Availability of adolescents and youth sexual and reproductive health commodities in public healthcare centers in Tanzania following the adoption of supply chain integration

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Recommended Reference: Sallwa, A. A., Mollel, H. A., & Mwagike, L. R. (2026). Availability of adolescents and youth sexual and reproductive health commodities in public healthcare centers in Tanzania following the adoption of supply chain integration. *African Quarterly Social Science Review, 3*(2), 290–297. https://doi.org/10.51867/AQSSR.3.2.27

ABSTRACT

While more efforts and interventions are directed at improving the health of young men and women in many developing countries, this study posits that supply chain integration (SCI) is the pillar of healthcare facilities in ensuring the availability of adolescent and youth sexual and reproductive health (AYSRH) commodities. This descriptive study assessed the availability of AYSRH commodities in Tanzania with an emphasis on the ongoing implementation of SCI. The study focused on the downstream level of the AYSRH service delivery by observing the public healthcare centers in four regions of Tanzania and employed a cross-sectional facility-based analysis to describe the availability of AYSRH commodities. The results indicate that short-term AYSRH commodities (such as male condoms and oral contraceptives) have a high rate of availability compared to long-term commodities such as IUDs, implants, and STI starter packs. Also, the voice of the youth captured through youth exit-intercepts revealed how commodity stockout and long waiting time hinder them from receiving AYSRH services. The study underscores the SCI potential by revealing the current level of AYSRH commodity availability, which is mainly attributed to the ongoing integration between relevant healthcare actors. The study recommends that more emphasis be directed towards improving SCI to improve the availability of long-term contraceptives and STI treatment commodities.

Keywords: Availability, AYSRH Commodities, Public Healthcare Sector, Supply Chain Integration, Tanzania

I. INTRODUCTION

Supply chain management (SCM) has gained significant emphasis in recent years, as firms, industries, and sectors have recognized its potential for facilitating the flow of goods across all supply chain members and ensuring the availability of commodities and services (Yuen et al., 2019). With the growing number of supply chain actors, the evolution of the supply chain has led to the emergence of supply chain integration (SCI) (Donkor et al., 2021). SCI is the coordination and alignment of activities within facilities and among supply chain partners, including suppliers, manufacturers, warehouses, distributors, and retailers (Birhanu et al., 2022). Regardless of the specific level of focus, the overarching aim of SCI is to foster interconnectedness and interdependence amongst supply chain actors, thereby enhancing overall efficiency and effectiveness of the supply chain (Liu et al., 2016). This integration facilitates a seamless information-sharing process, collaborative partnerships, and technological connectivity across the network (Yuen et al., 2019). Such connectedness culminates in logistical and relational integration, enabling optimized value delivery to end users (Tiwari et al., 2024).

Effective SCI maintains commodity availability and responsiveness through streamlined collaboration and resource optimization (Kalaria et al., 2023). For instance, in the context of healthcare, SCI has demonstrated efficacy in streamlining critical operations, including order management, demand forecasting, and the efficient transportation of pharmaceuticals and medical supplies (Donkor et al., 2024). Furthermore, implementing SCI as a strategic alignment and coordination of supply chain actors leads to improved supply chain agility and efficiency, which ensures the availability of goods by increasing data sharing, joint decision-making, real-time stock level visibility, and synchronization of procurement and distribution operations (Tiwari et al., 2024).

Focusing on the Adolescent and Youth Sexual and Reproductive Health (AYSRH) as one of the vital healthcare services for socio-economic development, where access to AYSRH services relies much on the availability of sexual and reproductive health commodities such as HIV test kits, oral and emergency contraceptive pills, and condoms to ensure that young people can safeguard their health, well-being, and economic potential (Hunter et al., 2023). Recognizing the importance of AYSRH services, governments worldwide, including in developing countries, prioritize

AYSRH to reduce maternal and child mortality (Mwandali et al., 2020), prevent sexually transmitted infections (STIs) (Mtaita et al., 2021), and improve mental health among youth (Bylund et al., 2020). In Tanzania, the availability of AYSRH commodities in public healthcare centers is 57%, which is led by the availability of male condoms, followed by HIV testing kits, oral contraceptive pills, emergency contraceptive pills, antiretroviral therapy, and intrauterine contraceptive devices lastly (Mathias et al., 2024; Mwamasangula & Gibore, 2024).

Efforts to improve the availability of AYSRH services through SCI have been implemented through initiatives such as the adoption of the Integrated Logistics System introduced by the Ministry of Health in 2009 and the electronic Logistics Management Information System (e-LMIS) and Enterprise Resource Planning (ERP) system introduced in 2014 (Vianney et al., 2024). These systems aim to integrate the supply chain for health commodities, including AYSRH products, to reduce inefficiencies, improve procurement and supply coordination, and ensure the timely availability of essential healthcare commodities for youth (Mtaita et al., 2021). SCI is pertinent to AYSRH services, where consistent availability of supplies and responsive service delivery are paramount (Hunter et al., 2023).

Despite the adoption of SCI in the Tanzanian healthcare sector in 2009, the availability of AYSRH commodities is still upsetting health facilities in AYSRH service provision (Mathias et al., 2024). Barriers such as inadequate medical supplies, frequent stockouts, and inconsistency of supplies continue to hinder healthcare centers in providing AYSRH services to youth (Mtaita et al., 2021; Mantel et al., 2021). Current demographic statistics indicate that the availability of AYSRH commodities at the public healthcare center is 57% as of the financial years 2022/23 and 2023/24 consecutively (Mwamasangula & Gibore, 2024). This limited availability of AYSRH commodities hinders health facilities from providing timely AYSRH services, which endangers youth by exposing them to STI infections, unsafe abortions, and early and unwanted pregnancies (Tiwari et al., 2024). Empirically, the availability of AYSRH commodities is uncertain, as many studies have examined factors affecting the availability of health commodities (Bylund et al., 2020; Mesiäislehto et al., 2021) and their effects on health service providers and recipients (Mtaita et al., 2021). This gap highlighted the need to assess the current level of AYSRH commodity availability, providing insights into the impact of SCI implementation and the effectiveness of youth health service provision.

1.1 Research objectives

The objective of the study was to assess the level of AYSRH commodity availability, to understand the impact of SCI into the healthcare sector.

II. LITERATURE REVIEW

The literature has displayed the key milestones of AYSRH services in Tanzania. The evolution of SCI adoption in Tanzania is traced to the late 1990s (Mwandali et al., 2020). Close to the 21st century, health monitoring reports highlighted the problem of AYSRH services in Tanzania, as less than 30% of youth did not have access to AYSRH (Tiwari et al., 2024). The main narratives were the problem of youth's unawareness of the importance and rationale of sexual and reproductive health, which limited their access (Mesiäislehto et al., 2021). As a result, many initiatives were implemented to enlighten adolescents and youth in schools, universities, and on the streets, to change their perceptions and increase their awareness (Marten, 2022). Also, AYSRH advocacies were introduced to counter negative culture and stigma on the AYSRH service to enable young men and women to access these services (Kalaria et al., 2023).

In the 2000s, studies like Mtaita et al. (2021) and Mwogosi (2023) witnessed a slight improvement in AYSRH service provision while marking operational inefficiencies in offering the services as one of the main challenges hindering AYSRH service provision in the country. To react to this, the public health sector was reformed to improve healthcare services, including AYSRH services, by improving healthcare infrastructures to ensure that each ward has a reliable healthcare center (Bylund et al., 2020). Also, by employing more healthcare providers to ensure an adequate number of healthcare providers across the country (Mwogosi, 2023), increasing funding for medicines and pharmaceuticals, and encouraging private sector investment in pharmaceutical industries, including local and international investors, to ensure adequate medical supplies (Mesiäislehto et al., 2021).

Unexpectedly, there was still a slight improvement in the availability of AYSRH services, prompting the suggestion to adopt SCI in 2008 to address supply chain inefficiencies that hindered AYSRH services' availability and accessibility (Mrisho et al., 2022). Efforts to improve the availability of AYSRH commodities through SCI have been implemented through initiatives such as the Integrated Logistics System introduced by the Ministry of Health in 2009, and the electronic Logistics Management Information System (e-LMIS) and Enterprise Resource Planning (ERP) system introduced in 2014 (URT, 2021). These systems aim to integrate the supply chain for health commodities, including AYSRH products, to reduce inefficiencies, improve service delivery, and ensure the timely availability of essential healthcare services for youth (Mtaita et al., 2021). Despite these efforts, it was revealed that 43% of young people in Tanzania are still unable to access AYSRH services, and contraceptive access rates remain particularly low (Hunter et al., 2023). Few studies in Tanzania have assessed the current availability of AYSRH commodities. Many

studies on AYSRH services have focused on challenges facing youth in accessing the services, the socio-cultural perceptions of the services, and less on the availability of different AYSRH services in the country, and have ended by recommending the improvement of SCI to improve AYSRH services.

For instance, Mesiäislehto et al. (2021) assessed the disparities in accessing SRH services at the intersection of disability and female adolescents in Tanzania. Using a qualitative participatory approach to explore access to SRH services among 136 Tanzanian adolescents with disabilities. The study revealed that SRH services in Tanzania do not adequately meet the needs of female adolescents with disabilities. The main reasons are the unavailability of SRH commodities when needed by female adolescents. However, the study highlighted the positive impact of supportive networks such as family, community leaders and members, and healthcare professionals in helping female adolescents with disabilities by providing financial, mobility, and communication support. Mrisho et al. (2022) conducted a study on understanding the SRH needs of adolescents and youth in Tanzania. The study focused on female adolescents, involving a qualitative approach to retrieve the perception of the group. The study revealed gaps in accessing and utilizing quality AYSRH services, which are lack of special needs counseling, sexual awareness programs, lack of pregnancy prevention services, and poor provision of sanitary pads. The study recommended the inclusion of adolescents, especially adolescent girls and young women (AGYW), in SRH interventions. The study called for the need to develop and test interventions implemented to improve access and availability of AYSRH commodities that are key to SRH service provision.

The study resembles that of Hunter et al. (2023), which examined the reach of adolescent girls with HIV self-testing kits in Tanzania. This study revealed the problem of access to contraception and the poor provision of HIV self-testing kits. The study ended by calling for broader girl-friendly interventions to improve AYSRH commodities availability in the country. Mtaita et al. (2021) conducted a study on the accessibility to GBV health services for adolescent girls and young women in Tanzania. The study revealed other barriers to accessing GBV health services, such as a lack of commodities to facilitate service provision, a lack of knowledge about the available SRH services, stigma, low self-esteem, fear of HIV testing, and lack of parental support. The emphasis of the study was on strengthening adolescent and youth interventions to address access to GBV health services, especially in rural areas. Mwandali et al. (2020) conducted a study to assess the availability, range, and utilization of SRH services for adolescents in Tanzania by focusing on health facilities. The study revealed a lack of uniform SRH services across health centers within the same districts and unstable availability of the services. This was attributed to a lack of integration among supply chain members, resulting in stock-outs and a lack of training and capacity, which hinders the delivery of other SRH services at the health centers. This cross-sectional qualitative study concluded that the utilization of AYSRH services is a result of available SRH commodities and reliable services.

Bylund et al. (2020) conducted a study aiming to explore and understand health professionals' perceptions and attitudes toward AYSRH services. This qualitative study used interviews to understand the challenges of AYSRH in the Arusha and Kilimanjaro regions. The study revealed that the unavailability of essential SRH services, stigma, ambiguous policies, and over-medicalization of services hinder SRH service utilization among youth. The study called for new interventions for male adolescents, as it was difficult to involve them in SRH services. Ooms et al. (2020) conducted a cross-country comparison to examine access to SRH commodities in East and Southern Africa. The comparison was on the availability, affordability, and stockout of essential SRH commodities in Kenya, Tanzania, Uganda, and Zambia. The study used a cross-sectional design and revealed that SRH availability among the four countries was less than 50%. The study revealed SC disparities as the major reason for this, as it made stockout a common issue in SRH commodities. The study also revealed unaffordability and low accessibility of the services in all four countries. The recommendations of the study were to involve all supply chain members in planning the SRH commodities supply and to integrate operational activities to counter stock-outs and improve SRH commodities availability.

III. METHODOLOGY

3.1 Study Design

This observational study employed a cross-sectional facility-based analysis to describe the availability of AYSRH commodities in public-owned healthcare centers in Tanzania. The study planned to involve 119 healthcare centers, but due to some healthcare centers lacking AYSRH services provision, only 110 facilities were examined from four regions of Shinyanga, Geita, Katavi, and Simiyu to represent other areas of the country, as seen in Table 1. The regions were purposively selected due to a high rate of unmet AYSRH needs compared to the other regions. The national census of 2022 provided the list of regions in meeting AYSRH needs in the country, which provided the basis of the sampling.

Table 1

Demographic Results

Characteristic	Category	Frequency (n)	Percentage (%)
Region	Shinyanga	28	25.5
	Simiyu	27	24.5
	Geita	29	26.4
	Katavi	26	23.6
Facility type	Health center	119	100.0
AYSRH services offered	Yes	110	92.4
	No	9	7.6
Family planning unit present	Yes	97	88.2
	No	13	11.8
eLMIS/bin card system available	Yes	92	83.6
	No	18	16.4

3.2 Data Collection

Data collection was conducted through observation, using a structured facility observation checklist to document the availability and stock status of the selected AYSRH commodities. Also, exit-intercept and stock were administered to youth aged 15-35 years immediately after receiving services. The facility observation captured the real-time availability status of AYSRH commodities, while the youth-exit intercept gathered the youth's experience of AYSRH commodity availability to triangulate the findings. The intercept was undertaken at the same 110 healthcare centers involved during the observation, to triangulate the findings gathered during the observation. 9 AYSRH commodities were selected as tracer commodities in this study: male condoms, oral contraceptive pills, emergency contraceptive pills, injectables, intrauterine devices (IUDs), implants, pregnancy tests, HIV rapid diagnostic tests, and STI starter packs.

3.3 Data Analysis and Ethical Consideration

Data analysis involved descriptive analysis, displaying the availability status of the selected AYSRH commodities and their stockout patterns. Since the observation involved binary indicators for availability and continuous measures for stockout, frequencies and percentages were involved.

3.4 Ethical Consideration

During the youth-exit intercept, informed Consent was obtained, and the confidentiality of the collected information and data was ensured to be used only as per the study's objectives, in accordance with the ethical clearance permit obtained from the National Institute of Medical Research (NIMR) of Tanzania, numbered NIMR/HQ/R.8a/Vol.IX/5169.

IV. FINDINGS & DISCUSSION

4.1 Findings

The study aimed to examine the availability of AYSRH commodities through assessing the commodity availability at the point of care, stockout status on the day of visit, mean stockout days of the last 30 and 90 days, and inventory documentation. The results are as follows.

4.1.1 Availability at point of care

In assessing the availability of AYSRH commodities at the point of care, during the visitation, it was revealed that male condoms were more available (87.3%), followed by oral contraceptive pills and pregnancy tests. The least available commodities are implants, IUDS, and STI starter packs. The remaining emergency contraceptive pills, injectables, and HIV rapid diagnostic tests had a moderate availability rate. These findings challenge those of Hunter et al. (2023), who reported a low availability rate of those products. This study included more commodities and the observation method to provide reliable results. The study is contrary to that of Mrisho et al. (2022), who reported a lack of pregnancy prevention services, as it is revealed that male condoms, oral contraceptives, and emergency contraceptives are readily available.

Table 2

Availability at Point of Care

Commodity	Available, n (%)	Not Available, n (%)
Male condoms	96 (87.3)	14 (12.7)
Oral contraceptive pills	90 (81.8)	20 (18.2)
Emergency contraceptive pills	74 (67.3)	36 (32.7)
Injectables	86 (78.2)	24 (21.8)
Intrauterine devices (IUDs)	54 (49.1)	56 (50.9)
Implants	48 (43.6)	62 (56.4)
Pregnancy tests	90 (81.8)	20 (18.2)
HIV rapid diagnostic tests	85 (77.3)	25 (22.7)
STI starter packs	65 (59.1)	45 (40.9)

4.1.2 Stock out Status on the Day of Visit

To affirm the availability status, the study also examined the stockout status of the AYSRH commodities. The result revealed that implants, IUDS and STI starter packs recorded the most stockout on the visited public healthcare centers during the day the day of the visit. This was followed by emergency contraceptive pills, injectables, and HIV rapid test kits, leaving male condoms, oral contraceptive pills, and pregnancy test kits as the most stable products since stockout was low (Bylund et al., 2020). These findings complement those of Mwandali et al. (2020) on the presence of AYSRH commodity stockout that hinders AYSRH service provision.

Table 3

Stockout status on the day of visit

Commodity	Stockout, n (%)	No Stockout, n (%)
Male condoms	14 (12.7)	96 (87.3)
Oral contraceptive pills	20 (18.2)	90 (81.8)
Emergency contraceptive pills	36 (32.7)	74 (67.3)
Injectables	24 (21.8)	86 (78.2)
IUDs	56 (50.9)	54 (49.1)
Implants	62 (56.4)	48 (43.6)
Pregnancy tests	20 (18.2)	90 (81.8)
HIV rapid diagnostic tests	25 (22.7)	85 (77.3)
STI starter packs	45 (40.9)	65 (59.1)

4.1.3 Mean stockout days of the last 30 and 90 days

The study also examined the mean stockout days of the last 30 and 90 days to justify the stockout of the visiting day. The results revealed that IUDS, implants, and STI starter packs had the highest mean stockout days, as they scored 2.95, 3.24, and 2.45 for the last 30 days before the survey day, and 10.26, 11.45, and 9.61 for the last 90 days before the survey, respectively. This was followed by emergency contraceptive pills, HIV rapid diagnostic tests, and injectables, who scored 2.60, 2.05, and 2.01 for the last 30 days' mean score, and 8.11, 6.74, and 6.82 for the last 90 days to the survey day. Male condoms, oral contraceptive and pregnancy tests were the more stable products.

Table 4

Mean stockout days of the last 30 and 90 days

Commodity	Mean (30 Days)	Mean (90 Days)
Male condoms	1.44	4.92
Oral contraceptive pills	1.89	6.43
Emergency contraceptive pills	2.60	8.11
Injectables	2.01	6.82
IUDs	2.95	10.26
Implants	3.24	11.45
Pregnancy tests	1.73	5.94
HIV rapid diagnostic tests	2.05	6.74
STI starter packs	2.45	9.61

4.1.4 Inventory documentation and eLMIS compliance.

On assessing the documentation of the commodity, the study found that most of these studied commodities are documented. This is evidenced by the score of 95.5% scored by pregnancy tests as the highest, and 88.2% scored by emergency contraceptive pills and implants. This is a new contribution that fills the preceding studies by Hunter et al. (2023) and Mrisho et al. (2021). These studies did not assess the inventory documentation, and therefore, answers to what might be the reason of stockout of these commodities were uncertain.

Table 5

Inventory documentation and eLMIS compliance

Commodity	Documentation Present n (%)	Not Present n (%)
Male condoms	104 (94.5%)	6 (5.5%)
Oral contraceptive pills	102 (92.7%)	8 (7.3%)
Emergency contraceptive pills	97 (88.2%)	13 (11.8%)
Injectables	101 (91.8%)	9 (8.2%)
IUDs	95 (86.4%)	15 (13.6%)
Implants	97 (88.2%)	13 (11.8%)
Pregnancy tests	105 (95.5%)	5 (4.5%)
HIV RDT	101 (91.8%)	9 (8.2%)
STI starter pack	96 (87.3%)	14 (12.7%)

4.1.5 Youth-exit intercept results

The study also involved a youth-exit intercept to draw the youth perspective on the availability of the AYSRH commodities. The exit intercept revealed that 70.8 of the youth involved had received their desired AYSRH commodity, and 29.2% did not. Among the common reasons for those who did not receive their desired commodity were commodity stockout (42.7%), long waiting time (24%), being denied (12%), and 21.3% had other reasons. These youth showed comfort in dealing with the service providers (81.3%), and 82.9% had a likelihood of returning to the facility for future dealings. These findings conquer that of Mtaita et al. (2021), who reported an improvement in AYSRH service provision. To add on that, this study has been able to gather adolescents' and youth experiences on the availability to understand the situation from the customer's side. To wind up, there is a significant improve of the AYSRH commodity availability led by SCI implementation. The study builds on Mesiäislehto et al. (2021) on how AYSRH services meet the needs of adolescents and youth.

Table 6

Youth-Exit Intercept Results

Variable	Category	Frequency (n)	Percentage (%)
Received desired commodity/service	Yes	182	70.8
	No	75	29.2
Reasons for not receiving service	Commodity out of stock	32	42.7
	Long waiting time	18	24.0
	Service denied/administrative issues	9	12.0
	Other reasons	16	21.3
Comfort level with service provider	Very uncomfortable	12	4.7
	Somewhat uncomfortable	36	14.0
	Comfortable	121	47.1
	Very comfortable	88	34.2
Waiting time acceptable	Yes	163	63.4
	No	94	36.6
Likelihood of returning to facility	Yes	213	82.9
	No	44	17.1

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

The study underscores the SCI potential by revealing the current level of AYSRH commodity availability, which is mainly attributed to the ongoing integration between relevant healthcare actors. The study has revealed a stable availability status of the short-term contraceptive commodities and an unstable availability status of long-term contraceptives such as implants and IUDs. On the other hand, STI treatment commodities and testing kits show a

moderate instability with variation depending on the area. On documentation, the bin cards and eLMIS records are widely applied within the healthcare sector, implying a potential opportunity to leverage this for demand and supply planning. Through the youth-exit intercept, the study has revealed some operational inefficiencies caused by stockout of AYSRH commodities and those of facility-based ones, such as long waiting time and pricing.

5.2 Recommendations

The study recommends improvements on SCI as it has improved the availability of AYSRH commodities in the country. Furthermore, the study recommends agile measures to be taken towards improving the availability of long-term contraceptives and STI treatment commodities. This needs to be done jointly, by the health sector governing authorities and the respective SC actors. To the healthcare facilities, the study recommends a proper utilization of the records/documentation to make future demand planning and forecasting. This can help to improve the availability of AYSRH commodities. Also, healthcare facilities need to improve their operational activities to reduce customer waiting time, as this hinders youth from acquiring services on time.

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