



REVIEW ARTICLE

Gender equality and social inclusion in agricultural systems: A systematic review and bibliometric analysis

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Abstract

Gender equality and social inclusion (GESI) are generally accepted to be key in enhancing the sustainability, productivity and resilience of agricultural systems. Nevertheless, there is still a lot of inequality that limits women's access to important resources, including land, technology, markets and opportunities in decision-making. This paper represents a synthesis of the GESI literature in the agricultural field by investigating the emergence, theoretical framework and new themes of the literature using a synthesis of the literature in the form of a systematic literature review (SLR) coupled with a bibliometric analysis. The study analysed 118 peer-reviewed articles published between 2020 and 2025 and indexed on the Scopus database. This analysis was carried out based on preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines, which involve the analysis of publication patterns, collaboration and key networks using VOSviewer and R-based tools. The results reveal that there is a high concentration of studies on women's empowerment, gender roles and household-level decision-making and an increasing interest in other areas like climate resilience, adoption of technology and engagement in value chains. Despite of these developments, the current literature is fragmented, especially in the areas of intersectionality, governance and digital inclusion. Social norms, unequal allocation of resources, labour constraints, institutional barriers and climate risks are the most significant structural factors that influence GESI outcomes. The results highlight the importance of gender-transformative and intersectional approaches to build inclusive and resilient agrifood systems.

Keywords: agrifood systems; gender dynamics; gender equality; social inclusion; women's empowerment

Introduction

Globally, farming is a significant source of livelihood, food security and poverty reduction. Despite its central role, persistent gender inequality and social exclusion continue to affect the transformative potential of agricultural systems. Although they constitute nearly half of the global agricultural labour force, the contribution of women has continued to be underestimated due to their restricted access to the markets, land, credit, technology and agricultural extension services (1). Institutional constraints and ingrained sociocultural beliefs also undermine the capacity of women to make choices in domestic and agricultural value chains and restrict productivity gains as well as equitable developmental results (2). In addition to gender inequality, agricultural systems often marginalise the indigenous communities, landless workers, rural youth, migrant workers and individuals with disabilities, hindering their effective involvement in agricultural development and governance (3).

Gender equality and social inclusion (GESI), as a key approach to achieving sustainable and equitable change in global development and policy agendas, has gained increasing importance in recent years. The necessity to guarantee equitable access to resources, the equality of participation and the addressing of

structural inequalities is a pillar of sustainable development as stated in global policy frameworks such as the sustainable development goals (SDGs) (4). Empirical studies have consistently shown that gender responsive and socially inclusive agricultural systems can and can lead to greater productivity, increased resilience and improved food and nutrition security outcomes (5). However, the ongoing unequal access to productive resources, digital technologies, financial support systems and institutional support continues to marginalise women and other disadvantaged groups, curbing their chances to benefit from ongoing agricultural transformation (6).

It has been demonstrated that a 20–30 % increase in agricultural output due to decreasing gender gaps in access to agricultural inputs and services could lead to a major reduction in poverty and livelihood security, as well as poverty alleviation (7). In addition, gender transformative responses that proactively confront constraining social norms and enhance the capacity of women have been reported to enhance the well-being of households, more equal labour sharing and adaptability to climate-related shocks (8). These results highlight the significance of comprehending the role of gendered power relations and social inclusion dynamics on

agricultural outcomes and resilience pathways.

The conceptual understanding of GESI in agriculture has evolved gradually. The initial gender-oriented research was mostly concerned with the role of women and their access to productive resources, their indispensable roles in agricultural labour and farm management (9).

New GESI methods embrace more analytical frameworks that embrace intersectionality, structural inequalities and power relations in a variety of social groups. These views show that access to resources, opportunities and participation in decision-making structures in agricultural systems are influenced by factors such as social positioning, demographic factors like ethnicity, disability and migration status interacting with gender (10). Consequently, GESI is progressively being perceived as an analytical perspective as well as a policy tool that should be used to enhance inclusive, equitable and sustainable agricultural growth.

Gender differences are still ingrained in agricultural systems, even as it is receiving more attention in the form of policy. On the international scale, women are less than 20 % of registered landowners and where ownership exists, landholdings remain small, less productive, or insecure, thus restricting incentives to long-term investment (7). The provision of agricultural extension services, advisory services and digital technologies remains skewed towards males, which worsens the imbalance in the knowledge of agriculture, decision-making power and the nutritional outcome of the household (11). These gendered restrictions are combined with other larger processes of social exclusion, which systematically disadvantage tribal and minority groups, youth, migrant workers and landless labourers, who often have limited access to markets, infrastructure, landholdings, financial resources and social protection programmes (12). The overlapping dimensions of disadvantage, especially to women in the marginalised groups, compound the underlying exclusions, creating multiple layers of vulnerabilities that limit women's involvement in agricultural decision-making and livelihood practices (13).

Farming methods that are inclusive, including community-based resource management, gender-transformative extension and participative technology development, have also proven to be of great possibilities in enhancing the outcomes of empowerment, productivity and food security (14). An example of tools that can offer empirical measures of change in gender and social inclusion outcomes is the women empowerment in agriculture index (WEAI) and social protection mechanisms created by the Food and Agriculture Organization (FAO) (15). Though the mainstreaming of GESI as an ethical norm has not yet been fully realised due to institutional biases and discriminatory normativity, it is becoming a strategic investment that enhances livelihoods, climate resilience and equitable rural development and is increasingly recognised in the literature. Although GESI research in agriculture is evolving quickly, with growing interdisciplinarity, the literature is still discontinuous, both thematic and methodological, as well as across regions.

This fragmentation inhibits the establishment of cumulative knowledge and the establishment of the predominant research paths and shortcomings. To fill this gap, the primary objective of the review is to adopt a combined methodological approach based on systematic reviews and bibliometrics to systematically map out the changes, intellectual framework and thematic focus of the academic

literature on GESI in agricultural systems. Specifically, the study will review the global scientific publications on the topic of GESI in agriculture each year; analyse the bibliometric connections between the articles on the topic; consider the networks of authors, institutions and keywords; identify the most common themes, new trends and gaps in the literature; and assess the major determinants of GESI in agricultural systems. This review is expected to inform future research and policy formulation and gender-responsive interventions in agrifood systems through a careful synthesis of the existing literature.

Methodology

Study design

The present research follows a robust methodological framework that combines a systematic literature review (SLR) and a bibliometric approach to analyse the global research on GESI in agriculture. The SLR element represents the qualitative part of the research, which includes critical analyses and thematic interpretations of the literature, while the bibliometric analysis is the quantitative part, which focuses on publication, citation and collaboration patterns. Bibliometric analysis was only conducted on the Scopus database because of its broad coverage of high-quality, refereed publications in social and agricultural sciences, uniform indexing format and its compatibility with bibliometric analysis software. Alternative databases, including Web of Science (WoS) and Dimensions, were not considered for data extraction to ensure consistency and avoid redundancy, as well as to avoid differences in indexing formats that may lead to non-comparable results.

Search strategy and data collection

A rigorous search procedure was employed by applying Boolean logic to a targeted list of keywords covering gender equality, women's involvement, empowerment, decision-making, social inclusion and agriculture. The Boolean search string used for the literature retrieval was as follows: ("gender equality" OR "women in agriculture" OR "gender roles" OR "social inclusion") AND ("agriculture" OR "agricultural systems" OR "farming") AND ("participation" OR "resource access" OR "empowerment" OR "decision making"). The study was constrained to include only peer-reviewed, open-access journal articles written in English from 2020 through 2025 and indexed under the agricultural and biological sciences and social sciences subject areas. Reviews, grey literature, conference papers, trade journals and non-English publications were excluded from the analysis. The combination of keywords

Table 1. A combination of keywords used and the total number of publications retrieved from databases

Data bases	Search terms	Number of articles
Scopus	"Gender equality" OR "women in agriculture" OR "gender roles" OR "social inclusion" AND "agriculture" OR "agricultural systems" OR "farming" AND "participation" OR "resource access" OR "empowerment" OR "decision making"	674

Search conducted using Boolean operators (AND, OR) to combine thematic keywords related to gender equality and agricultural systems.

used and the total number of publications retrieved from databases are presented in Table 1.

Study selection process

The initial search in the database was 674 records. After using preset inclusion and exclusion criteria (e.g., the type of publication, language (English), time (2020–2025) and the subject matter), 440 records were filtered out and 234 articles were chosen to be analysed further. The second step was to remove the duplicates and other irrelevant records by using software and this reduced it to 139 articles. This was followed by title and keyword selection that is based on relevance with gender equality, social inclusion and agricultural systems to make the final selection of 118 articles. The detailed inclusion and exclusion criteria applied in the study are presented in Table 2. These steps were carried out in accordance with the preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines (16) and the PRISMA flowchart is shown in Fig. 1.

Bibliometric analysis

In addition to the SLR, a comprehensive bibliometric analysis was conducted to map the intellectual structure and emerging trends in research on GESI in agricultural systems. The analysis was performed using VOSviewer (version 1.6.20) and RStudio (version 4.3.1) with the *Bibliometrix* package, ensuring both visualisation and analytical robustness. Bibliographic data were extracted exclusively from the Scopus database in comma-separated values (CSV) format and subjected to preprocessing, including standardisation of author names, keywords and institutional affiliations to minimise duplication and ensure consistency. Multiple bibliometric techniques, such as co-authorship analysis, bibliographic coupling, co-citation analysis and keyword co-occurrence analysis, were employed to explore collaboration patterns and thematic structures. Threshold parameters were applied to enhance the reliability of network visualisation, with a minimum of 5 occurrences for keyword analysis and 3 documents per author for co-authorship networks. The default association strength normalisation and

Table 2. The Inclusion and exclusion criteria

Criteria	Inclusion	Exclusion
Time span	2020–2025	< 2020
Subject area	Agricultural and Biological Sciences, Social Sciences, Psychology and Decision Sciences	
Document type	Article	Conference papers, book chapters, review, editorial
Publication stage	Final	Press
Keywords	Gender, women's status, gender role, empowerment, agriculture, decision making, gender equality	All other keywords
Source type	Journal	Trade journal
Languages	English	Non-English
Open access	All open access	Restricted access

clustering algorithm in VOSviewer was used to identify and visualise thematic clusters within the dataset.

Cluster solutions were evaluated for internal consistency and thematic coherence through visual inspection and comparison with existing literature. Interpretation was based on node proximity, link strength and thematic relevance to ensure meaningful representation of the intellectual landscape. To assess the robustness of the findings, a sensitivity analysis was conducted by varying threshold values (e.g., 3 and 10 occurrences) and the core cluster structure remained stable across configurations, indicating reliability. R studio was further utilised to generate descriptive bibliometric indicators, including publication trends, citation patterns and author productivity. The study relied on the Scopus database due to its comprehensive coverage of peer-reviewed journals across multidisciplinary domains; however, it is acknowledged that incorporating additional databases such as WoS could further enhance the breadth and validation of the

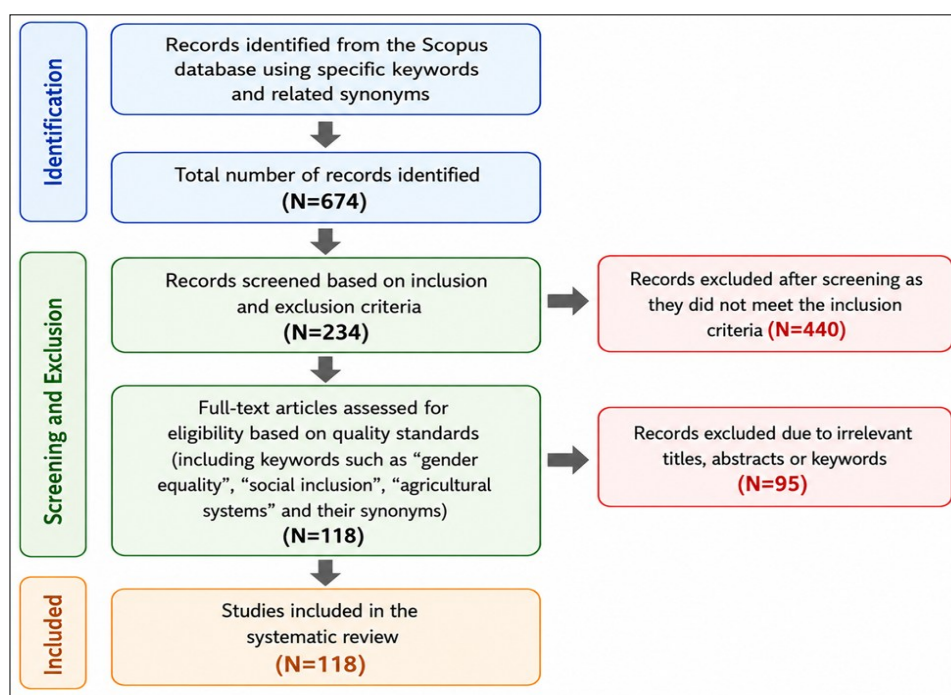


Fig. 1. Preferred reporting items for systematic reviews and meta-analyses flowchart depicting the search and selection of the literature and their characteristics, for a systematic review of gender equality and social inclusion in agricultural systems.

analysis. Future research may therefore consider cross-database comparisons to strengthen bibliometric insights.

Data synthesis

By combining the results of the SLR and bibliometric analysis, the study can present important contributions made by researchers, point out knowledge gaps in the literature and recognise current thematic trends. Using a combination of both approaches, the study creates an academic map of GESI research related to agriculture, helping future research in the area move in new directions.

Results and Discussion

Trends in gender equality and social inclusion research in agriculture (2020–2025)

Fig. 2 presents the annual number of publications on GESI in agricultural systems from 2020 to 2025. The data indicate an overall increase in research output during this period, reflecting growing scholarly attention to GESI issues in agricultural systems. As of 2020, 11 articles were posted on the subject, followed by 21 articles in 2021, showing an early increase of scholarly attention in the subject. In 2022, there was a slight decrease in articles to 18 articles, with the number stabilising to 17 articles in 2023.

In 2024, there were more publications than ever before at 29 articles; this growth is likely due to an increasing global interest in inclusive development, climate resiliency and gender-responsive agrifood systems, which is being supported by FAO, International Fund for Agricultural Development (IFAD), the Consultative Group on International Agricultural Research (CGIAR) and other organisations and also connecting to global instruments including the SDGs. In 2025, there has been a slight decline, but still significantly above the average output during prior years of the review period (17).

The upward trend in Fig. 2 suggests that GESI has emerged as an established research focus for agricultural systems. Increasing trends in GESI publications suggest the growing recognition of GESI as important components of sustainable agricultural development and the resilience of agricultural systems. Similar growth patterns are observable in other interdisciplinary, gender-focused research fields, suggesting that GESI is consolidating as a meaningful analytical framework in contemporary agricultural research.

Bibliometric coupling of documents

The bibliometric coupling framework presented in Fig. 3 elucidates the conceptual framework underpinning scholarly discourse on GESI in agricultural systems. Using the VOSviewer, documents were clustered based on shared references, enabling the identification of major thematic streams and patterns of knowledge convergence within the literature. The network shows a group of separate but connected clusters, which shows that GESI-related agricultural research is both coming together and branching out.

The red cluster represents the central conceptual core of the field. Articles have been critical in developing this cluster (2, 18). Their concepts include topics such as women's empowerment, household decisions, labour/gender relations and gender-sensitive agricultural approaches. The high interconnectivity of these works via bibliometric techniques implies that they cite similar sources. Therefore, these publications provide a major theoretical and empirical anchor that guides GESI research within agriculture. Additionally, the green and purple clusters represent papers addressing the issue of gendered access to agricultural resources, extension, livelihoods and community-based social inclusion processes. This is indicated through the strong bibliographic connections and proximity between these two clusters. These publications extend discussions within the kernel by exploring gender inequality and social exclusion through localised mechanisms within the agricultural context.

A relatively distinct cluster positioned away from the dense core reflects a stream of research focusing on institutional, governance and policy-oriented dimensions of GESI. The relative separation of this cluster suggests that these studies rely on a different, though partially overlapping, knowledge base. Despite being less densely connected, its linkage to the core indicates conceptual relevance, contributing to the expansion of the field through emphasis on gender-sensitive policy design, institutional frameworks and governance mechanisms.

In terms of its location in the network map, the orange peripheral cluster made up of works is characterised by weak ties between its constituent nodes (19). Such a cluster structure implies thematic specialisation or research conducted in a certain region based on an individual conceptual framework rather than a general one. Variations in the size of nodes in the network can reflect variations in scholarly impact.

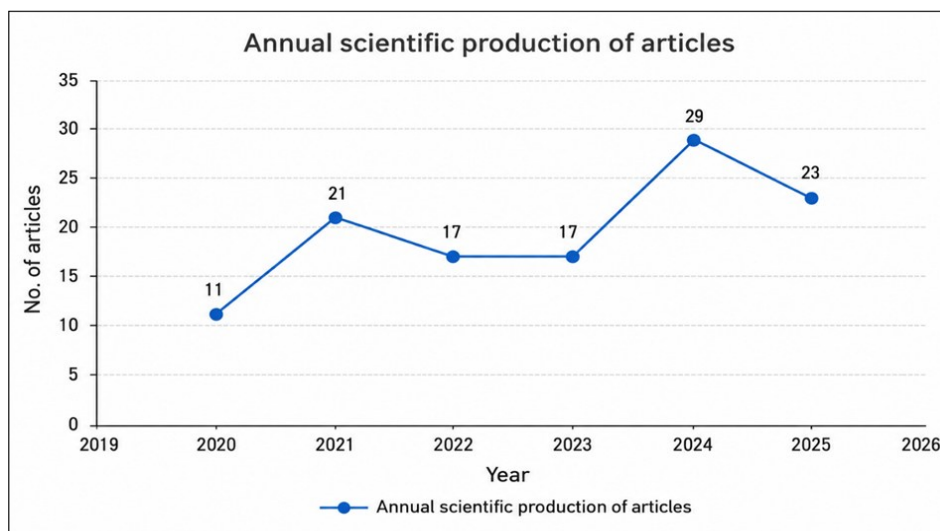


Fig. 2. Annual scientific production of articles.

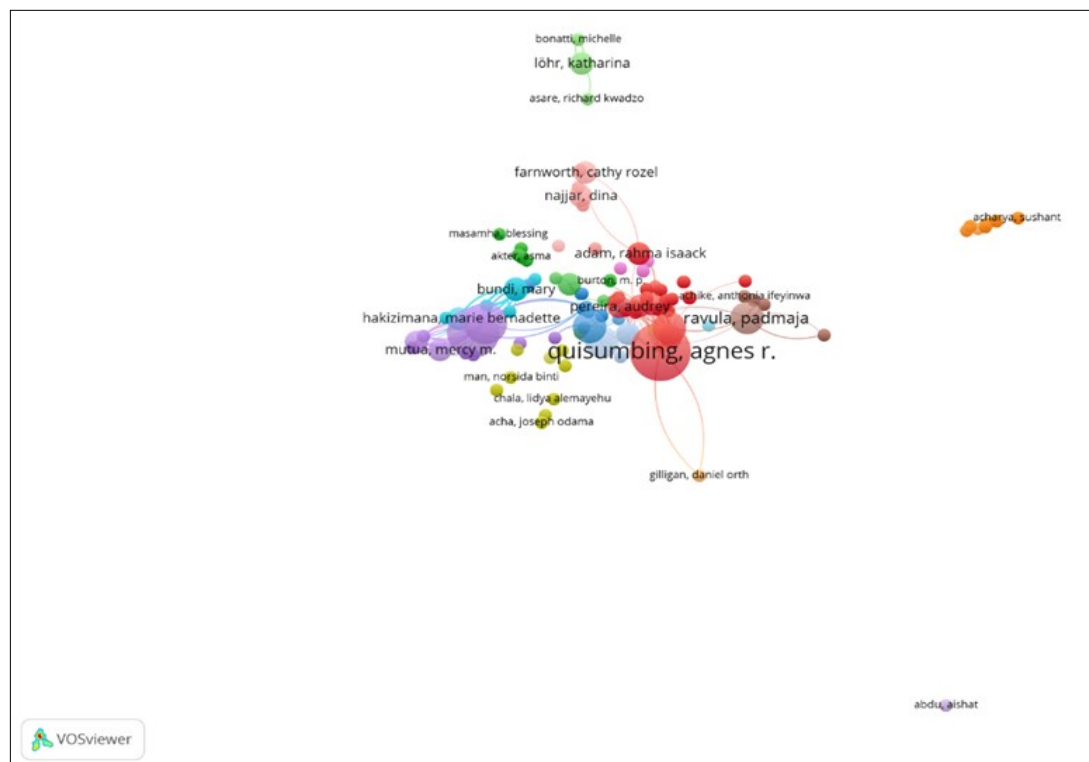


Fig. 3. The document of bibliometric coupling.

Overall, the development of connections between clusters shows that GESI studies have entered their mature but developing stage. The results of bibliometric coupling analysis show not only a solid intellectual core but also a growth of thematic branches, suggesting a consolidation of important GESI ideas along with diversification of approaches towards them.

Co-occurrence network

A systematic representation of the thematic construct in the form of a keyword co-occurrence network within scholarly literature on the topic of GESI is shown in Fig. 4. Keyword clustering using VOSViewer was done based on the extent of co-occurrences among keywords, giving rise to various thematic clusters that constitute the body of knowledge in GESI. A notable thematic cluster, highlighted by the colour red, focuses on empowerment issues and gender dynamics. Such a thematic domain is characterised by the analysis of how social inequalities, culture and power affect the participation of women in agriculture. Notably, the centrality of women's empowerment in the cluster underscores the importance of this concept both as a theoretical framework and an outcome of gender-sensitive agricultural projects.

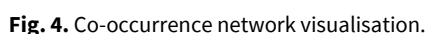
The blue cluster expands the above conversation by considering household-level and demographic factors such as decision-making power, labour distribution and nutritional impacts. Research papers in the blue cluster deal with issues related to intra-household processes and implications for gender differences in resource access, food security and welfare. Interdependencies between the red and blue clusters point to a high degree of relationship between empowerment processes and outcomes at the household level. The green cluster embodies the development of a new literature stream that focuses on topics such as land tenure, technology uptake, sustainable farming systems and institutions. The green cluster represents a new trend focusing on mechanisms that rely on innovation and policies in efforts to enhance the agency of women and support agricultural development in a manner that is more inclusive.

More detailed insights can be drawn from the yellow and purple clusters, which highlight how restrictive socio-cultural norms limit women's mobility and participation in decision-making, how gendered labour divisions confine women to low-paid or unpaid agricultural roles and how unequal access to resources such as land, credit, training and extension services constrains the agency of female farmers. These two clusters underscore the long-lasting impact of social and cultural constructs that perpetuate gender inequality and social exclusion in various agricultural environments. The terms that come out prominently at the heart of the network, like "gender," "empowerment," "decision-making" and "agriculture," can be taken as the concept-based links that join more than one cluster of a highly multidisciplinary area of study.

New areas of research interest, like adaptation to climate change, technology transfer and sustainability, indicate that there is a definite trend of progressively widening the scope of research on the subject of gender and social inclusion. In conclusion, the intricate network of interlinkages among the red, blue, green, yellow and purple clusters indicates a highly developed yet continuously developing area of study.

Most frequently used words

The treemap in Fig. 5 illustrates the most frequently used keywords in GESI-agriculture research, reflecting both the thematic focus of the studies (e.g., gender relations, empowerment and decision-making) and the specific subject areas addressed (e.g., agriculture, food security and climate change). The most prevalent terms, gender (occurrences = 44), gender roles (occurrences = 38), empowerment (occurrences = 37), agriculture (occurrences = 34), women's status (occurrences = 33) and decision-making (occurrences = 29), indicate that the conceptual foundation of this research area is centered on gender relations and women's autonomy. Terms of intermediate frequency, such as food security (occurrences = 10), climate change (occurrences = 8), livelihoods (occurrences = 7), technology uptake (occurrences = 7) and smallholder farmers (occurrences = 10), highlight the growing



The thematic map in Fig. 6 provides a visual representation of the

conceptual framework for GESI research related to agricultural systems, considering theme centrality and the level of development. The motor themes of gender role, empowerment and women's status are represented in the upper right quadrant, indicating that they are both highly developed and at the center of this research area, reflecting ongoing scholarly interest in women's agency and gendered labour relations. Basic themes of gender, decision-making and smallholders have a high level of relevance, but a comparatively lower level of development, indicating respective foundational importance but highlighting the need for deeper theoretical and contextual engagement with these concepts.

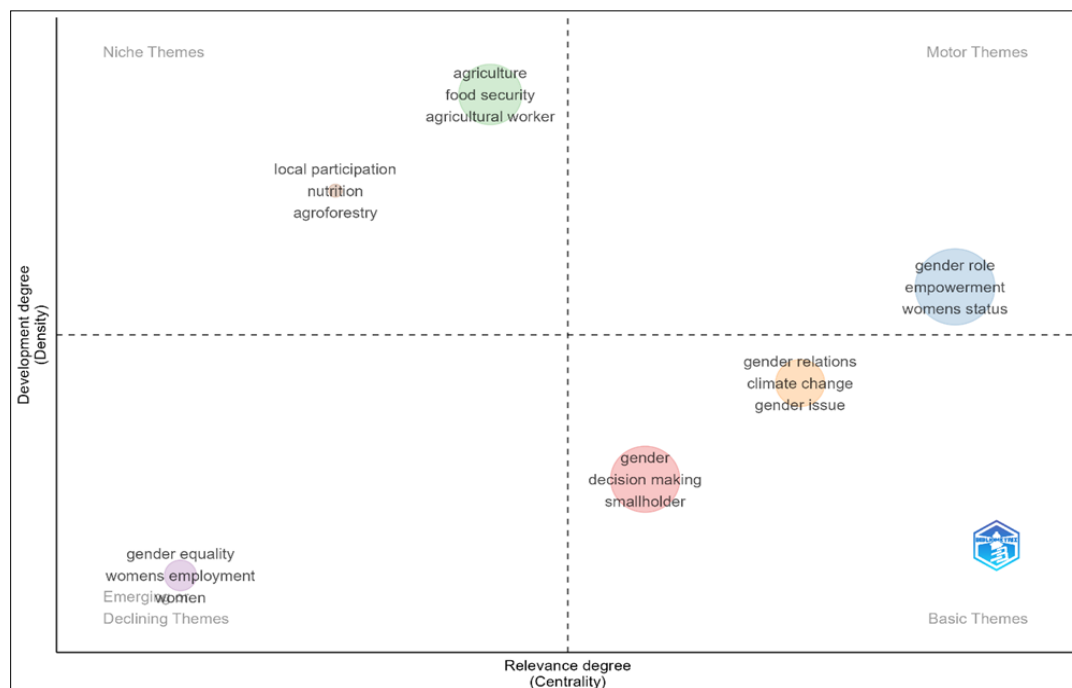


Fig. 6. Thematic map.

Themes of niche interest, such as agriculture, food security and agricultural labour, are quite mature and constitute mature topics that help give focused insights into gender relations in agriculture. On the other hand, emergent or declining themes, such as gender equality and women in the workforce, are quite immature and marginalised within this research field, thus indicating the key deficiencies that need to be addressed in this regard. This thematic framework is indicative of a developing yet imbalanced research field in which more integrative approaches need to be pursued.

Collaboration network

The author collaboration network in GESI research on agricultural systems, as shown in Fig. 7, demonstrates patterns of academic interaction and influence. The size of each node represents the number of publications or the strength of linkages (e.g., co-authorship connections) rather than the number of authors. The clustering of nodes reflects patterns of collaboration among researchers. The dense red cluster represents a core collaborative group within the research area, highlighting strong co-authorship

networks around key themes such as gender division of labour, women's roles in agriculture and empowerment. The blue cluster shows that there is another important and productive group of authors working on similar themes, such as decision-making, smallholder participation and gendered agricultural practices; however, this group has significantly fewer connections to the core researcher group than the large red node. Other non-core groups are represented by the smaller green and purple clusters, which show that most of these authors are collaborating on subject and place-based (i.e., region-specific) issues that relate to agricultural employment, the participation of rural residents and livelihoods. However, the orange cluster of authors indicates a grouping that may be working in isolation or as relatively new contributors to the research area. Overall, the collaboration network demonstrates that the research area is characterised by a strongly connected centre, with fragmentation around the outer periphery and this presents opportunities for authors to collaborate across clusters and regions, resulting in better integration of knowledge in the area of GESI-related agriculture.

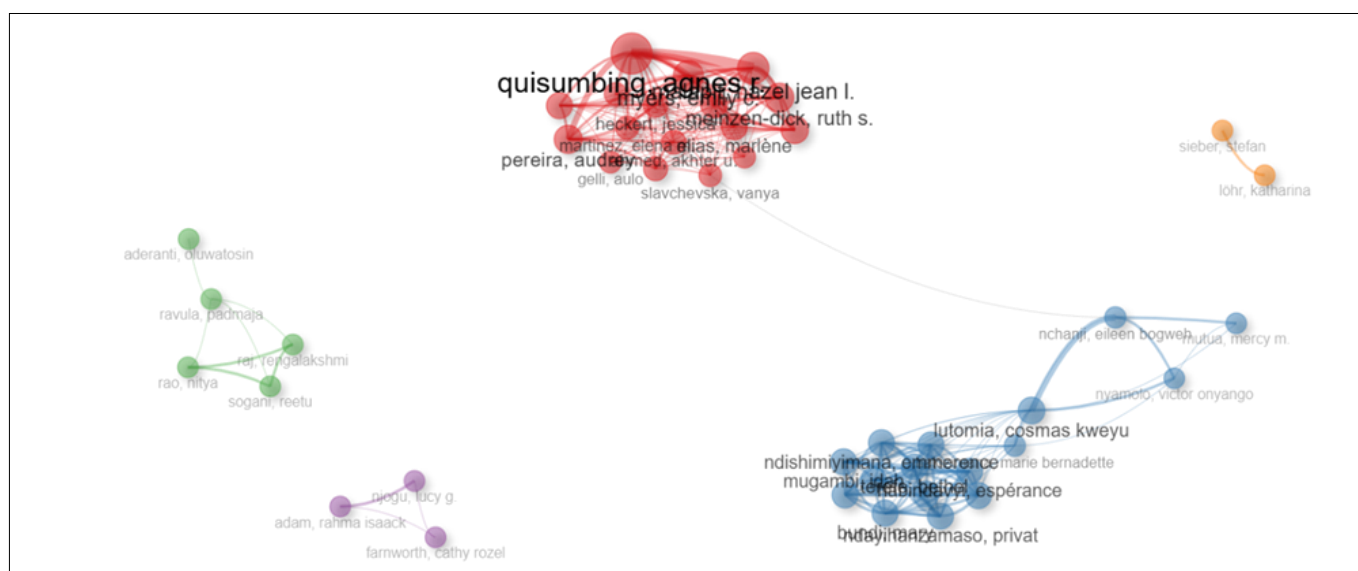


Fig. 7. Collaboration network visualisation.

Key factors influencing gender equality and social inclusion in agricultural systems

Socio-cultural structures and gendered power dynamics

There are many ongoing obstacles to achieving gender equality in agricultural systems due to the existing socio-cultural norms and power structures found amongst households. Many of these restrictions are found in longstanding cultural traditions that determine who is recognised as a farmer, often to the exclusion of women and reinforce a gender-based division of labour, while simultaneously limiting women's skill development and ability to participate in decision-making and to move around freely (20). The inability of women to assert themselves in terms of inheritance, land ownership and home duties has also contributed to their lack of access under conditions that have created an equitable economy by using extension services and climate adaptation (21). At the same time, women's gender will continue to disadvantage them more than men in climate terms because society has not provided the necessary means (information/tools) for them to respond to climate change effectively. There will not be successful interventions to change norms of gender roles in agriculture or achieve gender equity regarding agriculture unless those norms in agriculture are addressed (22). Otherwise, agricultural programs will continue to reinforce the current power dynamic between women and men.

Disparities in resource access and control in agriculture

Although women are significant contributors to agriculture and food production, they face ongoing inequalities when it comes to their ability to access and control many essential resources – such as land, farm inputs, financial services and agricultural extension assistance (23). Women's farms across the globe are usually on much smaller parcels of land than men's; typically, do not have formal ownership rights; tend to have little capital to invest in productive activities; and therefore do not have much leverage when it comes to their productivity (24).

For instance, in Ghana, many female cocoa producers must utilise customary land-tenure systems and thus are able only to work on farms using sharecrop agreements, thereby making land tenure very insecure and limiting their ability to implement best-practice agriculture (25). Access to productive agriculture is also limited for women by biased property and inheritance laws (26). These facts all demonstrate the need for equitable governance systems regarding land, equitable access to agricultural inputs and institutional changes to promote women in the economy and to increase their productive roles.

Intra-household decision-making and bargaining power

Agricultural outcomes are mainly affected by how decisions are made in the household. The more actively a woman participates in decisions concerning crop selection, livestock management and resource allocation, the better the nutritional status of her household and the greater the likelihood that new technologies will be adopted (20). In addition, the unequal distribution of control of income and assets among men and women creates barriers to women's autonomy and often results in men having control over important decisions affecting the household (27). When women have access to joint ownership of assets, financial inclusion and membership in groups, their power is increased along with the welfare of their household (28). There are cases where spouses report differing levels of decision-making authority regarding their household, which indicate underlying differences in the power of

decision-makers (29). Therefore, policies that support the establishment of joint ownership of assets, that recognise women as separate asset holders and that encourage equal decision-making authority among spouses should be developed.

Labour burden, time poverty and unpaid care responsibilities

The work-care burden experienced by the women working in agriculture refers to the fact that these women are doing both paid work on farms, as well as unpaid domestic work and caregiving. This dual responsibility has constrained their ability to participate in markets, training and extension services. In addition to this, many of the farm tasks that women complete, such as weeding, post-harvest work and caring for animals, often require more time than the traditional labour measure used for men (30). Additionally, traditional measures of productivity do not factor in the contribution that women make through their household and caregiving activities (31). Inclusive approaches will improve the level of women's engagement and productivity in agriculture by providing access to labour-saving technologies, childcare support and equitable sharing of the care burden.

Digital inclusion and technology adoption

The agriculture sector is mainly dominated by men, who have far more access to digital technology, mobile phones, climate data and other technical resources than women do. Many women have limited access to digital resources, due to gender-based sociocultural norms, low levels of digital literacy and the influence of gender-based stereotypes. According to several studies reviewed, women tend to have much less access to agricultural technology than do men (32). For example, men are more likely to adopt agricultural practices or technologies when the potential returns from doing so are higher, while women tend to adopt practices or technologies that have lower risk and lower potential returns (33). Providing gender-sensitive agricultural projects and programs that increase women's access to digital tools, as well as training or support, or extension services, will help to close this technology gap (34). That is, by creating and putting into place gender responsive agricultural interventions that provide equal access to digital devices and training/support and/or extension services, the technology gap will be diminished.

Value chain inclusion, mobility and market participation

Women are not able to participate in agricultural commercial markets because of limited access to finance, low levels of mobility and exclusion from the high end of the agricultural value-added chains (35). Thus, the majority of women are involved in the informal sector and subsistence agricultural labour; however, the majority of men are involved with commercial and export-based agriculture (36). In the case of avocado production in Tanzania, men control land allocation and crop income and this significantly limits women's economic empowerment (37). When women are able to engage in the agricultural market without barriers based on their gender, they are able to increase the nutritional status of their households and be more food secure and inclusive agricultural development will be advanced.

Governance, policy and institutional barriers

Institutional biases found in the regulations, extension services and governance frameworks of these organisations generate and sustain gender disparities in agriculture (38). Policies do not take into account the unique obstacles related to property rights, credit, labour and subsidies that women face in their agricultural activities

(39). Women may not own or manage land and/or make decisions about its use compared to men, even if women's aggregate levels of participation in agriculture may be the same as men's (40). These findings highlight the need for effective governance reform that includes intersectional and gender-based analyses in order to provide equitable outcomes in agriculture (41).

Environmental stress and climate vulnerability

Because women's dependency on natural resources is larger than the quantity of available resources and their adaptability to these resources is lower than that of men, they are disproportionately impacted by changes related to drought and flooding (42). Furthermore, by having limited opportunity for access to training, innovation platforms and climate-smart technologies, the social construction of gender norms limits women's ability to participate in accessing resources for climate resilience (39, 43). Therefore, it is essential to incorporate gender-sensitive adaptation strategies into the development of climate-resilient agricultural systems.

Intersectionality and social identity

Agribusiness differences in terms of gender will also expand, as women's access to land, technology/machinery and work in the labour market is affected by the many ways in which people relate to each other (e.g., group affiliations such as religion) and not just by their caste or race (44). For instance, in Nepal, within a caste system, women face gender-based discrimination and are at a significant disadvantage in accessing land (45). An intersectional lens will be used to implement and evaluate GESI policies to ensure that no differences or types of jobs will be created or maintained among the women.

Participation in collective action and social networks

By participating in cooperatives, farmer groups and community networks, women have increased access to knowledge acquisition, accessing financial resources and getting consulting support, which in turn can help them improve agricultural production (24, 36). Collective action can enhance women's performance when they can engage in decision-making and establish participation within markets and when they can successfully use new technologies; however, depending on the governance structure of the cooperatives or networks, women may not be able to fully benefit from these opportunities because of the fit between governing authorities and male dominance (46).

Conclusion

Gender equality and social inclusiveness are necessary for developing sustainable and resilient agrifood systems. The reviewed literature revealed that, although women and marginalised groups play significant roles in agriculture, various disparities still hinder equitable agricultural development, including unequal access to productive inputs, land rights, markets and decision-making opportunities. This study highlights an extensive body of research, including gender mainstreaming, women's empowerment, roles played by women, intrahousehold power dynamics, as well as emerging issues on climate resilience, technology use and value chain participation. However, several gaps exist, which include intersectionality, digitisation and information sharing, governance changes and context-specific issues. Further studies need to apply longitudinal designs, as well as participatory and mixed methods. Future actions will entail developing gender transformative policies, institutions, innovation

systems and utilising digital platforms, technologies, information systems and advisory platforms for market access to enable socially just and climate resilient agrifood systems.

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Authors' contributions

SR carried out the survey, analysed the data and formulated the manuscript. CFC assisted in data collection and analysis as part of the research study. KC contributed by developing ideas and reviewing the manuscript and PR contributed to summarising and revising the manuscript. MV contributed to summarising and PSR provided additional support and contributions to the research study. All authors read and approved the final manuscript.

Compliance with ethical standards

Conflict of interest: Authors do not have any conflict of interests to declare.

Ethical issues: None

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used QuillBot for language paraphrasing and improving sentence clarity. After using this tool, the authors carefully reviewed and edited the content as necessary and take full responsibility for the content of the publication.

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