DETECTION

To my father

Mother

Wife

Daughter

Bothers

Sisters

Hisham

ACKNOWLEDGMENTS

I would like to express my very great appreciation to Dr. Arbab Ismail Babiker Faris, Department of Econometric and Social Statistics – Faculty of Economic and Social Studies, University of Khartoum for his helpful supervision, suggestions and continual support throughout this work.

I would like to offer my special thanks to Dr. Amal Alsir, Department of Applied Statistic - Faculty of Sciences

I would like to thank my family for providing advices and greatest support.

I would also like to extend my thanks to colleague Amani Nazir for her contribution to this research.

ABSTRACT

This research aimed at investigating the main causes of under-five mortality in Khartoum State in 2018. Primary data were collected from stratified multistage sample of households in the state covering mainly socio-economic characteristics of the selected households as well demographic attributes of mothers in these households. Chi-square binary logistic regression and factor analysis were applied to the data collected leading to the main finding that under-five mortality Khartoum State in 2018 is significantly associated with duration of living in the State .fathers education and occupation, mothers age education and occupation, age at the first childbearing number of childbearing, mothers suffer from certain diseases ,medical checkups and their number delivery at hospital and home, delivery under supervision of doctor and midwives, average of breastfeeding, time of child feeding, immunization of mother ,immunization of under 5 years ,and reaction of mother when her baby sick.

Moreover, it was found that the main causes of under-five mortality are age of mother, age at the first childbearing, numbers of medical checkups, duration of pregnancy less than 32 weeks, average of breastfeeding, and mother suffers from diabetes.

Also fourteen indicators were constructed are supervision and place of delivery, socioeconomic characteristics of mother and father , demographic characteristics, mothers health and child feeding, health of pregnancy and under 5 children, reaction of mother on sickness of under 5 children, pregnancy complication, mother exposes alcohol , delivery at primary health, occupation of father, delivery under supervision of others,

mother suffer from blood pressure, exclusive breastfeeding and delivery in other places, the mother goes to the neighboring to bring their child medicine when her child is sick and suffering of mother from certain diseases.

Based on the main findings stated above it is recommended that immunization programmes be expanded to scale up child survival rate. Moreover, to reduce infant mortality quite significantly, the quality and use of skilled care need to be improved. To raise Awareness is important to send educational messages to the community in order to help families learn essential skills and basic health knowledge, particularly in the care of newborns. This includes best practices breastfeeding in and complementary feeding and ideal action when their child is sick. The interventions of the government to contribute in the treatment of underfive children or participate with families it is very essential step to reduce the under-five mortality.

مستخلص

يهدف هذا البحث الى التحقق من اسباب وفيات الاطفال دون الخامسة في ولاية الخرطوم في العام 2018. اعتمد البحث على البيانات الاولية التي تم جمعها من خلال عينة طبقية متعدد المراحل والتي تغطى الخصائص الاجتماعية والاقتصادية للأسر في ولاية الخرطوم والخصائص الديموغرافية بالنسبة للأمهات.

لتحقيق هذه الاهداف تم استخدم مربع كاي وتحليل الانحدار اللوجستي الثنائي والتحليل العاملي لتحليل البيانات. واوضحت النتائج الرئيسية على ارتباط كبير بين وفيات الاطفال دون الخامسة مع عمر الاسرة في ولاية الخرطوم والمستوى التعليمي و الوظيفي بالنسبة للاب وعمر الام وعمر الام عند انجاب اول طفل والمستوى التعليمي و الوظيفي بالنسبة للم وعدد الولادات والمراجعة الطبية وعدد المراجعات الطبية للم الحامل والولادة بالمستشفى والولادة في المنزل والولادة تحت اشراف قابلة وتحت اشراف طبيب ومتوسط فترة الرضاعة الطفل وتحصين الام ضد التيتانوس وتحصين الاطفال دون الخامسة ضد (السل والسحائي والروتا وشال الاطفال والحصبة).

وايضا وضحت الدراسة المحددات الرئيسية لوفيات الاطفال دون الخامسة وهي عمر الام وعمر الام عند انجاب اول طفل وفترة الحمل اقل من 32 اسبوع ومتوسط الرضاعة ومعاناة الام من مرض السكرى.

وعمدت الدراسة على بناء مؤشرات وفيات الاطفال دون الخامسة في ولاية الخرطوم وهى 14 مؤشر (الاشراف على الولادة ومكانها ، الخصائص الاجتماعية والاقتصادية بالنسبة للم والاب ، الخصائص الديموغرافية ، صحة الام و تغذية الطفل ، صحة الام الحامل والاطفال دون الخامسة ، مشاكل الحمل ، تعاطى الام للكحول ، الولادة في مراكز الرعاية الصحية الاولية ، مستوى عمل الاب ، عدم الولادة تحت اشراف القابلة او معاناة الام من مرض الضغط ، الرضاعة الطبيعية ، اعطاء الام طفلها علاج دون استشارة الطبيب ومعاناتها من بعض الامراض).

استنادا على نتائج البحث الرئيسية يوصى بالاتي توسيع برامج التحصين لزيادة معدل بقاء الاطفال على قيد الحياة وللحد من وفياة الرضع لابد من تحسين جودة واستخدام الرعاية الماهرة من المهم ايضا رفع مستوى وعي المجتمع بإرسال رسائل تثقيفية تعمل على مساعدة الاسر لتعلم

المهارات الاساسية والمعرفة الصحية لرعاية الاطفال حديثي الولادة وايضا تشمل افضل طرق الرضاعة الطبيعية والتغذية المكملة للرضاعة وايضا تبنى افضل طرق الرعاية عند مرض الاطفال دون الخامسة. وتوصى الدراسة ايضا بضرورة تدخل الحكومة في علاج الاطفال دون سن الخامسة لاعتبارها من اهم الخطوات التي تساهم وبشكل كبير في الحد من وفياة الاطفال دون الخامسة من العمر.

LIST OF TABLES

Table No.	Title	Page No
1.1	Sudan's under-five mortality rate for 1970, 1990, 2000, 2010, and 2014	4
1.2	Under-Five Mortality Rates by State as Obtained from 2008 and 1993 Population, census.	5
4.1	Distribution of sample size by mode of living	63
4.2	Socioeconomic and demographic characteristics	65
4.3	Association between the socioeconomic and demographic variables and under-five mortality	67
4.4	Maternal variables	69
4.5	Association between maternal variables and under-five mortality	72
4.6	Behavior variables	75
4.7	Association between the behavour variables and under-five mortality:	79
4.8	Personal illness control variables	
4.9	The association between the personal illness control and under-five mortality	84
4.10	Under-five mortality and its causes	87
4.11	Classification Table step0	89
4.12	Variables in the Equation	90
4.13	Hosmer and Lemeshow Test	91
4.14	variable in equation	91
4.15	Classification Table step0	95
4.17	Variables in the Equation	96
4.18	KMO and Bartlett's Test	98
4.19	Communalities	99
4.20	Total Variance Explained	101
4.21	Rotated Component Matrix	104

APPREVIATIONS

DHS Demography Health Survey

MDGs Millennium Development Goals

SDGs Sustainable Development Goals

WHO World Health Organization

UN United Nations

UNICEF United Nations Children's Emergency Fund

ARI Acute Respiratory Infections

LRTI lower Respiratory Tract Infections

HH Household

Table of Contents

	Dedication	i
	Abstract	iii
	Abstract (in Arabic)	v
	List of Tables	vii
	APPREVIATIONS	viii
	Table of Contents	ix
	Chapter One INTRODUCTION	
1.1	Background	1
1.2	Research Problem	5
1.3	Research Objectives	6
1.3.1	General Objective	6
1.3.2	Specific Objectives	6
1.4	The Research Hypotheses	6
1.5	Rationale	7
1.6	The Methodology	8
1.7	Research Structure	8
	Chapter Two UNDER-FIVE MORTALITY: AN OVERVIEW	
2.1	Introduction	9
2.1.1	Neonatal Mortality	9
2.1.2	Infant Mortality	9
2.1.3	Post Neonatal Mortality	9
2.1.4	Under-five Mortality	9
2.2	Under-five Mortality Rates Worldwide	10
2.2.1	Under-five Mortality Rates in MDGs and SDGs	11
2.3	Under-five Mortality Rates in Sudan	12
2.4	Determinants of Under-five Mortality	12
2.4.1	Socioeconomic Characteristics	12

	Level of Education	13
	Income	13
	Occupation	14
	The size of the households	15
2.4.2	Maternal Factors	17
	Age of Mothers	18
	Level of Education of Mothers	20
	Occupation of mother	22
2.4.3	Behavioural Factors	22
	Prenatal Care	23
	Breastfeeding	24
	. Smoking	25
	Alcohol	27
2.4.4	Personal Illness Control	27
	The action When Child Sick	28
	Immunization	28
	Diseases	30
	Malaria	31
	Diarrhea	33
	Acute respiratory infection	35
	Chapter Three MULTIVARIATE TECHNIQUES FOR MODELING RISK OF UNDER-FIVE MORTALITY AND GENERATING RELATED INDICATORS	
3.1	Introduction	37
3.2	Logistic Regression	37
3.2.1	Fitting The Logistic Regression Model	38
3.2.2	Assessing The Fit Of The Model	39
	R ² Statistics For Logistic Regression	40
	The Hosmer-Lemeshow Goodness Of Fit Test	42
3.2.3	Statistical Tests and Confidence Interval	42
3.2.4	Testing For The Significance Of Coefficients	43

	The Standard Error of The Coefficient	•	43
	Wald Test		44
	Confidence interval for coefficient (95% CI)		44
3.2.5	Odds ratio		44
3.3	Factor Analysis		45
3.3.1	Orthognol Factor Model		45
3.3.2	Estimation of Loading And Communalities		46
3.3.3	Determining the Number of Factors		55
3.3.4	Rotation Methods		57
3.3.5	Interpretation of Factor Analysis		59
3.3.6	Factor scores		60
	Chapter Four DATA COLLECTION AND AN	ALYSIS	
4.1	Introduction		61
4.2	Design of Data Collection Tools		61
4.2.1	The Questionnaire		61
	Socioeconomic and Demographic Characteristics		61
	Maternal Variables		61
	Behaviour Variables	1	61
	Personal Illness Control Variables		62
	Under-Five Mortality Variables		62
4.2.2	The Sample		62
4.3.3	Field Work	1	63
4.3	The Analysis	1	64
4.3.1	Socioeconomic and Demographic Characteristics of Responder	nts	64
4.3.2	The Association Between Socioeconomic and Demographic Ch Under-five Mortality	naracteristics and	66
4.3.3	Maternal variables		69
4.3.4	The Association Between Maternal Variables and Under-five n	nortality	71
4.3.5	Behavior Variables	,	74

4.3.6	The Association Between The Behavior Variables and Under-five Mortality	
4.3.7	Personal Illness Control	
4.3.8	The Association Between Personal Illness Control and Under-five mortality	84
4.4	Determinants of Under-five Mortality	
4.4.1	Main Determinants	
4.5	Under-five Mortality Indicators	98
	Chapter Five SUMMARY OF FINDINGS AND RECOMMENDATIONS	
5.1	Main Findings	108
5.2	Recommendations	113
5.3	Suggestions for future research	114
	References	115
	Annex 1	125
	Annex 2	128