



A feminist economics perspective on the agroecology-food and nutrition security nexus

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ABSTRACT

This paper investigates how research documented and framed the agroecology-food and nutrition security (FNS)-nexus in Africa. Our first objective is to reveal the links research in Africa has established between agroecology and FNS. Our literature review of empirical studies located in African countries, published between 1996 and 2020, consolidates evidence that agroecology has contributed to food and nutrition security. Second, we question which pathways of influence of agroecology on FNS the selected papers chose to investigate. While neo-classical economics concentrates on production and on the level of embeddedness of the agricultural activity in the capitalist markets to solve the problem of FNS, feminist economics offers new perspectives by addressing both production and the reproduction processes necessary to support production. Our analysis of literature is structured around the feminist economics concepts of physical, household, and social reproduction, as well as agency. We show that activities of reproduction linked to agroecology at the level of households and territories are scarcely documented in the investigated papers, while the documentation of the contribution of agroecology to FNS via physical reproduction activities (e.g. soil fertility) dominates. We then propose a conceptual framework linking agroecology, reproduction activities, and FNS based and also illustrate the postulate that sustainable production practices such as agroecological practices are intrinsically linked to the social activities of farmers and cultural contexts in which farmers are embedded. Viewing agroecology both as a social and ecological process concomitantly will reveal numerous pathways between agroecology and food security and nutrition and agroecology's full value.

1. Introduction

Malnutrition currently affects the lives of 23% of rural and farming households in sub-Saharan Africa (HLPE, 2020). Green revolution approaches advanced by international agencies and governments to address malnutrition promoted industrial input-based intensification strategy. Industrial agriculture embeds farming activities more tightly in formal commercial markets thereby promoting the production and consumption of more calories (Fanzo, 2015). This strategy, which remains dominant in development and agricultural policies in sub-Saharan Africa, requires the full involvement of the farmers in the cash economy. Yet, industrial input-based intensification seems in part ineffective in changing the nutrition status of rural smallholder households (Deutsche Welle, 2020). Yet, the persistence of malnutrition among farming households may also be related to the specific economic

and social context in sub-Saharan African agricultural regions. Around 80% of Africa's poor population derive their livelihoods from production-based entitlement and not market-based entitlements (Thompson, 2015). A large share of sub-Saharan smallholders has little land available for production (less than 5 ha), have little access to cash and credit (Giller, 2020), and are females. In addition, numerous economic activities possibly contributing to food and nutrition security still take place outside the market sphere in Africa (Nicholls and Altieri, 2018). Women are also the prime responsible persons for nutrition at the household level (Kassie et al., 2020). Against this background, investigating how else rural farming populations maintain themselves with alternative food systems is crucial for food security in Africa.

As an alternative to industrial farming (and to the prevalent low-input farming) methods, agroecology practices have emerged in Africa following a strong development in the rest of the world (particularly

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South and Central America, but also Asia and Europe). Agroecological practices consist of agricultural practices which mimic natural ecological processes in soils and agroecosystems to regenerate soils and increase production (Nichols et al., 2017). Yet, the word agroecology also is used to denominate an alternative food system based on systems thinking, which can secure food and nutrition (HLPE, 2019; FAO, 2019). According to FAO (2019), the term promotes more socially and environmentally sensitive agriculture by focusing not only on production practices but also on the economic and social context in which these practices are introduced, implemented, and passed on.

But does agroecology improve farmers' ability to reach food and nutrition security? We define food and nutrition security following the High-Level Panel of Experts in Food Security and Nutrition (2016) as dependent on access, stability, accessibility, and agency. These may all be influenced by agroecology. As stated by Silici (2014), the nexus between agroecology and food security makes no consensus, and the pathways through which agroecology leads to improved food and nutrition security among farmers are still unclear.

In this paper, we ask how research has addressed this nexus in sub-Saharan Africa. Thereby, we adopt a feminist economics perspective to reflect critically on the pathways through which agroecology in Africa is assumed to influence nutrition. Feminist economics criticizes neo-classical economics by showing how its models and methods are based on exclusive attention to masculine-associated topics in formal economics, focusing on production activities, and capitalist and cash-based exchanges. Feminist economics thus introduces concepts that allow for a fuller analysis of economic life, including topics such as family economics, care work, and unpaid work. It thereby highlights those economic exchanges essential for reproducing our societies and supporting production activities (Ferber et al., 2003). While of course, many of the reproduction activities are conducted by women in patriarchal cultures, feminist economics goes further than adopting a gender glance by looking at the structural elements in the socio-ecological system which lead to reproduction activities being ignored instead of nurtured, rather than looking at why women have (for instance) little power in agriculture. In our critical review, we thus consider both production and reproduction activities that influence food security, irrespective of whether such tasks are undertaken by men or women (Esther-Mirjam and van Staveren, 2019; Figart, 2015; Thomson, 2009). We especially, use the concept of reproduction under its three forms: ecological, household (economic), and social (political) to analyze the pathways the identified studies have chosen to investigate the agroecology-food and nutrition security nexus. We consider FNS as a productive goal of the household, linked to several other reproductive dimensions.

Our first objective in this paper is to assess whether agroecology practices have improved food and nutrition security in rural Africa. Second, we critically review the studies from a feminist economic perspective to identify how agroecology was framed in the studies reviewed and how they address the socio-economic context into which the agroecological practices take place in their analysis. We address these two questions by presenting a systematic literature review of studies conducted in sub-Saharan Africa on the link between agroecology and nutrition from 1996 to 2020. Our analysis thus uncovers which pathways of causalities between agroecology and FNS have been investigated in literature, and which pathways have not.

Our review shows that research and evidence depicting pathways through which agroecology fosters FNS are sparser than expected. Research efforts focused on investigating how agroecological production practices channeled important foods into household diets. The review shows in a second step that social and power structures around the introduction of agroecological practices at the level of households and territories are not well documented. These results are compared to evidence elsewhere in the world showing that agroecological agronomic innovations are often linked with components of the social system, such as nutritional well-being and the economic and social empowerment of the practicing persons. Finally, we propose a conceptual framework that

integrates the concept of reproduction proposed by feminist economics in the analysis of pathways toward food and nutrition security as a guide for the development of relevant indicators.

Competitions among actors in a food system can institutionalize hegemonic structures that contribute to food insecurity (Khadse and Rosset, 2017). In capitalist competitions, economic and material capabilities of actors within the food system determine the winners and losers in production and market decisions (Kapstein, 2000).

2. Theoretical background: Feminist economics perspective

While hunger and food insecurity might be blind to identity, vulnerability to hunger and food insecurity varies considerably across demography (Kabeer et al., 2008). Feminist economics is of the opinion that economics does not take women's experiences into account in economic affairs as gender roles are hardly represented in the economy (Janina and Pürckhauer, 2016). While gender is the focal point of feminist economics perspectives, it is also embedded in a broader understanding of inequality of - class, race, ethnicity, power, food security, etc. Therefore, the feminist economics perspective draws our attention to forms of work that are essential in our daily life, much of which we take for granted when we place emphasis only on commercialization and competition. Feminist economics raises the "ethics" questions of why housework and care are not recognized as work in economics? Why there should be a difference in value between productive (paid) work and reproductive (unpaid) work? According to Janina and Pürckhauer (2016), such dichotomy invariably affects scientific findings.

2.1. The concept of reproduction in food security framework

Studies, especially in Europe and Latin America, have documented the social and political dimensions associated with Agroecology (Fanzo, 2015; Thompson, 2015; De Schutter, 2019). The reproduction process that engenders and sustains these sociopolitical dimensions influences household agency for food security and nutrition (Burchi and De Muro, 2012). In this section, we review the different framings of reproduction and agency in literature, and how they contribute to The different pillars of food and nutrition security. Thus, we look at agency for FSN, not as a different (fifth) pillar of food security as proposed by the HLPE, but as an outcome of social reproductive process that influences or boosts the availability, access, utilization, and stability of food.

According to Menon (2015), reproductive activities consist of unpaid work such as subsistence activities (evident especially in developing nations) which do not earn or only earn less in the market. Within the food system context, it is linked to the different activities that lead up to the conversion of crops and wages from farms into useable goods in the home, as well as different activities that support this conversion (Menon, 2015). Age-long classical political economy literature by Lefebvre (1973) presented reproduction as an ongoing iteration process of production by which a unit (family, society, system, etc.) simultaneously: i) puts back consumed material goods, ii) replaces the depreciated stock of production capital, and finally iii) recreates or reinforces the relations of production through the perpetuation of experience into the present. These three ongoing iteration processes give rise to the economic and social reproduction processes as described in Paltasingh and Lingam (2014).

2.1.1. Physical reproduction

According to Paltasingh and Lingam (2014), economic reproduction represents a cyclical or recurrent process of maintaining the production base. Aglietta (2015) on the other hand described economic reproduction as the process whereby societies or families constantly recreate the initial conditions essential for economic activity to take place. In Agriculture, economic reproduction in terms of reproduction of physical environment, most especially the soil, is important for continuous production. The process whereby the initial condition of the soil, which

forms the foundation of agriculture, is recycled or at least maintained forms the basis for sustained economic production in agriculture (White et al., 2012). This means that the effectiveness of farm production economics, to an extent, depends on the efficiency of the reproduction in landscape.

2.1.2. Social and household reproduction

Social reproduction, on the other hand, is conceptualized as the “perpetuation and re-creation of the main production system with relation to society taken on the whole” (Paltasingh and Lingam, 2014, p.51). Social reproduction, while subsuming power and social relations, also involves the daily maintenance of the labor force and investment of time, effort, and resources in human capital (Paltasingh and Lingam, 2014). In the classical Marxist feminism’s conceptualization, social reproduction describes the unrecognized gender role of women within the broader social structures and the capitalist market economy through their activities within the households, in terms of childbearing and care (Marx, 1992). According to Silvius (2019), the extent to which this form of social reproduction (household reproduction) contributes to household income and overall wellbeing has been constantly undervalued and understudied, especially in accounting for food security and nutrition status. Wesley (2021) argued that households that see wealth beyond financial capital and include human, social, and cultural capital successfully ensure food stability over time and across generations by building on the non-food inputs in food security. Although these households do not trivialize the value of strong financial capital, they understand that wealth has to be reproduced or replenished for it to be sustained (Wesley, 2021). In other words, they put more emphasis on reproduction activities such as household education, diet, clean water, sanitation, health care, etc. that sustain the factors of production, and reproduce/sustain the financial capital of the household.

2.2. Reproduction and agency

At the societal level, Gore and LeBaron (2019) argued that food inequalities, labor exploitation, usurious debt bondage or indebtedness, modern slavery, etc., that exists within any food system or value chain are not random occurring problems but are designed and reproduced by the power of larger agribusiness firms to dictate the rules of business. Gore and LeBaron (2019) applied this conception of reproduction to analyze the gendered relation of *unfree labor* in cocoa value chain in Ghana. According to Harrod (2006), it is the differences between power holders and subjects of power, combined with differences in degrees of power and authority held that perpetuate or recycle different power and social relations. The loser (subjects of power) find it difficult to exit labor arrangements dictated by power holders thereby supplying “involuntary labor” as a condition to remain employed (Gore and LeBaron, 2019: p.575). Such social power relations have been defined by Fiske and Berdahl (2007) as the disproportionateness between two actors in their comparative ability to exercise power for resource acquisition or to define their desired food system.

Sen (2005) frames agency for food security as a set of empowerment indicators or conditions that enables smallholder farmers to exercise control over the prevailing socially reproduced status quo of their food environment. Thompson (2015), on the other hand, characterizes agency for food security into two dimensions namely: economic agency and non-economic or political agency. The author defined economic agency of rural households as their ability to take charge or exercise control over their livelihood independent of external economic agents. Such agency emanates from having relational access to assets, livelihood diversification, exercising control over income, and control over production decisions. The non-economic agency, on the other hand, includes all forms of capability developed through the expression of one’s view which ultimately leads to influencing power relations, existing state of affairs, and inputs in social decision making. According to Thompson (2015; p.343) to a very large extent, “it is the non-economic

agency that is most crucial for food availability and access ... since it determines capability – what we can and cannot do”, and it is strongly tied to longstanding literature on ethics and political economy (Sen, 2001). Sen (1992) argued that entitlements alone are insufficient in addressing food security issues but should encompass capabilities developed through organizations and networks channeled towards exerting pressure on the social reproduction process and struggle for power in society.

3. Methodology

Following Nandi, Nedumaran and Ravula (2021) we applied a systematic review methodology to assess the role of agroecology in achieving food security and dietary diversity among smallholder farmers in sub-Saharan Africa. We employed two diverse search approaches to ensure that we retrieved the highest number of potentially relevant studies (Ahmad et al., 2020). The two search strategies include the automated search strategy from Electronic Data Sources (EDS) and Snowballing Method. We thoroughly performed a search on two EDS, namely, Scopus, and Web of Science. Scopus and Web of Science were used as starting points because journals in these databases are stricter in the peer review process as they seek to publish high standard research papers. As ‘agroecology’ can be conceptualized in various ways — encompassing sustainable farming system, empowerment, freedom, right to food, and food sovereignty, we developed different search strings to capture the fullness of the topic. In total, we used 18 keyword combinations including food security, dietary diversity, empower*, food*, agency, reproduc*, right to food* and agroecology. We integrated the search terms and adapted them to the individual EDS using the “AND” and “OR” logical expressions where possible. We performed different search rounds for the different EDS until we achieved the best keyword combinations. We based the best keyword combination on the search that returned the precise and appropriate articles relevant to the topic. A set of final selected search string combinations employed for the two EDS is presented in Supplementary materials. The automated search strategy from the electronic data sources was conducted on 07/01/2021 and successfully retrieved 2,359 results only. 1338 studies were retrieved from SCOPUS and 1021 were retrieved from Web of science. After our search of the different databases, we de-duplicated the identified articles using the offline SRA-de-duplicator (Rathbone et al., 2015) to ensure that we retained unique articles. After deduplication, we were left with 1338 unique citations. Once imported into the EndNote software, we employed inclusion and exclusion citation screening using predefined criteria as presented in Table 1. 15 papers focusing on the agroecological approach to food and nutrition security analysis were retained.

In addition to the automated EDS approach, we also performed a snowballing search. Here the 15 empirical studies retained from the automated EDS search were used as primary seeds or the start set of papers. We first performed a backward snowballing by looking at the reference list of the start papers and then followed by a forward snowballing by looking at the papers citing the study being examined. To guarantee relevance, we applied the same inclusion and exclusion criteria used in the automated EDS search. After the first backward and forward snowballing, new papers identified in the first iteration were included in the next iteration stage. We ended the process after the third iteration as no new primary papers were found at this stage. During the snowballing search, grey literature emanating from the stipulated search strings was also included. According to Booth et al. (2016: p.120) not including grey literature in systematic reviews might lead to “exaggerated estimates of effectiveness” and publication bias. Finally, from the snowballing process, we retrieved 332 papers. After applying the inclusion and exclusion criteria, 11 papers focusing on the subject of investigation were retained. In total, 26 papers (15 from automated EDS and 11 from snowballing search) were retained. In summary, only empirical literature, written in English and focusing on agroecology and

Table 1
Exclusion/inclusion criteria for selecting documents.

	Inclusion	Exclusion
Focal area	Agroecology, Agency, and Food sovereignty/security Literature-based in Africa	Non-Food security-related projects High-income countries
Language	English	Language other than English
Year	1996–2020	1996 and earlier
Keywords	Agroecology and food security will be included either in the abstract, keywords, or title	Agroecology and food security not in the abstract, keywords, or title.
Alternative keywords	Sustainable food system, Alternative food system, food sovereignty	–
Methodology	empirically grounded research	Not showing a clear research methodology and based on conceptual work
Type of article	both published and grey empirical literature were included	

Note: In summary, articles published in English and conducted in Africa were purposively chosen. Also, Literature retained were those published after the year 1996, as that was when alternative concepts to neoliberal policies such as food sovereignty, was advanced by Via Campesina and brought to the public debate at the 1996 world food summit.

food and nutrition security among smallholder farmers in sub-Saharan Africa were included. Peer-reviewed publications and grey literature that do not fall within this scope were excluded. The retained studies were selected for further review. The diagrammatic representation of the algorithm employed is presented in Fig. 1. It is important to indicate the potential limitation that might arise from excluding literature in other languages other than English.

Following Porter et al. (2014) we graded the selected articles from zero to five to differentiate empirically robust (high-quality publications) among those using less rigorous methodology. Five-star papers

had clearly executed methodology that answers the research questions relevant to our study, and also had a large sample size; covering 200 subjects for surveys or 30 participants for in-depth interviews. Nineteen papers (0.01% of the initial search) had three stars and above. We assigned an identifier number 1 to 19 to each article, which, henceforth, we now use to refer to each paper individually. A list of all the 19 papers is found in supplementary material.

4. Result

In this section, we report the review findings. Our review provides evidence on the pathways from agroecology to FNS. We define these pathways as physical and social reproduction pathways. The physical reproduction pathways are framed as innovative or sustainable production practices through which agroecology farmers enhance their food security and nutrition status. We classify the physical reproduction pathway into three sub-pathways based on the nature of benefits derived from the innovative farming practice employed by agroecology farmers. The physical reproduction pathways include input reduction, production diversification, and climate resilience. Although we present the reproduction pathways separately, in reality, they are interdependent, integrating into diverse ways to improve smallholder farmers’ production efficiency. While the physical reproduction pathways occur at the farm or field level, they are linked to social reproduction activities that take place beyond the landscape. These social reproduction pathways encompass activities that define social relations within the household and society at large. Results of the review showed that assessed literature linking agroecology to FSN in Africa focused mainly on the physical reproduction pathways through which agroecology farmers achieve food security and nutrition. Out of the 19 papers reviewed, only four highlighted the social reproduction pathways, which we indicated as “Social reproduction”. A summary of the different pathways can be found in the supplementary material.

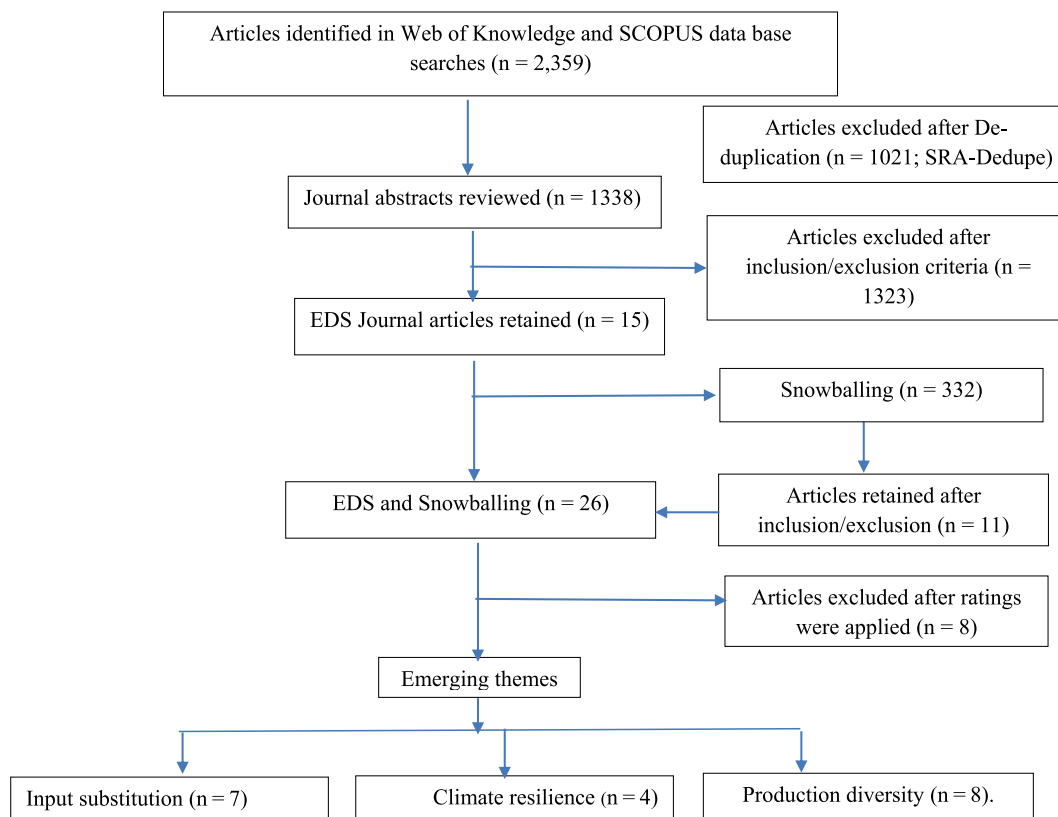


Fig. 1. Database search algorithm applied in citation screening.

4.1. Physical reproduction pathway

Physical reproduction in the landscape includes the innovative farming practices adopted by agroecology farmers to reduce the use of external inputs, conserve biodiversity, and build resilience to climate change. Our review identified seven papers on resource use efficiency, four on climate resilience, and eight on biodiversity conservation.

4.2. Resource use efficiency (Reduction in use of external input)

Literature on agroecology over the last two decades has provided substantial evidence on how agroecology farmers achieve efficiency and sustainable harvest without reliance on external inputs (Akpoti et al., 2021; Kassie et al., 2009, 2020; Kissoly et al., 2020; Ng'endo et al., 2015; Nyantakyi-Frimpong et al., 2016; Rogé et al., 2017). While some farmers gradually reduce the use of external inputs, others eliminate dependency on purchased inputs. The papers suggest that substituting or complete elimination of external inputs drives innovations and engenders better ways of producing appropriate and more nutritious foods. Most of the farmers were found to engage in organic farming, by reducing or eliminating the use of chemical fertilizers (Akpoti et al., 2021; Ng'endo et al., 2015). Some preserve and exchange seeds instead of depending on GMOs (Bezner Kerr, Kangmennaang, et al., 2019). To control pest infestations, agroecology farmers in Kenya, for instance, employ the use of Push-pull agricultural pest management which involves the planting of leguminous genus *Desmodium* that produces scents that repel common crop pests in the region (Kassie et al., 2020). In Burkina Faso, study by Akpoti et al. (2021) showed that farmers that adopted the agroecological approach of alternate wetting and drying techniques were able to save limited water and still achieved self-sufficiency in food production. The input reduction, therefore, appeared to be a strategy for reducing production cost as four of the assessed literature point to the fact that peasant farmers who engaged in this replacement strategy and reduction in input use, though they do not produce in large amounts, make more profits thereby achieving better food security and nutrition status (Kassie et al., 2009; Kissoly et al., 2020; Nyantakyi-Frimpong et al., 2016; Rogé et al., 2017). Study by Kassie et al. (2009) compared farmers that rely on recycling farm resources to those that rely on non-renewable resources in Ethiopia. The study particularly focuses on reduced tillage and chemical fertilizer use. Results of the study "revealed a clear superiority of reduced tillage over chemical fertilizers in enhancing crop productivity among small-scale farmers" (p.1).

4.2.1. Climate resilience

It is expected that climate change will strongly affect food security and nutrition in African as many nations in Sub-Sahara Africa rely on rain-fed agriculture, with little or no access to efficient market system. Empirical studies showed that agroecology farmers engage in climate-resilient crops and livestock (Bezner Kerr et al., 2018; Boillat and Bottazzi, 2020; Debray et al., 2019; Zazu and Manderson, 2020) production strategies that enable them to recover and maintain functioning in the time of adverse climate events. Studies such as Bezner Kerr et al. (2018) observed a strong correlation between the number of climate-proof practices adopted by farmers and the level of food security they experience. As earlier stated, the challenges of malnutrition in sub-Saharan Africa are associated with problems of environmental degradation heightened by climate change (FAO, 2019). Farming practices that will enhance the adaptive capacity of smallholder farmers will therefore enable them to overcome environmental shocks. As observed by Bezner Kerr et al. (2019) single climate-resilient practices are usually not enough, therefore, many agroecology farmers use a combination of multiple practices to build overall farming system resilience and ensure availability. Study by Ng'endo et al. (2015) showed that agroecology farmers employed diverse climate-smart agricultural practices such as green manure; organic farming and agroforestry in Malawi which helped build resilience among women agroecology farmers in the area.

4.2.2. Production diversity and biodiversity conservation

Through recycling of soil organic matter, and other soil conservation techniques, agroecology farmers maintain stability in food production by securing soil health in the long run. Through minimum or zero soil disturbances and bush fallowing, agroecology farmers retain perpetual soil cover which contributes to improved water and nutrient use (Moses Mosonsieyiri Kansanga et al., 2020). Agroecology farmers also engage in other farming practices including mixed farming, crop rotation, and mixed cropping which were found to have a positive and significant effect on the dietary diversity of households (Moses Mosonsieyiri Kansanga et al., 2020; Kassie et al., 2020). Through the optimization of the diversity of crop and animal species, agroecology farmers ensure food and nutrition security while preserving natural resources (Ng'endo et al., 2015). According to Wielgosz et al. (2014) effect of biodiversity conservation was also found to affect soil fertility levels. For instance, in Kenya and Tanzania, traditional mixed agroforestry farms were reported by (Moses Mosonsieyiri Kansanga et al., 2020) to improve soil nutrient levels that lead to improved productivity. Nyantakyi-Frimpong et al. (2016) also reported that agroecology farmers experience "higher yields, greater food security, and dietary diversity as a result of legume intercropping" (Nyantakyi-Frimpong et al., 2016: p.97).

4.3. Social reproduction pathway

The social reproduction pathways point to the social relations developed by agroecology farmers, within the household and the society at large. It deals with the improvement in food and nutrition security status as a result of social capital built through networks that facilitate knowledge sharing among farmers and access to productive resources. It also includes women empowerment goals that transform the social relations within the households, influencing how household food decisions are made, thereby impacting how food utilization within the household. Only four of the reviewed studies (Bezner Kerr, Kangmennaang, et al., 2019; Nyantakyi-Frimpong et al., 2017; Wielgosz et al., 2014) emphasized the social reproduction associated with agroecology which is currently evident in agroecological movements in Latin America such as Cuba and Brazil, however, still emerging in Africa.

Through peer-to-peer activities and movements, agroecology farmers engage in the co-creation of knowledge and indigenous knowledge dissimilation (Moses Mosonsieyiri Kansanga et al., 2020). The conventional ways of Agri-technology dissemination hardly benefit a large majority of the smallholder farmers due to high farmer-to-extension workers ratio in the developing nations, and neither are small-scale farmers capable of paying for independent advisory services. Agroecology farmers, therefore, leverage their social capital to build knowledge networks to enhance their farming practices (Emeana et al., 2018). Not only that these farming practices productive, but the social process involved is also critical as it is embedded in cultural and indigenous multidirectional and transgenerational process of knowledge transfer (Bezner Kerr et al., 2019a,b). Such process is fundamental to the idea of right to food, and its variations. Findings from Rogé et al. (2017) showed that the agroecology movement to protect indigenous people's right to feed themselves with dignity shields local farm households from corporate food regimes and vagaries of market that undermine the agency for self-sufficiency, which is essential for the temporal dimension of FSN. Also, agroecology farmers develop local agroecology markets (Kansanga et al., 2020).

The social structures underlying these markets help to preserve and perpetuate sustainable traditional, indigenous, and ecological practices required for transgenerational continuance of practices that brings about meaningful, economically adequate, and dignified food security in line with the customs of the people (Kansanga et al., 2020). Also, through agroecology, most women farmers come together to form women groups and movements that amplify their voices (Bezner Kerr, Hickey, et al., 2019). Outside Africa, in India for instance, the self-help group in Uttar Pradesh and the Tamil Nadu Women's Collective paints

the picture of how women who were oppressed as a result of their castes and landless status, engage in collective farming, employing indigenous traditional practices, thereby achieving independence and food security (Kangmennaang et al., 2017).

5. discussion

Our review has provided evidence for links between agroecology to food and nutrition security. Chronologically, in 2003 when scholars began to research this link, they focused on the perspectives of agricultural production and ecology. Few recent studies since 2015 have extended the scope of research to other pathways of causalities between agroecology and food and nutrition security, including that of social reproduction. To discuss the findings from the feminist economic perspective, we have incorporated the concepts of social and physical reproduction into an existing framework for understanding the link between agroecology and nutrition. Fig. 2 is a modified version of the research framework presented by the High-Level Panel of Experts (2019) for innovative approaches to achieving FSN. We introduce the concepts of physical and social reproduction operationalized at the scale of farming households by basic principles (e.g. resource cycling, social equity, household care) guiding decisions and enacted by practices (at the bottom of the figure, e.g. organization of farmers, zero tillage, permaculture). Through the enhancement of their physical and social

reproduction, the farming households shape their economic and non-economic agency in general and in relation to food and nutrition security in particular. This agency directly facilitates both the production (availability and stability) and non-production (access and utilization) components of food security and nutrition.

Agroecological practices encompass sustainable farming methods such as organic agriculture, permaculture, and agroforestry. These are what Dalgaard et al. (2003); Nicholls and Altieri (2018); and Silici (2014) termed field-level agroecology. Reviewed literature shows that such agroecological farm practices ensure food availability by reducing the cost of production, overcoming climate impact, and ensuring food stability through agrobiodiversity conservation. Our review shows that research on agroecology at the field level in Africa is well developed. This is not surprising as most of the field-level agroecological practices are semblances of traditional farming practices associated with small-scale farming in rural areas of Africa. However, there appears to be a connection between the farming practices as part of a farming socio-ecological system where practices cannot be implemented independently from other social and economic dynamics at the farm and higher levels. Although the field level is of course straightforward and intuitive. Yet, it is also rooted in a perspective of farming as a technique of production, where problems – here environmental or nutrition problems can be addressed with technical improvements or innovations. As opposed, we understand farms as socio-ecological systems, in which

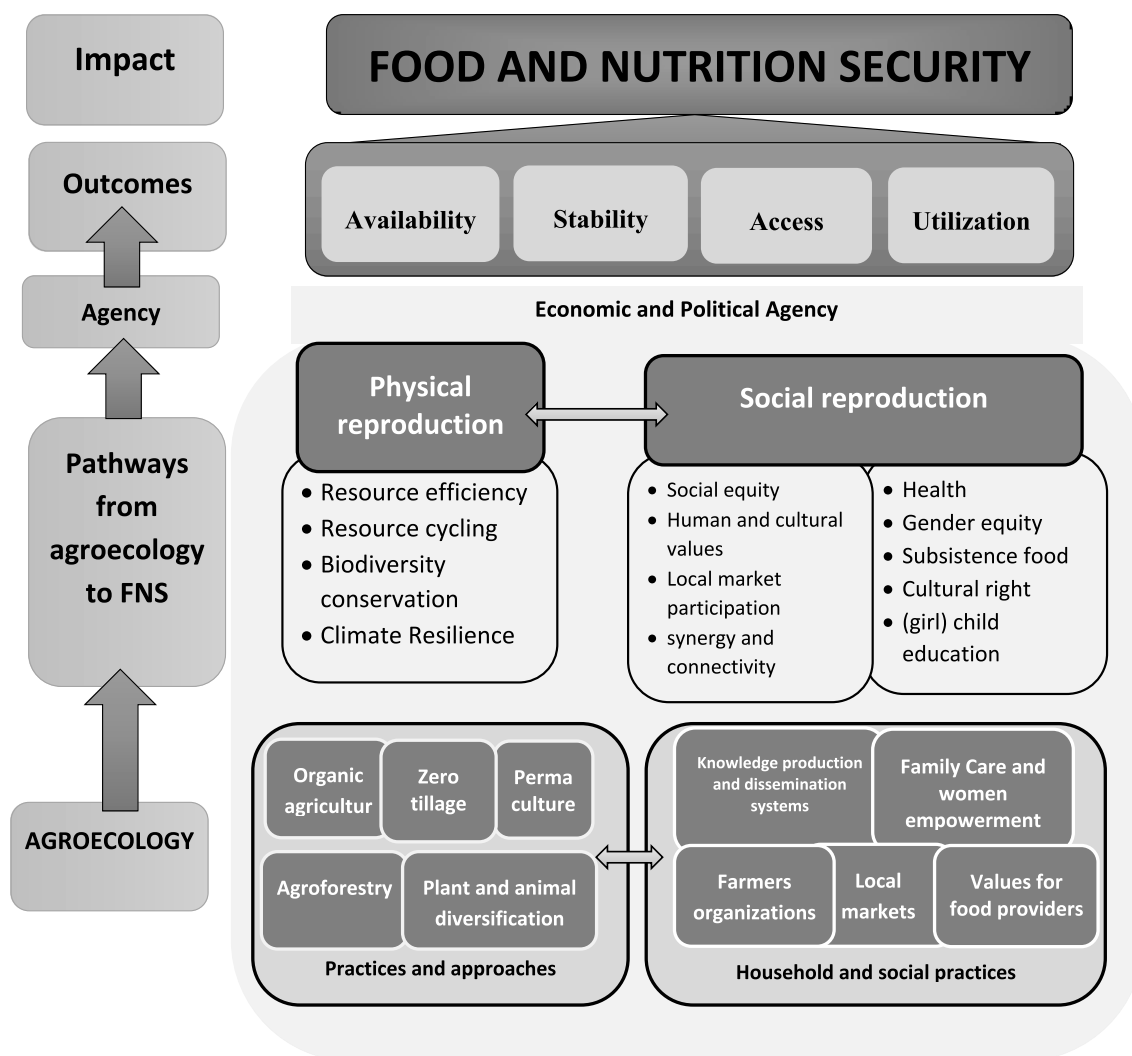


Fig. 2. Framework for understanding pathways from innovative agroecology to FNS at the household level. Source: modified from HLPE (2019).

practices on a farm are also subject to and affect the social and economic elements of the household and higher-level system.

This perspective provides a background to understand the statement of Olivier de Schutter, the United Nations' former Special Rapporteur for Food, that without the social and political dimensions, agroecology is mere cooptation, lacking the full principles of agroecology (De Schutter, 2019). The following section develops evidence and arguments for the social reproduction pathway of causality.

According to Nandi et al. (2021) household decisions on food purchase, production and consumption are complex and connected. "The farm household decision to produce their food on-farm or purchase from the markets has important implications for their access to food, and they pose great complexity in assessing household nutrition" (Nandi et al., 2021, p.2). Majority of farm households in Africa are characterized by small-scale subsistence farming. Bezner Kerr, Young, et al.(2019) found in their analysis in Malawi that agroecology farmers who decide to produce what they want to consume experience higher levels of food security and dietary diversity. Substantial evidence from smallholder farm households in low-income societies in Latin America such as Cuba and Bolivia suggests that agroecology and non-agroecology farmer differ in their patterns and preferences for resource allocation for food and cash crops. Agroecology farming households tend to have a more significant concern for food availability at the household level, which trickles across to family members in terms of food availability (CGIAR, 2020).

Because small-scale farmers cultivate on a very little land, they cannot effectively compete with big agribusinesses in terms of access to productive resources and markets. Thus, we observe that agroecology farmers organize alternative market systems (O'Kane and Wijaya, 2015). Agroecology markets emerged as a territory less influenced by political-economic and market factors, as they are more concerned with food crop marketing rather than cash crops. Findings by (Matita et al., 2021): p.8) in rural Malawi suggest that "agroecology households that engage more with food markets are more likely to have more diversified diets". Although agroecological markets are constrained by the fact that most consumers in the developing nations lack the awareness of the agro-ecological quality of food, the development of farmers' markets and sales through networking has proved to be a very progressive way of linking agroecology farmers and consumers (Courtois and Subervie, 2014; De Schutter, 2010). A typical example is in Kenya where the farmers' market serves as a public and recurring assembly where local farmers exchange produce and also sell products directly to consumers because the consumers value the ecological efforts put towards producing the foods (Fischer and Qaim, 2012). The market is less rigidly regulated; hence the farmers decide their prices and also avoid warehousing, distributors & retailers, and international quality standards.

Outside the farmers' market, agroecology farmers are also involved in network sales (tapping into their peasant group networks to find willing buyers through referrals) and exchanging their produce with fellow agroecology farmers. Most times, agroecology farmers recommend the products of their fellow farmers to consumers who buy at the farm gate (Bezner Kerr et al., 2018). By creating alternative agroecological markets, farmers are enabled to access not just market opportunities but also relational and structural access to inputs that are driven by demand for agroecology produce.

Thus, farmers who adopt agroecology seem to adhere to more than a set of practices but rather to group-sharing practices and further informal institutions. In France, Latin America, and Nigeria (own observation) agroecology farmers' groups develop knowledge, and technologies, share resources (land, seeds) and create markets, which all contribute to maintaining the farmers in the socio-ecological landscape of producers in their countries. Agroecology appears thus as a vehicle of social reproduction. How agroecological practices in particular, as compared to other environmentally friendly innovations such as climate-smart agriculture, achieve this in Africa, is a very exciting path for research.

From a socioecological perspective, Ajao et al. (2010) assessed the impact of reproductive activities such as family management and childcare practices on the food and nutritional status of rural households Ile Ife, Nigeria. They found that children with less childcare were significantly more likely to be stunted and food insecure. Reproductive activities such as childcare and family management have also been shown to reduce diseases and health challenges in households in China (Li et al., 2009), thereby freeing up man-hours that can be relocated to more quantity and quality food production. Agroecology farmers prioritize the traditional family caregiving by performing the essential roles of achieving household food and nutrition through selection, production, preparation, and ensuring that food is available for all family members.

Given that women constitute the majority of smallholder farmers in the developing nations, efforts in "de-marginalization" and empowering women farmers in making decisions that directly affect their lives, which is foundational in emerging agroecology movements, can be fundamental to eradicating hunger and food insecurity. Most of the agroecology movements in Asia and Latin America show that agroecology farmers are mostly comprised of women (Nicholls and Altieri, 2018; Vorgelegt et al., 2016). The practice of agroecology seems to empower women in the household to dedicate more resources to reproductive activities in wider sense - in other words, to maintain the household by constructing a healthy (adequate diet, care, and sanitation) home. How agroecology leads to such empowerment and a greater focus of farmers on household reproduction at the level of the household is not yet researched in southern Africa and is not clearly understood in general.

6. Conclusions

How is research on agroecology related to food and nutrition security is framed in research taking place in Africa? The paper opts for a feminist economics perspective to address this question for two reasons. First, food and nutrition are still among the few economic activities in Africa that largely take place within the household economy and not in the global economy. Second, marginalized actors (rural women) are often the main actors in rural food security. Feminist economics, with its consideration of both production and reproduction dynamics, appeared ideal to complement and rethink existing views on the causalities leading to food and nutrition security.

By employing a systematic literature review of empirical studies located in African countries, published between 1996 and 2020, we consolidate evidence on agroecology as a vector for an efficient production model for small-scale farming units. The results of our review show that the nexus between agroecology and FSN has been framed mainly from an agronomic perspective. On the contrary, impact of the adoption of agroecology practices on the household economy and their social reproduction is seldom investigated, despite being heavily documented in other parts of the world.

In our discussion, we modify the conceptual framework from high-level panel of experts in food and nutrition security (2019) to show how reproduction activities relate to FNS and highlight how research on Africa has until now failed to embrace agroecology in its social and political context. We then discuss reproduction dynamics as another essential pathway for analyzing the link between agroecology and FNS. We argue that the foundational (related) concepts of social reproduction and agency for food security and nutrition may provide a better lens to unpack the agroecology-FNS nexus than the agronomic technical perspective or the neoclassical eternal attempts to solve hunger among the (cash) poor through market mechanisms (e.g. integration). We call upon research to strengthen the analysis of agroecology as an innovation in a socio-ecological system rooted in a political ecology context. Further, in addition to documenting ecological sustainability, indicators to measure the effect of agroecology or any agricultural innovation at the household level, and especially on FNS, should be developed to capture the ability of the household to reproduce its members and to

reproduce itself in its social and political context.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.indic.2022.100212>.

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