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Leveraging research-based knowledge translation via rural libraries to improve maize postharvest practices in Uganda

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Background: Rural community libraries are increasingly recognised for providing localised knowledge, yet their potential to support agricultural extension services and improve access to postharvest knowledge in Uganda remains underexplored.

Objectives: This study examined the postharvest information needs of smallholder maize farmers and explored how community libraries can be leveraged to translate and repackage research-based knowledge to meet these needs.

Method: A mixed-methods parallel design was employed. Data were collected from a survey of 312 maize farmers, personal interviews and two focus group discussions (FGDs) with 22 extension workers and four librarians. Desk research was conducted to analyse relevant documents. Quantitative data were descriptively analysed using SPSS, while qualitative data were thematically coded and interpreted with ATLAS.ti.

Results: Farmers face critical knowledge gaps in storage, drying, value addition, credit access, pest management, marketing and insurance. Although limited in reach, rural community libraries are underutilised, yet hold potential as localised hubs for translating and repackaging research-based knowledge into farmer-relevant formats. Strengthening libraries' roles through policy support, funding, partnerships and multi-channel dissemination could enhance knowledge access, reduce postharvest losses, increase farmer incomes and improve food security.

Conclusion: Current top-down knowledge sharing inadequately meets farmers' needs, while rural libraries' untapped capacities limit access to relevant agricultural knowledge.

Contribution: The study identifies community libraries as key knowledge intermediaries and proposes their integration into extension systems to promote effective knowledge translation (KT) and improvement in postharvest practice.

Keywords: agriculture extension research knowledge; rural community libraries; postharvest handling; maize; information services; rural development.

Introduction

Rural community libraries are locally established libraries in rural areas that provide access to knowledge to support the community's agriculture, education, literacy and socio-economic development (Bopape et al. 2021). Providing rural communities in Uganda with expert knowledge through rural libraries to support agriculture, including maize postharvest handling (PHH) for improved practices, is essential.

Maize is one of the important crops for food security and income generation in Uganda (Sempiri 2025), cultivated by most rural smallholder households. Despite its importance, maize production faces persistent challenges during PHH. Farmers often depend on traditional methods such as open sun drying on bare ground, temporary cribs and woven granaries. These practices expose maize to contamination, pest infestation and moisture variability, resulting in high losses and reduced grain quality (Akumu et al. 2020). Studies show that smallholder farmers regularly lose a significant proportion of their harvest due to a lack of knowledge on how to handle postharvest practices effectively, leading to spoilage of maize, premature sale under market pressure and ineffective drying and storage (Akumu et al. 2020; Darfour & Rosentrater 2020; Kiwelu &

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Ngulube 2025; Tibaingana, Kele & Makombe 2018). Such losses undermine household nutrition and reduce farmers' ability to generate income, even in seasons of good yields.

Over the past decades, agricultural research has produced cost-effective and scientifically tested postharvest technologies such as hermetic storage bags, solar dryers, threshers, metal silos and chemical protectants (Baidhe et al. 2024; Baributsa et al. 2020; Mutungi et al. 2023). However, adoption rates remain low in Uganda. A key reason for this gap is the knowledge dissemination from the disconnect between research innovation sites and rural farmers' lived realities. While agricultural extension systems are mandated to bridge this divide, their reach is limited by staffing shortages, underfunding and sometimes a disregard for the value of farmers' indigenous knowledge (Cruz et al. 2022; Elueze 2016b). This has left farmers without consistent, localised and practical information about how to apply improved technologies, their benefits or their costs. Consequently, farmers continue to rely on outdated postharvest methods, reinforcing a cycle of food loss, low incomes and vulnerability to climate change.

Knowledge translation (KT) offers a structured process of converting complex, research-based evidence into actionable practices for specific communities. Graham et al.'s (2006) Knowledge-to-Action (KTA) framework emphasises identifying local problems, contextualising knowledge, selecting and tailoring solutions, and sustaining their use through monitoring. In agricultural contexts, KT requires more than the dissemination of technical manuals. It involves packaging knowledge in formats that resonate with rural communities, integrating farmers' experiential knowledge with scientific innovations, and delivering information through trusted and accessible channels. Without translation and repackaging, even the most effective technologies risk remaining confined to academic spaces, leaving smallholder farmers excluded from research benefits.

Rural community libraries are emerging as information hubs for supporting growth in rural Uganda (Dent & Yannotta 2005; Foundation 2025; Jones 2009). Though many struggle with funding, staffing, and information materials, they represent a unique opportunity for addressing postharvest information needs (Kiwelu & Ngulube 2025). Unlike overstretched extension systems, libraries are situated within communities, with mandates focused on knowledge access, literacy and local empowerment. Rural maize smallholder farmers can seek information in the rural library to improve their PHH practices. Their desire to acquire translated and repackaged information is crucial in helping these farmers make better decisions and enhance their maize postharvest practices.

Globally, libraries have demonstrated their potential in agricultural development by repackaging knowledge into user-friendly forms such as posters, radio programmes, audiovisual materials and mobile apps (Bopape et al. 2021; Islam & Zabed Ahmed 2012; Osei-Kwarteng et al. 2024). Librarians' expertise in information retrieval, digital skills and literacy training makes them valuable partners in translating complex postharvest research into practical, usable knowledge for smallholder farmers.

Despite rural libraries' growing role in development, little is known about how they can be systematically leveraged to address agricultural postharvest challenges in Uganda. Few studies have looked at maize postharvest information needs for rural smallholder farmers and KT through community libraries in Uganda, which is the gap this study intended to cover.

Farmers need context-specific knowledge on drying, storage, pest control and market access, but few interventions deliberately position libraries as part of agricultural knowledge systems. In learning from the KT framework, this study seeks to bridge this gap by examining farmers' postharvest information needs and how community libraries can be leveraged to translate and repackage research-based knowledge to meet these needs.

Research questions

- What specific maize PHH information is needed for rural smallholder farmers in Uganda?
- How can KT through community libraries be leveraged to provide research-based knowledge that improves PHH practices among rural smallholder maize farmers in Uganda?

Literature review

The researchers used the research questions to guide the literature review while analytically identifying gaps, strengths and weaknesses as seen below:

RQ1: What specific maize postharvest handling information is needed for rural smallholder farmers in Uganda?

Studies highlight a persistent gap between scientific innovations in PHH and farmers' everyday practices, often due to undervaluing farmers' experiential knowledge and the limited translation of research findings into accessible formats (Cruz et al. 2022; Elueze 2016a). Smallholder farmers in Uganda primarily rely on traditional practices such as bare-floor drying, temporary storage structures and immediate maize sales, which are vulnerable to insect infestation, climate variability and spoilage (Darfour & Rosentrater 2020; Dufour, Clancy & Wu 2023; Kelly 2015; Tibaingana et al. 2018). Farmers acknowledge that inadequate access to timely storage and market information forces them to sell maize at low prices despite significant losses during storage (Tibaingana et al. 2018).

Scientific research has generated improved technologies such as solar dryers, hermetic bags, metal silos, threshers and

chemical protectants that address losses and extend storage capacity (Mutambuki & Likhayo 2021; Muzoora 2025; Oyewole et al. 2025). However, uptake remains low because farmers lack clear, context-specific knowledge about these technologies' costs, benefits and applicability to rural smallholder settings.

Rural farmers' key information needs include moisture removal and safe drying methods suitable for local climatic conditions, affordable storage facilities like hermetic bags and silos that minimise insect damage, marketing information to avoid distress sales immediately after harvest, climate and weather forecasts tailored to postharvest timing and value-adding practices that increase income beyond grain sales (Ariyo et al. 2025; Atube et al. 2021; Liverpool-Tasie et al. 2020; Mutambuki & Likhayo 2021; Muzoora 2025). These findings confirm that farmers require technical knowledge about postharvest technologies and localised guidance on adoption, costs and long-term benefits.

RQ2: How can knowledge translation through community libraries be leveraged to provide research-based knowledge that improves postharvest handling practices among rural smallholder maize farmers in Uganda?

Knowledge translation models such as Graham's KTA framework provide systematic processes for transforming research into usable formats by identifying knowledge gaps, localising findings, assessing barriers, selecting interventions and sustaining uptake (Friedmann 2020; Graham et al. 2006). This framework allows rural community libraries to act as intermediaries between agricultural research institutions and smallholder farmers.

Globally, community libraries have played roles in rural development. In developed contexts such as the USA, UK, Canada and Australia, libraries support agricultural knowledge dissemination despite challenges of funding and staffing (Wynia, Scott & Gillett 2019).

In developing countries, Bangladesh (Islam & Zabed Ahmed 2012), Nigeria (Yahaya et al. 2024), Tanzania (Wema 2024) and South Africa (Bopape et al. 2021; Zimu-Biyela 2021) attest that libraries provide localised, repackaged information through training, posters and community outreach. Though constrained by resources, they enhance agricultural knowledge access and socio-economic growth.

In Uganda, rural community libraries established by nongovernmental organisations (NGOs), individuals and development partners in districts such as Masaka, Luwero, Bugweri, Adjumani and Wakiso offer untapped potential to bridge the postharvest information gap (Dent & Yannotta 2005; Foundation 2025; Jones 2009). With their expertise in literacy, information retrieval and digital skills (Hirsh 2022; Lenstra 2025), librarians can collaborate with researchers, extension agents and farmers to identify localised information needs, translate technical findings into simple (Okuonghae & Igbibovia 2025), culturally relevant formats (e.g. charts, drama, songs, radio spots, videos and mobile apps), disseminate knowledge via library programmes, agricultural shows, farm magazines and digital platforms and sustain adoption by monitoring and evaluating knowledge use at the community level (Aina 2006; Elueze 2016b).

Evidence from initiatives such as the African Postharvest Losses Information System (APHLIS), Farmer Field Schools and mobile extension apps shows that repackaged and localised agricultural information improves adoption and outcomes (Binge, Jalango & Tesfaye 2023; Osei-Kwarteng et al. 2024; Van den Berg et al. 2020, 2021). For Uganda, rural libraries could function as hubs where such initiatives are contextualised into local languages and disseminated affordably to farmers who lack consistent access to extension services.

However, integration challenges remain. Studies note weak linkages between extension workers, librarians and agricultural scientists (Sam et al. 2017; Sobalaje & Joel 2020), limiting the effectiveness of information delivery. Addressing this requires deliberate partnerships in which rural libraries complement extension systems by offering continuous, accessible and repackaged knowledge that addresses farmers' PHH needs. Few studies have looked at maize postharvest information needs for rural smallholder farmers and KT through community libraries in Uganda, which is the gap this study intended to cover.

Research methods and design

This study was guided by the pragmatic paradigm, which supports integrating qualitative and quantitative approaches (Mwansa et al. 2022) to address multifaceted research problems like this study, which, through the lens of the KT framework by Graham et al. (2006), examined rural smallholder farmers' knowledge needs, KT and repackaging, rural community libraries, and agriculture extension services. This methodology ensures flexibility, a comprehensive investigation of a phenomenon and the generation of balanced knowledge. A parallel convergent mixed-methods design was employed, enabling simultaneous collection and independent analysis of qualitative and quantitative data, which were later merged for comprehensive interpretation (Mwansa et al. 2022).

Population and sampling

The study targeted 1 930 019 individuals, including 1 926 034 smallholder maize farmers, 3854 agricultural extension officers and 131 information officers. For the quantitative strand, a sample of 400 farmers was determined using Adam's formula for a large population at a 5% margin of error (Adam 2020). A stratified random sampling was applied to select the smallholder farmers from four major maize-producing districts (Iganga, Mubende, Adjumani and Kabarole) in Uganda, with 312 valid responses obtained

(78% response rate). A researcher-designed questionnaire was pretested with 40 respondents, and validity was established through expert review using the Content Validity Index (CVI).

For the qualitative strand, purposive sampling selected 48 participants. In-depth interviews were held with 26 individuals (22 extension officers and four information officers) from four maize-producing districts (Adjumani, Iganga, Kabarole and Mubende) and the Ministry of Agriculture, Animal Industry, and Fisheries (MAAIF) head office in Entebbe. Two focus group discussions (FGDs) involving 15 participants validated and enriched the findings. Relevant policy documents were also reviewed.

Data collection

Quantitative data were collected via questionnaires, while interviews, FGDs and document analysis captured qualitative insights into PHH, rural smallholder farmers' knowledge needs, extension services, research-based KT and repackaging and rural community libraries. Five locally recruited assistants supported fieldwork between November 2023 and May 2024.

Data analysis

Quantitative data were analysed using SPSS v29, applying descriptive statistics. Qualitative data were analysed thematically in ATLAS.ti v24 using Braun and Clarke's six-phase process: familiarisation, coding, theme development, review, refinement and reporting (Braun & Clarke 2006). Codes (P1–P26) generated from interviews and focus groups (FGD1 on 09.02.2024 and FGD2 on 13.03.2024), informed the discussions, conclusions and practical implications for KT, repackaging and dissemination through rural community libraries to rural smallholder farmers. Integration of both strands was done using a convergent mixed-methods design, as explained by Hirose and Creswell (2023), highlighting convergence, complementarity and divergence.

Ethical considerations

Ethical approval clearance to conduct this study was obtained from the Uganda National Council of Science and Technology (Ref: SS1435ES), the Research Evaluation Committee of The AIDS Support Organization and the University of South Africa (Ref: REC 240616 CREC_CHS_2022). Participants received information sheets (translated where necessary), provided written consent and were assured anonymity and voluntary participation. The researchers acknowledge using ChatGPT for rephrasing, summarising long sentences, Grammarly for grammar and Scispace for relevant articles and understanding concepts.

Results

This study explored the maize PHH knowledge needs of rural smallholder farmers in Uganda and the potential of community libraries to translate, repackage and disseminate research-based knowledge. It examined how libraries can identify knowledge gaps, localise content, address barriers, select appropriate information and promote its sustained use.

Specific maize postharvest handling knowledge needs

The first question used a survey questionnaire to examine the specific information needs of rural smallholder farmers in Uganda regarding maize PHH. The results are reported in Table 1.

Results as presented in Table 1 show that the most pressing PHH knowledge needed for smallholder farmers was storage (305, 97.7%), followed by drying (296, 94.8%), value addition (284, 91.0%) and credit support (240, 76.9%). The qualitative findings from the personal interviews were consistent with these findings. For example, one participant said, 'Farmers still need information regarding PHH (postharvest handling)' (P17-MUB). Furthermore, participants mentioned other topics such as soil management, insurance for postharvest loss, marketable crops, reliable water for production and markets for maize, as additional information farmers needed, as seen in Figure 2 of the specific needs from the qualitative data.

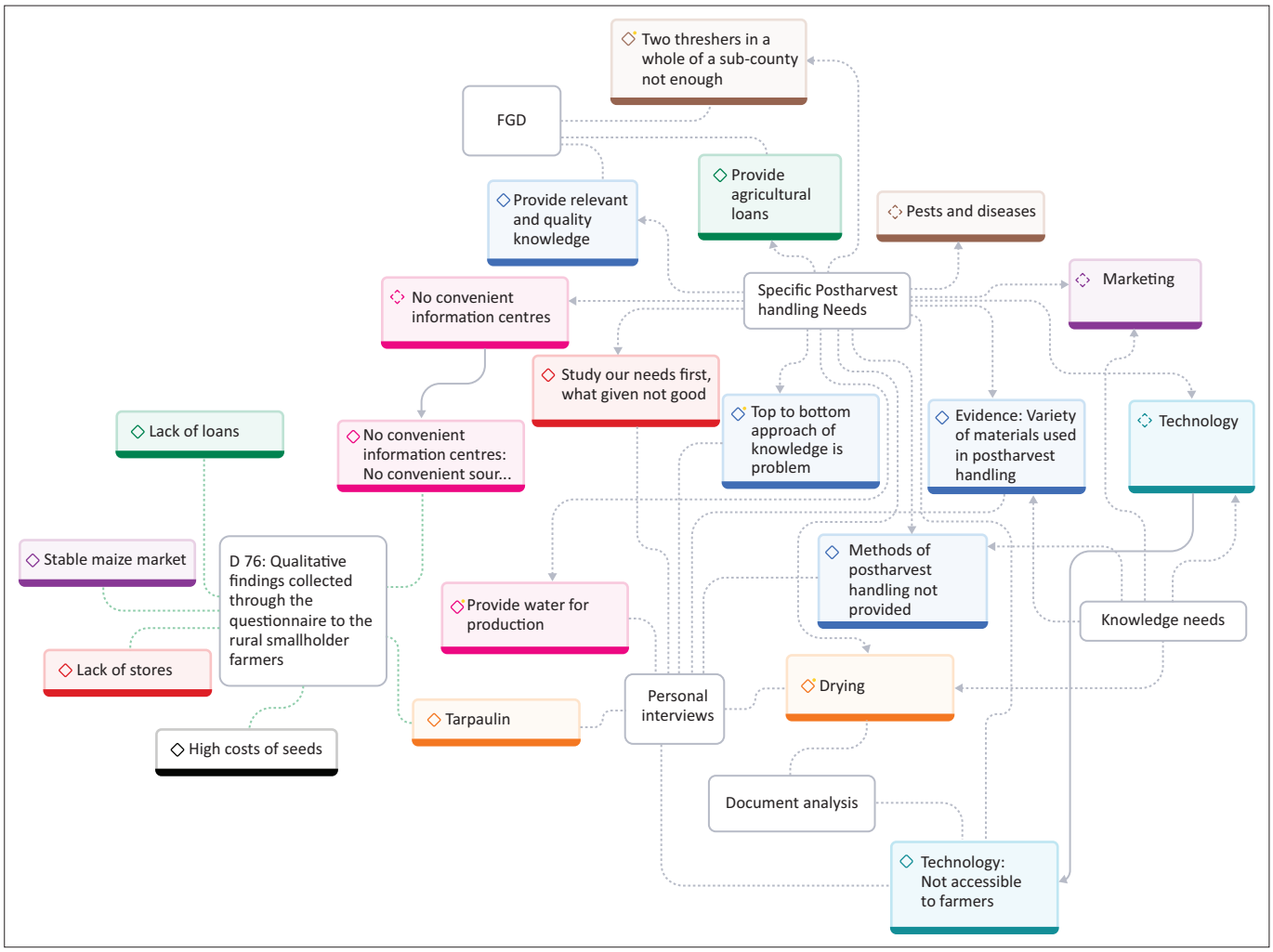
Figure 1 presents a network of various needs mentioned by the study participants, including FGDs, open-ended questions, personal interviews and document analysis. Participants highlighted the need for pest control, drying, storage, market access and appropriate technology. They also highlighted the limitations of the top-down knowledge delivery approach, noting that it ignored rural socio-economic realities. Scientific information was lacking in libraries, and extension services were insufficient due to a high farmer-to-extension worker ratio and limited outreach.

Knowledge translation and repackaging for rural maize farmers

The second research question investigated how research-based knowledge identified was translated and repackaged to meet the PHH needs of rural smallholder maize farmers in Uganda. Participants in the qualitative arm of this study were asked to explain how knowledge concerning maize PHH was translated into local languages and repackaged for farmers' easy use. The findings are presented in Figure 2 using a word cloud.

TABLE 1: Specific maize postharvest handling knowledge needs for farmers (N = 312).

Information needs	Yes	%
Drying	296	94.8
Storage	305	97.7
Value addition	284	91.0
Credit support	240	76.9
Continuous training	228	73.0
High-yielding seeds	26	8.3
Transportation	90	28.8



FGD, focus group discussions.

FIGURE 1: A network of the maize postharvest handling specific needs.

The grounded words 'farmer' and 'information' showed that the focus was on repackaging evidence to meet farmers' needs. This repackaging was in visual forms such as videos, leaflets, training manuals, demonstration knowledge and brochures. One interview participant said repackaging was expensive and rarely done because of the lack of funds. One of the participants said

> 'Information repackaging like translation is very expensive and challenging; rural farmers are like nursery children that need consistent training like you say "a" until they understand. Consistent training is important but with no funding.' (P22-EBB)

This information was disseminated to farmers through training, demonstrations and hands-on farm practices. These channels included: farm demonstrations and trials, training, reference service in community libraries, radio and TV talk shows, WhatsApp, farmers' exploration and exhibitions.

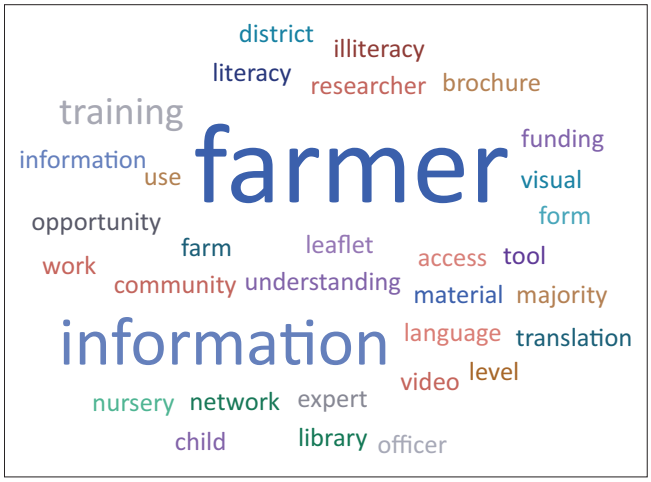


FIGURE 2: Translation and repackaging of evidence-based maize postharvest handling information.

The results of this study showed that though the information was translated and repackaged, it was a small quantity and not explicitly done in the rural community libraries. Farmers highlighted the lack of information on loans, farm marketing, reliable transport and coordinated training in the rural community libraries. Specific maize PHH information was also unavailable from some sources, such as information centres or community libraries in the studied districts. Furthermore, district information officers did not have the information available for dissemination, and extension workers' knowledge and skills were limited. The knowledge disseminated was not improving the quality and quantity of

maize as farmers were still using rudimentary means that were not effective, as confirmed by the qualitative findings in this statement:

> 'In Iganga, maize postharvest handling is still done traditionally, like threshing maize by beating the cobs to remove them, harvesting maize when not dry well, harvesting while throwing the maize into one collection centre, and drying maize on the soil. All these traditional practices lead to loss.' (FGD2; 13.03.2024; P20-IGA)

The qualitative findings revealed that limited resources and inadequate funding hindered translation, repackaging and the dissemination of information on maize PHH to rural farmers. Participants from Adjumani (ADJ), Mubende (MUB), Iganga (IGA), Kabarole (KAB) and Entebbe (EBB) agreed and cited a lack of adequate financial support and infrastructure for disseminating information concerning maize PHH. They confirmed they were unaware of any rural community libraries with such information. Through personal interviews and FGDs, the study participants said there were no rural community libraries known to them apart from urban public libraries that were far away from where they resided in Fort Portal town for Kabarole District, Jinja Public Library for Iganga. Mubende Public Library was in the municipality. Adjumani district research participants said they did not know of any community or public library.

However, in Iganga, there was a rural community library in the nearby district of Bugweri, privately owned by Kitakule Foundation at Busesa Trading Centre, known as Busesa Community Library (Foundation 2025). Most of the KT and repackaging was done at the Ministry level and brought to be disseminated to the rural communities. Through an online search, the researchers located two libraries in Adjumani that were established in 2022 by the Literate Earth Project, Mwerwerwe Primary School Library and Ayilo 1 Refugee Settlement Camp Library. These libraries support refugees and primary school children. In Kabarole District, Kabarole Resource Centre serves as the only centre noted for research, knowledge repacking and communication in the rural part of the district, though in Fort Portal City, there is a public library that farmers were not aware of utilising.

Questionnaire respondents expressed the need for rural smallholder farmers to be involved in the process of translating and repackaging information to ensure their social, cultural, economic and technological needs were considered before information was acquired and disseminated to them. The current top-to-bottom approach was considered unfavourable, where information was disseminated to farmers without asking about their specific needs. This top-to-bottom approach meant that farmers accessed information that did not apply to their specific needs. The qualitative study participants said information was packaged at the Ministry and distributed for dissemination without involving the farmers, which could no longer be appropriate. The online FGD participants argued that:

> 'Information is packaged according to farmers' seasons. If it is planting, then that is the kind of information that is packaged and disseminated during the planting season. If it is harvest, the harvesting information is packaged and disseminated at that season of harvesting.' (FGD2; 13.03.2024; P22-EBB)

Qualitative findings confirmed the same knowledge dissemination partners as in the quantitative study. Participants noted that extension workers did not collaborate with community libraries or recognise their role in reaching farmers. Recommendations included relocating libraries closer to farmers and improving outreach. Existing repackaging efforts lacked formal support, structure and updated skills.

One participant said:

> 'We are looking for such repackaged information we give farmers, but it is not there, I cannot help.' (P21-IGA)

They suggested that extension workers should work with community libraries by equipping them with already packaged evidence to disseminate to the farmers who visited their libraries:

> 'Repackage the knowledge in the form of brochures, audiovisual and disseminated using the community library or the district information officers.' (FGD2; 13.03.2024; P21-IGA)

However, the National Agricultural Extension Services Strategy 2016/17–2020/21 did not. There is no connection channel with agricultural technical people to train the librarians and equip them with information to help farmers. Participants confirmed these results:

> 'The only formal existing network is between the District Production Officers, the Extension workers and the line ministry, that is, the Ministry of Agriculture, Fisheries and Extension Services. Not with any library.' (FGD2; 13.03.2024; P24-IGA)

These participants suggested that rural community libraries and district information officers can communicate the final products of the knowledge repackaged to farmers.

Language barriers and connectivity were mentioned as one of the hindrances of knowledge dissemination and access by rural farmers:

> 'Information is failing to reach the intended farmers because of a lack of connectivity, or failure to participate in training where the information is disseminated and sometimes language barriers.' (FGD2; 13.03.2024)

However, the same participants mentioned that Internet connectivity using social media like WhatsApp messaging was used to repackage research agriculture knowledge for rural farmers, as confirmed in this statement from FGD:

> 'Information repacked in WhatsApp messages, few rural farmers understand English and have smartphones.' (FGD2; 13.03.2024; P25-IGA)

Illiteracy levels among rural maize farmers were also mentioned as a challenge that affected their access to disseminated knowledge:

'Some people did not know how to write and read, and yet the process of accessing information needed the two.' (FGD2; 13.03.2024; P26-KAB)

'Some of our farmers are not able to read English.' (FGD1; 09.02.2024; P19-IGA)

Discussion

Rural smallholder farmers' maize postharvest handling knowledge needs

This study's first question was set out to determine the specific needs for maize PHH information for rural smallholder farmers in Uganda. Results from quantitative and qualitative strands showed that farmers require diverse technical, economic and infrastructural knowledge. The most pressing needs were storage (97.7%), drying (94.3%), value addition (91.0%) and credit support (76.9%), with additional information needs identified around pest control, marketing, soil management, insurance for postharvest loss, water availability and appropriate technology.

The prominence of storage and drying reflects their centrality to maize PHH challenges in sub-Saharan Africa. Inadequate storage facilities often result in significant grain losses due to pests, mould and poor aeration, while insufficient drying leads to aflatoxin contamination. These findings reinforce earlier work by Atnafu et al. (2025) and Darfour and Rosentrater (2020), who emphasised the critical role of proper drying and storage in safeguarding food security and farmer income. Demissie, Tolera and Kuyu (2025) also demonstrated that adopting improved storage structures substantially reduces losses, underscoring why farmers ranked storage as their top information priority.

The need for value addition and access to credit reflects farmers' recognition of PHH as not merely a preservation process but also an avenue for income generation. Access to financial services enables investment in improved technologies, including hermetic bags, metallic silos or small-scale processing equipment. Vasavi et al. (2025) similarly observed that financial constraints limit smallholders' adoption of innovative PHH practices, suggesting that addressing credit information gaps is crucial to enabling technological uptake.

Qualitative insights extend these priorities by highlighting pest management, markets and insurance for postharvest losses as further knowledge gaps. Mutambuki and Likhayo (2021) found that pest infestations, particularly from maize weevils and larger grain borers, remain major contributors to losses in Eastern Africa. The farmers' emphasis on market access and insurance resonates with Meghana et al. (2025), who argued that improving PHH outcomes requires integrating market systems and risk management strategies.

Another key dimension of the findings is the inadequacy of knowledge delivery systems. Participants reported that top-down extension models fail to capture local socio-economic realities, while extension workers remain too few to serve large farming populations effectively. Prajapati et al. (2025) noted that high farmer-to-extension worker ratios constrain the dissemination of agricultural knowledge. The absence of adequate agricultural scientific information in rural libraries further exacerbates this gap, limiting farmers' ability to independently access reliable PHH information.

These findings imply that the farmers needed localised, participatory and multi-channel knowledge dissemination initiatives. Strengthening linkages between libraries, extension services and community engagement platforms could provide farmers with timely, research-based PHH information tailored to their contexts. By addressing both technical practices (drying, storage, pest control) and enabling conditions (credit, markets, insurance), such approaches could significantly reduce maize postharvest losses while improving farmer incomes and food security in Uganda.

Research-based knowledge translation and repackaging

The second research question examined how community libraries can be leveraged to translate research-based knowledge and repackage locally relevant PHH information for smallholder maize farmers in Uganda. The findings reveal that while the Ministry of Agriculture, Animal Industry, and Fisheries produces verified PHH content such as training manuals, demonstration sessions, videos, leaflets and WhatsApp messages, the process was essentially top-down. As a result, farmers felt excluded, and the repackaged knowledge did not fully reflect their socio-economic and cultural realities.

Community libraries in the studied areas were limited in number and scope, with minimal activities in KT or repackaging. Similar challenges have been documented in Nigeria, Malawi, Ghana and South Africa, where rural communities lack well-resourced libraries staffed with individuals knowledgeable in agriculture (Okuonghae & Igbibovia 2025; Sobalaje & Joel 2020; Zimu-Biyela 2021). Countries such as Bangladesh, Malaysia and Kenya face comparable obstacles, particularly inadequate funding and staffing for rural libraries. These findings suggest that despite their potential, rural libraries remain underutilised as platforms for delivering agricultural knowledge. Yet international models such as APHLIS, Farmer Field Schools and mobile platforms like AgriHub demonstrate how participatory and technology-driven approaches can bridge the gap between research and practice approaches that libraries could adapt locally.

Librarians possess relevant KT and repackaging skills, including information literacy training, needs assessment and content adaptation (Aina 2006; Elueze 2016a, 2016b; Hirsh 2022). Farmers in this study identified the need for information in formats such as brochures, audiovisuals, demonstrations and exhibitions. However, resource constraints limited

repackaging efforts. One participant described the process as costly and emphasised the need for repeated, practical training to help farmers adopt improved PHH practices.

Despite the available research-based knowledge through research4life, open access initiatives and materials, community libraries have not systematically disseminated this knowledge. Farmers reported gaps in access to information on loans, marketing, transport and coordinated training. Extension workers and district information officers did not actively collaborate with libraries, leaving farmers without specific, equipped centres in the community to access knowledge.

Barriers such as inadequate funding, limited infrastructure, language differences, weak Internet connectivity and farmer illiteracy further constrained dissemination. Although WhatsApp and social media were occasionally used, only a minority of farmers had smartphones or understood English. Moreover, the National Agricultural Extension Services Strategy (2016/17–2020/21) did not include provisions for training or equipping librarians, reinforcing the disconnect between libraries and agricultural extension systems.

These findings imply that community libraries have untapped potential as hubs for PHH knowledge dissemination. Strengthening their role will require investment, policy support, structured partnerships with extension systems and farmer participation in designing knowledge products to ensure cultural and practical relevance.

Study limitations and areas for further research

The study was limited to selected districts and may not fully capture the diversity of maize postharvest practices across Uganda. Few rural community libraries existed in the study areas, which restricted direct observation of their potential role in KT and repackaging. Therefore, widening the scope may be advantageous.

Future studies should explore how community libraries can be systematically integrated into Uganda's national agricultural extension system, including policies, funding models and collaborative frameworks with extension workers. As well as the role of mobile technologies, Artificial Intelligence and social media in localising PHH knowledge delivery through rural community libraries, to enhance timely, accessible and context-relevant information for smallholder farmers.

Practical implications or recommendations

Strengthening the role of community libraries could significantly improve access to timely and practical postharvest knowledge. This requires:

- Policy support and funding to equip rural community libraries with resources, research-based knowledge, infrastructure and trained staff.
- Partnerships between rural community libraries, extension workers and research institutions to ensure coordinated knowledge identification, translation, repackaging and dissemination.
- Farmer participation in designing repackaged knowledge products, ensuring cultural and contextual relevance.
- Using multichannel dissemination such as demonstrations, brochures, audiovisuals and online mobile platforms to overcome literacy, language and connectivity barriers.

Conclusion

This study revealed that rural smallholder farmers in Uganda have critical knowledge needs in maize PHH, particularly in storage, drying, value addition and credit access, alongside additional requirements for pest management, marketing and insurance. However, existing knowledge delivery remains inadequate, with extension services overstretched and libraries underutilised. Despite limited presence and capacity, community libraries hold untapped potential to serve as localised hubs for translating and repackaging research-based knowledge into formats relevant to farmers' socio-economic contexts. By leveraging libraries as community-based knowledge intermediaries, Uganda can reduce postharvest losses, enhance farmer incomes and strengthen food security.

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Further, the article is also based on data from a larger study. A related article focusing on evidence-based information practices (EBIP) and the development of a collaborative model for improving access to maize postharvest handling information has been published in *Cogent Food & Agriculture*, 11(1), Article ID 2553191, https://doi.org/10.1080/23311932.2025.2553191. The present article addresses a distinct research question, focusing on the role of rural community libraries in translating and repackaging research-based knowledge to support smallholder farmers in Uganda.

Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

CRediT authorship contribution

Jackline Estomihi M. Kiwelu: Conceptualisation, Data curation, Formal analysis, Investigation, Methodology, Project administration, Visualisation, Writing – original draft. Patrick Ngulube: Conceptualisation, Supervision, Writing – review & editing.

All authors reviewed the article, contributed to the discussion of results, approved the final version for submission and publication and take responsibility for the integrity of its findings.

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Data availability

To protect participant privacy, the data supporting the findings of this study can be obtained from the corresponding author, Jackline Estomihi M. Kiwelu, upon reasonable request via email at 12788279@mylife.unisa.ac.za.

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