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Women farmers' access to and control of agricultural production resources (man-made and natural) in Niger Delta, Nigeria

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Abstract: *This study examined women farmers' access to and control of agricultural production resources both natural (e.g., land, water) and man-made (e.g., fertilisers, tools, credit, and extension services) in the Niger Delta, Nigeria. A multi-stage random sampling technique was used to select 460 rural women farmers, and data were analysed using descriptive and inferential statistics, including ANOVA. Findings showed that while women had adequate access to natural resources like labour, water, and forests, they reported limited access and control over critical man-made resources such as tractors and extension services. Statistically significant differences ($F = 10304.706$, $p < 0.01$) were observed in their access and control levels across resource types, with the largest gap between control of natural and man-made resources. These disparities reflected deeply rooted sociocultural and institutional barriers. It was recommended that government and development partners prioritise equitable access to extension services and mechanised tools to improve productivity and gender equity in resource control.*

Keywords: Women farmers, Agricultural resources, Resource access, Resource control, Gender inequality, Niger Delta

Introduction

Agriculture is one of the major sources of livelihood in Nigeria and this is also true for rural communities in which women play a fundamental role in the production, processing and distribution of food products (Okoronkwo, 2019). The Niger Delta region is one that is a natural resource rich region and as such is faced with socio economic and environmental problems as women play central role in agricultural productivity (Boateng, 2022). Despite their constructive contribution, women's access to and ownership of inputs into agricultural production, both man-made (such as tools, machinery, fertilizers, credit, and extension services) and natural (such as land, water, and forest resources) remain very much restricted by institutional, legal, and cultural forces (Chibuike, 2017; Meinzen-Dick *et al*., 2019; Ifejika, 2020). Previous studies consistently verify the gendered nature of control over and access to farm resources. For example, Meinzen-Dick *et al*. (2019) found that women own less than 20% of agricultural land in Sub-Saharan Africa, including Nigeria, with married women owning less than 5% of land. These disparities are further worsened by limited access to credit (less than 10%) as well as agricultural inputs, which suppresses productivity and perpetuates the cycles of poverty.

The Nigerian context also reflects such constraints. Ifejika (2020) indicated that 8.3% of women who were surveyed in south-eastern Nigeria held land titles, and the vast majority of access was inherited through male relatives. Chibuike (2017) also noted how customary laws and patriarchal belief system intensely limit women from land ownership, and over 95% of women rely on male household members for the use of land. Their ability to invest in land and increase productivity is therefore seriously hampered.

Human-controlled resources management is as skewed. Kilic *et al*. (2018) put in place that women's access to fertilizers, better seeds, and extension services in Malawi considerably lagged behind men's, with the same phenomena being observed in Nigeria. Nasir, Anjum, and Asghar (2024) stated that gender disparity in the utilization of inputs and technology heavily incapacitates rural women empowerment and farm output.

Women in the Niger Delta are particularly affected by environmental degradation and socio-cultural marginalization. Oil exploration activities, deforestation, and land acquisition have disrupted native livelihoods, displacing women off fertile soil and polluting water resources vital to agriculture and fishing (Boateng, 2022). This is compounded by their absence from decision-making structures accountable for resource allocation.

Nonetheless, research also presents to the forefront that as women have greater access and control of resources in agriculture, family welfare and food security are greatly improved. For instance, Oladele (2023) demonstrated that women empowerment in South Africa's irrigation schemes greatly improved food security and livelihood capital. Likewise, Okafor-Yarwood *et al*. (2019) noted that women in Northern Nigeria who received microloans had their food security improve by 25% and also double their household income. Despite the widely acknowledged role of women in farm production, particularly in Nigeria's Niger Delta, the majority still face structural challenges in accessing and controlling basic agricultural resources. This is both in the natural resources (i.e., land,

water, and forest) and man-made inputs (i.e., implements, fertilizers, credit, and agro-extension services). Empirical evidence from various settings confirms the existence and impact of these inequalities.

Balasha *et al*. (2024) highlighted that females in the east of DR Congo were typically held back by cultural norms and biased land inheritance rights, leading to limited tenure and insecure access. Chibuike (2017) and Ifejika (2020) also reported in Nigeria that deep-rooted customary laws prevent women from owning land, thereby empowering them to make independent agricultural decisions or obtain credit based on land as collateral. The problem is not simply that of access but also control. Most of the women that are 'accessing' land or inputs have very little or no options to decide how these assets are used (Boateng, 2022). Furthermore, Doss *et al*. (2018) demonstrated that lack of control over assets restricts technology adoption and the economic agency for women farmers.

In the Niger Delta, environmental degradation such as land degradation and oil spillage further limit the availability of resources. Displacement of women from farm lands by commercial land acquisition (land grabs) and ineffective participation in community decision-making processes (Boateng, 2022) also contribute to their marginalisation. Also, the patriarchal norms of the area continue to influence access patterns with men dominating and possessing farm resources and women playing subordinate roles even though they have widespread involvement in productive work (Okoronkwo, 2019). The intersectional functions of geography and gender are also noted in a newer study by Dwomoh *et al*. (2023), who illustrate that women residing in coastal West Africa have greater inequality in terms of resource access than women in inland locations. This is relevant to the Niger Delta, which is extensively rural and coastal.

Additionally, despite the variety of interventions (e.g., training, extension services, microloans) directed towards women, they continue to be bounded by structural and policy cleavages. For example, it was found that participation of women in agricultural extension projects in Kaduna State was highly influenced by extension contact alone, while other systemic barriers were not significantly overcome (Ganiyu *et al*., 2021). There is thus an immediate necessity for systematic data and analysis targeted at the Niger Delta region to determine the effective levels of access and control women have over agricultural resources and the socio-cultural, institutional, and economic determinants of these processes. Unless special studies are carried out, efforts to bridge the gender gap in agriculture will remain shallow and futile.

Therefore, the primary problem that this study aims to unravel is the existing and yet not well explored gender disparity in access to and ownership of natural and man-made agricultural production resources among women farmers in the Niger Delta, and the overall implications of such disparity on agricultural development, rural living conditions, and food security in the region.

Objectives of the study

The main objective of the study is to examine women farmers' access to and control of agricultural production resources (man-made and natural) in Niger Delta, Nigeria. The specific objectives are to:

i. assess the level of women's access to natural and man-made agricultural production resources;
ii. examine the level of control by women over natural and man-made agricultural production resources; and
iii. assess the difference in women farmers' access and control of natural and agricultural production resources.

Methodology

The research was carried out in the Niger Delta region of Nigeria, covering about 70,000 square kilometres and including nine coastal southern states: Cross River, Edo, Delta, Abia, Imo, Bayelsa, Rivers, Akwa Ibom and Ondo. The area which is about Latitude 5°19'20.40" N and Longitude 6°28'8.99" E, is home to approximately 40 ethnic groups. It is famous for its biodiversity and having lots of natural resources, especially crude oil and natural gas. On the other hand, issues arising from nature such as oil spills, harsh winds, droughts and land damage, have a great effect on agricultural success and small rural communities (Ebegbulem, Ekpe, & Adejumo, 2013). Based on the Niger Delta's warm and rainy climate, women in rural areas plan their farming and choose the crops to grow according to the wet and dry seasons (Ebegbulem, Ekpe & Adejumo, 2013).

A simple random sampling method with several steps was applied to choose the respondents. Three of the nine Niger Delta States (Delta, Bayelsa and Edo) were chosen randomly to take part in the study. Rural towns and villages were chosen in these states due to their rural nature which was marked by having only one public primary school (Ovwigho & Ifie, 2009). Forty percent of each agricultural zone's rural areas were studied and from among these, 40% of women farmers involved in any crop were chosen at random. The whole sample included 460 women farmers (refer to Table 1). The researcher and other trained enumerators used a set structure for interviews and focus group sessions to collect the data. Experts looked at the test for validity and the test-retest method with a Cronbach's Alpha value of 0.884 was used to verify the instrument has excellent internal consistency. Descriptive statistics like frequency, percentage and mean helped us analyse Objectives (i) and (ii) and Analysis of Variance was used for Objective (iii). Based on a 4-point Likert scale, a score of 2.5 or more was considered as access/control for each resource and anything below that showed that the women had no access/control.

Table 1: Sample size distribution

S/N	States	Agricultural zone	Total No. of rural towns/villages	Total number of women farmers	40% of women farmers
1	Delta	Delta North	23	147	59
		Delta Central	125	381	152
		Delta South	10	45	18
		Total	**158**	**573**	**229**
2	Bayelsa	Bayelsa East	7	42	17
		Bayelsa Central	10	45	18
		Bayelsa West	5	48	19
		Total	**22**	**135**	**54**
3	Edo	Esan Central	55	75	30
		Edo North	60	95	45
		Edo South	96	105	104
		Total	**171**	**260**	**177**
		Grand total	**351**	**968**	**460**

One-way ANOVA test statistics is represented as follows:
F = MSB/MSW
Where;
F = ANOVA coefficient
MSB = Mean sum of squares between the groups
MSW = Mean sum of squares within the groups

$$MSB = \frac{SSB}{df_B} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

$$MSW = \frac{SSW}{df_w} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

$$SSB = \sum_{j=1}^{k} n_j (\bar{x_j} - \bar{x})^2 \dots\dots\dots\dots\dots\dots\dots\dots (3)$$

$$SSW = \sum_{j=1}^{k} \sum_{i=1}^{nj} (x_{ij} - \bar{x_j})^2 \dots\dots\dots\dots\dots\dots (4)$$

$df_B = k - 1$ and $df_w = N - k$
Where;
SSB = Sum of squares between the groups
SSW = Sum of squares within the groups
df = Degrees of freedom
k = The number of groups
N = Total number of observations across all groups

Results and discussions

Socioeconomic characteristics the respondents

Table 1 reveals many important points about the demographic and structural factors affecting women farmers' access to and control over farming resources in the Niger Delta. The largest proportion (30.2%) of women was in the 41–50 age group and the mean age was 43, showing a mature group involved in farming, just as described by Dwomoh *et al*. (2023). About 67.6% of the respondents were married and this is significant because it is linked to better access for women to land and important resources. On an educational level, the majority of respondents (62.8%) had finished secondary schooling, as Tryphone and Mkenda (2023) noted post-primary education is key to giving women the opportunity to become entrepreneurs. Families were usually large, consisting of eight members which led to a high possibility that households had many workers in the field. Over half of the respondents had farmed for at least 21 years (on average 25 years), indicating their strong farming knowledge and commitment. About of the respondents 25.7% connected with extension once a week or more, but 19.6% had no contact, revealing similar problems with access to extension and better technologies as found by Ifejika (2020) and Ganiyu *et al*. (2021).

Table 2: Socioeconomic characteristics the respondents

Variable	Frequency	Percent	Mean/Mode
Age (years)			
Less than 21	12	2.6	
21 – 30	67	14.6	
31 – 40	112	24.3	
41 – 50	139	30.2	43 years
51 – 60	92	20.0	
61 and above	38	8.3	
Marital status			
Single	24	5.2	
Married	311	67.6	Married
Divorced	51	11.1	
Widowed	37	8.0	
Separated	37	8.0	
Educational level			
No education	54	11.7	
Primary	15	3.3	
Secondary	289	62.8	Secondary
Tertiary	102	22.2	
Household size (persons)			
1 – 5	104	22.6	
6 – 10	235	51.1	8 persons
11 – 15	89	19.3	
Above 15	32	7.0	
Farming experience (years)			
0 – 10	91	19.8	
11 – 20	132	28.7	
21 – 30	165	35.9	25 years
Above 30	72	15.7	
Frequency of extension contact			
Once a week	38	8.3	
Twice a week	27	5.9	
Thrice a week	53	11.5	6 times
Monthly	104	22.6	
3 months	113	24.6	
6 months	35	7.6	
No contact	90	19.6	

Mean response to access to natural agricultural production resources

According to the results in Table 3, women farmers in the Niger Delta region stated that they had appropriate access to necessary natural agricultural resources, shown by the grand mean score of 3.6. The highest rating for labour (mean = 3.7) suggests that women had more human help which could be due to support from their community or homes. Capital, water and forest resources were not far behind (mean = 3.6 each), demonstrating that women could use all of these for their farming activities. Although land is considered adequately accessible (mean = 3.5), it ranked last, pointing towards ongoing issues in access to land, as previously shown by research. According to Balasha *et al*. (2024) and Chibuike (2017), traditions and the way land is passed down tend to marginalise women and Meinzen-Dick *et al*. (2019) and Ifejika (2020) have found that women often struggle with getting credit and securing tenure rights due to not having proper land titles. Despite the challenges, most items in the study received high ratings which indicates that women are now accessing services more easily thanks to improved policies or local programmes. However, as Nasir *et al*. (2024) and Dwomoh *et al*. (2023) explained, having access alone is not enough and not being involved in decisions can prevent women from fully making use of these resources to better their farming and economic activities.

Table 3: Mean response to access to natural agricultural production resources

Natural Agricultural Resources	Mean	Std. Deviation	Rank	Remark
Land	3.5	0.814	3rd	Adequate Access
Labour	3.7	0.692	1st	Adequate Access

Capital	3.6	0.696	2nd	Adequate Access
Waters	3.6	0.768	2nd	Adequate Access
Forest Resources	3.6	0.819	2nd	Adequate Access
Grand mean	**3.6**			

Mean value ≥2.5 is Adequate Access, <2.5 is Inadequate access

Level of Women's Access to Man-Made Agricultural Production Resources

Table 4 displays that women farmers' access to man made agricultural production resources in the Niger Delta presents a complex picture. On the whole, a grand mean of 3.0 suggests that women have sufficient access to these resources in general. Among the top five, seeds (Mean = 3.8) had the highest levels of access, followed by transportation (3.8), storage facilities (3.7), marketing of the farm produce (3.7) and profits from the farm produce (3.7). This supports Kilic *et al*. (2018) who found that seed access increases where women are included in agricultural groups and are empowered with its land and asset ownership. Similarly, Nasir *et al* (2024) concurred that access to inputs such as seeds and storage facilities is conducive to the empowerment of rural women. But, the data show glaring inequities in access to essential resources, including tractors (Mean = 1.0), extension services (1.0) and spades (1.1). This corroborates Ganiyu *et al*. (2021) that women's participation in agricultural innovation is largely shaped by limited extension contact. Additionally, Fadayomi (2018) and Ifejika (2020) also reported that women have limited access to mechanised equipment and technology because of financial constraints and normative cultural practises associating particular engagements or activities with a particular gender. The implication is, however, that although women are actively involved in the production and marketing, their productivity may be being constrained by poor access to labour saving technologies and advisory services. Accordingly, interventions should focus on ensure the expansion of gender equitable access to mechanisation and extension services to improve productivity as well as reduce the gender gap in control over agricultural resource (Dwomoh *et al*., 2023; Meinzen-Dick *et al*., 2019).

Table 4: Level of Women's Access to Man-Made Agricultural Production Resources

Man Made Resources	Mean	Std. Deviation	Rnak	Remark
Fertilisers	3.6	0.724	6th	Adequate Access
Knapsack	3.6	0.781	7th	Adequate Access
Tractors	1.0	0.223	13th	Inadequate Access
Herbicides	3.2	1.031	10th	Adequate Access
Motor saw	3.0	0.453	11th	Adequate Access
Spade	1.1	0.360	12th	Inadequate Access
Pesticides	3.3	1.114	9th	Adequate Access
Wheel barrows	3.5	0.735	8th	Adequate Access
Seeds	3.8	0.915	1st	Adequate Access
Transportation	3.8	0.627	2nd	Adequate Access
Storage facilities	3.7	0.611	3rd	Adequate Access
Marketing of farm produce	3.7	0.671	4th	Adequate Access
Profit from farm produce	3.7	0.707	5th	Adequate Access
Extension Services	1.0	0.389	14th	Inadequate Access
Grand mean	**3.0**			

Mean value ≥2.5 Adequate Access, <2.5 is Inadequate Access

Mean response to control over natural agricultural production resources by rural women

Table 5 also shows that rural women in Niger Delta have varying levels of control over natural agricultural resources. In particular, they have the highest level of control particularly over forest resources (Mean = 3.6), labour (Mean = 3.5), waters (Mean = 3.3) and capital (Mean = 3.1). However, they remain without control over land (Mean = 2.2), rated as the least achieved which shows that beyond gender there still exist unequalities in the ownership and utilisation of land. In line with Balasha *et al*. (2024), women's access to and control over land in the Democratic Republic of Congo are largely restricted by customary norms and marital status, similar to women in Nigeria as established by Ifejika (2020) and Chibuike (2017) whose customary practises and societal norms limit women's access to land. Furthermore, Dwomoh, *et al*. (2023) noted that these inequalities are still more exacerbated in coastal regions like the Niger Delta because of compounded socio-economic vulnerabilities. In regards to control over agricultural labour and forest resources, acquired control may reflect women's traditional roles in harvesting and processing and yet constrained with limited command over basic resources such as land and capital (Meinzen-Dick *et al*., 2019; Oladele, 2023). Overall rural women do have moderate control over natural resources, including land, with a grand mean of 3.1, but the land control dilemma remains a bottleneck towards full participation and productivity in agriculture. As a result, targeted policies need to be designed to address gender specific constraints pertaining to land tenure and agricultural financing.

Table 5: Mean response to control over natural agricultural production resources by rural women

Natural Agricultural Resources	Mean	Std. Deviation	Rank	Remark
Land	2.2	0.698	5th	No Control
Labour	3.5	0.879	2nd	Control
Capital	3.1	0.868	4th	Control
Waters	3.3	0.781	3rd	Control
Forest Resources	3.6	0.839	1st	Control
Grand mean	**3.1**			

Mean value ≥2.5 is Control, <2.5 is No control

Mean response to control over man-made agricultural production resources by rural women

The findings in Table 6 reveal a mixed picture of control over man-made agricultural production resources among rural women in the Niger Delta. Women reported significant control over most inputs necessary for small-scale production and post-harvest management, including knapsacks (mean = 3.7), seeds (mean = 3.7), fertilisers (mean = 3.6), pesticides (mean = 3.6), herbicides (mean = 3.6), wheelbarrows (mean = 3.6), and storage and marketing facilities (each 3.6). However, they lacked control over capital-intensive and institutional resources such as tractors (mean = 1.1), motor saws (mean = 1.3), and extension services (mean = 1.2), indicating limited access to mechanisation and technical support. This aligns with studies by Nasir *et al*. (2024) and Kilic *et al*. (2018), which showed that despite some access to inputs, rural women remained excluded from mechanised tools and services due to entrenched gender norms, low economic power, and weak extension linkages. Similarly, Doss *et al*. (2018) and Ifejika (2020) noted that systemic limitations in land tenure, capital access, and knowledge transfer hampered women's ability to adopt improved technologies. While inputs such as seeds and pesticides are relatively high in the hands of family members to control in day to day operations, the lack of control on high value, institutional tools or managerial decisions indicates persistent structural inequality. These interventions include therefore legal reforms as well as targeted credit schemes combined with measures to promote equitable access to machinery, technical support and training to strengthen women's control across the entire agricultural value chain.

Table 6: Mean response to control over man-made agricultural production resources by rural women

Man Made Resources	Mean	Std. Deviation	Rank	Remark
Fertilisers	3.6	0.869	6th	Control
Knapsack	3.7	0.753	1st	Control
Tractors	1.1	0.485	14th	No Control
Herbicides	3.6	0.722	7th	Control
Motor saw	1.3	0.596	13th	No Control
Spade	3.5	0.826	10th	Control
Pesticides	3.6	0.739	8th	Control
Wheel barrows	3.6	0.676	9th	Control
Seeds	3.7	0.719	2nd	Control
Transportation	3.5	0.803	11th	Control
Storage facilities	3.6	0.725	5th	Control
Marketing of farm produce	3.6	0.704	4th	Control
Profit from farm produce	3.5	0.836	12th	Control
Extension Services	1.2	0.504	13th	No Control
Grand mean	**3.1**			

Mean value ≥2.5 is Control, <2.5 is No control

Difference in women farmers access and control of natural and agricultural production resources

As shown in Table 7, there is a statistically significant difference in women farmers' access to and control over natural and man made agricultural production resources in the Niger Delta ($F = 10304.706$, $p < 0.01$). Due to high F value and the high level of significance, the study notes that all categories examined are totally different. Additionally, differences determined by the post hoc LSD test are further disaggregated and they found that women have a significantly higher access to natural resources than to man-made resources. A difference of high mean differences observed between control of natural resources and control of man made resources (-27.698) implying a great disparity in women controlling different resources. This is in concordance with Nasir *et al*. (2024), who have pointed out that women's empowerment and productivity in agriculture are detrimentally affected by gender disparities in access to resource such as credit, technology and land. Similarly, Dwomoh *et al*. (2023) also discovered that women's empowerment in decision making and agricultural production was circumscribed, especially among those in the socioeconomically and geographically disadvantaged regions.

Results further indicate that men had greater access to and control of manmade resources which not only is limited but also shows poor control by women compared to natural resources. For instance, access to manmade resources (27.006) implies that women have

lesser access of man made resources than control of the natural ones. It reiterates the findings of Kilic *et al*. (2018) who noted that women's access to manmade inputs such as fertiliser and irrigation was limited because of disparities in land ownership, literacy as well as skills and institutional support. This stark disparity shows that resource distribution to man (to the exclusion of woman) is gendered and grossly skewed against women. This is consistent with Balasha *et al*. (2024) which showed that sociocultural norms strongly limited women's control over land, agricultural inputs and labour. According to Doss *et al*. (2018), therefore, bridging this gender gap would require structural reforms in property rights, extension services and policy interventions specifically aimed at women's control of manmade agricultural inputs.

Table 7: Difference in women farmers access and control of natural and agricultural production resources

ANOVA					
	Sum of Squares	**Df**	**Mean Square**	**F**	**Sig.**
Between Groups	316807.109	3	105602.370	10304.706	0.000
Within Groups	18815.283	1836	10.248		
Total	335622.391	1839			
Post Hoc Tests Multiple Comparison (LSD)					
Category	**Category**		**Mean Difference**	**Std. Error**	**Sig.**
Access to natural resources	Access to man-made resources		-24.676***	0.211	0.000
	Control of natural resources		2.330***	0.211	0.000
	Control of man-made resources		-25.367***	0.211	0.000
Access to man-made resources	Access to natural resources		24.676***	0.211	0.000
	Control of natural resources		27.006***	0.211	0.000
	Control of man-made resources		-0.691***	0.211	0.001
Control of natural resources	Access to natural resources		-2.830***	0.211	0.000
	Access to man-made resources		-27.006***	0.211	0.000
	Control of man-made resources		-27.698***	0.211	0.000
Control of man-made resources	Access to natural resources		25.367***	0.211	0.000
	Access to man-made resources		0.691***	0.211	0.001
	Control of natural resources		27.698***	0.211	0.000

*** the mean difference is significant at the 0.01 level

Conclusion and Recommendations

The study shows that granting women nominal or symbolic access to agricultural resources (e.g., owning land) is not enough to bring about meaningful change unless they are also accorded real control, decision making power and agency. Women do not have the power to decide how resources are used or allocated and therefore cannot benefit fully from or contribute fully to, agricultural development. The empowering of women farmers to exercise full and autonomous control over both natural resources like land, water and forests and manmade inputs like tools, credit, fertilisers and extension services is not only about promoting gender equity and social justice, it is a strategic imperative for boosting agricultural productivity; for raising household welfare; and for ensuring food security in the region. Women with control over productive resources are more likely to make investment in sustainable farming practises and to play a major role in economic growth and community resilience. From the study findings, the following recommendations are made:

i. Government and policymakers should enforce and enact gender responsive land tenure policies to ensure that women have secure rights to own or have rights to use land. Therefore, legal education and community sensitization programmes should also support land reforms to fight patriarchal norms.
ii. Women's access to extension services must be increased through recruitment by agricultural extension services and development agencies of more female extension agents and by the organisation of women-oriented extension and awareness raising campaigns on modern farming practises and use of available inputs.
iii. Access to manmade resources like tractors, storage facilities and agrochemicals for the farmer should be provided at a subsidised rate by ministry of agriculture and mechanisation units. Mechanisation and technology adoption still needs to be promoted in targeted interventions ensuring gender equitable access.
iv. Microcredit and loan products with flexible repayment terms should be designed by financial institutions and NGOs for rural women farmers. It will widen their ability to invest in productive inputs and technologies.

v. Traditional and community leaders should be engaged to change discriminatory norms through inclusive dialogues that encourage women in agricultural decision making and resource governance within the community.

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