4.7)       |         |
| Secondary                    | 320(6.8)       |         |
| Higher Secondary             | 196(4.2)       |         |
| Higher                       | 109(2.3)       |         |
| Wealth index (quintiles)     |                |         |
| Poorest                      | 1498(32)       | <0.01   |
| Second                       | 1317(28.1)     |         |
| Middle                       | 993(21.2)      |         |
| Fourth                       | 527(11.3)      |         |
| Rich                         | 352(7.5)       |         |

chi-square test applied

* child having age<3 years

**Table-2: Association of diarrhea with characteristics of children Age <5 years**

Multivariate analysis was done using binary logistic regression. Children whose households were in the poorest wealth index quintiles were about 1.175 times more likely to develop diarrhea than those whose households were in the richest wealth index quintile. The association between mother education and diarrhea in children was marginally significant. Mothers with no formal education were 1.418 times more likely to develop diarrhea in child than mothers with higher secondary education. Children aged 6-11 months were 4.05 times more likely to develop diarrhea than children aged 48-59 months while those aged less than 6 months were 2.19 times more likely to develop diarrhea than those aged 48-59 months as presented in Table-3.
Table-3: Multivariate Analysis of Diarrhea with Socio-Demographic Factors

|               | B     | Odds Ratio | 95% CI      | P-Value |
|---------------|-------|------------|-------------|---------|
| Wealth index (quintiles) |       |            |             |         |
| Poorest       | 0.161 | 1.175      | 0.995-1.387 | 0.057   |
| Second        | 0.079 | 1.082      | 0.919-1.274 | 0.346   |
| Middle        | -0.023| 0.977      | 0.833-1.146 | 0.776   |
| Fourth        | 0.063 | 1.065      | 0.903-1.256 | 0.456   |
| Rich®         |       | 1          |             |         |
| Mother's Education |     |            |             |         |
| None          | 0.349 | 1.418      | 1.113-1.806 | <0.01   |
| Primary       | 0.365 | 1.441      | 1.125-1.847 | <0.01   |
| Middle        | 0.321 | 1.378      | 1.046-1.815 | <0.01   |
| Secondary     | 0.231 | 1.26       | 0.975-1.628 | 0.078   |
| Higher Secondary | 0.241 | 1.272      | 0.967-1.674 | 0.085   |
| Higher®       |       | 1          |             |         |
| Age of child (months) |     |            |             |         |
| <6            | 0.784 | 2.190      | 1.901-2.521 | <0.01   |
| 6-11          | 1.399 | 4.052      | 3.551-4.623 | <0.01   |
| 12-23         | 1.243 | 3.466      | 3.084-3.895 | <0.01   |
| 24-35         | 0.784 | 2.190      | 1.942-2.470 | <0.01   |
| 36-47         | 0.36  | 1.433      | 1.269-1.619 | <0.01   |
| 48-59®       |       | 1          |             |         |
| Constant      | -2.055| 0.128      | <0.01       |         |

®Reference Category

Multiple binary logistic regression applied

Discussion
The prevalence of diarrhea found higher (28.5%) in this study than previously reported (23.1%) in Pakistan Demographic and Health Survey 2012-13 for Sindh,7 this may be due to lower access to clean water and inappropriate hygienic practices in child care, our study showed that males were positively associated with diarrhea which is supported by same result reported by Siziya et al..11 In a study of the male predominance in the incidence of infectious diseases in children, Green found that the theory of immunodeficiency prevalence among males was not supported by an excess of 2-3% in overt symptoms.12 The risk of diarrhea was higher in male than in female children, agreed with other studies.13-15

Significant association of diarrhea was found with wealth index which is same as reported by, other studies.13,16,17 We found that children with lower quartiles have more risk to develop diarrhea. Boadi and Kuitunen reported the same that children from poor homes had higher diarrheal incidence than their medium wealth and high wealth counterparts.17 Children living in poorer households have higher diarrhea rates than their wealthier counterparts, it may be due to inadequate access to sanitary facilities, unsanitary environments in the home and poor child hygiene. Roots suggested that wealthy parents may be able to reduce risk of exposure due to factors beyond their control, such as contaminated community environments or lack of water.18

In our study, diarrhea was developed in 61.6% children living in rural areas. El- Gilany and Hammad have reported similar findings from Dakahlia, Egypt.19 this may due to the fact that rural residents tend to be poorer than urban residents, which impact the level of hygiene, especially in areas where there is a cyclic drought that may be affecting more the vulnerable rural population.

We also found higher risk of diarrhea in children aged 12-23 months same was reported in another study.20 Protections against diarrhea in the youngest age group may be conferred by several mechanisms such as maternal antibodies against enteric pathogens and current breastfeeding. It is possible that after the age of 6 month, with the introduction of supplementary foods and changing nutritional habits, this protection is lost.13,15,19, 20 The lower prevalence of diarrhea in the oldest age group may be due to acquired natural immunity.

Conclusion
Age of child, mother education and wealth index found significant with diarrhea while Male children, child aged 12-23 months, child with no mother education, child from rural areas and child from poor households found with high risk of diarrhea.

Acknowledgements
This study was made possible by the great field work of Bureau of Statistics, Planning & Development Department, Government of Sindh with technical support by UNICEF Pakistan.

References
1. Bryce J, Boschi-Pinto C, Shibuya K, Black RE, WHO Child Health Epidemiology Reference Group. WHO estimates of the causes of death in children? Lancet.2005;365(9465):1147-52.
2. Black RE, Morris SS, Bryce J. Where and why are 10 million children dying every year?.Lancet. 2003;361(9378):2226-34.
3. UNICEF, Diarrhea-Why children are still dying and what can be done. New York: UNICEF/WHO.2009.
4. Park K. Park?s Textbook of preventive and social medicine. 21st ed. Jabalpur,India: Banarasidas Bhanot Publishers; 2011:528.
5. Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJ. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. Lancet. 2006;367(9524):1747-57.
6. Bhutta ZA, Das JK, Walker N, Rizvi A, Campbell H, et al. Interventions to address deaths from childhood pneumonia and diarrhoea equitably: what works and at what cost?. Lancet. 2013;381(9875):1417-29.
7. Pakistan Demographic and health Survey 2012-13. Available at https://dhsprogram.com/pubs/pdf/fr290/fr290.pdf
8. Sindh District Based Multiple Indicator Survey 2003-4. Available at http://sindhbos.gov.pk/wp-content/uploads/2014/09/Sindh-MICS-Report-2003-04.pdf
9. Siziya S, Muula AS, Rudatsikira E. Correlates of diarrhoea among children below the age of 5 years in Sudan. African Health Sci. 2013;13(2):376-83.
10. Sindh Bureau of Statistics, Pakistan. Available at http://sindhbos.gov.pk/mics/
11. Siziya S, Muula AS, Rudatsikira E. Diarrhoea and acute respiratory infections prevalence and risk factors among under-five children in Iraq in 2000. Italian J Pediat. 2009;35(1):1.
12. Green MS. The male predominance in the incidence of infectious diseases in children: a postulated explanation for disparities in the literature. Int J Epidemiol. 1992;21(2):381-6.
13. Wilunda C, Panza A. Factors associated with diarrhea among children less than 5 years old in Thailand: a secondary analysis of Thailand multiple indicator cluster survey 2006. J health Res. 2009;23:17-22.
14. Melo MC, Taddei JA, Diniz-Santos DR, Vieira C, Carneiro NB, et al. Incidence of diarrhea in children living in urban slums in Salvador, Brazil. Brazilian J Infect Dis. 2008;12(1):89-93.
15. Molbak K, Jensen H, Aaby P. Risk factors for diarrheal disease incidence in early childhood: a community cohort study from Guinea-Bissau. Am J Epidemiol. 1997;146(3):273-82.
16. Hatt LE, Waters HR. Determinants of child morbidity in Latin America: a pooled analysis of interactions between parental education and economic status. Social Science Med. 2006;62(2):375-86.
17. Boadi KO, Kuitunen M. Childhood diarrheal morbidity in the Accra Metropolitan Area, Ghana: socio-economic, environmental and behavioral risk determinants. World Health & Population. 2005.
18. Root GP. Sanitation, community environments, and childhood diarrhea in rural Zimbabwe. JHPN. 2001:73-82.
19. Gilany AH, Hammad S. Epidemiology of diarrhoeal diseases among children under age 5 years in Dakahlia, Egypt. 2005.
20. Costello MA, Lleno LC, Jensen ER. Determinants of two major early-childhood diseases and their treatment in the Philippines: Findings from the 1993 National Demographic Survey. East-West Center, Program on Population; 1996.
21. Mock NB, Sellers TA, Abdoh AA, Franklin RR. Socioeconomic, environmental, demographic and behavioral factors associated with occurrence of diarrhea in young children in the Republic of Congo. Social Sci Med..1993;36(6):8.