Background

In Nigeria, where patent and proprietary medicine vendors (PPMVs) provide care in 55% of common paediatric illnesses, child deaths from diarrhoeal diseases stand at 104,000; 14% of total all-cause child mortality. Our aim was to investigate PPMVs knowledge of presentation, cause, treatment and prevention of childhood diarrhoea, and their recommendation of oral rehydration solution (ORS) and zinc in the treatment of sick children in Port Harcourt, Nigeria.

Methods

A cross-sectional design, structured questionnaires were administered to 200 PPMVs over six weeks with a 94% response rate. The main outcome variables were knowledge of childhood diarrhoea, and recommendation of ORS and zinc. Knowledge scores were analysed numerically and categorized as satisfactory (score $\geq 15$) and unsatisfactory (score < 15). Multivariate Poisson loglinear regression was used to analyse score ratios. Binomial logistic regression was used to assess the determinants of recommendation of ORS as well as recommendation of zinc.

Results

Overall knowledge of childhood diarrhoea was satisfactory among 47% of PPMVs. Eighty-six percent of them reported consistent recommendation of ORS, while 63% of PPMVs consistently recommended zinc. Secondary education (Score Ratio (SR) = 1.26, 95% Confidence Interval (CI) = 1.01–1.56, $P=0.039$) and post-secondary education (SR=1.37, 95% CI=1.09 –1.72, $P=0.008$) were associated with significantly higher knowledge scores. Recommendation of ORS was significantly associated with knowledge score (Adjusted Odds Ratio (AOR) = 1.41, 95% CI=1.19–1.66, $P<0.001$), availability of ORS (AOR=7.26, 95% CI=1.73–30.54, $P=0.007$) and prescribing of zinc (AOR=5.82, 95% CI=2.03–16.66, $P=0.001$). Recommendation of zinc was significantly associated with awareness of ORS/zinc guidelines (AOR=5.60, 95% CI=1.07–29.26, $P=0.041$).

Conclusions

With the low knowledge of presentation, cause, treatment and prevention of childhood diarrhoea among PPMVs, management of childhood diarrhoea by them in the community is unlikely to be optimal. The reported recommendation of ORS and zinc will need to be further investigated and confirmed by direct observation. Educational requirement for PPMVs to operate a drug shop should be increased to at least secondary education level, and supply of ORS/zinc made reliable as these have shown to be important factors in the recommendation of the products.

Globally, estimates of under five deaths from diarrhoeal diseases are put at 1.87 million, contributing 19% of total child deaths, making diarrhoea the second highest cause of under-5 mortality. A total of 78% of these deaths from diarrhoeal diseases, representing 1.4 million cases, occur in Africa and south-east Asian regions; with 73% of the deaths concentrated in 15 low-income countries including India, Nigeria, Democratic Republic of Congo, Bangladesh. It is estimated that approximately 67% of these deaths is due to dehydration, emphasizing the role of oral rehydration solution (ORS) and zinc.
ly focuses on prioritizing an increased use of ORS and zinc. These guidelines have seen a decrease of diarrhoea-related deaths from about 5 million in the 1980s to under 2 million by 2000; as well as an increase in the use of oral rehydration therapy (ORT) from 51 million in 1980 to 800 million in 1991; resulting in significant reductions in under-five deaths from diarrhoeal diseases. Despite these gains, several authors have shown that optimal benefits from these strategies are not being felt in low and middle-income as should reflect positively in morbidity and mortality figures there, and health workers continue to manage childhood diarrhoea incorrectly.7–10

In Nigeria, of the 752,000 deaths of children under five years of age, 105000, representing 14%, are caused by diarrhoeal diseases.11,12 Access to appropriate treatment is low at 39%.7 Mothers frequently first seek care for their children's ailments from patent medicine vendors, who don't prescribe ORS and zinc. Surveys have shown that only 33% of Nigeria's children suffering from diarrhoea get ORS products. Whereas only 39% PPMVs prescribe ORT; and only 35% prescribe zinc all the time.13–15

Patent and proprietary medicine vendors (PPMVs) are persons without formal training in pharmacy who sell pharmaceutical products on a retail basis for profit. They are retailers and increase access to essential drugs in the community. There are an estimated 200,000 PPMVs registered in Nigeria, and more than all other cadres of health worker in the country.16,17

Formal medicine or pharmacy training is not required to own or operate a drug store as a PPMV. However prospective PPMVs get attached to more senior and experienced PPMVs within apprenticeship arrangement, to gain the knowledge, skill and confidence to open their own shop. Typically, PPMVs are expected to have at least primary school education. PPMVs may legally sell pre-packaged, over-the-counter drugs. It is illegal for them to sell prescription drugs like antibiotics, or conduct invasive medical procedures like the conduct of diagnostic tests or injections.18,19

PPMVs have been shown by various studies at the state and community level to be an important, first source of care for children, and found that these PPMVs care for up to 55% of under-five illnesses.20–22

Since they are numerous and widely present in communities, PPMVs represent an important opportunity for improving the delivery of primary healthcare commodities and services. There is increasing interest among policymakers and program implementers in Nigeria to further engage PPMVs in primary health care delivery. PPMVs have also been listed as potential implementers at the community level for national Integrated Community Case Management (iCCM) guidelines.23

In Port Harcourt, Nigeria, the knowledge characteristics on PPMVs regarding childhood diarrhoea is unclear since there has not been any study on PPMVs for this purpose. There has also not been any study in the region conducted on PPMV recommendation of ORS and zinc for treatment of childhood diarrhoea.

With growing interest in use of PPMVs to scale-up healthcare delivery at the community level and reduce under-five mortality especially from diarrhoeal disease,23 it is important to evaluate PPMV knowledge of childhood diarrhoea and recommendation of ORS and zinc; as well as understand the predictors of any observed knowledge and recommendation. This will be an important contribution to the body of evidence for development of policies that seek to increase use of ORS/zinc and incorporate PPMVs for effective delivery of healthcare in the community.

METHODS

STUDY SETTING

With a population of about 5.2 million people, Rivers State is central to Nigeria's oil-based economy. Its capital is Port Harcourt, one of the three big cities in Nigeria. The study was carried out in Port Harcourt between February and April 2018. Port Harcourt is located at the heart of Nigeria’s Niger Delta, in the southern part of the country. In addition to being the administrative capital of Rivers State, it serves as the centre of key economic activities in the Niger Delta and the south-southern group of states in Nigeria, and is the hub of major oil and gas activities in the country. It has a population of 1,865,000.24,25

PPMVs are registered with the state's health department which in turn supervises their activities periodically.

DESIGN AND SAMPLING

This was a cross-sectional study. By simple random sampling, drug vendor shops in Port Harcourt were selected.

Using the Cochran’s formula for sample size calculation, a minimum sample size of 154 was determined.26 In this study, however, 200 drug vendor shops were randomly selected from a frame containing only vendor shops registered with the government. As there were security concerns in some areas of the city where anti-government militants and cult groups were a threat to lives and properties, whenever a sampled shop was located in such area, the nearest vendor shop in a safe area was selected instead, and the PPMV there interviewed. This was not expected to significantly affect the result as shops in insecure areas were not open for business. A safe area was any area of Port Harcourt with law and order with a thriving business atmosphere.

DATA COLLECTION

Two qualified assistants with experience in data collection and development co-operation were recruited and given a one-day training to support the administration of questionnaires. Data was collected in five weeks (March to first week of April 2018). Without previous notice, vendor shops were visited for questionnaire administration. Questionnaires were provided in English language, and when necessary, further explanations were made in pidgin-English which is widely spoken and understood in Nigeria. Each interview session lasted for about 50 minutes. The most senior PPMV in a shop was interviewed where there was more than one vendor. Interviews were done in the early mornings or evenings when client flow was expectedly low, with pauses when they had to attend to customers. The response rate was 94%.

DATA COLLECTION INSTRUMENT

A structured questionnaire was used. The questionnaire was developed based on the iCCM guidelines for community health workers, and adapted to the setting in Port Harcourt, Nigeria. The questionnaire was initially reviewed by a team consisting of three pharmacists, one of whom was a supervisor at Rivers State health ministry's department of pharmaceutical services, and in charge of supervision of PPMVs in the state. The review assessed the relevance and wording of the questions, as well as that the 'knowledge' segment reflected what was expected of PPMVs in the state. The questionnaire was then pre-tested on 10 PPMVs to ensure that the questions were clear and unambiguous. Pretesting resulted in a review of the questionnaire. The questionnaire was divided into five sections on: Socio-demographic infor-
Knowledge and recommendation of oral rehydration solution and zinc for management of childhood diarrhoea among patent and...
Table 1. Distribution of responses on PPMVs' knowledge of presentation, cause, treatment and prevention of childhood diarrhoea. n= 200, n (%) 

| Question area               | Correct response (%) | Question area               | Correct response (%) |
|-----------------------------|----------------------|-----------------------------|----------------------|
| **Definition**              |                      | **Role of zinc**            |                      |
| Passage of ≥ three tools/day| 186 (93)             | Reduces diarrhoea episode   | 173 (86.5)           |
| **Commonest Cause**         |                      |                             |                      |
| General                     | 144 (72)             |                             |                      |
| Specific                    | 52 (28)              |                             |                      |
| **Cause of most deaths**    |                      |                             |                      |
| Dehydration                 | 117 (58.5)           |                             |                      |
| **Emergency signs**         |                      |                             |                      |
| Unconsciousness             | 134 (67)             |                             |                      |
| Inability to drink          | 117 (58.5)           |                             |                      |
| Blood in stool              | 161 (80.5)           |                             |                      |
| **Prevention**              |                      |                             |                      |
| Access to safe-drinking water| 165 (82.5)          |                             |                      |
| Improved sanitation         | 155 (77.5)           |                             |                      |
| Hand-washing with soap      | 168 (84)             |                             |                      |
| Exclusive breastfeeding     | 102 (51)             |                             |                      |
| Hygiene                     | 178 (89)             |                             |                      |
| Health education            | 138 (69)             |                             |                      |
| **First choice treatment**  |                      | **Severe dehydration identified** | 141 (70.5) |
| ORS                         | 167 (83.5)           |                             |                      |
| **Best immediate approach** |                      |                             |                      |
| Moderate dehydration identified |                |                             |                      |
| Hospital referral           | 102 (51)             |                             |                      |
| Best Immediate approach     |                      |                             |                      |
| ORS                         | 109 (54.5)           |                             |                      |

All independent variables were tested in bivariate analysis for association with knowledge score (Table 2). Age was found to be significantly associated with knowledge score (P=0.002). PPMVs who had attained higher education level (P<0.001), received any formal medical education (P=0.047), or were aware of guidelines on ORS/zinc recommendation (P=0.016), had significantly higher knowledge scores. Whereas those who did not possess iCCM guidelines (P=0.045) or did not stock zinc (P=0.034) had significantly lower knowledge scores, use of ORS (P<0.001), and use of zinc (P=0.001) were significantly associated with higher knowledge scores. Poisson loglinear multivariate analysis revealed significant associations with having secondary education (SR=1.26, 95% CI=1.01–1.56, P=0.059), having post-secondary education (SR=1.37, 95% CI=1.09–1.72, P=0.008), and recommending ORS (SR=1.29, 95% CI=1.15–1.48, P=0.001) (Table 3).

DISCUSSION

Patent and proprietary medicine vendors are numerous and widespread in many Nigerian communities, where they account for up to 55% of care of childhood illnesses like malaria, pneumonia and diarrhoea. As such, policy makers and programme implementers now increasingly seek to include them in primary health care delivery. Yet for the patent and proprietary medicine vendor to give appropriate and timely advice to caregivers who tend to sick children, it is necessary that they have basic knowledge of the presentation, cause, treatment and prevention of childhood diarrhoea. This study assessed that knowledge, as well as the
Table 2. Associations between knowledge scores and characteristics of the study participants

| Variables                  | Knowledge score | P-value |
|----------------------------|-----------------|---------|
|                            | Min. | Max. | Mean ± SD | Median |         |
| Age                        |      |      |           |        | 0.002   |
| Sex:                      |      |      |           |        |         |
| Male                       | 6    | 20   | 14.32 ± 3.51 | 15     |         |
| Female                     | 5    | 20   | 13.48 ± 3.72 | 14     |         |
| Education level            |      |      |           |        | <0.001  |
| Primary                    | 8    | 16   | 10.62 ± 2.97 | 10     |         |
| Secondary                  | 5    | 20   | 13.41 ± 3.54 | 13     |         |
| Post-secondary             | 7    | 20   | 15.03 ± 3.51 | 16     |         |
| Profession                 |      |      |           |        | 0.276   |
| Pharmacist                 | 10   | 19   | 16.00 ± 3.40 | 17.5   |         |
| Nurse                      | 16   | 17   | 16.33 ± 0.58 | 16     |         |
| CHW                        | 10   | 17   | 14.16 ± 2.40 | 15.5   |         |
| PPMV                       | 5    | 20   | 13.50 ± 3.79 | 13     |         |
| Auxiliary nurse            | 8    | 18   | 14.59 ± 2.92 | 14.5   |         |
| Others                     | 9    | 20   | 14.86 ± 4.22 | 15     |         |
| Received any formal medical education: |      |      |           |        | 0.047   |
| No                         | 5    | 20   | 13.62 ± 3.71 | 14     |         |
| Yes                        | 10   | 20   | 15.29 ± 2.71 | 16     |         |
| Any training attendance:   |      |      |           |        | 0.329   |
| No                         | 6    | 19   | 13.57 ± 3.86 | 13.5   |         |
| Yes                        | 5    | 20   | 14.01 ± 3.51 | 14     |         |
| Any supervision:           |      |      |           |        | 0.105   |
| No                         | 6    | 20   | 13.41 ± 3.81 | 13     |         |
| Yes                        | 5    | 20   | 14.17 ± 3.47 | 15     |         |
| Guidelines awareness:      |      |      |           |        | 0.016   |
| No                         | 8    | 17   | 11.71 ± 2.58 | 11.5   |         |
| Yes                        | 5    | 20   | 13.98 ± 3.66 | 14.5   |         |
| Possession of guidelines:  |      |      |           |        | 0.045   |
| No                         | 5    | 20   | 13.16 ± 3.61 | 13     |         |
| Yes                        | 7    | 20   | 14.22 ± 3.61 | 15     |         |
| Currently stock ORS:       |      |      |           |        | 0.707   |
| No                         | 7    | 19   | 13.40 ± 4.15 | 13     |         |
| Yes                        | 5    | 20   | 13.86 ± 3.60 | 14     |         |
| Currently stock zinc:      |      |      |           |        | 0.034   |
| No                         | 8    | 19   | 12.88 ± 3.03 | 13     |         |
| Yes                        | 5    | 20   | 14.07 ± 3.75 | 15     |         |

SD – standard deviation, CHW – community health worker, PPMV - patent and proprietary medicine vendors, ORS - oral rehydration solution

use of ORS and zinc in the approach to such sick children.

This survey showed that PPMVs with only primary education constituted just 4% of the total, with most workers having a secondary (65.5%) or tertiary education (32.5%). Studies conducted in the northern parts of the country revealed that PPMVs with only primary education made up about 20% of the whole. Another possible explanation for this is the wide variation in educational levels in the southern and northern regions of the country, the north showing generally lower levels of education among residents. Another study conducted in Anambra in the south indicated higher educational levels among PPMVs. PPMVs that had received any formal medical training were previously reported to be 14% in Rivers State, 20% in Kano State, 32% in Lagos, with a national average of less than 20%. These are generally in keeping with the findings of present study where PPMVs that had received any form of medical training accounted for 12% of the total. The slightly higher number in Lagos might be due to its overall increased literacy and educational level. Another possible explanation is that Lagos, being the commercial capital of Nigeria, attracts the more educated vendors who have to
Table 3. Poisson multivariate regression model for associations between knowledge score and variables of interest

| Variables                          | Knowledge Score Ratio |                 |                 | p-value |
|-----------------------------------|-----------------------|-----------------|-----------------|---------|
|                                   | Crude (95% CI)        | Adjusted (95% CI) |                |         |
| Age                               | 1.01 (1.00–1.02)      | 1.01 (1.00–1.01) | 0.003           | 0.162   |
| Sex                               |                       |                 |                 |         |
| Male                              | 1                     | 1               | -               |         |
| Female                            | 0.95 (0.88–1.02)      | 0.97 (0.90–1.05) | 0.159           | 0.488   |
| Education level:                  |                       |                 |                 |         |
| Primary                           | 1                     | 1               | -               |         |
| Secondary                         | 1.26 (1.06–1.57)      | 1.26 (1.01–1.56) | 0.036           | 0.039   |
| Post-secondary                    | 1.42 (1.13–1.77)      | 1.37 (1.09–1.72) | 0.002           | 0.008   |
| Received any formal medical education: |                   |                 |                 |         |
| No                                | 1                     | 1               | -               |         |
| Yes                               | 1.12 (1.01–1.25)      | 1.03 (0.90–1.18) | 0.040           | 0.656   |
| Any supervision:                  |                       |                 |                 |         |
| No                                | 1                     | 1               | -               |         |
| Yes                               | 1.07 (0.99–1.15)      | 1.06 (0.98–1.14) | 0.101           | 0.164   |
| Guidelines awareness:             |                       |                 |                 |         |
| No                                | 1                     | 1               | -               |         |
| Yes                               | 1.19 (1.02–1.40)      | 1.01 (0.85–1.20) | 0.028           | 0.935   |
| Guidelines possession:            |                       |                 |                 |         |
| No                                | 1                     | 1               | -               |         |
| Yes                               | 1.08 (1.00–1.17)      | 1.06 (0.98–1.16) | 0.050           | 0.152   |
| Currently stock zinc:             |                       |                 |                 |         |
| No                                | 1                     | 1               | -               |         |
| Yes                               | 1.09 (1.00–1.20)      | 1.03 (0.93–1.13) | 0.064           | 0.615   |
| Recommendation of ORS:            |                       |                 |                 |         |
| No                                | 1                     | 1               | -               |         |
| Yes                               | 1.36 (1.20–1.55)      | 1.29 (1.13–1.48) | <0.001          | <0.001  |
| Recommendation of zinc:           |                       |                 |                 |         |
| No                                | 1                     | 1               | -               |         |
| Yes                               | 1.16 (1.07–1.26)      | 1.07 (0.98–1.17) | <0.001          | 0.119   |

CI – confidence interval, ORS – oral rehydration solution

compete for gains in among more educated populace.

The level of knowledge was considered poor among 53% of participants. This is in keeping with studies that were conducted in Lagos and Kwara states, as well as Uganda where it was identified that many PPMVs lacked the knowledge to treat childhood diarrhoea. Another study that was conducted in Enugu, south-east Nigeria found that 64% of PPMVs had good knowledge of cause, types, signs and effects of diarrhoea; with 68% of them being able to identify ORS as first line treatment of childhood diarrhoea. The same study revealed only 33% and 49% respectively demonstrated knowledge in prevention activities, and therapeutic use of ORS. Present study however, showed that an average of 75% had knowledge in prevention activities, and 83% identified ORS as first line treatment of childhood diarrhoea. Current study also showed that 86% of participants were aware of the role of zinc in management of childhood diarrhoea. In another study, it was stated that only two thirds of participants had this knowledge.

This study further demonstrated a significantly strong relationship between knowledge and education level, having received any formal medical education, awareness and ownership of guidelines, stocking of zinc, recommendation of ORS, and recommendation of zinc. Findings following regression analysis suggest that education level and recommendation of ORS are significant predictors of knowledge. The possible explanation is that the more educated a PPMV is, the more likelihood to get current information on childhood diarrhoea, and on best ways that help their clients. A similar trend was found in a survey that was conducted in Uganda among private for-profit community health care workers. It found that knowledge was strongly associated with level of education. As with present study, age, sex, and having received any formal medical trainings, were also shown to have no significant relationship with knowledge in a previous study that was conducted in Kogi and Kwara states.

Regular recommendation of ORS was reported by 87% of participants in this study, whereas 64% of PPMVs reported regular recommendation of zinc. Prescription of both zinc...
Table 4. Binomial logistic regression model for associations between ORS recommendation and variables of interest

| Variables                      | ORS Recommendation |
|-------------------------------|--------------------|
|                               | Crude (95% CI)     | P-value | Adjusted (95% CI) | P-value |
| Age                           | 1.09 (0.99–1.20)   | 0.075   |                    |        |
| Sex                           |                    |         |                    |        |
| Male                          | 1                  | -       | -                  | -      |
| Female                        | 0.49 (0.20–1.19)   | 0.111   |                    |        |
| Aware of guidelines:          |                    |         |                    |        |
| No                            | 1                  | -       | -                  | -      |
| Yes                           | 6.23 (1.96–19.77)  | 0.002   |                    |        |
| Currently have ORS:           |                    |         |                    |        |
| No                            | 1                  | -       | 1                  | -      |
| Yes                           | 5.38 (2.17–13.17)  | <0.001  | 7.26 (1.73–30.54)  | 0.007  |
| Currently have zinc:          |                    |         |                    |        |
| No                            | 1                  | -       | -                  | -      |
| Yes                           | 3.38 (1.42–8.07)   | 0.006   |                    |        |
| Zinc recommendation           |                    |         |                    |        |
| No                            | 1                  | -       | -                  | -      |
| Yes                           | 6.20 (2.46–15.62)  | <0.001  | 5.82 (2.03–16.66)  | 0.001  |
| Knowledge score               |                    |         |                    |        |
| No                            | 1                  | -       | 1                  | -      |
| Yes                           | 1.38 (1.20–1.59)   | <0.001  | 1.41 (1.19–1.66)   | <0.001 |
| Knowledge category            |                    |         |                    |        |
| No                            | 1                  | -       | -                  | -      |
| Yes                           | 29.3 (3.9–221.6)   | 0.001   |                    |        |

CI – confidence interval, ORS - oral rehydration solution

and ORS was observed among 60.5% of drug vendors. Previous studies have stated similar results. In Lagos, Nigeria, it was stated that 77% of drug vendors reported that they always recommended ORS. Another study conducted in Uganda revealed that 70% of workers at drug shops claimed to recommend ORS. These reported increases in prescribing ORS products might be explained by an increased information penetration within the community due to mass media campaigns, access to the internet and activities of community-based organisations. This differs from a study conducted in Benin, Nigeria, which reported that 55% of healthcare providers used zinc and 10% used it in every case of child diarrhoea. Also, in India, only 22% of health workers were found to prescribe both ORS and zinc. It has, however, been reported by one study that there was a significant gap between knowledge and documented practices, and though health workers reported carrying out an activity, this did not reflect what was actually done.

High knowledge score, ORS availability at time of survey and zinc supplement use were significant predictors of ORS recommendation. This study also reports that awareness and possession of treatment guidelines, stocking of zinc, recommendation of ORS, as well as satisfactory knowledge category were strong predictors of recommendation of zinc. The strongest predictors of recommendation of both ORS and zinc were awareness of iCCM guidelines, knowledge and availability of zinc in stock at the time of survey. These relationships suggest that increased access to, and availability of, ORT products can help influence PPMV prescribing behaviour. Since it is further shown there exists a significant association between ORT product availability and supply chain reliability, strengthening of supply chain reliability is suggested. These results reflect what has been done elsewhere such as in India, where among community-level health providers, access to ORS and zinc supplies where significantly associated with prescribing among those providers. Again in India, zinc usage has been shown to be a strong predictor of ORS recommendation.

This study showed that 7.5% and 21% of PPMVs did not stock ORS and zinc, respectively. But as it has been stated elsewhere, stocking either of ORS or zinc was found to have significant predictive impact on whether a drug vendor would recommend ORS, zinc or both. This is an improvement on results reported previously in Uganda where it was found that in a third of drug shops, ORS products were found to be out of stock; and in Kwara and Kogi states of Nigeria where 25% of shops did not stock ORT products. Again, the observed difference seen in present study might be because of widespread awareness among drug vendors. Current study also demonstrates reliable supply chain as a significant predictor of ORS and zinc stocking.

STRENGTHS AND LIMITATIONS

This study is the first time a comprehensive investigation of PPMV knowledge of childhood diarrhoea, and recommendation of ORS and zinc is being conducted in the Port Harcourt areas of Nigeria. The results presented provide invaluable information on PPMV recommendation practices.
Table 5. Binomial logistic regression model for associations between zinc recommendation and variables of interest

| Variables                              | Zinc supplements Recommendation |
|----------------------------------------|---------------------------------|
|                                        | Crude (95% CI)                  | P-value | Adjusted (95% CI) | P-value |
| Age                                    | 1.04 (0.98–1.10)                | 0.182   |                  |        |
| Education level                        |                                 |         |                  |        |
| Primary                                | 1                               | -       |                  | -      |
| Secondary                              | 0.48 (0.09–2.48)                | 0.381   | 0.87 (0.16–4.72)  | 0.872  |
| Post-secondary                         | 0.87 (0.16–4.72)                | 0.872   |                  |        |
| Received any formal medical education  |                                 |         |                  |        |
| No                                     | 1                               | -       |                  | -      |
| Yes                                    | 1.80 (0.68–4.76)                | 0.236   |                  |        |
| Guidelines awareness                   |                                 |         |                  |        |
| No                                     | 1                               | -       | 1                | -      |
| Yes                                    | 12.6 (2.73–58.08)               | 0.001   | 5.60 (1.07–29.26) | 0.041  |
| Guidelines possession                  |                                 |         |                  |        |
| No                                     | 1                               | -       | 1                | -      |
| Yes                                    | 2.50 (1.38–4.55)                | 0.003   | 2.39 (1.20–4.77)  | 0.013  |
| Currently stock zinc                   |                                 |         |                  |        |
| No                                     | 1                               | -       | 1                | -      |
| Yes                                    | 3.96 (1.94–8.06)                | <0.001  | 3.39 (1.53–7.49)  | 0.003  |
| Recommendation of ORS                  |                                 |         |                  |        |
| No                                     | 1                               | -       | 1                | -      |
| Yes                                    | 6.20 (2.46–15.62)               | <0.001  | 3.63 (1.26–10.48) | 0.017  |
| Knowledge score:                       |                                 |         |                  |        |
| No                                     | 1                               | -       | 1                | -      |
| Yes                                    | 1.17 (1.08–1.27)                | <0.001  |                  |        |
| Knowledge category:                    |                                 |         |                  |        |
| Not satisfactory                       | 1                               | -       | 1                | -      |
| Satisfactory                           | 3.68 (1.97–6.87)                | <0.001  | 2.22 (1.10–4.48)  | 0.025  |

CI – confidence interval, ORS - oral rehydration solution

of ORS and zinc, as well as their knowledge on childhood diarrhoea. And this should be used by civil society organizations, regulatory bodies, the government and other stakeholders to inform policy development and implementation on improving management of childhood diarrhoea in the community. Secondly, since the requirements for practice as a drug vendor and demographics are similar in other parts of the country, sub-Saharan Africa and other low-income countries, findings from this study may be cautiously generalized to those settings. Furthermore, in employing the modified Angoff method to categorize knowledge of childhood diarrhoea among PPMVs, attempts were made in this study to depart from the often-arbitrary setting of cut-off points seen in knowledge studies.

An obvious drawback of the study is the design, wherein no causal inferences may be drawn from the results. Another limitation is that responses to the questionnaire could have been what the vendors felt were desirable out of concern of being traced by the government for their practices. Thus, a way to directly observe practices would have been preferred. However, this could not be done due to constraints of time and resources. Yet, PPMVs were assured of the anonymity of their responses, to enable optimal cooperation. Again, since PPMVs in insecure areas were not inter-viewed, the results may not be representative of all PPMVs in Port Harcourt, this being a possible source of bias.

CONCLUSION

The finding of low overall knowledge of PPMVs on cause, treatment and prevention of childhood diarrhoea is disturbing as it questions the PPMVs’ ability to correctly advise caregivers who tend to sick children in the community. This also implies that currently, incorporation of PPMVs is unlikely to lead to the expected outcome of effective healthcare at the community level and a concomitant reduction of child mortality. However, with a significant association demonstrated between knowledge and education level, an opportunity is presented for policies that emphasize education and training of PPMVs to improve their knowledge and childhood diarrhoea, and function optimally in primary care delivery in the community. Again, the overall poor knowledge of childhood diarrhoea among PPMVs is not commensurate with the high reported prescribing of ORS and zinc to treat sick children, indicating the influence of other as yet unexplored factors; this reported prescribing will, thus, need to be confirmed by direct observation. And since recommendation of ORT products is significantly as-
associated with availability of the products, and possession of appropriate guidelines, this study highlights how stocking of ORT products and possession of relevant guidelines can lead to an increase in the use of ORS with resultant reductions in child mortality.

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