

Human resources for public health supply chain management in Ethiopia: Competency mapping and training needs

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Abstract

Background: A health care system is judged to be functioning well, among others, when seen in light of the access it provides to affordable and quality medicines and supplies. This largely depends on the availability of competent health supply workforce. Health supply workers can become competent if and when they get the education and training needed to develop the skills required to work effectively in health supply chain in the country.

Objective: The objective of this needs assessment was to identify the need for health supply chain management training and map competencies of personnel working at different levels of the health supply chain in Ethiopia.

Methods: Initially, national sensitization and consensus building workshop on human resources for public health supply chain management was held in Addis Ababa. At the workshop, gaps were identified and required competencies suggested. This was followed by qualitative and quantitative surveys.

Findings: The sensitive nature of public health supply seems to be increasingly recognized by policy makers and other stakeholders. This is encouraging. However, the situation of the supply chain in the country is not as effective as desired. Issues related to human resources were among the major factors that have contributed to the problem of the supply chain. Scarcity and lack of expertise in supply chain management were noted in the finding as the challenges often talked about. In addition, there are issues related to poor commitment and lack of motivation on the part of the personnel currently involved in the management of the supply chain. Overall, shortages in some aspects and gaps in others characterize the supply chain management. Evidence of emergency purchases has also been observed.

Largely, participants had either entry level or midlevel competencies in the five major supply chain domains. The majority (i.e., 89.5%) of the participants of the study showed interest to advance their career in health supply chain management. MSc level training was one way they said this could be achieved.

Conclusion: Despite various efforts made to implement initiatives that increase the supply chain efficiency over the past years, marked inadequacies still characterize the system. For example, stocks are observed to run out of essential medicines and supplies. Lack of timeliness in delivery of items is also reported. Multiple factors were identified to be held responsible for the reported deficiencies of the performances of the supply chain system. Human resources related challenges are identified as key contributing factors to the problems. Examples reported include workers' lack of competencies required for the work. One reason claimed to have underlined this lack of competencies is the inadequate level of the training given to the workers.

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Introduction

Health systems can achieve national and international goals only when effective health supply chain management is in place (1). Supply chain management encompasses activities like planning and managing, locating sources and procuring logistics, among others. It also includes coordination and collaboration with channel partners such as suppliers, intermediaries, third party service providers, and customers (2).

Human resource is a cross cutting issue that touches all aspects of functions in the supply chain management (3). That is perhaps why attention is needed to be drawn in this study to the current status of human resources involved in the public health supply chain management in the country.

Strengthening the provision of essential medicines, medical supplies and equipment is the priority of health and drug policies of Ethiopia (4, 5). In this regard, several measures have already been taken to build strong pharmaceutical and medical supplies system (6). This has significantly contributed to improving maternal and child health. Child mortality and poor health due to HIV/AIDS, TB and malaria can be mentioned as other aspects of achievements in the supply system (7).

Despite these improvements, however, affordable health commodities are still scarce. Lack of appropriate transportation mechanisms as well as poor stock management is another aspect of challenges facing the supply system. There is also a shortage of adequately trained health personnel in the supply system. An

irrational use of medicines also reported to be among the prevailing challenges in the supply system (7).

An increase in health service coverage, the efforts being made to introduce social insurance system and expansion of Pharmaceutical Fund and Supply Agency (PFSA) may increase the bulkiness and complexity of health commodities circulating in the country (6, 8, 9). Unless commensurate measures are put in place early enough, the future of the supply system is feared to face even more challenges in the years to come.

There is, therefore, an immense need for a more coordinated and multifaceted interventions to reduce, if not to eliminate, the effect of the prevailing inadequate investment in the training and deployment scheme of human resource for the health supply chain. It is important to note here that running health supply chain by health workers who are not themselves sufficiently trained to do the job is one way to worsen the situation (10).

Perhaps, in recognition of the not-so-encouraging status of the capacities of the personnel in health supply chain management, a consensus appears to have

been reached among stakeholders, including the Federal Ministry of Health (FMOH), to develop the human resource capacity in health supply chain management in a more structured and sustainable manner. As part of this understanding, the School of Pharmacy, Addis Ababa University, with the financial and technical support of the United Nations Population Fund (UNFPA) and USAID DELIVER, has been preparing a postgraduate program in health supply chain management (HSCM).

Need assessment is one of the pre-requisites to be undertaken prior to launching new programs. Accordingly, this survey was intended to assess the need for training programs in HSCM and map competencies of personnel working at different levels of the health supply chain in Ethiopia.

The competency mapping exercise was based on the theoretical framework developed by People That Deliver (11). The framework outlines six domains for supply chain management. Each domain has groups of associated competencies. The six domains considered in the framework are further subdivided into *Technical* and *Management* Domains (See Table 1 below).

Table 1: Domains and descriptions (11)

	Domain	Domain description
Technical Domains	1. Selection & Quantification	The competencies required by workers to be able to select and quantify the correct supplies for their work situation (e.g. their country, the needs and capacity of their facility).
	2. Procurement	The competencies required by workers to be able to procure the supplies needed for their work situation.
	3. Storage & Distribution	The competencies required by workers to be able to store and distribute the supplies needed for their work situation. This includes moving supplies to their facility and sending them to other facilities. It also includes the competencies required to manage outsourcing of these activities, and partnerships related to the activities.
	4. Use	The competencies required by workers to be able to ensure the best possible outcomes from the use of the supplies in their work situation where patients are treated.
Management domains	5. Resource Management	The competencies required by workers to be able to manage money/people etc., to ensure the systems work effectively.
	6. Professional and Personal	The competencies required by workers to be able to manage their day-to-day responsibilities and create a path to future career development. This includes competencies such as communication, stress management and time management skills

Methods

Initially, national sensitization and consensus building workshop on Human Resources for Public Health Supply Chain was held in Addis Ababa where gaps were identified and required competencies suggested. This was followed by qualitative and quantitative surveys. The identification of competencies and

specific needs were captured using qualitative (Key informant interviews) and quantitative (self-administered questionnaire) data collection instruments.

Consultative workshop: A consultative workshop on strengthening human resources capacity in HSCM was

held in Addis Ababa from April 29 to 30, 2014. The workshop was attended by 48 participants. These included the Federal Ministry of Health, Schools of Pharmacy, Federal Referral Hospitals and Health Centers. Regional Health Bureaus (RHBS), Pharmaceutical Fund and Supply Agency (PFSA) (central and regional hubs) were also among the workshop participants. Food, Medicine and Healthcare Administration and Control Authority (FMHACA) and other partners involved in health SCM also attended the workshop.

During the workshop, the participants were grouped into five, with each group having 9 to 11 members. At the plenary sessions of the workshop, discussions were held on general health supply situation in the country. In particular, the discussions focused on HR related gaps, in-service and pre-service trainings related to HSCM, and the need for post graduate HSCM trainings. Structure, option and method of delivering the training were also among the issues covered in the discussions during the workshop. In addition, the discussion guide used during the workshop included issues related to the required competencies for HSCM personnel at different levels.

Qualitative and Quantitative Surveys: A part from the four emerging regions, all the other administrative regions and chartered cities in the country were included in this survey. The four developing regions were excluded for logistic reasons. From each of the region/city administration covered in the survey, one major PFSA hub was randomly selected. From the catchment area of the selected hub, one referral, one general and one primary (where available) hospital and a health center were selected. A convenient sampling technique was used in the selection of the sample.

The survey employed two instruments. These were key informant interview (KII) and self-administered questionnaire. In the survey, two sets of key informant interviews were conducted. The first was held with policy makers and process owners. These included Chief Executive Officers (CEOs) and Medical Directors of the selected Hospitals. Heads of Health Centers, Heads/Deputy Heads of the Regional Health Bureaus and Directors of Human Resources were also among the interviewed participants. In addition, the first interview covered participants from Pharmaceutical and Medical Equipment Directorate at the Federal Ministry of Health. Participants in the second KII guide were supply chain managers at different levels.

After completing the interviews, each interview team compiled the data they gathered in a worksheet for each of the discussion theme. Later, responses were organized and thematically analyzed.

Self-administered questionnaires (SAQ) were developed and administered to the staff who were directly involved in performing the technical functions of the HSCM. The questionnaire was prepared based on the competency compendium developed by the

People that Deliver (PtD). Though the compendium of supply chain is organized under six domains, the questionnaire used in the present survey has focused on five domains that were pertinent to all levels. The questionnaire was administered to workers involved in the supply chain. Availability during the time of the survey and willingness to participate in the study were the only criteria used to determine the workers' inclusion or exclusion. The questionnaire was designed to generate quantitative data. The quantitative data were analyzed using the Statistical Package for Social Sciences (SPSS), version 19. Descriptive statistics was used to report the findings.

Findings

HSCM situation in Ethiopia: Data obtained from the key informants and the participants of the consultative workshop confirmed that sustainable supply of health commodities ensures the provision of efficient health care to the population. The data sources duly acknowledged the changes observed so far in the health supply chain of the country. In this regard, the establishment of PFSA and the introduction of tools such as Integrated Pharmaceutical Logistic System (IPLS), Logistic Management Information System (LMIS) and Auditable Pharmaceutical Transaction and Services (APTS) were among the notable examples raised to enhance the public health supply system of the country.

However, majority of the key informants from selected regional health bureaus and facilities noted that the supply by PFSA is still far from satisfactory. Most referral hospitals, for example, described the supply to be inadequate. They reported that less than half of their demands are met by PFSA. KIs in some RHBS also said that PFSA's supply did not meet the demands of the regions in terms of quantities delivered. They said that the delivery is either less or more than the requested quantity. They indicated cases in which mandatory supply of near-expiry products were observed. This, they reported, can be considered wastage of resources.

Challenges related to human resources were identified in the consultative workshop as one major factor that contributed to low performance of the supply chain. In this connection, the majority of the participants agreed that there are gaps in leadership, knowledge and skills in HSCM. The data showed existence of gaps in selection, procurement, distribution, warehouse management and resource management at different levels of the healthcare system. Another similar challenge identified during the workshop was a shortage of HSCM professionals to perform supply functions. Even the few available professionals were reported to have limited commitment and motivation for the duties entrusted to their care.

Very high attrition rate of trained and experienced HSCM professionals at PFSA was mentioned by the participants as a major cause of the shortage of trained workers.

As a part of the efforts made to simplify and standardize the work required for the logistics management of pharmaceuticals used in public health facilities, developing standard operating procedure manual for IPLS implementation was mentioned. Training was also reported to be given. However, the data from some key informants revealed that the functional integration across the different actors in the health supply system has not been sufficiently effective. This, the informant mentioned, resulted in poor data entry, reporting and overall management problem.

Problems of infrastructures at different levels of the SCM were identified by the majority of the respondents in the qualitative survey. Poor warehouse design at HFs, lack of cold rooms, poor transport facilities, etc., were among the problems related to infrastructures.

Training needs and program preferences in HSCM:

The HSCM in Ethiopia is largely handled by pharmacy professionals. Pharmacists mainly perform the supply chain functions. However, the coverage of SCM in the curriculum used in the pre-service training of the pharmacists was reported to be inadequate. This was reflected in the data obtained from the majority of the KIs and workshop participants as a factor that has worsened the problem.

The participants acknowledged interventions such as the provision of in-service trainings to fill the gap. The trainings, however, were reported not to be sustainable. They were often fragmented, poorly coordinated and duplicated. The cause for such ineffective efforts was noted to be lack of ownership of the program.

Eventually, however, a consensus was reached among the participants on the need for the master's, diploma and certificate level trainings to fill gaps in HSCM. This means that all agreed that the three proposed postgraduate programs were timely. Regarding the preferred mode of deliveries, blended (face-to-face and distance learning) mode of delivery was recommended for postgraduate diploma and certificate programs. For the Master's level training, however, face-to-face was the largely preferred mode of delivery.

In addition, key informants from regional health bureaus suggested that short courses be offered to the majority of the personnel at the lower level of the health system. Post Graduate diploma level training was reported to be of help to HSCM coordinators at primary hospital and woreda health office levels. The participants agreed that MSc level training suits the staff working in the management of supply chain operations at PFSA, RHBs, Zonal Health Offices (ZHOs) as well as HSCM coordinators in referral and general hospitals.

On the other hand, an attempt was made to assess specific training needs and preferences of programs. In this connection, SAQ was used to collect data from the

people involved in the different levels of the supply chain in the selected regions/city administrations.

Accordingly, questionnaire was administered to two hundred participants. The response rate of the questionnaire was 100%. This means that all the study participants completed and returned the questionnaire (Table 2). The mean age of the respondents was majority (46.5%) of them were between the age ranges 28.96 years (SD = 4.6, range: 21 to 49 years). The of 25 to 30 years. Slightly over three-fourths of the participants, i.e., 153 (76.5%) had first degree level qualification. In connection with their specific fields of study, 95.5% studied pharmacy. Others had a bachelor's degree in other fields of the sciences. There were also people who had a Bachelor of Arts degree. Over half of the participants (i.e., 55.5%), were drawn from the health facilities (i.e., hospitals and health centers). This was followed by people drawn from either central or regional hubs of the Pharmaceutical Fund and Supply Agency (PFSA) 66(33.0%).

As regards their work experience, more than three-fourths of them (i.e., 87.5%) were junior staff who had fewer than five years of work experience in HSCM. The average number of the junior staff's year of service during the survey was 2.9 year (SD = 2.31 years). The average number of total years of work experience for all respondents was 5.9 years (SD = 4.45 years).

The majority of the respondents (i.e., 89.5%) expressed interest in advancing their career in HSCM. Over three-fourths (80.5%) of those who expressed interest to advance their career in HSCM reported the master's degree program as their priority. Postgraduate diploma level training was chosen by 27(13.5%) of the participants in the study. (Figure 1).

In the questionnaire, the respondents were asked to prioritize the need for each program based on the importance of each of the program to improve challenges of the existing HSCM and shortages of trained personnel in supply chain in Ethiopia.

Accordingly, the Master's degree level training came to be the first important training mode in the rank. Nearly three-fourths (73.4%) of the respondents chose the Master's degree level as their priority program.

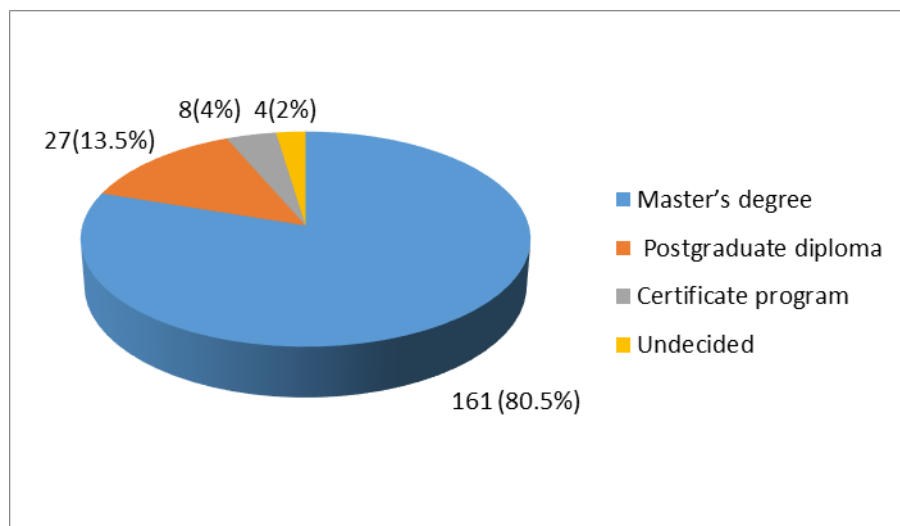
Regarding mode of delivery of the graduate program, face-to-face delivery mode was chosen by 80.5% of the participants. This was followed by a mixed method of delivery. Mixed method of delivery is a combination of face-to-face and internship. Distance learning was the least favored method of delivery for all types of the programs (Figure 2).

Required competencies in HSCM:

Needless to say, the data obtained from all of the study participants revealed the need to be competent in almost all areas of HSCM. The participants of the workshop and the majority of the KIs suggested the need to adopt the competencies model prepared by PtD for HSCM the development of the programs.

Table 2: **Study area and background characteristics of SAQ respondents, Ethiopia, December 2014**

Variables	Frequency	Percent
Region/City Administration		
Addis Ababa	29	14.5
Amhara	23	11.5
Oromia	41	20.5
Tigray	29	14.5
SNNPR	42	21.0
DireDawa	30	15.0
Harari	6	3.0
Educational status		
Diploma	34	17.0
BPharm/BSc/B.A.	154	77.0
MSc/M.A./MPH	12	6.0
Field of studies		
Pharmacy	191	95.5
Others (nurse...)	9	4.5
Area of Current practice		
Federal Ministry of Health	7	3.5
Regional Health Bureau	16	8.0
PFSA Central	12	6.0
PFSA Regional Hub	54	27.0
Hospital	89	44.5
Health Centre	22	11.0
Number of years at current place of work		
0-1 years	60	30.0
2-5 years	115	57.5
6 years and above	25	12.5
Average years of experience (\pmSD)	2.91 (\pm 2.31)	
Total number of years of work experience		
0-4 years	84	42.0
5-9 years	80	40.0
10 years and above	36	18.0
Average years of experience (\pmSD)	5.98 (\pm 4.45)	

Figure 1: **Respondents' Preference of Training Programs on HSCM in Ethiopia, December 2014.**

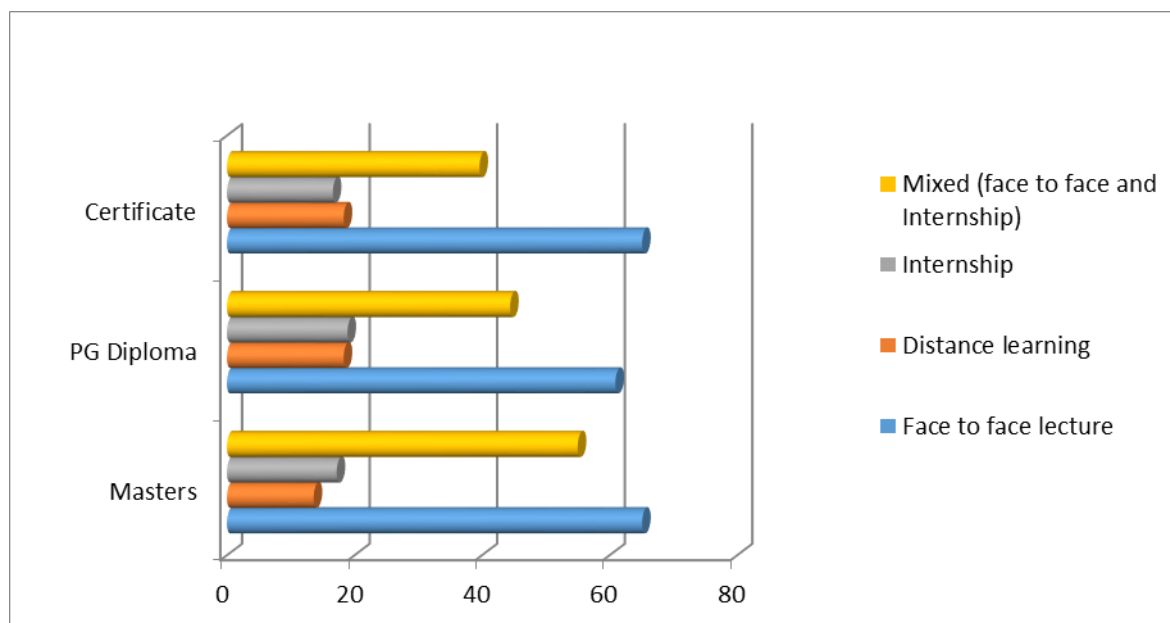


Figure 2: Respondents' preferred Mode of Delivery for the Training Programs on HSCM, Ethiopia, December 2014.

Key Informants from referral hospitals, RHBs and PFSA recommended competencies that enable personnel to do procurement planning advanced analysis and design HSCM systems. The data also revealed the need for the inclusion of competencies that enable pertinent personnel to conduct monitoring and evaluation. Respondents also suggested basic introductory courses in biomedical equipment and laboratory reagents as well as cold chain management, among other things.

A further aspect suggested to be considered in designing the training program was the competency on attitude of the trainers. The data obtained revealed the need for courses that enhance the trainees' commitment and motivation to execute their duties in efficient and ethical manners.

Self-assessment of competencies for HSCM: In this study, another attempt was made to get insight into the participants' level of competencies in relation to five domains of health supply chain management, namely; selection and quantification, procurement, storage and distribution, resource management, and professional and personal domain. To do this, thirty-three items of competencies on the five domains were administered to 200 participants to rate themselves on the competencies. The self-rating scale had *entry*, *skilled* and *expert* level competences. The respondents were instructed to consider their accumulated *knowledge*, *proficiency* and *experience* in each competency to make a decision about the status of their competencies. Overall, 6,600 responses were obtained in response to

the five domains. Of these, 2,367 (37.1%) responses showed *entry* level competencies, while 2,744 (43%) and 1,267 (19.1%) responses rated competencies to be at *skilled* and *expert* level, respectively.

In addition, more than half of the personnel (i.e., 55%) involved in public health supply chain indicated having little awareness, knowledge and experience in executing and managing contract. A similar percentage (i.e., 55%) replied having little awareness, knowledge and experience in executing and managing import and export products. Nearly the same percentage, that is 53%, responded that they had little awareness, knowledge and experience in executing and managing tendering processes.

The level of the workers' competency in areas like managing procurement costs and budget, building and maintaining relationships with supplier, and managing donated products was reported to be at *entry* level. On the other hand, nearly three-fourths of competency rating responses on selection, quantification, storage and distribution showed that the participants had moderate-to-advanced level of knowledge, experience and proficiency.

With respect to communication skills, ethical values and abiding by rules and regulation of the country, 48.3%; 26.6% and 25% of the respondents respectively reported having *skills* and *entry* level competencies. (See Table 3 for the summary of this).

Table 3: **Self-rating of competencies among personnel involved in health supply chain in Ethiopia, December 2014.**

Variables	Level of competency		
	Entry n (%)	Skilled n (%)	Expert n (%)
Selection and quantification	243 (24.3)	489 (48.9)	268 (26.8)
Select the appropriate product	36 (18.0)	99 (49.5)	65 (32.5)
Define the specifications and quality of the product	52 (26.0)	99 (49.5)	49 (24.5)
Define any special considerations for the product	40 (20.0)	108 (54.0)	52 (26.0)
Forecast and quality product needs	50 (25.0)	94 (47.0)	56 (28.0)
Supply planning	65 (32.5)	89 (44.5)	46 (23.0)
Procurement	639 (45.6)	515 (36.8)	246 (17.6)
Manage procurement costs and budget	80 (40.0)	83 (41.5)	37 (18.5)
Build and maintain supplier relationship	86 (43.0)	76 (38.0)	38 (19.0)
Manage tendering processes and supplier agreements	106 (53.0)	58 (29.0)	36 (18.0)
Execute management of contract, including risk and quality management	111(55.5)	57 (28.5)	32 (16.0)
Ensure quality of products	63 (31.5)	103 (51.5)	34 (17.0)
Manage import and export products	111 (55.5)	54 (27.0)	35 (17.5)
Manage donated products	82 (41.0)	82 (41.0)	34 (17.0)
Storage and distribution	465(33.2)	571(40.8)	364 (26.0)
Practice storage, warehousing and inventory management standard procedures	45(22.5)	87 (43.5)	68(34.0)
Supply commodities to facilities	48(24.0)	87 (43.5)	65(32.5)
Supply commodities to sections within a facility	50 (25.0)	85 (42.5)	65 (32.5)
Manage transport for commodities	79 (39.5)	78 (39.0)	43 (21.5)
Manage disposal of products	56 (28.0)	93 (46.5)	51 (25.5)
Manage manufacturing or compounding of products	105 (52.5)	59 (29.5)	36 (18.0)
Resource management	701 (43.8)	589(36.8)	310 (19.4)
Supply chain management	81 (40.5)	74 (37.0)	45 (22.5)
Oversee operation of logistics management information system	65 (32.5)	78 (39.0)	57 (28.5)
Implement risk management and monitoring and evaluation activities for the supply chain	89 (44.5)	79 (39.5)	32 (16.0)
Manage outsourcing SCM functions	105 (52.5)	60 (30.0)	35 (17.5)
Manage and plan projects	99 (49.5)	70 (35.0)	31 (15.5)
Manage financial activities	91 (45.5)	75(37.5)	34 (17.0)
Support human resources	83 (41.5)	78 (39.0)	39 (19.5)
Prepare for product supply during disaster and emergencies	88 (44.0)	75 (37.5)	37(18.5)
Professional and personal	319 (26.6)	580 (48.3)	301 (25.1)
Demonstrate generic skills	70 (35.0)	89 (44.5)	41 (20.5)
Demonstrate communication skills	43 (21.5)	110 (55.0)	47 (23.5)
Utilize problem solving skills	48 (24.0)	112 (56.0)	40 (20.0)
Exhibit professional and ethical values	38 (19.0)	102 (51.0)	60 (30.0)
Prove leadership abilities	66 (33.0)	90 (45.0)	44 (22.0)
Abide by rules/laws/legislation	54 (27.0)	77 (38.5)	69 (34.5)
Build and maintain supplier relationship	86 (43.0)	76 (38.0)	38 (19.0)
Manage tendering processes and supplier agreements	106 (53.0)	58 (29.0)	36 (18.0)
Execute management of contract, including risk and quality management	111(55.5)	57 (28.5)	32 (16.0)
Ensure quality of products	63(31.5)	103(51.5)	34 (17.0)
Manage import and export products	111(55.5)	54(27.0)	35 (17.5)
Manage donations of products	82(41.0)	84(42.0)	34 (17.0)
Manage re-packing of products	82 (41.0)	82 (41.0)	36 (18.0)
Resource management	701 (43.8)	589(36.8)	310 (19.4)
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Figure 3 summarizes competencies under the five domains. Responses obtained on competencies related to procurement (i.e., 45.6%) and resource management (i.e., 43.8%) were clustered at entry level. This shows gaps in performing the competencies. A fairly better self-rating of competencies was observed in

performing the competencies listed under selection and quantification, storage and distribution and professional and personal domain. One-third of the responses indicated having expert level competencies in these areas.

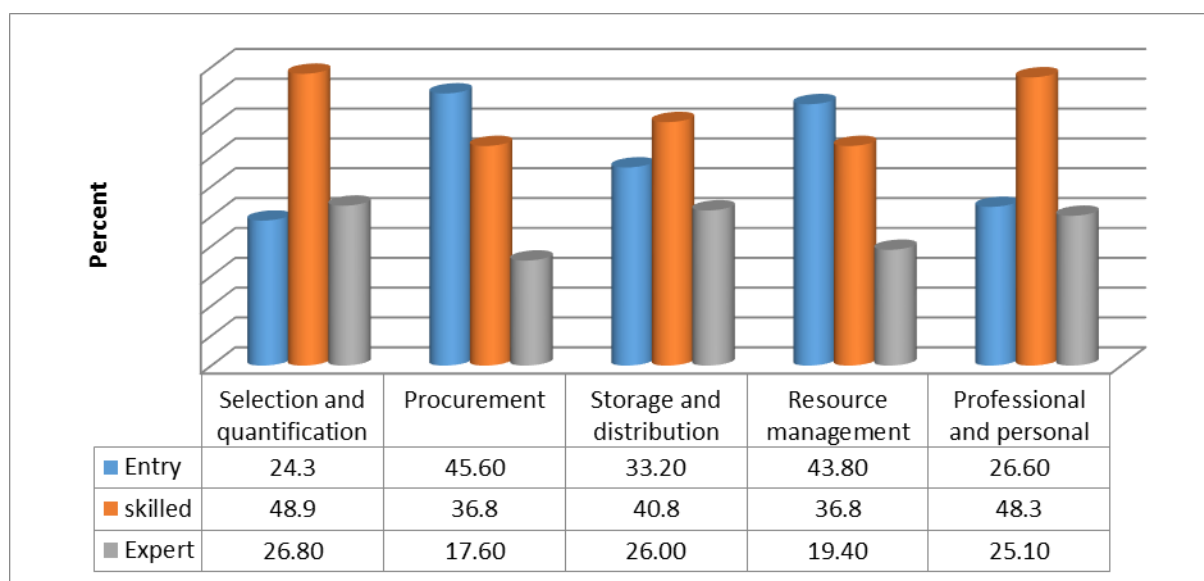


Figure 3: **Self-rated domain of competencies for health supply chain management in Ethiopia, December 2014.**

In this study, the relevance of the competencies listed in the five domains to the participants' current work was assessed. Accordingly, 65.8% of the respondents rated the competencies to be *very important* to their current work. The competencies were rated to be *important* to the current work of 27% of the respondents in the study.

Discussion

This training need assessment for HSCM and competency mapping survey employed a combination of methods. Primarily, consensus on the gaps prevailing in the public health supply chain system of the country and the need for postgraduate training was built in a national workshop that involved the participation of all pertinent stakeholders. At the workshop, an agreement was reached to use the competency framework developed by PtD for competency mapping. This was followed by preparing key informant interview guides and SAQ. The interview guides and the questionnaire were developed based on the five domains identified by PtD (11).

The health supply has been described as a key component of the healthcare system without which the entire health service would be at risk.

In the present assessment, instances in which participants expressed their concern about the level of policy makers' commitment and awareness were observed. There were also instances which revealed the participants' awareness of the growing attention being given by policy makers and other stakeholders to the health sector. For example, practical steps taken to

mobilize stakeholders and partners to strengthen HR for PHSCM is one example of the attention given to the sector. The establishment of PFSA and the launching of the IPLS and APTS could also be mentioned as another example of the concern shown by policy makers and other stakeholders in the health sector. This is an expression of the effort made to systematize and improve the public health supply. PFSA has gradually improved its performance over the years. Notable improvements have been seen in areas like procurement and distribution, as well as in putting in place trained human resources. Similar improvements were also observed in the construction of warehouses, distribution hubs, transportation fleets and the supply management capacity.

In addition, PESA has been providing technical assistance to regions and short-term trainings to health facilities personnel working in HSCM. The supply chain situation in health facilities, however, leaves much to be desired. Shortages and gaps in supply, for example, still characterize the health supply chain.

There are two seemingly opposing views about who should be in charge of the health supply chain management. FIP/WHO, on the newly developed standard of pharmacy practices, indicated the roles of pharmacists. The roles include obtaining, procuring, storing, distributing and ensuring rational use of medicines (12). Organizations such as International Associations of Public Health Logisticians have been supporting the idea of introducing logisticians in health supply chain management system (13). However, there seems to be a consensus on the need for context-based

training and equipping the personnel engaged in the actual work with the necessary competency for the HSCM (14).

In most developing countries, the public health supply functions are performed by pharmacists and other pharmacy personnel (15, 16). Similarly, the present assessment showed the involvement of pharmacists in most of the supply chain jobs at the managerial level and in performing the technical functions of the public health supply chain system in the country. However, the undergraduate curricula for pharmacists and other support pharmacy personnel do not sufficiently address public health supply issues. The finding of the assessment also indicated that majority of personnel working in PHSCM system of the country had *entry* level proficiency in the 33 competencies listed under the five domains of PtD (11). To address the skill gaps, attempts were made by PFSA and other partners to provide on-job training in selected aspects of the supply chain. However, the trainings were not structured and comprehensive enough to raise the trainees' competencies to an *expert* level competence. Expert level competency is required for most aspects of the strategic supply functions.

Moreover, the contents of the training appear to be donor driven. This might explain why the trainings fail to closely reflect the trainees' career structure. This clearly shows the need for revising pre-service training curricula and providing postgraduate level trainings. The same has been reflected in the discussions held during the workshop. Data obtained from the need assessment survey also confirmed the same. Experiences obtained from other countries suggest that strengthening the training of pharmacists and other pharmacy personnel had improved pharmaceutical supply management systems (17, 18).

The assessment also showed consensus of the participants on the need for postgraduate education in PHSCM at three levels. There was, however, some disparity related to the programs to be launched first. Some said certificate level training be given a priority to cater for the lower level health facilities. Yet others, including the key informants from FMOH, reported an immediate need for an MSc program. The possibility of assigning MSc graduates in the existing career structure was mentioned as a means of facilitating the training of lower level personnel in their respective regions.

Conclusion:

An increase in the drug financing, establishment of PFSA, introduction of tools like IPLS, LMIS and APTS in the HSCM system, has increased the supply chain efficiency of the Country. However, the HSCM system is often characterized by getting essential medicines and supplies going out of stock. In addition, delivering items that are already in stock frequently gets delayed. The present study identified multiple factors that affect the supply chain system performance in Ethiopia. However, human resources related

challenges were identified to be the most serious challenge.

Hence, there is a need for systematic development of HR for PHSCM. This can be achieved through launching accredited postgraduate trainings to HSCM personnel at different levels. An equally important intervention goes with incorporating relevant HSCM topics in the curricula offered to the would-be pharmacists in the pre-service program.

Limitations of the study

Unlike most self-administered questionnaire, the response rate in the quantitative aspect of the present study was 100%. However, some technical terms or phrases included in the questionnaire might have been difficult to some respondents. Possibilities could therefore exist for respondents to misunderstand the questions in the context where the opportunity for clarification was limited. Though major regions and PFSA hubs were included in the study, emerging regions were not part of the study. It is, however, expected that the gaps identified in HSCM would be huge as HR issues are more serious in these regions.

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