

Full Length Research Paper

## Risk factors of diarrhoea in the Mahmood Raghi district of Kapisa province Afghanistan-2010

Jawad Mofleh<sup>1\*</sup>, N. Muserat<sup>2</sup> and N. Ziar<sup>3</sup>

<sup>1</sup>Eastern Mediterranean Public Health Network, Jordan.

<sup>2</sup>Central Region-ANPHI-MOPH, Afghanistan.

<sup>3</sup>DEWS- ANPHI-MOPH, Afghanistan.

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Surveillance data claimed the presence of a diarrhoea outbreak after a flash flood swept off some villages of Mahmood Raqi district in Kapisa province. The water sources were treated with chlorine to stop the outbreak, but still no significant decrease in the incidence of diarrhoeal cases was observed. A case control study was conducted to find the risk factors of diarrhoea in the affected villages, of which approximately 5000 people are living in the affected villages of Mahmood Raghi district of Kapisa province. This study randomly selected 50 cases and 50 control families and applied a structured questionnaire. The control was defined as families that did not have any diarrhoea case in the two weeks prior to the study. The study was conducted on 8 and 9 of August, 2010. In the case families, 93 out of 161 (58%) children of ages under five and 51/451 (11.3%) people of ages over five years complained of diarrhoea. Average family size was 12 and 9.6 among case and control families. Average numbers of children under 5 years were 3.22 and 2 in the case and control families, respectively. Dug well was the main source of drinking water in 32% of the cases and 18% controls. The researchers found that hand washing with clean water and soap after using the toilet and before feeding the children was strongly protective in the controls, odd ratio (OR) = 0.03 (P=0.0000) (uncorrected chi square = 44.1 (P=0.000) and 0.15 (P=0.00072)), respectively. Covering the water pots for kitchen use was strongly protective against diarrhoea (OR=0.06, P=0.000). Education of mother was another protecting factor for children, average years of mothers education was 0.45 year in the cases and 3.1 years in the controls. Poor hand washing practices, improper water storage in the households and types of latrine were associated with the outbreak of diarrhoea. Level of parents' education is the key for prevention and control of diarrhoea in <5 years children. Health education session was conducted to control diarrhoea outbreak in the affected villages.

**Key words:** Risk factors of diarrhoea, outbreak of diarrhoea, case control study, Afghanistan, DEWS.

### INTRODUCTION

At the global level, approximately 10.5 million children aged 0 to 59 months die each year (Black et al., 2003), and 70% of these deaths are due to five health problems; diarrhoea, pneumonia, measles, neonatal tetanus and malaria (World Health Organization, 2012a). World Health Organization estimated in 2007 that approximately 4 billion cases of acute diarrhoea occurs annually, of

which 88% are attribute to un-safe water, inadequate sanitation and hygiene and 1.8 million die of the same problem annually (World Health Organization, 2007).

Diarrhoea is one of the killers of children in Afghanistan. Over a million children under-five years of age Afghanistan were dying each year, mostly from diarrhoea diseases, acute respiratory infections and

\*Corresponding author. E-mail: [jmofleh@yahoo.com](mailto:jmofleh@yahoo.com). Tel: +962779691966.

measles (Management Science for Health, 2006). Multi Indicator Cluster Survey (MICS, 2003) showed that the prevalence of diarrhoea among children aged less than 5 years old is 30% (UNICEF, 1997, 2000, 2003). As per the World Health Statistic Report (2012b), the number of deaths due to diarrhoea in children under five years of age has decreased in Afghanistan from 17/1000 in 2000 to 16/1000 in 2010. For every one child that die due to diarrhoea in Iran, there are four children dying for the same reason in Afghanistan and for every two children dyeing due to diarrhoea in Pakistan, three are dying in Afghanistan.

Regional averages of death due to diarrhoea in Eastern Mediterranean (EMR), South East Asia (SEA) and African Regions of WHO (AFR) are 11/1000 children under five years in 2010, which is the highest at the global level. Hence, the average number of deaths in children aged five years and below in Afghanistan is higher than these regions. As earlier mentioned, Afghanistan does not only have the first position in the high mortality rate of diarrhoea in children under five years of age at the regional level, but lead the world with 16 deaths per 1000 children under five years, Somalia also have the same rate of under-five death due to diarrhoea (World Health Organization, 2012c). On the other hand, the number of deaths due to diarrhoea in Afghanistan reduced by 5.9% between the year 2000 and 2010, while this number is 15.4% in EMR, SEA and AFR.

The Disease Early Warning System (DEWS), which is a sentinel based surveillance system in Afghanistan, established in December 2006, by technical support of World Health Organization and financial support of USAID, reported higher rates of diarrhoea from its sentinel sites in affected district of Kapisa in 2010. DEWS reported that 35, 34 and 28% of consultations of all under five years of age children in the DEWS sentinel sites were due to diarrhoea in years 2008, 2009, and 2010, respectively (DEWS Ministry of Health Afghanistan, 2008, 2009; DEWS Ministry of Public Health Afghanistan, 2010).

Surveillance data revealed that higher number of diarrhoeal cases was reported after a flash flood swept off some villages of Mahmood Raqi district in Kapisa province. The water sources were treated with chlorine and still outbreak was not controlled, therefore a case control study was conducted to find the risk factors of diarrhoea in the affected areas.

The specific objective of this study was to find the risk factors associated with diarrhoea in the affected villages to stop the outbreak of diarrhoea. Specifically, this was very much important to find the risk factors associated with diarrhoea, because the Rapid Response Teams chlorinated the water sources in the affected area.

## METHODOLOGY

A case control study was designed and implemented to find risk

factors of diarrhoea in Mahmood Kheil, Haroki, Baloch khil and Najarah villages of Mahmood Raghi district in Kapisa province of Afghanistan. Mahmood Raghi had a population of 48,835 and Kapisa has a population of 35,8240, in 2008 as per Central Statistics Office (CSO) of Afghanistan. Total population of these villages are about 5,000 people. Villages are located close to the centre of the district; people are mainly busy with agriculture, which is the main source of income for these villages. Villagers are all poor to middle class individuals. The villages do not have a basic health centre and attend health facilities of the centre of the district or closed by health centre which is almost an hour by walk from affected areas.

As most of the cases were among children under five years and because the researchers were unable to obtain required information from the children, the team decided to interview the families and care takers of the children. So, a case control study was designed and 50 families were selected as the case families and 50 families were selected as the control families in the affected villages. Case and control families were selected randomly. Families that have diarrhoeal cases at the time of the study were considered case families. Case families were those who had at least one case of diarrhoea who met the outbreak case definition of diarrhoea in the household at the time of the study. Families that did not have cases of diarrhoea at the time of the study and two weeks prior to the study were considered as control families.

Cases and controls were selected in a systematic random way. The teams entered to the villages from east of the villages and selected the first house randomly and every second house was interviewed till they reached to the 50 families for cases and controls. Number of families which was interviewed in the village is proportionate to the size of village population.

The investigation team developed an outbreak specific questionnaire and applied to case and controls during face to face interview.

The team used the standard WHO case definition (World Health Organization, 2012a) of the acute watery diarrhoea to detect acute watery diarrhoea cases in the villages. The case definition of acute watery diarrhoea which was used in this study are subsequently explained.

Acute watery diarrhoea is defined as three or more abnormally loose or fluid stools over the last 24 h. For the sake of this study, the team added component of place and time to the case definition to make sure that only cases from this outbreak is included in the study so the operational case definition was any case with an acute watery diarrhoea is defined as 3 or more abnormally loose or fluid stools over last 24 h, who is living in the affected village of Mahmood Raghi, two weeks prior to the study.

Free version of EpiInfo 3.4.1 which is availed by Centres for Diseases Control and Prevention (CDC) online was used for data entry and data analysis. The study was conducted in part by the outbreak investigation detection and control on 8 and 9 of August, 2010.

## RESULTS

Fifty case families and fifty control families were interviewed. 612 people were living in the case families and 423 people were living in the control families. Median age in the case families were 15.7 years and in the control families were 17.1 years. 161 children under five years were living in the case families and 101 children under five years were living in the control families. 93 out of 161 children (58%) in the case families had diarrhoea and 51 (11.3%) people of age over five years of had diarrhoea

**Table 1.** Demographic information.

Variable	Case families	Control families
Number people	612	423
Median age (years)	15.7	17.1
Children <5 years of age	161	101
Average <5 years age child in the family	3.22	2.02
Diarrhea <5 years of age	93	0
Diarrhea >5 years of age	51	0

**Table 2.** Source of health education/information to the families.

Source of information	Cases (%)	Controls (%)
Radio	80	94
Community Health Supervisors	22	74
Nation Immunization Days Volunteers	58	56
Religious Leaders (Mullah)	52	48
Health Care Workers	20	48

in the case families. In total, 144 out of 612 (24.8%) family members had diarrhoea in the case families. Fifty nine percent of the cases were girls under five years of age and 41% of them were boys of under five years of age (Table 1).

Duration of diarrhoea in children was 2 to 12 days, with a mean of 5.5 days and mode of 3 days. Duration of diarrhoea was associated with the higher number of children in the families. Families who had less number of children, reported higher duration of diarrhoea episode in the children, family with three children and less reported more lengthy duration for diarrhoea episodes of their children, when compared with those families that had more than three children (Odd ratio (OR) 7.078 ranged from 3.105 to 16.13 with a p-value of >0.0000). Also duration of diarrhoea was associated with the level of education of father, children who had fathers with education level of more than 6 years, had more chance to have a shorter episode of diarrhoea than others (uncorrected chi square 8.343 with p value of 0.0019).

Average family size in the case families was 12 people and in the control families was 8.5 people. Average numbers of children of under the age of five years in case and control families were 3.22 and 2, respectively. Average number of living rooms in the case families were 3.74 and in the control families were 3.

Thirty two percent of the cases are using dug well as main source of drinking water versus 18% in controls. 54% of the cases use hand pump as the main source of drinking water while this rate is 70% in controls. There was no association between diarrhoea and source of water.

All cases and controls reported that they received the Health Education Messages (HEM) through multiple

channels. Controls received HEMs through radio (94%), community health supervisors (CHS) (74%), NID volunteers (56%), Health Education Sessions of Mullahs and Health Care Workers (48%) each. Cases reported that they received information from radio (80%), NID volunteers (58%), Mullahs (52%), Health Care Workers and Teachers (22%) and CHS (20%). From the data, the only good source of information for health education to the poor families is radio, which also seems that the controls trust more the health care workers. There was no significance difference between the major sources of health education and its association with diarrhoea (Table 2).

Hand washing at the critical times is another variable under study, the team has found that 74% of the controls versus 10% of caretakers of the children with diarrhoea washed their hands with clean water and soap after using the toilet (uncorrected chi square =73.77 with a p-value of <0.0000), 64% of controls and 8% of the caretakers of children with diarrhoea washed their hands with water and soap before feeding their children (OR 0.04: range 0.01 to 0.15), 44% of the controls and 8% of cases were washing their hands before eating (uncorrected chi square 5.077 with a p-value of =0.01212). The habit of washing hands with clean water and soap were reported for 50% of controls and only 12% for cases (Table 3).

Education of parents and diarrhoea in their children was also studied. Average years of education for mothers of cases were 0.45 year and for fathers of the cases were 1.6 years; it was 3.1 and 5 years, respectively in mothers and fathers of the controls. No significance was detected. Hence, water storage at the household level was studied by the team, 84% of the controls reported that they cover the water pots for kitchen use and 70% of the cases

**Table 3.** Hand washing practices and diarrhoea.

Hand washing at critical times	Controls (%)	Cases (%)	Uncorrected chi square	P-value
Hand washing after using toilet	74	10	73.77	<0.000001
Hand washing before eating or feeding child	64	8	5.077	0.01212
Hand washing before cooking food	64	8	34.02	0.00000
General- habit of washing hands with clean water and soap	50	12	13.92	<0.000191

reported that they do not cover water pots for kitchen use (OR 12.25: range 4.24 to 36.68).

Eighty percent of the cases were taken to nearest health care facilities for their current episode of diarrhoea and 60% of them used oral rehydration salts (ORS) for this episode of diarrhoea. The mean reported walking time to nearest health facility was 40 min.

## DISCUSSION

Diarrhoea is a major killer of children all over the world; diarrhoea is the second major killer, first is pneumonia as per World Health Organization, poor access to safe drinking water, basic sanitation and poor hygiene cause nearly 90% of all deaths from diarrhoea. Proper hand washing can reduce prevalence of diarrhoea by 32% (Ejemot et al., 2009) to 45% (Lorna et al., 2005), other risk factors are under nutrition, having a covered latrine within the compound of the house, environmental sanitation, level of education of care takers of children and type of storage of drinking water in the house. This study once more proved that access to safe drinking water is not the only intervention that can reduce the incidence of diarrheal disease especially in children under five, that their health is directly related to the believe, knowledge and attitude of their caretakers. This study provided the insight that lower levels of education of the caretakers are associated with the higher incidence of diarrhoea in children and also duration of each diarrheal episode.

A finding which is not reported in other studies is that the higher number of children in the households are negatively associated with the episodes of diarrhoea and also duration of each episode of diarrhoea, this suggest a that younger parents do not have enough experience to protect their children from diarrhoea and also once the child has contracted the disease they cannot treat him in a proper way, while older parents apply their experience effectively to prevent their children from diarrhoea and also treat them more effectively than the younger parents. Hence, special education or awareness session on prevention and control of diarrhoea for young parents may reduce prevalence of the diarrhoea among children under five years of age and also the duration of each episode of diarrhoea.

## Conclusions

The first key recommendation to stop outbreak of acute watery diarrhea is provision of safe drinking water (Center for Diseases Control and Prevention, 2010), then the other recommendation such as safe water storage and hand washing. We presented an outbreak investigation that the source of outbreak was not water but the other risk factors at the family level. This outbreak was associated with poor hand washing practices, improper water storage in the households and types of latrine in the household. It is important to be reminded that diarrhoeal episodes can be reduced by 25% through improving water supply, 32% by improving sanitation, 45% through hand washing, and by 39% via household water treatment and safe water storage (Lorna et al., 2005). Level of parents' education is the key for prevention and control of diarrhoea in children under five years of age.

Mass awareness campaign through mosques, schools and health facilities conducted which helped reduce incidence of diarrhoea in the affected villages and number of cases come down to the endemic level.

## RECOMMENDATION

Apart from long term solutions to reduce the incidence of diarrhoea in the country, e.g. increase literacy rate, provide safe drinking water, canalization and proper handling of sewage systems in the cities which for sure greatly contribute in reduction of the incidence of diarrhoea in the country. ministry of health and other health stakeholder should consider disease education and prevention of the prevalent diseases and conditions through schools, mosques and health care facilities and provide enough social mobilization and community awareness materials that every house can have access to some types of these materials.

Radio being the main source of health education message should be used effectively to transmit the proper health education messages to the families. Special sessions on diarrhoea prevention and control for young parents may reduce the prevalence of diarrhoea and duration of each episode of diarrhoea.

Training community health volunteers on diarrhoea

case detection, reporting and treatment of mild to moderate cases and providing enough supply of ORS is strongly recommended which may help reduce the incidence of severe cases and related mortalities due to long duration and recurrent episodes of the disease.

## REFERENCES

- Black R, Morris S, Bryce J (2003). Where and why are 10 million children dying every year? *The Lancet*, 361(9376):2226-2234. Retrieved 2012.
- Center for Diseases Control and Prevention (2010). Emergency Preparedness and Response. Retrieved from Acute Watery Diarrhea and Cholera: Haiti Pre-decision Brief for Public Health Action: [http://emergency.cdc.gov/disasters/earthquakes/haiti/waterydiarrhea\\_pre-decision\\_brief.asp](http://emergency.cdc.gov/disasters/earthquakes/haiti/waterydiarrhea_pre-decision_brief.asp).
- DEWS, Ministry of Health Afghanistan. (2008 and 2009). Annual reports. MOPH.
- DEWS, Ministry of Public Health Afghanistan. (2010). *Weekly reports*. Ministry of Public Health. Retrieved 2012.
- Ejemot RI, Ehiri JE, Meremikwu MM, Critchley JA (2009). Hand washing for preventing diarrhea. *Cochrane Database Syst Rev*. 23(1):CD004265.
- Lorna F, Rachel B, David K, Wayne E, Laurence H, John M (2005). Review: Water, sanitation, and hygiene interventions to reduce diarrhoea in less developed countries: a systematic review and meta-analysis. *The Lancet*, 5(1):42-52.
- Management Science for Health (2006). *Mid-Term Evaluation of the Rural Expansion of Afghanistan's Community Based Health Care (REACH) Program*. USAID-Ministry of Health Afghanistan. Retrieved 2012, from [http://www.msh.org/afghanistan/pdf/CD/EOP\\_HHS\\_Report.pdf](http://www.msh.org/afghanistan/pdf/CD/EOP_HHS_Report.pdf).
- UNICEF. (1997, 2000 and 2003). Multi Indicator Cluster survey (MICS). UNICEF. Retrieved 2012.
- World Health Organization (2007). Combating water born diseases at the household level. International Network to Promote Household Water Treatment and safe storage. World Health Organization. Retrieved 2012, from [http://www.who.int/water\\_sanitation\\_health/publications/combating\\_di\\_seasepart1lowres.pdf](http://www.who.int/water_sanitation_health/publications/combating_di_seasepart1lowres.pdf).
- World Health Organization (2012a). Health Topics. Retrieved from Case Definition of Diarrhea: <http://www.who.int/topics/diarrhoea/en/>
- World Health Organization (2012b). Media Center Fact sheet N°178. Retrieved 2012, from Children: Reducing Mortality: World Health Organization Fact sheet: Fact sheet N° <http://www.who.int/mediacentre/factsheets/fs178/en/index.html>.
- World Health Organization (2012c). World Health Statistics 2012. World Health Organization. Retrieved December 2012, from [http://www.who.int/healthinfo/EN\\_WHS2012\\_Full.pdf](http://www.who.int/healthinfo/EN_WHS2012_Full.pdf).