Women Participation in Agriculture in Developing Countries: A Systematic Review

Beatrice Mbakaya[1], Dominique Ndegu[2] and Balwani Mbakaya[3]

Abstract

Despite the crucial role women play in agriculture in developing countries, they are faced with several constraints which reduce their productivity. The aim of this systematic review was to analyze women's participation in the agriculture sector in the developing world to direct policy interventions in this area. Literature search was conducted from six databases: Google scholar, EBSCO host (Econlit and Gender studies), Psychinfo, Scopus, Jstor, and Web of Science (agricultural, multidisciplinary and women studies components) covering the period from January 2009 to July 2019. This literature search employed the keywords: "Participation" or "role", "women" or "females" or "gender" or "girls", "farm" or "agriculture" or "estate" or "garden", "factors". The review was executed in three steps:1) identification of studies, 2) content extraction and critical appraisal, and 3) synthesis of extracted content. The quality of articles was evaluated using scoring matrics of Mixed Methods Appraisal Tool criteria. From a search finding of 1,705,928 articles, only 21 papers met the inclusion criteria. The review has demonstrated that most of the agriculture activities are done by women however they continue to face limited decision making.

Keywords: Women, Participation, Agriculture, Developing countries.

Introduction

Of the developing world's 5.5 billion people, an estimated 2.5 billion are involved in agriculture at household level, and 1.5 billion are in smallholder households (World Bank 2008). Agriculture accounts for between 30 to 60 per cent of the total

[1] District Agricultural Division Officer, Mzimba North District Agricultural Division Office. Corresponding author Email: mbatemwa2@gmail.com
[2] Senior Lecturer in Educational and Social Psychology, Mzuzu University, Department of Education
[3] Senior Lecturer, St John's Institute for Health, Mzuzu, Malawi.
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Gross Domestic Product and employs about 70 per cent of the total workers (Essays, UK, 2018), continuing to support livelihoods of majority of people in developing countries. However, the agricultural sector in many developing countries is underperforming, in part because women, who represent a crucial resource in agriculture and the rural economy through their roles as farmers, laborers and entrepreneurs, face constraints that reduce their productivity (FAO, 2011). Strategic policy interventions informed by evidence based research are required to enhance women's participation in the agriculture sector in developing countries. However, current participation trends for women in the agricultural sector of developing countries remain relatively mixed and inconclusive (Clark 2013). A conclusive analysis on women's participation in the agriculture sector in the developing world requires a systematic approach to the review of literature to direct policy interventions in this area hence the essence of this review. Specifically, this review analyzed women's participation in the agriculture sector and identified factors influencing their participation in the sector. Findings can guide policy makers in categorizing and prioritizing activities into viable gender mainstreaming strategies when implementing interventions.

Materials and Methods

Protocol

This review was guided by the proposed guidelines developed by PROSPERO for systematic search and selection. PROSPERO is an international database for registering systematic reviews in various professions. The protocol however was not published but guidelines were adhered to. In addition, a PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram was used in this study to illustrate the number of articles retrieved, retained, excluded and reasons for every action. Lastly, a Mixed Method Appraisal Tool (MMAT) was used to appraise the studies included.

Inclusion Criteria

The article inclusion criteria were as follows: (1) Studies whose participants were women or/ a mixture of gender categories; (2) Studies conducted in developing countries; (3) Studies whose outcomes were women or gender participation in agriculture regardless of design; and (4) Published peer reviewed papers (5) Papers written in English.

Information Source /Search Strategy

Six database sources were used to gather the required information viz., Google scholar, Web of Science (agricultural, multidisciplinary and women studies components), Psych Info via Pro-Quest, EBSCOhost (Econlit and gender studies component), Scopus, and Jstor. Efforts were made to identify both published and unpublished studies by manually checking the reference lists of articles that met the inclusion criteria. The period covered research from as far back as January 2009 to June 2019. The key search words used were: Participation or role, women or females or gender or girls, farm or agriculture or estate or garden, factors. Papers written in languages other than English were excluded. Finally, studies that were conducted in developing countries were identified.

Data Extraction Process and Data Items

The process of data extraction started with an internet search of relevant articles using search terms while following the PRISMA guidelines. The steps are: identification of records, screening to remove duplicate records, assessing for eligibility and including the records. A standardized table was used to guide data extraction from the included papers. All relevant information extracted from each study was summarized and documented. The details included: title of the study, author, year, place of study, study design, type of analysis, variables included, outcomes.

Quality Appraisal

The MMAT tool was used to appraise 21 studies included in the review. MMAT is a validated checklist used to appraise the quality of studies included in any systematic review with a quantitative, qualitative and mixed methods approach. The MMAT has two general screening questions applicable to all study designs: (1) Are there clear qualitative and quantitative research questions or objectives, or is there a clear mixed methods question or objective? and (2) Do the collected data address the research question or objective? The MMAT appraises the following study methodologies and designs: qualitative, quantitative randomized controlled, quantitative non-randomized, quantitative descriptive and mixed methods study designs. The tool is divided into five sections, with each section used to appraise a specific study design or methodology. Each section has numbered criteria for appraising studies. All the criteria per entity sum up to 100 per cent and each

criterion has 25 per cent power of quality except for the mixed methods study where the first 25 per cent is given by default (as it has three criteria) followed by topping up with assessment scores per criteria. The total score per domain is a percentile and the higher the score, the better the quality. The MMAT has a comparative advantage over other tools such as Jadad and MINORS (Methodological Index for Non-Randomized Studies) because it is efficient and can concomitantly appraise different types of empirical studies. The systematic review included studies of different designs thus making MMAT a suitable appraising tool.

Synthesis of Results

The extent of women's participation in agriculture in Developing countries was identified. The meaning of participation in this review focused on the role played by women in agriculture activities along various agriculture value chains and its related decision making processes. This study went further to analyze factors and constraints affecting women participation in these two areas. A narrative synthesis was conducted based on the content analysis of the included articles. The papers were synthesized, rated and finally, the results were put in Table 1 below:

Table 1: MMAT Details

Title	Author & Year	Design	Country	Study Participants	Intervention	Setting	Outcome	Unit of Measuring Participation	Major Findings, Factors and Constraints
Women Farmers' (Dis) Empowerment Compared to Men Farmers in Ethiopia	Solomon Petros, Fetien Abay, Girmanesh Desta, and Cheryl O'Brien, 2018	Quantitative-descriptive	Ethiopia	240 Men and women (52%women), 0.55ha of land, family size-4.9, average livestock size/ hh-3.2 units	N/A	Selected villages	Gendered participation in post-harvest practices-chickpea, sesame, maize, and wheat enterprises	% performed by women.	-Women's role increased significantly (to as much as 88 per cent) in the post-harvest phase compared to land preparation, sowing and cleaning, intercultural farm activities and post-harvest activities which had 41%, 61% and 73 % -Lack of access to technologies was a major constraint
Sowing seeds of empowerment: effect of women's home garden training in Bangladesh	Marie Antoinette Patalagsa, Pepijn Schreinemachers, Shahana Begum and Shawkat Begum 2015	Mixed methods	Bangladesh	Women farmers-456, land < 0.4 ha, 1 child <5, experience in veg cultivation but not received similar intervention	Nutrition and garden establishment training	Villages in rural Bangladesh	Effect of training on women participation in vegetable production decisions	% of participation (Control, intervention, men) in household in decisions	-Women who had received the training had more freedom to decide over most gardening tasks such as crop choice, planting and harvesting times, crop management, and inputs to use. -There was a significant ($p < 0.05$) difference between the intervention and control groups in all five aspects. -Most decisions were jointly done (men and women). -Training was a major factor
The Hidden Economic Backbone - Women in Agriculture	Sidra Mazhar, Mysbah Balagamwala and Haris Gazdar 2017	Quantitative-descriptive-secondary survey data	Pakistan	1151 (Females, 15-49 years)	-	Rural communities	Enumeration and analysis of women's work in Agriculture	% participation	Two-thirds of the women had done some agricultural work (67%), 46% some farming, 60% livestock. Male outmigration, increase in commercialization of agriculture, pandemic diseases that disproportionately affect more men (like HIV), conflict, climate change and technological innovations, Competing claims on time, unequal access to resources and opportunities, wealth status, education and reproductive roles are the factors that affected women participation.

Title	Author & Year	Design	Country	Study Participants	Intervention	Setting	Outcome	Unit of Measuring Participation	Major Findings, Factors and Constraints
Tribal Farm Women's Participation in Agriculture and Factors Influencing it: Evidence from West Bengal, India	A. Shamna, P. Biswas, S. K. Jha, S. Sarkar, and Sh. Kumar, 2018	Quantitative-descriptive	India	110 tribal families	-	Rural setting	women's participation in farming activities	Man-days spent by tribal women in agricultural activities	Participation of farmwomen in farming activities was much less than an average women laborer who gets 60 to 125 man-days of work per year. Age, education, social participation, economic motivation were the factors that had significant relation with participation of farm women. Constraints to women's participation were: Lack of education/Literacy level, too little Income, Lack of child care facilities, Lack of knowledge and skill, Lack of training, Doubts regarding the women capabilities, Loans are not sufficient, Family restriction: (a) Husband, (b) Elders, Partiality of government officials, Conflicts with other workers, Caste system in the village, Ego problems of men folk, Lack of freedom to take decision, Confining the role of women to household activities
Contribution of Rural Women in Vegetable Cultivation in Home gardens of Nainital District, Kumaun Himalaya, India	Kiran Bargali, Vibhuti and Charu Shahi, 2015	Quantitative-descriptive	India	100 rural women	-	Rural setting	Extent of women's participation	Participation Index	Rural women in the plantation activity had highest participation index (PI= 338) and ranked Ist while participation in marketing of home garden products had lowest participation index (PI=100) and ranked 10$^{th.}$ Time, Distance from market, Irrigation facilities, Availability of market, Availability of Capital, Transportation, Lack of knowledge, Shortage and lack of planting material, Other problems affected women participation.

Title	Author & Year	Design	Country	Study Participants	Intervention	Setting	Outcome	Unit of Measuring Participation	Major Findings, Factors and Constraints
Women's empowerment and gender equity in agriculture: A different perspective from Southeast Asia	Sonia Akter, Pieter Rutsaert , Joyce Luis , Nyo Me Htwe, Su San , Budi Raharjo, Arlyna Pustika, 2017	Quantitative-descriptive	South east Asian countries: Myanmar, Thailand, Indonesia and the Philippines.	37 FGDs with 290 female farmer	-	Rural settings	Women's role and decision making power in rice production	% participation	Task division between husband and wife in the field is similar, although the intensity of the role played by men and women to perform each task varied. Men take a lead role in land preparation, pesticide and fertilizer application, while women were predominantly involved in crop establishment, weeding, harvesting and post-harvest activities.
Gender Participation and Decision Making in Crop Management in Great Lakes Region of Central Africa	Justus Ochieng Emily Ouma Eliud Birachi, 2014	Quantitative	Rwanda, Burundi, and the Democratic Republic of Congo (DRC)	1,493 men (56 per cent) and 1,172 women (44 per cent) respondents	-	Rural households	Examines the degree to which women participate in farm management and decision making for crop production activities, and the socioeconomic factors that influence their participation	% participation	Farms managed by women are cultivated much less intensively than male-managed farms, because of the limited ability of women to acquire technological inputs such as fertilizers and improved seeds. While legumes are grown by both men and women, cassava seems to be "a women's crop," both in terms of cultivation and harvesting. Accessibility to rural credit, extension services, social capital in the form of groups, and engagement in off-farm activities are critical for stimulating women's participation in crop production activities. Limited ability to acquire technological inputs was the only constraint reported to affecting women participation.

Title	Author & Year	Design	Country	Study Partici-pants	Interven tion	Setting	Outcome	Unit of Measuring Participation	Major Findings, Factors and Constraints
Understanding women's participation in irrigated agriculture: a case study from Senegal	Marcia L. Nation, 2010	Quantita tive-	Senegal	Women from 30 hh	N/A	Rural areas	Examining gender relations within the household regarding the allocation of labor, time, and capital to agricultural production.	% participation	Labor for irrigated agriculture came from reallocating certain household and agricultural tasks to daughters and from lessening labor inputs to some rain-fed production, women gave up some control, overproduction in exchange for fewer demands on their time and labor, decisions about women's allocation of their own labor are shaped not only by relationships with husbands and other household members but are also embedded in larger struggles regarding the use of land, commodity prices, and input charges. Control of hh labour, access to capital and the returns to capital investment, Access to land, control over irrigation technology, conjugal relations of cooperation and conflict shape their decisions. Agricultural marketing,Lack of transportation, Limited business and negotiation skills, Family opposition and limited product were the constraints that affected women participation.

Title	Author & Year	Design	Country	Study Participants	Intervention	Setting	Outcome	Unit of Measuring Participation	Major Findings, Factors and Constraints
Roles of women in agriculture: A case study of rural Lahore, Pakistan	Wajiha Ishaq and Shafique Qadir Memon, 2016	Quantitative	Pakistan	207	-	Rural union councils	Highlight the enormous roles of the rural women in agriculture, determine the causes for women participation in agricultural activities, investigate different constraints faced and explore different factors which determine their empowermnet	% participation	The average working hours of the respondents were calculated as 9 hours per day, Out of all the pre-harvesting activities, 94.2% positive responses were recorded against seed bed preparation. A majority of rural women (85.02, 88.88 and 95.65%) were involved in shed cleaning, dung collection and fodder cutting, respectively.
Contribution of rural women to rice production activities in two different areas of Bangladesh	F Rahman, SA Shammi, MT Parvin, N Akter, MS Khan, S Haque1, 2016	Quantitative	Bangladesh	123 women	-	Rural areas	To identify the core contribution of women in the rice production activities, identify the wage gap between male and female laborers and factors influencing women's	Contribution of rural women in rice farming by analyzing the average time allocation (hours spent/day) by males and females on agricultural activities.	In terms of contribution, nearly 43% and 42% of the total works were done by rural women in rice farming activities in Nilphamari and Mymensingh district, respectively. It was found that male workers spent 228.2 hours and female workers 174.5 hours per season in Nilphamari region compared to 270 hours and 197.3 hours per season in Mymensingh region, respectively. The average wage rate in Nilphamari district was BDT 241/day for male and BDT 175/day was female. Similarly, in Mymensingh district the average wage rate for male and female

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							participation in rice farming at household level in Bangladesh.		workers was BDT 281/day and BDT 162/day, respectively. Distance of the rice field from the home, the number of available technologies used and the number of adult male labour significantly affect the women's participation in farming activities. Communication in marketing, physical weakness, use of modern technologies, lack of access to technology, training facility and information on farming were the constraints reported to affect women participation.
Beyond crop production	Nathalie Me-Nsope and Michelle Larkins, 2016	Quantita tive	Malawi	329(6 seed actors, 260 seed producers, 30 producer cooperative,19 retailers and local processers, 10 local buyers and traders, 4 export market buyers and traders.)	-	Rural areas	-	% participation	Participation rate of approximately 60% for women in pigeon pea farming, i.e. about 60% of those who grow pigeon pea are women, women comprise between 90-95% of local processors in Malawi. There are no women who act as large-scale exporters. Significance of the crop in helping women fulfill their responsibility of providing food (relish) for their families, local processing essentially involves cooking of the legume, a task perceived to be suitable for women, and one that they can easily perform with the assets available to them. Access to finance/cash is an important requirement to participate as a retailer. Unfortunately, unlike

Title	Author & Year	Design	Country	Study Participants	Intervention	Setting	Outcome	Unit of Measuring Participation	Major Findings, Factors and Constraints
									their male counterparts, women retailers had less income/cash generating opportunities -men retailers were more likely to be involved in other income generating activities (mostly as hired farm labor or other non-farm income opportunities) ,women's physical abilities (in terms of lifting and protecting themselves from theft) impact their participation in large scale market activities, cultural restrictions on their time and mobility are a factor in market participation at a local level.
Cassava entrepreneurship and gender participation in Udi Local govr area, Nigeria.	Christo-pher Ogbonna Emerole, Anderson Nwalozie Nwachukwu, Chidozie Onyedikachi Anyiro, Victor Ebong, Charles Kelechi Osondu, 2014	Quantitative	Nigeria	30mhh, 30fhh	-	Rural areas	Gender Leadership and Participation in Household cassava Enterprises	% participation	Amongst the female-headed households, marital status, adult number of females in the households, and frequency of extension contact had very high (P< 0.001) influence on the participation female household heads in own cassava enterprises. In addition, status of health of household members, weekly time spent on cassava activities and annual net enterprise profit had moderate (P<0.05) influences on participation of female heads of cassava enterprise households.

Title	Author & Year	Design	Country	Study Partici-pants	Interven tion	Setting	Outcome	Unit of Measuring Participation	Major Findings, Factors and Constraints
Determinants of female headed hhs participation in Peri Urban Modern SSI in Ethiopia: the case of kobo town	Goitom Sisay, 2018	Quantita tive	Ethiopia	333 (113M, 220W) participants and non-participants	-	Peri urban areas	Identify the determining factors influencing female-headed households' participation in periurban modern small-scale irrigation projects	% participation	Educational status of the household head, family size, livestock holding, access to credit services and distance from the nearest market centers have a significant and positive impact on participation.
Education and agricultural inputs use by female farmers in Zimbabwe	Innocent Matshe, Precious Zikhali and Pius Chilonda, 2019	Quantita tive	Zimba-bwe	-	-	Commu-nal and resettle-ment areas - rural Zimba-bwe	-	% participation	While 89% of parcels owned by male-headed households received chemical fertilizer, only 81% of parcels owned by female-headed households did, hired labour was used on 67% of male-headed households' parcels and 58% of parcels owned by female-headed household Education significantly raises the probability of female farmers' use of both chemical fertilisers and hire
Gender and development: roles of rural women in livestock production in Pakistan	Humera Amin, Tanvir Ali, Munir Ahmad and Muhammad Iqbal Zafar, 2010	Quantita tive	Pakistan	768 respondents	-	Rural areas	Investigate the role of rural women in the livestock production	% participation	Out of total 768 respondents, more number of wives (37 5%) participated in livestock production activities as compared to the husbands (17%),Role of rural women in livestock production was higher in activities such as fodder offering, cleaning of sheds, watering to the animals, milking, poultry raising, ghee and egg selling and raising

Title	Author & Year	Design	Country	Study Partici-pants	Interven tion	Setting	Outcome	Unit of Measuring Participation	Major Findings, Factors and Constraints
									of goats and sheep, whereas the role of husbands was higher in fodder cutting and transportation of fodder. Age, education, social participation, economic motivation had significant relation with participation of farm women
Gender involvement in manual material handling (mmh) tasks in agriculture and technology intervention to mitigate the resulting musculoskeletal disorders.	Dr Suman Singha, Dr. Neelima Sinwalb, 2012	Quantita tive	India	100 agriculture workers	-	manual material handling tasks in rural commu-nities	To study gender participation in agricultural activities involving manual material handling tasks.	-	In Agriculture female respondents played a key role in mmh tasks in land preparation, manuring, sowing, fertilizer broadcasting. The results revealed greater susceptibility of females to musculoskeletal problems in most of the household and animal husbandry tasks.
Gender Participation in Economic Activities and Decision Making in Keffi Area of Nigeria	Hassan Ishaq Ibrahim, Napoleon Danbeki Saingbe, Zubairu Ajiya Abdulkadir, 2012	Quantita tive	Nigeria	60 men and 60 women	-	Rural setting	Assessed gender participation and decision making role in economic activities	Means	The participation by women was frequent in post-harvest activities (mean=2.88) and poultry management (mean = 2.48). Women participation was occasional in home gardening (mean 1.58), local food processing (mean = 2.06), goat rearing (mean = 1.86), trading (mean = 1.97) and hair dressing (mean = 1.72). Educational level, years of experience, personal income and credit obtained significantly influenced the level of gender participation in economic activities.

Title	Author & Year	Design	Country	Study Participants	Intervention	Setting	Outcome	Unit of Measuring Participation	Major Findings, Factors and Constraints
Women's involvement in livestock care	Adeela Manzoor, Izhar Ahmad Khan, Hira Ashfaq, Norina Jabeen and Ashfaq Ahmad Maan, 2018	Quantitative	Pakistan	600	-	Rural areas	Analyze women's involvement in livestock care and management and its implications for their social life	-	Women of the Punjab province actively participated in livestock-related activities i.e. milking, feeding and watering, treatment, fodder cutting, cleaning sheds, grazing, making dung-pads, rearing and bathing the animals. Due to cultural milieu of the Punjabi rural society, women were involved in doing this difficult job. Curtural milieu was a major constraint.
Rural women's participation and constraints in agricultural activities: a case study of district nankana sahib, Punjab	Siddra Nazir, Izhar Ahmed Khan, Babar Shahbaz and Farkhinda Anjum, 2013	Quantitative	Pakistan	120 women	-	Rural areas of Punjab, province of Pakistan	-	-	Majority (81.7 %) of the respondents had participation in harvesting and picking activities. About 70.8 % of respondents in the research area participated in sowing. More than half (54.2%) of the respondents were involved in processing related activities like winnowing, drying of grains cleaning of grains. Slightly more than half (52.8%) were participated in marketing of livestock products and about 50.8% of the respondents participated in packing of vegetables. About 37.5 % of the respondents told that they participate in cultural practices (transplanting, manure application, fertilizer application, weeding, thinning, gap filling, irrigation and plant protection measures such as insecticides and pesticides). Areas where the participation of rural women was found to be least are leveling and cleaning of agricultural fields as only

Title	Author & Year	Design	Country	Study Partici-pants	Interven tion	Setting	Outcome	Unit of Measuring Participation	Major Findings, Factors and Constraints
									35.0% of the respondents said that they participated in these activities. Looking after children, Serve in laws, parents, Looking after yourself, Household chores, Meeting with relatives, Participation in ceremonies were the major constraints
What factors explain women's empowerment? Decision-making among small-scale farmers in Uganda	Mila Sella, Nicholas Minotb, 2018	Quantita tive	Uganda	1440 hh	-	Rural local councils	The aim of this study is to examine some of the key determinants of women's empowerment relating to an agricultural context in Uganda	% participation	There is very little difference in the self-reported participation of men and women in food production (94% of women and 92% of men). 57% of both women and women report input into all or most decisions on food crop production. For cash-crops the difference is larger (46% of women and 68% of men). Only 41% of women report input into all or most decisions on use of income from cash crops compared to 74% of men. Age, male-female educational differences, remoteness, and location, the individual and household characteristics affected women participation.
Participation and role of rural women in decision making related to farm activities: A study in Burdwan district of West Bengal	Subhadip Pal and Sourav Haldar, 2016	Quantita tive	India	100m,100w	-	Rural areas	-	-	Men and women respondents took joint decisions in 33.18% cases. Age, education, caste type and size of the family, size of land holding, socio-economic status of the families, education level of rural women have significant influence on the involvement in decision-making

Results

Search Outcome

An initial search of the databases and other sources yielded 1,705,928 articles. The titles of the identified articles were assessed, and 1,705,658 articles were removed because they were either duplicates or did not meet the inclusion criteria. Of the remaining 270 articles, 163 articles were excluded because they were abstracts only and efforts to find the complete articles proved futile. Eighty-six [86] articles were removed because the studies were not conducted in developing counties. The remaining 21 articles met the inclusion criteria (see search strategy table 2 below).

Table 2. Search Strategy

DATA BASES	SEARCH	SEARCH WORDS	NO OF RETRIEVED STUDIES	NO OF QUALIFIED STUDIES
Google scholar	full	"Participation" or "role", "women" or "females" or "gender" or "girls", "farm" or "agriculture" or "estate" or "garden", "factors".	478,000	11
Ebscohost		"Participation" or "role", "women" or "females" or "gender" or "girls", "farm" or "agriculture" or "estate" or "garden", "factors".		
(1)Econlit	Full article	"Participation" or "role", "women" or "females" or "gender" or "girls", "farm" or "agriculture" or "estate" or "garden", "factors".	35,137	1
(2)Gender studies	Full article	"Participation" or "role", "women" or "females" or "gender" or "girls", "farm" or "agriculture" or "estate" or "garden", "factors".	2,778	1
Scopus	Full article	"Participation" or "role", "women" or "females" or "gender" or "girls", "farm" or "agriculture" or "estate" or "garden", "factors".	871,000	3
Jstor	Full article	"Participation" or "role", "women" or "females" or "gender" or "girls", "farm" or "agriculture" or "estate" or "garden", "factors".	184,540	1

DATA BASES	SEARCH	SEARCH WORDS	NO OF RETRIEVED STUDIES	NO OF QUALIFIED STUDIES
Web of science	Full article	"Participation" or "role", "women" or "females" or "gender" or "girls", "farm" or "agriculture" or "estate" or "garden", "factors".		
(1) Agricultural multidisciplinary	Full article	"Participation" or "role", "women" or "females" or "gender" or "girls", "farm" or "agriculture" or "estate" or "garden", "factors".	11,007	3
(2) women studies components)	Full article	"Participation" or "role", "women" or "females" or "gender" or "girls", "farm" or "agriculture" or "estate" or "garden", "factors".	13,216	1
Psco socio info	Full article	"Participation" or "role", "women" or "females" or "gender" or "girls", "farm" or "agriculture" or "estate" or "garden", "factors".	109,980	0

Quality of the Studies

In this review, 19 articles were quantitative (descriptive), one was mixed method and one qualitative. Based on the score allocation as described in MMAT, 20 studies scored 100 per cent, one study scored 75 per cent. Therefore, this means that the included studies are of good quality. Three review authors independently assessed the risk of bias in the studies included by considering the clarity of questions (objectives) in the articles and whether the data collected addressed the research questions. For all the quantitative studies, the risk of bias was assessed by looking at the following: Is the sampling strategy relevant to address the quantitative research question (quantitative aspect of the mixed methods question)? Is the sample representative of the population under study? Are measurements appropriate (clear origin, or validity known, or standard instrument) and Is there an acceptable response rate (60% or above). For the qualitative study, the risk of bias was assessed by looking at the following: Are the sources of qualitative data (archives, documents, informants, observations) relevant to address the research question (objective)? Is the process for analyzing qualitative data relevant to address the research question (objective)? Is appropriate consideration given to how findings relate to the context, e.g., the setting, in which the data were collected? Is appropriate consideration given to how

findings relate to researchers' influence, e.g., through their interactions with participants? and finally, for the mixed method study, the risk of bias was assessed by looking at the following: Is the mixed methods research design relevant to address the qualitative and quantitative research questions (or objectives), or the qualitative and quantitative aspects of the mixed methods question (or objective)? Is the integration of qualitative and quantitative data (or results*) relevant to address the research question (objective)? Is appropriate consideration given to the limitations associated with this integration, e.g., the divergence of qualitative and quantitative data (or results*) in a triangulation design?.

Study Characteristics

The studies included in this review were conducted between 2010 and 2019. Four studies were carried out in Pakistan, 5 studies were from India, one study was from Uganda; 2 studies from Nigeria ; 2 studies from Ethiopia , one study from (Burindi, Rwanda and DRC), one study from Malawi, one study from (Philippines, Myammar, Indonesia and Thailand), one study from Zimbabwe, 2 studies from Bangladesh and one study from Senegal. In terms of study designs, one study was a mixed method study, 1 qualitative and the rest were quantitative (descriptive studies).

Study Participants

Study participants in the selected articles were males and females.

Study Intervention, Control and Setting

All studies included in the review were conducted in developing countries. Twenty out of the 21 studies, were conducted in rural/community/village setting, one [1] study indicated that it was conducted in a peri-urban setting. One out of the 21 studies had a training intervention.

Key Findings of the Study

The common outcome measure among the reviewed articles was women's participation in agriculture and factors affecting their participation. However, they were different in terms of their focus in the agriculture value chain activities. Areas of focus include: participation of women in implementation of activities of crop and livestock related enterprises and factors affecting their participation. It was noted that assessment of women's

participation in these studies, much as it could focus on selected crop enterprise in a setting, this was in the background of multiple cropping systems (upland and irrigated). A departure from a focus on women's participation in crop and livestock related enterprise activities was one study which assessed women's participation in agriculture activities involving manual handling of quipment and lastly one study on women's participation in agriculture had an intervention of training in home gardens where the effect of training on women's participation was evaluated. Participation was measured mostly in terms of percentage of women participating in various activities. Other participation measures include: man days spent on agriculture (1 study), participation index (1 study), average time allocated (1 study) on agriculture and means (1 study).

Presentation of Results

Studies included in this review were analyzed based on two outcomes: women's participation in agriculture, and factors influencing women's participation in agriculture. These sub-categories were generated from the objective of the study. Presentation and interpretation of the results follow these categories as narrated below.

Women's Participation in Agriculture

In a study by Solomon et al (2018), focusing on chickpea, sesame, maize and wheat crop enterprises in Ethiopia, results indicated that women participated at every level of agricultural production across all the surveyed regions. Findings also indicated that women's role increased significantly (to as much as 88%) in the post-harvest phase (storage) compared to land preparation, sowing and cleaning, intercultural farming activities which had 41 per cent, 61 per cent, and 73 per cent respectively. Post-harvest losses activities evaluated were: harvesting, handling, threshing/chipping, drying, transport, distribution/ marketing, storing, and processing. Lack of access to technologies exacerbated by limited access to extension services pegged at 92 per cent for men compared to only 43 per cent for women was reported as a major constraint hindering participation of women in post-harvest practices. Despite the key role women played in post-harvest losses, Solomon et al (2018) further report women's lack of decision making power compared to men in post-harvest decision making. Women could be informed, consulted, or in some cases even veto decisions regarding post-harvest activities. In contrast in some

regions of Ethiopia, women were mostly informed of post-harvest decisions, with few women reporting to be consulted in decision making regarding storage, use, and marketing.

Rahman (2016), measuring the contribution of rural women in rice farming, analyzed the average time allocation (hours spent/day) by male and female farmers on agricultural activities. Results also indicated that comparatively female workers were more involved in post-harvest operations than male members. Beside household activities, women were engaged in almost all agricultural activities like seedling nursing, weeding, threshing, cleaning and sorting of grain, boiling of grain, drying of straw and rice storing. However considering man hours spent by each gender category on rice production activities, less amount of working hours for women was reported compared to men 228.2 hours and 174.5 hours per season for men and women respectively in Nilphamari region compared to 270 hours and 197.3 hours per season in Mymensingh region, for men and women respectively. Of course significant differences between these participation levels between the gender categories were not reported. A drop in the number of hours among women than their male counterparts was traced to the time women devote to household chores. Distance of the rice field from the home, the number of available technologies used and the number of adult male labor significantly affect women's participation in farming activities. Constraints reported to have an effect on women's participation in rice production activities include: communication in marketing, physical weakness, use of modern technologies, lack of access to technology, training facility and information on farming.

In a study by Akter et al (2017) where rice was a major crop, in all the study sites, task division between a husband and wife in the field was similar, although the intensity of the role played by men and women to perform each task varied. Men took a leading role in land preparation and pesticide and fertilizer application, while women were predominantly involved in crop establishment, weeding, harvesting and post-harvest activities. In areas such as the Philippines, where manual transplanting is a common practice of crop establishment, women's drudgery was much more acute than in areas such as South Sumatra and Thailand where broadcasting method is practiced. Low level of mechanization is reported to affect women work load during peak seasons.

Singha et al (2012) in their study on gender participation in agricultural activities involving manual material handling tasks, also revealed a low level of mechanization by female

respondents in agriculture activities. Female respondents played a key role in manual material handling tasks in land preparation, manuring, sowing, fertilizer broadcasting and the results revealed greater susceptibility of females to musculoskeletal problems in most of the household and animal husbandry tasks. In terms of decision making, women's decision making power in rice farming varied substantially across and within the study sites. It was reported that in South Sumatra (Sumatra, Indonesia) and Myanmar, men take a lead role in the field. Nonetheless, men listen to women's opinions and in many of the FGDs (50%), participants mentioned that husbands and wives make decisions jointly. In contrast, in Yogyakarta (Java, Indonesia), decisions regarding rice farming are made by the community or farmer groups instead of households (78% cases). Women in these locations were reported to have minimal influence on community-level decision making. The highest amount of women's involvement in decision making in rice farming was observed in Thailand and in the Philippines. In Thailand, in half of the FGDs, participants mentioned that they have sole decision making power in rice farming, while in the remaining half of the cases, decisions are jointly made with their husbands. In the Philippines, all rice farming decisions are jointly made by husbands and wives.

Ibrahim et al (2012) in their study on gender participation and decision making role in agriculture related economic activities (pre harvest crop activities, post-harvest activities, home gardening, poultry management, goat rearing, cattle rearing, aquaculture activities, local food processing, marketing activities) among gender categories, also found dominance of women participation in post-harvest activities, however this was done in comparison with other economic activities like livestock, home gardening, local food processing, trading and hair dressing. Participation by women was frequent in post-harvest activities (mean = 2.88) and poultry management (mean = 2.48). Women's participation was occasional in home gardening (mean 1.58), local food processing (mean = 2.06), goat rearing (mean = 1.86), trading (mean = 1.97) and hair dressing (mean = 1.72). Educational level, years of experience, personal income and credit obtained significantly influenced the level of gender participation in economic activities. Compared to men, women participated more in agriculture related economic activities. But when it came to participation in decision making by the same target population, women sometimes could make some agriculture related decisions on selection of crops (26.7 per cent), home gardening (36.7 per cent), crop, cattle, goat and poultry selling (28.3 per cent). Activities such as selection of crop

variety (93.3 per cent) and crop, cattle, goat and poultry selling (60 per cent) were mostly decided by men. Level of women's participation in decision making in agriculture related activities was low compared to men; this was attributed to age and income level of respondents.

Using means, Ibrahim et al (2012), reported on men and women's participation in home gardening (1.88 and 1,86 respectively) however significant differences between these participation levels were not indicated. Bargali et al (2015), analyzing contribution of rural women in home garden vegetable cultivation, qualified the home garden activities and results indicated that majority of rural women were independently participating (60%) in home garden vegetable cultivation while 40 per cent of the women participated jointly with men. In particular, regarding plantation activity, women had the highest participation index (PI= 338) and ranked first while participation in marketing of home garden products had lowest participation index (PI=100) and ranked tenth. Time, distance from the market, irrigation facilities, availability of market, availability of capital, transportation, lack of knowledge, shortage and lack of planting material affected women's participation in vegetable production. Contributing to factors affecting women's participation in vegetable production is training; Patalagsa et al (2015), found out that women who had received the training in vegetable production had more freedom to decide over most gardening tasks such as crop choice, planting and harvesting times, crop management, and inputs to use. There was a significant ($p < 0.05$) difference between the intervention and control groups in all five aspects. Most decisions were jointly done (men and women).

Taking a crop rotation cycle of rice, jute and mustard which was predominant in the study site, in Bengal India, Shamna et al (2018), quantified participation of tribal farm women during the crop seasons which was 28.3 man-days on an average. Shamna and friends argue that this is much less than an average women labourer who gets 60 to 125 man-days of work per year. It was reported that weeding, harvesting and transplantation in rice fields were done only by females. This is in line with what Akter et al (2017) reported in their study on women's participation in rice production activities in Phillipines, Thailand, Indonesia and Myammar. Participation of tribal farm women in farming activities during the jute season revealed that, overall, the contribution of tribal women in jute crop production was less when compared to the total man-days required during the season. Their activities were restricted in land preparation, weeding,

steeping and washing and drying in case of jute cultivation and lastly, in case of mustard crop, women were involved in almost all the farm operations. An interaction with farm women revealed that some of the men folk go to other states during winter season for work, especially to southern states of India. This results in a shortage of labor and, for this reason, women's involvement is a little more in the mustard crop season. Age, education, social participation, economic motivation had significant relation with participation of farm women. Constraints reported to be affecting women's participation in farming activities were lack of education/literacy level, income derived is too little, lack of child care facilities, lack of knowledge and skill, lack of training, doubts regarding the women's capabilities, loans are not sufficient, family restriction: (a) husband, (b) holders, partiality of government officials, conflicts with other workers, caste system in the village, ego problems of men folk, lack of freedom to take decision, confining the role of women to household activities.

Looking at gender participation and decision making in crop management in Great Lakes Region of Central Africa, with specific reference to banana, cassava, groundnuts, beans, and cowpeas production, Ochieng et al (2014) reports that plots managed by men were characterized with higher input use compared to plots managed by women. With regard to gender and crop management practices, there was no clear pattern in terms of gender dominance in banana production. Cassava was considered a women's crop, sowing and harvesting could be solely done by women. Cultivation of beans is done largely by both men and women except in the DRC where women grow a variety of crops but women are mainly responsible for the harvesting of beans because these are mostly used for domestic consumption and women are in charge of serving food to their household. There was no gendered pattern of cultivation and harvesting of groundnut, soybean, and cowpea in many mandate areas of Rwanda. Only in Gitega, Kirundo, North Kivu, and South Kivu mandate areas was harvesting of these crops dominated by women. Men dominate both the cultivation and harvesting activities in Bas Congo, with women confined to secondary activities. It was further reported that men in Bas Congo still played the lead role in land preparation and ploughing, while women often provide the bulk of labor for weeding, harvesting, transporting, and processing.

Regarding participation of women in decision making on crop management, 59.3 per cent of women took decisions jointly with their husbands, about 27.7 per cent of women surveyed by this study did not participate in crop management decision-making process,

and only 13 per cent took decisions independently indicating a low level of decision making among women in crop management. The low agricultural productivity of women was attributed to social and economic constraints, such as limited access to land, lack of credit and inadequate opportunities for education, and cultural circumstances that favor men. The socioeconomic factors that significantly enabled women to participate in crop management decision making included: a larger farm size, accessibility to credit, extension services, group membership, and engagement in off-farm activities. Adding to the factors influencing input use among women, Matshe (2019) compared how much plots managed by men and women received input use (fertilizer and labour); 89 per cent of parcels owned by male-headed households received chemical fertiliser, while 81 per cent of parcels owned by female-headed households did, hired labour was used on 67 per cent of male-headed households' parcels and on 58 per cent of parcels owned by female-headed households. Education was found to significantly raise the probability of female farmers' use of both chemical fertilizers and hire.

Nazir (2013) assessing involvement of women in agricultural activities in rural Pakistan reported that women are involved in a variety of agricultural activities. Majority (81.7 %) of the respondents participated in harvesting and picking activities. About 70.8 per cent of respondents in the research area participated in sowing. More than half (54.2%) of the respondents were involved in processing related activities like winnowing, drying of grains, cleaning of grains. Slightly more than half (52.8%) participated in marketing of livestock products and about 50.8 per cent of the respondents participated in packing of vegetables. About 37.5 per cent of the respondents participated in cultural practices (transplanting, manure application, fertilizer application, weeding, thinning, gap filling, irrigation and plant protection measures such as insecticides and pesticides). The areas where the participation of rural women was found to be least are leveling and cleaning of agricultural fields as only 35.0 per cent of the respondents said that they participated in these activities. Challenges faced by women respondents regarding participation in agricultural activities include: "looking after their children", serving in laws, serving parents, looking after themselves, performing house hold chores, meeting with relatives and attending different ceremonies in the family.

Taking the pigeon pea value chain in Malawi, Nsope and Larkins (2016) report a participation rate of approximately 60 per cent for women in pigeon pea farming (60% of

those who grow pigeon pea are women), 90-95 per cent of local processing is done by women, however when it came to retailing, 70 per cent was done by men; there are no women who acted as large-scale exporters. Significance of the crop to the gender categories, type of processing requirements and access to finance/cash, women's physical abilities (in terms of lifting and protecting themselves from theft), cultural restrictions on their time and mobility were reported as factors affecting women participation in pigeon pea value chain.

Emerole et al (2014) among other objectives, assessed factors that influenced participation of male and female heads of farm households in cassava entrepreneurship. Amongst the female-headed households, marital status, adult number of females in the households, and frequency of extension contact had very high ($P< 0.001$) influence on the participation of female household heads in own cassava enterprises. In addition, status of health of household members, weekly time spent on cassava activities and annual net enterprise profit had moderate ($P<0.05$) influence on participation of female heads of cassava enterprise households. It was further indicated that, culturally, women in the study area have difficulties in accessing farmland, farm credit and other inputs and do many of the house works with little or no assistance.

Nation (2009) examined intra-household dynamics in his study on women's participation with a focus on irrigation activities in Senegal. In terms of activity implementation, in irrigated agriculture, irrigation infrastructure bound women and men together. Both were dependent on the irrigation pump and system of canals for their agricultural production, and both had to cooperate to ensure the operation of this infrastructure. Women and men, working in separate work-groups, coordinated their labor to weed and maintain the earthen canals. Irrigation group membership depended on this contribution of labor. Despite the need for collective work on the village irrigation fields, male irrigators assumed more control over the irrigation system and its technology than women did. A group of elected officers undertook the decision making for the irrigation group, making critical decisions on when and how long to irrigate the fields. These elected officers mostly were men. All of the pump operators were men, even on the women's irrigation fields. Some irrigation lands with separate women's gardens had female presidents who organized women's workgroups on the main irrigation fields. However, these women were seldom consulted

about the operation of the irrigation infrastructure. Factors that influenced women's participation in farm decision making include: access to and the returns to capital investment, access to land, control over irrigation technology, labour allocation to irrigated agriculture. Constraints included: agricultural marketing (lack of transportation, limited business and negotiation skills, family opposition, limited product).

Sisay G. (2018) also assessed women's participation in irrigation activities but the focus was on female headed households and factors facilitating their participation in Peri urban modern small scale irrigation projects. The findings indicated that female-headed households' participation in peri-urban modern small-scale irrigation projects was found to be minimal. This was attributed to educational status of household head, access to credit services, livestock endowment, farm landholding size, distance from the nearest market centre, age of household head, distance to irrigated land, and non-farm income-generating activities.

Without regard to a specific enterprise, in a study by Wajiha Ishaq and Shafique Qadir Memon (2016) out of all the pre-harvesting activities, 94.2 per cent positive responses were recorded against seed bed preparation. A majority of rural women (85.02, 88.88 and 95.65%) were involved in shed cleaning, dung collection and fodder cutting, respectively with indication of high involvement of women in mostly post-harvesting and livestock management. Higher participation of women in livestock activities was also reported in a study by Amin et al, (2010) where out of a total 768 respondents, more number of wives (37 %) participated in livestock production activities as compared to the husbands (17%). Role of rural women in livestock production was higher in activities such as fodder offering, cleaning of sheds, watering to the animals, milking, poultry raising, ghee and egg selling and raising of goats and sheep, whereas the role of husbands was higher in fodder cutting and transportation of fodder. Age, education, social participation, economic motivation had significant relation with participation of farm women. Though their participation was not quantified, a study by Manzoor et al, (2018), also indicated that women of the Punjab province actively participated in livestock-related activities i.e. milking, feeding and watering, treatment, fodder cutting, cleaning sheds, grazing, making dung-pads, rearing and bathing the animals. Due to cultural milieu of the Punjabi rural society, women were involved in doing this difficult job.

Sella and Minot (2018) from their findings in Uganda, reveal that there was very little difference in the self-reported participation of men and women in food production (94% of women and 92% of men). This implies that food production is jointly done. Fifty Seven per cent of both men and women report input into all or most decisions on food crop production. For cash-crops the difference is larger (46% of women and 68% of men),only 41 per cent of women report input into all or most decisions on use of income from cash crops compared to 74 per cent of men, implying male dominance in use of income. Factors reported to affect women's participation include: Age, male-female educational differences, remoteness, and location, individual and household characteristics.

Subhadip Pal and Sourav Haldar (2016), reported on participation and role of rural women in decision making related to farm activities in their study in Burdwan district of West Bengal. Among the responding men (N = 100), 36 per cent were engaged in agriculture and agriculture labour and then 30 per cent in agriculture labour. There were significant differences among the responding men in relation to their occupation ($\chi 2 = 11.68$, df = 3, $P < 0.0005$). Moreover, there were no statistical differences between the responding women and men, ($t = 0.00$, df = 5, $P > 1.0000$) in relation to their occupation. In terms of decision making, Mean (± S.E.) decision score for women respondents was 2.1 (± 0.1) and for men respondents it was 3.0 (± 0.1). Therefore, decision making power in relation to farming activities was higher among men respondents than women respondents ($t = 8.20$, df = 10, $P < 0.0001$) implying that men play a larger role in farm production decisions and farm women's involvement in decision making process in the agriculture field is quite minimal. Age , education, caste, type and size of the family, size of land holding, socio-economic status of the families, education level of rural women have significant influence on the involvement in decision-making.

In a study by Sidra Mazhar, Mysbah Balagamwala and Haris Gazdar (2017) with the objective of enumeration and analysis of women's work in Agriculture, 81 per cent of the women were indicated to be involved in agriculture work, 67 per cent in farming work and 70 per cent in livestock activities. In terms of women's prevalence in agriculture work, most involvement of women was in crop harvesting (39%) compared to weeding (23%), sowing and planting (15%) and carrying loads (6%). In livestock farming, women were mostly giving water to livestock (47%), fodder preparation (37%), milking (26%), fodder collection (23%), livestock care (19%), grazing 11%. Constraints to women's

participation in agriculture included: Male outmigration, increase in commercialization of agriculture, pandemic diseases that disproportionately affect more men (like HIV), conflict, climate change , technological innovations, reproductive status of women competing claims of their time, unequal access to resources and opportunities in agriculture, unequal access to land, and lack of access to technologies, agricultural innovations, government services, such as agricultural extension and financial services. They are also disadvantaged when using tools and equipment because even though they are meant to be gender neutral they are more suitable for men.

Limitations

The limitations of this review are as follows: firstly, despite including quality studies in this review, the review was limited to studies written in English. This may have led to some bias because articles in languages other than English could have contributed significantly to this systematic review in terms of study outcomes. Secondly, all the articles included in this review were conducted in developing countries as such, the review may not be generalizable to other global settings. Despite these shortfalls, this review has identified factors affecting women's participation. The trend of their participation, if taken into consideration, could enhance women's participation in agriculture.

Conclusion

This review has demonstrated that most of the activities in production of crop enterprise related activities are done by women although intensity of their cultivation is low compared to men. Women dominate especially in post-harvest handling practices in developing countries. Although variations exist among regions, this study found out that despite being key players in production activities, women continue to have a limited participation in farm decision making especially on marketing issues.

Factors affecting women's participation in agriculture include: Education levels, Age, socio participation, economic motivation, accessibility to credit, farm size, access to extension services, group membership, size of the family, marital status, engagement in off farm activities, adult number of females in the household, access to and returns to capital, innovation, access to land, control over irrigation technologies, education of household head, distance from nearest market, livestock endowments, age of household head,

distance to irrigable land, male female educational differences, remoteness, socio economic and status of the family. From all these studies, it is the training intervention only that was evaluated. There is need for an evaluation on participation of women in agriculture under other interventions that promote power relations in the household since most factors affecting women participation are skewed towards power relations in the family.

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