بسم الله الرحمن الرحيم

Republic of Sudan
Ministry of Higher Education and scientific Research
University of Shendi
Faculty of Graduate Studies and Scientific Research

Study about:

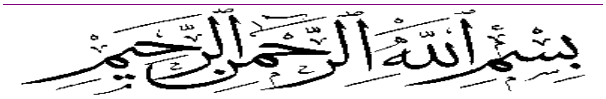
Assessment of Rota Vaccine Coverage in Al Matama Locality, River Nile State, Sudan (2013-2015)

A Thesis Submitted in Fulfillment as a Requirement for M.Sc. Degree in Public health

Submitted By: Osman Magzoub El Tayeb Musa
B.Sc. Public Health and Environmental Health,
Faculty of P E H, of Kh 1995

Supervisor: Dr. Suleman ElKamil Ahmed
Associate Prof. PhD in Public Health

2018



قال تعالى:

(قَدْ خَسِرَ الَّذِينَ قَتَلُوا أَوْلَادَهُمْ سَفَهًا بِغَيْرِ عِلْمٍ وَحَرَّمُوا مَا رَزَقَهُمُ اللَّهُ افْتِرَاءً عَلَى اللَّهِ ۚ قَدْ ضَلُّوا وَمَا كَانُوا مُهْتَدِينَ)

صدق الله العظيم

سورة الانعام الأية (140)

Dedication

To my parents whom awarded

Me a sense of life

To my family, my wife and my daughter

To my brothers, sisters whom paved to me the way

I dedicate this study with much love and best wishes to all

ACKNOWLEDGMENTS

All thanks to Allah from start to end

I would like to express my sincere gratitude to my supervisor Dr. Suleman Alkamel Ahmad who helped me in all stages of research and writing of thesis .I would like thank him for his guidance, patience, motivation, knowledge and excellent cooperation.

My sincere thanks also go to Dr. Adam Dawria, DR .Ibrahim Kabashi, Dr. Khater Mohammed, Mohammed Osman Sanosi, Noha Bushra ,Madina Elshakh and Munther Al-Zubair for their valuable comments on this thesis.

I would like to thank my colleagues for their wonderful collaboration. They supported me greatly and were always willing to help me.

Last but not the least , I would like to thank my family :my mother , sons , wife and daughter , for supporting me throughout my life.

List of contents

المستخلـص

فيروس الروتا هو السبب الأكثر شيوعا لالتهاب المعدة والأمعاء الحاد والسبب الرئيسي للإسهال الشديد والجفاف في الرضع والأطفال الصغار.

أجريت هذه الدراسة الوصفية المجتمعية المقطعية في محلية المتمة. وهدفت لتقييم تغطية لقاح الروتا (2013- 2015) ومن حيث مقارنة التغطية مع لقاح الخماسي الذي يعطى متزامنا مع لقاح الروتا وكذلك حساب نسبة سواقط الروتا, ومعرفة الاثار الجانبية للقاح ومدى معرفة الامهات عن لقاح الروتا.

تم اختيار 210 من الامهات باستخدام تقنيات أخذ العينات النظامية ودليل منظمة الصحة العالمية للعينة العنقودية ،وتم استبيان كل فنيي التحصين ببرنامج التحصين الموسع وعددهم 20 .تم تحليل البيانات باستخدام برامج الحاسب الآلي (SPSS version11.5). الحزمة الاحصائية للعلوم الاجتماعية ثم عرضت النتائج في جداول ورسوم بيانية ، وتم جمع البيانات المتعلقة بمتغيرات الدراسة باستخدام استبيان معد مسبقا لهذا الغرض ,ومن سجلات الولاية والمحلية. وكشفت نتائج الدراسة أن تغطية لقاح الروتا الاولى في العام 2013 كانت بنسبة 91٪ بينما كانت التغطية بلقاح الخماسي الجرعة الاولى بنسبة 102٪, وفي العام 2014 كانت تغطية لقاح الروتا جرعة أولى 93٪, بينما كانت التغطية بلقاح الخماسي جرعة أولى بنسبة 99٪, وفي العام 2015 كانت التغطية بلقاح الروتا جرعة أولى بنسبة 89٪, بينما كانت التغطية بلقاح الخماسي جرعة أولى بنسبة 92٪. في عام 2016 كانت التغطية بلقاح الروتا الجرعة الأولى بنسبة 105٪ بينما كانت التغطية بلقاح الخماسي الجرعة الأولى بنسبة 106٪ .نسبة سواقط لقاح الروتا جرعة اولى 11٪ في العام (2013) ونسبة 8.6٪ في العام (2014) ونسبة 3٪ في العام (2015). وكشفت الدراسة أن 87٪ من الأطفال كانت تتراوح أعمارهم بين 9 أشهر إلى سنتين 83.3٪ من الأطفال قد أكملوا جرعات الروتا، 16.7٪ لم يكملوا جرعات الروتا بسبب إهمال وكسل الأمهات. وأظهرت النتائج أن 39.6 من الأمهات حصلن على تعليم عال و 9% من الأمهات هن أميات , 66.2 % لديهن معرفة عن فيروس الروتا من المركز الصحي عن طريق فنيي التطعيم , 50.5٪ من الامهات يعرفوا

اسم اللقاح المستخدم ضد الإسهال. وأظهرت الدراسة أن جميع الأمهات يعرفن أهمية التطعيم، 59٪ يعرفن زمن أخذ جرعة الروتا الأولى، 82.4٪ يعرفن زمن أخذ جرعة جرعة الروتا الثانية، 45٪ يعرفن العمر المحددلأخذ الجرعة الأولى ، 56٪ يعرفن العمر المحدد لأخذ الجرعة الثانية ، أظهرت النتائج أن 98٪ من الأطفال يحملون بطاقات تطعيم و 77.1٪ من الأطفال تم تطعيمهم في الاستراتيجية الثابتة. وأشارت جميع الأمهات إلى أن التطعيم له آثار جانبية، وأن 15.7٪ من الأطفال حدثت لديهم آثار جانبية بعد التطعيم مثل الحمى، وأظهرت الدراسة أيضا أن 48.5٪ أجرى العلاجات المنزلية في حالة الآثار الجانبية.

,45٪ من المطعمين لديهم شهادة دراسية أولية ، 90٪ تم تدريبه على لقاح الروتا، ويقوم كل المطعمين بتوصيل الرسائل الخمس الأساسية للمستفيدين من خلال الجلسات.

وأوصت الدراسة بحصر جميع السواقط والعمل على استردادها من خلال تنفيذ الزيارات المنزلية بفعالية بواسطة فنيي التطعيم او العاملين الصحيين في المنطقة القابضة لمركز التطعيم ، والاستمرار في توصيل الرسائل الأساسية من قبل المطعمين للأمهات والمستفيدين ،كذالك اوصت الدراسة على تدريب فنيي التحصين بواسطة المسؤولين المحليين لتحسين مهاراتهم للتواصل الفعال مع قادة المجتمع والسياسيين والمديرين التنفيذيين واللجان الشعبية والعمد والشيوخ، وإشراكهم في تعبئة المجتمع. وسيساعد ذلك على زيادة الوعي و زيادة التغطية وتقليل نسبة السواقط في المنطقةوتدريبهم على عدم تفويت أي فرصة لتطعيم الأطفال القادمين إلى المرافق الصحية لأي سبب من الأسباب.

Abstract

Rotavirus is the most common cause of acute gastroenteritis and is the leading cause of severe diarrhea and dehydrated in infants and young children. This cross-sectional community descriptive study was conducted in Al Matama locality. The aim of this study was to assess the coverage of rotavirus vaccine (2013-2015) and to compare the coverage with the penta vaccine, which is given simultaneously with the rotavirus vaccine, as well as to account percentage of defaulters of Rota vaccine and side effects of the vaccine.A total of 210 mothers were selected using systematic sampling techniques and the WHO Cluster Sample Manual [(36)]. And 20 EPI immunization technicians were interviewed. Data were analyzed using software the statistical package for social sciences, (SPSS version 11.5) was then presented in tables and graphs. Data on the study variables were collected using a pre-prepared questionnaire for this purpose and from state and local records.

The study showed that the coverage of RV1 in 2013 was 91% while the coverage of penta1 vaccine was 102%. Coverage of RV1 in 2014 was 93%, while the penta1 coverage was 99%. In 2015 RV1 coverage was 105%, while Coverage of penta1 was 106%. The rate of Rota vaccine defaulters are 11% in 2013, 8.6% in 2014 and 3% in 2015.The study revealed that 87% of children were between the ages of 9 months to 2 years. 83.3% of children had completed Rota vaccine doses, 16.7% did not complete Rota vaccine doses due to neglect and laziness of mothers. The results showed that 39.6% of mothers had higher education, 9% of mothers were illiterate, 66.2% had knowledge of rotavirus from the health center through immunization technicians, and 50.5% of mothers knew the name of the vaccine used against diarrhea. The study showed that all mothers know the importance of vaccination, 59% know the time of taking the first dose,

82.4% know the time of taking the second dose of Rota, 45% know the age to take the first dose, 56% know the age to take the second dose, the results showed that 98% of the children had vaccination cards, 77.1% of the children were vaccinated in the fixed strategy. All mothers indicated that vaccination had side effects, 15.7% of children had side effects after vaccination such as fever. The study also showed that 48.5% had home remedies in case of side effects.45% of the technicians have a primary certificate, 90% of whom have been trained in the Rota vaccine, and all the technicians sent the five basic messages to the beneficiaries through the sessions. The study recommended that all the defaulters be collected and retrieved through the implementation of home visits effectively by vaccination technicians or health workers in the holding area of the vaccination center, and continue to deliver basic messages by the technicians to mothers and beneficiaries during the sessions. The study also recommended that immunization technicians be trained by local officials to improve their skills for effective communication with community leaders, politicians, executives, people committees, mayors and elders, and involve them in community mobilization. This will help increase awareness, increase coverage and reduce the defaulters in the area, and train them to not miss any opportunity to vaccinate children coming to health facilities for any reason.

List of tables

List of Figure

List of Abbreviations

Abbreviation	Term
AAP	American Academy of Pediatrics
AEFV	Adverse Events Following Vaccination
DPT	Diphtheria, Tetanus, pertussis
EPI	Expanded program on immunization
EU	European Union
ENIP	European national immunization programs for children
FDA	Food and Drug Administration
RV1	First dose of Rota vaccine
RV2	Second dose of Rota vaccine
Penta1	First dose of (Diphtheria, Tetanus, pertussis, Hepatitis B, Homophiles influenza type b).
GAVI	global alliance of vaccines and immunization
MNT	Maternal and neonatal tetanus
NIP	national immunization programs
RVS	Rotavirus
UNICEF	United Nation Children Fund
US	United States
VENICE	Vaccine Eurasian New Integrated Collaboration Effort
WHO	World Health Organization
SCID	Subjects with Severe Combined Immunodeficiency disorder

CDC	Center Diseases Control
D.N.A	Adenosine Nucleic Acid
AFR	Africa Region
ELISA	Enzyme-Linked Immunosorbent Assay

1. 1.INTRODUCTION

Diarrheal diseases are still a major cause of mortality and morbidity in children, particularly in developing countries.

Rotavirus is the most common cause of acute gastroenteritis and the leading cause of severe dehydrating diarrhea in infants and young children. In Europe, every child is expected to experience episodes of gastroenteritis during the first three years of life. A recent study estimated that there are 3.6 million episodes of rotavirus disease annually among the 23.6 million children under the age of five, living in the European Union, with 231 deaths, more than 87,000 hospitalizations and about 700,000 primary care consultations[(1).]

Rotavirus gastroenteritis is the most common cause of acute dehydrating diarrhea among children younger than 5 years and globally the most important cause of severe diarrhea in this age group. Most children acquire rotavirus infection before they turn2 years of age, the severity varies from complete absence of symptoms to severe diseaseincluding hospitalization with the need for intravenous fluids. The illness usually lastsabout a week, Rotavirus is highly infectious, and if one child is infected child in a daycare Centre, the rest of the children bare easily infected as well, traditional means of preventing transmissionsuch as thorough hand washing are not sufficient to avoid transmission of rotavirus, and applying alcohol rub sanitizers to the hands has no effect[(2)].Symptoms appeararound 2 days after infection. The person is not infectious during that period. Whenillness appears, the person excretes large quantities of the virus in the faces and vomit, and this creates difficulty in avoiding transmitting the virus to other people[(3).]

1.1.2. Justification of the study:

Rotavirus is the global leading cause of severe childhood gastroenteritis, responsible for an estimated two million hospitalizations each year and approximately (475,000-580,000) child deaths in 2004 the majority of rotavirus-related deaths are in the developing world children are most likely to contract rotavirus in their first five years of life, with the peak age of initial infection being 3–24 months in developing countries the peak age of onset is typically within the first year of life. There was no research done in Rota vaccine coverage in Al Matama locality since 2011 when it was introduced.

1.1.3. Study Objectives:

1.1.3.1. General Objective:

To assess the Rota vaccine coverage in Al Matama Locality, River Nile State, Sudan, (2013-2015)

1.1.3.2 Specific Objectives:

1- To estimate rotaviruses vaccine coverage among children less than two years.

2- To compare Rota vaccine coverage with penta1& penta2 coverage.

3- To compare Rota vaccine coverage with 2013, 2014and 2015

4- To identify the possible factors affectively to rotavirus vaccine coverage.

1.2. LITRATURE REVIEW

1.2.1General Introduction

In 1976, Jon Rohde, highlighting the importance of diarrhea as a prime killer of children in the developing world, beckoned the scientific community to" take science where the diarrhea is"!While researchers were discovering many new etiologic agents that cause diarrhea, progress in preventing diarrheal deaths then estimated at about 5 million per year was slow. Twenty years later, despite massive efforts to prevent diarrheal mortality with programs of oral rehydration therapy, diarrhea still ranks as the first or second most common cause of death and disabilityadjusted life years lost among children in developing countries [(3)]. An estimated 3-3.2 million children still die each year from diarrhea (23 deaths/1000 live births), making diarrheal disease a major contributor to infant mortality in the developing world. The need for simpleeffectiveinexpensive interventions, not only to treat diarrhea but to prevent its occurrence, is urgent and abundantly clear. The discovery of rotavirus by Bishop and colleagues in 1973 initiated a line of research that has progressed rapidly toward the goal of prevention of rotavirus diarrhea by vaccination. First was the development of simple, sensitive, and inexpensive diagnostic tests that allowed epidemiologists to search for rotavirus in fecal specimens of children with diarrhea[(4)]. Rotavirus proved to be the most common cause of severe diarrhea, responsible for 20%-70% of hospitalizations for diarrhea among children worldwide. Moreover, diarrhea was traditionally considered to be a disease spread by focally contaminated food and water or by poor hygiene and, thus, concentrated among

children in the developing countries; however, rotaviruses a "democratic "virus that infects nearly all children in the world, rich or poor, by the age of 3-5 years. Clearly, improvements in food, water, or hygiene would have little impact on the control of rotavirus infection[5].Although early studies documented the tremendous disease burden of rotavirus, little could be done to prevent disease. The prospect that vaccines might prevent rotavirus in children was appreciated early. Natural immunity was suggested by the concentration of disease among children in the first 2 years of life and the decreased incidence of disease with increasing age. Follow-up of infants'neonatal infected with rotavirus confirmed that subsequent rotavirus infections were associated with less severe diarrhea. The discovery of methods to propagate rotavirus provided a simple technique to prepare vaccine seed lots by using traditional methods of tissue culture and allowed work with the virus to proceed in the laboratory. The first rotavirus vaccine was tested by Vesikari et al .in 1983, and the success of these trials laid the groundwork for the current strategy for vaccine development. A single oral dose of a live vaccine prepared from a bovine rotavirus was effective (%80<) in preventing clinically significant rotavirus diarrhea in Finnish infants. This led to a flurry of studies to identify immune proxies for protection, animal models of disease, and ways to increase the efficacy of vaccines among other populations by using the technique of gene segment resentment. These studies, methods, and results are all well described in this supplement. The outcome has been the successful field testing of several candidate reassortant live rotavirus vaccines. While reassortant rotavirus vaccines are being prepared for licensure

in the United States, many research questions remain. None of these live oral vaccines, like natural immunity itself, is fully protective against rotavirus diarrhea. Hence, the door is open for the development of an improved vaccine that might immunize by a principle different from that of natural infection with a live strain of rotavirus. Even though much has been learned about immunity to rotavirus, current measures of immunity are not reliable in predicting protection by vaccines, and better measures are urgently needed. Animal models have provided many insights into the pathogenicity and immune mechanisms of rotavirus disease, but their relevance to human disease is uncertain. While much is known about the gene coding assignments and structure-function relations of the virus, key principles, such as genes encoding virulence, attenuation, or host range, are still being explored Despite these shortcomings in our understanding of many rotavirus vaccine research issues, progress with live oral "Jennerian"reassortant vaccines may soon lead to the first licensed vaccine[4].Two field trials of the rhesus reassortant vaccine have been completed, and a trial with a bovine reassortant candidate vaccine has demonstrated similar efficacy .The considerations for licensure by the US Food and Drug Administration are reviewed in this supplement, as are the many hurdles that remain to take these vaccines from licensure to widespread use in the United States with the goal of disease reduction[5].Diarrhea is a leading killer of children across, Africa, causing approximately 12 percent of deaths in children under five years of age in the World Health Organization's African Region (WHO AFR). Rotavirus, the most common cause of severe diarrhea in young children worldwide, causes more than 450,000 deaths each year

in children under five and is responsible for millions of hospitalizations and clinic visits.2–4 The vast majority of countries with the highest childhood death rates from rotavirus (i.e., greater than 300 rotavirus deaths per 100,000) are in sub-Saharan Africa.2, 4 Causes of death in African children [6].

1.2.2.EPIin Sudan:

Immunization programs have a major impact on the health status of the population .As many diseases are prevented through immunization. For instance smallpox was globally eradicated in 1977 as one of the greatest achievements in the area of public health and since then EPI programs have been established all over the world on the foundation of Smallpox eradication .It's one of the most cost effective public health interventions ever known .In Sudan the EPI was launched in 1976.The program has introduced the six traditional EPI antigens with the measlesvaccine[27].

As the last antigen to be introduced in 1985.Matrenal and neonatal tetanus (MNT), Campaigns conducted by the program supplement the routine immunization activities .The early 2005 with support of global alliance of vaccines and immunization (GAVI).The program hasintroduced Hepatitis B vaccine in phased manner to complete national coverage by end of 2006.

The rotavirus vaccination program started in Sudan in June 2011 as the first African country to introduce rotavirus vaccines with funding from GAVI, the Vaccine Alliance, just two years after WHO recommended all countries introduce the vaccine into their national immunization programs, As of August 15, 2014, more than 65

countries have introduced rotavirus vaccines in their national immunization programs, including more than 20 countries in Africa. Rotavirus immunization program in Sudan expected to prevent a significant number of young infants from developing this infection; it may also provide some additional protection to the wider population through herd immunity 20countries in Africa[3].

1.2.3. EPI in Al Matama locality:

Introduced vaccination in Al Matama locality since 1986Strategy used delivered vaccination services in Al Matama locality include fixed site strategy (it has 10 fixed site give services available about 5km of area), Outreach site strategy (it has 19 outreach site give services available about 5-10km of area) and mobile team strategy (it has 2 mobile one north Al Matama locality and the other north locality give services to the villages far from health centers or unavailable health services) The EPI staffs in Al Matama locality include EPI manager, cold chain officer surveillance officer and 30 vaccinators[7] .

1.2.3 **Rotavirus: Clinical and Epidemiologic Features**:

Rotavirus is a major cause of childhood death. The spectrum of rotavirus illness ranges from mild, watery diarrhea of limited duration to severe, dehydrating diarrhea with vomiting and fever, which results in death. Virtually all children become infected in the first 3–5 years of life, but severe diarrhea and dehydration occur primarily among children aged 3–35 months. Rotaviruses are shed in high concentrations in the stools of infected children and are transmitted by the fecal-oral route, both through close person-to-person contact and through fomites[11].Rotaviruses also might be transmitted by other

modes, such as respiratory droplets. In the United States, rotavirus causes seasonal peaks of gastroenteritis from November to May each year. Rotavirus appears to be responsible for approximately 5%–10% of all diarrheal episodes among children age<5 years in the United States, and for a much higher proportion of severe diarrheal episodes Although rotavirus gastroenteritis results in relatively few deaths in the United States (approximately 20 per year among children aged <5 years) it accounts for more than 500,000 physician visits and approximately 50,000 hospitalizations each year among children aged <5 years. Rotavirus is responsible for 30%–50% of all hospitalizations for diarrheal disease among children aged <5 years, and more than 50% of hospitalizations for diarrheal disease during the seasonal peaks. Among children aged <5 years in the United States, 72% of rotavirus hospitalizations occur during the first 2 years of life, and 90% occur by age 3 years 15 In the first 5 years of life, four out of five children in the United States will develop rotavirus diarrhea one in seven will require a clinic or emergency room visit; one in 78 will require hospitalization; and one in 200,000 will die from rotavirus diarrhea. The risk for rotavirus diarrhea and its outcomes do not appear to vary by geographic region within the United States. Limited data suggest that children from disadvantaged socioeconomic backgrounds and premature infants have an increased risk for hospitalization from diarrheal disease, including rotavirus diarrhea. In addition, some children and adults who are immune compromised because of congenital immune deficiency, hematopoietictransplantation, or solid organ trans-plantation experience severe, prolonged, and sometimes fatal rotavirus

diarrhea[22]. Rotavirus is also an important cause of nosocomial gastroenteritis among adults in the United States, rotavirus infection infrequently causes diarrhea in travelers, persons caring for children with rotavirus diarrhea result of hospitalizations for severe diarrhea and dehydration, and societal costs are attributable primarily to loss of work time among parents and other care givers[9]. Several reasons exist to adopt immunization of infants as the primary public health intervention to prevent rotavirus disease in the United States. First, similar rates of illness among children in industrialized and less developed countries indicate thatclean water supplies and good hygiene have not decreased the incidence of rotavirus diarrhea in developed countries, so further improvements in water or hygiene are unlikely to have a substantial impact. Second, in the United States, a high level of rotavirus morbidity continues to occur despite currently available therapies. For example, hospitalizations for diarrhea in young children declined only 16% from1979 to 1992 despite the widespread availability of oral rehydration solutions and recommendations by experts, including the American Academy of Pediatrics, for the use of oral rehydration solutions in the treatment of dehydrating gastroenteritis. Third, studies of natural rotavirus infection indicate that initial infection protects against subsequent severe diarrheal disease, although subsequent asymptomatic in-factions and mild disease might still occur. Thus, immunization early in life, which mimics a child's first natural infection, will not prevent all subsequent disease but should prevent most cases of severe rotavirus diarrhea and its sequelae (e.g., dehydration, physician visits, and hospitalizations) [8].

95% of these deaths occur in developing countriesvaccination offers the best hope for preventing severe rotavirus disease and the deadly dehydrating diarrhea that it causes. Vaccines against rotavirus are saving lives today in countries where children have Access to them [(9)]. A new vaccine has been developed and is a candidate for licensure. To recount the early development and recent demonstration of the safety and efficacy of the new vaccine,a bovine rotavirus attenuated for humans was isolated and reasserted with human rotaviruses of serotypes G1-4 and P1 to create a pentavalent vaccine. Multiple placebo-controlled clinical trials, including one involving approximately 70,000 infants, were conducted in multiple developed countries. The pentavalent vaccine was well tolerated by infants less than 8 months of age, and the incidence of intussusceptions was similar among vaccine and placebo recipients. More than 90% of infants had a significant rise in serum antirotavirus IgA titer after 3 doses. Efficacy of 95% against severe disease causing hospitalization or emergency care was demonstrated, and pentavalent vaccine prevented 74% of all rotavirus disease. If widely used, pentavalent vaccine would control rotavirus disease in the United States and other developed countries and could also have a major effect in developing countries. Rotavirus is the most common cause of severe gastroenteritis in infants worldwide. It causes severe diarrhea and vomiting, resulting in the death of one infant every minute due to dehydration, according to the most recent mortality estimates reported at the 2004 Sixth International Rotavirus Symposium in Mexico City. Worldwide, rotavirus is associated with 5 percent of deaths in children younger than 5 years. The highest incidence of deaths is found in

developing nations of Asia, Africa, and the Americas. A manufacturer's development and introduction plan[10].

1.2.4.:Rotavirus Pathogenesis

Rotavirus is highly contagious and spreads easily from person to person through contaminated hands and objects. It cannot be treated with antibiotics or other drugs. Mild rotavirus infections can be treated effectively in the same manner as other forms of diarrhea by providing fluids and salts (oral rehydration therapy). However, children with severe rotavirus diarrhea can become dehydrated and often need intravenous fluids or they risk dying. In developing countries, this type of urgent health care is often inaccessible or unavailable, making rotavirus prevention through vaccination critical to saving children'live[6] .Rotavirus causes, gastroenteritis (inflammation of the stomach and intestines), dehydration and potentially death. Children aged six months to two years of age are most vulnerable to infection. One of every 260 children born each year die of rotavirus before their fifth birth day,that's more than1, 200 children each dayRotavirus is very contagious, spreading mainly person-to-person through the fecal-oral route[9]. In other words, the virus is taken in by mouth from contact with objects, or from food or drinks, that have become contaminated by the feces (stool) of an infected person. For example, if a child has the virus on her hands and plays with a toy, and then another child plays with the same toy, the virus is very likely to be passed on" .Children are more at risk than any other age group for getting a rotavirus infection. Since they are

constantly exploring, touching objects, and then putting their fingers in their mouths, there's no good way to prevent infection besides using rotavirus vaccine ",said Dr. Meg Fisher of the American Academy of Pediatrics. Although all children are at risk for rotavirus, those in child care centers or settings with many young children are at a higher risk for rotavirus infections. The reality is that the disease spreads very easily and is hard to control, because rotavirus can live a long time on hard surfaces like a changing table, countertop, and toys[12].

1.2.5.Disease burden:

Rotavirus infects nearly every child by the age of 3-5 years. The median age of a primary rotavirus infection is younger in developing countries, ranging from 6 to 9 months (80% occur among infants <1 year old). Developing countries often exhibit one or more periods of more intense rotavirus us circulation against a background of year-round rotavirus transmission anda great diversity of rotavirus strains[28]. In contrast, the median age of primary infection is older in developed countries, ranging from 9 to 15 months (65% occur among infants <1 year old) caused by 4 to 5 common rotavirus strains. Despite nearly universal rotavirus infections early in life, these differences between developing and developed countries, as well as differences in health care access, childhood co-infections and co-morbidities, drive substantial differences in disease burden[13].

1.2.6. Transmission:

Rotavirus is known to be transmitted person-to-person by the fecal oral route in developing countries rotavirus can also be transmitted via focally contaminated water. 19 It is also suspected that

rotavirus can spread from child to child via the contamination of caretaker's hands by infected fomites or surfaces

Respiratory spread by small particle aerosol has also been suspected, although not proved in humans. Evidence for the airborne spread of rotavirus gastroenteritis is primarily circumstantial and includes the short incubation period of 1 to 3 days and the fact that the virus often occurs in explosive outbreaks. Rotavirus has also been detected in respiratory secretions in a small number of patients, and cases of pneumonia have been described. In addition some studies have noted the presence of respiratory symptoms and otitis media in up to 50% of patients with rotavirus. The preliminary findings of rotavirus RNA from air samples taken from rooms of hospitalized children with rotavirus infections suggest that airborne spread may be a major route of transmission of rotavirus in the hospital and day-care settings [(43)].Transmission of rotavirus is facilitated in child day-care centers, including family day- care homes, by frequent and intimate exposure among susceptible hosts, with diaper changing as the highest risk procedure for such transmission. Investigators have found rotavirus on diaper disposal containers, toys, faucets, diaper changing areas, hand washing areas and even in food preparation areas, demonstrating that rotavirus can be spread all over a home or day-care center, not just in areas directly contaminated by stool [(15)]. Rotavirus-infected children excrete 100 billion virus particles per g of stool. These viruses may survive days to weeks on environmental surfaces, are viable on hands for at least 4 h and can survive for weeks in recreational or drinking water. Studies on adult) volunteers have shown that ingestion of as few as 10 infectious rotavirus particles can cause infection. Almost one-half of the children with rotavirus diarrhea tested in the 2 days before symptoms appeared were already shedding virus, and high rates of asymptomatic shedding of rotavirus have also been reported in young children. Presymptomatic shedding and the high rate of asymptomatic rotavirus infections may be important factors in the introduction and transmission of rotavirus [(43).]

1.2.3.Rotavirus vaccine:

Rotavirus vaccines play an essential and life-saving role in comprehensive diarrhea control strategies. A coordinated approach that combines rotavirus vaccines with other prevention and treatment methods, including oral rehydration therapy, zinc, breastfeeding, improvements in water, sanitation, and hygiene as well as proper nutrition, will achieve the greatest impact on diarrheal disease mortality and morbidity (deaths and hospitalizations In developing countries, where the toll of rotavirus is devastating, GAVI's support for the affordable and financially sustainable introduction of rotavirus vaccines in national immunizationprograms is making as significant impact on global efforts to achieve millennium development goal. Two orally administered rotavirus vaccines are available today. Both vaccines have been shown to be safe and effective in clinical trials in Africa, Asia, Europe, Latin America and the United States [(9)]. There are two orally administered rotavirus vaccines available on the global market today: Rotarix®, manufactured by GlaxoSmithKline, and RotaTeq®, manufactured by Merck & Co. Inc. Both vaccines are prequalified by WHO and have been shown to be safe and effective in large-scale clinical trials in Africa, Asia, Europe, Latin America, and the US. Clinical trials in Africa(Ghana, Kenya, Malawi, Mali, and South Africa) found that rotavirus vaccines reduced severe rotavirus disease by more than 60 percent during the first year of life, when children are at the greatest risk forsevere rotavirus diarrhea[(6)].

1.2.3.1 Type of rotavirus vaccine:

The Merck bovine-human reasserting vaccine contains five antigens (G1 to G4 and P1,(whereas the GSK

vaccinecontains a single, attenuated human rotavirus serotype, G1P1. Both vaccines have been shown to have similar efficacy against any rotavirus gastroenteritis, to have up to 90 to 100 percent efficacy against severe rotavirus gastroenteritis, and to have heterotypic protection against multiple virus serotypes.6.7 Recent licensure of Rotarix® in predominately Latin American countries and of RotaTeq® in the US will provide additional post marketing effectiveness data against non-vaccine serotypes. Both vaccines are also in clinical trials for efficacy in developing nations [17].

1.2.3.1.1. **Human monovalent vaccines**:

Natural infectionoffersprotection against subsequent rotavirus disease Human virus high replication in the host attenuated by multiple tissue culture passage Broad immunity is acquired through various immune effector mechanisms Heterotypic protection is gained through broad immune response[18] .

1.2.3.1.2 **Animal reassortant vaccines:**

Animal rotaviruses are naturally attenuated strains in humans Lowerreplication highertitersrequired Expectation that neutralizing Antibody in the gut lumen is required Reasserting vaccine constructs To include the common human rotavirus antigens Elicit neutralizing antibody Responses[18].

1.2.3.2 Worldwide Rotarix Use:

Lyophilized formulation first licensed in Dominican Republic, June 4, 2004 .Licensed in the U.S. on April 3, 2008Liquid formulation First licensed in Brazil, March 12, 2007.Through January 2010, Rotarix has been sold in over 110 countries with the majority sold in

Latin America [10].5 countries in the African region have introduced rotavirus vaccine into EPI South Africa 2009 Zambia January 2012GhanaApril2012Rwanda, May2012Botswana Aug 2012[19].

1.2.3.3.Recommended vaccination schedule:

Following areview of new evidence on age specific burden of rotavirus disease and deaths, timeliness of vaccination, and the safety and effectiveness of different immunization schedules, WHO recommends that the first dose of rotavirus vaccine be administered as soon as possible at or after 6 weeks of age, along with diphtheria tetanus pertussis (DTP)or pentavalent vaccination, to ensure induction of protection prior to natural rotavirus infection Rotarix® (RV1) should be administered orally in a 2 dose schedule at the time ofDTP/penta1 and DTP/penta2 contacts, with an interval of at least 4 weeks between doses., rotavirus vaccination of children >24 months of age is not recommended. Prematurely born infants should follow the vaccination schedules recommended for their chronological age. Rotavirus vaccinations can be administered simultaneously with other vaccines in the infant immunization schedule[23] .The first dose is given to children between the ages of 6-15 weeks. If the child attains the age after 15 weeks (3 months and a half), no dose of rotavirus is given at all, The second dose is allowed until the age of 32 weeks (8 months) for children who were given the first dose at the age of 6 - 15 weeks only, If the child is present after 8 months, the second dose is not given at all [30].

1.2.3.4.Rotavirus Vaccine Benefits*:*

What followed was the rapid uptake of the rotavirus vaccines in national EPI programs, beginning in many countries of the Americas.

Post-introduction studies soon began to reveal the vaccines' impact in preventing deaths, disease and hospitalizations .He noted differences between high- and low-income countries that could influence vaccine efficacy: disease epidemiology; circulating serotypes; rates of mixed infections; malnutrition; interference from high maternal antibody titer; and different gastrointestinal infections that could interfere with vaccine take. "We have to do the research now, because understanding this could substantially improve the performance of these vaccines," and prevent hospitalizations and deaths, Glass said. Reviewing the map of countries that have introduced rotavirus vaccines, Glass commented, "It's a very interesting picture." By world region, the biggest gap in coverage is Asia. "And yet this is where we started surveillance, this is where we had the most data," Glass said. This issue is that data do not make decisions, the community makes decisions, Glass said. "It's all about people," he concluded. "We're all here because we have a common vision of how we could use these vaccines in our own countries... We have the knowledge, we have the financial support, and we have the motivation. We have incredible people, and those people are you. And while many challenges remain, the goal is clear. It's compelling, and it's doable in a decade[24].

1.2.3.5. Effect of Rotavirus Vaccine:

We calculated the median rate of diarrhea-related death for each of the surveillance years, using population estimates for Mexico from the National Population Council for those years. We compared the rate of diarrhea-related death in 2008 with baseline data from 2003 through 2006. We also compared the absolute number of diarrhea-related deaths during the peak rotavirus-season months of December through

May in 2008 and 2009 with the median number of deaths duringthe same months in baseline years. Because the rotavirus vaccine was introduced in 2006 and early 2007, we considered 2007 as a transitional year and excluded it from our analysis[25].

1.2.3.6.Immune response:

The immunologic mechanism by which Rotarix protects against rotavirus gastro-enteritis is not completely understood. A relationship between antibody responses to rotavirus vaccination and protection against rotavirus gastro-enteritis has not been established. In a clinical study conducted in preterm infants, born after at least 27 weeks of gestational age, the immunogenicity of Rotarix was assessed in a subset of 147 subjects and showed that Rotarix is immunogenic in this population; 85.7% (95% CI: 79.0; 90.9) of subjects achieved serum anti-Rotavirus IgA antibody titers ≥ 20U/ml (by ELISA) one month after thesecond dose of vaccine impact on mortality [20].

1.2.3.7. Vaccine Safety:

The safety and effectiveness of vaccines and under constant study .Because vaccine are designed to be given routinely during well-child care visits, they must be extraordinary safe .Safety testing begins as soon as anew vaccine is contemplated ,continues until it is approved by the FAD, and monitored indefinitely after licensure[27].

1.2.3.8. Efficacy of rotavirus vaccines:

Vaccine efficacy against severe disease has been shown to be 85-96%, with efficacyagainst any rotavirus gastroenteritis at 87% in

the first season after vaccination. This persisted through the second rotavirus season with vaccine efficacy against severe rotavirus gastroenteritis at 79-86%[25]

1.2.3.9.Precautions for use:

Infants with an acute moderate to severe illness, including acute gastroenteritis, should not be vaccinated until their condition has improved[26]. However, infants with mild gastroenteritis can be vaccinated. Infants with pre-existing chronic gastrointestinal conditions (such as congenital mal-absorption syndrome, short-gut syndrome) are at risk of more severe disease from rotavirus and so stand to benefit more from vaccination. However, neither safety nor efficacy of vaccination has been established for infants with such conditions [28]. Providers should consider the potential risks and benefits of administering rotavirus vaccine to such infants. Whilerotavirus vaccination is not recommended for infants who are severely immune compromised, the risk for infants with less severe immune compromising conditionsmay be less than the risk of infection. This should be considered in the context of the infant's specific condition and withappropriate specialist advice. Infants living in households with persons who have or are suspected of having an immunodeficiency disorder or impaired immune status can be vaccinated[27].Vaccine rotaviruses can be shed in the stool of vaccinerecipients, particularlyafter the 1st dose. However, the protection of the immune compromised household member afforded by vaccination of young children in the household outweighs the small risk for transmitting vaccine virus to the immune compromised person and any subsequent theoretical risk for vaccine virus-associated

disease. Hospitalized infants, including premature infants, who are otherwise clinically stable and at the appropriate chronological age, can be givenrotavirus vaccines in thechildren, are usually protected from developing severe disease due to rotavirus because they have acquired partial immunity from being infected earlier in life [28]. Unlike other childhood diseases, such as measles and chickenpox, natural rotavirus infection doesn't offer lifetime protection, but provides protection from severe disease when subsequently exposed to the virus. Similarly, vaccination of adults is not recommended because it is likely that they may have partial pre-existing immunity and are unlikely to experience severe rotavirus disease[29].

1.2.3.10. Contraindications:

Hypersensitivity to the active substance or to any of the excipients, Hypersensitivityafter previous administration of rotavirus vaccineshistory of intussusceptions, Subjects with uncorrected congenital malformation of the gastrointestinal tract that would predispose for intussusceptions. [19] Subjects with Severe Combined Immunodeficiency (SCID) disorder. Administration of Rotarix should be postponed in subjects suffering from acute severe febrile illness. The presence of a minor infection is not a contra-indication for immunization. The administration of Rotarix should be postponed in subjects suffering from diarrhea or vomiting[20].

1.2.3.11. Who should not receive rotavirus vaccine?

Any child who has had a severe (life-threatening) allergic reaction to a previous dose of Rota virus vaccine should not get another dose. A child with a severe (life-threatening) allergy to any component of rotavirus vaccine should not get the vaccine. Because

the oral applicator for Rotarix contains latex rubber, infants with a severe (anaphylactic) allergy to latex should not be given Rotarix; the RotaTeq dosing tube is latex-free. Rotavirus vaccine should not be given [32]. The age indication for the Rotarix vaccine is a two-dose series that is approved by Health Canada for use in infants from six to 24 weeks of age. This is a live vaccine for oral use only. The vaccine includes an antacid component to protect the live attenuated virus during passage through the stomach and prevent its inactivation due to the acidic environment[31].Infants who have recovered from a rotavirus infection may not be immune to the entire virus types present in the vaccine. So infants who have previously had rotavirus disease should still complete the vaccine series if they can do so by age 8 months[31].

1.2.3.12.Adverse Events Following Vaccination:

With a vaccine, like any medicine, there is a chance of side effects. These are usually mild and go away on their own. Serious side effects are also possible but are rare. Most babies who get rotavirus vaccine do not have any problems with it. But some problems have been associated with rotavirus vaccine. Mild problems following rotavirus vaccine Babies might become irritable, or have mild, temporary diarrhea or vomiting after getting a dose of rotavirus vaccine[33].

1.2.3.13. Serious adverse events (SAEs):

Monitored for occurrence in the 31-day period following vaccination occurred in 1.7% of Rotarix recipients vs. 1.9% of placebo lower rates of diarrhea, dehydration, and gastroenteritis reported among Rotarix recipients compared with placebo pneumonia[37].

1.2.3. 14.**Intussusception:**

Data from observational safety studies performed in several countries indicate that rotavirus vaccines carry an increased risk of intussusceptions, mostly within 7 days of vaccination. Up to 6 additional cases per 100,000 infants have been observed in the US and Australia against a background incidence of 33 to 101 per 100,000 infants (less than one year of age) per year, respectively. There is limited evidence of a smaller increased risk following the second dose. It remains unclear whether rotavirus vaccines affect the overall incidence of intussusceptions based on longer periods of follow-upforintussusceptions, look for signs of stomach pain along with severe crying[20]. Early on, these episodes could last just a few minutes and come and go several times in an hour. Babies might pull their legs up to their chest. Your baby might also vomit several times or have blood in the stool, or could appear weak or very irritable. These signs would usually happen during the first week after the 1st or 2nd dose of rotavirus vaccine, but look for them any time after vaccination. Look for anything else that concerns you, such as signs of a severe allergic reaction, very high fever, or unusual behavior. Signs of a severe allergic reaction can include hives, swelling of the face and throat, difficulty breathing, or unusual sleepiness. These would usually start a few minutes to a few hours after the vaccination[33].

1.2.4. Previous studies in countries.

1.2.4.1. Studies in Mexico:

Globally, the Rota virus remains widespread. Efforts are under way to provide Rota vaccine in developing countries, where Rota deaths are still widespread. Mexico was among the first countries to receive the Rota vaccine in 2006; by the 2009 Rota virus season, deaths from diarrheal disease in the targeted population (children younger than 11 months, with deaths down 40%) and children between 1 and 2 years deaths dropped to about 30%). Since deaths have declined even in non-target areas, collective immunization has been reported to non-vaccinated persons: for few cases of onset, the disease has been transmitted among a small population, leaving less opportunity for exposure[(38)].

1.2.4.2. Studies in Austria:

Austria was the first country in Europe implementing a universal mass vaccination program against rotavirus gastroenteritis for all infants nationwide. Epidemiological data from a hospital based surveillance system show that incidence rates of children hospitalized decreased in 2009 compared to 2008 and compared to the revaccinations period 2001–2005. Decreasing hospitalization-rates were observed in children of all age groups, even in those not eligible for vaccination according to their age, suggesting herd immunity induced by universal mass vaccination. In 2009 the disease burden was highest in children below three months of age stressing the importance of the early start of the immunization course[(39)].

1.2.4.2. Studies in US:

Rotavirus vaccines are already used to routinely vaccinate children in the US and many other countries. In the US, studies have shown that rotavirus-related hospital admissions for young children have been cut by more than two-thirds since rotavirus vaccination was introduced. The high vaccine coverage reported for the first cohort of children to be offered this vaccine routinely in England suggests that the UK could rapidly achieve a similar reduction in the burden of Rotavirus [(40).]

1.2.4.3. Studies inSudan:

The prevalence rate of rotavirus infection among children with gastroenteritis in this study is 16% and the infection rate is higher in males than females. The majority of the infected children were below 2 years of age. This rate is higher in children between 3-12 months and lowest among children less than 3 months of age. Since this study is hospital-based, the prevalence rate will be of value among children with gastroenteritis in hospital populations thus a community-based surveillance will really reflect the true prevalence of rotavirus in Sudan. Rotavirus infection is common among children of illiterate parents. The commonest presenting symptoms were diarrhea, vomiting and fever. Both diarrhea and vomiting were encountered in 81% of rotavirus infected children. Severe dehydration is the more common than mild or no dehydration in children with rotavirus gastroenteritis. Breast feeding in this study has no role in protection against rotavirus infection[(41).]

1.2.4.4. **Studies in Ghana:**

Studies evaluating the potential impact of rotavirus vaccination programs often use government immunization statistics and assume that vaccine is administered according to the recommended schedule. This study used immunization data from a demographic surveillance system to evaluate the effects of less-than-ideal timing, coverage, and efficacy. We found that vaccination against rotavirus can directly impact diarrhea-associated mortality in this rural area in Ghana, and the magnitude of the impact depends on various assumptions made in the model. Our analysis highlights 4 possible areas to affect policy change: vaccine coverage, timing of vaccination, restricted schedules of administration, and vaccine effectiveness. If coverage and timing of rotavirus vaccination were to match that used for DTP vaccine during the study period, 70% of all deaths due to rotavirus disease would be averted, compared with 88% of deaths averted with perfect coverage and exact timing of doses. Restriction of dose 1 to only those children <12 weeks of age reduced the impact of vaccination to 53% of prevented deaths due to rotavirus disease. As expected, the most important factor determining the impact of a vaccine program was the efficacy of the vaccine. A decrease from 90% to 50% resulted in a 31% decrease in impact (from 70% to 39% of deaths prevented). Coverage was found to have a greater impact on mortality than on timing, but efficacy was the biggest determinant of reduction in mortality [(42).]

Methods and material

3.1.Study design:

This is descriptive across – sectional communityand health facilitiesbased study conducted among children aged12- 23 months in Al Matama locality, River Nile State, Sudan, from Jan 2013 to Dec 2015.

3.2.The Study area:

Al Matama locality is one of the River Nile Statelocalities, it's locatedbetween latitude 16 South and 17 North and longitude 32 west and 33.40 East. It is bordered to the North El Dammer locality, karare in southward, North Darfur state in the west side and eastward Shendi locality. The total area of the locality is about 11723 kms [34]. Total population of Al Matama locality is about 183080 people [35]. The locality divided into three administrative units wad hammed Tayba, and Al Matama unite. Children under five year are about 4783[34]. The most important economicactivities agriculture, grazing, andtrade the climate Semi-desert is verycold in winter and hot in summer with a few rains in autumn[7].

3.3 Study population:

The study populations covered the mothers with at least has one child at the age of 12-23 month.

3.3.1 **Target population**

Children aged 12 – 23 months in Al Matama locality.

Children <12 months old on the period of survey

Children >23 months old on the period of survey

Exclude mother's child refused to participate

3..Sample Size.4

A standard WHO30clusters survey`s methodology for determining immunization coverage is based on a survey of small numbers of individuals(n=210)[36].

3.5.Sample technique:

In Al Matama locality the sample includes the followingclusters Immunization coverage survey are defined as survey of small number of individuals to determine their immunization status the survey technique essentially visiting homes and examining record (cards) as well as obtaining vaccination history .it's usually done in a systemic way that only a significant number of mothers (210) are required to be surveyed in order to obtain valid results within a given precision level.(210) sample in 30 cluster of Al Matama locality. In Wad hammed, Tayba, and Al Matama unit sample includes the followingin Wad hammedunit depend on total of the population representing 33%from the locality. (10Clusters).

In Tayba unit depend on total of the populationrepresenting 32%from the locality. (9clusters).in Al Matama unit depends on total of the population represents35%from the locality. (11 cluster).EPI documents were reviewed [7].

3.6.Sample Unite:

The first house visited in each cluster was selected at random using existing listing of household names, official maps; in case of the listing not available the map of the catchment area was used to determine the first house systematic random sample was applied for listed the households to select the 7 in each cluster. The sample intervals intend to select, the second housedividing the number of units

in the population by the desired sample size. In areas where no listing for the households, the sketch map of the area was obtained and divided the catchment area into 4 sectors, then, Random selection of one sector was applied, the data collectors stand at the center of the sector and spin bottle/pen and chosen the first house in the direction pointed as the starting point of the survey. The next or second household was selected by directing to right side and aftercount the number of sample interval[36].

3.7 . Data collection and analysis and presentation:

The data were collected systematically using questionnaire for mothers, records in EPI Al Matama locality, (2013 – 2015) and personal interview with the immunization technicians in health centers.

Data were analyzed by entering it into computer using the statistical package for social science program SPSS version (11.5) tables and figures used to present the results.

3.8.Ethical consideration

The survey conducted in accordance with the national policies on ethics for surveys involving human subjects .The proposal was approved by the faculty of public health and faculty of post graduate in Shendi University .The data collection started after taken consent from Al Matama locality health author and child's mothers information of this study will be disseminated to the health authority in national, state and local level and in addition to published in local and international journals.

Results

Part one: Records in EPI Al Matama locality (2013 – 2015) and personal interview.

Table 1:shows distribution of EPI program by sessions 2013**.**

Items	Fixed Strategy	Outreach Strategy	Mobile Strategy	Total	Observations
Villages	**44**	**73**	**22**	**139**	
Target	**2754**	**1544**	**400**	**4698**	**Annually**
Number of sessions	**41**	**19**	**6**	**66**	**Monthly**

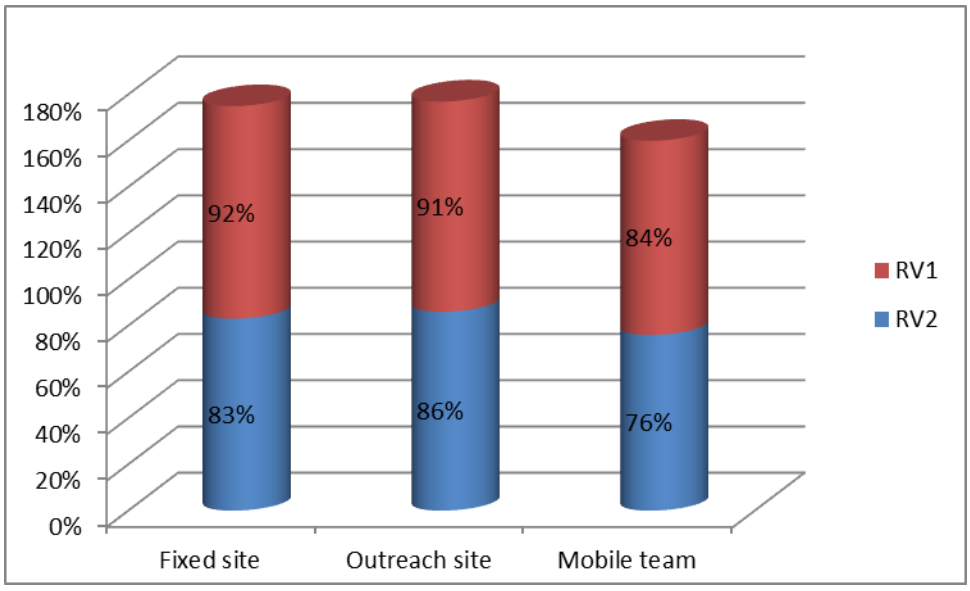


Figure 1: shows distribution of coverage 2013 compared to strategies in AlMatama locality 2013.

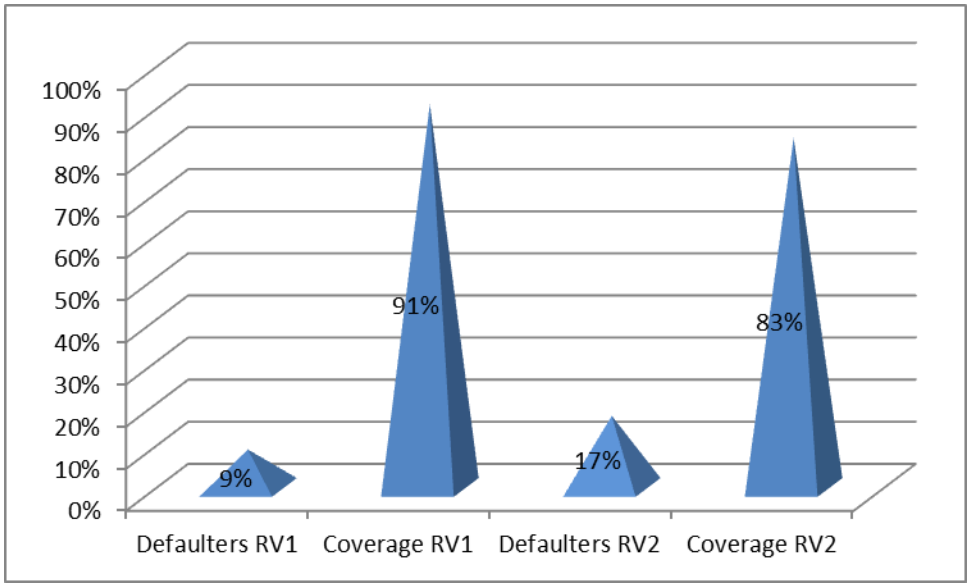


Figure 2: shows comparison of Rotacoverage to defaulters in Al Matama locality 2013.

Table 2: Shows distribution ofEPI program by sessions 2014**.**

Items	Fixed Strategy	Outreach Strategy	Mobile Strategy	Total	Observations
Villages	44	73	22	139	
Target	2617	1858	420	4698	Annually
Number ofsessions	41	19	6	66	Monthly

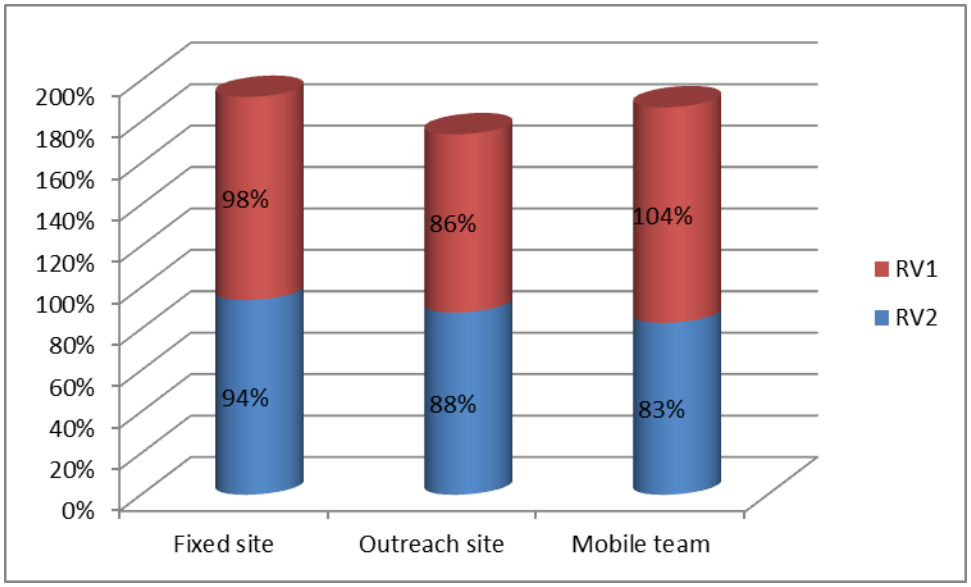


Figure 3: shows distribution of coverage compared to strategies in Al Matama locality 2014.

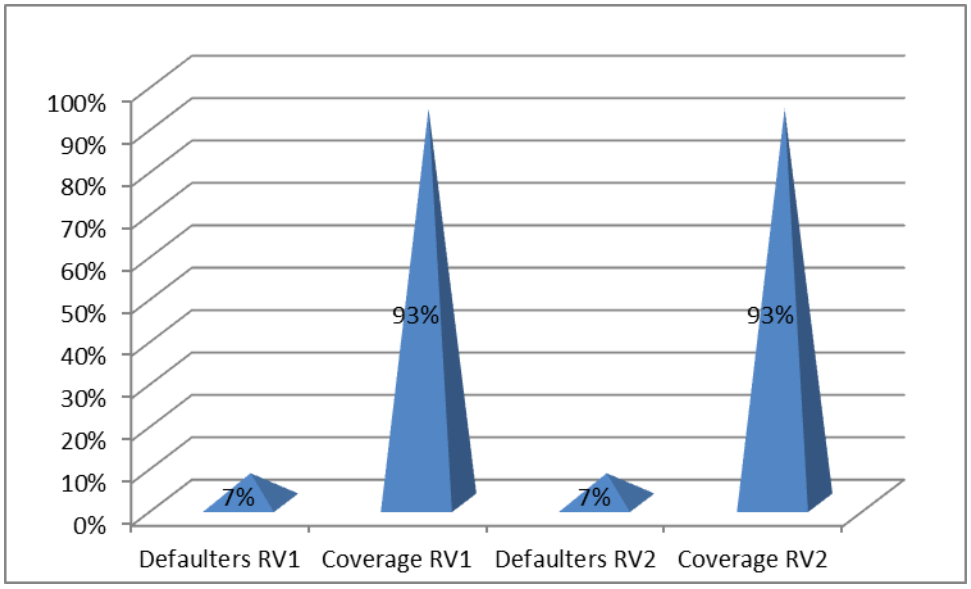


Figure 4: shows comparison of Rotacoverage to defaulters in Al Matama locality 2014.

Table 3: Shows distributionEPI program by sessions 2015.

Items	Fixed Strategy	Outreach Strategy	Mobile Strategy	Total	Observations
Villages	44	73	22	139	
Target	2652	1769	448	4869	Annually
Number ofsessions	43	19	6	68	Monthly

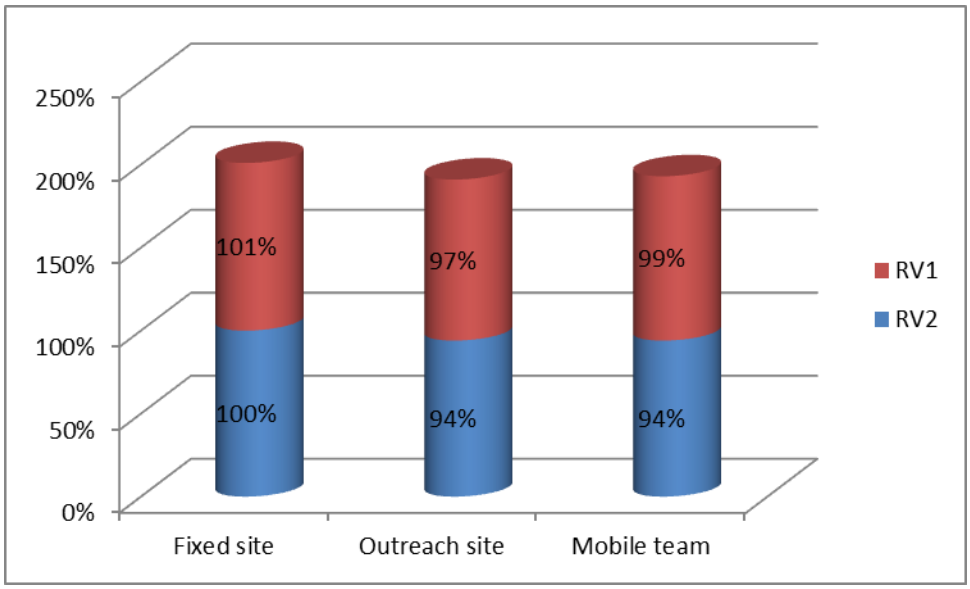


Figure 5: shows distribution of coverage compared to strategies in Al Matama locality 2015.

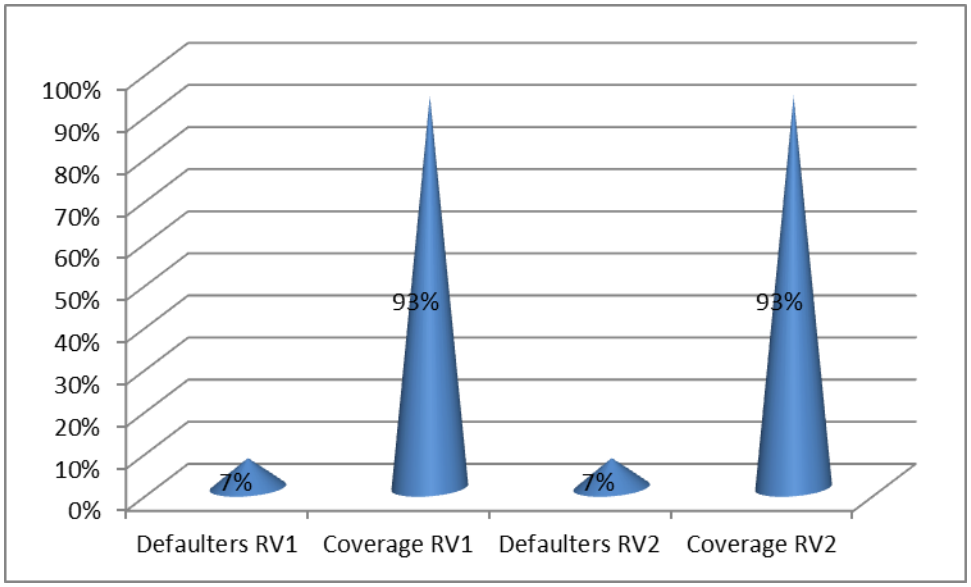


Figure 6: shows comparison of Rotacoverage to defaulters in Al Matama locality 2015.

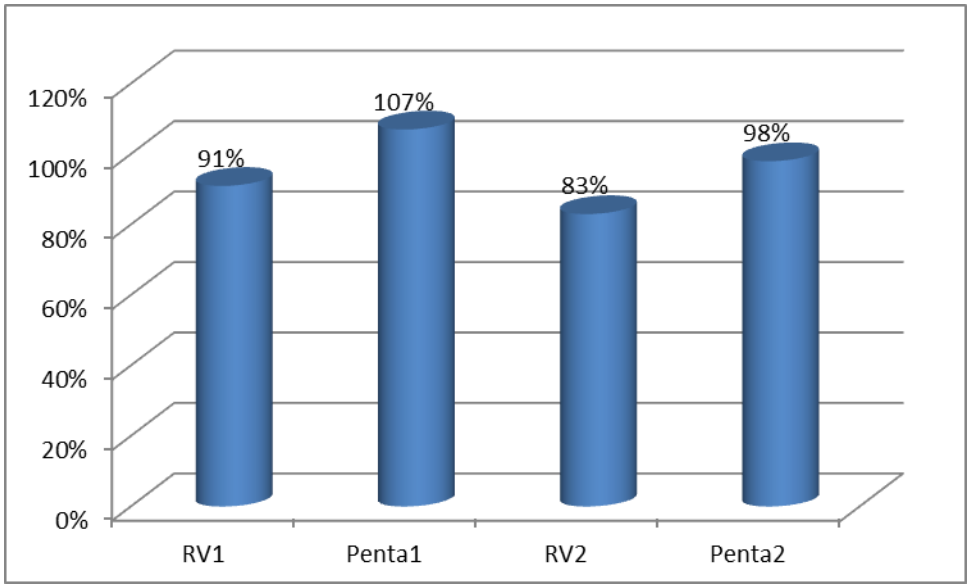


Figure 7: shows distribution of total coverage compared to penta1&penta2 coverage in Al-Matama locality 2013.

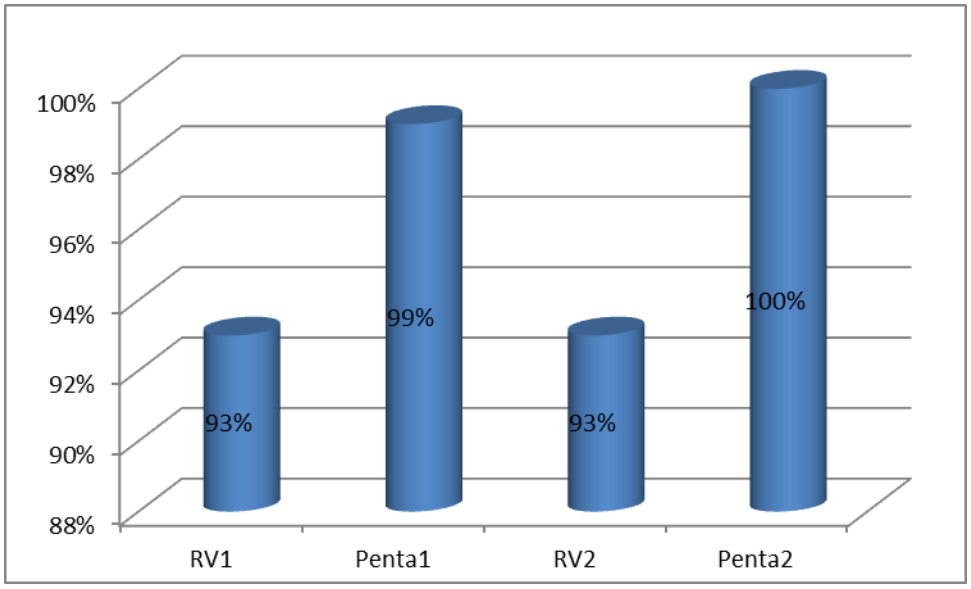


Figure 8: shows distribution of total coverage compared to penta1&penta2 coverage in Al - Matama locality2014.

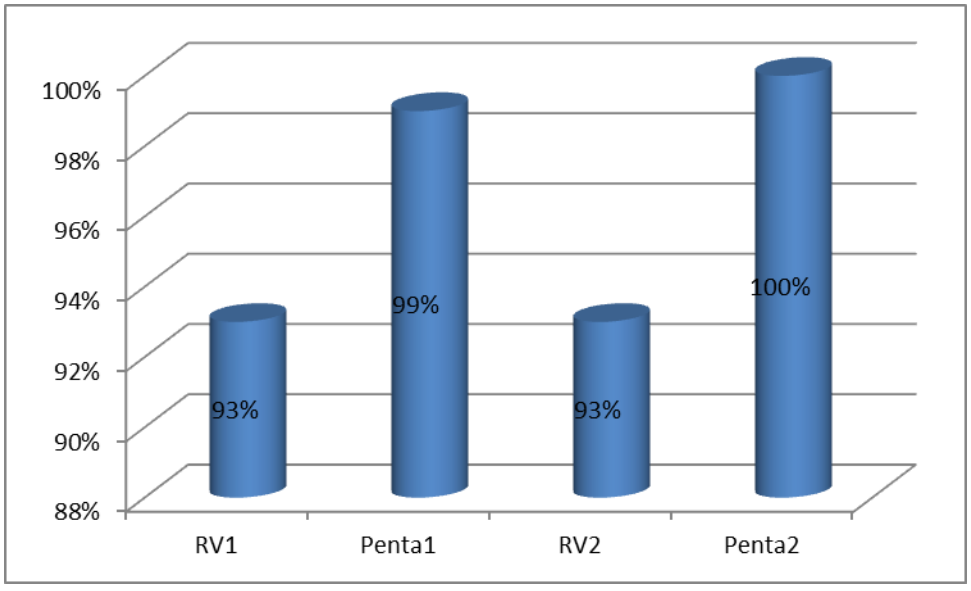


Figure 9: shows distribution of total coverage compared to penta1&penta2 coverage in Al-Matama locality 2015.

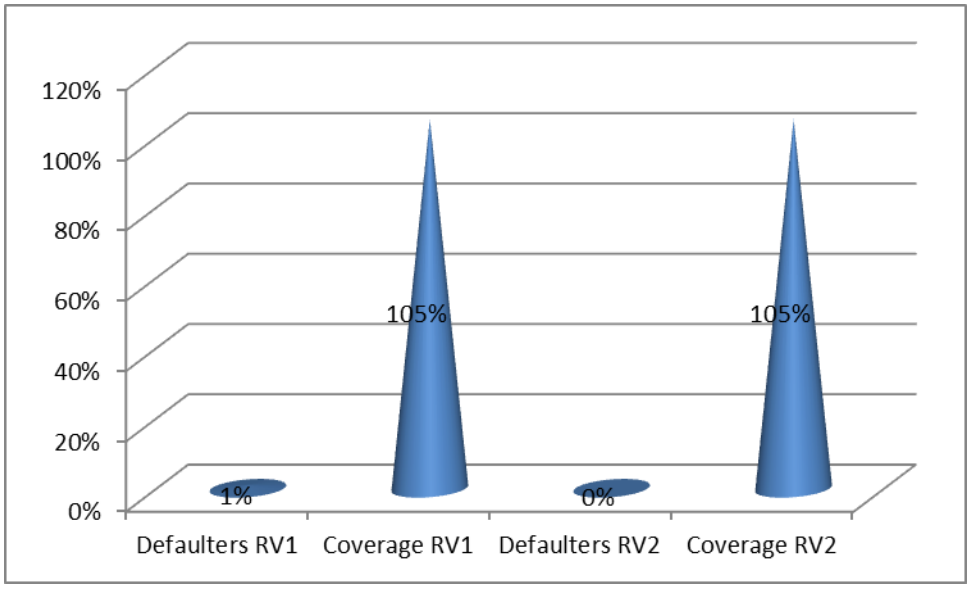


Figure 10: shows comparison of Rota coverage to defaulters in Al Matama locality 2016.

Part two: Questionnaire with the mothers:

Table 4: showssocio-demographic characteristic of study group. (n=210).

Age group	Frequency	Percentage (%)
15-25	60	28.6
26-35	107	51.0
36-45	39	18.6
46-49	4	1.9
Total	210	100.0
Social status		
Married	203	96.7
Widow	5	2.3
Divorced	2	1.0
Total	210	100.0
Family size		
>3	34	16.2
3-6	147	70.0
<6	29	13.8
Total	210	100.0
Educational level		
Illiterate	19	9.0
Primary	42	20.0
Secondary	66	31.4
a university graduate	83	39.6
Postgraduate studies	0	0
Total	210	100
Occupation.		
Worker	25	11.9

House wife	185	88.1
Total	210	100.0
Income level		
Non	39	18.6
>500 pounds	20	9.5
500-1000 pounds	87	41.4
1100 - 1500 pounds	54	25.7
<1500 pounds	10	4.8
Total	210	100.0

Table (5): shows distribution ofstudy group according tochildrenage from two years old or younger. (n=210)

1-2year	Frequency	Percentage (%)
12 month	177	84.3
13-23 month	33	15.7
Total	210	100.0

.

Table (6): shows distribution of study group according to age for child who less than two years. (n=210)

Agechild	Frequency	Percentage (%)
Less than 40 days	3	1.4
From 40 days to eight months	23	11.0
From nine months to two years	184	87.6
Total	210	100.0

Table (7): shows distribution of study group according to knowledgeabout if vaccination important. (n=210)

The importance of vaccination	Frequency	Percentage (%)
Yes	210	100
No	0	0
Total	210	100

Table (8): shows distribution of study group according to have a vaccination card. (n=210)

Hasvaccination card	Frequency	Percentage (%)
Yes	207	98.6
No	3	1.4
Total	210	100.0

Table (9): shows distribution of study group according to the reasons of havenot a vaccination card. (n=3)

Reason of have not a vaccination card	Frequency	Percentage (%)
Loss card	1	33.3
damage Card	2	66.7
Total	3	100.0

Table (10): shows distribution of study group according to immunizationsite. (n=210)

Immunization site	Frequency	Percentage (%)
Fixed center	162	77.1
Outreach center	40	19.0
Mobile Team	8	3.9
Total	210	100.0

Table (11): shows distribution of study group according to knowledge about vaccinations against diarrhea.(n=210)

know vaccinations against diarrhea	Frequency	Percentage (%)
Yes	114	54.3
No	96	45.7
Total	210	100.0

Table (12): shows distribution of study group according to knowledge about vaccine that protects against diarrhea. (n=114)

Vaccine protects against diarrhea.	Frequency	Percentage (%)
Penta vaccine	21	18.4
Polio vaccine	16	14
Pneumococcus pneumonia vaccine	19	16.7
Rota Vaccine	58	50.9
Total	114	100.0

Table (13): shows distribution of study group according to resource of knowledgeabout rotavirus vaccine. (n=210)

Resource of knowledge about rotavirus vaccine.	Frequency	Percentage (%)
From the media	11	5.2
From the vaccination center	139	66.2
From the mothers of the region	52	24.8
Others	8	3.8
Total	210	100.0

Table (14): shows distribution of study group according to knowledge about age to receive first dose of Rota. (n=210)

Knowledge to receivefirst dose of Rota.	Frequency	Percentage (%)
Yes	124	59.0
No	86	41.0
Total	210	100.0

Table (15): shows distribution of study group according to knowing the mothers for the specific age to receive the first dose. (n=210)

The age to receivefirst doseofRota	Frequency	Percentage (%)
Since birth	59	28.1
40 days later	95	45.2
After two months	50	23.8
After 4 months	6	2.9
Total	210	100.0

Table (16): shows distribution of study group according to knowledge about age to receive second dose of Rota. (n=210)

Knowledge of the ageto receivesecond dose	Frequency	Percentage (%)
Yes	173	82.4
No	37	17.6
Total	210	100.0

Tables (17): shows distribution of study group according to knowing the mothers for the specific age to receive the second dose. (n=210)

The age to receive second dose.	Frequency	Percentage (%)
A month after the first	118	56.2
Within eight months of the child's age	39	18.6
After eight months of the child's age	53	25.2
Total	210	100.0

Tables (18): shows distribution of study group according to knowing the mothersvaccination against diarrhea. (n=210)

Know vaccination against diarrhea.	Frequency	Percentage (%)
Yes	111	52.9
No	99	47.1
Total	210	100.0

Tables (19): shows distribution of study group according to knowing the mothers for reason to vaccinate against diarrhea. (n=210)

Reason of vaccination against diarrhea	Frequency	Percentage (%)
Protects against diarrhea	82	39.0
Because it is important	69	32.9
Like mothers were vaccinated their children	59	28.1
Total	210	100.0

Tables (20): shows distribution of study group according to knowing the number of Rota doses. (n=210)

Number of Rota doses	Frequency	Percentage (%)
One dose	3	1.4
Two doses	95	45.2
Three doses	27	12.9
I do not know	85	40.5
Total	210	100.0

Tables (21): shows distribution ofstudy group according to completed immunization doses against diarrhea. (n=210)

Completed vaccination	Frequency	Percentage (%)
Completed immunization	175	83.3
Partial immunization	35	16.7
Non- immunization	0	0
Total	210	100.0

Tables (22): shows distribution of study group according to reason to uncompleted vaccination. (n=210)

Reasons of uncompleted vaccination.	Frequency	Percentage (%)
Not aware of the importance of vaccination	0	0
Not aware of the importance of completing doses	6	17.1
Fear of side effects	8	22.9
The child is sick	1	2.9
Neglect and laziness of the mother	13	37.1
Distance from the vaccination center	3	8.6
Others	4	11.4
Total	35	100.0

Tables (23): shows distribution of study group according to knowing if Vaccinations cause side effects. (n=210)

Vaccination cause side effects	Frequency	Percentage (%)
Yes	210	100.0
No	0	0.0
Total	210	100.0

Tables (24): shows distribution of study group according if children Occurred side effect. (n=210)

Occurred side effect	Frequency	Percentage (%)
Yes	33	15.7
No	177	84.3
Total	210	100.0

Tables (25): shows distribution of study group according to type of side effects. (n=210)

Type ofa side effect	Frequency	Percentage (%)
Diarrhea	8	24.2
Vomiting	3	9
Fever	22	66.8
a headache	0	0
Total	33	100.0

Tables (26): showsdistribution of study group according to what to do in case of side effect. (n=210)

In case of side effect	Frequency	Percentage (%)
going to the health center	13	39.4
Home Care	16	48.5
I am not doing anything	4	12.1
Total	33	100.0

Part three: interview with the immunization vaccinators in health centers:

Table (27): shows distribution ofstudy group according toyears' experience. (n=20)

Years of experience	Frequency	Percentage (%)
<4 years	0	0
4- 8	5	25
9 - 12	8	40
> 12 years	7	35
Total	20	100

Table (28): shows distribution ofstudy group according toeducation level. (n=20)

Education level	Frequency	Percentage (%)
Undergraduate	16	80
Graduate	4	20
Total	20	100

Table (29): shows distribution of study group according to training beforeIntroducing Rota vaccine. (n=20)

Received training	Frequency	Percentage (%)
Yes	18	90
No	2	10
Total	20	100

Table (30): shows distribution of study group according to knowledge about type of vaccine consists. (n=20)

Vaccine consists.	Frequency	Percentage (%)
Live Attenuated virus.	15	75
A virus separated from its toxins.	2	10
Genetically modified virus	3	15
All that is true	0	0
Total	20	100

Table (31): shows distribution of study group according to deliver the five basic messages during sessions to beneficiaries. (n=20)

Deliver the five basic messages.	Frequency	Percentage (%)
Yes	20	100
No	0	0
Total	20	100

Table (32): shows distribution of study group according to vaccinators knows about target age for rotavirus vaccination. (n=20).

Target age for Rotavirus vaccination.	Frequency	Percentage (%)
From 6-15weeks for the first dose.32weeks for the second dose.	20	20
From 15-20 weeks for the first dose.44 weeks for the second dose	0	0
From 15 weeks for the first dose.48 weeks for the second dose	0	0
Total	20	100

Table (33): shows distributionof study group according to knowledge about number of Rota doses. (n=20)

Number of doses	Frequency	Percentage (%)
One dose	0	0
Two doses	20	100
Three doses	0	0
Total	20	100

Table(34):showsdistribution of studygroup according to knowledge of site of dose. (n=20)

Site dose	Frequency	Percentage (%)
Muscle	0	0
In the thigh	0	0
In The mouth	20	100
Total	20	100

Table (35): shows distribution of study group according to knowledge about ways of prevention against rotavirus. (n=20)

Ways to prevent againstrotavirus	Frequency	Percentage (%)
Washing hands.	1	5
Rotavirus vaccination	6	30
Avoid overcrowding during the season of spread of the disease	1	5
All that is true	12	60
Total	20	100

Table (36): shows distribution of study group according to knowledgeabout the contraindications of rotavirus vaccine. (n=20)

Contraindications for rotavirus vaccine.	Frequency	Percentage%
The rotavirus vaccine is not given to children over three and a half months old	0	0
Rotavirus is not given to children over 8 months of age for the second dose	0	0
allergic reaction to a previous dose of Rota virus vaccine should not get another dose	0	0
All that is true	20	100
Total	20	100

Table (37): shows distribution of study group according to knowledge of side effects of rotavirus vaccination. (n=20)

Side effects caused by Rotavirus vaccination.	Frequency	Percentage (%)
vomiting after getting a dose of rotavirus vaccine	0	0
children might become irritable	0	0
temporary diarrhea	0	0
All that is true	20	100
Total	20	100

Table (38): Chi square test of (Relationship between educational level and Knowledge of mothers)

P value of Chi square test (sig)	0.000

Since the probability value for testing the Chi Square sig test is 0.000 which is less than 0.05; the result of the test is significant, indicating a statistically significant relationship between the educational level of mothers and the extent of their knowledge of the Rota vaccine.

Table (39): Chi square test of (Relationship between educational level and Knowledge of technicians)

P value of Chi square test (sig)	0.1

Since the probability value of the Chi Square sig test is 0.1 and is greater than 0.05, the result of the test is insignificant, indicating that there is no statistically significant relationship between the education level of technicians and their knowledge of Rota virus. There is no statistically significant relationship between the level of education and knowledge of Rota vaccine among technicians. This is because the immunization program depends more on the training of technicians and the training workshops when introducing any new vaccine.

5.1 Discussion

Part (1): From record (2013 -2015):

The study shows that Rota vaccine coverage first or second dose in all strategies, fixed outreach and mobile team since 2013 to 2015 is low than the coverage of penta vaccine, both first and second dose, and this agree with, [39]. "deaths from diarrheal disease in the targeted population (children younger than 11 months, with deaths down 40%) and children between 1 and 2 years deaths dropped to about 30%)",this lead to increase number of defaulters between children less than one year attributed to receive doses after specific age for immunization and this agree with,[30]." first dose is given to children between the ages of 6-15 weeks, second dose is allowed until the age of 32 weeks", This led to low coverage of rotavirus vaccine and increases children's exposure to rotavirus diarrhea, and this agreeswith[40]." The high vaccine coverage routinely suggests that could rapidly achieve a similar reduction in the burden of rotavirus".

In November 2016, the Rota vaccine policy was changed by W.H. O and it was allowed to be given to children less than one year, so the coverage was increased in 2016 compared years (2013 - 2014 - 2015) where the percentage of Rota vaccine defaulters decreased [40]."High vaccine coverage routinely suggests that could rapidly achieve a similar reduction in the burden of rotavirus".

Part (2): Mother questionnaire:

The study revealed that 51% of the mothers are in the age group of 26 - 35 years. We note this is the period of the fertility for women, also became interested in higher education delay the age of marriage. The study showed that 84.3% of mothers had one child, 87% of children aged 9 months and 2 years, 70% from the families have 3 to 6 individuals, attributed to maternal awareness and the availability of family planning methods by reproductive health services, on the other hand to the absence of parents who abandoned their areas in search of livelihoods, 96% married women this in the normal situation and this supports the stability of the family, which reflects on their interest in their children, 39.6% of mothers are university graduates and the proportion of illiterate mothers 9%, the educational background of mothers were associated with the knowledge of vaccination importance. The children of illiterate mothers showed a high rate of rotavirus infection this may be explained by the fact that the more educated mothers will have the skills, practice and knowledge to protect their children from likely exposure torotavirus.88% of mothers haveno working, attributed to the lack of jobs in Al Matama locality, 41.4% of families have an income level between 500-1000 pounds, low income lead to increased exposure children to diarrhea, and this agrees with [13]."Children in low income countries acquire the infection early during the first year of life". All mothers said vaccination was important attributed this most mothers received messages from vaccinators in centers, and spread of health

awareness among members of community, and this agrees with[30]".Health education and mass mobilization of the community are essential not only to increase the coverage but also for the timely receipt of vaccines".98% of the mothers have vaccination cards for their children due to received messages within sessions about importance of vaccination card, and this agrees with[30]. "The only record of immunization history and status available for health workers if the facility registers do not exist or if clients move from one health facility to another .77.1% immunized their children in fixed strategywhich the immunization program depends on the future, service sustainable throughout the week, converse layout-reach and mobile team strategy monthly Sessions, this agrees with[30]." Fixed site give services available about 5km of area),54.3% of mothers knows the vaccination against diarrhea, and this agrees with[30]."Key messages".50.5% of mothers knows the vaccine used against diarrhea, and this agrees with[30]."Key messages".66.2% of mothers had knowledge of rotavirus, and this agrees with[30]."Key messages".59% of mothers know the dates of taking the first dose of Rota, andthis agrees with[30]."Key messages".45% of mothers know the age of the first dose, andthis agrees with[30]. "Key messages".82.4%of mothers know the dates of the second dose, and this agrees with[30]."Key messages" .56% of mothers knowthe age to take second dose, 39% of mothers vaccinated their children against diarrheal disease because of their knowledge that vaccination protects against rotavirus-induced

diarrhea, and this agrees with [30]."Key messages". (83.3%) of children completed doses against diarrhea due to their knowledge about importance of completing doses, and this agrees with[30]. " Key messages". 16.7% did not complete the doses due to laziness and neglect of mothers by 37.1% despite mothers knowing the importance of completing vaccination, and this agrees with [30]." Key messages". All mothers said vaccinations have side effects due to the spread of health awareness during sessions by vaccinators, and this agrees with [30]."Key messages".15.7% of the children happen to him side effects, and this agrees with [33]." Like any medicine; there is a chance of side effects". 66.2% of the 15.7%, which had side effects was in the form of fever, I think fever as a result of vaccination with penta vaccine as opposed to vaccination with rotavirus vaccine, which does not have fever, and this agrees with [33]."Some problems have been associated with rotavirus vaccine. irritable, or have mild, temporary diarrhea or vomiting after getting a dose of rotavirus vaccine".48.5% of the mothers are doing home care in event side effects due to the recommendation of vaccinators in health centers during the sessions, and this agrees with[30]. "Key messages".

Part (3): Interview with vaccinators:

The study revealed that 40% of the vaccinators have experience between 8-12years, this indicates the stability of the vaccinators in their work for a long time and stability in their job, which increases their accumulated experience in the field, 45% of the vaccinators have primary certificate, this is attributed to all of

vaccinators health assistance visitors, just requires primary education as a minimum for admission, 90% of the vaccinators received training on rotavirus vaccine, this is due to the policy of immunization program trains vaccinators before introducing any new vaccine;75% of the vaccinators know Rotavirus vaccine consists of live attenuated virus, ,all vaccinators are delivering the five basic messages during the vaccination sessions, all vaccinators knows the target age,(From 6 -15weeks for the first dose or second dose for rotavirus vaccination, allvaccinators knowsnumber of doses specified for Rota vaccine), all vaccinators knows Rotavirus vaccine is given oral, 60% of the vaccinators said that the Rotavirus is prevented bywashing hands,vaccination and Avoid overcrowding during the season of spread of the disease,.Allvaccinators knows about contraindications, the rotavirus vaccine is not given to children over three and a half months old,Rotavirus is not given to children over 8 months of age for the second dose and allergic reaction to a previous, dose of Rota virus vaccine should not get another dose,allof the vaccinators knowsthe side effects of vaccination with Rota vaccine, vomiting, and children might become irritable and temporary diarrhea.

This is due to the policy of immunization program trains vaccinators before introducing any new vaccine.

Probability value for testing the Chi Square Sig test is 0.000 which is less than 0.05; the result of the test is significant,

indicating a statistically significant relationship between the educational level of mothers and the extent of their knowledge of the Rota vaccine.

probability value of the Chi Square sig test is 0.1 and is greater than 0.05, the result of the test is insignificant, indicating that there is no statistically significant relationship between the educational level of technicians and their knowledge of rotavirus,This is because the immunization program depends more on the training of technicians and the training workshops when introducing any new vaccine.

5.2. Conclusion

The study concluded that the coverage of the rotavirus vaccine, RV1orRV2atfixed, out-reach and mobile strategy, in Al Matama locality. RV1 coverage in 2013(91%), RV2 (83%), RV1 coverage in 2014 (93%), RV2 93%, RV1 coverage in 2015 (89%), RV2 89% Low coverage compared with penta1or penta2 which is given simultaneously with the rotavirus vaccine at the same age and time. The study showed that a number of mothers took their children to vaccinate at the age of more than three and a half months , a number of mothers did not complete Rota doses for their children on time due to neglect and laziness, where Rota was limited in age, which led to uncompleted the doses to their children, the study concluded that a large number of mothers had knowledge of the age specified for rotavirus vaccination, as well as the timing of doses and side effects of vaccination, all was acquired by the vaccinators. The study concluded that Rota vaccine coverage was increased, RV1 or RV2 when opening the rotavirus vaccine, so given to children less than one year instead of the age of three and a half months, by W.H.O in February 2016. Therefore, the defaulters of rotavirus vaccine were decreased very clearly. The study included that children who have some side effects, I think, do not result from penta vaccine because the side effects of penta vaccine appear like fever, and Rota vaccine cannot make fever.

5.3. Recommendations

1. Extract all defaulters and work to recover them by implementation of home visits effectively, and through visits mothers and beneficiaries are aware by the vaccinators in the holding area of the vaccination center about importance of vaccination, timely commencement of immunization and completion of the schedule should be emphasized.
2. Continue to communicate the five basic messages by the vaccinators to mothers, beneficiaries through the various vaccination sessions.
3. Training the staff on immunization program by local officials to improve their skills for effective communication with community leaders, policy, executives, people committees, mayors and elders, and engaging them to mobilize the community. This will help to increase awareness, coverage and reduce the percentage of defaulters in the locality.
4. Health workers need to be trained and not miss any opportunity to vaccinate children coming to health facilities for any reason.

6.1- References

1- Paranjothy M, Yap K, Sabil D. Clinical and laboratory characteristics of rotavirus-associated diarrhea. Med J Malaysia. 1987; 42:31-5.

2- Zuccotti G, Meneghin F, Dilillo D, Romano L, Bottone R, Mantegazza C, et al. Epidemiological and clinical features of rotavirus among children younger than 5 years of age hospitalized with acute gastroenteritis in Northern Italy. BMC infectious diseases. 2010; 10(1):218.

3- Garrido MV. Health technology assessment and health policy-making in Europe: current status, challenges and potential: WHO Regional Office Europe; 2008.

4- Bayard V, DeAntonio R, Contreras R, Tinajero O, Castrejon MM, Ortega-Barría E, et al. Impact of rotavirus vaccination on childhood gastroenteritis-related mortality and hospital discharges in Panama. International Journal of Infectious Diseases. 2012; 16(2):e94-e8.

5- Glass RI, Lang DR, Ivan off BN, Compans RW. Introduction: Rotavirus-from basic research to a vaccine. Journal of Infectious Diseases. 1996; 174:S1-S2.

6- Liu L, Johnson HL, Cousens S, Perin J, Scott S, Lawn JE, et al. Global, regional, and national causes of child mortality: an updated systematic analysis for 2010 with time trends since 2000. The Lancet. 2012; 379(9832):2151-61.

7- Al Matama EPI annual report .2015

8- Smith PJ, Schwartz B, Mokdad A, Bloch AB, McCauley M, Murphy TV. The first oral rotavirus vaccine, 1998–1999: estimates of uptake from the National Immunization Survey. Public Health Reports. 2016.

9- Clark HF, off it PA, Plotkin SA, Heaton PM. The new pentavalent rotavirus vaccine composed of bovine (strain WC3)-human rotavirus reassortants. The Pediatric infectious disease journal. 2006; 25(7):577-83.

10- Organization WH. Proceedings of the seventh Global Vaccine Research Forum and parallel satellite symposia: 3-6 December 2006, Bangkok, Thailand. 2007.
11- Vesikari T. Rotavirus vaccination programme is not only about costs/Rotavirus as program sadecemaliyetleiliskilidegildir. Journal of Pediatric Infection. 2013; 7(1):1-3.
12- Gregg MB. Field epidemiology: Oxford University Press, USA; 2008.
13- Secretariat W, Mantel C. Detailed Review Paper on Rotavirus Vaccines.
14- Diseases CoI. Prevention of rotavirus disease: guidelines for use of rotavirus vaccine. Pediatrics. 1998; 102(6):1483-91.
15- Payne DC, Baggs J, Zerr DM, Klein NP, Yih K, Glanz J, et al. Protective association between rotavirus vaccination and childhood seizures in the year following vaccination in US children. Clinical infectious diseases. 2013; 58(2):173-7.
16- VENICE I. Vaccination coverage assessment in EU/EEA.
17- Maure CG, Dodoo AN, Bonhoeffer J, Zuber PL. The Global Vaccine Safety Initiative: enhancing vaccine pharmacovigilance capacity at country level. Bulletin of the World Health Organization. 2014; 92(9):695-6.
18- Serazin AC, Shackelton LA, Wilson C, Bhan MK. Improving the performance of enteric vaccines in the developing world. Nature Publishing Group; 2010.
19- Charmaz K. The power and potential of grounded theory. Medical Sociology Online. 2012; 6(3):2-15.
20- Desai R, Cortese MM, Meltzer MI, Shankar M, Tate JE, Yen C, et al. Potential intussusception risk versus benefits of rotavirus vaccination in the United States. The Pediatric infectious disease journal. 2013; 32(1):1.
21- Ustrup M, Madsen LB, Bygbjerg IC, Konradsen F. Outstanding challenges for rotavirus vaccine introduction in low-income countries–a systematic review. Dan Med Bull. 2011; 58(10):1-5.

22- Zaffran M, Vandelaer J, Kristensen D, Melgaard B, Yadav P, Antwi-Agyei K, et al. The imperative for stronger vaccine supply and logistics systems. Vaccine. 2013; 31:B73-B80.
23- Carlin JB, Macartney KK, Lee KJ, Quinn HE, Buttery J, Lopert R, et al. Intussusception risk and disease prevention associated with rotavirus vaccines in Australia's National Immunization Program. Clinical Infectious Diseases. 2013; 57(10):1427-34.
24- Amodio E, Tabacchi G, Cracchiolo M, Sciuto V, Vitale F. Hospitalization of children aged 0–59 months with rotavirus gastro-enteritis before the introduction of routine vaccination (Sicily 2003–2012). Pediatrics and international child health. 2015; 35(4):319-23.
25- Husby S, Koletzko S, Korponay-Szabo I, Mearin M, Phillips A, Shamir R, et al. European Society for Pediatric Gastroenterology, Hepatology, and Nutrition guidelines for the diagnosis of coeliac disease. Journal of pediatric gastroenterology and nutrition. 2012; 54(1):136-60.
26- Fisman DN, Chan CH, Lowcock E, Naus M, Lee V. Effectiveness and cost-effectiveness of pediatric rotavirus vaccination in British Columbia: a model-based evaluation. Vaccine. 2012; 30(52):7601-7.
27- EPI Sudan. Manual Rotavirus vaccine 2011.
28- Coalition IA. Needle Tips. St Paul, MN: Immunization Action Coalition Available at: immunize org. 2012.
29- Drain P, Primack A, Hunt D, Fawzi W, Holmes K, Gardner P, et al. GH Elective Reading List. Arch PediatricAdolesc Med. 2006; 160:191-6.
30- Pendleton A, Galic M, Clarke C, Ng SP, Ledesma E, Ramakrishnan G, et al. Impact of rotavirus vaccination in Australian children below 5 years of age: a database study. Human vaccines &immunotherapeutics. 2013; 9(8):1617-25.
31- EPI River Nile State. Annual report. (2013-2015).
32- Krishna rajah G, Landsman-Blumberg P, Eynullayeva E. Rotavirus vaccination compliance and completion in a Medicaid infant population. Vaccine. 2015; 33(3):479-86.

33- Santschi M. Briefing: Counting 'New Sudan'. African Affairs. 2008; 107(429):631-40.
34- Wirth S. Pediatric Infectious Diseases Revisited: Birkhäuser Basel; 2007.
35- Parashar UD, Steele AD, Widdowson M-A, Centers for Disease C, Prevention, Global Alliance for V, et al. Global rotavirus surveillance: preparing for the introduction of rotavirus vaccines. Chicago, Ill.: IDSA; 2009.
36- Organization WH. The selection and use of essential medicines: report of the WHO Expert Committee, 2002 :(including the 12th model list of essential medicines). 2003.
37- Bernstein DI, editor live attenuated human rotavirus vaccine, Rotarix™. Seminars in pediatric infectious diseases; 2006: Elsevier.
38- Richardson V, Hernandez-Pichardo J, Quintanar-Solares M, Esparza-Aguilar M, Johnson B, Gomez-Altamirano CM, et al. Effect of rotavirus.Vaccination on death from childhood diarrhea in Mexico. New EnglandJournal of Medicine.2010; 362(4):299-305.
39- Aulke-Korinek M, Rendi-Wagner P, Kundi M, Kronik R, Kollaritsch H. Universal mass vaccination against rotavirus gastroenteritis: impact on hospitalization rates in Austrian children. The Pediatric infectious disease journal. 2010; 29(4):319-23.
40- Glass RI, Kilgore PE, Holman RC, Jin S, Smith JC, Woods PA, et al. The epidemiology of rotavirus diarrhea in the United States: surveillance and estimates of disease burden. Journal of Infectious Diseases. 1996; 174(Supplement_1):S5-S11.
41- Magzoub MA, Bilal NE, Bilal JA, Osman OF. Rotavirus infection among Sudanese children younger than 5 years of age: a cross sectional hospital-based study. Pan African Medical Journal. 2014; 16(1).
42- Arvay ML, Curns AT, Terp S, Armah G, Wontuo P, Parashar UD, et al. How much could rotavirus vaccines reduce diarrhea-associated mortality in northern Ghana? A model to assess impact. The Journal of infectious diseases. 2009; 200(Supplement_1):S85-S91.

43- Dennehy PH. Transmission of rotavirus and other enteric pathogens in the home. The Pediatric infectious disease journal. 2000; 19(10):S103-S5.

6.2- Appendix

Appendix (1):

The basic messages:

1- Thanks the parents for visiting the center and getting her children vaccinated.

2. Dates and place of future doses. tell the parents about the exact date when thy should return for the next immunization session; say how many weeks ahead the date is, tell the parents where to go for the next immunization session by announcing in places of worship ,markets, weddings and other social events ,in the case of the, outreaches sessions.

3 - Explain to parents Importance of taking their children for immunization and completing immunization schedule before children are one year old.

4. Possible side effects and how to deal with them Educate parents and about the probable body reactions that is likely to occur

After each vaccine has been given .Advise parents and on how to manage the body reactions resulting from each vaccine where and when to seek medical assistance in case of prolonged body reactions. "It is possible that a child may develop mild body reactions after mobileImmunization e.g. fever and pain or as welling at the site of injection, do not apply any medication –it will heal by itself.

5 - Explain the benefits of immunization to children parents, and the Importance of bringing a child health card, may be the only record of immunization history and status available for health workers if the facility registers do not exist or if clients move from one health facility to another,[30].

Appendix (2):

بسم الله الرحمن الرحيم

Shendi University

College of Graduate Studies and Scientific Research

A questionnaire on mothers' knowledge of rotavirus vaccine

In your hands a questionnaire form to study the knowledge of mothers about rotavirus vaccine, we ask you to answer this questions with all transparency and honesty and this study for scientific research only and the information received from you top secret.

First: Basic information:

1. Housing…… Administrative unit..... Village.....

2- **Age**:

1- 15-35 ( )
2- 26-35 ( )
3- 36-45 ( )
4- 46- 49 ( )

3- How many children are two years old or younger?

1- 12 month ( )
2- 13 – 23 month ( )

4 -How old is your child?

1- Less than 40 days ( )
2- From 40 days to eight months ( )
3- From nine months to 2 years ( )

5 - Social status:

1- Married ( )
2- Widow ( )
3- Divorced ( )

6 - Number of family members:

1- Less than 3 ( )

2- From 3 to 6 individuals ( )

3- More than 6 individuals ( )

7 - Educational level:

1- Illiterate ( )

2- Primary ( )

3- Secondary ( )

4- A university graduate ( )

5- Postgraduate studies ( )

8 - Occupation:

1- Worker ( )

2- House wife ( )

9 - Income level:

1- Non( )

2- Less than 500 pounds ( )

3- From 500-1000 pounds ( )

4- From 1100 - 1500 pounds ( )

5- More than 1500 pounds ( )

Second: the concept of mothers about Rota vaccine:

1 - Is vaccination important?

1- Yes ( )

2- No ( )

2 - Does your child have a vaccination card?

1- Yes ( )

2- No ( )

3 - Where is your child's vaccination?

1- Fixed center ( )

2- Outreach center ( )

3- Mobile Team ( )

4 - Do you know vaccinations against diarrhea?

1- Yes ( )

2- No ( )

5 - What is the vaccination that protects against diarrhea?

1- Penta vaccine ( )

2- Polio vaccine ( )

3- Pneumococcus pneumonia vaccine ( )

4- Rota Vaccine ( )

6 -Where did you know about rotavirus?

1- From the media ( )

2- From the vaccination center ( )

3- From the mothers of the region ( )

4- Others ( )

7 - Do you know when to give your child the first dose?

1- Yes ( )

2- No ( )

8 - If yes, at what age do you go to take the first dose?

1- Since birth ( )

2- 40 days later ( )

3- After two months ( )

4- After 4 months ( )

9 - Do you know when to give the second dose?

1- Yes ( )

2- No ( )

10 - If yes, at what age do you go to take the second dose?

1- A month after the first ( )

2- Within eight months of the child's age ( )

3- After eight months of the child's age ( )

11 - Is your child vaccinated against diarrhea?

1- Yes ( )

2- No ( )

12 - If yes, why?

1- Protects against diarrhea ( )

2- Because it is important ( )

3- Like mothers were vaccinated their children ( )

13 - How many doses?

1- One dose ( )

2- Two doses ( )

3- Three doses ( )

4- I do not know ( )

14 -Hasyour child completed vaccination doses against diarrhea?

1- Completed immunization. ( )

2- Partial immunization. ( )

3- Non- immunized. ( )

15 - If the answer is no, what are the reasons?

1- Not aware of the importance of vaccination ( )

2- Not aware of the importance of completing doses ( )

3- Fear of side effects ( )

4- The child is sick ( )

5- Neglect and laziness of the mother ( )

6- Distance from the vaccination center ( )

7- Others ( )

16 - Does the vaccination have side effects?

1- Yes ( )

2- No ( )

17 - When your child was vaccinated with Rota; does he have a side effect?

1- Yes ( )

2- No( )

18 - If yes, what is it?

1- Diarrhea ( )

2- Vomiting ( )

3- Fever ( )

4- a headache ( )

19 - In the case of a side effect of rota vaccine what do you do?

a. Going to the doctor ( )

b. Home care ( )

c. I am not doing anything( )

Appendix (3):

بسم الله الرحمن الرحيم

Shendi University

College of Graduate Studies and Scientific Research

A questionnaire to determine about the extent of knowledge of immunization vaccinators in health centers on rotavirus vaccine

In your hands a questionnaire form to study the knowledge of immunization technicians in health centers on rotavirus vaccine, we ask you to answer this questions with all transparency and honesty and this study for scientific research only.

(1): **How many years of your experience?**

a- Less than 4 years ( )

b - (4- 8) years ( )

c - (8- 12) years ( )

d - More than 12 years ( )

(2): Education level:

a – Primary ( )

b – Midrate ( )

c – Secondary ( )

d - A university graduate ( )

E-Postgraduate studies ( )

(3): Have you been trained when introducing rotavirus vaccine?

a – Yes ( )

b -No ( )

(4): Rotavirus vaccine consists of:

a - Live Attenuated Virus. ( )

b - A virus separated from its toxins.( )

c - Genetically modified virus. ( )

d - Genetically modified virus. ( )

e - All that is true. ( )

(5) Do you deliver the five key messages during sessions to beneficiaries?

1 / Yes ( ) 2 / No ( )

(6)**The target age for rotavirus vaccination is?**

a -From (6 -15) weeks for the first dose .32 weeks for the second dose.()

b - From 15-20 weeks for the first dose.44 weeks for the second dose ( )

c - From 15 weeks for the first dose.48 weeks for the second dose ( )

(7): **The number of doses specified for Rota vaccine is:**

a - One dose ( )

b - Two doses. ( )

c - Three doses. ( )

(8**): Rotavirus vaccine is given by:**

a- Muscle ( )

b- Thigh. ( )

c- Mouth ( )

(9): **Rotavirus is prevented by?**

A - Washing hands. ( )

b- Rotavirus vaccination.( )

c-Avoid overcrowding during the season of spread of the disease.( )

d- All that is true. ( )

(10): **What are the contraindications for rotavirus vaccine?**

a- The rotavirus vaccine is not given to children over three and a half months old. ( )

b- Rotavirus is not given to children over 8 months of age for the second dose.( )

c- Allergic reaction to a previous dose of Rota virus vaccine should not get another dose. ( )

d- All that is true. ( )

(11):**What are the side effects caused by rotavirus vaccination?**

A - Vomiting after getting a dose of rotavirus vaccine. ( )

b- Children might become irritable. ( )

c- Temporary diarrhea. ( )

d- All that is true. ( )

Researcher: Oshman Majzob Al Taib

Phone number: 0129749509

ملحق (4)

بسم الله الرحمن الرحيم

جامعة شندي

كلية الدراسات العليا والبحث العلمي

استبيان عن مدى معرفة فنيي التحصين حول لقاح الروتاا

بين ايديكم استمارة استبيان للتعرف **عن مدى معرفة فنيي التحصين بالمراكز الصحية**حول لقاح الروتا نرجو منكم شاكرين الاجابة عن اسئلته بكل شفافية وصدق وهذه الدراسة من أجل البحث العلمي فقط والمعلومات الواردة منكم سرية وجزاكم الله خيرا .

1/ كم عدد سنوات عملك بالتحصين؟

(ا)اقل من 4 اعوام ( )
(ب)من 4 اعوام الى 8 اعوام ( )
(ج)من 8 اعوام الى 12 عام ( )
(د) من 12 عام فاكثر ( )

2/ المستوى التعليمي؟

(ا) اساس (ب) متوسط (ج) ثانوي (د) جامعي

3 /هل تم تدريبك عند ادخال لقاح الروتا ؟

(ا) نعم ( ) (ب) لا ( )

4/ يتكون لقاح الروتا من:

(ا) فيروس حي مضعف (ب) فيروس مفرز من سمومها
(ج) فيروس معدل وراثيا (د) كل ماذكر خطأ

5/هل يقوم الفني بتوصيل الرسائل الخمس للمستفيدين أثناء الجلسات ؟

/ (ا) نعم ( ) (ب) لا ( )

6/ العمر المستهدف للتطعيم بلقاح الروتا هو:

(ا) 6___ 15 اسبوع للجرعة الاولى و32 اسبوع للجرعة الثانية كاقصى فترة ممكنة
(ب) 15___ 20 اسبوع للجرعة الاولى و 44 اسبوع للجرعة الثانية كاقصى فترة ممكنة
(ج) 15 اسبوع للجرعة الاولى و 48 اسبوع للجرعة الثانية كاقصى فترة ممكنة

7/ عدد الجرعات المحددة للروتا هي

(ا) جرعة واحدة (ب) جرعتان (ج) 3 جرعات .

8/ يتم اعطاء لقاح الروتا عن طريق :

(ا) العضل (ب) الفخذ (ج) الفم .

9/ تتم الوقاية من فيروس الروتا عن طريق :

ا- غسل اليدين جيدا والاهتمام بنظافة الحمامات

ب- التطعيم بلقاح الرو**تا**

ج- تجنب الازدحام وقت موسم انتشار المرض

د- كل الاجابات صحيحة

10/ ماهي موانع التطعيم للقاح الروتا ؟

1. لاتعطى للاطفال الذين تزيد أعمارهم عن ثلاثة شهور ونصف .2
2. لاتعطى الجرعة الثانية للاطفال الذين تجاوزت اعمارهم 8 ثمانية اشهر
3. عندحصول رد فعل تحسسي لجرعة سابقة من لقاح فيروس روتا .
4. كل الاجابات صحيحة

.

11/ اذكر ثلاثة من الاثار الجانبية التي تحدث بسبب لقاح الروتا

1-القيء بعد الحصول على جرعة من لقاحالروتا.

2- الإسهال المؤقت.

3- يصبح الطفل عصبي.

4/ كل الاجابات صحيحة. -1

الباحث : عثمان مجذوب الطيب
رقم التلفون : 0129749509

ملحق (5)

بسم الله الرحمن الرحيم

جامعة شندي

كلية الدراسات العليا والبحث العلمي

<u>استبيان عن مدي معرفة الأمهات حول لقاح الروتا</u>

بين ايديكم استمارة استبيان للتعرف عن مدي معرفة الأمهات حول لقاح الروتا نرجو منكم شاكرين الاجابة عن اسئلته بكل شفافية وصدق وهذه الدراسة من أجل البحث العلمي فقط والمعلومات الواردة منكم سرية وجزأكم الله خيرا .

<u>أولا : البيانات الاساسية:</u>

1. **السكن:** الوحدة

الادارية.....القرية..... .....

2. العمر:

أ/ من 15_25سنة ( ) ب/من 26_35 سنة ( )

ج/من 36 _ 45سنة ( )د/ من 46- 49 ( )

3/كم عدد اطفالك الذين اعمارهم عامين او اقل:

أ/ عمر12 شهر ( ) ب/ من13-23 شهر ( )

4/ كم يبلغ عمر طفلك :

أ/ اقل من 40( ) ب/ من 40 يوم الى ثمانية اشهر ( )

ج/ من تسعة شهور الى عامين ( )

5/ الحالة الاجتماعية:

أ/ متزوجة ( )ب/ أرملة ( ) ج/ مطلقة ( )

6/ عدد افراد الاسرة ؟

أ/ أقل من 3 ( ) ب/ من 3 –6 افراد ( ) ج/اكثر من 6 أفراد ( )

7/ المستوى التعليمى:

أ/ امى ( ) ب/ أساس ( )ج/ ثانوى ( ) د/جامعى ( )
ه/ فوق الجامعى ( )

8/ المهنة :

أ/ عاملة ( )ب/ ربة منزل ( )

9/مستوى الدخل:

أ/ بدون دخل ( ) ب/ اقل من 500ج ( )
ج/ 1100- 1500ج ( ) د/ 1100- 1500ج ( )
ه/ أكثر من 1500ج( )

ثانيا : مفهوم الامهات عن لقاح الروتا :

1/ هل التطعيم مهم ؟أ/ نعم ( )ب/ لا ( )

2/هل لطفلك كرت تطعيم؟ أ/ نعم ( )ب/ لا ( )

3/ اين طعمتي طفلك؟أ/ مركز ثابت ( ) ب/مركز فرعي ( ) ج/جوال ()

4/هل تعرفي وجود تطعيم ضد الاسهالات؟

أ/ نعم ( ) ب/ لا ( )

5/ماهو التطعيم الذى يقئ من الاسهالات؟

أ/ خماسى ( )ب/ شلل ( ) ج/ مكورات ( ) د/ روتا ( )

6/من أين عرفتي بلقاح الروتا؟

أ/ من وسائل الاعلام ( ) ب/ من مركز التطعيم ( ) ج/ من امهات المنطقة ( )

د/ اخرى (حدد):.....

7/هل تعرفي مواعيد اعطاء الجرعة الاولى للطفل؟

أ/ نعم ( ) ب/ لا ( )

8/ فى حالة الاجابة بنعم في اى عمر تذهبين بطفلك لاخذ الجرعة الاولى ؟

أ/ منذ الولادة ( ) ب/ بعد الاربعين مباشرة ( ) ج/ بعد الشهرين ( )
د/ بعد 4 اشهر ( )

9/هل تعرفي مواعيد اعطاء الجرعة الثانية للطفل؟

أ/ نعم ( ) ب/ لا ( )

10/ فى حالة الاجابة بنعم في اى عمر تذهبين بطفلك لاخذ الجرعة الثانية ؟

أ/ بعد شهر من الاولى ( )
ب/خلال ثمانية اشهر من عمر الطفل( )
ج/ بعد الثمانية اشهر من العمر( )

11/هل طعمتى طفلك ضد الاسهال؟

أ/ نعم ( ) ب/ لا( )

12/اذا كانت الاجابة بنعم لماذا؟

أ/ يحمي من مرض الاسهال( )
ب/ لأنه مهم( )

ج/ أسوة بالامهات اللائي طعمن أطفالهن( )

13/كم عدد جرعاته؟

أ/ جرعة واحدة ( ) ب/ جرعتين( ) ج/ 3 جرعات ( )
د / لا أعرف ( )

14/ هل اكمل طفلك جرعات التطعيم ضد الاسهال ؟

أ/ مكمل التطعيم ( )ب/ تطعيمجزئي () ج / غير مطعم ( )

15/اذاكانت الاجابة بلا ماهي الاسباب ؟

أ/ غيرمدركة باهمية التطعيم ( )ب/ غير مدركة لاهمية اكمال الجرعات ( )

ج/ الخوف من حدوث الاثار الجانبية ( )د/ مرض الطفل( )

ه/ اهمال وكسل ( ) و/ بعد المسافة من مركز التطعيم( )

ز/ اخرى (حدد): .....

16/هل للتطعييم اثار جانبية ؟

أ/ نعم ( ) ب/ لا ( )

17/عند تطعيم طفلك بالروتا هل حدث له اثر جانبى؟

أ/ نعم ( )ب/ لا( )

18/ اذا كانت الاجابة نعم ماهو ؟

أ/ اسهال ( )ب/ استفراغ ( )ج/ حمى ( )د/ صداع ( )

19/ في حالة حدوث اثر جانبي بلقاح الروتا ماذا تفعلي؟

أ/ الذهاب الى الطبيب ( ) ب/رعاية منزلية ( ) ج/ لاافعل شي( )

الباحث :عثمان مجذوب التلفون:0129749509