**Reviewer’s Comments**



**DETERMINATION OF ATTITUDE OF COMMUNITY PHARMACISTS TO MEDICINE INVENTORY MANAGEMENT.**

**Abstract:**

**Background:** Present global economic recession and harsh practice environment has place a demand on community pharmacy to ensure effective and efficient management of Medicine inventory to promote Cost saving for professional valuable profit advantage.

**Objectives:** This study presents the determination of the attitude of community pharmacists to medicine inventory management.

**Methods:** A cross-sectional descriptive survey of 125 community pharmacists selected using simple random sampling method. Primary data were collected with the aid of a pretested semi-structured questionnaire. Sample size was determined using Taro Yamane’s formula for finite population. The questionnaire comprises three main sections to study the attitude of community pharmacists to medicine inventory management and designed using simple statements on Likert-type scale with five alternative responses having weighting scores of 0-4. Data collected were subjected to descriptive and inferential analysis at 5% level of significance using the Statistical Package for Social Sciences (SPSS) version 21.0 for Windows (SPSS, Chicago, Illinois).

**Results:** The response rate was 125 (96.2%) and reliability of the questionnaire was 0.97. Most respondents were located in Warri 69 (75.2%), with almost evenly split sex categories with the male 70 (56.0%) being slightly more, age distribution almost bell-shaped with the 30-39 years range being the modal range. Respondents were mostly superintendents 98 (78.4%), computer 79 (63.2%) usage in their premises with 67(84.8%) being used for inventory management purpose. Community pharmacists showed negative attitude (MWA= 2.46) toward inventory management with significant association with sex of the respondents (x2 = 9.32, p = 0.01) however, males being more negative than the females.

**Conclusion:** The result shows that community pharmacist in Delta State had negative attitude towards inventory management. Adequate training through self-development is highly advocated.

**Keywords:** Medicine Inventory management; Community pharmacists; Attitude.

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| **1. INRODUCTION**Medicine inventory management is crucial especially in a period of economic recession when efforts are tailored towards cost saving. strategies to manage systems more efficiently. It was reported that estimated 70% of resources of curative and preventive medicines are wasted in any country due to poor drug management [1]. Inventory management is the core of pharmaceutical supply and is a key tool towards effective cost reduction in community pharmacy practice critically presenting a strong relationship between sales and customer service [2]. It is defined as the continuous process of planning, organizing and control that aim at minimizing the investment in inventory which maintain a sound balance between holding cost on one aim and purchasing and shortage cost on the other [1]. The process is primarily used to ensure that assets are properly secured and there is concurrency among all accounting systems. In community pharmacy practice, inventory is a major investment made towards the success of the pharmacy. Adequate inventory management is therefore essential in assuring security inventory which is the firm’s single largest asset. It helps to improve work flow and enhances customer’s satisfaction [3]. Inventory control is the process of ordering the right goods at the right time with the right quality [4]. Control of inventory is a means of ensuring that the forecasted stocks are adhered to in daily operational processes. The objective of an inventory control system is to minimize the total running cost. It is reported that it would cost a business more to run out of an item, than to stock extra units of it, as availability and convenience may affect future transactions [1]. Most inventory decisions revolve around replenishment, which involves knowing how much and when to order. This will inform managers how much of a product to re-order, when to re-order and how frequently orders are made. The effective and efficient management of medicine entails close supervision of important drugs, prevention of pilferage and priority in purchase and distribution of drugs [3]. This will help to optimize use of resources and eventually help to improve patient care by ensuring availability of essential drugs and prevent stock-out. It was reported that the good understanding of various techniques in pharmacy practice positively impacted administrative task including inventory management [4]. On the whole researchers have not focused on attitude of community pharmacists to inventory management and reports on the area of research are rarely available.  |
| **2. MATERIALS AND METHODS*****2.1 Study Setting***The study was carried out in Delta State. The locations included Abraka, Agbor, Asaba, Eku, Kwale, Oleh, Ozoro, Sapele, Ughelli and Warri.***2.2 Study design*** The study employed a cross-sectional design.***2.3 Study population*** Descriptive survey of 125 out of 157 community pharmacists selected using simple random sampling method of the registered pharmacists of the Pharmacists Council of Nigerian 2016 registration data.***2.4 Sample size*** Sample size of 130 was comprised randomly determined using Taro Yamane’s formula for finite population calculated with a confidence interval of 95%.$$n=\frac{N}{1+Ne^{2}}$$n – sample size N - population sizee – margin of error \* 95% confidence level and e = 0.05, Using the PCN 2016 data, Population = 157  n = sample size, N= Population size, e = the acceptable sample error. = 157/1+ 157(0.05)2 = 157/1+ (157 x 0.0025) = 157/ 1 + 0.3925 = 112.75 = 113 pharmacists. Add 15%, 112.75 x 15/100 = 129.66 = approximately 130 pharmacists.***2.5 Inclusion/ Exclusion criteria*** All registered community pharmacists were included whether licensed for the year or not but those in community pharmacies not registered with the Pharmacists’ Council of Nigeria (PCN) were excluded from the study.***2.6 Instrument used*** Primary data were employed and were collected with the aid of a pretested semi-structured questionnaire. The questionnaire comprises three main sections in line the study objectives and designed using simple statements on Likert-type scale with five alternative responses having weighting scores of 0-4. Data collected were analyzed using descriptive and inferential statistics at 5% level of significance.***2.7 Validity and reliability of instrument***This was achieved by adapting model(s) from literature and seeking judgment of project supervisor and other experts (senior academicians) in the field. Cronbach alpha values (Appendix 1) were then computed to determine the internal consistency of the items in each section of the instrument with section on the knowledge, skill and competencies giving Cronbach alpha values.***2.8 Ethical approval***Ethical approval was obtained from the Institute of Public Health, ObafemiAwolowo University Ile-Ife, Osun State. No IPH/OAU/12/856 of 23rd October, 2017. This was attached to the protocol and submitted to Delta State ministry of Health ethics committee for approval.***2.9 Methods of Data Analysis*** The questionnaires were manually checked for accuracy of the data, and then analyzed using the Statistical Package for Social Sciences (SPSS) version 21.0 for Windows (SPSS, Chicago, Illinois). The analysis included frequencies of discrete variables. Responses of “strongly disagree”, “disagree”, “agree” and “strongly agree” with weighing scores of 1, 2, 3 and 4 respectively are taken to imply “nil”, “little”, “moderate” and “high” level of attitude respectively. The method employed in which all the respondents were categorized into four groups based on their responses to questions asked on their attitude to inventory management. Given that eighteen (18) questions were asked to assess attitude, the highest obtainable score is 72 (all 4s were “strongly agree” responses) and the lowest obtainable score is 0 (all 0s were neutral responses). Respondents were divided into four categories based on aggregate scores. Scores of 0 - 36, were taken to indicate negative attitude while aggregate scores of 37-72 were taken to imply positive attitude. Data obtained for this section were analysed using median statistic for the individual items. Inferential statistics of selected variables SPSS (v. 21) was used to run chi-square tests of association for the selected variables. ***2.10 Weighted average calculations***$$WA=\frac{fsd.xsd+fd.xd+fa.xa+fsa.xsa}{xsd+xd+xa+xsa}$$**3. RESULTS AND DISCUSSION:** Table 1 shows the demographic profile of the respondents indicating a significant proportion 94 (75.2%) of the community pharmacies were located in Warri and Asaba, the two largest cities in the State. The respondents were almost evenly split between the two sex categories with the male 70 (56.0%) being slightly more. The age distribution is almost bell-shaped with the 30-39 years range being the modal range. Majority 92 (73.6%) of the respondents possessed B.Pharm/B.Sc as their highest educational qualification; few 5(4.0%) of the respondents possessed M.Sc./M.Phil. and trivial portion 1 (0.8%), of the respondents possessed a Ph.D. degree. Almost a tenth of the respondents 11(8.8%) were fellows of the West African Post Graduate College of Pharmacists. Majority 101(80.8%) of the respondents were full-time resident pharmacists and majority 98(78.4%) of them were the superintendent pharmacist. Greater proportions 82 (65.6%) of the respondents were less than fifteen years in practice.Table 2 shows that the proportion 32 (25.6%) of those having website reported that they were hosted by internet hosting companies. Computer usage in community pharmacy practice was reported by large percentage (63.2%) of the respondents. Of these, majority (84.4%) used computer for inventory purposes. Table 3 presents the responses of the community pharmacists to items employed for measuring attitude to inventory management. Sixty three (50.4%) of the respondents strongly agreed Median (Mdn = 4) to only two of the items which are “IM practices enhances availability of stock” (WA=3.28) and “Inventory management (IM) activities should be a regular issue in CP” (WA=3.14).whereas respondents agreed (Mdn=3) to ten of the items and ‘disagree’ to four of the items. The mean of the weighted averages for the attitude items was computed as 2.46.(Approximately 2) which implies that the community pharmacists’ attitude to inventory management was negative.Table 4. Presents the effects of some of the demographic variables on the community pharmacists’ attitude to inventory management. The computed result show that the community pharmacists’ attitude to inventory management was significantly affected by only the sex of the respondents (x2 = 9.32, p = 0.01) and the male were more negative than the females. The actual sample size for this study is a little more than the calculated sample size and therefore could be said to be sufficient to make the results of this study generalizable to the population. From the sample size and pretest’s reliability coefficient, as well as the high Cronbach’s Alpha value for internal consistency obtained, this study satisfies the requirements for internal and external validity and therefore generalizable to the study population.Some pharmacists complained of busy schedule in the filling of questionnaire. This resulted in repeated visits to community pharmacies before collection of filled questionnaire is achieved. There is need for pharmacist to imbibe the culture to volunteer information freely [5].Community pharmacies are usually established to meet organizational goals. This strategy normally includes but not limited to the location, organizational operational processes and resources available. The location of pharmacies in a city is a reflection of the economic viability of the city. This was reported in the situation of the urban location of pharmacies in Ghana [5]. Warri is a petroleum industrial city of Delta State. It is not therefore surprising that Warri had the highest number of pharmacies in the State. The capital city of the State, Asaba is expected to attract large number of pharmacies. In this study, Asaba which is the capital city recorded the second highest number of pharmacies. It could be deduced that the economic value of oil rather than political content influenced Warri accounting attracing high numbers of pharmacies. While Asaba determines the polity of the State, Warri determines the economy. Moreover, it could be deduced from this study that the low number of pharmacies in Asaba is an indication of superintendent pharmacists are not resident in the city of practice (Register and Go syndrome “R and G”) a practice that have negatively impacted community pharmacy practice in Nigeria. The fact that there were more male community pharmacists than females is contrary to the reported ratio of 60:40 in favor of female pharmacists in Great Britain in 2011 in the number of pharmacists generally investigated [6]. It could be deduced from this study that the female pharmacists are not very interested in community pharmacy because of the management task required for the community pharmacy practice. Moreover, the male community pharmacists bear the financial burdens of the family and are more likely to be involved in community pharmacy which has more managerial demands.  The fact that majority of the community pharmacist had first degree as highest qualification possessed without fellowship of the Post Graduate College of Pharmacy is in agreement with the reviewed literature which stated that majority of community pharmacists lack additional educational qualifications [5]. The majority of community Pharmacists having no website implied poor knowledge and negative attitude to inventory management which is indicated in the low awareness of inventory management procedures the problem of inabilities to use inventory models [6].  The negative attitude to inventory management exhibited by community pharmacists is promoted by the time consumed by the implementation of inventory management process as in the case of community pharmacists’ involvement in public health activities [7]. The challenges of assess to essential medicine experienced in developing countries and the sub-Sahara Africa can be associated with the lacuna in inventory management resulting from negative attitude of community pharmacists. A positive attitude is expected to ensure adequate use of tools to enhance inventory management. Male community pharmacists being more positively than their female counterpart may be due to the former being more aggressive in their practices.**LIMITATIONS OF THE STUDY****4. CONCLUSION**   The study showed that attitude of community pharmacists in Delta State to inventory management was generally negative resulting into a sub-optimal practice. This will seriously promote barriers to the universal concept for global assess to essential medicine. The negative attitude can be resolved through adequate training of community pharmacists through self-development to position community pharmacists for a better practice provision. The mandatory continuing professional Development (MCPD) of the Pharmacy Council will go a long way in meeting this need if inventory management is fully focused on in the training programme modules scheduled. Individuals can also embark on training provided by numerous communication technologies training by IT consultants available. The presence of various inventory management soft wares could also be tools utilized to enabled inventory management in community pharmacies.**ACKNOWLEDMENT**We wish to acknowledge all community pharmacists in Delta State who willingly filled the questionnaires**DECLARATION OF INTEREST**The authors report no conflict of interest. The authors alone are responsible to the content and writing of this article.**CONTRIBUTION OF AUTHORS**Concept:-AEI.;Design:-AEI.;Supervision:-OJO.,WOE.,OKP,;Resources:-AEI.;Material:-AEI.;Data collection and or / processing:- AEI.,OJO.;Data Analysis-AEI.,OJO,;Literature search:-AEI.;Writing:-AEI.; Critical Review:- WOE.,OJO.,OKP.We declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will borne by the authors. **REFERENCES:**[1] Khembhavi, R.,Bhojwani, K., Bhojwani, D., Basekar, S. A Study to review drug inventory and pharmacy management with reference to I.V & injectables at a tertiary municipal care hospital with 1800 bedded hospital. *The pharma Innovation Journal*.2019; 8 (12): 342-350.[2] Panigrahi, R.R., Das, R.J., Jena, D., Tanty, G. Advances Inventory Management Practices and Its impact on Production Performance of manufacturing Industries. International Journal of Recent Technology and Engineering.2019; 8(4): 3875-3880.https//doi:10.35940/ijrte.D1006.1284S219.[3] Shiau, W C., Tasmin,R., Aziati, N. Rasi, R.Z.. Ismail, F.B. Yaw, P.L. Factors influencing the Effectiveness of Inventory Management in Manufacturing SMEs. *International Research and Innovative Summit,*2017; 226.Doi.10.1088/1757-899X/226/1/012024.[4] Ighorodje, A.E., Ola-Olurun, N.J.Assessing the level of community Pharmacists’ knowledge about Medicine Inventory Management in Delta State, Nigeria. Journal of Pharmacy and Biological Sciences.2019; 14(3): 14-20.DOI:10.9790/3008-1404032733. [5] Adje, D. U; Oli, A. N. Community Pharmacy in Warri. A survey of Practice Details, *Scholars Academic Journal of Pharmacy (SAJP).2013;* 2 (5): 391-397.[https://saspublisher.com/[6] Akindipe, O. S. (2014).A tool for Optimal use of Resources and overall efficiency in manufacturing SMEs. *Journal of Enterpreneurship management and innovation.* 201410(4): 93-113.https//doaj.org. [7] Osemene K P, Erhun W O,. Evaluation of community pharmacists’ involvement in public health activities in Nigeria.Braz.J. Pharm. Sci. Vol.54 no.3 Sao Paulo 2018.http//dx.doi.org/10.1590/s2175-97902018000317447. |
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Table 1: Demographic characteristics of community pharmacists in Delta State

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| --- | --- | --- | --- |
|  Variable |  Location | Frequency(%) | ~~Percentage~~ |
| Community pharmacist location | WarriAsabaUghelliSapeleEkuAgborKwaleOlehOzoroAbrakaTotal | 69 (55.20)25127422211125 | ~~55.20~~~~20.00~~~~9.60~~~~5.60~~~~3.20~~~~1.60~~~~1.60~~~~1.60~~~~0.80~~~~0.80~~~~100.00~~ |
| AgeYear of Practice | Less than 2020-2930-3940-4950-5960 and aboveTotal5 and Below6-1011-1516-20Above30Total | 32345202113125452215719125 | ~~2.40~~~~18.40~~~~36.00~~~~16.00~~~~16.80~~~~10.40~~~~100.00~~~~36.00~~~~12.60~~~~12.00~~~~5.60~~~~15.20~~~~100.00~~ |

 *CP = Community pharmacy*

Table 2: Availability and usage of computers and internet facility by community Pharmacists in Delta State

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | Category | Frequency | ~~Percentage~~ |
| Community pharmacy hasWebsiteCP’s Website’s host Computer usage in CP premisesComputer for inventory purposes | NoYesTotalCP itselfInternet hosting companyTotalYesNoTotalYesNoTotal | 93321251022327946125671279 | ~~74.40~~~~255.60~~~~100.00~~~~31.30~~~~68.70~~~~100.00~~~~63.20~~~~36.80~~~~100.00~~~~84.80~~~~15.20~~~~100.00~~ |

 CP= Community pharmacy

Table 3 Attitude of community pharmacists towards inventory

Management in Delta State.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables  |  | N(%) | SD(%) | D(%) | A(%) | SA(%) | Mdn | WA |
|  |  | 0 | 1 | 2 | 3 | 4 |  |  |
| Inventory management (IM) activities should be a regular issue in CP | f(%) | 20(16.0) | 0(0.0) | 0(0.0) | 27(21.6) | 78(62.4) | 4 | 3.14 |
| I see IM as a professionalresponsibilityI see IM as a managerialresponsibilityI consider training ininventory managementnecessary | f(%)f(%)f(%) | 21(17.0)24(19.2)16(12.8) | 0(0.0)1(0.8)0(0.0) | 4(3.2)5(4.0)0(0.0) | 51(40.8)49(39.2)60(48.0) | 49(39.2)46(36.8)49(39.2) | 333 | 2.862.743.01 |
| I have undergone training in IM before | f(%) | 39(31.2) | 4(3.2) | 21(16.8) | 30(24.0) | 31(24.8) | 3 | 2.08 |
| I will avail myself of opportunity in IM if provided\*Time constraint preventIM in communityPharmacy\*Complexity prevents IM In CP\*Energy source for  is a Barrier to IM \*Although IM isNecessarybut impossible\*IM practices consumetoo much time\*Poor businessperformance bares IMIM practices enhancesavailability of stockIM improves sales in a CPIM improves profit in CPIM facilitates customer’ssatisfaction in a CP  | f(%)f(%)f(%)f(%)f(%)f(%)f(%)f(%)f(%)f(%)f(%) | 7(5.6)24(19.2)37(29.6)15(12.8)26(20.8)24(19.2)20(16.0)9(7.2)22(17.6)25(20.0)18(14.4) | 0(0.0)4(3.2)10(8.0)8(6.4)13(10.0)5(4.0)16(10.0)0(0.0)3(2.4)3(2.4)0(0.0) | 1(0.8)40(32.0)29(23.2)14(11.2)44(35.2)38(30.4)35(28.0)1(0.8)11(8.8)2(1.6)4(3.2) | 70(56.0)42(33.6)33(26.4)54(43.2)33(26.4)37(29.6)35(28.0)52(41.6)51(40.8)51(40.8)60(48.0) | 47(37.6)15(12.0)16(12.8)34(27.2)9(9.2)21(16.8)19(15.2)63(50.4)38(30.4)44(35.0)43(34.4) | 32232234333 | 3.201.842.151.332.111.791.543.282.642.692.88 |
| Mean of weighted average (MWA)  |  |  |  |  |  |  | 2.46 |  |

*KEY:SA= Strongly Agree, A=Agree, N= Neutral, D= Disagree, SD= Strongly Disagree, WA= Weighted Average, Mdn= Median, f= frequency, %= percentage. CP= Community pharmacy, \*Scores for items denoting negative attitude reversed.*

Table 4. Effects of demographic characteristics on community pharmacists’

attitude towards inventory management in Delta State

|  | CP’s level of Attitude towards Inventory Management | Total | *x2 (df)* | *p-value* |
| --- | --- | --- | --- | --- |
| Neutral | Negative |  Positive |
| Sex | Female | 25(64.1) | 9(36.0) | 21(34.4) | 55(40.0) | 9.315 (2) | 0.009***\**** |
| Male | 14(35.9) | 16(64.0) | 40(65.6) | 70(56.0) |
|  | Total | 39(100) | 25(100) | 61(100) | 125(100) |  |  |

 **\***test is significant at p < 0.05