

Evaluation of Perception towards Capacity Building Programs and Workforce Skills in HIV/AIDS Supply Chain Management in Nigeria

Sunday O Aguora^{1*}, Azuka C Oparah², Edith C Okechukwu¹, Jeffrey S Soni²

¹*School of Public Health, Texila American University, Georgetown, Guyana, South America*

²*Department of Pharmacy and Pharmacy Practice, Faculty of Pharmacy, University of Benin, Benin City, Nigeria*

Abstract

This study on the evaluation of perception towards capacity building programs and workforce skills in HIV/AIDS supply chain management in Nigeria comprised of research objectives and questions. A structured self-completion pre-tested questionnaire (422) was administered to respondents, 396 were completed and returned, with a response rate of (93. 8%). The respondents (mostly managers, supervisors, specialists, advisors, and officers) were drawn from all levels of the HIV/AIDS supply chain sector and work, the majority from national and state levels, with significant experience and workable knowledge of supply chain management. The study revealed that perception towards capacity-building programs and workforce skills in supply chain management reflects reality and entails a good understanding of the HIV/AIDS supply chain management system, mean \pm standard deviation score (3.695 \pm 0.889 and 3.455 \pm 0.643) on a Likert scale of 1-5 (5-point scale) respectively. Reliability analysis was carried out, and Cronbach's alpha (α) showed the questionnaire reached acceptable reliability, $\alpha = 0.886$ (perception towards capacity building programs), and less reliable, $\alpha = 0.071$ (perception towards workforce skills) in HIV/AIDS supply chain management. Inferential analysis revealed that socio-demographic characteristics such as age, years of experience, and job title/rank influence the perception of workforce skills in supply chain management ($P < 0.05$). Federal and State Ministries of Health should ensure proper and effective supervision to prevent the workforce from having a wrong understanding of its capacity-building programs and workforce skills to avoid its harmful effect.

Keywords: HIV/AIDS, supply chain, perception, capacity building, workforce.

Introduction

Health workforce crises are a major challenge in Nigeria and sub-Saharan Africa [1, 2]. A previous study reported a critical shortage of trained HIV/AIDS workforce in Nigeria, which is a key bottleneck in ensuring the effective provision of service and improved health [3].

Accordingly, a functioning health system should include access to an adequate and well-performing health workforce as well as strategic policy frameworks to provide effective analysis, oversight, and governance [4]. Workforces are

the backbone of health systems, and their bottlenecks should be addressed to achieve the health-related SDGs [5]. In some instances, dedicated and competent supply chain personnel are lacking, and roles are performed by clinicians, pharmacists, pharmacy technicians, or nurses [6]. There seems to be no formal career path or incentive for supply chain professionals to undertake supply chain training [6].

Studies have emphasized the need for more attention to be given to workforce development in supply chain management [7]. Workforce capacity building is the key parameter towards

strengthening human resources and the knowledge, skills, and motivation of the health workforce determine health systems performance [8]. Lack of funds, inadequate welfare, and poor state of health facilities have been reported as major factors affecting workers' motivation, and there is a need to strategically adopt a broader range of motivational factors.

It has been suggested that one of the ways to achieve this is to introduce non-financial benefits to the health workforce [9], such as career development, special skills acquisition, and other varieties of workforce capacity improvement. The supply chain workforce plays a vital role in supply chain management, and improving their capacities would result in improved quality of services. There is a rising need to address capacity requirements for supply chain systems [10]. A previous study reported that investments in the supply chain workforce would be a worthwhile and effective strategy to improve the overall efficiency of the healthcare system and services [11]. Workforce knowledge is key for sustained progress in health supply chains and sustainable development [7]. Therefore, the present study seeks to evaluate the perception towards capacity-building programs and workforce skills in HIV/AIDS supply chain management in Nigeria.

Materials and Methods

Selection of the Area

The study is a cross-sectional observational design and was carried out in Abuja, the administrative and political center of Nigeria. The selection of Abuja as the study area is because it serves as the head office of the HIV/AIDS organizations from where they carry out their supply chain functions and other activities around the country.

Sample Size Determination

Cochran's formula for calculating representative sample size for an infinite population was used [12].

$$n_o = z^2pq/e^2$$

n_o = sample size.

$z = 1.96$ (critical value of desired confidence level).

$p = 0.5$ (assuming the maximum variability, which is equal to 50%).

$q = 1 - p$.

$e = 0.05$ ($\pm 5\%$ desired level of precision at 95% confidence level).

$$n_o = (1.96)^2(0.5)(0.5)/(0.05)^2$$

$$n_o = 384.16$$

To ensure a minimum response rate, 10% overage was added to the calculated sample size to accommodate possible dropout, non-response, incomplete and late responses.

Sampling Technique

A sample size of (422) comprised of the public sector, private sector, non-governmental organization, faith-based organization, and donor agency workforce involved in HIV/AIDS supply chain management without gender discrimination were randomly selected. The study included respondents with at least a bachelor's degree qualification and who have spent two or more years in their organization, agreed to participate in the study by signing the consent form, and did not take part in the pilot. Similarly, those who declined consent, had not spent up to two years in their respective organizations, or obtained at least a bachelor's degree qualification, were excluded from the study. More so, respondents that participated in the pilot test and supply chain workforce other than HIV/AIDS workforce were excluded as well.

Data Collection

The data collection instrument was a structured self-completion questionnaire. The questionnaire contained socio-demographic data (7 questions) including age, gender, years of experience, sector of engagement, job title, level of supply chain work, and highest educational qualification; 6 questions regarding perception towards knowledge; 4 questions regarding

perception towards capacity building programs. In total, the questionnaire had seventeen (17) questions and required 12 minutes to complete. The questionnaire's reliability was certified by Cronbach's alpha. Construct validity was checked by literature and empirical studies; content validity was tested by an expert mentor and pre-test.

The purpose of the study and questionnaire was explained to the respondents. Participation was voluntary, and respondents were free to withdraw from the study at any stage without consequences. Respondents signed the informed consent sheet. Respondent's identity was anonymous and confidential. Those who could not complete the questionnaire immediately were allowed to do so later and return within one week to avoid social response bias. Ethical approval was received from the National Health Research Ethics Committee of Nigeria (NHREC)- NHREC/01/01/2007-05/11/2020.

Data Analysis

Returned questionnaires were checked for accuracy, completeness, and consistency. Items in the questionnaire were responded to on a Likert 5-point scale, where 5 = strongly agree and 1 = strongly disagree for positive items and reverse score, so that the opposite is true (i.e., 1 = strongly agree and 5 = strongly disagree) for negative questions. Usable questionnaires were coded and entered in an excel template. The entries in the excel template were rechecked for accuracy before data analysis. Reliability and inferential analysis of data was carried out in Statistical Package for Social Sciences (SPSS) version 22.0 (SPSS Inc., Chicago, Illinois, USA).

Reliability analysis established whether the items on the questionnaire all reliably measure the same construct, and Cronbach's alpha ($\alpha > 0.7$), mean, standard deviation, and factor loading were calculated based on their scores. A low value of alpha could be due to a low number of questions, poor interrelatedness between items, or heterogeneous constructs [13]. The

value of alpha is increased if the items in a test are correlated to each other. Conversely, a high coefficient alpha does not always mean a high degree of internal consistency [13]. More so, alpha is affected by the length of the test. When the test length is too short, the alpha value may be reduced. Whereas when the alpha is too high, it may suggest that some items are redundant. They are testing the same question but in a different guise. A maximum alpha value of 0.9 is recommended [13].

Inferential statistics established the effect of the socio-demographic characteristics on the various domains investigated ($P < 0.05$). Descriptive statistics were also computed, and results were presented using tables (frequency count and percentages of responses in each category). Analysis of data also involved discussions with various in-country stakeholders for a more in-depth interpretation of perceptions.

Results and Discussion

The study had a response rate of 396 (93.8%). Table (1) socio-demographic data, table (2) percentage frequency of perception towards capacity building programs, table (3) reliability analysis of perception towards capacity building programs, table (4) percentage frequency of perception towards workforce skills in supply chain management, table (5) reliability analysis of perception towards workforce skills in supply chain management and table (6) effect of socio-demographic characteristics.

The socio-demographic profile showed that the respondents were drawn from all levels and sectors of healthcare and the majority from national and state levels that drive supply chain policy development and implementation.

Most of the respondents were in the rank of manager, supervisor, specialist, advisor, and officer, with ages of many between 30 and 59 years and years of experience in the HIV/AIDS supply chain between 4 and 15 years. The respondents have significant experience with a good understanding of the supply chain

management needs of the HIV/AIDS program [14].

The result of this study showed the following perception towards capacity-building programs; training alone is not enough to change practice, additional interventions are required to reinforce training as a behavioral change strategy, the effective capacity-building approach should be cost-effective and conducted with minimal disruption to service delivery and result in the needed practice change. It also revealed that more training would address the workforce capacity issues in the HIV/AIDS supply chain system. These findings agree with previous studies [15-17]. Previous studies reported that when training results to practice change, such change is usually unsustainable [16,18]. Nonetheless, another study reported that training is essential for an efficient workforce since there is a limited staff that is adequately trained, and some are employed to work in areas where they are deficient [19]. It has been observed that interventions that involved many stakeholders in the subject area have been effective in achieving sustainable practice change [18]. There has been an established relationship between training and employee performance, and effective capacity-building programs remain vital to improving supply chain systems [14, 20-25].

Furthermore, perception towards workforce skills in HIV/AIDS supply chain management revealed that a skilled workforce is an important part of a functional HIV/AIDS system, contributes to health system strengthening, and is vital for improving health outcomes and achieving health-related Sustainable Development Goals (SDGs). These findings are consistent with the reports of previous studies [8, 26-28]. More so, for supply chains to run effectively, it requires a dynamic workforce (which is the most important resource) at all levels who are motivated and possess the competencies (competent, consistent, competitive, effective, and efficient) required to fulfill vital supply chain tasks and deliver quality service [29]. Thus, the need to strengthen

workforce capacity in the areas they are lacking cannot be overemphasized [30].

Additional perception is that there is a shortage of manpower at the sub-national level, and the country's current poor economic situation may not allow for personnel recruitment in the immediate future. Also, there are still capacity gaps at the national and state levels, especially for quantification and the use of quantification results to inform the procurement of HIV/AIDS products within the government system. Similarly, supply chain workforce capacity gaps have been reported in low- and middle-income countries, with some having vacancy rates of about 71% for public sector posts that would require accredited pharmaceutical training [31], often due to a combination of insufficient training as well as 100-150% higher wages in the private sector as compared to the public sector [10]. There is a rising need to address human resources capacity requirements for supply chain systems [14, 10], and investments in the health supply chain personnel will be a worthwhile and effective strategy to improve the overall efficiency of health systems [11].

In continuance, the respondents hold the perception that an inadequate workforce is the most important problem of Nigeria's HIV/AIDS supply chain. The workforce crisis due to brain drain poses enormous challenges in meeting the manpower capacity needs in the healthcare sector [32] and may hinder progress toward country ownership and sustainable HIV/AIDS response. While there may be adequate capacity in the key supply chain functions [33], available human resource in the Nigerian public sector is inadequate and do not have the requisite supply chain skills and competencies [34]. It is well-known that the global problem of insufficient and adequately trained human resources for health is most critical in sub-Saharan Africa, with an alarming health workforce crisis [35].

The previous study reported workforce shortage as the most complex challenge of health systems strengthening [27]. Similarly, another

study recognized workforce shortage as a significant constraint in achieving the SDGs [36]. Human resource crisis has been reported in all areas of the health system and cadres, including the HIV/AIDS supply chain workforce in Nigeria [37]. Improving the capacity of workforces will ensure a reliable supply chain for essential HIV/AIDS commodities [38].

On a Likert 5-point scale, the mean score (3.695±0.889) for perceptions towards capacity building programs revealed that existing perceptions reflect the reality of capacity building programs, factor loading ranged from (0.740-0.918), which is good and entails all mean components are added to the summation, Cronbach's alpha, $\alpha=0.886$ showed the questionnaire is reliable. Similarly, the mean of mean and standard deviation score (3.455±0.643) for perceptions towards

workforce skills in supply chain management entails a good understanding of HIV/AIDS supply chain management, and factor loading ranged from (0.592-0.919), which is good, and entails all mean components are added to the summation, Cronbach's alpha, $\alpha=0.071$ showed the questionnaire is less reliable. Inferential analysis revealed that socio-demographic characteristics such as age, years of experience, and job title/rank influence the perception of workforce skills in supply chain management ($P<0.05$). Those in the rank of Managers and Directors with less than 8 years of experience and below the age of 40 years have a better perception towards workforce skills in HIV/AIDS supply chain management. However, sex and highest educational qualification have no effect on the perception of workforce skills in HIV/AIDS supply chain management.

Table 1. Socio-demographic Profile of Respondents

Socio-demographic Characteristics	Categorization	Number (%)
Age (Years)	30-49	328 (82.9)
	50-≥60	68 (17.1)
Gender	Female	121 (30.6)
	Male	275 (69.4)
Years of Experience (years)	0-7	138 (34.9)
	8-15	241 (60.8)
	≥16	17 (4.3)
Sector of Engagement	Public	103 (26.0)
	Private	52 (13.1)
	Faith-based organization	17 (4.3)
	NGO	207 (52.3)
	Donor Agency	17 (4.3)
Job Title/Rank	Director	68 (17.2)
	Associate/Assistant Director	34 (8.6)
	Manager/Supervisor	156 (39.4)
	Specialist/Advisor/Officer	138 (34.8)
Educational Qualification	Bachelor's/Postgraduate Diploma	133 (33.6)
	Fellowship/ Master's Degree	256 (64.6)
	Doctorate	7 (1.8)

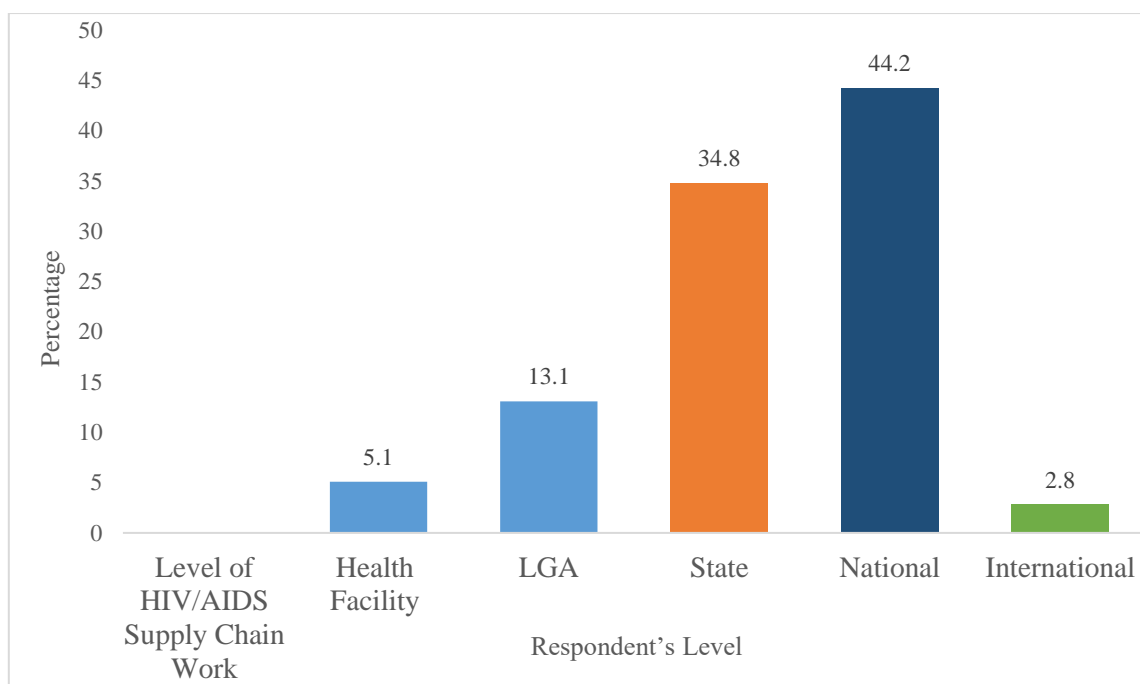


Figure 1. Respondent's Level of HIV/AIDS Supply Chain Work

Key: LGA- Local Government Area, Y-axis- Percentage Frequency of Respondents, X-axis- Respondents Level of Supply Chain Work

Table 2. Percentage Frequency of Perception towards Capacity Building Programs (N=396)

Items	Positive Responses
	Frequency N (%)
Effective capacity building approach should be cost-effective and conducted with minimal disruption to service delivery and result to the needed practice change	362 (91.4)
More training will address the workforce capacity issues in the HIV/AIDS supply chain	344 (86.9)
Trainings alone are not enough to change practice	362 (91.4)
Additional interventions are required to reinforce training as a behavioral change strategy	362 (91.4)

Positive responses = Agree/ Strongly Agree

Table 3. Reliability Analysis of Perception towards Capacity Building Programs (N=396)

Items	Mean	SD	Factor Loading	Cronbach's Alpha
Effective capacity building approach should be cost-effective and conducted with minimal disruption to service delivery and result to the needed practice change	4.477	0.8755	0.918	0.886
More training will address the workforce capacity issues in the HIV/AIDS supply chain	4.134	0.9439	0.787	-
Trainings alone are not enough to change practice	1.515	0.8757	0.911	-

Additional interventions are required to reinforce training as a behavioral change strategy	4.654	0.8621	0.740	-
Mean of mean \pm SD	3.695	0.8893		-

Table 4. Percentage Frequency of Perception towards Workforce Skills in HIV/AIDS Supply Chain Management (N=396)

Items	Positive Responses
	Frequency N (%)
Development of skilled workforce contributes to health systems strengthening	396 (100)
Supply chain workforce is an important part of functional HIV/AIDS system	396 (100)
Skilled supply chain workforce is vital for improving health outcomes and achieving health-related Sustainable Development Goals	396 (100)
There is shortage of manpower at the sub-national level and the country's current poor economic situation may not allow for personnel recruitment in the immediate future	344 (86.9)
There are still capacity gaps at the national and state levels especially for quantification and use of quantification results to inform procurement of HIV/AIDS products within Government system	379 (95.7)
Inadequate workforce is the most important problem of Nigeria HIV/AIDS supply chain	241 (60.9)

Positive responses = Agree/ strongly agree

Table 5. Reliability Analysis of Perception towards Workforce Skills in HIV/AIDS Supply Chain Management (N=396)

Items	Mean	SD	Factor Loading	Cronbach's Alpha
Development of skilled workforce contributes to health systems strengthening	4.742	0.4379	0.730	0.071
Supply chain workforce is an important part of functional HIV/AIDS system	4.871	0.3354	0.737	-
Skilled supply chain workforce is vital for improving health outcomes and achieving health-related Sustainable Development Goals	4.828	0.3776	0.772	-
There is shortage of manpower at the sub-national level and the country's current poor economic situation may not allow for personnel recruitment in the immediate future	1.823	0.9595	0.919	-
There are still capacity gaps at the national and state levels especially for quantification and use of quantification results to inform procurement of HIV/AIDS products within Government system	1.652	0.6970	0.660	-

Inadequate workforce is the most important problem of Nigeria HIV/AIDS supply chain	2.813	1.0508	0.592	-
Mean of mean± SD	3.455	0.643		-

Table 6. Effect of Socio-demographic Characteristics on Workforce Skills in HIV/AIDS Supply Chain Management (N=396)

Variables	N	Perception towards Workforce Skills
Age		
Below 40	121	4.934±1.1437
Above 40	275	3.452±0.6326
P-value	<0.0001	
Sex		
Male	275	3.459±0.6304
Female	121	3.445±0.6714
P-value	0.8419	
Years of experience		
Below 8	138	3.508±0.6892
Above 8	258	3.326±0.6104
P-value	0.0072	
Highest Education		
Bachelor's Degree	119	3.486±0.7041
Postgraduate	277	3.442±0.6108
p-value	0.5254	
Job Titles		
Managers/Directors	258	3.475±0.6392
Specialists/Advisors	138	3.318±0.6494
P-value	0.0246	

Conclusion

The study revealed that perception towards capacity building programs and workforce skills in HIV/AIDS supply chain management reflects the reality and understanding of Nigeria's HIV/AIDS supply chain system values and culture as it appears comparable among respondents.

Recommendations

Federal and State Ministries of Health should ensure proper and effective supervision to

prevent the workforce from having a wrong understanding of its capacity-building programs and workforce skills to avoid its harmful effect.

Conflicts of Interest

No conflicts of interest exist.

Acknowledgement

The authors are deeply indebted to the study participants for assisting with the information needed for the success of the study.

References

- [1] Dovlo, D. (2005). Wastage in the health workforce: some perspectives from African countries. *Hum. Resour. Health*, 3:6.
- [2] Adelaye, D., David, R. A., Olaogun, A. A., Auta, A., Adesokan, A., Gadanya, M., Opele, J. K., Owagbemi, O., and Iseolorunkanmi, A. (2017). Health workforce and governance: the crisis in Nigeria, *Human Resources for Health*, 15:32 DOI 10.1186/s12960-017-0205-4
- [3] Nwandu, A., Claassen, C. W., Riedel, D. J., Madubuko, T., Olutola, A., Onu, E., Onyekonwu, C., Nwobi, E. and Chukwuka, C. (2019). Effectiveness of a Comprehensive 4-Week Course in HIV Medicine for Postgraduate Doctors at the University of Nigeria: A Preservice Education Initiative, *Journal of the International Association of Providers of AIDS Care*, 18: 1-9.
- [4] WHO (2007). Everybody's business: Strengthening health systems to improve health outcomes: WHO's the framework for action, WHO Document Production Services, Geneva, Switzerland.
- [5] WHO. (2013). Working for Health Equity: The Role of Health Professionals. Geneva, Switzerland.
- [6] Brossette, V., Silve, B., Grall, A., Bardy, K., Pilz, K., Dicko, M., and Gerberg, L. (2011). Workforce Excellence in Health Supply Chain Management: *Literature Review*, 1-21.
- [7] Brown, A. and Sankaranarayanan, A. (2014). *Human Resource Development in Supply Chain Management of Health Commodities - A realist review of UN sources*, ISBN: 978-1-74088-410-5. 10.13140/RG.2.1.2365.1046.
- [8] WHO. (2000). *World Health Report 2000 Health systems: improving performance*. Geneva, Switzerland.
- [9] Akinyemi, O. and Atilola, O. (2013). Nigerian resident doctors on strike: insights from and policy implications of job satisfaction among resident doctors in a Nigerian teaching hospital. *Int J Health Plann Manage*, 28(1): e46-61.
- [10] Cometto, G., Babar, Z., Brown, A., Hedman, L. and Campbell, J. (2014). Health supply chain personnel: an integral part of the health workforce." *Journal of Pharmaceutical Policy and Practice*, 7(Suppl 1): I1.
- [11] Soucat A, and Scheffler R. (2013). *The Labor Market for Health Workers in Africa: New Look at the Crisis*. Washington, DC: World Bank.
- [12] Cochran, W.G. (1977). *Sampling Techniques*. 3rd Edition, John Wiley & Sons, New York.
- [13] Streiner, D. (2003). Starting at the beginning: an introduction to coefficient alpha and internal consistency. *Journal of personality assessment*, 80:99-103.
- [14] Aguora, S. O., Oparah, A. C., Okechukwu, E. C. and Jeffrey, S. S. (2021). Appraisal of Nature of Capacity Building Programs of HIV/AIDS Supply Chain Workforce in Nigeria. *Texila International Journal of Public Health*, 9 (1): 168-175.
- [15] Grimshaw, J. M., Thomas, R. E., MacLennan, G. S., Fraser, C., Ramsay, C. R., Vale, L. D., Whitty, P., Eccles, M. P., Matowe, L., Shirran, E., Wensing, M., Dijkstra, R. and Donaldson, C. (2004). Effectiveness and efficiency of guideline dissemination and implementation strategies. *Health Technol Assess*, 8(6): iii-iv, 1-72.
- [16] Obua, C., Ogwal-Okeng, J. W., Waako, P., Aupont, O., and Ross-Degnan, D. (2004). Impact of an educational intervention to improve prescribing by private physicians in Uganda. *East Afr Med J*, S17-24.
- [17] Kafle, K. K., Shrestha, N., Karkee, S. B., Prasad, R. R., Bhuju, G. B. and Das, P. L. (2005). Intervention studies on rational use of drugs in public and private sector in Nepal. *Nepal Med Coll J*, 7(1):47-50.
- [18] Laing, R., Hogerzeil, H. and Ross-Degnan, D. (2001). Ten recommendations to improve use of medicines in developing countries. *Health Policy Plan*, 16(1):13-20.
- [19] Ayuk, S. O., Agbor, O. N. and Tanyi, F. (2014). Assessment of human resources capacity of pharmaceutical warehouses in Cameroon, *Journal of Pharmaceutical Policy and Practice*, 7(Suppl 1): P9.
- [20] Tennant, C., Boonkrong, M. and Roberts, P. (2002). The design of a training program measurement model. *Journal of European Industrial Training*, 26(5):230-240.

- [21] Jagero, N. and Komba, H. V. (2012). Relationship between on-the-Job Training and Employee's Performance in Courier Companies in Dar es Salaam, Tanzania. *International Journal of Humanities and Social Science*, 2(22):114-120
- [22] Saeed, M. and Asghar, M. A. (2012). Examining the Relationship between Training, Motivation, and Employees Job Performance – The Moderating Role of Person Job Fit. *Journal of Basic and Applied Scientific Research*, 2(12):12177-12183.
- [23] Singh, R. and Mohanty, M. (2012). Impact of Training Practices on Employee Productivity: A Comparative Study. *Inter-science Management Review (IMR) ISSN: 2231-1513*, 2(2):87-92.
- [24] Awamley, N. (2013). Enhancing Employees Performance via Empowerment: A Field Survey. *Asian Journal of Business Management*, 5(3):313-319.
- [25] Elnaga1, A. and Imran, A. (2013). The Effect of Training on Employee Performance, *European Journal of Business and Management*, 5(4):137-147.
- [26] Leatherman, S., Ferris, T. G., Berwick, D., Omaswa, F. and Crisp, N. (2010). The role of quality improvement in strengthening health systems in developing countries. *International Journal of Quality Health Care*, 22(4):237–243.
- [27] Frenk, J. (2010). The Global Health System: Strengthening National Health Systems as the Next Step for Global Progress. *PLoS Med*, 7(1): e1000089. doi: 10.1371/journal.pmed.1000089.
- [28] Schneider, D., Evering-Watley, M., Walke, H., Bloland, P. B. (2011). Training the Global Public Health Workforce through Applied Epidemiology Training Programs: CDC's Experience, 1951–2011. *Public Health Rev*, 33:190–203.
- [29] Aguora, S. O., Oparah, A. C. and Okechukwu, E. C. (2020). Barriers and Reinforcers as Correlates of Effective and Efficient Capacity Building among HIV/AIDS Supply Chain Workforce in Nigeria. *Texila International Journal of Public Health*, 8 (3): 68-77.
- [30] Aguora, S. O., Oparah, A. C. and Okechukwu, E. C. (2020). Assessment of Knowledge of Essential Supply Chain Functions among HIV/AIDS Supply Chain Workforce in Nigeria. *Texila International Journal of Academic Research*, 7 (2): 95-102.
- [31] WHO. (2011). *Tackling the crisis of workforce shortages in the pharmaceutical sector*. Geneva, Switzerland.
- [32] Ike, S. O. (2007). The health workforce crisis: the brain drain scourge. *Niger J Med.*, 16:204–211.
- [33] Aguora, S. O., Oparah, A. C., Okechukwu, E. C. and Jeffrey, S. S. (2021). Assessment of Progress in Capacity Building of HIV/AIDS Supply Chain Workforce in Nigeria. *Texila International Journal of Public Health*, 9 (2): 186-195.
- [34] Itiola, A. J., and Agu, K. A. (2018). Country ownership and sustainability of Nigeria's HIV/AIDS Supply Chain System: qualitative perceptions of progress, challenges, and prospects. *Journal of Pharmaceutical Policy and Practice*, 11:21 <https://doi.org/10.1186/s40545-018-0148-8>.
- [35] Anywangwe, S. C. E. and Mtonga, C. (2007). Inequities in the global health workforce: the greatest impediment to health in sub-Saharan Africa. *Int J Environ Res Public Health*, 4:93-100.
- [36] Matovu, J. K. B., Rhoda, K., Wanyenze, Susan Mawemuko, Gakenia Wamuyu-Maina, William Bazeyo, Olico-Okui and David Serwadda. (2011). Building capacity for HIV/AIDS program leadership and management in Uganda through mentored Fellowships. *Glob Health Action*, 4:5815. doi:10.3402/gha.v4i0.5815.
- [37] Adekola, A. and Adelanwa, A. (2014). Developing the SCM workforce in Nigeria through contextualised preservice education and continued professional development. *Journal of Pharmaceutical Policy and Practice*, 7(Suppl 1): O22.
- [38] IOM (Institute of Medicine). (2013). *Evaluation of PEPFAR*. Washington, DC: The National Academies Press.