

Determinants of Pharmaceutical Logistics System Performance in Ethiopia Public Health Facilities: The Case of Non-Program Drugs in Harari Regional State

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Abstract

The purpose of this study was to determine the association and magnitude between determinant factors with performance of pharmaceuticals logistics system of non-program drugs (NPDs) among Public health facilities of Harari Regional State, where most supply problems were repeatedly reported. A census study of all 2 hospitals and 8 health centers in the selected area on determinants of pharmaceuticals logistics system practice. A structured questionnaire adapted from Logistics Indicator Assessment Tool (LIAT) was used to collect data with Yes and No formats. Findings from this study indicate that management ownership level of the system with β value 3.961, health facility staff skill level β value 2.109, and educational background of health facility staffs β value 1.213, have positive effect on pharmaceuticals logistics system performance of NPDs and the health facility service volume with β value -0.895, sign level 0.677, has no association with the performance. It also revealed that the three variables which have associations with the independent variable are the significant determinant factors of the pharmaceuticals logistics system of NPDs performance in the study area. The hypothesis proposed were accepted for Educational Background, Health Facility Staffs Skills and Management ownership of the system while the hypothesis proposed for health facility Service Volume is rejected as it have no significant effect on the performance of Pharmaceuticals Logistics of NPDs in the study area. The study contributes for logistics and supply chain management scholars that all Educational level, Staff skills and Management ownership have positive effect on the performance of pharmaceutical logistics of Non Program Drugs

Keywords: Non-Program Drugs, Logistic Management System of NPDs, Management Ownership, Health facility Staff skill, Health facility Service Volume

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Introduction

1.1. Background of the Study

The well-functioning pharmaceutical logistics system to deliver medicines, vaccines and other health products are critical to the provision of health services. Any good health system necessitates supply chains that can guarantee consistent availability of affordable, high-quality medicines, vaccines and health products at all health service delivery points (Kraiselburd S. and Yadav P. 2013). The accessibility to medicines is the fundamental right of every person and its effectiveness is substantially affected by the functioning of logistics system. In Ethiopia 90% of the population is dependent on the government to provide for their health care needs, mainly through primary health care facilities. The provision of complete health care necessitates the availability of safe, effective and affordable drugs and related supplies of the required quality. Ethiopian Ministry of Health, grants the pharmaceutical logistics system to perform under the concept “No Product, No Program” (FMOH, 2009). Pharmaceutical logistics system typically includes a number of activities such as selection, forecasting, procurement, inventory management, and serving customers that supports the six rights - the right goods in the right quantities and in the right condition delivered to the right place at the right time at the right cost (JSI, 2004).

With full skill and ownership pharmaceutical logistics system, products must be selected and identified. In the health sector, no health care system can afford to supply all drugs that are available on the market. Selection of medicines ensures that available financial resources are used wisely provide a limited list of drugs and dosage forms that are appropriate to the health problems of a country or community (MSH 2011). Provided that selection of medicines involves reviewing the prevalent health problems, identifying treatments of choice, choosing individual medicines and dosage forms, and deciding which medicines was be available at each level of a health care system which need all direction determinants.

In Ethiopia, the drug policy ensures that Non Program Drugs which are required for prevention, diagnosis, treatment, mitigation and rehabilitation of diseases affecting the majority of Ethiopian people have to be

identified and classified to respective levels of health service delivery (FMOH (1993a). The better performance pharmaceutical logistics of NPDs need to manage all components of logistics activities within Public Health Facilities including information system, storage, capacity building, tracer drugs availability, quality records and documentations, timely, wastage or expiry management and accurate reports. These all need better understanding from management, health facility staffs and community indeed. Even though unreserved support and reasonable budget allocation were provided by the government to improve the pharmaceuticals logistics management of Non program Drugs there still complaints on poor implementation of the pharmaceutical logistics system.

Generally, the pharmaceutical logistics system is accepted and guaranteed if both programs and non-program pharmaceuticals are managed accordingly. Thus, this study tried to envisage the association of determinants of the pharmaceutical logistics management system particularly that of Non-Program Drugs (NPDs) in Public Health Facilities of Harari Regional State; East Ethiopia.

1.2. Statement of the Problem

In 1977, world nations made a commitment to ensure availability of essential medicines in public health facilities by ensuring better pharmaceutical logistics system. However, as this commitment approaches its forty three years, stock out of essential medicines still remains a chronic problem to many developing countries in general and specifically in Africa (Oxfam GB 2012). Consequences of stock outs of essential medicines specifically Non Program Drugs in health facilities are frustrating to both patients and prescribers. To patients this may mean they have to resort to private medicines outlets, go to traditional healers or forgo treatment (Mariane J. 2012). As they represent a large portion of the costs in the healthcare system; Pharmaceuticals stock shortage and stock outs of NPDs are characteristics of poor pharmaceutical supply system that affects many developing countries as they suffer lack of financial resources, infrastructure, capacity and competencies.

In health facilities be it small health posts or big teaching hospital non program drugs form an essential and indispensable resource elements, therefore the supply of medicines needs to be managed efficiently in order to prevent all types of wastage including overstocking, pilferage and expiry (Godeliver A.B and Kagashe 2012). It is indicated in SOP of IPLS (2007, 2018) a well-designed and operated pharmaceutical logistics system due to contribution on generating quality data, helps to prevent shortage, over supply and expiry of pharmaceutical.

Study done in China 309th Hospital of PLA, Beijing indicates as logistics and supply chain management system for hospital pharmacy is an important element of HIS. But the HIS in common use lack support for drug logistics and supply chain service functionality and documentation management is done manually and also there was information gap between hospital and drug supplier because of traditional HIS (Kong H., Feng D., Fan W., Li Q. 2015).

Report of MSH on developing countries mostly at Africa; indicate that there are problems and gaps in Implementation pharmaceutical Logistics system in terms of skills, management and educational background (MSH 2016). Study done on developing countries in Africa like Zambia indicates that; health logistics and supply chain reform cannot be achieved or sustained without strong leadership in the health sector and a strong and skilled supply chain workforce (Kraiselburd S and Yadav P (2013). There were also management ownership gaps at eastern Part of Ethiopia (Daniel T, 2015).

In Ethiopia, studies on pharmaceutical logistics management system had been largely limited to program drugs such as contraceptives, anti-retroviral drugs, anti-tubercular drugs and anti-malarial drugs. And also those studies were only assessment of the system, but not analyzed the detail association and magnitude between determinant factors with performance of pharmaceutical logistics system. Bearing the aforementioned facts in mind, this study was conducted to analyze the association and magnitude between determinants factors with performance of pharmaceuticals logistics system of Non program Drugs (NPDs) among Public health facilities of Harari Regional State, East Ethiopia lining the following research questions:

- 1) How educational Background of health facility staffs affect successful performance of pharmaceuticals logistics System of Non Program Drugs?
- 2) How skills of health facility staffs did affect performance of logistics System of Non Program Drugs?
- 3) What is the effect of health facilities service volume on the successful performance of pharmaceuticals logistics System of Non Program Drugs?
- 4) What is the effect of management ownership of the system on successful performance of pharmaceuticals logistics System of Non Program Drugs?

1.3. Objective of the Study

The main objective of the study was to analyze the effect of factors influencing performance of pharmaceuticals logistics system of Non Program Drugs (NPDs) among Public health facilities.

The Specific Objectives are:

- 1) To investigate the effect of educational background of health facility staffs on successful performance

- of pharmaceuticals logistics System of Non Program Drugs
- 2) To analyze the association of skills of staffs of health facilities on the performance of logistics System of Non Program Drugs
 - 3) To analyze the effect of management ownership of the system on successful performance of pharmaceuticals logistics System of Non Program Drugs
 - 4) To investigate the effect of health facilities service volume on the successful performance of pharmaceuticals logistics System of Non Program Drugs.

2. Research Methodology

2.1. Research Design & Methodology

The population for this study is defined as all Public Hospitals and Health Centers in Harari Regional State and the study used both cross-sectional descriptive study and explanatory research designs with inferential statistics to analyze the association and magnitude of determinant factors on performance of the Pharmaceutical logistics management of NPDs in Public Health Facilities of Harari Regional State.

2.2. Method of Data Collection

2.2.1. Data Sources

In this study, the sources of data for the study were health facility records, facility management, pharmacy staffs and DU focal persons working in the selected health facilities. The primary data was collected by observation, physical inventory, assessment of facility records, and structured interviews. In addition, secondary data was collected from documents, formats and reports of Public Health Facilities of Integrated Pharmaceutical Logistics System. The researcher administered-structured questionnaire, document review and structured observation methods. Bin cards, receiving voucher (model 19), issuing vouchers (model 22) and ordering forms (IFRR, RRF) was used for all Logistics activities documentation of NPDs. Tracer Drugs for NPDs was selected from FMOH tracer drug list. Semi structure questionnaire set in Yes or No type of questions was used to collect primary data from the facilities.

2.2.2. Sampling Procedures and Sample Size

For Health facilities selection Census Method was used for Health Facility selection in the study. The sampling procedure for personnel's that questionnaire was distributed selected proportionally at Hospital and Health Centers. Harari Regional State has 2 Public Hospital and 8 Public Health Centers. The researcher took all facilities for the study. The individual sample from facilities had been selected using the following formula which was used by Krejcie & Morgan in 1970 article "Determining Sample Size for Research Activities" (*Educational and Psychological Measurement*, #30, pp. 607-610) and 84 health facility staffs (professionals) selected for the questionnaire which are proportional from each Health facility of the region.

$$n = \frac{X^2 * N * P * (1 - P)}{(ME^2 * (N - 1)) + (X^2 * P * (1 - P))}$$

Where:

N = sample size

X² = Chi-Square for the specified confidence level at 1 degree of freedom

N = Population Size

P = Population Proportion

ME = Desired Margin of Error (Expressed as Proportion)

2.3. Method of Data Analysis

2.3.1. Variables and Measurement

The study takes four determinant factors as independent variable and the performance of pharmaceutical logistics system as dependent variable. The four variables include in the study: Educational background, Health Facility Staffs Skill, Health facility Service Volume and Management ownership of the system. Binary Logistics Regressions was used for the analysis of data obtained from questionnaire survey of the logistics system and Narrative data analysis was used for qualitative data. The quantitative data was entered and analyzed using tools like SPSS version 22 and the result are presented in the form of tables and graphs. The findings were grouped according to key themes; and positions that emerged under each key theme were identified. Each of the different positions was summarized and the extent to which each position held by participants was assessed and the determinants were evaluated related to proposed hypothesis with their significance and odd ratios.

2.3.2. Reliability and Validity Measurement

To ensure validity of study questionnaires, a pilot study was conducted and Cronbach's Alpha was used to measure reliability. The questionnaire was checked for completeness & consistency by the principal investigator or during data collection. For better reliability of the data obtained, the principal investigator was supervising the data collection process and review completed questionnaires to clarify any data inconsistencies.

3. Results and Discussion

3.1. Introduction

The study had taken population of all Harari Regional State Public Health Facilities and sample staffs that were working on Pharmaceutical Logistics system of Non program Drugs directly and indirectly influencing the system implementation at Hospitals and Health Centers of the region. It takes determinants at Facility level and individual level with Management Ownership and Health facility service volume are compiled at health facility level and staff skill was compiled at Individual level for health facility staffs.

The surveyed item on determinants of performance of pharmaceuticals Logistics system of NPDs covered independent variable of Educational Background of staffs, were management system ownership (support), health facilities operational volume level and skills of staffs working in the pharmaceuticals storage. In the study total of 84 staffs working on pharmaceuticals logistics system directly and indirectly distributed questionnaire with responses rate of (100%). The response rate 100% was representative enough to reflect reliable result for the study. Steven (2004) agrees that respondent rate above 80% means less sampling bias and effective.

3.2. Descriptive Statistics of the Determinants

3.2.1. Educational Background

The educational background of respondents who managed the pharmaceuticals logistics system at Store and dispensing units were 23(29.49%) Pharmacists, 15(19.23%) were druggists (pharmacy technicians), 33(42.31%) were Nurses, 6(7.69%) were midwifery and 1(1.28%) was psychiatry professional. Their respective performances of Pharmaceuticals logistics system of NPDs increased if managed by pharmacy professionals (Pharmacist and Druggists) as 63.46% of them are in acceptable performance level. The majority of dispensing units rather than pharmacy dispensaries staffs were Nurses 33(82.5%) with almost half of them have no acceptable skill needed for pharmaceutical logistics system of NPDs management.

3.2.2: Health Facility Staff Skill Level

The study for skills of staffs needed to perform pharmaceutical logistics of NPDs response indicates that from responses of skill affects the performance; 85.7% were responded it affects the process of performance. The various skill measures found 59(70.24%) health facilities staffs were trained IPLS, only 23(27.38%) of them trained DSM, 32(38.09%) of them trained DTC, 22(57.89%) of pharmacy professionals were trained HCMIS FE (Dagu), 54(64.28%) of them trained APTS (Auditible Pharmaceutical Transaction Service) and all health facilities main pharmaceutical store is managed by appropriate professional which means either it is managed by pharmacist or druggist.

3.2.3: Health Facility Service Volume Level

From study facilities 3(30%) of health facilities patient load is below 50 which compared as low in Ethiopian HSTP, 4(40%) of them have patient load of 51-79 which is medium and 3 of them have patient load of above 80 which is high patient load. The study indicates 4(40%) high volume and 6(60%) low volume health facilities. hospitals better performed than health centers but there are high patient load health centers somewhat less than hospitals. From health facilities with high service volume and patient load 75% of them perform acceptable level of PLS performance of NPDs and facilities with low patient load have 50% of pharmaceutical logistics of NPDs performance.

All facilities at least implemented Integrated Pharmaceutical Logistics System (IPLS) in the facility store room. 7(70%) of health facilities implemented pharmaceutical logistics system in 80% of their dispensing units with 6(85.71%) of them perform acceptable and only 1(14.29%) of them perform unacceptable. 3(30%) of health facilities didn't implemented pharmaceutical logistics system in 80% of their dispensing units and none of them perform acceptable level and 3(100%) of them perform unacceptable performance.

3.2.4. Management Ownerships level of the system

[The management ownership level of the facilities measured on various aspects found 60.00% facilities with good and 40.00% with poor management ownership. 83.33% of health facilities with good management support performed acceptable level of pharmaceuticals pharmaceutical logistics of NPDs system and from the poor management ownership health facilities only 25% performed acceptable level of performance.

3.3. Binary Logistics Regression of the Determinants

The analysis model fitness test was performed by omnibus test of model coefficients to confirm the suitability and found analysis model containing all determinants. All predictors was statistically significant, indicated that the model was able to distinguish which components of determinants have effect on the performance. Hosmer and Lemeshow test also supported the model that limited the significance should be >0.05 . The model usefulness also supported by Cox and Snell R square and Nagelkerke R Square values with the amount of variation should be from 0 to 1, which was in the limit.

3.3.1. Educational Background

The magnitude of the association explained by the corresponding odd ratio of the table and the odd ratio of educational background of Pharmacist and druggist 11.905 and 7.006 indicated Pharmacist and Druggists were 12 and 7 times more likely to perform pharmaceutical logistics of NPDs system better than with those with other health professionals respectively. The value of educational background of pharmacist and druggist from the table tells us the Pharmacist and druggists variable increases by one unit the PLS performance of NPDs increases by 2.560 and 1.026 respectively when other components kept constant.

Table 1.1: Binary Regression of educational background profiles against PLS of NPDs

| | B | S.E. | Wald | Df | Sig. | Exp.(B) AOR | 95% C.I.for EXP(B) | |
|---------------------------|-------|-------|-------|----|------|----------------|--------------------|--------|
| | | | | | | | Lower | Upper |
| Step 1^a | 2.560 | .360 | 1.993 | 1 | .002 | 11.905 | 3.001 | 72.316 |
| Pharmacist | 1.026 | .109 | 1.806 | 1 | .005 | 7.006 | 2.620 | 53.381 |
| Druggist | .914 | .533 | .681 | 1 | .662 | .099 | .122 | 2.228 |
| Nurse | -.253 | .269 | 1.982 | 1 | .342 | .411 | .703 | 3.002 |
| Midwifery | 1.007 | 1.739 | .605 | 1 | .212 | .057 | | |
| Constant | | | | | | | | |

Source: researcher survey, 2020

3.3.2: Health Facility Staff Skill Level

The effect of the predictor components was tested by using Wald test of binary logistics regression indicated that IPLS training level with sign value of .001, DTC training level with sign value of .000 and HCMIS FE (Dagu) implementations with sig value of .005 have effect on health facility staff skill as their sig value is less than 0.05 and found it has significant effect on the performance. The association of components with the performance in the study explained using the generated logistics regression in table 4.12, the β value in the second column provided use in the equation to calculate the probability of a case falling in to a specific category and the sign of the value tells about the direction of the association to the performance, Hence β value for IPLS training level is 6.104, DTC training level with β value of 5.792 and HCMIS FE (Dagu) training level have β value of 3.037 for acceptable professional skill have positive association with performance.

The association of component predictors in the study determined by the confidence intervals value in the corresponding odd ratio of 4.784 for IPLS training, 11.089 for DTC training and 3.501 for Dagu training with value of 95% CI, the 95% CI is (4.459, 96.512) for IPLS training level, (4.122, 162.206) for DTC training and (2.872, 73.603) for Dagu training indicated there is positive association since their value does not contain number 1 in the range. Other components; DSM training and APTs training have no significant effect on health facility staff skill on pharmaceutical logistics system of NPDs.

Table 1.2: Binary Logistics Regression of Health Facility Staff Skill level

| | B | S.E. | Wald | Df | Sig. | Exp.(B) AOR | 95% C.I.for EXP(B) | |
|---------------------------|--------|-------|--------|----|------|----------------|--------------------|---------|
| | | | | | | | Lower | Upper |
| Step 1^a | 6.104 | .528 | 10.525 | 1 | .001 | 4.784 | 4.459 | 96.512 |
| IPLS | 4.243 | 1.568 | 2.022 | 1 | .105 | .803 | .069 | 1.302 |
| DSM | 5.792 | 1.502 | 7.801 | 1 | .000 | 11.089 | 4.122 | 162.206 |
| DTC | 3.037 | .573 | 1.852 | 1 | .001 | 3.501 | 2.827 | 73.603 |
| Dagu | 5.904 | .668 | 4.351 | 1 | .401 | 3.651 | .915 | 1.045 |
| APTS | -8.977 | 1.004 | 1.234 | 1 | .196 | .993 | | |
| Constant | | | | | | | | |

Source: researcher survey, 2020

3.3.3: Health Facility Service Volume Level

As shown in the table 4.16, the effect of the component or predictor variable tested by using Wald test of binary logistics regression, indicated that patient load had sig value $p=0.000$ which is less than 0.05 found be significant effect to the performance of health facility service with pharmaceutical logistics system of NPDs. With β value of 1.815 the association of component or predictor in the study also determined by the confidence intervals value in the corresponding odd ratio value of 95% CI, if there is number 1 in the 95% CI variable not have association and in this study the 95% CI for patient load is (3.500, 81.920) indicated there is association.

Table 1.3: Binary Logistics regression of Health Facility Service Volume Level

| | B | S.E. | Wald | Df | Sig. | Exp.(B) AOR | 95% C.I.for EXP(B) | |
|---------------------------|--------|-------|--------|----|------|----------------|--------------------|--------|
| | | | | | | | Lower | Upper |
| Step 1^a | 1.885 | .863 | 4.775 | 1 | .211 | 1.509 | .089 | 1.126 |
| Service Type | -.037 | .820 | .073 | 1 | .107 | 1.603 | .044 | .608 |
| Mode | -.418 | .950 | 1.556 | 1 | .390 | 1.027 | .107 | 1.219 |
| APTSI | -.221 | .269 | 10.931 | 1 | .064 | .486 | .442 | 3.323 |
| Patientload | 1.815 | 1.938 | .612 | 1 | .000 | 4.400 | 3.500 | 81.920 |
| Constant | -1.916 | 1.308 | 2.271 | 1 | .668 | .516 | | |

Source: researcher survey, 2020

3.3.4: Management Ownership level of the System

The association of component predictors in the study determined by the confidence intervals value in the corresponding odd ratio of 11.641 for Regular Feedback for Reports, 26.14 for Regular DTC meeting, 12.105 for BSC measurement of staff performance and 16.845 for BPR implementation with value of 95% CI, the 95% CI is (3.444, 79.003) for Regular Feedback for Reports, (4.906, 106.549) for Regular DTC meeting, (2.222, 90.000) for BSC measurement of staff performance and (2.341, 81.093) for BPR implementation indicated there is positive association for those components since their value does not contain number 1 in the range.

Other components; Budget for Pharmacy staff recruitment have no significant effect on health facility management ownership of pharmaceutical logistics system of Non Program Drugs. The suggested way by researcher for budget insignificance is due to staff with better skill will do and cover insufficient staff places work and most of the staffs are busy due serve their patients even though there is no budget or enough staff within the facility.

Table 1.4: Binary Regression of Management Ownership of the System

| | B | S.E. | Wald | Df | Sig. | Exp.(B) AOR | 95% C.I.for EXP(B) | |
|---------------------------|--------|-------|--------|----|------|----------------|--------------------|---------|
| | | | | | | | Lower | Upper |
| Step 1^a | 2.455 | 1.457 | 2.837 | 1 | .002 | 11.641 | 3.444 | 79.003 |
| Feedback | 1.739 | 1.403 | 1.536 | 1 | .215 | 5.690 | .098 | 1.004 |
| Budget | 3.263 | 1.499 | 4.741 | 1 | .000 | 26.140 | 4.906 | 106.549 |
| DTCmeeting | 2.494 | 1.558 | 2.561 | 1 | .001 | 12.105 | 2.220 | 90.000 |
| BSC | 2.824 | 1.461 | 3.739 | 1 | .004 | 16.845 | 2.341 | 82.093 |
| BPR | -6.611 | 1.988 | 11.057 | 1 | .001 | .001 | | |
| Constant | | | | | | | | |

Source: researcher survey, 2020

3.4: Binary Logistics Regression of Combined Determinants

The combined analysis model fitness test was performed to confirm the suitability and found the analysis model containing all predictors was statistically significant, $C^2(4, N=84) = 83.291, P < .001$, indicated that the model was able to distinguish between the facilities with the problem of pharmaceutical Logistics system of NPDs performance. Hosmer and Lemeshow test also supported the model which limited the significance should be > 0.05 found 0.502 for pharmaceutical logistics performance of NPDs. The model as a whole also explained between 55.3% (Cox and Snell R square) and 76.6% (Nagelkerke R square) of the variance in performance of Pharmaceutical logistics of NPDs system, and correctly classified 90.2% cases.

From the model equation the logit of the independent variables determined using the formula of $\ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$: the following equation was obtained from binary logistics regression.

$\beta_0 = -2.016$, indicates the constant intercepter (alpha);

$\beta_1 = 1.213$, indicates educational background of health facility staffs (X_1)

$\beta_2 = 2.109$, indicates skills level of health facility staffs (X_2)

$\beta_3 = -0.895$ is the health facilities service volume level (X_3)

$\beta_4 = 3.961$ is the management system ownership level (X_4)

Then the equation is as follows:

$$\ln\left(\frac{P}{1-P}\right) = -2.016 + 1.213X_2 + 2.109X_2 - 0.895X_1 + 3.961X_4 + e$$

The effect of determinants on Pharmaceutical Logistics of Non Program Drugs at Harari regional State significance as stated in table 4.24 it shows that EDUC (Educational Background), HFSS (Health Facility Staff Skill) and MOTS (Management Ownership of the System) have positive association with the performance the logistics system of NPDs while HFSV (Health Facility Service Volume) have no significant effect on

performance of the system.

Table 1.5: Binary Logistics Regression of the combined determinants

| | B | S.E. | Wald | Df | Sig. | Exp.(B) AOR | 95% C.I.for EXP(B) | |
|---------------------------|--------|-------|--------|----|------|----------------|--------------------|---------|
| | | | | | | | Lower | Upper |
| Step 1^a | 1.213 | 0.721 | 2.867 | 1 | .003 | 2.111 | 2.203 | 66.34 |
| EDUC | 2.109 | 1.797 | 7.864 | 1 | .005 | 8.241 | 3.703 | 81.336 |
| HFSS | -0.895 | 1.735 | .378 | 1 | .677 | .469 | .061 | 1.302 |
| HFSV | 3.961 | .530 | 10.850 | 1 | .001 | 19.373 | 3.765 | 116.271 |
| MOTS | -2.016 | .487 | 4.015 | 1 | .000 | .079 | | |
| Constant | | | | | | | | |

Source: researcher survey, 2020

The effect of the EDUC (Educational Background) predictor variable tested by using Wald test of binary logistics regression, indicated that Educational Background had sig value $p=0.003$ which is less than 0.05 found be significant effect to the performance of pharmaceuticals logistics system of NPDs, the 95% confidence interval value (2.203, 66.34), also didn't contained the value 1 which indicated that there is an association, the β value 1.213 indicated that there is positive association with the performance, the odd ratio of this factor is 2.111 more than one explained that the strength of the association with the performance of pharmaceuticals pharmaceutical logistics of NPDs system is strong. The value of β_1 from the model equation which is 1.213 also indicated that when the variable of educational background increase by one unit, the performance of pharmaceutical logistics system of NPDs increase by 1.213 showed positive association and strong magnitude.

The effect of the HFSS (Health Facility Staff Skill) predictor variable tested by using Wald test of binary logistics regression, indicated that health facility staff skill had sig value $p=0.005$ which is less than 0.05 found be significant effect to the performance of pharmaceuticals logistics system of NPDs, the 95% confidence interval value (3.703, 81.336), also contained the value 1 which indicated that there is an association and the hypothesis is accepted, the β value 2.109 indicated that there is positive association with the performance, the odd ratio of this factor is 8.241 more than one explained that the strength of the association with the performance of pharmaceuticals pharmaceutical logistics of NPDs system is strong and have positive association. The value of β_2 from the model equation which is 2.109 also indicated that when the variable of health facility staff skill increase by one unit, the performance of pharmaceutical logistics system of NPDs increase by 2.109 showed positive association and strong magnitude.

The effect of the HFSV (Health Facility Service Volume) predictor variable tested by using Wald test of binary logistics regression indicated that health facility service volume had no significant effect.

The effect of the MOTS (Management Ownership of The System) predictor variable tested by using Wald test of binary logistics regression, indicated that Management Ownership of the System had sig value $p=0.001$ which is less than 0.05 found be significant effect to the performance of pharmaceuticals logistics system of NPDs, the 95% confidence interval value (3.765, 116.271), also contained the value 1 which indicated that there is an association and the hypothesis is accepted. The β value 3.961 indicated that there is positive association with the performance, the odd ratio of this factor is 19.373 more than one explained that the strength of the association with the performance of pharmaceuticals pharmaceutical logistics of NPDs system is very strong and have positive association. The value of β_4 from the model equation which is 3.961 also indicated that when the variable of health facility staff skill increase by one unit, the performance of pharmaceutical logistics system of NPDs increase by 3.961 shows positive association and strong magnitude.

3.5. Validation of the Proposed Hypothesis

The four hypotheses proposed to determine the effect of determinants on pharmaceutical logistics system of NPDs association and magnitudes were used determinants: EDUC (Educational Background), HFSS (Health Facility Staff Skill), HFSV (Health facility Service Volume) and MOTS (Management Ownership of the system).

Table 1.6: Summary of hypothesis testing validation

| Proposed Hypothesis | Confidence Level $P < 0.05$ | Decision based on finding |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------|
| Ha1: There is significant effect of educational background of health facility staffs on the performance of pharmaceuticals logistics system of NPDs in public health facilities of Harari Regional State. | .003 | Accepted |
| Ha2: There is significant effect of staff's skill of health facility on the performance of pharmaceuticals logistics system of NPDs in public health facilities of Harari Regional State. | .005 | Accepted |

| Proposed Hypothesis | Confidence Level P < 0.05 | Decision based on finding |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------------------------------|
| Ha3: There is significant effect of health facilities service volume on the performance of pharmaceuticals logistics system of NPDs in public health facilities of Harari Regional State. | .677 | Rejected |
| Ha4: There is significant effect of management ownership of the system on the performance of pharmaceuticals logistics system of NPDs in public health facilities of Harari Regional State. | .001 | Accepted |

Source: researcher survey, 2020

4. Conclusion

The study covers the four determinants detail association and magnitude on performance of Pharmaceutical logistics system of NPDs. The study found that the educational background, management ownership of the system and the health facility staffs skill on the system implementation were above average which resulted the performance of the effectiveness of pharmaceuticals logistics system of NPDs in the study area be encouraging, but the performance of the pharmaceutical logistic system of NPDs was not the effect of the health service volume level.

Even though management ownership of the system is encouraging it needs orientation on the system, better commitment of managements to support the system and need more attention on pharmaceutical supplies issues. The major factors on management support and inability to get the required professionals and poor skill transfer mechanism were the factors for professional's unacceptable skill. Based on the findings the investigator draws that the poor performance of the pharmaceuticals logistics system of NPDs is strongly linked to management ownership of the system and health facility staffs skill, so that there is a strong and positive association of management ownership on the system and the performance of pharmaceuticals logistics system of NPDs. The study indicates Professional whom was learnt logistics and drug supply management during their educational course (Pharmacist and Druggist) performs better.

There is also a positive association of the skill of health facility staffs working in the Pharmaceuticals storage, Pharmaceuticals Dispensary and other Dispensing Units (DUs) in the Hospital and Health Center which are receiving pharmaceuticals from main pharmaceutical storage room and uses for patient care and follow up, but no positive association of the Health Facility service volume (high or Low) with the pharmaceuticals logistics system of NPDS performance observed. Management ownership and the skill of professionals are the two important determinant factors on performance of pharmaceuticals logistics system of NPDs performance in the study area.

In the study area the overall health facilities pharmaceuticals logistics system of NPDs performance is moderate with 60% of health facilities performed with acceptable level of performance with the mean performance of 61.91%. The management ownership of health facilities is below expectations with 60% meet the acceptable level and most of the professionals working and managing pharmaceutical logistics system activities do not have the necessary updated trainings in pharmaceuticals supply chain and post-employment training on the pharmaceutical logistics system as a general not only for NPDs. Lastly most of the staffs in all health facilities have more information regarding logistics of program drugs such as HIV, TB, Malaria, Family Planning (FP) and Maternal, Neonatal and Child Health (MNCH) products but their few general information of Non-Program Drugs (NPDs) in the study area.

5. Recommendation

The study on determinants of Pharmaceutical logistics system of NPDs findings indicates that the practice of the current pharmaceuticals logistics system is much more influenced by the management ownership of the system and the skill of healthcare professionals working in the system and with the system with moderate influence of educational background. Therefore: It is better if the key management bodies (Senior Management team or Boards in Hospitals) and health center management team, woreda health offices and regional health Bureau pharmaceutical logistics and supply chain coordinating departments orient or train on the system implementation and follow up, appropriate monitoring and evaluation of the pharmaceuticals logistics system of NPDs in addition to program drugs

It essential if the supply chain management in general practiced in all level, health facility management follow-up on the system and regular evaluation should be strengthening, establishment and strengthening of technical committee (DTC) to support the system implementation in facility level should be commenced, regularly reviewing, supporting, monitoring and providing of feedbacks jointly with all stake holders practice in the Regional health Bureau can bring better result.

The regional state government work on improving the challenge on availability of pharmacy technicians and managements of the district to employ adequate qualified personnel involved in pharmaceutical supply chain activities as a general will also leads to better performance.

Ensuring the pharmaceutical logistics of NPDs handled by competent and well trained professionals and relevant training to improve the logistics system functions and supply chain management activities coordinated regularly with need based and delivered to the appropriate professional is positive for the district and health facility managements.

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