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Determinants of the Performance of Logistic Management Information System in the Ethiopian Health Service Delivery Points

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Abstract

The aim of this study was to examine the determinants of the performance of logistics management information system in the health service delivery points under Jimma Zone, Oromia, Ethiopia. The research intended to address particularly the determinants of facility related factors, personal related factors, managerial related factors, information related and supply chain related factors. The study employed both descriptive and explanatory research methods. This research design facilitates a better understanding of the determinants of LMIS performance. To accomplish the study, the researcher applied a mixed approach. The primary sources of data were collected by interview and questionnaire from respondents of health service delivery points in Jimma zone. The secondary data was gathered from recorded documents, LMIS data sheet, RRF, bin card, stock card. The study targeted all (141) health service delivery points in the Jimma zone. Semi-structured questionnaires were developed and distributed to the entire service delivery points in Jimma zone. The collected data were analyzed using SPSS statistical software. The results from the regression analysis indicated that personnel related factors, managerial related factors, information related factors, and supply chain related factors have significantly and positively determine the LMIS performance explaining 72.8% of variations in dataset. The study concluded that for LMIS performance, particularly function to achieve its effectiveness facility related factors failed to significantly predict the LMIS performance with lack of automated data recording tools (electronic bin cards) and poor system implementation at the delivery points. The study recommends Jimma zone health facilities should look at the issue of facility infrastructures for system implementation and decision making in ensuring LMIS standards meet the users' needs.

Keywords: Logistic management information system; LMIS data; LMIS data collection tools

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Introduction

A supply chain is dynamic and involves the constant flow of information, product, and funds between different stages; therefore, supply chain management integrates supply and demand management [1-6]. Logistics is part of supply chain management that plans, implements, and controls the efficient, effective forward and reverses flow and storage of goods, services, and related information between the point of origin and the point of consumption to meet customers' requirements [7-22].

A supply chain is an organization of facilities and activities that support flow of products and services accompanied with two directional flow of information. It is basically a set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouses, and stores so that a product is produced and distributed at the right quantities, to the right locations, and at the right time, in order to maximize customer services with individual & country wide affordable cost [14].

Logistics management aims to achieve the six rights of the right goods, in the right quantities, in the right condition, delivered to the right place at the right time for the right cost [22,23]. Logistics management information system (LMIS) is a system of records and reports whether paper based or electronic [13]. Logistics management is a part of supply chain management that plans, implements, and controls the efficient & effective forward and reverse flow and storage of goods, services, and related information between the suppliers of supplier and ultimate user [8].

Logistics services i.e. warehousing & transportation, infrastructures and the information system are the glistening components of logistics system. Logistics system integrates all its

activities and coordinates them with the supply chain functions like manufacturing, marketing & finance and information technology. It can be kept effective and integrated well with help of accurate and timely information from service delivery point [1]. Logistics management information system is used to institutionalize a framework for the optimal management of health commodities at all levels and provide critical information to logistics managers to improve the health commodities supply chain [9].

Information of all activities at each level is paramount for coordination and integration of supply chain/logistics activities throughout all the elements of supply chain [13]. Logistics management information system across all the supply chain levels; increases program impact i.e., maintains commodity availability and improves service seeking of the community, enhances quality of care, -increasing professional satisfaction and morale that, motivated staff are more likely to deliver a higher quality of service, improves efficiency and effectiveness. It reduces losses due to overstock, waste, expiry, damage, pilferage, and inefficiency and maximizes the potential for cost recovery [24].

Logistics activities as the operational component of supply chain management, including quantification, procurement, inventory management, transportation and fleet management, and data collection and reporting [23]. These components are in a continuous cycle where all components are interconnected, so decisions made at a single point directly impact other parts of the cycle. Supply chain management includes the logistics activities plus the coordination and collaboration of staff, levels, and related functions [17]. Therefore, logistics records are the primary framework for every logistics system. The records are intended to capture critical logistics data at each level of the health system. The data captured on logistics records are then combined to form logistics reports, which are used for crucial decision making about resupply quantities, forecasting, and procurement decisions. Thus, this study will be attempted to identify the Determinants of Logistics Management Information System Performance: The Case of Service Delivery Points under Jimma Zone, Oromia, Ethiopia.

Statement of the problem

Supply chain is a system of organizations, people, technology, activities, information and resources involved in moving a product or service from supplier to customer. Supply related information sharing between the buyer and vendor in the system have been considered as useful to reduce bullwhip effect, lead time and total cost and increase total supply chain profit to improve organizational performance [11]. In a perspective of a dynamic supply chain, a regular improvement of organizational performance has become a serious issue for most suppliers, manufacturers and the related retailers to gain and sustain attractiveness. Monitoring and improvement of performance of a supply chain has become an increasingly difficult task [10].

Logistics plays a major role in ensuring that drugs and equipment are sourced and delivered within a reasonable time in order to serve its purpose. A number of studies [3] have been carried out in different developing countries of the world on logistics management information system (LMIS) and its effects on essential medicines availabilities. According to [5] a study done in Malawi indicated the LMIS reporting rate of the health facilities was 58% and it was associated with poor data quality, calculation errors as well as incorrect recording of data on stock-keeping records. In addition, the study revealed other constraints of limited human resource, insufficient storage space, and weak information technology in the study area [25].

An assessment of logistics management system done in Ghana evidenced that lack of appropriate skill, training gaps on the system & failing to deploy the required quantity of pharmacy professionals and lack of appropriate essential data from the service center resulted in serious consequence on the rational use of medicine, quantification and availability of medicine at health facilities of developing countries [3]. These are the common causes of low patient compliance, client dissatisfaction and decrease confidence of health workers that further causes staff attrition and then service interruption [17]. Another study done in Ethiopia, Malawi and Rwanda highlighted that low data availability, low essential logistics data reporting rate and the knowledge and capacity of the health workers was low as well as only 10% of the workers reported they were trained [4].

A study done in Ethiopia showed that utilization of the logistics recording cards usage was limited to regional health bureaus & hospitals and majority of stock-keeping records were not updated [10]. The study also revealed only 58.8% of pharmacy professionals were trained in LMIS, 37.2% of the facilities had stock outs at the time of visit for at least one laboratory commodity, only 50% of the assessed hospitals and 54% of health centers were currently using stock-keeping records for all HIV/AIDS and laboratory commodities [10]. Therefore, it is imperative to have a well-designed and practical LMIS if the whole drug supply management cycle is to function effectively and efficiently. Cognizant of this fact the government of Ethiopia has designed and implemented a pharmaceutical logistics management information system in 2009 [24].

Inadequate and inappropriate logistics management information system (LMIS) affects pharmaceutical supply decision which also results in a quantification, procurement and distribution not based on real demand that causes either resource wastage due to drug expiration or stock out of essential medicines [22]. Most of the previous studies were identified the LMIS performance status. This study could fill the gap through identifying the determinants of the LMIS performance. And also the study fills the methodological gap through explanatory study with considering the factors of facility related factors, personal related factors and managerial related factors.

Use of LMIS data for decision making will have a positive reinforcing effect to improving data quality [7]. The Ethiopian Federal ministry of health has developed a national monitoring and evaluation framework to be implemented as each level. As per the framework, all health facilities and administrative health units should provide a due attention to the quality of data generated at each level of the health system [15]. To ensure the quality of data, each facility should underline data management

system, build an internal data quality assurance mechanism, and make sure that data quality assurance processes are in place [20].

Although different studies [1] focused on the challenges, data quality parameters and problems associated with availability and utilization of LMIS, less attention has been paid to its influence on supplier, customer, inter-organizational relationship and organizational performance. To the best knowledge of the researcher, little information is available on the determinants of LMIS performance as well as no studies were focused on the determinants of it in the study area. Therefore, this study intended to provide insight to the determinants of logistics management information system (LMIS). To conceptualize the study variables, the following research questions and objectives will guide the study.

Research questions

The following research questions guide the study:

- To what extent does facility related factor influence the performance of LMIS in health service delivery points in Jimma zone?
- To what extent does a personal related factor influence the performance of LMIS in health service delivery points in Jimma zone?
- To what extent does a managerial related factor influence the performance of LMIS in health service delivery points in Jimma zone?
- How do the information related factors influence the performance of LMIS in health service delivery points in Jimma zone?
- To what extent does a supply chain related factor influence the performance of LMIS in health service delivery points in Jimma zone?

Objective of the Study

General objective

The main objective of the study is to examine the determinants of the performance of logistics management information system in the health service delivery points under Jimma Zone, Oromia, Ethiopia.

Specific objectives

Specifically, the study aims;

- To investigate the effect of facility related factors on the performance of LMIS at health service delivery points of Jimma zone.
- To identify the effect of personal related factors on the performance of LMIS at health service delivery points of Jimma zone.
- To determine the effect of managerial related factors on the performance of LMIS at health service delivery points of Jimma zone.
- To determine the effect of information related factors on the performance of LMIS at health service delivery points of Jimma zone.
- To investigate the effect of supply chain related factors on the performance of LMIS at health service delivery points of Jimma zone.

Literature Review

Empirical review

An assessment done on contraceptive logistics management system in Nigeria which conducted a descriptive study indicated the percentage of staff trained on LMIS was 84% however the reporting rate and bin card accuracy were 12.3% & 57% respectively [16].

A report on systems for improved access to pharmaceuticals and services (SIAPS) program: resources a continuous supervision and mentoring of health workers has mandatory effect on improvement of the LMIS performance. Evaluation assessment on improvement of health facilities LMIS performances done in Cameroon & Burundi by SIAPS highlighted that remarkable changes on LMIS performances had been obtained. Training and supportive supervision of staff improved the reporting rate from 35% to 62% and the logistics report data accuracy from 13% to 75% in Cameroon and timeliness of LMIS report was maintained at over 90% in Burundi [20].

A research conducted in Kenya public health facilities on factors influencing logistics management information system, which was conducted on descriptive design identified the work experience of the staffs working on LMIS that the workers having service year <= 5years were 50% and those having >5years were 47.5% however the study did not consider the work experience as influencing factor of LMIS performance [2].

A study done in Addis Ababa on Assessment of Pharmaceutical Logistics System in Health Centers of Addis Ababa, Ethiopia based cross-sectional descriptive study design, showed that all the assessed health centers were using bin card and IFRR in store; The supervision frequency was 79% quarterly, 17% was bimonthly and 4% monthly and all the store keepers had got training. The qualitative result disclosed that training, availability of required facilities, supervision and staff commitment were facilitators of LMIS [18].

Another study done in the same area on storage condition of laboratory commodities in public hospital medical stores with descriptive study design revealed that 91% of the store managers were degree holders and only 45.5% of them had received training on store management [15].

A study conducted on assessment of the IPLS/LMIS of HIV/AIDS& TB laboratory commodities in Addis Ababa, A descriptive cross-sectional study was used. Thirty-three public health facilities were selected using stratified sampling method. Information on selected indicators for IPLS implementation was collected using semi structured questionnaire customized from USAID|DELIVER's LIAT and LSAT. Data for selected indicators was collected through document review, physical inventory, and in-depth interview with key informants report and request forms (RRF), IFRR and bin

cards were reported available in 92.6% of facilities while intra-facility report & request formats (IFRR) were reported by 84.6% of facilities. Utilization of bin cards was higher at health centers (76.5%) compared to hospitals (33.3%). Management support for IPLS implementation was significantly associated with improved data quality [21].

A study done in East Showa zone, Oromia regional state, Ethiopia on inventory management performance of essential drugs with a descriptive and explanatory study showed that only 28.5% of bin cards was accurate while the availability of record & report formats (bin card, RRF, and IFRR) was 100% but that of automated format (computer) was only 20% [12].

A study on integrated pharmaceutical logistics system implementation in selected health facilities of Ethiopia: The case of four Wollega zones, cross sectional quantitative and qualitative studies was conducted in selected health facilities from February 15 to March 15, 2015. This study aimed to assess progress and challenges towards the implementation of IPLS in selected health facilities in the Wollega zones of Oromia region, western Ethiopia. The calculated sample size was 31 health facilities calculated for a 20% margin of error and 90% confidence interval. The Logistics Indicator Assessment Tool (LIAT) was used to collect the information from selected health facilities; while an in-depth interview was held with chief pharmacist from the selected facility to collect qualitative data. Correlation and multiple linear regression analysis were used at significance of 90%CI for independent variables and dependent variables. The findings showed that, the average availability of bin cards for the selected products was 83.9% for hospital, 75.4% for health center, and 70.6% for health post. On average, hospitals had an updated bin card for 43.8% of the product while health center and health post had an updated bin card for 32.9% and 32% of their products, respectively. On average the exact accuracy of request and resupply form (RRF) data for hospital and health center were 45.6% and 37.1%, respectively. IPLS implementation was related with health facility stores infrastructures (40.1%), Logistics Management Information System/LMIS (32.2%), stock availability and status (31.9%), storage condition (17.7%), and order fill rate (14.1%). Multivariable regression revealed the LMIS (std. β=2.539, p=0.022), stock status (std. β=0.848, p=0.049) and availability of tracer medicines (std. β=0.212, p=0.013) were positively associated with IPLS implementation [26].

Facilities based cross sectional study design in 30 HFs (9 hospitals and 21 health centers) at HFs of Southern Nations, Nationalities and People's Regional State (SNNPRS), Ethiopia and five pharmaceuticals fund and supply agencies (PFSAs) was conducted. The HFs were selected randomly. Semi-structured questionnaires and observation checklists with logistic indicators assessment tools (LIATs) were used to collect data for HIV/AIDS related services from November 2016 to May 2017. The findings showed that, among HFs; 17 (56.7%) of them sent RRF on time, 8 (26.7%) sent out of reporting time and 5 (16.7%) did not send at all. Five (62.5%) hospitals and 10 (58.8%) HCs sent complete RRF **(Figure 1).** RRF data quality showed significant association with IPLS training and HCMIS use (P<0.05). Quality and IPLS training or use of HCMIS was positive moderate correlation (r=0.449, P<0.013 and 0.472, P<0.008) respectively. Among assessed HFs, 23 (76.7%) properly filled their bin cards with stock on hand and reported RRFs. Pearson chi squared test evidenced that inventory accuracy rate showed significant association with store man dissatisfaction (P<0.008) and supportive supervision (P<0.035) [27].

A facility-based descriptive cross-sectional study supplemented with a qualitative method was conducted in selected public health facilities of East Gojjam zone from March 21 to April 23, 2018. Twenty health facilities (15 health centers and 5 hospitals) were included in the study, and we selected randomly health facilities in proportion to their size. Data collectors were collected quantitative data through a physical count and document review. Key informants were selected using the purposive sampling technique and one of the researchers conducted an in-depth interview. The result showed that the availability and utilization of bin card records and report and requisition reports were 20 (100%). Out of 640 bin card records reviewed, 408 (63.8%) had accurate data ranged from 40 to 100% at hospitals and 20 to 86.6% at health centers. Likewise, 1089 (61.9%) of report and requisition form reports data were accurate ranged from 31 to 100% that 49 (89%) were complete and 51 (92.7%) were timely

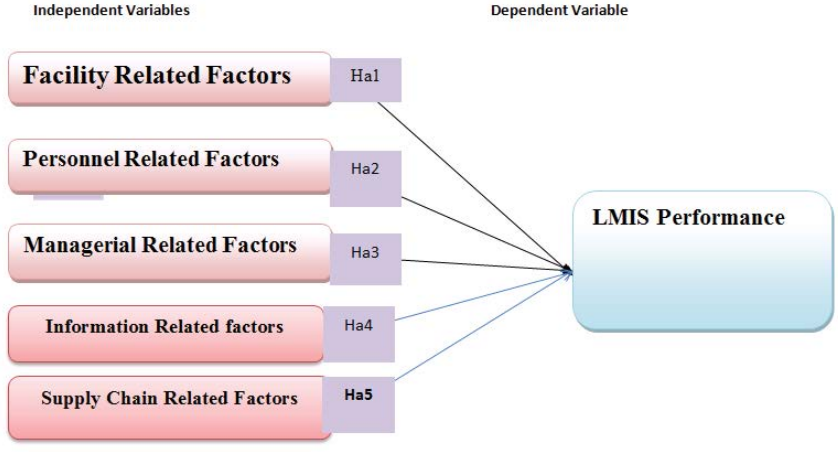

Figure 1 Adopted from [17].

reported with health facilities reporting rate of 55 (91.7%). Poor facility setup and lack of organizational supports identified as principal bottlenecks of logistics management information system performance [28].

The study was conducted to assess the logistics management information system performances of program drugs in the selected public health facilities of East Wollega zone, Oromia regional state, Western Ethiopia. The result showed that a total of 23 public health facilities (3 hospitals and 20 health centers) were included in the study of which 39% of them had automated recording system but no any installed electronic reporting system was found. With respect to data quality and facility reporting rates, about 65% & 79% of the facilities had accurate report and request format and bin-cards respectively while the facilities reporting rate was 97%. Around sixty nine percent of the facilities had timely reported and 97.8% of the reports were found to be complete. Inadequate human resource, lack of automated record format and lack of commitment from the health workers and the management group were identified as the major challenges of the logistics management information system management [29].

The result from similar study showed that from a total of 62 pharmacy staffs in the study facilities, 47(75.8%) were trained on IPLS/LMIS of which 22(46.8%) of them were working on LMIS. Based on the type of facility, 18(66.7) of the hospitals' and 29(82.9%) of health centers' pharmacy staffs have received the training. Of the trained pharmacy staffs, 3(16.7%) of hospitals' and 19(65.5%) of health centers' staffs were currently working on LMIS management. A total of 62 pharmacy staffs of different professions were working under pharmacy units of the selected facilities, of which 23(37%) (3 in Hs &20 in HCs) of them were stoke keepers engaged in managing LMIS. Most of these stoke keepers were with work experience of greater than 5 years 17(74%) and pharmacy in profession 22(95.7%). 12(52.2%) of them were degree holders and the remaining were diploma holders. From the interview results, 22(95.7%) (3Hs & 19HCs) of the selected facilities reported they had been receiving supportive supervision, of which 11(50%) was quarterly and 9(41%) semiannually. 2(66.7%) of the hospitals had got supervision quarterly and 9(47.4%) and 8(42.1%) of the health centers had been supervised quarterly and semi-annually respectively. The no facilities had received feedbacks from higher level on the LMIS activities was 10(43.5%) (3Hs & 7HCs), of which 6(60%) received semi-annually and 4(40%) quarterly [29].

Conceptual framework

The independent variables are facility related factors, personal factors, and managerial related factors. The relationship between determinants and LMIS performance will explain both quantitatively and descriptively while the interferences of factors tested according to the hypothesis.

Research Methods

Research approach, design, and period

This study aimed to examine the determinants of pharmaceutical LMIS performance in the service delivery points. To reach the purpose, the researcher used mainly quantitative research approach complemented by a qualitative method. In the quantitative approach, the collected data will be analyzed in a quantitative way. The qualitative method was employed to support the finding of the quantitative study.

The study employed an explanatory research design with descriptive method as well. This research design facilitates a better understanding of the determinants of LMIS performance. Since the study intended to examine the determinants of pharmaceutical LMIS performance in the service delivery points, it was employed both a descriptive and explanatory research design. This research design facilitates a better understanding of the determinants of LMIS performance. A cross-sectional data was collected from the respondents between 20/8/13 and 10/9/13.

Source of data

Both primary and secondary sources of data were used in this study. The primary sources of data were collected by semi structured interviews and self-administered questionnaires from health service delivery points in the Jimma zone. The secondary data was gathered from stock-keeping records (Report and requisition form, and bin card).

Target population and sampling design

The target population for this study was health service delivery points situated in the Jimma zone, Oromia region. Totally, there are 141 health service delivery points (health centers and hospitals) in the zone. Since this figure is manageable and easy to address, the study used census method.

Method of data collection and data collection instruments

The methods of collecting primary and secondary data differ since primary data are to be originally collected, while in case of secondary data the nature of data collection work is merely that of compilation [30].

A semi-structured questionnaire was adapted from different literatures. A self-administered five-point Likert scale agreement type questions (1 = 'strongly disagree' to 5 = 'strongly agree') was employed to collect the required data. Moreover, a covering letter was attached to each questionnaire to introduce the research objectivity and confidentiality to the study participants. The questionnaire-based data collections had an advantage of low cost, free from the bias of the interviewer and respondents have got enough time to respond well to the questions.

The qualitative data was collected through interview guide questions which were prepared to ask the management bodies on the study areas. The interview method of collecting data involves presentation of oral-verbal stimuli and reply in terms of oral-verbal responses. This method can be used through personal interviews.

The secondary data which the study was focused on published secondary data and LMIS data tracking tools at the facilities. These data was collected through the review analysis of the published secondary data sources which were journals, articles,

books and electronics media. The data was collected with regard to the subject matter which this study was focused on.

Methods of data analysis and data analysis tool

The data obtained through the questionnaire was edited for their completeness, consistency, and other errors before data entry. The collected data was coded and entered in the SPSS version 20. The collected data was analyzed using descriptive and inferential statistical analysis techniques. Descriptive statistics such as frequencies, means, and standard deviations was employed to analyze the data. Inferential statistics techniques such as Pearson's product-moment correlation were conducted to determine the relationship between the study variables. Multivariate assumptions tests (Linearity, normality, and multicollinearity) were tested. Multivariate linear regression was regressed to predict Pharmaceuticals LMIS performance with its determinants in the study (test the hypotheses). P-values less than five percent ($p<0.05$) were used to indicate the statistical significance. The qualitative data will be analyzed using content analysis and it was presented using words to support the quantitative data.

Reliability and validity of data

Reliability refers to the degree of consistency with which an instrument measures the attribute it is designed to measure [30]. The most popular method of testing for internal consistency is Cronbach's alpha. The Cronbach's α was used in this study to indicate the internal consistency of the scale.

Cronbach alpha was computed and compared with the threshold value of 0.7 as proposed by [19]. Higher than the critical value of was obtained for each construct as shown in **Table 1** indicating the internal consistency of the scale as excellent. An overall value of 95.7% was obtained which implied that high level of internal consistency of research instruments.

The idea of validity to the questionnaire refers to the steps that were taken by the researcher to ensure clarity, wording and ordering of the questions. Content validity of the study was ensured by making sure the questionnaire provides adequate coverage of the topic under study. To achieve face validity, questions were based on information gathered during the literature review and the objective of the study. It was formulated in simple language for clarity and easy understanding. The questionnaire also got comments from advisors and other researchers.

Table 1 Cronbach's alpha reliability test.

S/No	Variables	N of items	Cronbach's Alpha
1	Facility Related Factors	5	.846
2	Personnel Related Factors	5	.830
3	Managerial Related Factors	7	.952
4	Information Related Factors	4	.988
5	Supply Chain Related Factors	4	.878
6	LMIS Performance	5	.928
Overall		**30**	**.957**

Source: Survey Data, 2021

Model Specification, Description & Coding of Study Variables

Multiple regression models

The effect of independent variables over dependent variable in the study area is explained using the following multiple regression model or equation. It was used to predict the value of certain variable based on the other variable. This study was used cross sectional data. The intended impact on LMIS performance by factors of facility related factor, personnel related factor and managerial related factors will be considered using the following model:

$Y= \alpha + \beta 1x1 + \beta 2x2 + ...\beta kxk+e$

Where, x is independent variable (Factors)

Y is dependent variable (LMIS performance)

α is constant value

β is coefficient of independent variable to be estimated.

$Y (LMISP) = \alpha+ß1FF+ß2PF+ß3MF+\beta 4IF+\beta 5SCF+e$

Where:-

LMISP= Logistic Management Information System performance

FF= Facility related factors

PF= Personnel related factors

MF= Managerial related factors

IF= Information related factors

SCF= Supply chain related factors and e = model error term

Analysis and Discussions

Descriptive findings

As exhibited in the above **Table 2**, an overall mean and standard deviation of (M=3.32, SD=1.448) was recorded indicating that facility related factor was rated as in neutral range. This could suggest the facility system infrastructure could not able to support for the advancement of LMIS operation on the study area indicated as it was weak.

The mean values for managerial related factors (M=3.48, SD=1.38), personnel related factors (M=3.55, SD=1.256), information related factors (M=3.50, SD=1.533), supply chain related factors (M=3.46, 1.533), and LMIS performance (M=3.49, SD=1.405) were obtained in the study. This implies the means

Table 2 Descriptive Statistics Determinant factors of LMIS performance.

Study variables	N	Mean	Std. Deviation
Facility Related Factors	102	3.32	1.448
Personnel Related Factors	102	3.55	1.256
Managerial Related Factors	102	3.48	1.385
Information Related Factors	102	3.50	1.533
Supply Chain Related Factors	102	3.46	1.533
LMIS Performance	102	3.49	1.405

Source: Survey data, 2021

values were found within the range of 3.41- 5.00 which mean that the above variables were agreed on average number of the study participants in the study area. This implies that the LMIS performance convinced with the study participants with its current status.

Logistics management information system (LMIS) is a system of records and reports whether paper based or electronic used to aggregate, analyze, validate, and display data (from all levels of the logistics system) that can be used to make logistics decisions and manage supply chain. Findings regarding the performance of LMIS in this study presented as shown below;

According the information on **Table 3**, the mean analysis for LMIS performance shows that the facility achieved full RRF reporting period in the last 6 months, dispensing units fill IFRR for their continues re-supply and LMIS data kept and documented in a well manner were accepted practices LMIS with the study population since their mean values were found within the range of 3.41-4.2 which mean that the above variables were agreed on average number of the study participants in the study area. These could indicate that the facility could able to generate reliable LMIS data, ensures the facility continues resupply with reporting regularly according to the reporting schedule and the data kept in well manner to retrieve at the required data. These were could have a potential contribution on the performance of the LMIS at the service delivery points. On the other side, the facilities to centralize their focus on attaining report quality and following the practice and update of bin card for all items regularly.

Inferential Findings

Correlation analysis

The sign of the correlation coefficient determines whether the correlation is positive or negative. The magnitude of the correlation coefficient (r) determines the strength of the correlation. The strength of correlation can be described by using the absolute value of r as (Thompson et al, 2017) if '0.00 <r<0.39' = weak, '0.40<r<0.59'=moderate, and '0.60<r<1.0'=strong". Pearson correlation coefficients were determined with the objective to obtain information about the relationships between the dependent and independent variables as presented in **Table 4** below.

Table 4 indicates that there is a significant positive relationship between all five determinants of the performance of LMIS and

Table 3 Descriptive Statistics of LMIS performance.

Items in the LMIS Performance	N	Mean	Std. Dev.
The facility achieved full RRF reporting period in the last 6 months	102	3.43	1.324
The report attained acceptable data quality	102	2.84	1.412
Bin card practiced and regularly updated for all items regularly	102	2.85	1.458
Dispensing units fill IFRR for their continues re-supply	102	3.51	1.225
LMIS data kept and documented in a well manner	102	3.48	1.299

Source: Survey data, 2021

Table 4 Correlation results of the LMIS performance and its determinants.

Variables	FRF	PRF	MRF	IRF	SCRF	LMISP
Facility Related Factors (FRF)	1					
Personnel Related Factors (PRF)	.631**	1				
	.000					
Managerial Related Factors (MRF)	.626**	.765**	1			
	.000	.000				
Information Related Factors (IRF)	.659**	.663**	.800**	1		
	.000	.000	.000			
Supply Chain Related Factors (SCRF)	.583**	.709**	.770**	.807**	1	
	.000	.000	.000	.000		
LMIS Performance (LMISP)	.528**	.648**	.774**	.827**	.767**	1
	.000	.000	.000	.000	.000	

**Correlation is significant at the 0.01 level (2-tailed).

LMIS performance. The strongest correlation is obtained between personnel related factors (r=.648), managerial related factors (r=.774), information related factors (r=.827), and supply chain related factors (r=.767) with LMIS performance; followed by the moderate correlation between facility related factors (r=.528) with the outcome variable. The bivariate correlation analysis suggested that higher level of determinants of performance of the LMIS were associated with higher level of LMIS performance.

Regression analysis

Model summary: The model summary provides R (the multiple correlation coefficient), R-square (the coefficient of determination), and adjusted R square values. R value of 0.851 indicates very strong correlation between LMIS performance and the five independent variables that indicated a good level of prediction. The "R Square" represents the proportion of variance in the dependent variable that can be explained by the independent variables. As shown from the **Table 5** below, R^2 value of .728 indicates that 72.8% of the variation in the LMIS performance of health service delivery points can be explained by the predictors (independent variables included in the model); while the 27.2% remain unexplained (not addressed in this study).

Analysis of variance (ANOVA): Result of goodness of fit test: The F-ratio generated in the ANOVA table **(Table 6)** tests whether the overall regression model is a good fit for the data. The table shows that the independent variables statistically predict the dependent variable significantly at F (5,96) = 51.470, p<.001.

Regression coefficients: The standardized coefficients are useful to know which of the different independent variables is more important. They are used in comparison of impact of any independent variable on the dependent variable. As indicated in regression coefficients table **(Table 7),** information related factor had the highest standardized coefficient (.586) followed by supply chain related factors (.289). This revealed that information related factor had the highest relative effect (58.6%) on the LMIS performance than any determinant factors. As it can be seen from the regression coefficient table, the predictor variables of personnel related factors, managerial related factors, information related factors, and supply chain related factors are statistically significant in predicting LMIS performance as all their p-values are

Table 5 Model summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.853[a]	.728	.714	.751
a. Predictors: (Constant), Supply Chain Related Factors, Facility Related Factors, Personnel Related Factors, Information Related Factors, Managerial Related Factors				
b. Dependent Variable: LMIS Performance				

Table 6 ANOVA a model fit.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	145.292	5	29.058	51.470	.000[b]
	Residual	54.199	96	.565		
	Total	199.490	101			
a. Dependent Variable: LMIS Performance						
b. Predictors: (Constant), Supply Chain Related Factors, Facility Related Factors, Personnel Related Factors, Information Related Factors, Managerial Related Factors						

Table 7 Regression coefficients.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta, β		
(Constant)	.711	.241		2.949	.004
Facility Related Factors	.108	.080	.104	1.35	.075
Personnel Related Factors	.280	.109	.271	2.569	.007
Managerial Related Factors	.275	.104	.277	2.651	.008
Information Related Factors	.537	.093	.586	5.757	.000
Supply Chain Related Factors	.281	.123	.289	2.284	.006

Table 8 Hypothesis test Summary.

S/No	Alternative Hypotheses	p-value	Correlation coefficient	tested value
1	Ha1: Facility related factors have significant positive effect on the LMIS performance in the study area	.075	.528	Fail to accept
2	Ha2: Personal related factors have significant positive effect on the LMIS performance in the study area	.007	.648	Accepted
3	Ho3: Managerial related factors have significant positive effect on the LMIS performance in the study area	.008	.774	Accepted
4	H04: Information related factors have significant positive effect on the LMIS performance in the study area	.000	.827	Accepted
5	Ho5: SC related factors have significant positive effect on the LMIS performance in the study area	.006	.767	Accepted
Source: Survey data, 2021				

less than alpha level of 0.05 ($p<0.05$). However, the p-value for facility related factors (0.075) is greater than alpha level of 0.05, which indicates that the variable is not statistically significant indicating that changes in the variable is not associated with changes in the dependent variable (LMIS performance).

Unstandardized coefficients: Denote the change in the dependent variable with a unit change in the independent variable. But they are not comparable in terms of impact on the dependent variable. As stated in chapter three, the study used the following multiple regression model to establish the statistical significance of the independent variables on the dependent variable.

$Y = \beta 0 + \beta 1X1 + \beta 2X\ 2 + \beta 3X3 + \beta 4X\ 4 + \beta 5X5 + \varepsilon$

Where,

Y=LMIS performance

X1=Facility related factors; X2=Personnel related factors; X3=Managerial related factors; X4=Information related factors; X5 = Supply chain related factors

In the model, β0 = Constant, β1 to β6 = Regression coefficients represent the mean change in the dependent variable for one unit of change in the independent variable while holding other independent variables in the model constant and ε=Error term which captures the unexplained variation in the model.

The regression coefficients are shown in the above **Table 8**. The intercept, 0.771, is representing the estimated average value of LMIS performance of health service delivery points when personal related factors, facility related factors, management

related factors, information related factors and supply chain related factors is zero.

Conclusions and Recommendations

Conclusions

The study revealed that for LMIS performance function to achieve its effectiveness facility related factors failed to significantly predict the LMIS performance with lack of automated data recording tools (electronic bin cards) and poor system implementation at the delivery points. However, Personnel related factors have revealed positive and significant prediction of LMIS performance. The study indicated that it's necessary to recruit, train and develop personnel with the capacity and motivation to do better job, thus the study concluded that the skills possessed by staff had a positive effect on the efficiency of LMIS operation among employees of Jimma zone health service delivery points.

The study also revealed that there was a significant positive prediction of managerial related factors, information related factors and supply chain related factors on LMIS performance of Jimma zone health service delivery points. However, to these aspects lack of managerial supervision and feedback provision, poor update of bin card records and also implementation of stock card record with a pharmacy head were the identified tasks which needs a great concern at the facilities.

Generally, factors like training of staffs, availability of automated record systems, supportive supervision and feedback report had a considerable contribution for the RRF data accuracy and quality. Therefore, health service delivery points of Jimma zone and partners should increase their frequency of supportive supervision and also provide constructive feedback to the facilities. The facilities, especially the health centers together with the concerned stakeholders, should strengthen their LMIS by implementing automated recording systems.

Recommendations

Based on the findings of the study the researcher could able to forward the following recommendations as a possible solutions to fill the identified gaps on this study in order to be intervene by the concerned bodies.

There is need for organizations to ensure accuracy of records provide the management with the information which is used to ensure accountability thus the study established that Proper documentation ensures that pharmaceuticals products availability meets required demand and that accuracy of inventory records is necessary to provide satisfactory customer.

The study identified positive effect of staff proficiency on LMIS practice of health facilities at Jimma zone. Thus, the facilities could keep recruiting, training and developing personnel with the capacity and motivation to do better job that the skills possessed by staff had a positive effect on the efficiency of inventory management practice of the facilities.

In order to improve the data quality and accuracy of the LMIS records health service delivery points of Jimma zone and partners should increase their frequency of supportive supervision and also provide constructive feedback to the facilities. The facilities, especially the health centers together with the concerned stakeholders, should strengthen their LMIS by implementing automated recording systems.

The study also recommends Jimma zone health facilities should look at the issue of facility infrastructures for system implementation and decision making in ensuring LMIS standards meet the users' needs.

Suggestion for Further Study

The study suggests that future researchers should do the same using other factors not only the information system, personnel, managerial, facility related and supply chain related factors but from other corresponding factors that influence the effectiveness of the logistic management information systems.

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