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FACTORS INFLUENCING VACCINATION COVERAGE AMONG CHILDREN AGED 2-5 YEARS IN MSAMBWENI SUB-COUNTY, KWALE COUNTY-KENYA

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FACTORS INFLUENCING VACCINATION COVERAGE AMONG CHILDREN AGED 2- 5 YEARS IN MSAMBWENI SUB-COUNTY, KWALE COUNTY-KENYA

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ABSTRACT

Background: While vaccination currently averts an estimated 2-3 million deaths every year an estimated 21.8 million infants worldwide are still missing out on basic vaccines. In Kwale County, particularly Msambweni Sub County, vaccination coverage among under five children is 77% compared with recommended of 80% for rural and 90% urban.

Objective: To determine factors influencing vaccination coverage among children aged two to five years in Msambweni Sub-County, Kwale County, Kenya.

Study Design: A descriptive cross-sectional study

Study Setting: Four wards of Msambweni Sub-County, Kwale County, Kenya

Study Subjects/participants: A total of 399 households were selected using Probability Proportional to Size sampling in the 4 wards. Systematic sampling technique was employed, and 11 health workers were interviewed, within the Wards. Data was collected using structured questionnaires through door to door visits. Observation checklist was used to supplement data.

Results: Fully/complete vaccination coverage was 63.7% while specific antigen were as follows: BCG - 87%, Pentavalent 1- 82%, Pentavalent 2 - 82.5%, and Pentavalent 3 -80% and measles- 65.6%. Mothers/caregivers who rated vaccination not very importance were OR=0.64(95% CI 0.43 to 0.97) P=0.037, while mothers /caregivers age was significantly associate with unimmunized where OR=0.39(95% CI 0.18 to 0.65) P=0.001.

Conclusion: The proportion of fully vaccination children was far below the WHO's target of 80% however, measles coverage remains low. Knowledge on the importance of vaccination, numbers of living children, side effect of vaccine and mothers /caregivers age were significant associated with vaccination coverage. Therefore, interventions need to focus on these factors to improve vaccination coverage in future.

INTRODUCTION

Vaccination saves millions of lives every day, it's widely recognized as one of the most cost-effective ways to ensure that population lives healthier and more productive (1). It currently averts an estimated 2 to 3 million deaths every year; however, an estimated 21.8 million infants worldwide are still missing out on basic vaccines (2).

Globally, vaccination coverage remains at 85% with no significant changes during the past few years past (3). There are 30 million children who are not routinely immunized every year and 5.9 million children under five years of age died in 2015, more than half of these early child deaths are due to conditions that could be prevented or treated with access to simple, affordable interventions(4).

Majority of the infants are those who live mainly in disadvantaged rural communities and are not reached by routine immunization services (5). Significant variations in coverage exist between and within regions and countries. Unless this gap is closed more children under five years of age will continue to die annually from preventable diseases for which vaccines are available. In sub-Saharan Africa, access to vaccines remains a challenge (2). Vaccine preventable diseases contribute 22.5% of morbidity in Kwale County. In (1999) Msambweni was the least populated Sub County in Kwale County with a total population of 136,450 persons but was the most densely populated with immunization coverage of 79%, which is still below the national target of 85% in rural areas (6). There is need to understand the reasons behind the low immunization coverage in this region.

MATERIALS AND METHODS

Study design: A descriptive cross-sectional study.

Study Setting: The study was carried out in Msambweni Sub-County, Kwale County, Kenya

Data Collection: Data collection was carried out between the month of November 2016 and January 2017. Data was collected from mothers/caregivers of the eligible children aged 2 - 5 years using pre-tested semi structured questionnaires. Information collected included socio-demographic characteristics as well as knowledge, attitude and practices of the mothers/caregivers towards immunization, immunization status of the children and other unique factors in the area.

Study Variables

Dependent Variables: Immunization coverage which included not immunized, partially and fully immunized children.

Independent Variables: Socio demographic factors, knowledge attitude and practices of mothers/care givers and health facility factors.

Study Population: Mothers/caregivers of children aged 2-5 years, who meet the inclusion criteria.

Inclusion criteria: Mothers/caregivers of children aged 2- 5 years who lived within Msambweni Sub-County and consented to participate in the study.

Exclusion Criteria: Mothers/caregivers of children aged below 2 years and above 5 years in Msambweni Sub-County. Children aged 2-5 years who do not reside in Msambweni Sub-County and children within the age of 2-5 years whose mothers/caregivers did not consent.

Sample size determination:

The sample size of children was calculated using the following formula below (9);

$$n = z^2p(1-p)/e^2$$

Where,

n = sample size

z = the statistical certainty usually chosen at 95% confidence level, that is

1.96 error risk of 5%

p = estimated level/coverage to be investigated, usually p= 0.5

e = precision desired, usually e = 0.05

A sample size of 385 children with their corresponding mothers/caregivers was used.

Sampling procedure: The study area was divided into 4 clusters, each corresponding to administrative wards. Probability proportionate to size (PPS) sampling method was used to determine the sample for each cluster (ward), using the formula below. This ensured that all mothers/caregivers in the population have the same probability of selection irrespective of the size of their stratum (7).

Sample size per Ward:

Population of children under 5 years in ward

Total population of children under 5 years in
Sub County x Sample size

Data Collection Tools: Primary data were collected using semi-structured questionnaires for the mothers/caregivers, while in-depth interviews were conducted on relevant health workers, in order to obtain demographic information or information that cannot be directly observed or difficult to put down in writing.

Ethical Consideration: Ethical approval for the study was obtained from the Ethical Review Committee of Pwani University. Prior consent from study participants was obtained in accordance with the ethical guidelines. Informed consent was obtained from the mothers/guardians of the children after a clear explanation, by signing a written Consent Form in English and Kiswahili. In case they

were literate they were allowed to read the consent and ask any questions. For those who were illiterate, the consent was read and explained clearly to them before putting a figure mark to show consent.

RESULTS

A total of 424 mothers/caregivers were interviewed. However, 25 (5.8%) mothers were excluded on the account of not meeting eligibility criteria (didn't have immunization cards). Analysis was done on 399 mothers/caregivers of children aged 2 - 5 years, making a response rate of 94.1%. The mean age was 42.1 months; the minimum age was 24 months and the maximum 48 months.

Socio demographic characteristics of mothers/caregivers: Table 1 summarizes the socio-demographic characteristics of mothers and caregivers. Majority 36.8% (147) of the respondents were within the age bracket of 25-29 years; however, 56.7% (224) had attained primary school education while 12.7% (50) had no formal education. In terms of religion, majority 72.9% (288) were Muslims, while the rest were Christians (Catholics - 14.7%, Protestants - 12.4%). Most of the respondent (80.2%) were married, small proportion were single (11.9%) while only 5.9% were divorced/widowed. On occupations, majority (64.7%) of the respondents reported that they had small businesses/farmers/formal employed while the least, 35.3% were housewives.

Table 1

Socio-demographic characteristics of mothers/caregivers with children aged 2-5 years in Msambweni Sub County, Kwale County, 2017

Variable	Frequency (N = 399)	Percentage (%)
Age group		
≤ 24	73	18.3
25-29	147	36.8
30-34	111	27.8
≥ 35	68	17.1
Religion		
Other Christian	50	12.5
Catholic	60	15.0
Muslim	289	72.4
Education level		
No formal education	51	12.8
Primary	220	55.1
Secondary	128	32.1
Marital status		
Married	329	80.2
Single	47	11.9
Divorced/Widow	23	5.9
Occupation		
Housewife	141	35.3
Others(Farmer/Business/formal employed)	258	64.7
Income level		
< 10,000	231	57.9
10,001-20,000	110	27.6
More than 20,000	58	14.5
Birthplace		
Home	60	15.0
Hospital	339	85.0
No. of living children		
1-2	163	40.9
3-4	168	42.1
More than 4	68	17.0
Age group		
≤ 24	73	18.3
25-29	147	36.8
30-34	111	27.8

Table 2

Univariate analysis non vaccination coverage in relation to socio demographic factors of mothers/caregivers

Variables	Fully vaccinated	Not vaccinated	Odd Ratio	P value	Partially vaccinated	Odd Ratio	P value
	N=254(%)	N=48(%)	95%(CI)		N=97	95%(CI)	
Respondent's age group	X²=14.82	P=0.002					
< 20	19(7.5)	Ref			1(14.3)	0.92	0.9
20-24	41(16.1)	5(10.3)	1.3(0.2-7.3)	0.795	20(30.3)	0.32 (0.22-7.29)	0.1
25-29	77(30.3)	26(54.2)	0.46(0.96-2.15)	0.321	44(29.9)	0.27(0.96-2.130)	0.1
30-34	78(30.7)	9(18.8)	1.33(0.24-6.87)	0.731	24(21.6)	0.50(0.23-6.88)	0.4
≥35	39(15.4)	6(12.5)	1(0.18-3.37)		6(11.8)	1(0.17-3.38)	
Religion	X²=0.52,	P=0.77					
Other Christian	33(13.0)	1(2.1)	2.48(0.24-24.92)	0.442	16(32.0)	0.88(0.25-24.92)	0.7
Catholic	40(15.7)	3(6.3)	Ref		17(28.3)	Ref	
Muslim	181(71.3)	44(91.6)	0.31(0.91-1.04)	0.059	64(22.2)	1.20(0.91-1.04)	0.6
Education level	X²=0.32,	P=0.85					
No formal education	34(13.4)						0.4
		7(14.6)	0.83(0.30-2.24)	0.711	10(19.6)	0.74(0.31-2.23)	
Primary	138(54.3)	27(56.3)	0.82(0.43-1.74)	0.703	55(25.0)	0.75(0.43-1.74)	0.5
Secondary	82(32.3)	14(29.1)	Ref		32(25.0)	Ref	
Marital status	X²=4.90,	P=0.09					
Married	206(81.1)	44(91.6)	0.26(0.06-1.12)	0.072	79(24.0)	0.65(0.06-1.12)	0.3
Single	36(14.2)	2(4.2)	Ref		9(19.2)	Ref	
Divorced/Widow	12(4.7)	2(4.2)	0.33(0.04-2.63)	0.297	9(39.1)	0.33(0.04-2.63)	0.06
Occupation	X²=0.82,	P=0.84					
Others	165(65.0)	20(41.7)	2.20(1.39-4.19)	0.016	66(27.16)	0.72(1.14-4.19)	0.2
Housewife	89(35.0)	25(52.1)	Ref		27(19.2)	Ref	
Income level	X²=0.77,	P=0.68					
< 10,000	151(59.4)	31(64.6)	0.56(0.38-1.69)	0.799	49(21.2)	1.47(0.38-1.69)	0.1
10,001-20,000	67(26.4)	11(22.9)	0.98(0.34-2.89)	0.985	32(29.1)	Ref	
More than 20,000	36(14.2)	6(12.5)	Ref		16(27.6)	1.08(0.34-2.88)	0.8
Birthplace	X²=1.24	P=0.54					
Home	37(14.6)	11(22.9)	Ref		12(20.0)	Ref	
Hospital	217(85.4)	37(77.1)	0.15(0.83-3.20)	1.743	85(25.1)	0.82(0.82-3.72)	0.6
No. of living children	X²=8.04,	P=0.02					
1 to 2	111(43.7)	13(27.1)	Ref		39(23.9)	Ref	
3 to 4	94(37.0)	26(54.2)	0.42(0.21-0.87)	0.019	48(28.6)	0.69(0.21-0.87)	0.1
More than 4	49(19.3)	9(18.7)	0.64(0.23-1.59)	0.335	10(14.7)	1.72(0.23-1.39)	0.2

Level of vaccination coverage: The level of vaccination coverage as immunization card was as follows; fully immunized 254 (63.7%), partially immunized 97 (24.3%) while 48 (12.0%) not immunized. Vaccination coverage for BCG/Polio 0, Pentavalent 1/Polio 1, Pentavalent 2/Polio 2, Pentavalent 3/Polio 3 and measles at 9 months were as follows; 87%,

82%, 82.5%, 80% and 65.6%, respectively (Fig. 1). The proportion of children who were vaccinated on time varied for different vaccine antigens (83.3-64.3%), with BCG /Polio 1 has the least timely while measles vaccination coverage was relatively low compared with other vaccines.

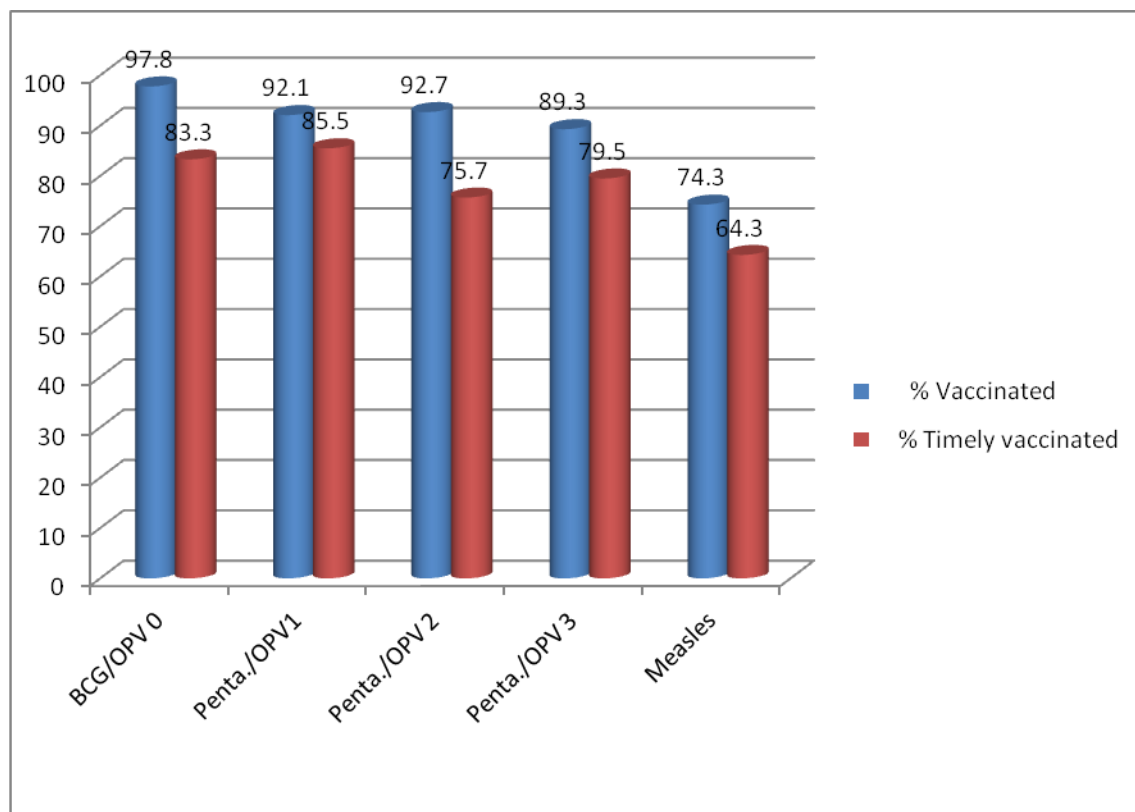


Fig 1: Vaccination coverage and timely vaccination per antigen

Effect of accessibility to Health Facility and Immunization Centres: Summary results are shown in Table 4 below. Majority of the respondents who were fully immunized (37%) lived within a distance of less than hundred metres (100 m) from the health facility or vaccination centre, with only (53%) living at distance of more than one kilometre away.

Most respondents obtained immunization services in health facilities (77.6%) 198 while the rest obtained those services at outreach level (22.4%). Table 4; source of transport, distance to health facility were not significantly associated with immunization coverage.

Table 3

Univariate analysis on vaccination coverage in relation to accessibility to health facility in mothers/caregivers with children aged 2-5 years in Msambweni Sub County

Variables	Fully vaccinated (N=254) %	Not vaccinated (N=48) %	Odd Ratio (95%) CI	P-value	Partially vaccinated N=91	Odd Ratio (95%) CI	P-value
Source of immunization	X²=0.654,	P=0.7					
Health facility	198(77.6)	30(62.5)	Ref		81(26.3)	Ref	
Outreach	56(22.4)	18(37.5)	0.3(0.14-0.79)	0.006	16(17.9)	1.41(0.24-0.89)	0.269
Source of Information	X²=2.278,	P=0.8					
Health facility	176(69.4)	38(79.1)	Ref		63(22.7)	Ref	
Radio	52(20.5)	6(12.5)	1.9(0.75-4.67)	0.179	25(30.1)	2.50(0.95-6.68)	0.299
Others (school/mosque/church/village chairman)	18(3.5)	2(8.6)	1		2(40.0)	1	
None	14(5.5)	2(4.2)	1.5(0.32-6.93)	0.595	3(15.8)	1.67(0.14-5.66)	0.432
Vaccine stock out	X²=0.950,	P=0.3					
Yes	63(24.8)	11(22.9)	Ref		31(29.5)	Ref	
No	191(75.2)	37(77.1)	1.1(0.53-2.30)	0.781	66(22.5)	0.70(0.71-3.51)	0.177
Distance to immunization services	X²=2.073,	P=0.557					
Less than 100 M	37(14.5)	12(25.0)	Ref		15(23.4)	Ref	
100-500 M	51(20.1)	7(14.6)	1.6(1.5-10.2)	0.214	25(30.1)	2.29(0.02-12.89)	0.519
501-1 KM	113(44.5)	20(41.7)	1.4(1.6-14.4)	0.120	41(23.6)	1.14(0.88-25.39)	0.888
More than 1 Km	53(20.9)	9(18.7)	0.8(0.5-56.8)	0.172	16(20.5)	N/A	N/A
Distance to nearest health facility	X²=2.113,	P=0.3					
Less than 1 Km	158(62.2)	31(64.6)	Ref		49(20.6)	Ref	
1-2 Km	41(16.1)	9(18.7)	0.9(0.4-2.0)	0.788	16(24.2)	1.12(0.44-2.82)	0.495
More than 2 KM	55(21.7)	8(16.7)	1.4(0.6-3.1)	0.483	32(33.7)	2.53(1.03-6.19)	0.023
Means of transport	X²=0.425,	P=0.80					
Matatu	33(13.0)	6(12.4)	1.6(0.6-4.3)	0.353	14(26.4)	0.61(0.69-6.55)	0.451
Walking	149(58.7)	21(43.8)	2.1(1.1-4.0)	0.033	59(25.8)	0.75(1.18-5.56)	0.477
Boda Boda	72(28.3)	21(43.8)	Ref		24(20.5)	Ref	

Ref=Reference, X²=Chi square, N/A=Not, Applicable value=Probability Value, OR=Odd ratio

Effect of Knowledge, attitude and practice on immunization coverage: Importance of immunization in mothers/caregivers was statistically significant associated with being unimmunized (p=0.036; OR 0.57 at 95% CI 0.68 to 27.98) (Table 4). The odd of being unimmunized was strikingly higher among mothers/caregiver who do not fear side effects (OR 2.12; 95% 0.36-8.96).

Table 4

Univariate analysis on association between vaccination coverage with Knowledge, attitude and practice among children age 2-5 years in Sub County Msambweni -Kwale County

Variable	Fully vaccinated N=254(%)	Not vaccinated N=48(%)	Odd Ratio (95%) CI	P value	Partially Vaccinated N=97(%)	Odd Ratio (95%)	P value
Health workers attitude $X^2=7.524, P=0.48$							
Arrogant	8(3.1)	5(10.4)	Ref		6(31.6)	Ref	
Dissatisfied	6(2.4)	0(0)	1	0.119	2(25.0)	2.50(0.34-18.33)	0.407
Extremely Satisfied	14(5.5)	2(4.2)	4.38(0.68-27.98)	0.037	6(27.3)	1.75(0.51-6.25)	0.442
Friendly	196(77.2)	35(72.9)	3.48(1.07-11.26)	0.105	75(24.6)	1.95(0.22-5.45)	0.230
Satisfied	31(12.8)	6(12.5)	3.23(0.78-13.34)	0.410	8(17.8)	2.91(0.36-3.93)	0.171
Importance of immunisation $X^2=4.42, P=0.036$							
Not very important	215(53.9)	30(62.5)	0.57(0.30-1.07)	0.036	58(27.9)	0.64(0.39-1.02)	0.062
Very important	39 (46.1)	18(37.5)	Ref		29(21.2)	Ref	
Immunisation session needed $X^2=6.28, P=0.179$							
Don't know	36(14.2)	1(2.1)	Ref		5(10.2)	Ref	
1-2	14(5.5)	7(14.6)	0.44(0.13-1.45)	0.181	5(19.2)	0.39(0.97-1.55)	0.181
3-4	74(29.1)	22(45.8)	1.09(0.42-2.82)	0.849	39(30.5)	0.26(0.09-0.72)	0.010
5-6	115(45.5)	17(35.4)	1.50(0.59-3.77)	0.385	44(25.0)	0.36(0.13-0.98)	0.047
More than 6	15(5.9)	1(2.1)	3.33(0.38-9.03)	0.276	4(20.0)	0.52(0.12-2.21)	0.377
Polygamy likely to miss immunisation $X^2=7.684, P=0.10$							
Agree	43(16.9)	10(20.8)	Ref		28(34.6)	Ref	
Disagree	186(73.3)	36(75.0)	1.12(0.44-2.85)	0.642	62(21.8)	0.62(0.27-1.41)	0.018
Strongly agree	25(9.8)	2(4.2)	2.53(1.03-6.19)	0.190	7(20.6)	1.25(0.23-7.05)	0.086
Side effects $X^2=6.152, P=0.046$							
Yes	36(14.2)	2(4.2)	Ref		90(25.4)	Ref	
No	218(85.8)	46(95.8)	3.79(0.88-6.32)	0.046	7(15.6)	2.12(0.36-8.96)	0.081

Ref=Reference, X^2 =Chi square, N/A=Not, Applicable-value=Probability Value, OR=Odd ratio

Multivariate analysis: The only variables which were significantly associated with not immunized for both partially and fully immunized were analysed further in multivariate analysis, which includes mothers/caregivers ages, importance of immunization, side effects of vaccine and number of living children (Table 5 below).

Table 5
Multivariate analysis for Not immunized (unimmunized)

Variables	AOR (95% CI)	P (value)
Mothers /caregivers age		
≤ 24	0.56(0.27-1.16)	0.119
25-29	0.39(0.18-0.65)	0.001
30-34	0.72(0.36-1.44)	0.349
≥35	Ref	
How important are immunization		
Not very important	0.64(0.43-0.97)	0.037
Very important	Ref	
Fear side effects		
No	2.51(1.17-5.37)	0.018
Yes	Ref	
No of living children		
1 to 2	0.83(0.44-1.54)	0.552
3 to 4	0.48(0.26-0.89)	0.021
More than 4	Ref	

DISCUSSION

This study was conducted to determine vaccination coverage and its associated factors among 2-5 years children. The proportion of fully immunized children was 63.7%, which is below the WHO recommended 80% for a rural set up. Vaccination coverage was lower when compared with KDHS, 2014 (71.0%) for the country wide and a study done in Senegalese children (77.14%) (11). These findings are worrying in the face of high infant and child mortality, which could be probably addressed studying various factors affecting immunization services. Therefore, the Kwale County government needs to urgently put more effort to increase the vaccination coverage through sensitization and awareness campaign and setting up more outreach services.

Mothers/caregivers age was a predictor of vaccination coverage; with middle age women (25-29 years) having a lower likelihood to

fully immunized their children. Therefore, there is a need to focus on this population when sensitization and awareness is done. Since they do not compliant with good health practice, they are probably asserting wrong influence on younger women and wrong advice from older mothers. These findings are similar with a study on factor influencing basic vaccination coverage (12) which stated that marital age both negatively and positively correlated with complete vaccination coverage. Marital status and education were not predictor of vaccination coverage. These findings were similar with a study on utilization of immunization services in Pokot, Kenya County (13). This is because the above factors have not been known to advocate for vaccination coverage. This would be explained by the fact that vaccination coverage is not necessary affected by socio-economic factors but can be affected by accessibility, and knowledge, attitude and practice.

The study found out that there is significant association between the family size and fully immunization. Mothers with more than four children are two times less likely to have their children fully immunized compared to those with less than 3. Children from large families have been found to have low vaccine uptake by several investigators (14) in a study on factors influencing low vaccination coverage in East Pokot. This has been interpreted as reflecting the practical difficulty and expense of having other children at home in taking up the immunisation services. The number of living children has been linked with health outcome in many developing countries. As the number of family member increases the quality of care, they receive decreases (15) on a study on vaccine hesitancy among caregivers.

Respondents who rated immunization services as not being very important were less likely to fully immunize their children. Despite rating of immunization services some of the reasons given by participant for not taking their children for immunization were vaccine stock out and unawareness, loss of vaccination card, side effect and shortage of staff. These results concurred with (10) in a study on immunization coverage and it determinant, but differed with (20), who stated that larger proportion of awareness of the important immunization the higher the vaccination coverage.

Mothers/caregivers who do not fear side effects of vaccination were twice and a half more likely to fully vaccinate their children, AOR 2.5(1.17 -5.37) 95% CI, p=0.018. Therefore, more sensitization needs to be focus on mothers/caregivers so that they can clearly understand that vaccines prevent illness and not the aspect of side effects. These finding disagree with (21), stated that although health workers provided counselling to mothers/caregivers on the common side effects, the information still was frequently incomplete. Therefore, there is need for capacity building to health workers on how

they can pass message to caregiver to afford interference with vaccination programme.

Mothers/caregivers occupation is an important factor in attaining fully immunization. A child's whose mothers/caregivers have business are twice likely to fully immunize their children. This could be due to mothers/caregivers running business would easily access information on vaccination and still being able to access health facilities for the services ,because they are able get money through their business and farming to access the services irrespectively of the distance. These results differed with (16) who stated that occupation is not significantly associated with fully immunized but concur with (17) and (18) in a study in Uganda who stated that occupation is predictor of immunization. However, government should be designed to target those disadvantaged especially housewife through sensitization programmes.

CONCLUSION

In conclusion, immunization services in Msambweni Sub-County, Kwale County requires urgent improvement in the areas of expanding service delivery points through outreach services to reduce accessibility gap, recruitment of more health workers, transportation and implementation of tailored mechanisms to ensure adequate communication between health care workers and mothers/caregivers through community sensitization. There is need for future studies to test specific interventions in Msambweni Sub County Kwale which finding can cover more counties and entire country with similar immunization inequities. More effort needs to focus on mothers /caregivers in middle age and much attention on mothers with more children, which will play a big role in improving the coverage.

RECOMMENDATIONS

Interventions need to target middle age mothers/caregivers and family with more children in order to improve vaccination coverage.

Health education and promotion campaigns should be carried out by local authorities and non-governmental organizations to increase community awareness on the importance of immunization services

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