# Socio-Economic Factors influence Measles Immunization Coverage in Shendi and Almatama Localities- Sudan

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***Abstract*****—**Measles is a vaccine preventable disease targeted for elimination all over the world by 2020 , a descriptive cross sectional facility and community based study was carried out in Shandi and Almatama localities in River Nile state in Sudan during the period from November 2012 to February2015.This study aimed to assess the ongoing activities concerning measles elimination including measles converge in routine program and supplementary immunization activities. 30 clusters immunization survey was applied for both localities to assess immunization coverage through examine the immunization status of 840 children. The study revealed that, measles's first dose coverage ($MCV^1$) was (93.8% - 91.9%) in Shendi and Almatama localities respectively, measles's second dose coverage ($MCV^2$) was (84.8% - 86.2%) in Shendi-Almatama localities respectively, the post measles SIAs survey coverage was (91.9% - 87.7 %). Concerning the reasons behind vaccine intake ,the present study showed that respondents reported the primary reasons for children not being ever vaccinated against measles to "long waiting time", "unaware of the need to immunization", "unaware of return for next dose", and ``immunization post too far``. Moreover, educated mothers were more likely to have their children immunized than mothers who had no education. Substantial differences in vaccination status rates were found for children in urban and rural areas. Rural areas had the highest coverage rates compared with urban and slum areas. In conclusion ,the study recommended that, National immunization program should conduct a periodic immunization surveys especially in high risk groups To obtain high level of first and second doses of measles coverage .

***Keywords*****—** coverage, immunization, Measles, socio-economics

## I. Introduction

IN the 1970s, at the end stage of the global campaign to eradicate smallpox, the World Health Organization (WHO) launched the Expanded Program on Immunization (EPI). Coverage for basic vaccines was an estimated 5% in developing countries at that time. The EPI goals were to ensure that every child received protection against childhood tuberculosis, polio, diphtheria, pertussis, tetanus, and measles by the time he or she was one year of age and to give tetanus toxoid vaccinations to women to protect them and their newborns against tetanus. During the 1980s, national immunization programs in developing countries made substantial progress in meeting the EPI goal, with the support of WHO, the United Nations Children's Fund (UNICEF), the U.S. Agency for International Development (USAID), the Italian government, and other partners. EPI and the program to control diarrheal diseases were the "twin engines" that powered child survival programs worldwide. As immunization coverage in developing countries soared, EPI was helping lay the foundation for other primary health care services. By 1990, average reported coverage for the six antigens was over 70%. As a result of the increase in coverage, the incidence of vaccine-preventable diseases began to fall dramatically [(1)].

Under normal circumstances, it is possible to fully immunize children with at least four contacts with immunization services during their first year of life. However, some children remain unreached for reasons of geographic isolation, lack of information, the social or cultural environments in which they live, or active dis-crimination to which they are subjected. There-fore, special measures are needed to overcome all these barriers. Reaching unreached urban populations will become an important component of this strategy as urbanization and informal settlements place urban children increasingly at risk of missing out on immunization [(2)].

The fourth Millennium Development Goal (MDG 4) aims to reduce the under-five mortality rate by two-thirds between 1990 and 2015. Recognizing the potential of measles vaccination to reduce child mortality, and given that measles vaccination coverage can be considered a marker of access to child health services, routine measles vaccination coverage has been selected as an indicator of progress towards achieving MDG 4 [(3)]. Overwhelming evidence demonstrates the benefit of providing universal access to measles and rubella-containing vaccines. Globally, an estimated 548 000 children died of measles in 2000. By 2011, the global push to improve vaccine coverage resulted in a 71% reduction in deaths. Since 2000, with support from the Measles & Rubella Initiative (M&R Initiative) over 1 billion children have been reached through mass vaccination campaigns about 225 million of them in 2011 [(4).]

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## II. Material And Methods

The type of this study was a cross- sectional community and facility – based conducted in Shendi & Almatama localities, during 2014 .

### *A. Study area*

Shendi & Almatama localities are part of River Nile state in North Sudan and they were one province in past, River Nile state bounded by Khartoum state to the south, northern state to the North, Gadarif state to the east and Kordufan state to the west .Shendi and Almatam localities are locating in the southern part of River Nile state they bounded by Aldamar locality to the North, Khartoum state to the South, Kassala state to the East and Northern Darfur state to the West .The total area of the tow localities is 76243 Km².

### *B. Study Population*

Two children were selected from each household to evaluate the immunization status by examining the immunization cards or taking histories from caregiver recall, the state of two groups are child aged from 12 – 23 month during the time of immunization survey were checked to assess MV1 & MV2.(Routine Immunization )and Child aged from 9 month to less than 15 years to evaluate the last SIAs campaign ( measles campaign ).

### *C. Sampling and sample size*

WHO recommended 30-cluster EPI Coverage survey methodology was followed to assess immunization coverage in this study. Total numbers of 30 clusters were randomly selected from each locality to complete 60 clusters (30 clusters from Shendi & 30 clusters from Almatama), then From each cluster we selected 7 children aged (12 – 23 month) for first and second measles doses and 7 children aged (9 month to 15 years ) to examine the last supplementary immunization activities campaign .

| *Subject* | *Sample size* | *Note* |
|---|---|---|
| Child12-23 month | 210 + 210 = 420 Shendi+Almatama | |
| Child(9)month–<15 year | 210 + 210 = 420 Shendi +Almatama | 840 Children |

### *D. Selection criteria*

The catchment areas (Blocks or villages) list was obtained as sampling frame in order to select the 30 clusters for each locality. Then random simple sample was applied to select the 30 cluster from each locality and reserve list was devolved to provide option in case of any missing in the cluster like inaccessibility or community rejections.

Systematic random sample was applied for listed the households to select the 7 children for MV1 and 7 children for MV2. The sample interval was obtained by divided the total numbers of households over the number of child intend to select etc:

$$\textit{Sample interv} = \frac{\textit{total numbers of households in the cluster}}{\textit{7(number of sample unit)}}$$

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 centre of the sector and spin a 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 after count the number of sample interval.

Second households = first household + sample i

Any child aged between 12-23 month (for routine immunization) and 9month - <15 years (for measles campaign) living in the study area and took his/her vaccine shot inside the study area.

Any child coming from outside the study area and took his /her vaccine shot from outside or partially vaccinated in study area.

Any child has measles vaccine sensitivity disease or has reasons for not completing the course.

Any eligible child hasn't got person to give information about vaccine status during the time of data collecting should be discarded. (Caregiver should be the mother, father or any other family members up to 18 years)

## III. Data Collection And Analysis

Data was collect by WHO adapted Structure questionnaires. Pretesting and Questionnaires validation was apply before the survey. The following four questionnaires and forms were used characteristics of households; mothers and all children aged 9 months through 15 years in each household included in the sample. All data collected from the questionnaires were coded, checked and cleaned before entering, and analyzed by entering to computer using the statistical package for social science program (SPSS and solution) [(3)].

## IV. Ethical Clearance For The Study

The survey conducted in accordance with the national policies on ethics for surveys involving human subjects. The proposal was passed by the faculty of public health and faculty of post graduate in Shendi University. The data collection started after taken consent from shendi locality health authority, Almatama locality health author and children caregiver.

## V. Results

Table I
Distribution By Resident Site

| *Variables* | *Shendi* | *Almatama* | *Total* | *%* |
|---|---|---|---|---|
| Urban | 102 | 26 | 128 | 30.5 |
| Rural | 91 | 105 | 196 | 46.7 |
| Semi Urban | 17 | 68 | 85 | 20.2 |
| Slum Area | 0 | 11 | 11 | 2.6 |
| Total | 210 | 210 | 420 | 100 |

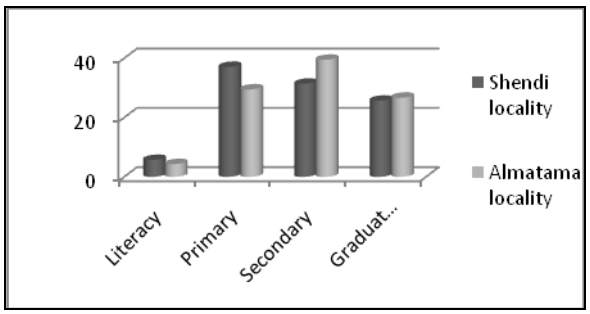


Fig. 1 Shows the educational level in shendi locality is most of mothers are in primary education (37.1%), secondary are (31.4%), (25.7%) are graduated and post graduate and 5.7 % illiteracy .in Almatama locality greater number is among secondary school 39.5%, primary 29.5% , graduate and post graduate 26.7%and 4.3%are literacy .

TABLE II
NUMBER OF CHILDREN PER HOUSEHOLD

| *Variables* | *Shendi* | *Almatama* | *Total* | *%* |
|---|---|---|---|---|
| One Child | 33 | 14 | 47 | 11.2 |
| 2-3 Children | 90 | 104 | 194 | 46.2 |
| 4-5 Children | 62 | 77 | 139 | 33.1 |
| >5 Children | 25 | 15 | 40 | 9.5 |
| Total | 210 | 210 | 420 | 100 |

TABLE III
REASONS OF MEASLES VACCINATION FAILURE FOR (MCV1)

| *VARIABLES* | *FREQUENCY* | *%* |
|---|---|---|
| UNAWARE OF NEED TO BE IMMUNIZED | 5 | 29.4 |
| UNAWARE OF NEED TO RETURN | 4 | 23.5 |
| PLACE AND TIME UNKNOWN | 4 | 23.5 |
| IMMUNIZATION TIME INCONVENIENCE | 2 | 11.8 |
| VACCINATOR ABSENT | 2 | 11.8 |
| TOTAL | 17 | 100 |

TABLE IV
A CROSS TABULATION OF MOTHERS EDUCATION AND CHILDREN VACCINE STATUS

| *VARIABLES* | *VACCINATED* | *NOT VACCINATED* | *TOTAL* |
|---|---|---|---|
| LITERACY | 29 | 18 | 47 |
| PRIMARY | 225 | 50 | 275 |
| SECONDARY | 283 | 15 | 298 |
| GRADUATED AND POST | 207 | 13 | 220 |
| TOTAL | 744 | 96 | 840 |

*P. value* < 0.05 significant N= 840

TABLE V
REASONS BEHIND SIAS VACCINATION FAILURE

| *Variables* | *Frequency* | *%* |
|---|---|---|
| Unaware Of Return | 2 | 4.2 |
| Unaware Of Immunization | 10 | 20.8 |
| Place And Time Unknown | 2 | 4.2 |
| Fear Of Reaction | 13 | 27.1 |
| Time Inconvenient | 19 | 39.6 |
| Long Waiting Time | 2 | 4.2 |
| Total | 48 | 100 |

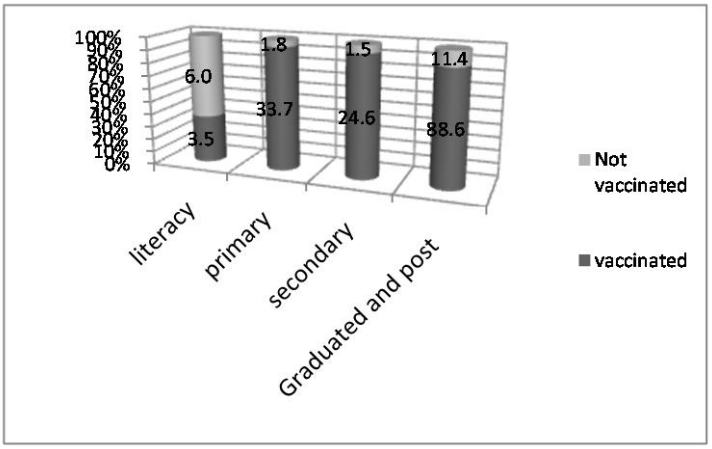


Fig. 2 Shows that, most of illiteracy mothers were not vaccinate their children (6% )compared with (3.5%) were vaccinate their children .it is also shows high coverage among mothers having primary education ( 33.7%) and graduated mothers (88.6%) .P.value indicates significant relationship.

## VI. DISCUSSION

In the present study and according to the 30 cluster survey conducted in the study area, the measles's first dose coverage was (93.8% - 91.9%) with an Average of (92.8%) [CI 95%] in Shendi and Almatama localities respondents. This coverage represents the routine coverage for children below one year. The measles's second dose coverage for children aged 18-24 months was (84.8% - 86.2%) [CI 95%] in Shendi-Almatama localities, respectively.

Although the reported coverage is high, the study also showed poor immunization cards record keeping available for performance among respondents (15.2% - 20.5%) [Average 17.9%] in shendi & Almatama localities .

Concerning the reasons behind vaccine intake ,the present study showed that respondents reported the primary reasons for children not being ever vaccinated against measles to "long waiting time", "unaware of the need to immunization", "unaware of return for next dose", and ``immunization post too far`` .This is agreement with previous study conducted in Eretria 2012 [(4)]. These results indicate the poor utilization of immunization health services increasing the possibility to elevate the numbers of susceptible children. Additionally the factors of unvaccinated children during the SIAs were ''unaware of immunization '', ''fear of reaction '' and ''time of immunization in convenience'', and this is in line with

studies conducted in developing countries including Sudan [5][6]. A previous study conducted in Kenya found that, in systems where parents have to expend time and energy to vaccinate their children, utilizing outreach can reduce prevailing gender and socioeconomic differences in vaccine received [5].

Educated mothers were more likely to have their children immunized than mothers who had no education. Mothers with secondary and higher education had a great chance for full immunization than more than half of the illiterate respondents who had unvaccinated children and this is in line with study carried out in southeast Asian [7],.and study conducted in Tanzania which found that (a child whose mother had completed primary or had not attended school was three times more likely to have a low uptake than a child whose caretaker had completed secondary school ) [8].

Substantial differences in vaccination status rates were found for children in urban and rural areas. Rural areas had the highest coverage rates compared with urban and slum areas. This is probably partly due to the general distribution of immunisation services strategy because they depend on mobile team in rural area and that may boost access opportunity and diminish dropout rate, this result disagrees with previous study done in Sudan and found that (Mothers of children from urban areas reported correct vaccination more than mothers of children in rural areas ) [6] and also dissimilar with another study accomplish in Uganda and found that (58% of children in urban areas were fully immunized compared to 53% of children in rural areas.) [9].

## VII. Recommendation

National immunization program, should conduct a periodic immunization surveys especially in high risk groups To obtain high level for first dose of measles coverage vaccine for children between (9month -18 month ) on the way to elevate the immunity level and decrease the numbers of susceptibility among targeting groups.

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