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DETERMINANTS OF DEATH RATES IN PAKISTAN: AN EMPIRICAL ANALYSIS

SHAHID MANZOOR SHAH[1], NOORIA SHAMS-U-DIN[2]

ABSTRACT

This paper presents a wide look on the present condition of less develop country like Pakistan. In Pakistan, there is poor water, sanitation and environmental protection services which further cause to increase diarrhea and other health related problems. Heavy metals polluted the environment badly. The water and sanitation extension program (WASEP) project, handled in selected villages in Northern Pakistan between 1997 and 2001, was designed to deliver a rid of segregated package of activities to improve clean water supply at village and household levels, sanitation facilities and their use, and awareness and practices about hygiene behavior. The primary basis of the decade is to improve the health of the people: as PSLM report, diarrhea is seriously affected the children especially the new born. Diarrhea disease is the second chief cause of death in children under the age of five. Highest percentage of diarrhea cases were reported in Baluchistan with 11% n 2014-15 as compared to 14% in 2012-13 & lowest cases were reported in Sindh with 6% in 2014-2016 as compared to 9% in 2012-13. Peshawar with 16%, Kalat with 31% have the highest percentage of cases reported with diarrhea in last 30 days within particular provinces. This study was examined on the northern areas of Pakistan and concluded that there are more than 9% diseases emerged due to improper water and sanitation services. Most likely 4 billion cases of diarrhea annually comprise, 5.7% of the global disease burden in the year 2000(according to the WHO report of 2002). One of the major problems is the installation of conserved resources that are far away from the home. The transportation of water, the quality of water is quite lower in home as compared to the source. Government of Pakistan should make policies that aim to improve water quality through source improvements. Household water storage must be taken into account.

Keywords: Diarrhea, Sanitation, Crude Death Rate, CO2 Emission, Sustainable, Adulterate, Enrollment Rate
JEL Codes: P28, J17

[1] Lahore School of Accountancy and Finance, University of Lahore.
[2] University of the Punjab, Lahore.

I. INTRODUCTION

Drinking water polluted with different chemicals and heavy metals, freed from different anthropogenic sources has become a global interested (Rapant and Krcmova, 2007). The economy of Pakistan is suffering from huge amount of deaths due to the fact of polluted water, poor sanitation and health facilities. There are several causes, in which water comes first. Kemp et al. (2010) suggested that different developmental activities, such as mining, cause great risk to human rights to approach to clean drinking water. Water is polluted by so many reasons which causes diarrhea especially in children. In the years 2005 to 2007, a figure of 1,400 deaths due to diarrhea, malaria and malnutrition can be directly assign to poor water and sanitation provision globally. The polluted water resources have important source for the environment and human health (Emmanuel et al., 2009; Muhammad et al., 2011). Improper sanitation system which effects the environment as well. Diarrheal disease is one of the major cause of deaths in Pakistan. Pollutants concentration in the water effects the health badly. One primary audience consists of people working in the health sector and the second audience consists of people working in finance and planning ministries. Drinking water polluted with animal and human feces is the routes cause of diseases to human beings. Poor water supply, little chlorination and sewage flooding seem to be attached with self-reported diseases (Abu-Amr and Yassin, 2008). The purpose is to provide information about what works—specifically, the cost-effectiveness of health interventions in a variety of settings. New epidemic diseases like AIDS are emerging; and the health of the poor during economic crisis is a source of growing concern. A valuable dimension of globalization has been the diffusion of knowledge about what these interventions are and how to deliver them. The purpose is to the health improvement in that country much more than its level of income. Bacteria is added into the water and cause serious harms to the society, mostly in urban areas. Such focusing takes place due to the worsen water pipe lines and poor sewerage system. In order to reduce the health risk, it is necessary to stop the uses of drinking water from adulterate sources and government should supply treated/clean water with supply lines far away from solid waste, mud and sewage sites. Improving water, sanitation and hygiene has the capacity to stop at least 9.1% of the disease burden (in disability-adjusted life years, DALYs) or 6.3% of all deaths globally (Pruss Ustun et al., 2008). Other studies estimate an even higher mortality burden (e.g. Kosek et al. 2003). Recent World Health Organization (WHO) evaluate for children (0–14 years) put the annual global diarrheal death over 1.8 million, far in surplus of the toll for tuberculosis (81,000), malaria (844,000) and HIV/AIDS (302,000) put together (WHO 2008a). Recent work by WHO has begun to address this gap by producing a methodology for quantifying the health contact related to incomplete water supply and sanitation fullness at both national and sub-national level (Fewtrell et al. 2007). New research suggests that fast declines in the U.S. child mortality rate in the early twentieth century were largely a result of improvements in water quality (Cutler and Miller 2005).

II. LITERATURE REVIEW

Khan et al., (2013) explore the drinking water quality and human health risk in Charsadda district, Pakistan. Access of safe drinking water is one of the basic human right. The study explored the pollutants concentration in the water that badly affected the health of Charsadda district. Khyber-Pakhtunkhwa, Pakistan. Water supplies from hand pumps, tube wells, rivers and canals. It was investigated that the attentiveness of nitrate and bacteria seriously forced the health of the people who belongs to that area. In order to reduce the health risk, it is necessary to immediately stop the uses of drinking water from adulterate sources and government should supply treated/clean water with supply lines far away from solid waste, sludge and sewage sites. Farmers should be properly trained in regards to the selection or agrochemicals, both men and women should be properly educated. Awareness and training programs are needed in for sustainable management use of drinking water. Fewtrell et al., (2005) explores the water, sanitation and hygiene interventions to reduce diarrhea in less developed countries like Pakistan. Many studies have disclosed the results of involvement to reduce illness through pure drinking water. It is one of the leading causes of mortality in less developed countries, especially among children under the age of 5. Water supply involvement included the supplying of a new or improved water supply, or improved allocation. This could be at the public level or household level. Hygiene interventions were those that included hygiene and health education and the motivation of certain behaviours, such as hand washing. This review recognizes many research questions that need more attention: the role of group versus household connections within water supply interventions, the role of sanitation interventions in the reduction of diarrheal illness, and the stability of the health-related effects of individual interventions. Kremer et al., (2007) explore the cost-effective constraint of diarrheal diseases and identifies research priorities in this area aimed at finding ways to reduce the diarrheal disease burden. In variation to the empirical knowledge base that exists for traditional child health programs to reduce diarrheal morbidity and mortality, verification on the

relative effectiveness and cost effectiveness of various environmental health interventions is limited and subject to significant methodological covers. In order to identify cost-effective means of smoothing long-term behavior change and technology affection, additional research is needed that compares alternative messages and alternative message delivery avenues in several cultural scene. Oliveira et al., (2005) explore Global burden of diarrheal disease traceable to the water supply and sanitation system to measure the impact of the water supply and sanitation system on diarrheal diseases among children aged under five. The global burden of diarrhea was calculated based on the traceable population fraction, using information on prevalence and relative risks from the 2000/2010 censuses and a study by Pruss et al. Diarrhea is considered one of the major causes of morbidity and mortality in developing countries. Need is to improve the quality of water, especially for drinking purposes. These measures and mainly those related to the reduction in diarrheal diseases, bring about economic and social benefits to the entire population, and consequently improve the quality of life and reduce health expenditures. Dyer et al., (2000) explore alcohol-free Instant Hand Sanitizer Reduces Elementary School Illness Absenteeism is related to transmissible infections. Rates of transmission can be reduced by hand washing with soap and water, but such washing occurs infrequently. In response to the need for hand sanitization in situations where soap and water are not readily available, and time is limited. In summary, this study determined that daily use of the SAB instant hand sanitizer with at-will hand washing using soap and water significantly decreased absences due to acute communicable illness. Dill et al., (2008) explore the Government of Pakistan; Pakistan environmental protection agency, improving the quality of water for purposes of drinking, domestic consumption, personal hygiene and certain medical situations has always been among the top priority goals of the Government of Pakistan. Bacteria is added into the water and cause serious harms to the society, mostly in urban areas. Such concentration takes place due to the deteriorated water pipe lines and poor sewerage system. A second strong source for ground water contamination in irrigated and industrial areas is chemical pollution from toxic substances from the industrial effluents, textile dyes, pesticides, nitrogenous fertilizers, arsenic and other chemicals. For the sake of public health, it is absolutely essential to establish drinking water quality standards and criteria that are chemically balanced and medically safe. The need is to fight against all the elements that become the cause of poor water sanitation and drinking water system.

Mohamed et al., (2016) explored the environmental assessment of heavy metal pollution and human health risk. Heavy metals are normally occurring elements that have a density at least 5 times higher than of water. Their plentiful domestic, industrial, agricultural and technological usages have led to their widespread distribution in the environment; raising worries over their possible impacts on human health and the environment. Water is an important resource for developing countries. Water not only supplies the water but waste also. Heavy metals and pollutants are added into the water which can cause great harm to the society. Awareness about such metals and pollutants shall be a priority consideration. More segments of such data are needed to be studied. Razak et al., (2015) explore the drinking water studies: a review on heavy metal, application of biomarker and health risk assessment. Rapid development has deteriorated the quality of drinking water. The heavy metals are permissibly added into the water. Biomarkers of heavy metal exposure in drinking water such as blood, urine, hair and toenail have been used in drinking water studies elsewhere. HRA (Health Risk Assessment) is important to be included in drinking water studies because it can be used to estimate the potential of adverse health effects in humans. Inclusion of biomarker in future drinking water studies is necessary to fill up the knowledge gap of heavy metal accumulation in developing countries. Government should help to reduce the health risk in order to attain sustainable water supply. Waddington et al., (2009) explores water, sanitation and hygiene interventions to combat childhood diarrhea. This report is a synthetic review of impact evaluations examining effectiveness of water, sanitation and hygiene (WSH) interventions in reducing childhood diarrhea. The results challenge the notion that water quality treatment in the household and sanitation 'software' (hygiene) interventions are necessarily the most efficacious and sustainable interventions for promoting reduction of diarrhea. Hygiene interventions, particularly provision of soap for hand-washing, are effective in reducing diarrhea morbidity, and there does not appear to be evidence that compliance falls over time. Interventions in water, sanitation and hygiene are usually innovations in that they tend to include a new technology accompanied by information on how to use this new technology. McCormic et al., (1994) investigate wellbeing and monetary impacts of drinking water. This examination looks at the connection between sub-clinical normal sickness, for example, furious stomach and other low-level maladies, and nature of drinking water and water treatment plant qualities. Under the suspicion that low level disease in the grown-up populace is influenced by a steady extent to children's ailment, the quantity of drinking water-related unlucky deficiencies and their related dollar esteem were assessed. A reliable relationship was found between

administrator compensation and primary school non-attendance, controlling for group riches and urbanization. In any case, one can't expect that salary increases will promptly enhance group wellbeing. We trust that the outcomes demonstrate that if changes are made in the nature of drinking water, generous funds will be figured it out.

Nenan et al., (2002) explore the insufficient water and sanitation services adverse effect on the health and socioeconomic development of communities in Northern Pakistan. The water and sanitation extension program (WASEP) project, handled in selected villages in Northern Pakistan between 1997 and 2001, was designed to deliver a rid of segregated package of activities to improve clean water supply at village and household levels, sanitation facilities and their use, and awareness and practices about hygiene behavior. The findings of this study may help clear the approach to future water, sanitation, and hygiene capabilities in northern Pakistan. The combined approach taken by WASEP, which includes engineering solutions with suitable education to maximize facility usage and improve hygiene practices, is a useful example of how wished health benefits can be withdrawn from projects of this type. Esrey et al., (1986) explore epidemiological evidence for health benefits from improved water and sanitation explores the quality of water, is the need of the day. Most of our population in unable to drink pure water due to the insufficient water supply. There is no proper methodology to waste of the human fecal waste. The primary basis of the decade is to improve the health of the people: as PSLM report, diarrhea is seriously affected the children especially the new born. Diarrhea disease is the second chief cause of death in children under the age of five. Highest percentage of diarrhea cases were reported in Baluchistan with 11% n 2014-15 as compared to 14% in 2012-13 & lowest cases were reported in Sindh with 6% in 2014-2016 as compared to 9% in 2012-13, Naushahro Feroze with 12%, Peshawar with 16%, Kalat with 31% have the highest percentage of cases reported with diarrhea in last 30 days within specific provinces. Wright et al. (2004) explore Household drinking water in developing countries like Pakistan: an ordered review of microbiological adulteration between source and point of use examines, a systematic meta-analysis of 57 studies measuring bacteria counts for source water and stored water in the home to evaluate how mixed between settings. The quality of water is poor. The bacteria (Escherichia Coli) caused diarrhea and other diseases. Probably 4 billion cases of diarrhea annually constitute 5.7% of the global disease burden in the year 2000(according to the WHO report of 2002). One of the major problem, the installation of protected resources that are far away from the home. The transit of water, the quality of water is quite lower in home as compared to the source. Policies that aim to improve water quality through source improvements may be understand by post-collection contamination. Household water storage must be taken into account.

Thornton et al., (2006) explore a substructure and guidelines moving towards sustainable water resources management. Water is essential for the survival of every living thing. But the problem is that people are unable to get it as pure as it is on its beginning. This paper presents an abstract framework and instruction that integrates ecological, economic and social consideration through institutional and legal construct to move towards sustainable water management system. Sustainable water resource management is not theoretical wish - it is achieved. Over 90% of the information is required in this-regards. We do not follow the patterns to make water germs free. Information in not an issue, there is need to take a first step in this concern. Gorter et al., (1991) explore water supply, sanitation and diarrheal disease was undertaken in the rural areas. Children from homes with water supplies over 500 meters from the house had countable rates of diarrhea 34% higher than those of children from houses with their own water supply. It is well known that critical diarrheal disease is one of the most important causes of state of mind and mortality in children under five years of age. The higher rate of diarrhea state of mind in houses with more children under the age of five requires little explanation. Secondary transfer of diarrhea is clearly smooth by person to person contact between the children in the house. Family planning programmers or improved housing may have some impact on diarrhea incidence but the effect observed in this study was small excluding where more than four children under five years old lived in the house. Serageldin (1995) explores towards sustainable management of water resources examines the global master plan for the sustainable management of water resources. It pushes the importance of water in human lives and other species as well and super scription the problem of shortage, especially in developing countries. It is noted that likely 1 Billion people lack a self-confident supply of safe drinking water, and that 1.7 Billion have no sufficient sanitation. The approach pressurized that water policies and investment must be of long-term planning as well as to protect food security, health improvement, or environmental protection. It requires the very highest levels of government to take a step in the case of pure national water and sanitation.

III. THE MODEL

Following the previous methodologies, Ali (2011), Ali (2015), Ali (2018), Ali and Bibi (2017), Ali and Ahmad (2014), Ali and Audi (2016), Ali and Audi (2018), Ali and Rehman (2015), Ali and Naeem (2017), Ali and Zulfiqar (2018), Ali et al., (2016), Arshad and Ali (2016), Ashraf and Ali (2018) Haider and Ali (2015), Sajid and Ali (2018), Ali and Senturk (2019), Kassem et al, (2019) and Ali and Bibi (2020). Functional form can be written as:

CDR= f(CO2E,DIA, ISF, ER)
LCDR= α+LCo2E+LDIA+LISF+LER+Ɛ
(WITH RESPECT TO TIME)
L denotes log
CDR= Crude death rate
Co2E= Co2 emission
DIA= Diarrhea
ISF= Improved sanitation facilities
ER= Enrollment rate

IV. METHODLOGY

The use of econometric tools on macroeconomic models is one of the most important features of quantifiable economic analysis. In time series regression, there may be a problem of spurious regression, which can further cause of non-stationary. Time series may be stationary or non-stationary. Stationary time series have long run mean, means, variance and covariance are constant or time in variant. New bold & Granger (1974), Pyndicks (1998) states that stationary is preconditional from moving to any econometric work. Stationarity time series have momentous shocks in which the series return to its mean. Non stationary time series have non constant mean, variance an auto covariance or time variant. Nelson & Plosser (1982) states that mostly time series data have unit root problem. If the data is non stationary, then we move forward to 1st difference approach or data generating process. Non-stationary time series regression has long run mean and variances problems; (a) the time that a regression takes to return to its mean (b) variance will depends on time, as time goes to infinity, variance also goes to infinity. There are several tests of unit root like Dickey fuller, augmented dickey fuller and Phillips Perron. It is the addition of dickey fuller. Dickey-Fuller (1979) test was unable for the incorporation of lags. ADF (1982) includes lagged dependent terms, to check whether the residuals are correlated or not. LM test is proposed for this purpose. When explanatory variables contain lag values, then it will call auto regressive and when dependent variable contain lag values, it will call distributed lag. Dependent variable must be I(1) and independent variables can be I(1) & I(0). It tells us about long run and short run relationships. Bound test is used to check the presence and absence of long run relationships by setting a restriction of concluded F stat. If F stat is greater than upper bound, we conclude that there is long run relationship usually at 1%.

V. EMPIRICAL ANALYSIS

Empirical analysis will show which variable is significant or which is not.

Table 1

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.544965	Prob. F(1,17)	0.4705
Obs*R-squared	1.056075	Prob. Chi-Square(1)	0.3041

Here, p value is greater than at 5% significance level. So, we reject Ho, and concluded that there is no auto.

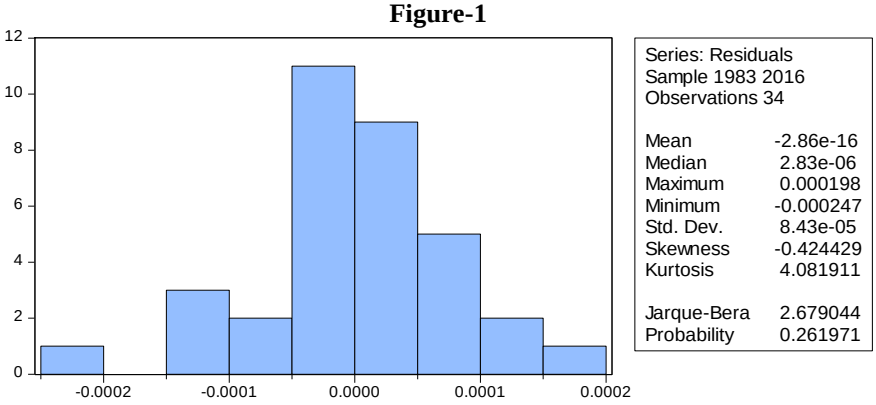
Table 2: Hetroskedasticity

Heteroskedasticity Test: White

F-statistic	1.144708	Prob. F(15,18)	0.3879
Obs*R-squared	16.59911	Prob. Chi-Square(15)	0.3434
Scaled explained SS	7.169059	Prob. Chi-Square(15)	0.9528

Here, p value is greater than at 5% significance level. So, we reject ho, and concluded that there is no hetro. Jarque bera normaity test estimate the stability of residuals and shows normality assumption in which mean is zero and variance is constant (o,∞)

Figure-1



Here, p value is greater than 10%. So we are unable to reject ho, and concluded that residuals are normally distributed.

Table 3: Unit Root Tests

Variables	Level (Constant)	P Value	First Difference	P Value
CDR	I(0)	0.1580	I(1)	0.0536
CO2E	I(0)	0.1401	I(1)	0.0000
DIA	I(0)	0.8920	I(1)	0.0000
ISF	I(0)	0.0000	I(1)	---------
SE	I(0)	0.8160	I(1)	0.0002

To check the co integration between crude death rate, c02 emission, diarrhea, sanitation and enrollment rate we use ARDL Approach. Its F-stat must exceed from at least one of the upper bound value. The Results of ARDL bound test are shown in table 1

Table 4: ARDL Bound Testing Approach

ARDL (1, 1, 1, 0, 1)

Dependent variable CDR

Test Statistic	Value	k
F-statistic	3.995036	4
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Table 5: Estimated Long Run Relationship using ARDL Approach

ARDL (1, 1, 1, 0, 1)

Dependent variable CDR

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CO2_EMISSION	0.488191	0.240036	2.033825	0.0570
DIARRHEA	-1.972598	0.939097	-2.100527	0.0500
IMPROVED_SANITATION_FACI	-0.053871	0.028125	-1.915431	0.0715
SCHOOL_ENROLMENT	0.756906	0.740113	1.022690	0.3200
C	3.316329	1.638022	2.024594	0.0580

Here, F stat is (3.995036) which is greater than upper bound (3.52). So, we reject ho and concluded that there exist co integration between variables. Now we will estimate the long run relationship between crude death rate, CO2 emission, diarrhea, sanitation and school enrollment. The estimated variables for long run relationships are listed below. It shows positive and significant relationship between CO2 emission and school enrollment. Whereas improved sanitation and diarrhea shows negative and insignificant relationship. Functional form is correctly specified. Here, p value is greater than at 10% significance level. So, we are unable to reject ho, and concluded that functional form is correctly specified.

Table 6: Ramsey RESET Test

	Value	df	Probability
F-statistic	2.014904	(2, 16)	0.1658
F-test summary:			
	Sum of Sq.	df	Mean Squares
Test SSR	4.72E-08	2	2.36E-08
Restricted SSR	2.34E-07	18	1.30E-08
Unrestricted SSR	1.87E-07	16	1.17E-08

Here, p value is greater than 10% so we are unable to reject ho and concluded that regression is correctly specified. It is basically used to estimate the error correction representation between crude death rate, diarrhea, co2 emission, improved sanitation and school enrollment.

Table 7: Short Run Outcomes

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DEATH_RATE__CRUDE__PER_1(-1))	1.652940	0.082944	19.928306	0.0000
D(DEATH_RATE__CRUDE__PER_1)	-0.708723	0.085900	-8.250586	0.0000
D(CO2_EMISSION)	0.002504	0.001074	2.331580	0.0315
D(CO2_EMISSION(-1))	0.001566	0.001376	1.138101	0.2700
D(DIARRHEA)	-0.000383	0.005612	-0.068233	0.9464
D(DIARRHEA(-1))	0.009625	0.003521	2.733322	0.0136
D(IMPROVED_SANITATION_FACI)	-0.000092	0.000101	-0.906911	0.3764
D(IMPROVED_SANITATION_FACI)	0.000346	0.000185	1.868637	0.0780
D(SCHOOL_ENROLMENT)	0.016887	0.014265	1.183807	0.2519
D(SCHOOL_ENROLMENT(-1))	0.011698	0.010639	1.099519	0.2860
CointEq(-1)	-0.007880	0.001850	-4.259479	0.0005
Cointeq = DEATH_RATE__CRUDE__PER_1 - (0.4882*CO2_EMISSION				
-1.9726*DIARRHEA -0.0539*IMPROVED_SANITATION_FACI + 0.7569				
*SCHOOL_ENROLMENT + 3.3163)				

In short run analysis, there is positive and significant relationship between school enrollment. Whereas diarrhea, co2 emission and improved sanitation shows negative relationship. CUSUM test is used to ensure the stability of parameters. Regression line is in the boundary that shows stability of parameters. Between 1992-2004, there are many clashes occurs in the Pakistan. In 1992, earth quake aroused in the northern areas caused a slight change in the economy. 1000 deaths due to flood, 167 passengers killed due to airline crash. In 1993, Bombay bombing, US branded Pakistan as a terrorist nation. In 1998, economy moved towards the equilibrium path due to becoming an atomic power in May 28. In 2001, 9/11 attacks were prosed by Al- Qaeda. After that economy moves faster to the equilibrium level and achieved its long run mean position.

Table 8: Diagnostic and Stability Tests

Test	Null Hypothesis	P- value
Jarque Bera Normality Test*	Rediaduals are normally distributed	0.261921
Breusch Godfrey LM Test**	No auto correlation	0.3041
White's Hetroskedasticity Test***	No hetroskedasticity	0.3434
Ramsey RESET Test****	Functional form is correctly specified	0.1658

Figure 2: CUSUM TEST

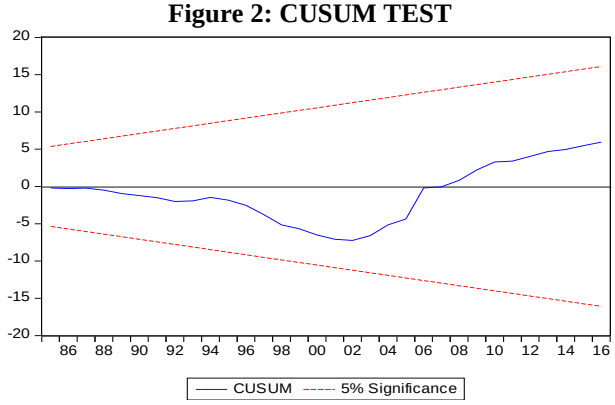
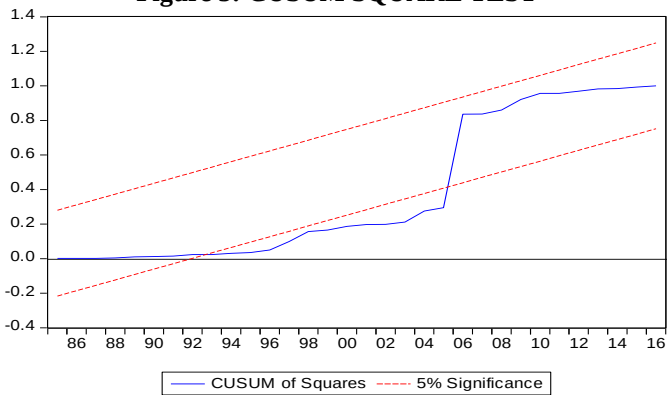


Figure 3: CUSUM SQUARE TEST



VI. CONCLUSIONS

This paper was proposed on the base of the poor water and sanitation in the less developed country like Pakistan. The test was applied on the backward areas of Pakistan, that reveals that there is no proper sanitation and environmental protection services in that areas. The results show the bad impact on the education of that native persons. Water, that is necessary for life, is polluted by so many causes. A great cause of that is diarrhea. It is concluded that the reduction in diarrhea can reduce 9.1% diseases and can reduce 6.3% deaths globally. In Thar, there is no supply of drinking water. They use rain water for drinking and sanitation. Obviously, water is not pure which further causes diarrhea. This study shows the main aspects that plays a strong role in increasing death rates in Pakistan. Diarrhea is mostly found in children. The results show negative and insignificant relationship between school enrollment and improved sanitation. That means 1% increase in school enrollment, on average 0.756906 % decrease in crude death rate in the long run holding other variables constant. 1% increase in improved sanitation, on average 0.053871% decrease in crude death rates in the long run, holding other variables constant. There is positive and significant relationship between diarrhea and CO2 emission. 1% increase in CO2 emission, on average 0.488191 % increase in crude death rates, in the long run, holding other variables constant. 1% increase in diarrhea, on average 1.972598% increase in death rates, in the long run holding other variables constant. It is noted that likely 1 Billion people lack a self-confident supply of adequate drinking water, and that 1.7 Billion have no adequate sanitation. The quality of water is poor. These bacteria (Escherichia Coli) caused diarrhea and other diseases. Probably 4 billion cases of diarrhea annually constitute 5.7% of the global disease burden in the year 2000(according to the WHO report of 2002). It is suggested that Government of Pakistan should take an eye on this problem and make policies that could decrease death rates which arises due to poor water and sanitation. Awareness campaigns can be helpful in this regard.

REFERENCES

Ali, A & Bibi, C. (2020). Public Policies, Socio-Economic Environment and Crimes in Pakistan: A Time Series Analysis. *Bulletin of Business and Economics*, 9(1), 1-11.

Ali, A. & Naeem, M.Z. (2017). Trade Liberalization and Fiscal Management of Pakistan: A Brief Overview. *Policy Brief-Department of Economics, PU, Lahore*. 2017 (1), 1-6.

Ali, A. (2011). Disaggregated import demand functions of Pakistan; An empirical Analysis. M-Phil Thesis, NCBA&E, Lahore, Pakistan, 1-70.

Ali, A. (2015). *The impact of macroeconomic instability on social progress: an empirical analysis of Pakistan*. (Doctoral dissertation, National College of Business Administration & Economics Lahore).

Ali, A. (2018). Issue of Income Inequality Under the Perceptive of Macroeconomic Instability: An Empirical Analysis of Pakistan. *Pakistan Economic and Social Review*, 56(1), 121-155.

Ali, A. and Bibi, C. (2017). Determinants of Social Progress and its Scenarios under the role of Macroeconomic Instability: Empirics from Pakistan. *Pakistan Economic and Social Review* 55 (2), 505-540.

Ali, A., & Ahmad, K. (2014). The Impact of Socio-Economic Factors on Life Expectancy in Sultanate of Oman: An Empirical Analysis. *Middle-East Journal of Scientific Research*, 22(2), 218-224.

Ali, A., & Audi, M. (2016). The Impact of Income Inequality, Environmental Degradation and Globalization on Life Expectancy in Pakistan: An Empirical Analysis. *International Journal of Economics and Empirical Research*, 4 (4), 182-193.

Ali, A., & Audi, M. (2018). Macroeconomic Environment and Taxes Revenues in Pakistan: An Application of ARDL Approach. *Bulletin of Business and Economics* (BBE), 7(1), 30-39.

Ali, A., & Rehman, H. U. (2015). Macroeconomic instability and its impact on the gross domestic product: an empirical analysis of Pakistan. *Pakistan Economic and Social Review*, 285-316.

Ali, A., & Şenturk, İ. (2019). Justifying the Impact of Economic Deprivation, Maternal Status and Health infrastructure on Under-Five Child Mortality in Pakistan: An Empirical Analysis. *Bulletin of Business and Economics*, 8(3), 140-154.

Ali, A., & Zulfiqar, K. (2018). An Assessment of Association between Natural Resources Agglomeration and Unemployment in Pakistan. *Pakistan Vision*, 19(1), 110-126.

Ali, A., Ahmed, F., & Rahman, F. U. (2016). Impact of Government Borrowing on Financial Development (A case study of Pakistan). *Bulletin of Business and Economics* (BBE), 5(3), 135-143.

Ali, A., Mujahid, N., Rashid, Y., & Shahbaz, M. (2015). Human capital outflow and economic misery: Fresh evidence for Pakistan. *Social Indicators Research*, *124*(3), 747-764.

Arshad, S., & Ali, A. (2016). Trade-off between Inflation, Interest and Unemployment Rate of Pakistan: Revisited. *Bulletin of Business and Economics (BBE)*, *5*(4), 193-209.

Ashraf, I., & Ali, A. (2018). Socio-Economic Well-Being and Women Status in Pakistan: An Empirical Analysis. *Bulletin of Business and Economics (BBE)*, 7(2), 46-58.

Bajracharya, D., Brooks, J. T., Clasen, T. F., & Curtis, V. (2003). Water, Sanitation, Hygiene, and Diarrheal Diseases Bibliography EHProject Information Center. *Int J Environ Health Res*, 13(1), S141-152.

Cronin, A. A., Shrestha, D., Spiegel, P., Gore, F., & Hering, H. (2009). Quantifying the burden of disease associated with inadequate provision of water and sanitation in selected sub-Saharan refugee camps. *Journal of water and health*, 7(4), 557-568.

Esrey, S. A., & Habicht, J. P. (1986). Epidemiologic evidence for health benefits from improved water and sanitation in developing countries. *Epidemiologic reviews*, 8(1), 117-128.

Fewtrell, L., Kaufmann, R. B., Kay, D., Enanoria, W., Haller, L., & Colford Jr, J. M. (2005). Water, sanitation, and hygiene interventions to reduce diarrhoea in less developed countries: a systematic review and meta-analysis. *The Lancet infectious diseases*, 5(1), 42-52

Fewtrell, L., Kaufmann, R. B., Kay, D., Enanoria, W., Haller, L., & Colford Jr, J. M. (2005). Water, sanitation, and hygiene interventions to reduce diarrhoea in less developed countries: a systematic review and meta-analysis. *The Lancet infectious diseases*, 5(1), 42-52.

Hafiza, N., Razak, A., Praveena, S. M., Hashim, Z., & Zaharin, A. (2015). Drinking water studies: a review on heavy metal, application of biomarker and health risk assessment. *J. Epidemiol. Glob. Health*, 5, 297-310.

Karim, S., Saeed, K., Rana, M. H., Mubbashar, M. H., & Jenkins, R. (2004). Pakistan mental health country profile. *International Review of Psychiatry*, 16(1-2), 83-92.

Kassem, M. Ali, A. & Audi, M. (2019). Unemployment Rate, Population Density and Crime Rate in Punjab (Pakistan): An Empirical Analysis. *Bulletin of Business and Economics (BBE),* 8(2), 92-104.

Khan, S., Shah, I. A., Muhammad, S., Malik, R. N., & Shah, M. T. (2015). Arsenic and heavy metal concentrations in drinking water in Pakistan and risk assessment: a case study. *Human and Ecological Risk Assessment: An International Journal*, 21(4), 1020-1031.

Khan, S., Shahnaz, M., Jehan, N., Rehman, S., Shah, M. T., & Din, I. (2013). Drinking water quality and human health risk in Charsadda district, Pakistan. *Journal of cleaner production*, 60, 93-101.

Liu, Y., Gupta, H., Springer, E., & Wagener, T. (2008). Linking science with environmental decision making: Experiences from an integrated modeling approach to supporting sustainable water resources management. *Environmental Modelling & Software*, 23(7), 846-858.

McCormic, D., Yu, C., & Hobss, C. (1993). The relevance of antibody concentration to the immunohistochemical quantification of all proliferation antigens. Histopatology, 22, 543-7.

Mock, C. N., Donkor, P., Gawande, A., Jamison, D. T., Kruk, M. E., & Debas, H. T. (2015). Essential surgery: key messages from Disease Control Priorities. *The Lancet*, 385(9983), 2209-2219.

Muhammad, S., Shah, M. T., & Khan, S. (2010). Arsenic health risk assessment in drinking water and source apportionment using multivariate statistical techniques in Kohistan region, northern Pakistan. *Food and Chemical Toxicology*, 48(10), 2855-2864.

Muhammad, S., Shah, M. T., & Khan, S. (2011). Health risk assessment of heavy metals and their source apportionment in drinking water of Kohistan region, northern Pakistan. *Microchemical Journal*, 98(2), 334-343.

Mustapha, A., & Aris, A. Z. (2012). Multivariate Statistical Analysis and Environmental Modeling of Heavy Metals Pollution by Industries. *Polish Journal of Environmental Studies*, 21(5).

Nanan, D., White, F., Azam, I., Afsar, H., & Hozhabri, S. (2003). Evaluation of a water, sanitation, and hygiene education intervention on diarrhoea in northern Pakistan. *Bulletin of the World Health Organization*, 81, 160-165.

Oliveira, A. F. D., Leite, I. D. C., & Valente, J. G. (2015). Global burden of diarrheal disease attributable to the water supply and sanitation system in the State of Minas Gerais, Brazil: 2005. *Ciencia & saude coletiva*, 20(4), 1027-1036.

Prüss, A., Kay, D., Fewtrell, L., & Bartram, J. (2002). Estimating the burden of disease from water, sanitation, and hygiene at a global level. *Environmental health perspectives*, 110(5), 537.

Rahaman, M. M., & Varis, O. (2005). Integrated water resources management: evolution, prospects and future challenges. *Sustainability: science, practice and policy*, 1(1), 15-21.

Sajid, A. & Ali, A. (2018). Inclusive Growth and Macroeconomic Situations in South Asia: An Empirical Analysis. *Bulletin of Business and Economics (BBE),* 7(3), 97-109.

Steenland, K., & Boffetta, P. (2000). Lead and cancer in humans: where are we now? *American journal of industrial medicine*, 38(3), 295-299.

van Wijk-Sijbesma, C. (1995). Gender in community water supply, sanitation and water resource protection: a guide to methods and techniques. IRC International Water and Sanitation Centre.

Waddington, H., Snilstveit, B., White, H., & Fewtrell, L. (2009). Water, sanitation and hygiene interventions to combat childhood diarrhoea in developing countries. *New Delhi: International Initiative for Impact Evaluation.*

Wright, J., Gundry, S., & Conroy, R. (2004). Household drinking water in developing countries: a systematic review of microbiological contamination between source and point-of-use. *Tropical medicine & international health*, 9(1), 106-117.