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# Knowledge And Attitudes of Caregivers Towards Measles Vaccine Second Dose in Adamawa State Nigeria, June 2024

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***Abstract***

*Despite the availability of reliable and affordable measles vaccines, Nigeria is still experiencing low vaccination coverage, resulting in high cases of measles and related.se. This study assessed the baseline knowledge and attitude of caregivers towards measles and MCV2 in Adamawa State, Nigeria. Baseline reports of the knowledge and attitudes of caregivers towards measles and MCV2 were obtained from a three-arm, parallel randomized control trial conducted in four health facilities sampled through three-stage multistage sampling technique in Adamawa State. Semi-structured interviewer-administered questionnaire was administered to 351enrolled caregivers. Mean age of caregivers was 30.7 (SD±6.7); 212 (60.39%) of caregivers had good knowledge of measles and MCV2 and 265 (75.5%) had high level of positive attitude toward measles and MCV2. Major factors statistically associated with good knowledge of measles and MCV2 among caregivers include age ($X^2$=27.1, p-value=<0.001) marital status ($X^2$=37.0, p-value=<0.001) and Family size ($X^2$=15.1, p-value=<0.001). Factors statistically associated with the positive attitude of mothers towards MCV2 include marital status ($X^2$=49.0, p-value=<0.001), religion ($X^2$=73.3.0, p-value=<0.001) and occupation of caregiver ($X^2$=11.1, p-value=<0.049). There is partial understanding of measles and MCV2 among caregivers in Adamawa State; however, there is relatively high level of awareness on measles with high level of positive attitude towards MCV2 among caregivers. Knowledge of caregivers on MCV2 is suboptimal but a good proportion had positive attitude towards measles and MCV2; therefore, the Adamawa State government should develop measures to improve measles vaccination coverage by increasing awareness of MCV2 through monitoring and addressing knowledge gaps on MCV2.*

***Keywords:*** *Attitude, Caregivers, Knowledge, Measles, MCV2.*

## Introduction

Immunization is the foundation of an efficacious health system and has made a significant contribution towards decreased morbidity and mortality of various infectious diseases [1]. It is one of the most successful health interventions and has remained a key channel to achieving Sustainable Development Goals (SDG) [2, 3].

The World Health Organization Immunization Agenda 2030 (IA2030) strives to reduce morbidity and mortality from vaccine-preventable diseases across the life course which is in consonant with the SDG 2030 priorities of eliminating vaccine preventable diseases and improving access to new lifesaving vaccines [4, 5]. However, for countries to attain the expected level of herd immunity, children have to receive the recommended doses of antigens. In Nigeria, the vaccination coverages of most antigens are still suboptimal with vaccine-preventable diseases accounting for an estimated 29% of childhood deaths annually[6].

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The current immunization measles coverage rate falls short of national and global targets of 95% and 90% respectively[7, 8]. The global vaccination coverage survey (2010 to 2019) showed decrease in first dose of Measles Containing Vaccine 1 (MCV1) between 84% and 86%, while measles second dose (MCV2) coverage increased from 42% to 71%, reflecting second dose introductions in many countries. From 2019 to 2020, global MCV1 coverage decreased to the 2014 level of 84%, whereas MCV2 coverage was relatively stable at 71% in 2019 and 70% in 2020. MCV1 coverage in 2020 ranged from 68% in the African Region [9]. In Adamawa State, nearly 1 in 4 of all the under-5 children in Adamawa State received no basic vaccinations [10].

Being a highly contagious disease that has caused global morbidity and mortality, tremendous progress has been made in measles elimination, yet resurgence of measles has been observed in recent years. [11]. Worldwide, more than 140,000 people died from measles in 2018, according to new estimates from the World Health Organization (WHO) and the United States Centers for Disease Control and Prevention (CDC) with most of the deaths occurring among children under the age of five years [12]. In Nigeria, a total of 203,089 measles cases were reported to the surveillance system with the overall incidence rate of 200 cases per 1 million population higher in the North exceeding that of the South of 24 cases per 1 million population yearly [13].

To reduce the burden of measles, the World Health Organization (WHO) recommended a coverage of 95% of 2 doses of measles-containing vaccine (MCV) to ensure an immunological response and stop transmission.

In order to interrupt measles transmission and prevent outbreaks, there is need to reach at least 95% coverage with both recommended doses of measles [14]. Studies have revealed that Nigeria is far from reaching its target due to suboptimal RI performance and high measles dropout rate which is a critical concern especially with the low vaccination coverage in northern Nigeria[15].

There is the paucity of information regarding the knowledge, attitude and practices of caregivers towards MCV2 in Nigeria and Adamawa State in particular. Understanding mothers´ knowledge and attitudes towards immunization could guide targeted interventions to improve MCV2 coverage. Therefore, this study was carried out to determine caregiver's knowledge, attitudes, and practices towards MCV2 in Adamawa state.

## Materials and Methods

Baseline knowledge and attitudes were obtained from a of a three-arm, parallel, randomized controlled trial which is being conducted in four health facilities and involving 351 caregivers in Adamawa State Nigeria. The health facilities included Ngbalang & Gweda Mallam PHCCs of Numan LGA and Major Aminu & Jambutu PHCCs of Yola North LGA. Randomization was applied to health facilities during enrolment with a 1:1:1 allocation ratio of one control arm and two intervention arms.

Participant selection criteria and recruitment Criteria for inclusion into this study included all mothers and/or caregiver who had a 9 months old child that is vaccinated with MCV1, aged 18 years and older, have a working mobile phone, have resided in the study area at least for 6 months before enrolment and willing to provide consent for participation in the study. Mothers who could not read mobile phone text messages in any of the four languages used in the study (Hausa, English languages, Fulfulde or Bwatiye), Mothers and/or caregivers who had no mobile network access in their house/compound and mothers who planned to relocate out of the study area during the study follow-up period.

The sample size was calculated using the formula by [16]. The largest sample size was obtained for the outcome variable knowledge on measles and MCV2.The sample frame was

the list of patients at each recruitment site. Simple randomization with an allocation of 1:1:1 to the control, SMS or Automated Calls were performed using a list of generated random numbers in all the selected health facilities (1 Control arm and 2 Intervention arms). Units of randomization were mother-infant pairs in each of the study arms of interventions and control. Total number of caregivers assessed for eligibility were 507 caregivers; 156 caregivers were excluded based on the exclusion criteria outlined. (Figure 1).

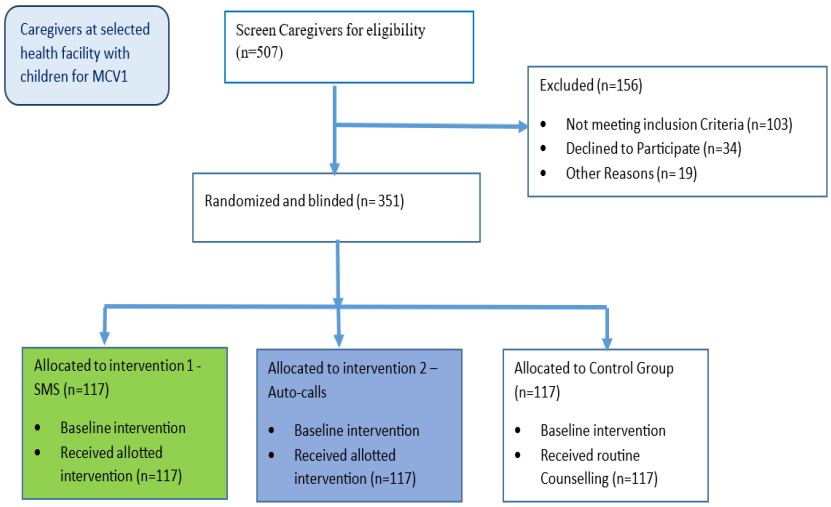


**Figure 1.** Flow Chart of Randomized Controlled Trial among Caregivers in Four Health Facilities in Adamawa State

## Data Collection Tool/Instrument

A validated and pretested semi-structured questionnaire was employed as the data collection tool. Questionnaires were interviewer administered and baseline data was obtained from all 351 respondents. The questionnaire was a modified version of those used by [17-19], It consisted of three sections; Section 1 on socio-demographic variables, Section 2 on knowledge of Caregivers om Measles and MCV2 and Section 3 on Attitude of Caregivers towards Measles. Reliability test for knowledge gave a Cronbach's alpha of **0.621** and that of attitude gave a Cronbach's alpha of 0.742.

## Data Analyses

Data was analysed using Epi Info 7™ and Microsoft Excel, test of normality was conducted to ascertain the distribution of data which will determine the statistical test to conduct; Descriptive analysis was conducted where frequencies, proportions, means and standard deviations of variable were be determined. Comparability of the variables was assessed on the baseline characteristics of the study participants randomized to the intervention and usual care groups, using Chi-square tests. Log-binomial regression was used to estimate the relative risk (RR), difference in risk (RD).

## Grading of Caregiver's Knowledge and Attitude

### Knowledge

Eight questions were asked on knowledge of Measles and MCV2; each correct answer was graded '1' and wrong answer zero (0); Score range was therefore 0-8.

### Attitude

Seven (7) variables were assessed for caregivers' attitude towards MCV2; all questions asked were in the negative perspective so the scores were given as: ―Strongly agree; (0 point), ―Agreed‖; (1

point), Disagreed; (2 points) and ―Strongly disagreed‖; (3 points) giving a range of scores of 0-18.

This grading was adapted from previous study [19]

## Definition of Terms

### Good Knowledge

Caregivers with scores 5-8 (63-100%) are categorized as having good knowledge of measles and MCV2. -rephrase

### Poor Knowledge

A caregiver is categorized as having poor knowledge when he/she scores 0-4 (0-38%).

### Positive Attitudes

Caregivers with scores 9-18 (50 -100%) are categorized as having positive attitude towards MCV2 -rephrase

### Negative Attitude

Caregivers with scores 0-8 (0 - 44%) are categorized as having negative attitude towards MCV2

## Ethical Consideration

Approval was sought from the Research Ethical Committee of the Adamawa State Ministry of Health, informed written consent of the participant in the study was obtained, respondents were assured of anonymity and confidentiality of information supplied at all levels of data handling and mothers in control arm were health educated on MCV2 vaccination on completion of data collection even after scheduled time of MCV2 uptake.

# Results

**Table 1.** Sociodemographic Characteristics of Caregivers Surveyed on MCV 2 in Adamawa State, May 2024

| Variables | Frequency; n (%) | | | Total | Test type | p-value |
|---|---|---|---|---|---|---|
| | Intervention 1 | Intervention 2 | Control Group | | | |
| **Age group (years)** | | | | | | |
| 15-24 | 17 (14.53) | 21 (17.95) | 17 (14.53) | 55 (15.67) | $X^2$ | **0.025** |
| 25-34 | 71 (60.68) | 58 (49.57) | 64 (54.70) | 193 (54.99) | | |
| ≥35 | 29 (24.79) | 38 (32.48) | 36 (30.77) | 103 (29.34) | | |
| Total | 117 (100.00) | 117 (100.00) | 117 (100.00) | 351 (100.00) | | |
| Mean (SD) | 28.83 (2.90) | 28.60 (2.81) | 29.13 (3.33) | 28.85 (3.01) | | |
| 95% CI | 26.82 – 30.12 | 26.42–30.82 | 27.32–31.82 | 26.24–31.02 | | |
| **Health Facility** | | | | | | |
| Gweda Mallam | 34 (29.06) | 31 (26.50) | 34 (29.06) | 99 (28.21) | $X^2$ | 0.854 |
| Jambutu | 26 (22.22) | 35 (29.91) | 26 (22.22) | 87 (24.79) | | |
| Major Aminu | 29 (24.79) | 25 (21.37) | 27 (23.08) | 81 (23.08) | | |
| Ngbalang | 26 (22.22) | 26 (22.22) | 30 (25.64) | 84 (23.93) | | |
| Total | 117 (100.00) | 117 (100.00) | 117 (100.00) | 351 (100.00) | | |
| **Relationship with Child** | | | | | | |
| Aunt | 8 (6.84) | 16 (13.68) | 13 (11.11) | 37 (10.58) | F | 0.509 |
| Father | 1 (0.85) | 2 (1.71) | 2 (1.71) | 5 (1.42) | | |
| Grandmother | 0 (0.00) | 1 (0.85) | 1 (0.85) | 2 (0.57) | | |
| Mother | 107 (91.45) | 98 (83.76) | 100 (85.47) | 305 (86.89) | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Sister | 1 (0.58) | 0 (0.00) | 1 (0.85) | 2 (0.57 | | |
| Total | 117 (100.00) | 117 (100.00) | 117 (100.00) | 351 (100.00) | | |
| **Caregiver's educational level** | | | | | | |
| Informal Edu | 9 (7.69) | 9 (7.69) | 5 (4.27) | 23 (6.55) | *X2* | 0.912 |
| Primary | 23(19.66) | 22 (18.80) | 21 (17.95) | 66 (18.80) | | |
| Secondary | 56 (47.86) | 53 (45.30) | 57 (48.71) | 166 (47.29) | | |
| Tertiary | 29 (24.79) | 33 (28.21) | 34 (29.06) | 96 (27.35) | | |
| Total | 117 (100.00) | 117 (100.00) | 117 (100.00) | 351 (100.00) | | |
| **Religion** | | | | | | |
| Christianity | 54 (46.15) | 44 (37.61) | 55 (47.01) | 153 (43.59) | $X^2$ | 0.276 |
| Muslim | 63 (53.85) | 73 (62.39) | 62 (52.99) | 198 (56.41) | | |
| Total | 117 (100.00) | 117 (100.00) | 117 (100.00) | 351 (100.00) | | |
| **Marital Status** | | | | | | |
| Married | 95 (81.20) | 98 (83.76) | 84 (71.79) | 277 (78.92) | F | 0.070 |
| Separated/Divorced | 0 (0.00) | 0 (0.00) | 3 (2.56) | 3 (0.85) | | |
| Single | 22 (18.8) | 19 (16.24) | 29 (24.79) | 70 (19.94) | | |
| Widow | 0 (0.00) | 0 (0.00) | 1 (0.85) | 1 (0.28) | | |
| Total | 117 (100.00) | 117 (100.00) | 117 (100.00) | 351 (100.00) | | |
| **Occupation** | | | | | | |
| Business | 35 (29.91) | 31 (26.50) | 39 (33.33) | 105 (29.91) | F | 0.385 |
| Civil Servant | 12 (10.26) | 16 (13.68) | 15 (12.82) | 43 (12.25) | | |
| Farmer | 5 (4.27) | 1 (0.85) | 3 (2.56) | 9 (2.56) | | |
| Housewife | 62 (52.99) | 69 (58.97) | 60 (51.28) | 191 (54.42) | | |
| Student | 3 (2.56) | 0 (0.00) | 0 (0.00) | 2 (0.57) | | |
| Total | 117 (100.00) | 117 (100.00) | 117 (100.00) | 117 (100.00) | | |
| **Place of Child Delivery** | | | | | | |
| Health Facility | 98 (83.76) 18 | 105 (89.74) | 103 (88.03) | 306 (87.18) | F | 0.622 |
| Home | (15.38) 1 | 11 (9.40) | 12 (10.26) | 41 (11.68) | | |
| Traditional Birth Attendant | (0.85) | 1 (0.85) | 2 (1.71) | 4 (1.14) | | |
| Total | 117 (100.00) | 117 (100.00) | 117 (100.00) | 351 (100.00) | | |

A total of 351 caregivers were recruited for the study. Mean age of caregivers across the three study arms was 28.85 (SD±3.01) and ranged 18-60 years. Majority of caregivers were mothers (86.9%) and married (78.9%) across the three study arms; About half were Muslim (56.4), housewives (54.4) and with have secondary education (47.29). Majority of children brought for MCV1 were born in health facility (87.5%), are female (53.3%), from a family size of greater than 5 persons (64.1%)

and living at a distance of 15-30km (70.7%) from health facility (Table 1).

**Table 2.** Knowledge of Caregivers on Measles and MCV2 in Adamawa State, May 2024

| **Knowledge Questions** | **Correct Response (%)** | **Incorrect Response (%)** |
|---|---|---|
| Heard about measles | 299 (85.2) | 52 (14.8) |
| Knowledge of at least 3 symptoms of measles | 122 (34.8) | 229 (65.2) |
| What causes measles (Measles virus) | 55 (15.7) | 296 (84.3) |
| Aware of measles vaccine | 63(17.9) | 288 (82.1) |
| Heard and know about the MCV2 | 123 (35.0) | 228 (65.0) |
| Age at which MCV2 is given (15 months) | 211 (60.1) | 140 (39.9) |
| Benefits of MCV2 (Prevent a child from measles infection) | 145 (41.3) | 206 (58.7) |
| Knowledge one potential side effects of the MCV2 vaccine | 123 (35.1) | 228 (64.9) |

Significant majority (85.2%) had heard about measles before, while 14.8% had not. Knowledge of the cause of measles revealed that only 15.7% correctly identified the measles virus as the cause, while 28.5% were incorrect, and 55.8% gave partially correct responses. Awareness of the existence of a vaccine to prevent measles was high, with 82.1% affirming this knowledge, and 17.9% being unaware. Similarly, knowledge about the Measles-Containing Vaccine (MCV2) was substantial, with 65.0% having heard about it, compared to 35.0% who had not (Table 2).

**Table 3.** Attitude of Caregivers towards Measles and MCV2 in Adamawa State, May 2024

| **Attitude Questions** | **Agree** | **Disagree** | **Neutral** | **Strongly Agree** | **Strongly Disagree** |
|---|---|---|---|---|---|
| MCV2 vaccine is important | 221(63.0) | 3 (0.9) | 69 (19.7) | 44(12.5) | 14 (4.0) |
| Trust the safety and effectiveness MCV2 | 218 (62.1) | 9 (2.6) | 71 (20.2) | 42 (12.1) | 11 (3.1) |
| Vaccines have side effect | 174(49.6) | 32 (9.1) | 114(32.5) | 9 (2.6) | 22 (6.3) |
| Would recommend MCV2 to other caregivers? | 239 (68.1) | 3 (0.9) | 27 (7.7) | 75 (21.4) | 7 (2.0) |
| Every child should receive two doses of measles vaccine | 251 (71.5) | 0 (0.0) | 20 (5.7) | 72 (20.5) | 8 (2.3) |
| Measles vaccine can prevent measles outbreak | 243 (69.2) | 1 (0.3) | 17 (4.8) | 87 (24.8) | 3 (0.9) |

A significant majority of respondents (75.5%) believe that the MCV2 vaccine is important, with 63.0% and only a small fraction disagreed (0.9%). 74.1% of respondents expressed confidence in the safety and effectiveness of the MCV2 vaccine with 62.1% agreeing and 2.6% disagreeing. Nearly half (49.6%) of respondents agreed that too many

vaccines could have side effects and stress their children while 2.6% strongly disagreed. The willingness to recommend the MCV2 vaccine to other caregivers was high, with 68.1% agreeing and 21.4% strongly agreeing. The belief that every child should receive two doses of the measles vaccine was widely held, with 71.5% strongly agreeing and 2.3% strongly disagreeing. The belief that the measles vaccine can prevent measles outbreaks in the community was strong, with 69.2% agreeing and only 0.3% disagreed (Table 3).

**Table 4.** Association between Sociodemographic Factors and Caregiver's Knowledge on MCV2 in Adamawa State May, 2024

| **Variable** | **Knowledge** | | **Total** | **$\chi^2$** | **p-value** |
|---|---|---|---|---|---|
| | **Good** | **Poor** | | | |
| **Relationship with child** | 22 (12.0) | 15 (10.8) | 37 (10.5) | 7.67 | 0.175 |
| Father | 5 (2.7) | 0 (0.0) | 5 (1.4) | | |
| Grandmother | 0 (0.0) | 2 (1.4) | 2 (0.6) | | |
| Mother | 183 (86.3) | 122 (87.8) | 305 (86.9) | | |
| Sister | 1 (0.5) | 0 (0.0) | 1 (0.3) | | |
| Sister in-law | 1 (0.5) | 0 (0.0) | 1 (0.3) | | |
| Total | 212 (100.0) | 139 (100.0) | 351 (100.0) | | |
| **Marital status** | | | | | |
| Married | 188 (88.7) | 89 (64.0) | 277 (78.9) | 37.0 | **<0.001** |
| Separated/Divorced | 3 (1.4) | 0 (0.0) | 3 (0.9) | | |
| Single | 21 (9.9) | 49 (35.3) | 70 (19.9) | | |
| Widow | 0 (0.0) | 1 (0.7) | 1 (0.3) | | |
| Total | 212 (100.0) | 139 (100.0) | 351 (100.0) | | |
| **Religion** | | | | | |
| Christianity | 66 (31.1) | 87 (62.6) | 153 (43.6) | 33.8 | **<0.001** |
| Muslim | 146 (68.9) | 52 (37.4) | 198 (56.4) | | |
| Total | 212 (100.0) | 139 (100.0) | 351 (100.0) | | |
| **Caregiver educational level** | | | | | |
| No Formal Education | 15 (7.1) | 8 (5.8) | 23 (6.6) | 6.4 | 0.094 |
| Primary | 34 (16.0) | 32 (23.0) | 66 (18.8) | | |
| Secondary | 96 (45.3) | 70 (50.4) | 166 (47.3) | | |
| Tertiary | 67 (31.6) | 29 (20.9) | 96 (27.4) | | |
| Total | 212 (100.0) | 139 (100.0) | 351 (100.0) | | |
| **Occupation** | | | | | |
| Business Woman | 61 (28.8) | 44 (31.7) | 105 (29.9) | 6.56 | 0.255 |
| Civil Servant | 29 (13.7) | 14 (10.1) | 43 (12.3) | | |
| Farmer | 8 (3.8) | 1 (0.7) | 9 (2.6) | | |
| Housewife | 111 (52.4) | 80 (57.6) | 191 (54.4) | | |
| Nill | 1 (0.5) | 0 (0.0) | 1 (0.3) | | |
| Student | 2 (0.9) | 0 (0.0) | 2 (0.6) | | |
| Total | 212 (100.0) | 139 (100.0) | 351 (100.0) | | |
| **Residence** | | | | | |
| Rural | 11 (5.2) | 1 (0.7) | 12 (3.4) | 5.21 | 0.074 |
| Semi-urban | 59 (27.8) | 38 (27.3) | 97 (27.6) | | |

| | | | | | |
|---|---|---|---|---|---|
| Urban | 142 (67.0) | 100 (71.9) | 242 (68.9) | | |
| Total | 212 (100.0) | 139 (100.0) | 351 (100.0) | | |
| **Sex of Child** | | | | | |
| Female | 115 (54.2) | 72 (51.8) | 187 (53.3) | 0.202 | 0.653 |
| Male | 97 (45.8) | 67 (48.2) | 164 (46.7) | | |
| Total | 212 (100.0) | 139 (100.0) | 351 (100.0) | | |
| **Birth order of Child** | | | | | |
| First | 21 (9.9) | 22 (15.8) | 43 (12.3) | 4.48 | 0.214 |
| Second | 52 (24.5) | 24 (17.3) | 76 (21.7) | | |
| Third | 68 (32.1) | 46 (33.1) | 114 (32.5) | | |
| Fourth and above | 71 (33.5) | 47 (33.8) | 118 (33.6) | | |
| Total | 212 (100.0) | 139 (100.0) | 351 (100.0) | | |
| **Place of Child delivery** | | | | | |
| Health Facility | 181 (85.4) | 125 (89.9) | 306 (87.1) | 2.21 | 0.331 |
| Home | 29 (13.7) | 12 (8.6) | 41 (11.7) | | |
| Traditional Birth Attendant's | 2 (0.9) | 2 (1.4) | 4 (1.1) | | |
| Total | 212 (100.0) | 139 (100.0) | 351 (100.0) | | |
| **Distance of caregiver house to vaccination site** | | | | | |
| 15-30 Minutes | 159 (75.0) | 89 (64.0) | 248 (70.7) | 17.7 | **<0.001** |
| Less than 15 Minutes | 16 (7.5) | 2 (1.4) | 18 (5.1) | | |
| More than 30 Minutes | 37 (17.5) | 48 (34.5) | 85 (24.2) | | |
| Total | 212 (100.0) | 139 (100.0) | 351 (100.0) | | |
| **Family size** | | | | | |
| Greater than 5 | 59 (27.8) | 67 (48.2) | 126 (35.9) | 15.1 | **<0.001** |
| ≤ 5 | 153 (72.2) | 72 (51.8) | 225 (64.1) | | |
| Total | 212 (100.0) | 139 (100.0) | 351 (100.0) | | |
| **Caregivers age group** | | | | | |
| 15 - 24 | 41 (19.3) | 24 (17.3) | 65 | 27.1 | **<0.001** |
| 25 - 34 | 130 (61.3) | 53 (38.1) | 183 | | |
| ≥ 35 | 41 (19.3) | 62 (44.6) | 103 | | |
| Total | 212 (100.0) | 139 (100.0) | 351 | | |

Marital status showed a significant association with knowledge level ($\chi^2 = 37$, $p < 0.001$). Among respondents with good knowledge, 88.7% were married, compared to 64.0% with poor knowledge. Religion also exhibited a significant association with knowledge level ($\chi^2 = 33.8$, $p < 0.001$). A greater proportion of respondents with good knowledge were Muslims (68.9%) compared to those with poor knowledge (37.4%). The distance of the caregiver's house to the vaccination site was significantly associated with knowledge level ($\chi^2 = 17.7$, $p < 0.001$). Respondents living 15-30 minutes from the vaccination site had better knowledge (75.0%) than those living more than 30 minutes away (17.5%). Family size was also significantly associated with knowledge level ($\chi^2 = 15.1$, $p < 0.001$). Among respondents with good knowledge, 72.2% had a family size of 5 or fewer, compared to 51.8% of those with poor knowledge. Caregiver's age group showed a significant relationship with knowledge level ($\chi^2 = 27.1$, $p < 0.001$). The majority of caregivers with good knowledge were in the 25-34 age group (61.3%), whereas a higher

proportion of those with poor knowledge were
35 years or older (44.6%). (Table 4).

**Table 5.** Association between Sociodemographic Factors and Caregiver's Attitude towards MCV2 in Adamawa State May, 2024

| **Variable** | **Attitude** | | | | |
|---|---|---|---|---|---|
| | **Good** | **Poor** | **Total** | **χ2** | **p-value** |
| **Relationship with child** | | | | | |
| Aunt | 21 (9.0) | 16 (13.6) | 37 (10.5) | 5.36 | 0.374 |
| Father | 5 (2.1) | 0 (0.0) | 5 (1.4) | | |
| Grandmother | 1 (0.43) | 1 (0.8) | 2 (0.6) | | |
| Mother | 204 (87.6) | 101 (85.6) | 305 (86.9) | | |
| Sister | 1 (0.43) | 0 (0.0) | 1 (0.3) | | |
| Sister in-law | 1 (0.43) | 0 (0.0) | 1(0.3) | | |
| Total | 233 (100.0) | 118 (100.0) | 351 (100.0) | | |
| **Marital status** | | | | | |
| Married | 207 (88.8) | 70 (59.3) | 277 (78.9) | 49.0 | **<0.001** |
| Separated/Divorced | 3 (1.3) | 0 (0.0) | 3 (0.9) | | |
| Single | 22 (9.4) | 48 (40.7) | 70 (19.9) | | |
| Widow | 1 (0.4) | 0 (0.0) | 1 (0.3) | | |
| Total | 233 (100.0) | 118 (100.0) | 351 (100.0) | | |
| **Religion** | | | | | |
| Christianity | 64 (27.5) | 89 (75.4) | 153 (43.6) | 73.3 | **<0.001** |
| Muslim | 169 (72.5) | 29 (24.6) | 198 (56.4) | | |
| Total | 233 (100.0) | 118 (100.0) | 351 (100.0) | | |
| **Caregiver educational level** | | | | | |
| No Formal Education | 21 (9.0) | 2 (1.7) | 23 (6.6) | 7.6 | 0.056 |
| Primary | 45 (19.3) | 21 (17.8) | 66 (18.8) | | |
| Secondary | 104 (44.6) | 62 (52.5) | 166 (47.3) | | |
| Tertiary | 63 (27.0) | 33 (28.0) | 96 (27.4) | | |
| Total | 233 (100.0) | 118 (100.0) | 351 (100.0) | | |
| **Occupation** | | | | | |
| Businesswoman | 62 (26.6) | 43 (36.4) | 105 (29.9) | 11.1 | **0.049** |
| Civil Servant | 25 (10.7) | 18 (15.3) | 43 (12.3) | | |
| Farmer | 9 (3.9) | 0 (0.0) | 9 (2.6) | | |
| Housewife | 134 (57.5) | 57 (48.3) | 191 (54.4) | | |
| Nill | 1 (0.4) | 0 (0.0) | 1 (0.3) | | |
| Student | 2 (0.9) | 0 (0.0) | 2 (0.6) | | |
| Total | 233 (100.0) | 118 (100.0) | 351 (100.0) | | |
| **Residence** | | | | | |
| Rural | 12 (5.2) | 0 (0.0) | 12 (3.4) | 7.2 | **0.027** |
| Semi-urban | 67 (28.8) | 30 (25.4) | 97 (27.6) | | |
| Urban | 154 (66.1) | 88 (74.6) | 242 (68.9) | | |

| | | | | | |
|---|---|---|---|---|---|
| Total | 233 (100.0) | 118 (100.0) | 351 (100.0) | | |
| **Sex of Child** | | | | | |
| Female | 127 (54.5) | 60 (60.8) | 187 (53.3) | 0.4 | 0.516 |
| Male | 106 (45.5) | 58 (49.2) | 164 (46.7) | | |
| Total | 233 (100.0) | 118 (100.0) | 351 (100.0) | | |
| **Family size** | | | | | |
| Greater than 5 | 64 (27.5) | 62 (52.5) | 126 (35.9) | 21.4 | **<0.001** |
| ≤ 5 | 169 (72.5) | 56 (47.5) | 225 (64.1) | | |
| Total | 233 (100.0) | 118 (100.0) | 351 (100.0) | | |
| **Caregivers age group** | | | | | |
| 15 - 24 | 49 (21.0) | 16 (13.6) | 65 (18.5) | 36.6 | **<0.001** |
| 25 - 34 | 140 (60.1) | 43 (36.4) | 183 (52.1) | | |
| ≥ 35 | 44 (18.9) | 59 (50.0) | 103 (29.3) | | |
| Total | 233 (100.0) | 118 (100.0) | 351 (100.0) | | |
| **Birth order** | | | | | |
| First | 30 (12.9) | 13 (11.0) | 43 (12.3) | 8.2 | **0.043** |
| Second | 60 (25.8) | 16 (13.6) | 76 (21.7) | | |
| Third | 72 (30.9) | 42 (35.6) | 114 (32.5) | | |
| Fourth and above | 71 (30.5) | 47 (39.8) | 118 (33.6) | | |
| Total | 233 (100.0) | 118 (100.0) | 351 (100.0) | | |
| **Place of Child delivery** | | | | | |
| Health Facility | 196 (84.1) | 110 (93.2) | 306 (87.2) | 8.4 | **0.04** |
| Home | 33 (14.2) | 8 (6.8) | 41 (11.7) | | |
| Traditional Birth Attendant's | 4 (1.7) | 0 (0.0) | 4 (1.1) | | |
| Total | 233 (100.0) | 118 (100.0) | 351 (100.0) | | |
| **Distance of caregiver house to vaccination site** | | | | | |
| 15-30 Minutes | 175 (75.1) | 73 (61.9) | 248 (70.7) | 17.0 | **<0.001** |
| Less than 15 Minutes | 16 (6.9) | 2 (1.7) | 18 (5.1) | | |
| More than 30 Minutes | 42 (18.0) | 43 (36.4) | 85 (24.2) | | |
| Total | 233 (100.0) | 118 (100.0) | 351 (100.0) | | |

Marital status had a significant association with attitude towards MCV2 ($\chi^2 = 49$, $p < 0.001$). Among those with a positive attitude, 88.8% were married compared to 59.3% of those with a poor attitude. A larger proportion of caregivers with a positive attitude were Muslims (72.5%). Caregiver's occupation also showed a significant relationship with attitude ($\chi^2 = 11.1$, $p = 0.049$). Housewives were more likely to have a positive attitude (57.5%) compared to a poor attitude (48.3%). Residence showed a significant association with attitude ($\chi^2 = 7.21$, $p = 0.027$). Family size was significantly associated with attitude towards MCV2 ($\chi^2 = 21.4$, $p < 0.001$). Caregiver's age group showed a significant relationship with attitude ($\chi^2 = 36.6$, $p < 0.001$). Birth order was also significantly associated with attitude ($\chi^2 = 8.17$, $p = 0.043$). The place of child delivery also showed a significant relationship with attitude ($\chi^2 = 6.43$, $p = 0.04$). Distance from the caregiver's house to the vaccination site was significantly associated with attitude ($\chi^2 = 17$, $p < 0.001$). (Table 5).

**Table 6.** Knowledge (Good or Poor) and Attitude Positive or Negative) among Groups (n=351)

| Variable | Frequency = 351 | | | Test ($X^2$) | P -value |
|---|---|---|---|---|---|
| | Intervention 1 (SMS) n= 117 (%) | Intervention 2 (Auto call) n=117 (%) | Control group n= 117 (%) | | |
| Knowledge | | | | | |
| Good Knowledge | 44 (37.61) | 42 (35.90) | 62 (79.46) | **1.52** | **0.218** |
| Poor Knowledge | 73 (62.39) | 75 (64.10) | 55 (20.51) | | |
| Total | 117 (100.00) | 117 (100.00) | 117 (100.00) | | |
| **Attitude** | | | | | |
| Positive Attitude | 103 (88.04) | 103 (88.04) | 51 (43.56) | **42.27** | **<0.001** |
| Negative Attitude | 14 (11.96) | 14 (11.96) | 66 (56.41) | | |
| Total | 117 (100.00) | 117 (100.00) | 117 (100.00) | | |

Table 6 shows no statistically significant difference of knowledge among caregivers allocated to the different study groups (X2=1.52; p-value = <0.218). However, there was statistically significant difference in caregivers' attitudes towards MCV2 among the different study groups (X2=42.27; p-value = <0.001).

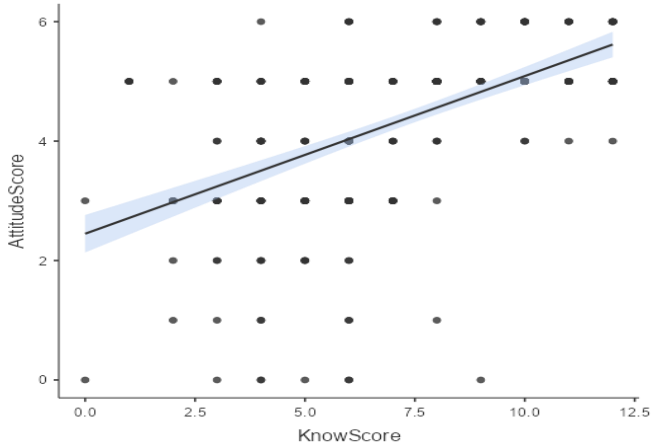


**Figure 2.** Correlation between Knowledge and Attitude of Caregivers towards MCV2 in Adamawa State

Figure 2 demonstrates a strong and statistically significant positive correlation between the level of knowledge and attitude towards the MCV2 vaccine among caregivers. This underscores the importance of educational interventions to improve knowledge, which in turn is likely to enhance positive attitudes towards vaccination.

**Table 7.** Association between Sources of Information on MCV2 and Knowledge of Caregivers on MCV2 in Adamawa State May 2024

| Sources of Information about MCV2 vaccine | Attitude | | Total | χ2 | p-value |
|---|---|---|---|---|---|
| | Good | Poor | | | |
| Friends/Family | 12 (5.2) | 16 (13.6) | 28 (8.0) | 10.4 | **0.005** |
| Healthcare Provider | 212 (91.0) | 93 (78.8) | 305 (86.9) | | |
| Media | 9 (3.9) | 9 (7.6) | 18 (5.1) | | |
| Total | 233 (100.0) | 118 (100.0) | 351 (100.0) | | |

The table examines the relationship between the source of information about the importance of the Measles-Containing Vaccine (MCV2) and caregivers' attitudes. The analysis reveals a statistically significant association between the source of information and attitude towards the vaccine ($\chi^2$ = 10.4, p = 0.005). Among caregivers with a good attitude towards the MCV2 vaccine, 91.0% reported learning about the vaccine from healthcare providers, compared to 78.8% of those with a poor attitude. Friends and family were a more common source of information among those with a poor attitude (13.6%) compared to those with a good attitude (5.2%). Information from media sources was cited by 3.9% of those with a good attitude and 7.6% of those with a poor attitude. (Table 7).

## Discussion

Measles is an acute and highly contagious viral disease that continues to pose a public health concern, particularly in developing countries. As such, several studies have been conducted to assess the knowledge and attitudes of caregivers towards measles and vaccination in general. These studies aim to better understand the factors that influence vaccine acceptance and to inform interventions that can increase vaccination coverage.

The study showed that majority of caregivers were mothers who were married. This finding highlights the caring attitude of mothers compared to other categories of caregivers. The study provides valuable insights into the roles and responsibilities of most women play in the lives of their children. This is consistent with other findings in Nigeria [19, 20].

Association between sociodemographic variables such as marital status, religion, distance to vaccination sites, family size, and caregiver's age group showed significant association with the level of knowledge about measles and the MCV2 vaccine among caregivers. This underscores the need for targeted educational interventions that consider these demographic and socio-economic factors to improve vaccination knowledge and coverage. This is in congruent to findings of a study in Abeokuta, Nigeria [18] and a study conducted in Pakistan [21].

Marital status, religion, occupation, residence, family size, caregiver's age group, birth order, place of child delivery, and distance to vaccination site were all significantly associated with caregivers' attitudes towards the MCV2 vaccine which is consistent with findings from study in Edo State Nigeria [22] and in Enugu State Nigeria [23], where these variables were shown to be positively associated with mother's attitude towards measles vaccination; however, this is in variance with findings in France[24] where these factors are not significantly associated with attitude. These findings underscore the importance of considering these demographic and socio-economic factors in designing interventions aimed at improving attitudes towards vaccination.

In addition, area of residence was found to be significantly associated with positive attitude towards MCV2. Caregivers who reside in Urban areas are more likely to have positive attitude towards MCV2 than those who reside in rural areas. This was similar to findings in other studies, where most caregivers that reside in urban areas had positive attitude than other caregiver[17, 19]. The occupation of caregivers was also significantly associated with positive attitude towards MCV2. Caregivers that are housewives were more likely to have a positive attitude towards MCV2 than caregivers with other occupations. This was consistent with findings from other studies, where majority of housewives had a positive attitude towards MCV2 than those of other occupations [18].

Healthcare providers are the primary source of information for caregivers with good knowledge about MCV2. The significant association indicates that caregivers who learn about the vaccine from healthcare providers tend to have better knowledge. This is in

consonance with findings from other studies in Nigeria [20] and in Myanmar[25] which revealed that majority of mothers obtained information on the vaccination program primarily from the health facilities; though this conflicts with findings from Edo State Nigeria [22] where the media was identified as the major source of information on vaccination for mothers. This highlights the crucial role of healthcare providers in disseminating accurate information about MCV2. Efforts to improve knowledge levels should focus on strengthening the role of healthcare providers in public health education. The significant association indicates that caregivers who learn about the vaccine from healthcare providers are more likely to have a positive attitude. This highlights the important role of healthcare providers in shaping positive attitudes towards vaccination. Efforts to improve attitudes should focus on enhancing the involvement of healthcare providers in public health education.

The survey results highlight relatively high level of awareness and partial understanding of measles and the MCV2 vaccine among caregivers in Adamawa State. However, there is a notable proportion of partially correct and incorrect answers, which could be as result of measles being a common disease indicating areas where public health education and awareness campaigns could be improved to enhance comprehensive knowledge about measles and vaccination. The relatively high level of awareness could be as a result the disease' endemicity in the region, however partial understanding of MCV2 could be due to the fact that the second dose was just recently introduced into the expanded program on immunization in Nigeria. This is similar to findings from other studies Nigeria [18, 19].

The study further reveals a high level of positive attitude towards MCV2 among respondents, with strong beliefs in its importance, safety, effectiveness, and role in preventing measles outbreaks. However, concerns about vaccine side effects and the impact of multiple vaccinations on children were also evident, indicating areas where further education and reassurance may be beneficial. This is similar with findings from other studies which showed positive attitudes of mothers towards measles vaccination [23, 24, 26]. Nevertheless, some studies carried out in Bauchi and Cross rivers States Nigeria revealed negative attitudes towards vaccination among the mothers [27].

This study also demonstrates a strong and statistically significant positive relationship between the level of knowledge and attitude towards the MCV2 vaccine among caregivers. This underscores the importance of educational interventions to improve knowledge, which in turn is likely to enhance positive attitudes towards vaccination. This corroborates other studies conducted in Nigeria [19, 23]. Furthermore, caregivers with positive attitude towards MCV2 were significantly more likely to vaccinate their children compared to those with a negative attitude which is similar to findings in other studies in Osun State, Nigeria [20] and in Switzerland [28]. This underscores the importance of fostering positive attitudes towards vaccination to improve vaccine uptake and coverage.

## Conclusion

This study shows that the knowledge of caregivers on measles and MCV2 is inadequate. There is partial understanding of measles and MCV2 among caregivers in Adamawa State; however, there is relatively high level of awareness on measles with high level of positive attitude towards MCV2 among caregivers.

Major factors associated with good knowledge of measles and MCV2 among caregivers in Adamawa State include age (caregiver being older than 35years), marital status (being married), religion (being a Muslim), marital status (being married) and distance of caregivers' house to vaccination site (less than 30 minutes' walk to vaccination site).

Factors associated with positive attitude of mothers towards MCV2 include marital status (being married), religion (being a Muslim), area of residence (living in urban area), distance of caregivers' house to vaccination site (less than 30 minutes' walk to vaccination site), Birth order (4th order and above) and occupation of caregiver (being a housewife).

A multi-faceted approach is essential to achieve the vaccination coverage needed to eliminate measles in Nigeria. It is essential to continue to monitor and address knowledge gaps and negative attitudes towards measles vaccination to effectively combat measles. Improving vaccination coverage of MCV2 requires increasing awareness of measles and MCV2 through monitoring and addressing knowledge gaps and negative attitudes towards measles vaccinations.

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## Declaration of Conflicting Interest

The Author(s) declares that there is no conflict of interest.

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