Understanding Knowledge Levels and Influencing Factors among Implementers of the Prime Vendor System: A Case Study of Tanzania Mainland

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Abstract
Background: The United Republic of Tanzania's government has implemented various significant health commodities supply chain management reforms, including introducing and national rollout of the Prime Vendor System in October 2018. This initiative aimed to address and complement the 40% health commodities supply chain gap observed at the Medical Stores Department (HRSC-2017). Over the five years since its implementation, the Prime Vendor System has shown high acceptability by the Government, implementers, and the beneficiaries of the intervention; it resulted in increased availability of health commodities at health facilities, improved order fulfilment rates, and timely delivery of commodities, it made contributions to Tanzania's public health sector. However, despite the Government's strong commitment to the health sector, administrative reports indicate regional disparities in the Prime Vendor System bridging the health commodities supply chain gap.
Little has been done to explore the knowledge level and influencing factors among Prime Vendor System implementers in addressing health commodities supply chain challenges. Therefore, this study aimed to understand the level of knowledge and its influencing factors among implementers regarding the Prime Vendor System Implementation in Tanzania Mainland.
Methods: A quantitative cross-sectional study was conducted between June and September 2023, collecting data via the ODK application from 356 respondents across the Dodoma, Morogoro, Mtwara, and Mwanza regions. Statistical analysis was performed using SAS version 9.4, with significance set at a 95% confidence level.
Results: All respondents (100%) were aware of the Prime Vendor System, with only 30.9% receiving formal orientation training. Most respondents (78.93%) reported having no prime vendor contracts in their health facilities yet recognized and acknowledged the PVS as complementary to the Medical Stores Department (MSD). However, only 60.76% knew of changes made since the PVS's introduction. Factors such as age and position within the healthcare organization influenced PVS knowledge.
Conclusion: Respondents have a high level of knowledge and awareness of the prime vendor system's basic structure and transitional phases. However, there is a need for more sensitization and training in prime vendor contracts and continuous refresher training of the prime vendor system, especially for lower-level health facilities.

Keywords: Prime Vendor System, Supply Chain Management, Medical Stores Department, Knowledge levels, Influencing factors and Health Commodities

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Introduction.
Supply Chain Management in healthcare aims to ensure complete end-to-end visibility of information among stakeholders. The involvement of governmental institutions, regulatory agencies, and insurance companies adds further complexity to the system.

The healthcare logistics landscape has evolved significantly since 1999. Initially, it focused primarily on purchasing with little emphasis on inventory management or internal distribution. As healthcare supply chains developed, the Directorate of Purchasing integrated with the Directorate of Finance (Riverd-Royer et al., 2002).

Many countries have implemented Public-Private Partnership policies, recognizing the role of the private sector in enhancing the public supply chain system. Governments have realized the ability of the private sector to complement the general supply chain. Public-Private Partnerships (PPPs) improve essential health commodities availability in public health facilities by improving order fulfilment rates, controlling cost, and increasing client/patient satisfaction (Kuwawenaruwa et al., 2020), (MoHCDGEC, 2021), (Tanzania. Technical Assistance, 2018) and (Arney et al., 2014).

Therefore, it is evident that the pharmaceutical supply chain in these countries has attracted substantial attention, focusing on health system strengthening, specifically targeting options for redesigning and optimizing the performance of the supply chain (Lamphere et al., 2019) (MoHCDGEC, 2013). Such interventions include expanding funding sources, staff training and re-training, improving supply chain procurement and distribution processes, promoting the responsible use of commodities, and improving data visibility and utilization to make well-informed decisions.

In Tanzania, the Public Supply Chain System for Health Commodities has evolved from a push system to a pull system. The introduction of the prime vendor system contributed a lot in complementing all health commodities out of stock and reduced the burden from MSD. Continuous monitoring in the prime vendor system pilot regions shows that the complementary prime vendor system has effectively increased the availability of essential medicines in public health facilities; improved commodities availability was the main criterion that, in 2018, pushed the Government decision to roll out the prime vendor system to all 26 regions of Tanzania's mainland.

The Medical Stores Department (MSD), an autonomous public organization under the Ministry of Health (MOH), is responsible for procuring, storing, and distributing essential health commodities to all public and approved non-public and non-profit health facilities in the country. However, in recent years, MSD has encountered difficulties that have hindered its efficiency in supplying 100% of all facilities' needs.

Pharmaceutical supply chain systems face multiple challenges in most low- and middle-income countries, including insufficient funding, poor drug quality, low acceptability and affordability, transparent procurement procedures, weak accountability mechanisms, inefficient management systems, and a lack of well-equipped and knowledgeable personnel with experience in pharmaceutical supply chain management.

Despite significant reforms, including introducing the Prime Vendor System in 2018, challenges persist, leading to regional disparities in commodity availability. Various initiatives have been introduced to improve supply chain efficiency, yet gaps remain, highlighting the need for further exploration.

However, successfully establishing an intervention based on PPPs within the public sector supply chain system requires high acceptability by the Government, implementers, and the intervention's beneficiaries (Chandani et al., 2017) (Kuwawenaruwa et al., 2021). However, most research does not report on implementers' knowledge, awareness, and influencing factors regarding prime vendors. The study aims to understand the level of knowledge of prime vendor system

implementers and to identify factors influencing the fidelity of implementation of the prime vendor system in Tanzania.

Methodology

Study Design

The research adopts a quantitative cross-sectional design, focusing on four regions in Tanzania's Mainland: Dodoma, Morogoro, Mtwara, and Mwanza. Within these regions, the study encompasses thirteen diverse local government authorities, including Dodoma (Dodoma City Council, Kondoa District Council, Kongwa District Council), Morogoro (Morogoro Municipal Council, Mvomero District Council, Kilosa District Council), Mtwara (Mtwara District Council, Mtwara Municipal Council, Newala Town Council, Masasi District Council), and Mwanza (Magu District Council, Nyamagana District Council, Ukerewe District Council).

Study Population

The study population consisted of purposively selected members from various levels of the health facilities who were directly involved in the health commodities supply chain, including their crucial role in the fidelity implementation of the Prime Vendor system in Tanzania. This includes health facilities in charge, storekeepers/pharmaceutical personnel, and laboratory personnel at the health facility level.

Sample Size and Sampling

The sample size for this study was determined using Yamane's formula (1967), which considers the study population, marginal error, and confidence level. With a total study population (N) of 3,203 individuals and a chosen marginal error (e) of 0.05, the calculated sample size (n) is 356. Regarding the sampling strategy, regions were purposively selected based on their relevance to the research objectives, including regions with and without medical store department zonal offices and regions with facilities with high health commodity consumption rates. From these regions, councils were chosen randomly, ensuring the representation of rural and urban settings to capture diverse perspectives. This random selection of councils enhances the study's representativeness. Within these councils, facilities and individuals were also randomly chosen, contributing to the inclusivity and generalizability of the study findings. This comprehensive approach ensures that a wide range of experiences and characteristics are represented within the selected regions and councils, thereby improving the validity and reliability of the research outcomes.

Study Approach

The study deployed a quantitative research approach. Before data collection, informed consent was obtained, and strict confidentiality protocols were followed. Ethical clearance was secured from the University of Dodoma's Institutional Review Board.

Data collection and data processing

A face-to-face interview was conducted with all purposefully selected respondents, and a guided and constructive structured questionnaire containing both open- and closed-ended questions was utilized to gather information from the selected participants. All quantitative data was electronically collected using the ODK application, where data collectors entered the information/data they collected directly into the Tablet using the electronic tool. The ODK application allowed online and offline data entry with GPS coding, and the data collection was done from June up to September 2023.

Dependent variable

The study's dependent variable, the "Level of knowledge," was derived from twenty questions designed to assess respondents' understanding. Each question had a correct and incorrect answer. A score of 1 was assigned for a correct response, while a wrong answer received a score of 0. These questions were categorized into Basic Knowledge of Prime Vendor, Transition Period, Prime Vendor Structure, and Contract Management. The total score was calculated by summing the scores from all questions.

Independent Variables

The independent variables in this study encompass various factors: demographic indicators such as sex, age, and education level; professional attributes such as position within the health facility and years of experience; and contextual elements including the type of health facility, region, and mobility-related factors. The objective is to investigate the multitude of factors that may impact the knowledge levels of individuals involved in implementing the Prime Vendor System.

Data Analysis

Basic descriptive statistics were computed to elucidate the respondents' baseline characteristics, including frequency and percentage for categorical variables and mean and standard deviation for non-categorical variables. Since the outcome variable, the knowledge score demonstrated an approximately normal distribution and is non-categorical. A multiple linear regression model was utilized to identify factors associated with the knowledge level among Prime Vendor System implementers. The analysis was performed using SAS version 9.4, with statistical significance set at a 5% level.

Ethical Considerations

The University of Dodoma Ethics Committee granted ethical approval and registration for the study. In addition, the Office of the President of the Local Government Regional Administration and the Ministry of Health in Tanzania granted permission for access to all facilities supporting/implementing the Prime Vendor System within the Regional Secretariat and Local Government Authorities as well as four regional referral hospitals (Mwanza, Dodoma, Morogoro and Mtwara). Finally, informed consent was obtained from respondents during data collection, and confidentiality was maintained throughout the study.
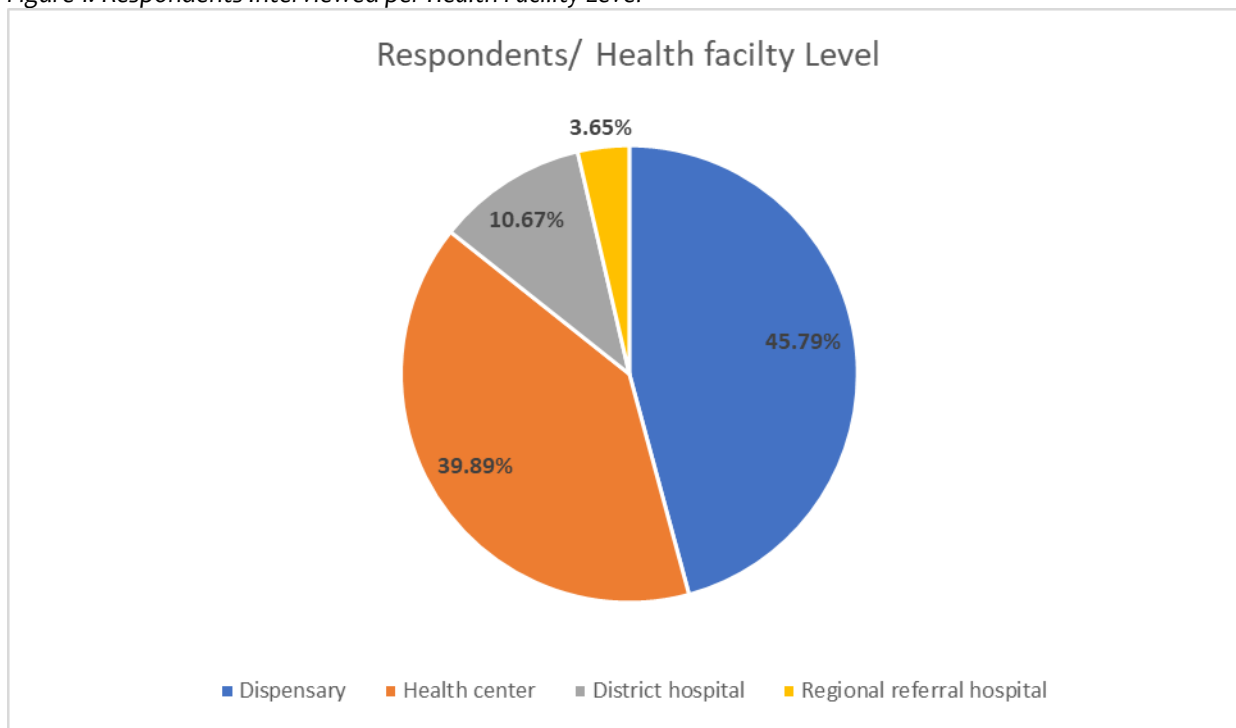
Results

The study was conducted in all four regions: Dodoma, Morogoro, Mtwara, and Mwanza. A total of 356 respondents were interviewed from health facilities visited; vast numbers of respondents are from Mwanza (27.81%) and Morogoro (27.81%), followed by Mtwara (26.40%) and with a few participants from Dodoma (17.98%).

In Tanzania, there is a decline in health facilities when transitioning from lower to upper levels. This trend was particularly evident in my study, where a significant portion of the visited health facilities were dispensaries, in contrast to the Regional Referral Health facilities. Figure 1 This pattern is also mirrored in the distribution of respondents from our results, with the majority coming from dispensaries (45.79%) and health centres (39.89%). A smaller percentage of participants were

associated with District hospitals (10.67%), and the least were from Regional Referral Hospitals (3.65%).

Figure 1: Respondents Interviewed per Health Facility Level

Demographic Results of Respondents

All 356 intended respondents (100% of the sample) participated throughout the data collection process. Notably, a substantial proportion of the participants were females, accounting for 181 (50.84%), while males constituted 175 (49.16%) in the study.

Most respondents fell within the 30-34 age range, comprising 33.71% of the total. Subsequently, individuals aged 35-39 constituted 20.79%, and those above 45 accounted for 19.10%. In contrast, a smaller % of participants, 8.71%, belonged to the 40-44 age group.

During data collection, we aimed to interview the Health Facility in charge, the storekeeper, and Laboratory personnel at each health facility. The findings across all visited health facilities revealed that 41.85% were Health Facility In charge, followed by Storekeepers at 32.58%. A smaller percentage, 25.56%, represented Laboratory personnel, as many of the observed dispensaries lacked standard laboratories.

The results showed that most respondents had no upper level of education; only 3.37% had a master's degree, and 14.61% had a first degree. Meanwhile, most % had a diploma, 55.06%, and 26.97% had a certificate. (See Table 1)

Table 1: Demographic results

Demographic Results			
Variable	**Frequency**	**Percentage (%)**	**Mean ±SD**
Sex			
Male	181	50.84	
Female	175	49.16	

Total	356	100.00	
Age category			36.74±8.33
<30	63	17.70	
30-34	120	33.71	
35-39	74	20.79	
40-44	31	8.71	
45+	68	19.10	
Education level			
Certificate	96	26.97	
Diploma	196	55.06	
Degree	52	14.61	
Master	12	3.37	
Position in this health facility			
The Health Facility In charge	149	41.85	
Storekeeper/ Store In – Charge	116	32.58	
Laboratory Personnel	91	25.56	

General Information of respondents

Table 2 shows that among the interviewed respondents, the majority had 5 – 9 years (40.17%) of experience as government officials working as healthcare workers. During their working period, half of the interviewed respondents (59.27%) had transferred from one working station to another, the majority of them transferred once (56.40%) or twice (22.27%), while 40.73% had never transferred to any station since their employment.

Table 2: General Information of Respondents Interviewed

General Information of Respondents			
Variable	**Frequency**	**Percentage (%)**	**Mean ±SD**
Experience			9.72±7.30
<5	66	18.54	
5-9	143	40.17	
10-14	85	23.88	
15+	62	17.42	
Ever transferred from one working station			
No	145	40.73	
Yes	211	59.27	
How many Times? (n=211)			
1	119	56.40	
2	47	22.27	
3	17	8.06	
4	28	13.27	

Throughout the data collection process, we aim to assess healthcare workers' understanding of fundamental aspects such as the Prime Vendor, the Transition of the Prime Vendor, the structure of the Prime Vendor, and contract management of their respective prime vendor. In the questionnaire, we mixed false statements to measure their knowledge through understanding and checking their awareness of respondents on the prime vendor system.

Results regarding Basic Knowledge of Prime Vendor

A total of 316 (88.76%) respondents heard about Prime Vendor, while 40 (11.24%) respondents never heard about Prime Vendor at all; this is due to a few of the respondents being new employees at the station. When the respondents were asked about whether the national rollout of the prime vendor system in Tanzania was in 2017, half of the respondents did not agree, 197(55.34%) that it is true, while the remaining 159 (44.66%) agreed on the statement the claim is not valid.

Furthermore, when participants were prompted to elucidate the purpose of the prime vendor system in Tanzania, the data revealed that the majority understood its purpose. Specifically, 326 (91.57%) respondents acknowledged that the prime vendor system complements the Medical Stores Department (MSD) in the Health Commodities Supply Chain System. Moreover, a significant majority, 351 (98.60%), disagreed with the notion that the prime vendor is intended to substitute the MSD, and 356 (100%) respondents disagreed that the prime vendor is the sole supplier of health commodities. Additionally, 355 (99.72%) respondents also disagreed that the prime vendor system is there to compete with the MSD in country health commodities supply chain system. See figure 2.

This indicates that while most respondents possess a basic knowledge about the Prime vendor System, still they lack updated information regarding the implementation dates of the Prime vendor system in Tanzania.

Figure 2: Main purpose of Prime vendor system
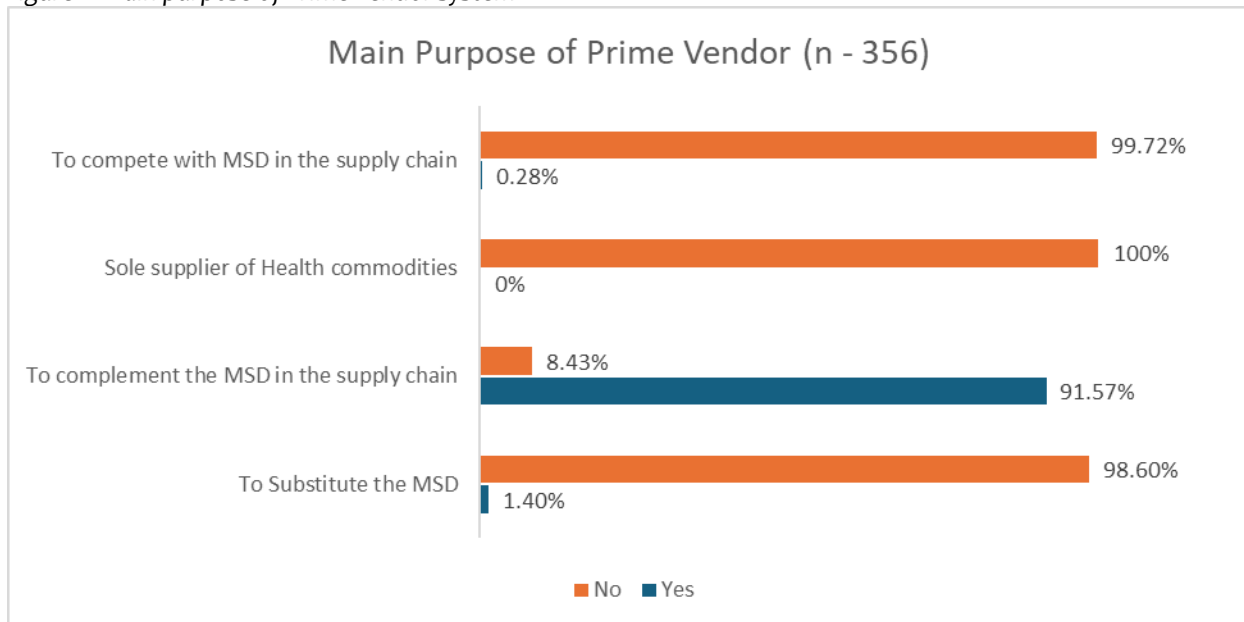
Knowledge of the transition period of the Prime vendor system
The nationwide implementation of the prime vendor system has significantly enhanced Tanzania's Health Commodities Supply Chain System. However, throughout the entire rollout period, adjustments and transitions have been made to enhance the overall efficiency of the health commodities supply chain system.

During the data collection, we wanted to know if the respondents were aware of the prime vendor system's transition period, what has changed or improved in it, and when the circular for changes issued by PORALG was.

According to the respondents' results, more than half were aware of amendments to the prime vendor system 192(60.76%). In comparison, the remaining respondents were not aware of the amendments 88 (27.85%), and 36 (11.39%) did not agree if there were any amendments in the prime vendor system. Regardless, few of them were unaware of the amendments made to the prime

vendor system. Surprisingly, 255 (80.70%) correctly identified when the circular for changes was issued by PORALG (July 2021).

Moreover, when asked if the transition in prime vendor enables a region to procure from a single LOT system to a four LOT system, half of the respondents 171 (54.11%), agreed, while 127 (40.19%) were unaware of it. Additionally, this was seen when 126 (39.87%) of respondents stated that the transition enabled more than four LOT systems in the region, which is wrong. (See Table 3) This indicates a disparity in information among healthcare workers, with some respondents being aware of the transition in the prime vendor while a few are not, and others do not agree, likely due to lack of prior knowledge.

Table 3: Transition period

Transition Period		
Variable	**Frequency**	**Percent (%)**
Awareness of any amendments made to the Prime Vendor System		
No	36	11.39
Yes	192	60.76
I don't know.	88	27.85
When was the circular for changes issued by PORALG?		
Oct-20	4	1.27
Jul-21	255	80.70
Jan-22	57	18.04
The transition in the Prime Vendor System enables a region to Procure from a single LOT system to Four LOT system		
No	18	5.70
Yes	171	54.11
I don't know.	127	40.19
Changes made in the Prime Vendor system		
The transition from single LOT to 4 LOT system	190	60.13
Having more than four LOT systems in the region	126	39.87

Knowledge of prime vendor structure

We included questions to verify respondents' comprehension of the prime vendor structure. Most responses were accurate, indicating respondents were aware of the prime vendor system.

A considerable number of respondents, 299 (94.62%), acknowledged the prime vendor role as complementary to the MSD. Additionally, more than half of the respondents, 219 (69.30%), recognized the Prime Vendor System as an integral part of the Government Structure. Furthermore, 207 respondents (65.51%) noted that only designated healthcare workers were authorized to communicate with the Regional Prime Vendor, which most respondents heard, stating only the District Pharmacist was allowed to do so. Additionally, most respondents, 224(70.89%), agreed that currently, the region can contract more than one prime vendor.

Nevertheless, several aspects remained relatively unfamiliar to most respondents. For instance, 178 (56.33%) respondents acknowledged a lack of awareness regarding the allowance for a Regional Prime Vendor to serve multiple regions, and 146 (46.20%) were unaware of the Ministry of Health's responsibility for contracting a Regional Prime Vendor, as depicted in Table 4

Table 4: Prime vendor structure

Prime Vendor Structure			
Variable	**No (%)**	**Yes (%)**	**I don't know (%)**
Acts as a complementary system to MSD	4(1.27)	299(94.62)	13(4.11)

Anchored within the Government Structure	41(12.97)	219(69.30)	56(17.72)
Any healthcare worker is allowed to communicate with the Regional RPV at any time when the facility receives a stock-out from MSD	207(65.51)	62(19.62)	47(14.87)
The Region is allowed to have more than one Prime Vendors	17(5.38)	224(70.89)	75(23.73)
The regional prime vendor is supposed to be registered by TMDA	5(1.58)	242(76.58)	69(21.84)
Regional Prime Vendor is allowed to serve more than one region	25(7.91)	113(35.76)	178(56.33)
The Ministry of Health is responsible for contracting a Regional Prime Vendor	109(34.49)	61(19.30)	146(46.20)

**Contractual Understanding of Prime Vendor System**
We also wanted to assess respondents' awareness of Contractual management, including whether they know all the procedures for finding a new prime vendor, Contractual agreement time with a prime vendor, contractual review, and termination terms.

Most respondents were not aware of most of the contract terms the region enters with their respective regional prime vendor, and this was confirmed when 283 (79.49%) of the respondents stated that they were not aware of any process of contracting a new prime vendor, while the remaining 73(20.51%) of the respondents stated that they were aware of all processes.

Surprisingly, most respondents knew the contractual agreement time with a prime vendor. This was confirmed when 348 (97.75%) did not agree when asked if the agreed contractual period is 2 years between the region and their respective regional prime vendor. Additionally, 313 (87.92%) disagreed that the regional commissioner signs the contract on behalf of their region.

Regarding the contract review process, more than half of the respondents 209 (58.71%) were unaware that the contract between the region and their regional prime vendor could be reviewed/amended after signing the contract. In comparison, 147 (41.29%) knew the contract could be amended. From Figure 3, Amendments were reported to occur under various circumstances: Whenever the Region and Prime vendor needs to change the Price 229 (64.33%). When there is a change in Pack size, 209 (58.71%), and when there is an increase or decrease in the market price for health commodities, 199 (55.90%).

Figure 3: Areas of contract amendments
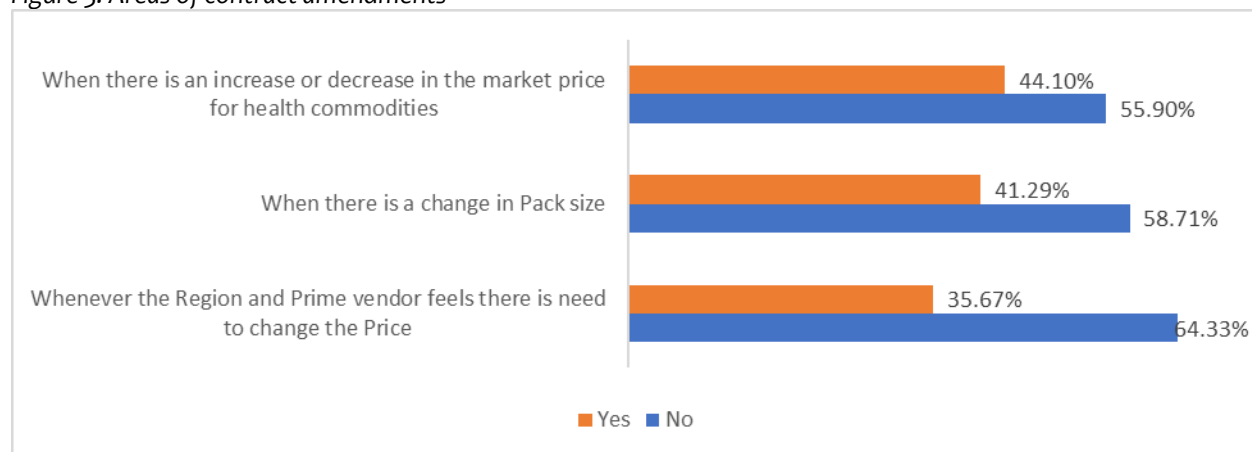
Distribution of Knowledge among variables with correlation test

The evaluation of Goodness-of-Fit Tests for the Normal Distribution underwent an exhaustive examination, employing diverse statistical metrics such as the Kolmogorov-Smirnov, Cramer-von Mises, and Anderson-Darling tests. The collective results of these assessments consistently revealed that the distribution of knowledge scores closely conformed to a regular distribution pattern. The visual representation of the standard curve in Figure 4 vividly illustrates the close alignment of knowledge scores with an approximate normal distribution. This thorough analysis affirmed the statistical normality of knowledge scores and underscored the reliability of the findings concerning their distributional characteristics. This confirms that half of the respondents are aware and have knowledge, while the remaining respondents are still unaware and do not know enough about the prime vendor system.

Figure 4: Distribution of Knowledge
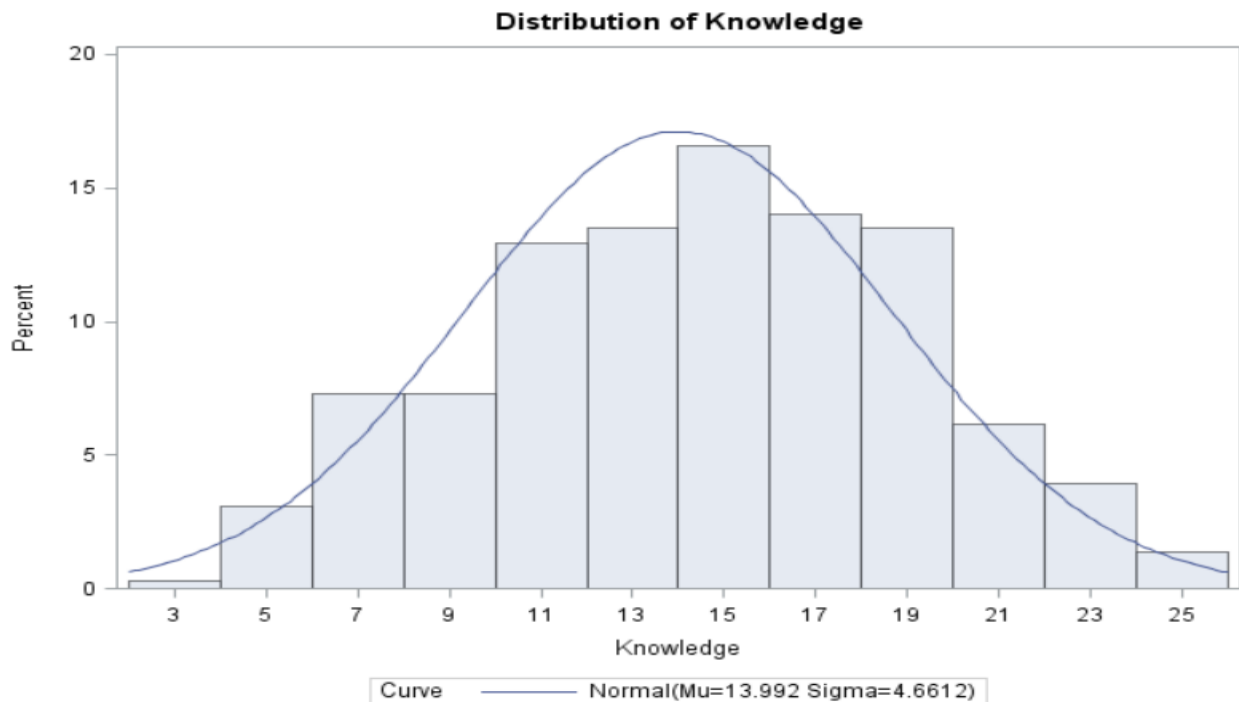
Factors associated with knowledge of implementers of the Prime vendor system.
We used linear regression to determine the factors associated with knowledge among the Prime Vendor System. The analysis uncovered significant relationships between knowledge and various factors, including the age of respondents (p=0.0012), their positions within the health facility (p<0.0001), the type of health facility (p=0.0005), and their region of affiliation (p=0.0008).

Specifically, age demonstrated an inverse correlation with knowledge, with each unit increase in age associated with a decrease in knowledge by 0.124 (β=-0.1239, p=0.0012). The health facility in charge exhibited notably higher knowledge (β=2.7511, p<0.0001), scoring 2.75 points higher than laboratory personnel and Storekeeper/pharmaceutical personnel.

Additionally, respondents from District hospitals and regional referral hospitals demonstrated a higher knowledge advantage (District hospitals (β=2.9351, p=0.0005) and regional referral hospitals (β=3.5004, p=0.0079)) compared to those from dispensaries and Health centres.

Additionally, respondents from the Dodoma and Morogoro regions exhibited higher knowledge (Dodoma region (β=2.3375, p=0.0008) and Morogoro region (β=1.5142, p=0.0145)) compared to

those from the Mwanza region. However, variables such as respondents' gender, educational level, years of experience, and job transitions did not display significant associations with knowledge among Prime Vendor System implementers (See Table 5).

Table 5: Linear regression analysis for factors associated with knowledge.

Parameter	Estimate	Standard Error	t Value	p-value	R square
Intercept	17.55201	2.220012	7.91	<.0001	0.514206
Sex					
Male	0.170784	0.511804	0.33	0.7388	
Female	Ref				
Age	-0.12394	0.037917	-3.27	**0.0012**	
Education level					
Certificate	1.277644	1.43566	0.89	0.3741	
Diploma	2.070065	1.402545	1.48	0.1409	
Degree	1.3101	1.485413	0.88	0.3784	
Master	Ref				
Position in this health facility					
Health Facility In charge	2.751081	0.605365	4.54	**<.0001**	
Storekeeper/ Store In - Charge	0.269181	0.610743	0.44	0.6597	
Laboratory Personnel	Ref				
Experience	0.016164	0.044765	0.36	0.7183	
Type of health facility					
Dispensary	Ref				
Health center	0.81364773	0.53439636	1.52	0.1288	
District hospital	2.93512008	0.83168261	3.53	**0.0005**	
Regional referral hospital	3.50042624	1.30907680	2.67	**0.0079**	
Region					
Dodoma	2.337539	0.692619	3.37	**0.0008**	
Morogoro	1.514163	0.616393	2.46	**0.0145**	
Mtwara	-0.20063	0.625062	-0.32	0.7484	
Mwanza	Ref				
Transferred from one working station					
Yes	0.53066	0.505546	1.05	0.2946	
No	Ref				

Discussion

The study aimed at assessing the level of knowledge and influencing factors among implementers of the prime vendor system. The results were grouped into four aspects: understanding of basic

knowledge of the prime vendor, transition of the prime vendor, the structure of the Prime Vendor, and contract management of their respective prime vendor.

Fundamental understanding of prime vendors

This study revealed that most respondents were familiar with the prime vendor system, recognizing its role in supplementing the medical store department. Many mentioned ordering health commodities from the prime vendor when facing shortages in the medical store department. However, despite this familiarity, most respondents lacked a clear understanding of the prime vendor system's history, particularly its national rollout.

The transition of the prime vendor

The circular for the transition of the prime vendor system, released in July 2021 by the minister of PORALG, aims to improve the prime vendor system's performance by modifying its operation. More than half of the respondents were aware of the amendments made in the prime vendor system. However, it was difficult for new employers (employed within 2022 – 2023) to be aware of any amendments made in the prime vendor system.

Regarding the prime vendor structure

Most respondents mistakenly thought the Ministry of Health was responsible for contracting the new regional prime vendor. Additionally, most were unsure whether the prime vendor could serve more than one region. Despite these misconceptions, respondents demonstrated awareness of certain aspects, such as the purpose of the prime vendor and the responsible party for contacting them.

Effective procurement of health commodities from the prime vendor necessitates a thorough understanding of the operational structures and principles involved. District pharmacists and laboratory technologists provide this understanding to healthcare workers under their supervision, facilitating smooth processes without encountering challenges.

This aligns with findings by (Elias, 2023) that highlighted PVS as a crucial complement to the work done by the Medical Stores Department in the Tanzanian health supply chain system. Additionally, the excellent reputation of prime vendors in the regions, close collaboration with district authorities, and participants' understanding of the intervention's role in complementing the public health supply chain enhance the acceptability of PVS in the regions.

Regarding the contractual terms of the prime vendor system

The study found that most respondents lacked awareness of key terms, such as the contract review period, the legality of amending the contract with the prime vendor, and the termination process. However, many were aware of the duration of the contract. The availability of prime vendor tools, including a copy of the contract with the respective vendor, significantly influenced awareness levels. It was noted that many health facilities visited did not possess these essential prime vendor tools. This contrasts with findings by (Arney et al., 2014) that emphasized the importance of clear contracts in implementing framework agreements like PVS for high performance and increased availability of essential health commodities at service delivery points.

The study revealed remarkable levels of awareness and knowledge regarding the Prime Vendor System, with all respondents indicating familiarity with the intervention. Only 30.9% of respondents have undergone formal orientation training, which indicates significant efforts in sensitizing and enhancing awareness among new and established staff across the regions. These findings echo those of Kuwawenaruwa et al. (2020), who highlighted that improved awareness and

knowledge directly contribute to better understanding and compliance with the operations of the Jazia Prime Vendor System.

Furthermore, this study identified various factors influencing knowledge of different aspects of PVS; these include age, position within healthcare facilities, type of health facility, and region. It was observed that older individuals had significantly lower levels of knowledge, and lower-level health facilities exhibited a lack of knowledge, suggesting the need for targeted sensitization efforts, particularly among younger personnel at grassroots levels of the health supply chain. Beyond knowledge, factors such as capacity building and supply chain management skills were crucial for effectively implementing the Prime Vendor System.

Conclusion

Respondents have a high level of knowledge and awareness of the prime vendor system's basic structure and transitional phases. However, there is a need for more sensitization and training in prime vendor contracts and continuous refresher training of the prime vendor system, especially for lower-level health facilities.

Study limitation.

The main limitation of the presented study is that it did not explore the level, scope, and extent of knowledge and awareness of other healthcare workers at Health facilities rather than selecting a few key implementers of the prime vendor system, which could have given us a clear picture of the level of knowledge and awareness of all cadres/healthcare workers working at health facilities.

List of Abbreviations

CHMT	Council Health Management Teams
CMTs	Council Management Teams
DHIS2	District Health Information System
eLMIS	electronic Logistics Management Information System
ERP	Enterprise Resource Planning
GPS	Global Positioning System
ILS	Integrated Logistics System
IMPACT	Information Mobilized for Performance Analysis and Continuous Transformation
IRB	Institutional Review Board
MoH	Ministry of Health
MSD	Medical Stores Department
ODK	Open Data Kit
PORALG	President's Office Regional Administration and Local Government
PVS	Prime Vendor System
RHMT	Regional Health Management Teams
RS	Regional Secretary
SAS	Statistical Analysis Software
TMDA	Tanzania Medicines and Medical Devices Authority

Availability of data and materials

The data sets used and/or analyzed during the current study are available from the corresponding author.

Declarations
Ethics approval and consent to participate.
The Ethical Clearance Committee of the University of Dodoma Tanzania gave the ethical clearance for the study in writing.
Competing interests
The authors declare that they have no competing interests.

Authors contributions
MM developed the proposal and study design and participated in planning, data collection, and interpretation. MM was the principal investigator in all four regions visited and supervised the data collection process. MM contributed to the training and management of data collection. Research Assistants managed data entry and data analysis. RM and MM supported planning and organizing logistics. MM drafted the manuscript for input by the other authors. All authors read and approved the final manuscript.

Competing interests
The authors declare that they have no competing interests

References
Rodenberg, C.A. (2006). *A Review of Assessing Quality of Life in Clinical Trials: Theory and Methods* (2nd Ed). P. Fayers and R. Hays (eds.)" . J Biopharm Stat.16(5):761–3.
Bernstein, E. R. (1995). *Dynamics and photochemistry of neutral Van Der Waals clusters*. Annu Rev Phys Chem. 46(1):197–222.
Lamphere, B., Machagge, M., & Adane, T. D. (2019). *IMPACT Team Approach to Supply Chain Management*. Reprod Heal supplies coalition [Internet]. 39. Available from: https://www.rhsupplies.org/
Chandani, Y., Duffy, M., Lamphere. B., Noel, M., Heaton, A., & Andersson, S. (2017). *Quality improvement practices to institutionalize supply chain best practices for iCCM: Evidence from Rwanda and Malawi*. Res Soc Adm Pharm. 13(6):1095–109.
MoHCDGEC. (2017). *Holistic Supply Chain Review Report*. Dodoma..
MoHCDGEC. (2013). *The United Republic of Tanzania Standard Treatment Guidelines and Essential Medicines List Ministry of Health and Social Welfare* (4th Ed). Available from: http://www.who.int/selection_medicines/country_lists/Tanzania_STG_052013.pdf
Kuwawenaruwa, A., Wyss, K., Wiedenmayer, K., Metta, E., & Tediosi, F. (2020). *The effects of medicines availability and stock-outs on household's utilization of healthcare services in Dodoma region, Tanzania*. Health Policy Plan. 35(3).
MoHCDGEC. (2021). *Tanzania Health Sector Strategic Plan 2021-2026.*
Ann Glob Health. (2015). *Improving access to life-saving medicines through mobile community health supply chain management.*
PORALG. (2022). *Prime Vendor System Implementation Manual.*

Technical Assistance - Tanzania. (2018). *Creating a Demand Driven-Supply Chain : Aligning Stakeholders and Priorities.*

Kuwawenaruwa, A., Tediosi, F., Obrist, B., et al (2020). *The role of accountability in the performance of Jazia prime vendor system in Tanzania.* J Pharm Policy Pract.

Arney, L., Yadav, P., Miller, R., & Wilkerson, T. (2014). *Strategic contracting practices to improve procurement of health commodities.* Glob Heal Sci Pract. 2(3):295–306.

Elias, L. (2023). *Effectiveness of prime vendor system on availability of medicines and medical supplies in selected public health facilities in Arusha district council.* 1–13.

Kuwawenaruwa, A., Tediosi, F., Metta, E., Obrist, B., Wiedenmayer, K., Msamba, V.S., et al. (2021). *Acceptability of a prime vendor system in public healthcare facilities in Tanzania.* Int J Heal Policy Manag. 10(10).